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The Coast Artillery Journal

Vol. 59 No. 3 SEPTEMBER, 1923 Whole No. 205

The Action of the I, II, and III German Armies from August 15 to September 15, 1914

By Major E. C. McNeil, J. A. G. D.

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EUROPEAN SITUATION AFTER 1870

AFTER the defeat of France by Germany in 1870, both nations planned and prepared for another war which each was certain would come. A close alliance was formed by Germany and Austria in 1879, which Italy, due to her resentment against France because of the latter's acquisition of Tunis, joined in 1882, completing the Triple Alliance. This alignment drew France and Russia together, and an alliance resulted which was definitely announced in 1895. Italy's position in the Triple Alliance was always unnatural, and her breaking away was made evident at the Algeciras Conference in 1906, and by her war in 1911 against Turkey, which had come to be regarded as an ally of Germany. Following Algeciras, England, alarmed at the growing military and commercial power of Germany, held conversations with France with respect to joint action in case of aggressive action by Germany against France, or in case Germany should violate the neutrality of Belgium, but no alliance was formed. Germany, therefore, with the assistance of her ally Austria, had to plan for war against both France and Russia, and she could count little upon support from Italy. Moreover her plan of attack, matured for many years, insured that Belgium and very probably England, would be in the lists against her.

GERMANY'S PLAN OF CAMPAIGN

In this situation, the decision of the German General Staff was to hold Russia with the Austrian Army and a few German divisions, and attack France in force, seeking a quick and decisive victory, after which they could turn upon Russia and defeat her at leisure. The reason for this decision was that France was considered the more dangerous opponent, could mobilize faster and it was known that she would fight, whereas a quick decision was not likely against Russia because of her large forces, the great extent of her territory, and the belief that she would retreat rather than give decisive battle. Control of the Straits by Turkey made certain that communication and transport between Russia and the Western Allies would be most difficult. This decision was sound from the military standpoint, but its execution by violating the neutrality of Belgium brought Belgium and England alongside of France, raised the morale of all the Allies, lost Germany the sympathy of the world by making her enemies appear as the defenders of civilization against ruthlessness, and ultimately brought the United States into the war, which turned the tide. This was Germany's greatest error, and I think, barring an overwhelming victory in the opening weeks, insured her ultimate defeat, for it gave the war such a character that the Allies were forced to go on.

GERMANY'S PLAN OF OPERATIONS IN THE WEST

The German plan of operations against France evolved by Count von Schlieffen, Chief of Staff, and adopted as the official plan in 1905, was simple. It provided for the defensive in Alsace Lorraine, and an advance in force thru Belgium, a great wheel pivoting on Metz-Thionville, sweeping around and to the south of Paris, enveloping the French armies and driving them up against the Swiss frontier, culminating in a greater Sedan. Map I shows both the German and French initial concentrations, and the German plan for the advance against Paris. The route through Belgium though longer, was chosen because it offered no serious military obstacles, and transportation lines were plentiful. While this advance might be forcibly opposed by Belgium, and possibly England, the German General Staff regarded them as insignificant. They were over confident and even declined an offer of the German Navy to interrupt the transport of the British Expeditionary Forces. Speed was the essence of the German strategy, and they expected a decision in the West, within six weeks, such as they had obtained in the Austrian War and the French War of 1870.

The French-German frontier, fortified by nature with the Vosges Mountains, and the heights of the Meuse and with the only gateways covered by the fortified camps of Verdun, Toul, Epinal and Belfort, was considered too strong to be attacked, and this induced the German Staff to

violate the neutrality of Luxembourg and Belgium in order to attack against the unfortified northern frontier of France. An attack through Luxembourg alone presented serious obstacles, viz: the Ardennes Forest and the trench-like valley of the Meuse which formed a strong natural line of defence from Verdun to Namur. But from the Meuse to the sea the country was comparatively level, and neither the few small streams nor the fortresses of Liege, Namur and Maubeuge were considered serious obstacles.

The route chosen possessed four military advantages, viz: no serious topographic barrier, plenty of railroads and roads, large production of food, and important coal and iron areas. Across the Lorraine border, the outer defenses, Verdun-Toul, were very strong, but even were they penetrated, the invader, advancing against Paris, must attack one height after another, always with its steepest scarp facing toward the east. These heights, called the natural defenses of Paris, decided the Germans on the northern route. The failure later of their heaviest attacks against Verdun, the plateau crest west of the Woevre, and the Grand Couronné of Nancy, justified from a military viewpoint, the selection of the Belgian route.

Von Schlieffen retired in 1906, and his successor, Von Moltke, adhered to the plan for a great wheel thru Belgium and around Paris, but during the years before 1914, assigned 7 new divisions to Lorraine and but 2 to the right wing. The assignment of divisions under the two plans is shown below:

	1905	*1914*
France, Right wing, I to V Armies,	53	55
France, Left wing, VI and VII Armies,	9	17
Russian front,	10	9

Moltke desired to be safe everywhere. He believed that the French would attack in Lorraine and that a great German victory was as likely there as near Paris. This led to indetermination. He had no single plan of campaign which he backed to the limit. Schlieffen on the other hand staked all on the great wheel around Paris. He welcomed an advance by the French in Lorraine, but counted on the German advance toward Paris to draw their main forces there. The Schlieffen plan preserved the initiative to the Germans whereas Moltke allowed the initial operations of the French to determine the decisive point. Schlieffen would no doubt have assigned all nine of the newly organized divisions to the right wing for as he lay dying, he is reported to have said, "It must come to a fight. Only make the right wing strong."

In 1914, the German right wing had two divisions more than under the Schlieffen plan. The later plan was simpler, but either was workable, and each made the *French Army* the main objective. Failure was not because of a poor plan, but because of errors in its execution. As

Ludendorff says, "Only power of leadership was required. The Supreme Command in 1914 did not possess this."

THE FRENCH PLAN

The French plans were prepared, first on the supposition that Germany would respect the neutrality of Belgium, and second that she would not. In the second eventuality they counted upon the assistance of the English which had been promised, but its strength and the time of its arrival were uncertain, as was the help to be expected from the Belgians. The French knew the plan of the Germans to force a decisive battle in the early weeks of the war, but not knowing where the attack would come they had to be covered everywhere with a "mass of maneuver" to throw in the needed direction. But as stated by Buchan "The craze for the offensive (which had been preached by Foch at the Ecole Superieure de Guerre) induced a departure from this policy in favor of a general attack with the right pushed up to the Rhine, which would threaten the flank of the enemy forces moving through Luxemburg and Belgium." This offensive into Lorraine was made, together with a raid into Alsace which captured Mulhausen, but both were driven back, and then the French, determined not to risk all till the chance of victory favored them, took up their proper course, a step by step defensive, which culminated in the battle of the Marne.

THE OPPOSING ARMIES

The German right wing was made up as follows:

I Army	von Kluck	7	Army	Corps	3	Cavalry	Divisions	(Marwitz)
II "	von Bülow	6	"	"	2	"	"	(Richthofen)
III "	von Hausen	4	"	"				

Opposed to these three armies were the 5th French Army under Lanrezac (5 corps), Sordet's Cavalry Corps, the British Expeditionary Force under Field Marshal French (2 corps and Allenby's cavalry) totaling about 80,000, and on the extreme left four divisions of Territorials under d'Amade. Later on two new French Armies were formed,—the 9th under Foch (3 corps) which entered the line to the right of Lanrezac, and the 6th under Maunoury, which operated to the north of Paris on the left of the British. The composition and commanders of the other German and French armies are shown on Map No. 1.

OPERATIONS DURING AUGUST-SEPTEMBER, 1914

On August 4th, German Cavalry under von Marwitz, crossed into Belgium and seized the crossing of the Meuse at Vise, just south of the Dutch boundary. On the 5th, the infantry appeared before Liege, 20 miles from the frontier, and von Emmich demanded permission to pass, which was refused. He then made an assault supported only by field guns and was repulsed on the 5th and again on the 6th. The town was

entered on the 7th, but eight of the 12 forts still held out and heavy howitzers had to be brought up to reduce them. The last fort did not fall till August 16. The German High Command urged von Bülow to be in position to take up the advance beyond Liege on the 13th, but he replied that he could not for the forts of Liege still held out. How long the defense of Liege delayed the Germans is uncertain, perhaps not over 48 or 72 hours—for it must be remembered that during all that time the concentration of the German Armies was being completed. But the delay, however short, was serious—for it permitted the French to concentrate before Paris, and allowed the British Expeditionary Force, which did not sail till the night of August 12-13, to get into line. The delay was due to the failure of the German Command to have in position sufficient of their new siege howitzers, which could have reduced all the forts in two days as they did later at Namur. The brave and prolonged resistance which this error permitted General Leman to maintain in the forts of Liege, greatly heartened the French and British armies, and served to augment neutral sentiment which had turned against Germany when she violated Belgium's neutrality.

The advance from the position abreast of Liege was taken up by the I, II and III Armies on August 18, and at that time the I Army and 2nd Cavalry Corps were placed under Bülow, who still retained his command of the II Army. It is always a mistake to place one army under the command of another army commander, a mistake which the Germans repeated with the VI and VII Armies. Had the first three armies been placed under a Group Command, the IV and V, and VI and VII likewise, results must have been far better. As it was the Armies operated as separate units, cooperation was poor, and the High Command (at Coblenz and later Luxemburg) 150 to 200 miles from the right wing, dependent upon wireless, or motor communication, knew little of what was going on, and was unable to *command.* The III Army (von Hausen) advanced against the line Namur-Givet, while the I and II Armies extended the wheel, pivoting on Namur. Louvain was entered on the 19th, Brussels on the 20th, and King Albert finding his army of less than 100,000 opposed by greatly superior numbers, retired on Antwerp. The orders to Von Kluck said that the enemy "should be shouldered away from Antwerp," but this he was not able to accomplish. Had King Albert joined the British, it is possible that the German invasion would have been turned back before the Marne, but as it was the Germans detached two Corps from their maneuver wing to invest Antwerp. These were badly needed later, and might have been present at the front, had the German command sent originally to Belgium instead of to Lorraine, the 6 Ersatz divisions which were intended to invest Paris. As it was, there was no general reserve, and detachments so reduced the German right, that the French had a decided superiority of numbers at the Marne. Having taken Brussels, von

Kluck turned south and he and von Bülow moved upon the Sambre river where they met the British Expeditionary Force and the Fifth French Army on the line, Mons-Charleroi-Namur.

The German wheel brought von Bülow to the position first, and on the 21st he attacked Namur, and the river position west in the vicinity of Charleroi, and crossed the river at several points but was fiercely attacked by Lanrezac. The battle continued on the 22nd, the French being slowly forced back. Meanwhile, the Germans not repeating the mistake of Liege, promptly brought their heavy howitzers into play against the forts of Namur, with such effect that its resistance ended on the 23rd and it was occupied on the 24th. This together with the capture of Dinant by von Hausen's III Army forced Lanrezac to fall back. Meanwhile von Kluck and the British were just joining battle at Mons. Although von Kluck outnumbered the French 2 to 1, his forces were strung out and he joined battle in scarcely superior force, and when repulsed, halted his attack, to wait his enveloping movement. These troops had so far to march that they did not get into action on the 23rd, and the British, being advised that night of the retreat of Lanrezac and the superior numbers of the German forces, withdrew on the 24th to the line of Maubeuge. Von Kluck has been severely criticized for attacking at Mons before concentrating his Army, but had he not done so, the British would have withdrawn without serious battle. Thus began the great retreat of the Allied armies which was to continue until September 6th, and end in the great battle of the Marne, which blasted the German hopes of carrying out her plan of operations. The positions and movements of the opposing armies from August 22 to the battle of the Marne are shown on Map 2, and the daily advances of the I, II and III German armies on Map 1.

Up to this point (August 24 and indeed till September 1) the Germans advanced according to plan. True their advance had been secured by overwhelming numbers but that in itself was an evidence of military skill, for their numbers, and their advance north of the Meuse completely surprised the French. It is said that on August 21st, 700,000 Germans were in Belgium and approaching France. The plan for an envelopment of the Allied left by von Kluck was frustrated by the action of von Bülow and von Hausen in pressing back the front too soon, thus causing a withdrawal before von Kluck could reach the flank. With any co-operation between von Bülow and von Hausen on August 21 and 23 it seems that Lanrezac should have been trapped in the angle formed by the Sambre and Meuse, and crushed.

What now was happening elsewhere? On August 7th, the French crossed into the lost province of Alsace, defeated the Germans at Altkirch, and occupied Mulhausen, but were promptly driven out by a strong counter attack for which they were unprepared. This attack was little more than a raid, but it had the effect of holding important

German forces in southern Alsace. The French again advanced in greater force (1st and 2nd Armies) into both Alsace and Lorraine, and by the 19th were approaching Colmar and Saarburg, but on the 20th they were defeated at Morhange and fell back along the Meurthe covering Nancy and Epinal. Further north on the 22nd the French 3rd Army was defeated near Virton and the 4th was driven across the Semoy at Neufchateau. It is probable that the French would have halted their advance into Lorraine, even had it not been defeated, for the German numbers in Belgium were becoming apparent and Joffre had started to move troops from his right to his left. The Battle of the Frontiers had ended in victories for the Germans. Four French Armies had been defeated, but they had fallen back and maintained the line. In pursuance of their policy of a mobile reserve, a new army, the 9th, under Foch, had been formed.

In the meantime the Russians, upsetting all German calculations as to their speed of mobilization, invaded East Prussia on August 17th, defeated the Germans on August 20th, and with two armies under Rennenkampf and Samsonoff were threatening Konigsberg and Danzig. Hindenburg and Ludendorff were sent to take command, and the XI and Guard Reserve Corps were sent from the II and III Armies as reinforcements. Before their arrival, however, Hindenburg totally destroyed the army of Samsonoff on August 26-28, at Tannenberg. Rennenkampf made good his escape. Further south Brusiloff defeated the Austrians on September 1-3 at Lemberg. Thus the German Staff totally miscalculated the strength the Russians would show in the early weeks of the war, and in consequence had to send support from the West front at a time when it could ill be spared.

With the defeat of the French in Lorraine on August 20-22, and the victory of the German right wing at Charleroi, Namur and Mons, the initiative passed to the Germans along the whole western front. On the 25th, Joffre issued an order containing the following:

"It being impossible to execute the offensive movement which had been projected, the subsequent operations will be carried out in a manner to constitute on our left by the united strength of the 4th and 5th Armies, the British Army and the new troops gathered in the eastern region, a massed force capable of taking the offensive, while the other armies will for the necessary time hold in check the efforts of the enemy."

von Moltke, 200 miles to the rear, and having little information other than von Bülow's glowing reports of a French rout, thought the war was won. On August 25th, he further weakened the right wing, already seriously depleted by battle, the rapid advance and detachments to Antwerp and Maubeuge, by sending two corps to Russia. This was a fatal error. Of it Ludendorff says, "If Moltke had not sent the G.R.C. and XI Corps to East Prussia, all would have gone well. If he wished to send something, he should have taken the corps from the left wing.

There again *leadership*." Moltke, in his report written in 1915, says that he intended to take these corps from the VII Army, but that it continually reported such heavy losses and that it was opposed by superior forces, so he took them from the right. He said "I admit that this was a mistake, and one that was fully paid for on the Marne." It was the counter offensive by the French 1st and 2nd Armies before Nancy on August 25th, of which the feature was the attack of the XX Corps under Foch, that caused this change of plan on von Moltke's part which had such far reaching effects.

Meanwhile the retreat toward Paris continued. On the 26th, Gen. Smith-Dorrien, commanding the 2nd British Corps, considering his men too fatigued to retreat farther, gave battle at LeCateau, while the 1st Corps under Haig continued the retreat. Smith-Dorrien suffered heavy loss, and might have been annihilated had not von Kluck, who on the 27th was removed from under von Bülow, failed to follow up the victory in force and started upon another wide envelopment of the Allied left. At the same time that von Kluck started on his eccentric march to the right, von Hausen was drawn to the left to assist the IV Army, which left von Bülow alone and made possible the successful counterstroke of Lanrezac at Guise on the 29th. This brilliant success enabled the British as well as the French 4th Army to withdraw. Von Kluck not only lost his chance against the British but took himself out of the battle of Guise as well, when, had he been present, a smashing victory should have resulted. Again the German armies act as separate units instead of as a team, and now, with the arrival of Foch's 9th Army in the gap between the 4th and 5th, their chance was gone.

Von Moltke thought he was pursuing a beaten enemy. The continued retreat led him to believe that his right was superior, and that the French had no troops before Paris capable of an offensive. He knew nothing of the new 6th Army under Maunoury now appearing on von Kluck's flank, formed by the transfer of troops from the French right, and accordingly he decided not to send the VI and VII Armies to the right wing as had been planned, and, though empty trains were waiting along the Rhine to carry them, he held them to attempt another break through in Lorraine. Von Moltke was obsessed with the idea of a great victory in Lorraine.

But though von Moltke seemed not to realize it, von Kluck's army was beginning to feel the effect of its record breaking march. The long marches on hot August days, coupled with severe fighting almost daily, caused heavy losses. Von Kluck called for reinforcements but none reached him before September 13. In addition, the right wing (I, II and III Armies) which should have been kept strong, was short 90,000 men,—one corps at Antwerp, one at Maubeuge and two sent to Russia. On August 27, when von Kluck was released from the control of von Bülow, he was ordered to march west of the Oise toward the lower

Seine. Always bent on enveloping, first the British and now Maunoury, von Kluck opened a 25 mile gap between himself and von Bülow, which was covered only by cavalry. Then came Guise, and the High Command, now disillusioned, ordered von Kluck to wheel to the southeast through Compiegne. All idea of passing south of Paris was now definitely abandoned. On September 2, von Kluck was ordered to follow in echelon behind von Bülow and protect the right flank of the army. Considering the latter part of the order the more important, von Kluck, who was then a day's march ahead of von Bülow, kept going,—across the Marne and the Grand Morin, seeking always the French flank to give battle and secure a decisive victory. At this time he thought nothing of Maunoury and the British, and assigned a flank guard to deal with them. In the meantime, Joffre, in accordance with his order, while holding in the east, was building up his left. Von Moltke had no idea of the extent of this movement, at least not before September 4, when he began to realize what was taking place before Paris and ordered the I and II Armies to stand on the defensive while the great battle before Nancy was taking place. After that he intended to strengthen them for the final attack before Paris.

Von Moltke's great attack before Nancy was made by the VI Army, supported from Verdun west by the V, IV and III. It began on September 4. The VII Army attacked in order to pin down the French 1st, and then transferred forces to strengthen Rupprecht for the assault upon Nancy. From the 4th to the 8th of September, the battle waged without success; the supporting armies were equally unsuccessful in breaking the line Vitry le Francois—Revigny—Verdun. The line bent back but it would not break. Castelnau held on to Nancy, Sarrail refused to give up Verdun, and Foch stood firm against the German III.

The southern line of retreat reached by the Allied Armies (Sept. 5) is shown on Map 2. From here, Joffre, encouraged by Gallieni, the Governor of Paris, ordered a general attack for the morning of September 6. At that time, the French had 28 divisions in the 6th, British, 5th and 9th Armies against 20 in the I and II German, while the German offensive by the other five armies had 38 divisions against 33 French. The French had outmanouvered the Germans, having superior numbers on the Marne and holding a larger German force on the eastern frontier. Joffre had made excellent use of his interior lines. The situation is well stated by Captain Wynne in the Army Quarterly for July 1921:

"The period 5th-8th of September was most critical, and the situation presents a strange paradox. For twenty years the German plan of campaign had been based on the fundamental idea of drawing the French into the open and avoiding an attack against their eastern fortresses. The German Army had been trained for years past almost entirely for offensive action in open warfare mainly on this account. Its system was entirely unsuitable for the assault on strongly fortified areas. And yet, when the hour of action arrived, we find the mass of the German Armies engaged about those very fortresses against a strongly

entrenched enemy while the offensive in the open was being delivered by the French with a numerical superiority. The two German right-wing Armies had to fight a defensive battle against the concentric attack of the four Allied Armies with no prepared system of defense, whereas the numerical inferiority of the French eastern Armies was compensated for by the great natural strength of the positions they occupied."

Turning now to the western flank of the wide flung battle, on September 6, Manoury attacked von Kluck's right flank while part of his forces were south of the Marne, but he succeeded in falling back to the Ourcq. On the 7th von Kluck still hard pressed, recalled his 3rd and 9th Corps which had been attached to Bülow. This widened the gap between the I and II Armies, which was weakly held by cavalry, and permitted the British and the 5th French Army to advance. Von Kluck held on to his position on the Ourcq and manouvered so skilfully that Maunoury was in imminent danger of defeat but for the arrival of the taxicab army (7th Division) from Paris on the morning of September 8. Von Bülow was forced to fall back to conform to the line. This permitted the 5th French Army to send aid to Foch's 9th Army in the centre, which had been especially hard pressed by von Bülow but had held on because Foch met every attack with a counter attack. With this reinforcement, Foch made a surprise attack close to the St. Gond Marshes (battle of Fere-Tardenois), behind which the German line was thin, and penetrated the line of the III German Army, which fell back in great demoralization. von Bülow also was forced to fall back because the British, penetrating the gap between him and von Kluck, were threatening his right. This caused Colonel Hentsch, a representative of the High Command, to order von Kluck back. Thus the whole German line fell back to prepared positions behind the Aisne, where by the use of artillery and machine guns, they were able to halt the Allied advance.

It is well the Germans retired when they did.

"* * * * * fighting with both flanks enveloped, its front broken, enemy cavalry in its rear, its supply of ammunition nearly exhausted, without organized lines of communication, in a hostile country, and with no reinforcements in sight, it was, to say the least of it, in such an unfavorable strategical situation that there was only one course—retreat."

Thus ended the great German offensive. It failed from lack of leadership by the High Command. The task given the I, II and III Armies was too great to be carried out with the men they had.

GENERAL COMMENTS

Germany was over confident. Believing that her war machine was invincible, and that it could quickly crush France, she dared to flaunt the opinion of the world by violating Belgium. The effect of this false step was felt in increasing degree to the end of the war. It was as Count Czernin said, Germany's "greatest blunder." Aside from this feature, the Schlieffen plan for the great sweep around Paris was excellent. It preserved the initiative to Germany and had von Moltke

carried it out with determination, it would have succeeded. But instead, during the first month of the war, he took the offensive against Serbia, against Russia, and against France on both flanks. It was poor strategy for he had not men enough. Had von Moltke been a stronger man and a greater general, he would not have tried to be safe everywhere. Had he stood on the defensive against Russia, defended the Nied line between Metz and Strassburg in Lorraine, and thrown all his forces to the right wing, he would have won the campaign, if not the war.

This leads to another observation. Von Moltke never should have been in command. He was not among those recommended as qualified to succeed Schlieffen as Chief of Staff, but was chosen by the Kaiser because of his great name. Most of his service had been as A.D.C. to his uncle and to the Kaiser. He was never competent for his position, and moreover in 1914 he was a sick man. He broke down and had to be relieved on September 14. Of all the prominent German generals, only von Moltke and von Kluck were not Staff College graduates. Of the seven armies on the west front, three were commanded by Albert of Wurtemburg, the Kronprinz and Rupprecht of Bavaria. There was need of someone to apply the advice of Napoleon who, in relieving his brother from command, said "The battlefield is the place for soldiers, not princes."

The more serious errors were those of the High Command. Some of them were: the invasion of Belgium, incompetency in the higher commands; miscalculation as to the speed and strength of Russian mobilization; not placing a Group Command over the I, II and III Armies, and over others as needed, to keep closely in touch and compel team play; placing Supreme Headquarters too far to the rear and depending on wireless communication; providing no general reserve which could be thrown to threatened points or used to fill gaps; providing no replacements with the result that the armies at the Marne were but 50 per cent strength; not sending reinforcements from Lorraine as the plan called for; not sending second line troops to invest Antwerp, Maubeuge, etc.; the rigidity of the supply system which broke down.

PARTICULAR COMMENTS

The movement of the I, II and III Armies through Belgium in such great strength and by the route north of the Meuse, was a great surprise to the French. So also was the efficiency of the new heavy artillery which had been kept a secret. The marching of the troops, in particular of von Kluck's army, established a record in history both for the distance marched and for the number of men. The offensive spirit of the troops was excellent, as was the leading of troops, but the command blundered. Von Kluck has been severely criticised—his enveloping wing failed to arrive, he swung too far to the right, he disobeyed orders. Perhaps he did, but the principal fault lies with the High Command.

Von Moltke's plan asked more than the armies could do, and he did not help them but left each army to operate by itself, simply urging *co-operation*. Of this there was none. Some of the mistakes are mentioned below.

1. No siege howitzers at Liege. While the Germans should have been prepared for every eventuality, confidence led them astray. They had a powerful new weapon and did not use it, causing a delay of three vital days.

2. The decision to send first line troops to invest Antwerp and later other places should probably be charged to the High Command, but the Army Commanders should have protested.

3. Proper cooperation between von Bülow and von Hausen when Lanrezac was in the position Chaleroi—Namur would have cut him off. There was no command, no cooperation, and each army drove ahead for itself. This brought serious consequences later when German preponderance of troops waned.

4. Von Bülow's attack at Charleroi and von Hausen's at Dinant drove back the front before von Kluck had time to envelop.

5. Von Kluck did the same thing at LeCateau, but here the fault is all his own. His failure to take up an active pursuit allowed Smith-Dorrien to escape. Von Kluck had 140,000 against 55,000.

6. Interpreting the early *normal* victories as decisive. Von Bülow in particular sent back glowing reports of a French rout.

7. Cavalry sent on independent missions instead of screening the attack and protecting the flanks. On August 23, von Bülow permitted von Marwitz to be absent on a distant mission and lack of information by von Kluck permitted the British to escape on that day. The information service was poor. Von Kluck never had correct information as to the British or Mavnoury. On September 5, von Moltke said that "scarcely a horse could go out of a walk."

8. The massed attacks by infantry produced very heavy losses.

9. On the 23rd von Kluck sent two Corps and, on the 26th, one Corps and the cavalry after inferior detachments of French Territorials under d'Amade and thus weakened his force on the battlefield.

10. On August 25th, one corps from the II Army and one from the III were sent to East Prussia by the High Command. Had the armies understood the situation in their fronts, they would have protested. Von Kluck complains that he was not informed of the dispatch of these corps to Russia.

11. On August 29th, a gap between the II and III Armies permitted Lanrezac to win an important success at Guise, which greatly assisted the retreat of the British and the IV Army on his flanks.

12. Von Kluck's wide wheel to the right was in an endeavor to outflank the Allied left which was his mission. There should have been reserves to fill in the gap as Foch's 9th Army did in the French line.

13. The decision on August 29 for von Kluck to wheel south east in front of Paris was wise for it intended to close the gap between him and von Bülow's II Army.

14. When von Kluck crossed the Marne, he disobeyed the order of the High Command to protect von Bülow's right and follow in echelon. He was seeking victory and seems always to have had an idea that somehow he alone would win the war. His withdrawal on the night of September 6 to prepare for Maunoury was a right decision and well executed.

15. On September 7, von Kluck withdrew his 3rd and 9th Corps from von Bülow to whose army they were attached, and opened a 25 mile gap between them. Again the need of command and reserves. His attempt again to outflank Mavnoury took him still farther away.

16. On September 9, von Kluck was ordered by Lt. Col. Hentsch from O.H.L. to retire from the Ourcq, where he was winning, to the line of the Aisne. Since the whole line was going back, this was no doubt necessary but von Kluck was not beaten.

17. Failure of von Hausen, on September 5, to discover the gap between the French 4th (Langle) and 9th (Foch) Armies near Sommesous, and the great opportunity it offered.

18. Communications were poor between the Armies as well as with O.H.L.

19. Ammunition supply failed.

CONCLUSIONS

The campaign failed because of the errors of the High Command. The Germans should have stood on the defensive in East Prussia and Lorraine, even though German soil were invaded, and backed the right wing to the limit. They should not have embarked upon so pretentious an envelopment without making certain a decided superiority in numbers. This could have been done by taking at least four Corps from the left, and making no detachments from the fighting armies. They should have formed a "mass of manouver" as the French did and when it was thrown in, have then formed another. Then the gaps could have been filled, and von Kluck turned loose to finish the British and Territorials. They should have held the cavalry in hand and not rendered it useless by distant forays on independent missions. My views are expressed in the following from Buchan:

"She (Germany) failed because she left a perilous gap in her front, and that gap was due, less to any blunders of individual generals than to the defects inherent in her whole strategy of envelopment. The scheme was over-ambitious, and broke down because it demanded the impossible. It asked too much of her overworked troops, and it placed a burden of coordination and control on Great Headquarters which they could not sustain. Tactically, when the battle was joined, her commanders made few mistakes."

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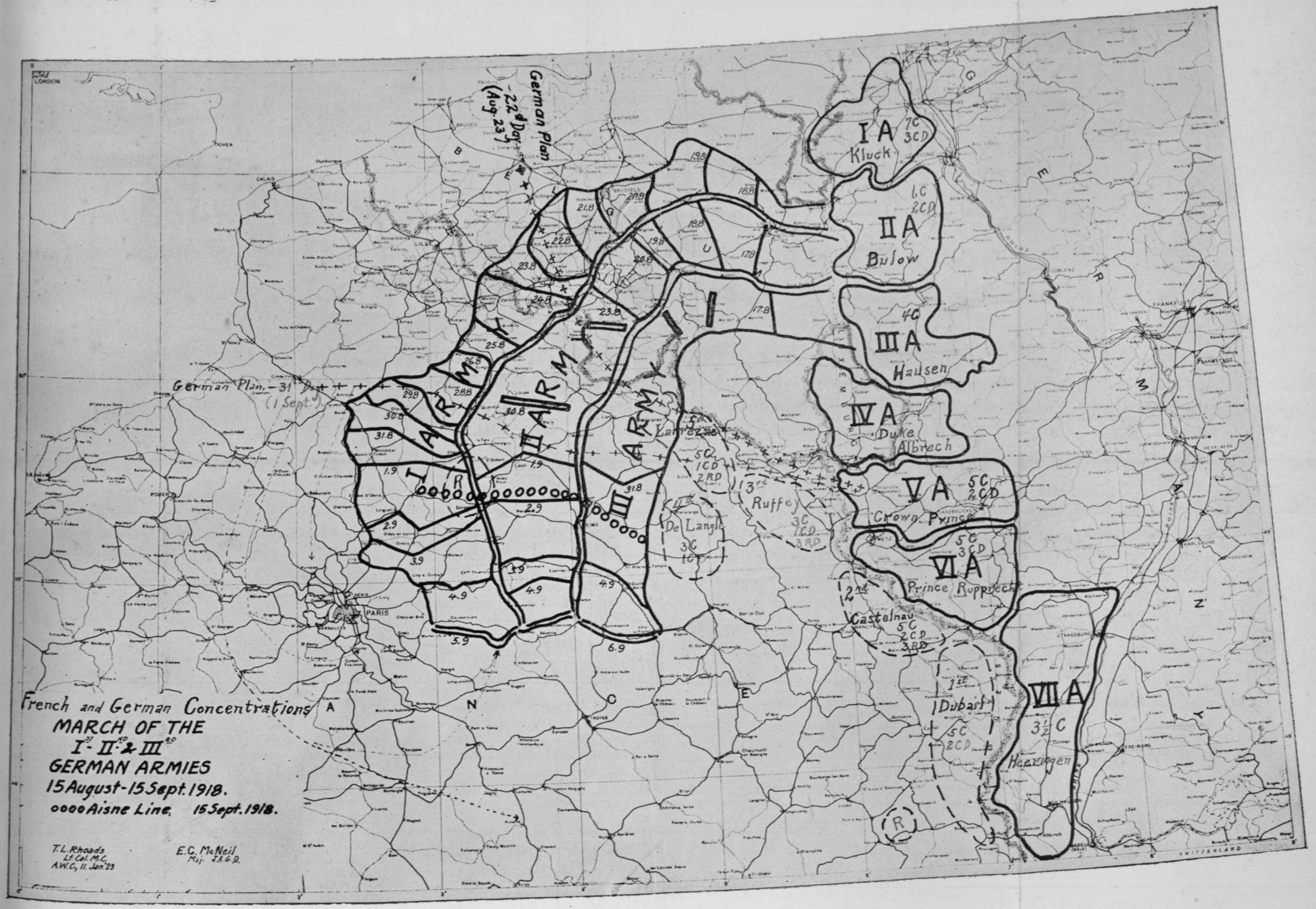
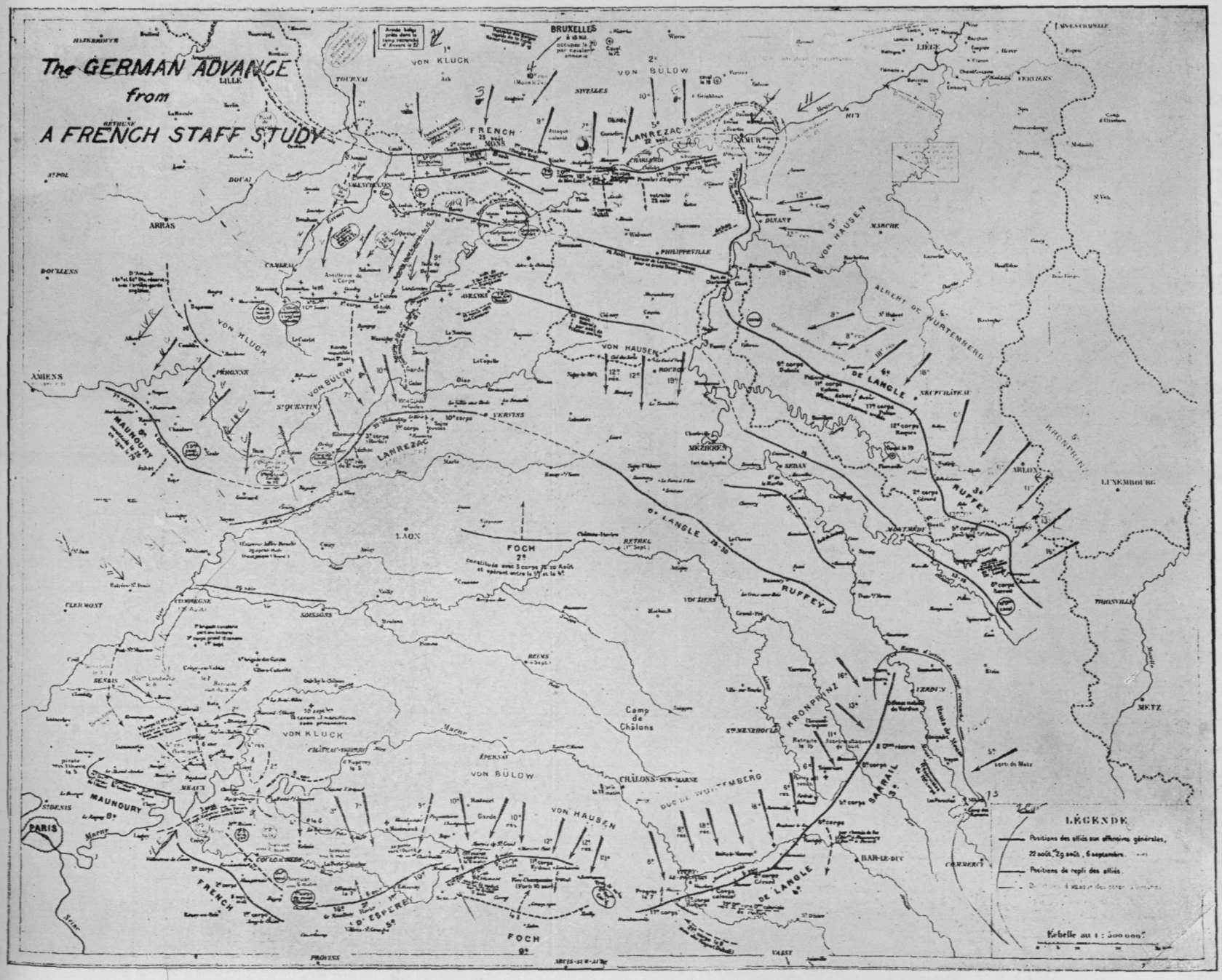

German Plan – 22nd Day (Aug. 23)
German Plan – 31st Day (1 Sept.)
I ARMY
II ARMY
III ARMY
I A
7C
3CD
Kluck
II A
6C
2CD
Bulow
III A
4C
Hausen
IV A
Duke Albrech
V A
5C
2CD
Crown Prince
VI A
5C
3CD
Prince Rupprecht
VII A
3½ C
Heeringen
Lanrezac
5C
1CD
2RD
13th
Ruffey
3C
1CD
3RD
4th
De Langle
3C
1C
12nd
Castelnau
5C
2CD
3RD
1st
Dubail
5C
2CD
PARIS
French and German Concentrations
MARCH OF THE
I·II·& III
GERMAN ARMIES
15 August-15 Sept. 1918.
oooo Aisne Line. 15 Sept. 1918.
T.L. Rhoads
Lt Col. M.C.
A.W.C., 11 Jan'23
E.C. McNeil
Maj. J.A.G.D.

MAP NO. 1


The GERMAN ADVANCE
from
A FRENCH STAFF STUDY
BRUXELLES
LILLE
LIÈGE
ARRAS
AMIENS
LAON
FOCH
MAUNOURY
LANREZAC
VON KLUCK
VON BÜLOW
VON HAUSEN
DE LANGLE
RUFFEY
KRONPRINZ
DUC DE WURTEMBERG
SARRAIL
FRENCH
PARIS
CHÂLONS-SUR-MARNE
Camp de Châlons
LÉGENDE

MAP NO. 2

Long-Range Position Finding and Fire Control

By 1st Lieutenant Riley E. McGarraugh, Coast Artillery Corps

THE future success of coast defense batteries will lie, to a great extent, in their ability to cooperate effectively with the Air Service. The steady increase in the ranges obtained by seacoast guns has been accompanied by the need of a position-finding and fire-control system that will operate efficiently on targets that are beyond the range of vision from shore.

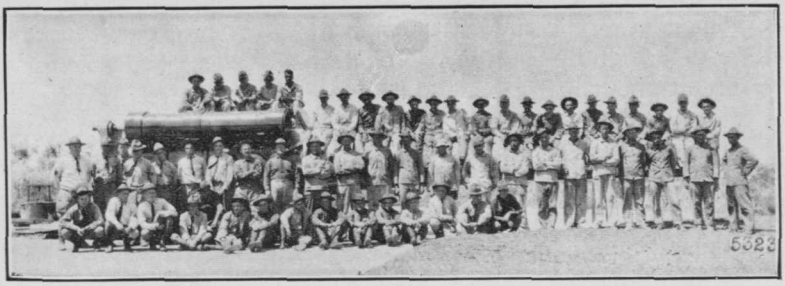


FIG. 1. 4TH COMPANY, C. A. C., FORT MILLS, P. I.

Various theories have been suggested as a solution to this problem. I believe that the greatest possibilities lie in fire control at long ranges by means of airplane observation, although the actual experiments carried out thus far along this line have been very few and limited. This belief is not entirely theoretical on my part but is the result, to a great extent, of three practices which I have held within the past two and a half years. In these practices fire control was based entirely on airplane observation. Each practice was held at a range greater than 22,000 yards, which in many coast defenses is beyond the range of terrestrial observation. In each firing a different phase was developed.

These practices were all held at *Battery Frank G. Smith*, Fort Mills, Corregidor, Philippine Islands, manned by the 4th Company, C. A. C. This battery consists of two 12-inch Model of 1895 M-I guns mounted on the 1917 model of all-round fire barbette carriage. This carriage gives a maximum elevation of 35 degrees and has a corresponding range of about 27,000 yards using the 1070 pound projectile. Since no reliable range table for the 900 pound projectile, for which this battery is designed, had been received at the time of these firings, it has been neces-

sary to use the 1070 pound projectile. The latter has proved very satisfactory.

The first practice was fired December 22, 1920. In the main the problem was as follows:

1. Ammunition allowance: Record shots—7.

2. Distant bombardment of Fort Mills, ships out of range from batteries regularly in commission. L.R. No. 2, recently mounted but with no fire control, is hastily gotten ready, using improvised equipment "as is."

3. Mission.—To destroy or drive off super-dreadnaughts.

4. F-2 and F-3 using improvised plotting boards, base line F-2 and F-3—C-2, Scale 1 inch = 600 yards, will furnish L. R. No. 2 with initial ranges to tug and hypothetically moving target along line of anchored targets at the assignment of target and after each interruption.

5. The Battery Commander will open fire when so directed by the Fire Commander. The enemy super-dreadnaught target will be represented for deflection by a tug traveling at a slow speed (2-K) across the field of fire at about half range (13,500 yards) over course "A1." The target for range will be on a line marked by Mine Planter 1000 yards to left of target No. 1, thence 300 yards additional to target No. 2, and thence 600 yards additional to target No. 3.

6. Fire for adjustment and effect will be in such groups as the Battery Commander may direct.

7. Observation:

(a) Terrestrial—in mils by Mine Planter.

(b) Aerial—Airplane and Balloon, in yards, the latter at the end of the firing or sooner if called for. The overs and shorts will be determined from a line passing through targets No. 1 and No. 2.

An approximate initial range was obtained as outlined in paragraph 4 above, but after that no further ranges were called for. The deviations as reported by the airplane observer were alone used in the adjustment of the fire. These deviations were quite large. Successive approximations was the method of adjustment used in this practice, but the response was rather slow. This was due primarily, I believe, to the fact that the first deviation was most likely underestimated. It was not until the sixth and seventh shots that they began to fall near the target. Yet this response was sufficient to show that the system had a practical value.

The deflections used in aiming on the moving tug, which was at a range of about 12,000 yards, proved to be very accurate. The initial deflection was obtained as in a rapid-fire battery; the observer taking the travel of the target on his sight during the time of flight. After the first shot the gun pointer made his own corrections. The plotted range to the line of anchored targets was 24,500 yards.

On the mainland at either side of the channels which approach the

entrance of Manila Bay, there is a series of small irregular peninsulas which extend into the sea. As a result there are numerous little water areas and bays which are concealed from our vision at Corregidor yet which are within the range of our fire. The depth of water is everywhere sufficient for the largest ships.

In the War Games here this situation has given rise to much argument. Many times the Naval Commander would cause the attacking fleet to approach when concealed by this natural cover. At other times a division of battleships would lie at anchor within range yet out of sight of Fort Mills.

The question of how effective our fire would be against such a target is of great importance. Equally important is what method of fire control would be the best to use. Similar situations to this prevail in other coast defenses. Methods of fire control which are applicable in this case would also be effective where targets are out of the range of vision due to low height of site, or where the target is obscured in the fog or by a smoke screen. It is simply a question of getting a long-range eye to direct our long-range fire.

If attacking fleets can be kept at a distance so great that we, their targets, are hidden from view by the horizon, the effectiveness of their fire will be greatly reduced unless they are able to maintain supremacy in the air. Such a condition in connection with any of our defensive positions is hardly conceivable. But in order to combat this problem of fire from ships which are out of the range of our vision, it behooves us to get the full benefit from the cooperation which we may expect from our Air Service.

The need of developing new fire control methods for long-range shooting has been apparent for some time. Thus it was that the suggestion of Lieutenant G. H. Burgess, Air Service, to conduct a long range seacoast practice using airplane fire control, met with approval. Upon his suggestion the following problem was evolved:

1. Battery Smith will fire a special long-range problem on March 29, 1923. In cooperation with the Air Service, it is desired to obtain ranges and direction to a battleship division, bombarding Fort Mills from a point beyond the maximum reading of our position-finders, not visible from any position-finding station at Fort Mills and from the battery, and by means of airplane observation adjust fire of Battery Smith on this point.

2. *Situation:* A state of war exists. Enemy warships have appeared off the entrance of MANILA BAY. On the morning of March 29, 1923, FORT MILLS is bombarded from a point beyond, and concealed by HORNOS POINT. Our observation planes locate this battleship division bombarding FORT MILLS. Battery Smith receives orders to open fire on target designated by range and direction by airplane observer.

Required: Adjustment of fire on this point by airplane observation.

3. The following procedure will be followed to facilitate cooperation of the Air Service:

(a) Target will be anchored by the *U. S. A. M. P. Hunt* in a position designated by the Garrison Commander, the exact position to be withheld from the battery and Air Service personnel.

(b) The battery will track the airplane and take readings only upon signal from airplane observer. (Altitude of airplane, 4000 feet.)

(c) Battery will receive the range from the observer by radio.

(d) Position of target on grid map of area will be signalled by airplane observer, as a check on previous data.

(e) Battery will fire only upon signals from airplane observer.

(f) Airplane observer will report deviations in deflection and range of each shot, deflection first.

4. *Safety of range:* A Safety Officer, Air Service, assisted by an Artillery Officer, will be carried in a second airplane, provided with radio communication direct to battery. The Air Service Officer will operate his own radio set from observer's cockpit. The Mine Planter *Hunt*, after anchoring target will take position 2000 to 3000 yards due South of target and observe the field of fire for bancas and other small boats. It will maintain radio communication with C-1.

5. Arrangements have been made for photographic airplane to photograph splashes during firing.

6. The firing will be under the immediate supervision of the Fire Commander, First Fire Command.

This problem was drawn as a preliminary step in joint Coast Artillery and Air Service training, its object being the determination of the possibilities and limitations of each of the arms in joint operations in coast defense and the development of training methods which will insure efficient cooperation of the two arms. It was not a map problem in any sense. A grid map of the water area was prepared, but this was intended to be used only as a "safety" measure. The original plan and the one used in the problem was finding the position of a target by means of airplane radio reports based on speed and time of flight of airplane, the battery tracking the airplane to obtain direction.

The first series of trial flights were made on March 24, their object being to determine rate of speed of the airplane over a prescribed known course and to test the accuracy of range finding over long courses, calculated on the basis of speed and time of flight.

The speed rate (average of four flights) was found to be 36.6 yards per second. Range by map of a known long course, was 24,778 yards. Range calculated from time of flight over same course was reported as 24,288 yards, giving a difference between map ranges and reported range of 490 yards.

On March 27th two flights were made over a long course to check the accuracy of these data. The mean error for the two flights, that is, difference between calculated range and map range, was 488 yards. On this date three flights in all (including the two referred to above) were made over a long course, similar to the one expected to be used in the problem, during which the battery personnel tracked the airplane. Simultaneous readings were taken at approximately one minute interval by several azimuth instruments near the battery. This practice showed the possibilities of the method proposed, although the observers were able only once to follow the airplane clear through to the assumed target. The plotted results of the readings taken indicated that the airplane did not fly exactly the same course on each flight but that the battery spotters were uniformly accurate in tracking the plane. Results indicated that the initial deflection should be obtained within 200 yards of a target.

These preliminary trials showed clearly that the original plan was practicable and that the range and direction of the target could be determined with sufficient accuracy for the first shot.

Two-way radio communication with the airplane was used in all this work and in the execution of the problem, and gave most satisfactory results.

The practice was held as scheduled at Battery Smith, No. 1. Very little special training was given the organization. The drill periods for two mornings prior to the practice were spent in establishing a system of battery fire control which was suitable for this kind of firing. This was done by changing the scale of the Whistler-Hearn plotting board to 1,000 yards to the inch, so as to reach the expected range of 25,000 yards. Corrections in azimuth were made on the plotting board by plotting the position of the splash with reference to the plotted location of the target. This was done by making the gun arm when set on the splash read the azimuth at which that shot was fired. Then by moving the gun arm to the target, it gave the corrected azimuth for the next shot. As there was a play of more than .10 of a degree in the gun-arm micrometer, I had the difference in the angles of the gun setting and the splash recorded and a corrected azimuth computed from these data. In case of a difference, the mean of the two corrected azimuths was used. The following method was employed in recording the deviations reported and in making a check on the azimuth corrections received from the plotting room. On a sheet of cross-section paper 20 inches square, the target was located in the center. Using a scale of one inch equal to one hundred yards, this gave space to plot all shots that fell within a thousand yards of the target. For the purpose of this practice the sheet was made out considering the target to be at a range of 25,000 yards, the expected approximate range. The lateral and longitudinal deviation lines were numbered in at every one hundred yards. On the

line of 0 range deviation the lateral deviations were put in hundredths of degrees as well as in yards, by use of the mil system. Thus a lateral deviation of 100 yards equalled .20 of a degree. This proved to be a very simple yet effective method of checking the plotting board data.

Ballistic corrections for range were made on the Pratt Range Board. In doing this we made a correction upon the range received from the airplane observer. The corrections for azimuth were made from the deflection board in the usual manner except that there was no travel. Arbitrary range corrections as a result of reported deviations were made at the gun by use of an arbitrary correction ruler.

The only special mechanical device used was an arbitrary range correction ruler that had been perfected by First Sergeant Thickett and myself. This ruler provides a slide that shows the amount of each correction as it is made as separate from the resultant correction already made, thus making it more simple for the operator than the usual type of ruler. This ruler also eliminates the necessity of the operator remembering or writing in the thousands of the range, which to my knowledge is an unusual feature, especially on a ruler that will handle ranges from 5,000 to 30,000 yards and allow for a twelve hundred yard arbitrary correction either "up or down." The ruler itself is only 30 inches long with a scale of 200 yards to the inch, making it easy to read the ten yard graduations.

Adjustment of fire in this practice was made by Successive Approximations as it seemed the only practical method authorized for such a limited number of shots (6).

The solution adopted by the battery commander was as follows: Three azimuth instruments were set up and oriented on the parados in rear of the gun. The airplane went out and located the target. It came back and started on the B-T line at an altitude of 4000 feet. After having gone about 10,000 yards the target was obscured by a heavy cloud. This made it necessary for the plane to return and make another trip on the B-T line, this time at a little lower altitude.

Direct communication was had with the plane by Lieutenant Burgess who had his receiving set in the improvised B.C. station on the parados in rear of the gun. He communicated with the plane by using a direct telephone line to the Air Service Radio Station. At intervals on the way to the target the airplane observer sent "Aim on me" signals, when he considered that he was on the B.T. line. At those signals which were preceded by a warning signal, the azimuth of the plane was read and recorded. Two of the three observers at the battery were able to follow the plane until it signalled that it was over the target. This final or "Target" reading was the one considered in plotting the location of the target. The other readings were for a check and also were to be used in case the plane was lost from sight before it got over the target.

The readings which were obtained are as follows:

Reading number	*Azimuth Instrument No. 1 (Model 1910)*	*Azimuth Instrument No. 2 (Model 1910)*	*Azimuth Instrument No. 3 (Model 1910)*
1	106.30	105.24	106.28
2	106.50	106.71	107.71
3	106.50	106.29	106.41
4	105.70	105.53	105.63
5	106.00	105.84	106.01
6	Lost	106.68	107.84
7	Lost	107.96	107.83
8	Lost	107.83	108.90
9	Lost	108.23	108.29
10	Lost	108.93	108.09
11	Lost	109.39	109.52
12	Lost	109.52	109.59
13	Lost	109.78	109.90
14	Lost	109.65	109.80
15	Lost	Lost	110.09
16	Lost (Target)	110.94 (Target)	111.04

The small difference in readings may have been caused by several things. The accuracy of orienting the instruments varied as much as .02 of a degree. They were not over fixed stations but were oriented by reciprocal pointing, on an instrument which was oriented. At the longer ranges (more than ten miles) the cross wire almost obscured the airplane so it was necessary to keep it alongside the cross wire rather than directly on it.

The azimuth of the target as plotted on the plotting board was 111.00 degrees which is just about the mean of the last readings of numbers 2 and 3 instruments. The airplane observer before starting on the B-T line timed his travel over a short known course in the same direction as the B-T line. Then by taking the time it took to reach the target from the gun he calculated the range of the target which he reported as 22,800 yards. After the practice we found the map range to be a little over 23,000 yards.

As we were satisfied with the direction of the target as obtained by tracking the airplane we did not call for its location on the grid map.

With this direction and range obtained from the airplane we made the ballistic corrections which gave the following data for the first shot, azimuth 110.40, range 23,400 yards.

For this practice we assumed a probable error of 200 yards. The first shot was reported as right 500 yards, short 10 yards. A correction of -1.26 degrees was made in direction and no correction in range. The second shot was reported as left 20 yards and short 300 yards. Following the rule of successive approximations a corrections of up 150 yards was made in range. In direction a correction of plus .04 of a degree was made. The third shot was reported as left 20 yards and 400 yards short. A further correction of up 150 yards and plus .05 of a degree was made. The next shot was reported as left 50 yards and

short 200 yards. I made a correction of up 100 yards as I considered that it was not advisable to make a correction of less than that amount. An azimuth correction of plus .13 of a degree was made. The next shot was reported as 50 yards left and 50 yards over. I made no range correction but an azimuth correction of plus .17 of a degree. The last shot was reported as 10 yards left and 10 yards over. I then reported to the Fire Commander that fire had been adjusted and the problem solved.

The Mine Planter *Hunt* took position about 4,000 yards from the target and at almost right angles to the B-T line. Observers on the boat by aid of range rakes made the following estimates of overs and shorts but were unable to get any information as to deflection deviations. Their estimates as compared with those of the airplane observers are tabulated blow:

Shot	*Lt. Gravely**	*Lt. Owens*	*Mine Planter*
1	500 R 10 S	300 R 10 S	220 S
2	20 L 300 S	20 L 200 S	300 S
3	20 L 400 S	20 L 300 S	460 S
4	50 L 200 S	30 L 100 S	160 S
5	50 L 50 O	40 L 40 O	80 O
6	10 L 10 O	10 L 10 O	20 O

A careful and thorough analysis of the practice disclosed no errors which were greater than the mechanical defects of the equipment used.

Two hits were made on the deck of a hypothetical target the size of the U. S. S. *California*, if we assumed it to be at an angle of 45 degrees to the line of fire. Placing the assumed target in any position desired the last shot would be a hit as it just missed the small material target. See Figure 2.

The best explanation that we have been able to figure out for the shots falling in direction as they did, is as follows: it is believed that the report of 500 yards right was too great for the first shot. The mean of the lateral deviations of the two airplane observers was 400 yards. Thus correcting for the full 500 yards had the effect of placing the splash of the second shot well to the left of the target. The spotting of the lateral deviations of the succeeding shots is believed to have been too conservative, especially in the cases where there was a large range deviation. Thus the battery was slow in getting on the target in direction. It also gave the impression that the gun was failing to respond to the azimuth corrections.

This practice brought out several points of interest, some of which may be of value. It showed that the "Aim on Me" system can be adapted quite well to fixed armament, thus presenting one solution to the long-range position-finding and fire-control problem.

It showed that enemy vessels taking cover in these obscured water areas would be practically in the same danger as if they were in the open.

* Reports on which adjustment was made.

The system of communication between the battery and the airplane functioned perfectly. The reports of the deviations were received very promptly and without an error in transmission. The cooperation given by the Air Service, was splendid.

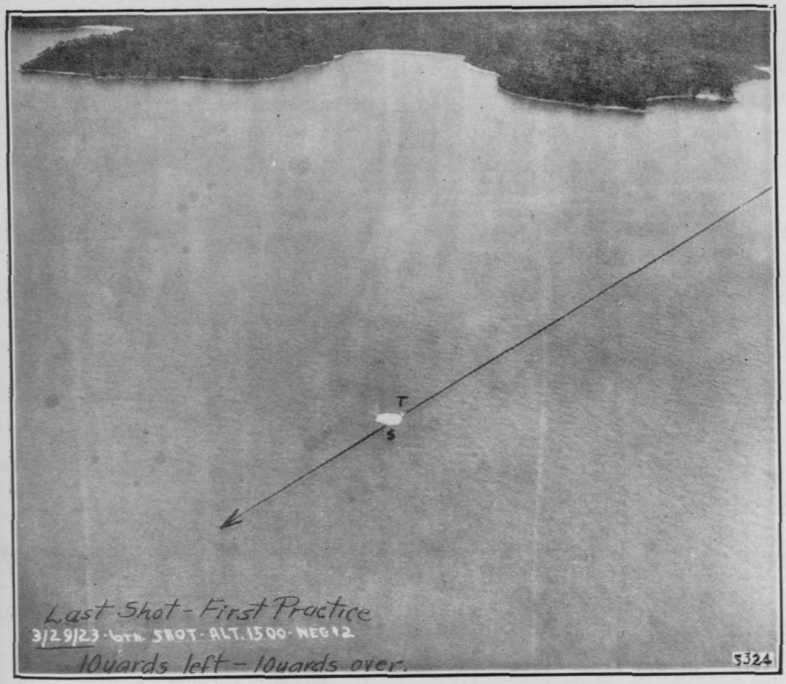


FIG. 2.

The following named officers actively participated in this practice:

Colonel Andrew Hero, Jr., C. A. C., Commanding Artillery Garrison: Observer on Mine Planter *Hunt*.

Major R. F. Cox, C. A. C., Fire Commander, First Fire Command.

1st Lieut. Riley E. McGarraugh, C. A. C., Battery Commander.

2nd Lieut. W. G. Holder, C. A. C., Attached as Range Officer.

2nd Lieut. J. L. Goff, C. A. C., Commanding Officer, A. M. P. *Hunt*.

Liaison Officer:

1st Lieut. G. H. Burgess, A. S., Supervising Problem.

Observation Plane (Type H S 2 L Seaplane):

Pilot—1st Lieut. M. H. McKinnon, A. S.

Ass't Pilot—1st Lieut. R. L. Owens, A. S.

Observer—1st Lieut. W. S. Gravely, A. S.

Safety Plane (Type H S 2 L Seaplane):

Pilot—Captain I. H. Edwards, A. S.

Observer—1st Lieut. C. R. Evans, A. S.

Safety Officer—Captain L. D. Farnsworth, C. A. C.

Photographic Plane (Type D H 4 B Airplane):
Pilot—Captain F. I. Elgin, A. S.
Photographer—Staff Sergt. J. Behunick, A. S.

The next practice was held on April 13, at Battery Smith No. 1. It was in many respects a sequel to the one held on March 29th. I desired to work out a somewhat similar problem but under conditions where the initial range and direction would be obtained by the airplane observer locating the approximate position of the target by the coordinates of a map, thus trying out a different phase and putting it on a basis which could be used under almost any condition. As there were four rounds of the annual target practice allowance left, the Commanding Officer, Coast Artillery Garrison, asked for suggestions for the next practice. Upon my recommendation he approved a problem as just outlined, to be fired in connection with the practice to be held at Fort Drum, shooting at a target obscured by Limbones Island. As this target was out of the normal field of fire for Battery Smith No. 1, and could not be seen from the battery or from any of our (Battery Smith) manned observation stations, and was even off the plotting board, it appealed to me as approaching emergency conditions, as far as we were concerned. But on the other hand the target could be seen from the Fire Commander's station as well as several other stations on Fort Mills. Even though off the range scale of the D.P.F. it gave an opportunity to check the accuracy of the lateral deviations reported by the airplane, which in the previous practice were subject to some doubt.

A blueprint map, scale 1,000 yards to the inch was made for the Fort Drum problem. I took one of these maps and combined it with the map made for the previous problem, making a map showing the battery position and the general area in which the target was to be located. The map was divided into 500 yard squares. These squares, in the vicinity of where the target was to be located were numbered so that the target could be approximately located by sending the number of the square. When the airplane observer reported the location of the target this square was to be located on the map. The azimuth and range would be determined by the use of a protractor and ruler. The ballistic corrections for this range and azimuth were to be made in the plotting room.

It was hoped that this would give accurate enough data for the first shot so that the airplane observer would be able to pick up the splash and report the deviations. Corrections from the deviations reported by the airplane observer were to be made by the Battery Commander and applied directly at the gun.

The sheet of cross-section paper had worked out so well in the previous practice, in checking corrections in range and direction, that I decided

to use it alone in this practice, especially since the target was off the plotting board.

The projectiles used in this practice were carefully checked to see that there was no difference in weight. In a further effort to reduce the dispersion, the powder, although previously blended, was blended again the day before firing.

Fire was adjusted again by successive approximations as it seemed the only practical method authorized for such a small number of shots (four).

The solution of the problem as adopted by the Battery Commander was as follows: As I was in doubt as to the accuracy of my firing map, especially since I had used two maps in making it, I desired to check it. This I did by calling on F′ and C-1 stations to give me the azimuth of Jamelo Point from their stations. As this point is at a range of about 27,000 yards and in the general direction of where the target was to be located, it gave an excellent opportunity to verify the map. I located these stations on the map and then compared the direction obtained from the map to the reading of the instruments in these stations. In the case of F′ there was a difference of 1.30 degrees and of C-1 the difference was 1.28 degrees in the same direction. This convinced me that the map was not properly oriented and that it would be necessary to change the map location of the target as received from the plane by one square in order to be sure of getting the first shot near the target in direction.

The location of the target as received from the airplane observer was 03-8. But for the reason just stated, I assumed it to be in 03-7 in computing the initial data. This made no change in range and a change of about 500 yards or a little over a degree in direction. The map range was 22,500 yards. The azimuth of the corrected position of the target was 360.00 degrees. A ballistic correction of plus 150 was made in range, due principally to the fact that the powder on previous firings developed a muzzle velocity less than normal. This below normal muzzle velocity more than overcame the helping wind and above normal atmospheric conditions. An azimuth correction of minus .60 of a degree was made for wind and drift.

With these data the first shot was fired. It was reported as direction O.K., over 800 yards. I made a correction of down 800 yards and fired again at the same azimuth. This shot was reported as left 80 yards, range O.K., see Figure 3. I made a correction of plus .20 of a degree in azimuth and no correction in range. The third shot was reported as direction O.K., over 150 yards. I made no azimuth correction. But as I had not yet gotten a short and since I did not think it advisable to make as small a correction as 50 yards when firing at such a long range, I made a correction for the full deviation or down 150 yards. This shot was reported as direction O.K., short 100 yards. (It is interesting

to note that had I followed the rule literally and made a correction of down 50 instead of 150 yards that the last shot would have been a hit. But at the same time this would have thrown the center of impact farther from the target). The results obtained convinced me that the fire was well adjusted so I reported to the Fire Commander that the problem was solved.

A careful and thorough analysis of this practice disclosed no errors.

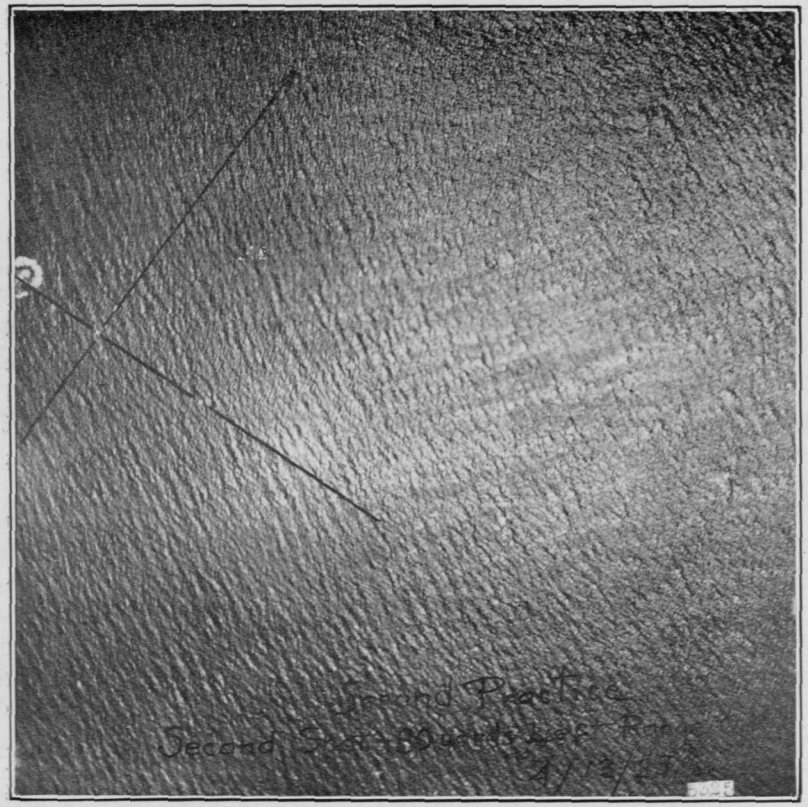


FIG. 3. SECOND PRACTICE, 2ND SHOT —80 YDS. LEFT, RANGE O.K.

One hit was made on the deck of a hypothetical target the size of the U. S. S. *California*.

I believe that this problem again showed the practical use of reliable airplane observation in long-range position finding and fire control. It also demonstrates the use of maps for fire control work in coast defenses.

The splashes of the shots were visible from F′ station. According to the observer there the first shot fell about .21 degrees left, but due to the fact that there was such a large range deviation on this shot it was impossible for the airplane observer to get the small lateral deviation.

But on the second shot, which was correct for range, the lateral deviation was obvious to the airplane observer. As seen from F′ the second splash was at the same azimuth as the first. Then the third and fourth shots, after the correction of plus .20 of a degree had been applied, both fell on the B-T line. This functioning of the gun is remarkable, there being virtually no lateral error at all. The longitudinal dispersion was also exceedingly small. The longitudinal probable error developed for the four shots was only 42 yards.

The fact that the first shot went so far over can be easily accounted for. The surface wind was reported as 17 miles per hour. The men in the airplanes say that the wind was at least 35 miles an hour and coming almost down the B-T line. This shows the need of obtaining an accurate ballistic wind, if correct initial data are to be obtained for long range firings. It was intended to have the ballistic wind furnished the battery, but preliminary arrangements for doing so were not completed in time to have the information available at time of firing.

In this problem two targets were anchored 100 yards apart. This was done in order to give the airplane observer a scale to help in the estimation of the deviations. It also is of great help in determining deviations from the airplane photographs. Unfortunately in the last practice only one good airplane picture was obtained of the splashes from Battery Smith. This was of the second shot and verifies the airplane observer's report. On the other shots clouds obscured the targets from the photographic plane.

The tug took position at about 3000 yards from the target and at right angles to the line of fire. By the aid of range rakes the longitudinal deviations were estimated as follows:

1. Over 750 yards
2. Short 25 yards
3. Over 237 yards
4. Short 150 yards.

In such a problem as this the first shot can really be considered nothing less than a trial shot. Considering the last three shots of the series, the center of impact is over 17 yards and left 27 yards, as computed from the deviations as reported by the airplane observer.

In the complete series of ten shots, in which airplane position finding and fire control was used, the center of impact is 27 yards right and "target" or 0 yards for range. This is based on the reported deviations which were used in making the adjustment. Of the ten shots, five were short, four were over and one was O.K., for range. (See Figure 4, plot of fall of shots and center of impact.)

This method of position-finding and fire control, in which all position-finding stations and the plotting room are eliminated, would be very practical for use by heavy railroad artillery and large mobile guns. It is believed that by a modification of the system used, fire could be adjusted on a moving target, which is out of sight of all stations and the battery, with a similar degree of success.

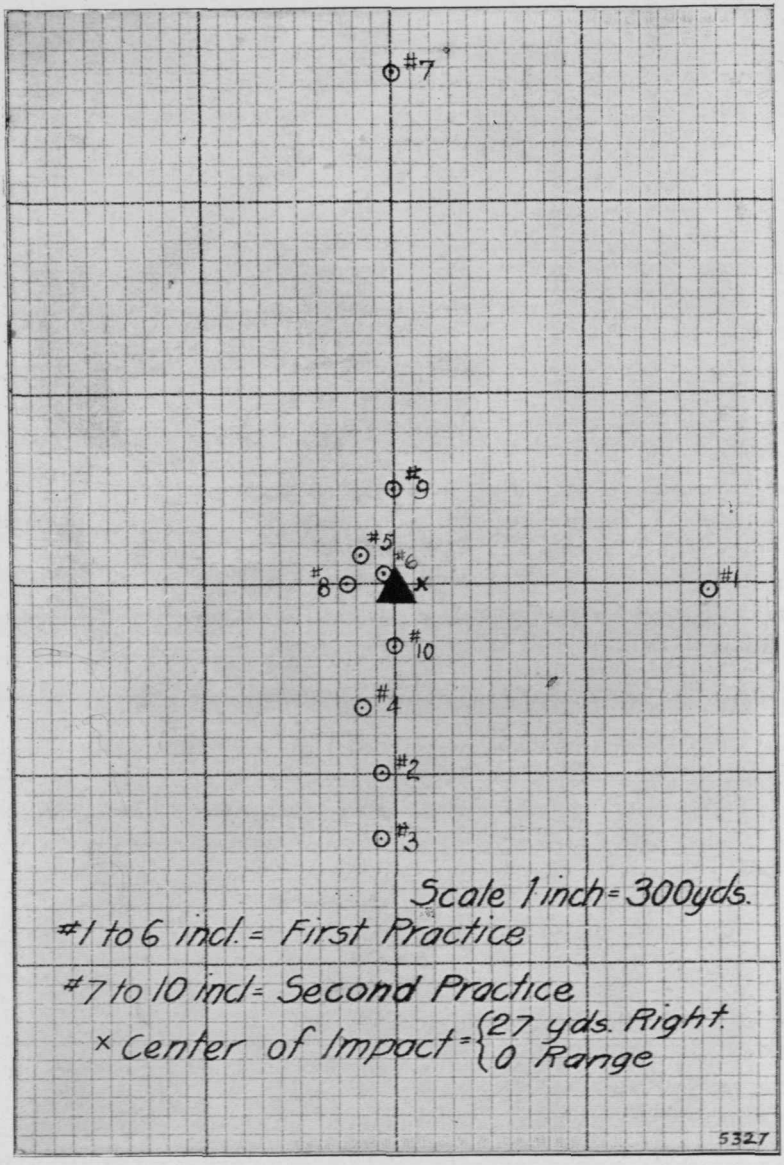


FIG. 4.

In conclusion it is the writer's belief that these problems have shown some of the possibilities of what may be accomplished by proper co-operation between the Coast Artillery and the Air Service; that it is a step in the right direction; and that there are benefits to be gained by both branches of the service if such practices were held often and more generally.

The Case for Emergency Range Finders

By Captain Joseph C. Haw, C. A. C.

General Situation:

The United States and the Pinks are at war. Our fleet has been defeated, and the Pink fleet is making a determined attack on the Coast Defenses of Whatnot.

Special Situation:

Captain A is the Battery Commander of Battery B, of the major armament.

One or more of his guns is still in action.

However, lucky hits by the enemy have destroyed all of his communications, including those with his emergency base-end stations.

The Pink fleet is still advancing, as though for a close bombardment or a run-by.

Required:

Captain A's action.

SOLUTION SUBMITTED WITH COMMENTS THEREON

1. "Continue the time-range and time-azimuth curves."
   Criticism: Supposing the enemy zigzags?
2. "Pull down the range several hundred yards, fire until fleet has passed through this barrage, pull down the range again, etc."
   Criticism: While applicable to high velocity quick-firing weapons this method is obviously unsuited to major caliber batteries with their long time of flight and slow rate of fire.
3. "Use one of the methods of adjustment prescribed in Coast Artillery Memorandum No. 4."
   Criticism: These are designed for fire at a fixed target, or at a moving target whose changes of range are known. But without accurate information of the *changes* of range, how can the adjustment be secured or maintained?
4. "Fire by guess and by G—."
   Criticism: As good as methods 1, 2 or 3.
5. "Cease firing."
   Criticism: As good as methods 1, 2, 3 or 4.

AN APPROVED SOLUTION

1. Use an azimuth instrument and a self-contained base (or vertical base) range finder, both located at the battery.

Discussion of Approved Solution

The sole purpose of this screed is to present the plea that every single battery should be equipped with a self-contained horizontal base range finder (or a depression position finder, if conditions make this type preferable). There are many arguments in favor of such a course; I know of only two arguments against it. Let us first examine the favorable aspects.

Omitting for the moment all considerations of emergency, it may be shown that even under normal conditions, the single-station system would often be of immense value. First there is the matter of communications. The Coast Artillery is but too familiar with telephone troubles, especially when the lines are used for several hours at a time. Who can tell what may happen of an enemy hovers in the offing for days, keeping the defense on the alert continually, and consequently telephone lines are subjected to long, hard usage? Or if the enemy pops in one fine day and an important line develops troubles of its own?

Moreover, it is evident that the single-station system is equally effective in all directions, while the accuracy of a baseline system decreases as the target departs from the normal to the baseline.

Again, in case of investment from the land side, a self-contained horizontal base range-finder can be transported to previously prepared positions for use in land firing.

And smoke screens. Have you ever seen the Navy lay down a smoke screen? If so, did not your heart sink within you at the prospect of trying to hit an invisible enemy ship moving at high speed behind that impenetrable wall of black? The writer has witnessed a smoke screen on only one occasion, but the memory of it is a real nightmare from a Coast Artillery viewpoint. However, it is said that at present the usual smokescreen, while effectually concealing the hulls of ships, is not dense enough in the upper strata to prevent occasional glimpses of mast-heads. Obviously, it would be very unusual for two widely separated base-end Stations to secure a simultaneous reading upon such a fleeting target; and of course an azimuth reading from a single base-end station would be utterly valueless. But with a single-station system, if mastheads could be seen with reasonable frequency, the battery is practically as well off as though no smokescreen existed, save only for the opportunity to adjust the fire.

The preceding paragraph does not deal with an emergency situation; for certainly no admiral will fail to avail himself of the concealment afforded by a smokescreen whenever conditions permit its use.

Even when no smokescreen is employed, the difficulties of getting two base-end observers on the same target are sometimes very annoying—to put it mildly—and productive of great loss of time. There is no need to expand on such a topic, for every officer has encountered

this trouble in drill. What will happen when you have a whole fleet in view, perhaps so aligned as to present an entirely different appearance to the two observers? In this case, the superiority of a single-station system is too obvious to need elaboration.

All navies depend entirely on self-contained base range finders. Moreover, the writer is told by an exceptionally well-informed officer of long service that all foreign countries whose Coast Defenses he has studied base their fire control principally upon single-station systems. Now it can hardly be assumed that ours is the only efficient Coast Artillery in the world; and our own Navy, firing from moving platforms at moving targets, secures very creditable scores at ranges as high as 20,000 yards. From these considerations it would seem that the single-station system of range and direction finding is by no means to be despised.

It is therefore evident that the single-station system might often prove a highly valuable auxiliary to the baseline system, even when no unusual circumstances exist. However, it is the value of the unistatic installation in desperate emergency that presents the most urgent phase of the matter.

Before going further, consider the case when the field of fire is not visible from the battery. Here, it will be necessary to use some system of communication between battery and range-finder, presumably telephones; but even so, the installation of a single range-finder, absolutely independent of all other communications, at once halves the chance of disaster.

Now what are the "chances of disaster?" Well, we cannot give even an approximation in mathematical terms; but were the chances a million to one in our favor, there would still be too much at stake for us to ignore the millionth chance.

Consider the vulnerability of our communications. Suppose an enemy spy should locate our conduits, and on the night before an attack should sneak out and cut the cable in a couple of places? Certainly, the great powers are pretty well informed concerning all of our important coast defenses; so while this occurrence is the millionth chance, yet *it is far from being an impossibility.*

A much more probable disaster may result from enemy gunfire. Suppose the attacking force has ten battleships averaging eight major caliber guns apiece, each gun capable of firing one shot per minute; this is certainly a conservative estimate. In the short space of five minutes, such a fleet would deliver no less than 400 projectiles. Firing at only *half* the maximum rate, in one hour at least 2400 shots could be fired. Moreover, the impacts would not be scattered all over the countryside; on the contrary, since the salvos would be aimed at our batteries, the projectiles would fall in a relatively small area adjacent to these batteries. Is it prudent—is it reasonable—this blithe assumption of ours that not a single chance projectile can possibly smash a telephone conduit?

All of these considerations must have occurred to practically every Coast Artillery officer. Why, then, are most of our batteries today devoid of self-contained base (or vertical base) range-finders?

It would seem that there are only two possible reasons. One reason is the superior accuracy of the base-line system; the other, the expense of installing range-finders.

The following figures, taken from Ordnance Pamphlets which lay down specifications to bidders on self-contained base instruments, give some idea of the errors to be expected with these range-finders.

9-Ft. Range-Finder, Horizontal Base, Self-Contained

O. P. No. 3067

Range, yards	Maximum allowable error, yards
3000	19
6000	69
9000	210
12000	440
15000	742

15 and 22-Ft. Range-Finders, Horizontal Base, Self-Contained

O. P. No. 3092

Range, yards	Maximum allowable error, yards
3000	21
6000	59
9000	142
12000	291
15000	537

The specifications, published in 1918, state that "any instrument whose curves show a higher percentage error at any point than the range-error curve above" will be rejected.

It is evident that the errors increase rapidly for ranges above 10,000 yards; but below that range, they are not so great as to preclude a reasonably accurate fire.

Further, it must be remembered that the base-line system is not absolutely accurate by any means. There are no figures available that give a true measure of the accuracy of baseline plotting. However, the writer has been informed by an officer of long experience that he once made a test by using logarithms to re-calculate the ranges of a plotted course, and found the range-section had consistently averaged errors of more than 50 yards in those parts of the field of fire where the angle at the target was small. Note that this did not include errors of base-end observers.

As far as accuracy is concerned, then, we may conclude that the single-station system is not very accurate beyond 10,000 yards; but even

here, it is a thousand times better than nothing—and it has already been pointed out that many different circumstances may render the two-station system inoperative. Within 10,000 yards, the unistatic system is sufficiently dependable; and if never used at a greater range, its efficiency here would more than justify its existence. For not only is this an extremely critical area; it is also the area in which the Coast Artillery will probably do most execution; for obviously, the shorter the range, the flatter the trajectory and the better the visibility. In these circumstances, can we contemplate with complacency the pitiful spectacle of an accurate and powerful battery firing at random, or lying silent, when a single hit might decide the battle?

There remains only the matter of expense. The current Ordnance price list gives the following figures for horizontal self-contained base range finders: 9 foot, $1750.84; 15 foot, $3833.20; 22 foot, $5231.80. Take the most expensive of the three, add the cost of a pedestal imbedded in concrete, a wooden shack, and a couple of telephones with plenty of wire, and the initial cost is still well under $10,000. This equipment should last indefinitely, but we will be conservative and say that it must be renewed at the end of ten years. Then, we are certainly safe in assuming an expense of $10,000 spread out over ten years, or $1000 per year. Compare these figures with fire insurance.

In the state of Virginia, annual premiums on fire insurance range from twenty cents to ten dollars per hundred, and in the majority of cases, property can be insured for only three-quarters of its actual value. Now the present type of 16-inch 2-gun seacoast battery, including guns, mounts, emplacements, and mounting, totals $1,500,000. (Boatwright in the COAST ARTILLERY JOURNAL for April, 1923.) Three-quarters of this sum is $1,125,000. The annual fire insurance premium on an investment of this value, taken at the most favorable rate (20 cents per $100) would be $2250—two and a quarter times the $1000 per year needed to insure a major caliber battery. Or, getting back to initial outlay, the money invested in a single 16-inch battery would be sufficient to purchase and install *one hundred and fifty* horizontal self-contained base range finders—and we can easily imagine circumstances when a single instrument of this nature, located at the right place, would be worth a dozen sixteen-inch batteries located elsewhere. Of course, we want all the big gun batteries we can get—the preceding comparison is simply intended to show the small expense involved.

In all this discussion of cost, note that, for the sake of conservatism, the cost of buying and installing a self-contained base range finder has been taken as $10,000, whereas the actual price of the instrument itself is only $5231.80, and that this is for the 22 foot instrument; the 15 foot range-finder costs only about three-fifths as much, although it is practically as accurate; while the 9 foot range-finder, less accurate but still serviceable for emergency use up to 10,000 yards, sells for a mere $1750.84.

You could buy *856* of these little fellows for the price of a sixteen-inch battery!

Is it good business to sink a million and a half dollars in a tremendously important fire unit, and omit the expenditure of a paltry $10,000—only 0.7 of one per cent—when that small sum would halve the chances of a possible catastrophe? What will we say to the country if some day a major caliber battery fails to deliver accurate fire at short range, while an enemy fleet steams on to triumph?

Under Five Flags

The History of the Fortification at Mobile Bay

By Major E. J. Cullen, C. A. C.

NO other of our coast fortifications can boast of a history so diversified, nor of a past more closely allied with the making of our nation, than can those at Mobile Bay. The flags of five different nations have flown above forts located there, and on four occasions hostile fleets have heavily attacked these forts. Twice they have been surrendered in the face of overwhelming attacks, but only after resistances, the records of which will forever stand to the honor of the defenders. The history of these fortifications, dating back to the early part of the sixteenth century, can be divided into seven distinct periods: Two Spanish, one French, one English, one Confederate, and two United States (Federal).

The First Spanish Period

In 1519, Garay, the Spanish Governor of Jamaica, sent an expedition commanded by Pinedo, to search for a northwest passage around Florida. This expedition discovered and explored a large bay to the west of Florida and to this day gave the name of "Bay de Spiritu Santo" (later renamed Mobile Bay by the French). Based upon this discovery, and upon the later explorations in the vicinity by Navarez (1528), Maldonado (1539), De Soto (1540), and Bazarres (1558), the Spanish crown, more than a century later, laid claim to this region. The records of these explorations were vague and indefinite. At that time other events and discoveries were centering attention upon more attractive parts of the New World. It is a fact that the very existence of this region was forgotten until its re-discovery more than a century later.

The French Period

European interest in this region began more than a century later, with the exploration of the Mississippi by LaSalle in 1682. The French were first to realize the importance of establishing a trading post in the vicinity of the Mississippi delta. With this purpose in view, an expedition, commanded by Pierre le Moyne, Sieur de Iberville, sailed from Brest in October, 1698. Iberville made his first landing, January

31, 1699, at the present site of Fort Morgan. While exploring this vicinity, he visited a large island a few miles to the westward, where he found great quantities of human bones. Believing it to be the death place of Navarez's ill fated expedition, Iberville named it Massacre Island (later renamed Dauphin Island, 1701).

Proceeding further west, Iberville established a settlement in May, 1699, at what is now Biloxi, Mississippi. This settlement was transferred, 1701, to Massacre Island, then renamed Dauphin Island, where a fort was constructed near the present site of Fort Gaines. Traces of this settlement can still be seen. The foundation of a kiln used by these settlers to obtain lime from shells, stands to-day about two miles from Fort Gaines. Among the few present inhabitants of Dauphin Island, can be found names that appeared in the roster of Iberville's colony.

In 1702, Iberville's brother, Jean Baptiste le Moyne, Sieur de Bienville, established a fort on the Mobile River about twenty miles above the mouth. This was named Fort Louis de Louisiane, and its local settlement became the government seat of the French Province of Louisiana. Because of floods, this settlement was transferred to a site at the mouth of the Mobile River in 1711. Here a new Fort Louis was constructed, and out of this settlement grew the present City of Mobile. This name, "Mobile," given by the French to all this region, is believed to have been derived from the Indian word "Maubila," a name applied to a local branch of the Choctaws because of their knowledge of the art of swimming.

The first of the several attacks that have been made on forts at the entrance to Mobile Bay occurred in 1713, when a band of pirates from Jamaica captured and destroyed the Dauphin Island fort. In 1717 the French then built Fort Tombigbee on Dauphin Island somewhat nearer the location of the present Fort Gaines, and commanding what was then the West Channel of Mobile Bay, and the anchorage between Pelican and Dauphin Islands. This fort successfully withstood a twelve-day attack made by a Spanish Fleet from Pensacola, in 1719. Later a hurricane destroyed the West Channel and the anchorage, thus rendering Fort Tombigbee useless as a defense against naval attack; and as a consequence it was dismantled in 1725, and its armament transferred to Mobile.

The English Period

Under the terms of the Treaty of Paris, 1763, all French possessions east of the Mssissippi passed into the control of England. In accordance therewith the French garrison evacuated Mobile when, on October 20, 1763, a British force under Colonel Robertson arrived to take possession. The English then changed the name of the Fort at Mobile to "Fort Charlotte." England retained possession of this region for only twenty years.

The Second Spanish Period

In March 1783, Mobile was attacked by a Spanish force of two thousand men commanded by Galvez. After a two weeks siege, the British surrendered Fort Charlotte, and the Spanish took possession of Mobile and all the surrounding territory. The efforts of the Spanish to develop and hold this region, though unsuccessful, have left certain indelible marks on this locality. In 1785, the land from Perdido Bay to the end of Mobile Point was granted to F. and J. Suarez. At about the same time, Dauphin Island was granted to Joseph Moro. These Spanish grants were afterward confirmed by United States Courts, thus establishing the basis of the present titles to this property. The first house on Mobile Point was built near Navy Cove in 1790 by John Courrege under authority of a Spanish Fishing Grant. The Spanish control of Mobile lasted thirty years.

The First United States Period

The Louisiana Purchase, 1803, marked the entry of the United States to this region, for it was claimed by the United States that Perdido Bay was the eastern limit of the territory purchased from Napoleon; but Spain remained in control of Mobile until the "War of 1812" brought complications, caused by England's being permitted to use Pensacola and Tampa as bases for operations against American commerce. In accordance with orders from President Madison in 1813, an expedition commanded by General Wilkinson, was organized at New Orleans for the purpose of capturing Fort Charlotte (Mobile) and securing control of Mobile Bay. This expedition moved from New Orleans in two columns. The first column, consisting of seven companies of the 2nd U. S. Infantry (now 1st U. S. Infantry) and Lieutenant A. L. Sand's Battery, 1st U. S. Artillery, under direct command of General Wilkinson, was transported by water to Dauphin Island and proceeded thence by land toward Mobile. The second column, consisting of the remainder of the 2nd U. S. Infantry, commanded by Colonel John Bowyer, moved overland from New Orleans to the line of the Tensas River and thence south towards Mobile. These combined forces effected the capture of Fort Charlotte on April 13, 1813.

Immediate steps were then necessary to close Mobile Bay to British naval vessels operating in the Gulf of Mexico. Colonel Bowyer arrived on Mobile Point on April 20, 1813, with part of his regiment and began the construction of a fort there to cover the main channel. This fort "Fort Bowyer," located on the site of the present "Old Fort Morgan," was completed in May, 1814. It consisted of a semi-circular battery constructed on a chord 200 feet in length, with parapet walls fifteen feet in thickness. The landward side of the battery was covered by a bastion, connected thereto by curtains 180 feet in length. The entire

work was surrounded by a ditch twenty feet wide, with a glacis slope affording complete concealment. The entire construction was of sand with pine log revetment, and contained no casemates. In the main battery were mounted five 9-pounders, six 6-pounders, eight 24-pounders, and three 32-pounders; and in the bastion were two 9-pounders, and one 24-pounder. The garrison consisted of a mixed command of 130 men under Major William Lawrence, 2nd U. S. Infantry.

A British fleet of four ships, commanded by Commodore Percy, arrived off Fort Bowyer on September 14, 1814, and began an immediate attack by attempting to establish shore batteries on the Gulf beach and take the fort from the landward side. These attempted landing operations were repulsed, and the next day the fleet moved inside the harbor, took up anchored positions opposite the main battery; and at about four o'clock that afternoon began a heavy bombardment of the fort. General Andrew Jackson, then at Mobile with several thousand men, attempted to send reenforcements to Major Lawrence; but the vessels conveying them were driven back by the fire of the hostile fleet. Perceiving that they were cut off entirely from all outside assistance, the garrison of the fort, to the last man, took solemn oath not to surrender; and adopted a motto, "Don't give up the fort," derived from the words of Major Lawrence's illustrious namesake of Chesapeake fame. The fleet maintained a terrific fire on the fort until about eleven o'clock that night when the guns of the defense succeeded in destroying the enemy's flagship *Hermes* (28 guns). This disaster, accompanied by considerable loss of life, caused the fleet to abandon the attack and to withdraw at once to Pensacola. The losses in the fort were four killed and four wounded; while the enemy suffered a loss of 162 killed and 70 wounded.

Immediately following the withdrawal of the enemy, repairs were made to the fort, and its garrison enlarged to 18 officers and 359 men—Major Lawrence being brevetted and retained in command. General Jackson proceeded overland to Pensacola and drove out the British fleet on November 6, 1814. Jackson then moved to New Orleans where he arrived with his troops on December 2, 1814. British operations against New Orleans opened on December 16, 1814, and culminated in the withdrawal of the entire British expedition on January 18, 1815. But this battle of New Orleans was not "the last battle of the War of 1812," as it is so frequently called. Three weeks after their withdrawal from New Orleans, this British expedition made an attack on Fort Bowyer, as part of their plan to capture Mobile before the possible return of General Jackson.

On February 7, 1815, the British fleet, consisting of thirty-eight ships, commanded by Admiral Cochrane, accompanied by 7500 troops under General Lambert, appeared off Fort Bowyer. They immediately landed 5000 troops on the Gulf beach of Mobile Point about three miles

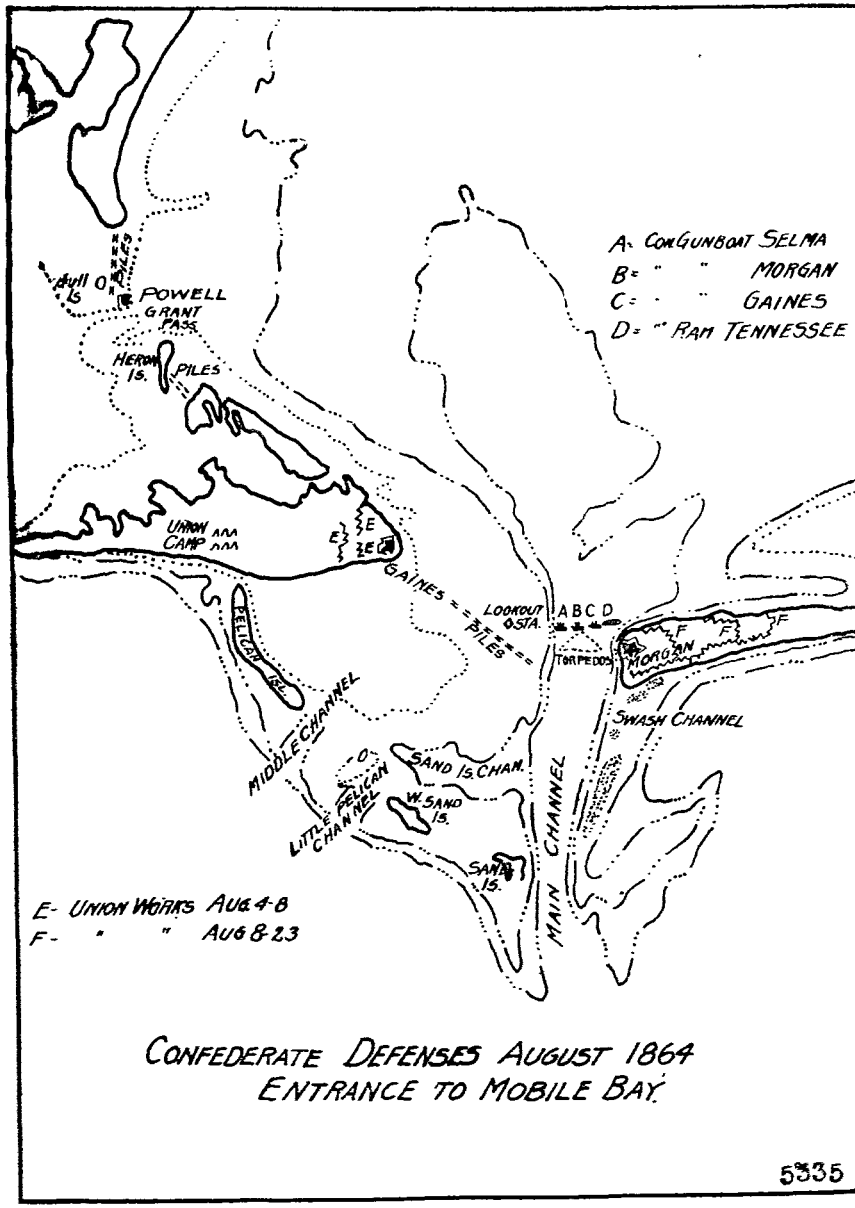
east of Fort Bowyer, and also landed 2500 men on Dauphin Island. Early the next day, February 8th, the fleet moved inside Mobile Bay, and covered the transfer, by boat, of their troops at Dauphin Island to a point east of Fort Bowyer, near Navy Cove. These troops at once joined the forces landed on Mobile Point on the previous day, and gave the British 7500 men in position to attack the landward side of Fort Bowyer. The fleet then took up position to bombard the fort from two sides, twenty-five ships being placed on the south, or Gulf side, in line extending to near Dauphin Island; while thirteen ships occupied a similar line on the north, or Bay side. Both lines were practically parallel to the shore and brought a heavy converging fire to bear on the main battery of Fort Bowyer. Under cover of this fire the land attack advanced that day to within 700 yards of the bastion.

At this point the attacking force began siege operations, which they carried on for four days in conjunction with a continuous bombardment by the fleet. On February 12th the siege works had approached to within forty yards of the fort, whose garrison was then without food or water; and was completely cut off from any reenforcements that General Winchester might attempt to send from his small force at Mobile. Major Lawrence was therefore compelled to surrender. The American losses were one killed and ten wounded, and the British losses were said to have been at least forty killed. Shortly after the surrender, Admiral Cochrane learned of the signing of the Treaty of Ghent, and accordingly, permitted Major Lawrence and his command to proceed to Mobile; where Major Lawrence, on March 25, 1815, was court-martialled and exonerated for the surrender of Fort Bowyer. General Lambert, commanding the British forces, withdrew from Fort Bowyer and sailed from Mobile Bay with the British fleet on April 1, 1815.

Aside from being "The last Battle of the War of 1812," the operations of Admiral Cochrane and General Lambert against Fort Bowyer are noteworthy from another standpoint. In 1864, Admiral Farragut and General Granger employed against Fort Morgan, tactics similar thereto in almost every detail, even to the number of ships and troops engaged, due allowance being made for improvements in fortifications and artillery and for the presence of floating and submarine defenses.

Fort Bowyer was never garrisoned after the evacuation by the British, and in 1821, was demolished to prepare a site for a new fort. Congress made the first appropriation, $38,000, for the construction of Fort Morgan on March 3d, 1821. Completed in 1833, this work was named in honor of General Daniel Morgan of Revolutionary fame. It then consisted of a five bastioned closed work, entirely surrounded by a dry moat, with a counterscarp battery on all land faces, and a detached shore battery covering the channel. The entire construction was of brick, with walls thirty feet in height. One tier of guns was mounted in casemates and a second tier was mounted *en-barbette* on top of the

main work. A citadel inside the fort proper, gave position for a third tier of guns, and was used for magazines, storerooms, and quarters for the garrison. From 1821 to 1861 the sum of $800,000, was expended



for the construction and upkeep of this fort; but no garrison was stationed there, except during a period of the Mexican War when it was used as a supply base for General Scott's campaign.

In 1824, President Monroe sent a special message to Congress stating the necessity of additional fortifications required on the west side of the entrance of Mobile Bay. In accordance therewith, Congress on March 3, 1825, appropriated the sum of $73,727.00, which was used for the construction of Fort Gaines on the eastern end of Dauphin Island. Though from that date until 1861, the sum of $454,000.00 was expended on this fort, no permanent garrison was ever maintained there.

The Confederate Period

On January 5, 1861, Fort Morgan and Fort Gaines, then occupied by caretakers, were seized by Alabama State troops preparatory to the passage of Articles of Secession later enacted by the Alabama Legislature on January 11, 1861. The Confederate government immediately placed strong garrisons at both forts and also constructed an earthwork "Fort Powell" on Tower Island just north of Fort Gaines, to cover Grant's Pass, leading from Mississippi Sound into Mobile Bay. So strongly did the Confederates develop these defenses of Mobile Bay, that except for the blockade, this harbor was not molested by the Federal forces until 1864.

Plans for the capture of Forts Morgan and Gaines by combined land and naval attack were made by the Union government in July 1864, and contemplated the use of thirty ships under Admiral Farragut and a force of 5500 men commanded by General Gordon Granger. The Confederate defenses had been further augmented by the construction of a line of piling extending across the shoal water from Fort Gaines to the main channel, and by the presence at Fort Morgan of a Confederate naval force of four vessels, commanded by Admiral Buchanan, of *Merrimac* fame. These vessels were the *Tennessee* (Iron Clad Ram), and *Selma*, *Morgan*, and *Gaines* (Steam Gunboats). The garrison and armament of the forts are shown in the following table:

FORTS	MORGAN	GAINES	POWELL
Commander	Brig. Gen. R. L. Page	Col. C. D. Anderson	Lt. Col. J. M. Williams
Troops	1st Tenn. 1 Co. 21st Ala. 2 Cos. 1st Ala. Arty.	6 Cos. 21st Ala. 2 Cos. 1st Ala. Arty. 1 Co. Pelham Cadets	2 Cos. 21st Ala.
Armament	7 10″ S. B. 3 8″ S.B. 2 8″ Rifles. 2 7″ Rifles. 7 6.5″ Rifles. 1 3″ Rifle. 11 32-Pdrs. 1 30-Pdr. 11 24-Pdrs. 1 12-Pdr. Howitzer.	3 10″ S. B. 5 32-Pdrs. 4 30-Pdrs. 15 24-Pdrs.	1 10″ S. B. 1 8‴ S. B. 2 7″ Rifles. 1 32-Pdr.
Total Guns	46	27	5
TotalTroops	400	600	150

General Granger's forces consisted of twelve regiments of Infantry, one regiment of Cavalry, and about two regiments of Artillery, as follows:

INFANTRY: 20th, 34th and 38th Iowa; 77th and 94th Illinois; 96th and 97th U. S. Colored; 20th and 23rd Wisconsin; 67th Indiana; 96th Ohio; 161st New York.

CAVALRY: 3rd Maryland; Co. "A" 2nd Maine; Co. "M" 14th New York.

ARTILLERY: 6th Michigan (Heavy); One Battalion 6th Indiana (Heavy); Rawles Battery, 5th U. S.; Battery "A" 2nd Illinois; 17th Ohio Battery; 2nd Connecticut Battery.

These troops were landed on Dauphin Island on August 3rd, and immediately proceeded to a close investment of Fort Gaines, thus preventing any of its garrison being sent to strengthen the defenses at Fort Morgan. The Monitors with the fleet, were stationed inside of Sand Island and bombarded Fort Gaines throughout the entire next day, while preparations were made by Admiral Farragut for the run-by of the fleet contemplated for the following morning.

At about six o'clock on the morning of August 5th, the fleet proceeded to enter the harbor in the following formation: The monitors *Tecumseh*, *Manhattan*, *Winnebago*, and *Chickasaw*, in single column in the order named, moved ahead to close in on Fort Morgan and cover the passage of the main fleet which consisted of eight steam sloops and six gun boats. Each gun boat was lashed to the port side of one of the sloops, and thus protected from the fire of the forts. This column moved in the following order: *Brooklyn*, and *Octorara*, *Hartford* (*Flagship*) and *Metacomet*, *Richmond* and *Port Royal*, *Lackawana* and *Seminole*, *Monongahela* and *Kennebec*, *Ossippee* and *Itasca*, *Oneida* and *Galena*. During the run-by six gunboats: *Bienville*, *Sebago*, *Pinola*, *Pembina*, *Tennessee*, and *Genesee* maintained a bombardment of Fort Morgan from the Gulf side. Five other gunboats: *Stockdal*, *Estrella*, *Narcissus*, *J. P. Jackson*. and *Conomaugh*, at the same time attacked Fort Powell, and attempted to force Grant's Pass.

The *Tecumseh* struck a mine when opposite Fort Morgan, and was sunk. This caused confusion in the main column and during the ten minute period that it lasted, the fleet suffered its heaviest losses; the *Brooklyn* alone being struck seventy times. The *Hartford* then took the lead and the fleet succeeded in passing beyond the limit of fire of Fort Morgan, and came to anchor near the north end of Middle Ground. Here the Ram, *Tennessee*, attacked the Union ships and after a severe engagement during which the *Tennessee* itself was rammed several times, Admiral Buchanan was forced to surrender. Of the Confederate gunboats, the *Gaines* was disabled early in the action and driven ashore at Fort Morgan; the *Selma* was forced to surrender, while the *Morgan* was pursued and forced to run aground near Navy Cove, but escaped to Mobile that night.

Admiral Farragut's losses in the engagement were 145 killed, 170 wounded, and 4 captured. This included 93 drowned by the sinking of the *Tecumseh.* The Confederate naval losses were 12 killed, 20 wounded, and 280 captured. As most of the fire of the fleet passed over Fort Morgan, the losses inflicted upon the garrison were very slight. The failure of the fort to inflict heavier punishment upon the fleet was due to the high speed and the chain side-armor of the vessels. Although the fort fired 491 projectiles, and scored over one hundred hits, its guns were not of sufficient caliber to damage seriously the ships. Defective moorings, strong tide current, and depth of water accounted for the failure of the mine field to sink but one ship.

The Confederates evacuated Fort Powell during the night of the 5th. Fort Gaines was surrendered on the 7th after a heavy attack by Granger's forces, assisted by the monitor *Chickasaw.* On the 9th, under cover of a heavy bombardment of Fort Morgan by the fleet, the Union forces on Dauphin Island were transported to Navy Cove. Battery Bragg, a field work 2700 yards east of Fort Morgan, was immediately abandoned by the Confederates ,and preparations were made by them to withstand a close siege. Heavy sand traverses were constructed to protect the sally port and casemates of the fort; and buildings and other obstructions in the landward field of fire were removed.

The Union forces, on August 10th completed their first line of approach, extending entirely across Mobile Point about 2000 yards east of Fort Morgan. This was immediately followed by the construction of a second line about 500 yards nearer to the fort, and on the 14th the third line had been established within 700 yards of the glacis. During this period the fleet bombarded the fort several hours each day. This, in conjunction with the fire of several heavy batteries ashore, kept the garrison of the fort occupied with the repair of traverses and other works, and prevented any offensive action on their part. On the 15th the guns of the fleet succeeded in breaching the right face of No. 4 Bastion. The topographic features greatly aided the advance, which by the 21st, had approached to within 200 yards of the fort. Under cover of the sand-dunes, sharpshooters drove off the gun crews of the fort and reduced the garrison to a state of passive defense.

At daylight on the 22nd the fleet, including the captured *Tennessee,* encircled the fort on three sides, and in conjunction with land batteries of 25 guns and 16 mortars opened a heavy fire. Maintained steadily throughout the day, the fire was increased to furious intensity at sundown; and then followed by the steady fire of the mortars and heavier calibre guns at regular intervals throughout the night. Every gun in the fort, except two, was dismounted; all bomb proofs and magazines were demolished; the citadel within the fort was destroyed by a conflagration caused by mortar fire, and the fort was reduced to a mass of ruins. Eighty thousand pounds of powder were removed from the

magazine and destroyed within the fort in order to prevent explosion. It was seen that further resistance was useless, and at dawn, August 23, 1864, the fort surrendered, having withstood the siege for fifteen days. The entire operation, from the landing at Dauphin Island on August 3rd, to the surrender of Fort Morgan on August 23rd, had required twenty days to complete.

The Confederate casualties in this siege were one killed and three wounded; and the Union forces, seven wounded. The entire action on the part of the garrison was limited to a purely passive defense that finally developed into a mere test of endurance, which accounts for the remarkably small list of casualties on both sides. However, in justice to the Confederates under General Page, as well as to the garrison under Major Lawrence in 1815, it must be admitted that they were hopelessly lost from the instant that the hostile fleet forced the harbor entrance, and gained control of their only line of communication with Mobile. Both Commanders (Lawrence and Page) accomplished all that could reasonably have been expected of them, and that was to detain the enemy for a certain length of time, the time necessary for him to effect the capture of the fortifications at the harbor entrance. Both instances illustrate the futility of placing defensive works beyond proper supporting distance of the main defending force, and of the futility of expecting unsupported fortifications to execute a positive defense.

The United States Period

After the close of the Civil War, the walls and casemates of Fort Morgan were repaired; the ruins of the citadel were removed; and the entire work was placed in practically the same condition that it stands to-day. No information is obtainable as to the armament installed, nor is it believed that any garrison was stationed there except possibly during the Reconstruction Period. The sum of $500,000.00 was expended upon the repair and upkeep of Fort Morgan from 1865 to 1898; but threatened hostilities with Spain in 1898, found this fort ungarrisoned.

The present development of Fort Morgan dates with the arrival thereat of Battery "I" 1st U. S. Artillery, on March 19, 1898. The officers of this Battery were Captain R. H. Patterson, (now Colonel, retired), 1st Lieutenant T. W. Winston, (now Lieutenant-Colonel, retired) and 2nd Lieutenant W. Chamberlaine (now Colonel, retired). On June 27, 1898, Company "F" 3rd Texas Volunteer Infantry, (Captain Lyon) arrived for station, followed on July 27th by Company "K" (Captain Young), same regiment. The armament at that time consisted of 8-in. converted rifles mounted in the Old Fort. The first guns of the present modern fortification were mounted by "I" Battery soon after its arrival in 1898. Since that date the sum of $1,500,000.00 has been expended and to-day Fort Morgan is a modern coast defense work, capable of rendering as good an account of itself as it ever did in the days gone by.

The Mission and Tactics of Antiaircraft Defense

By Captain Benjamin F. Harmon, 62nd Artillery, C. A. C.

Editor's Note.—This is a short talk delivered by Captain Harmon, on the first Antiaircraft Day, at Fort Totten, on the subject of Antiaircraft defense of front line and rear localities. In connection therewith, see the account of the Antiaircraft Days in *The Bulletin Board* of the July JOURNAL

IT is essential in the first place, that we see clearly the *mission* of antiaircraft troops before considering the *means* by which that mission is to be accomplished. The primal mission of antiaircraft units is to protect all matériel and personnel (except antiaircraft) against hostile aircraft operations. Antiaircraft matériel and personnel should properly be excluded from this protective mission. By this I mean that we must never locate any of our principal weapons (guns, machine guns and searchlights) with a view to protection for our own units. For example, a searchlight has been given a definite position in a scheme of defense; the commander who, in his estimate, assigns machine gun units from the Machine Gun Battalion for the protection of that light has committed a tactical error in assigning a principal weapon for the defense of our own units. The searchlight battery is assigned automatic rifles as secondary weapons for accomplishing the secondary mission of protecting itself. If the searchlight battery were given machine guns instead of automatic rifles—which eventually I trust will come to pass—those machine guns will become secondary weapons and their mission a secondary one, namely, protection for the searchlights. If a machine gun from the Machine Gun Battalion is properly located near a searchlight it is with the idea of destroying planes caught in the beam for the protection of other elements and the protection afforded the searchlight is incidental thereto. This is by no means splitting hairs. It is bearing in mind the primal mission assigned to antiaircraft troops and in planning any operation it is vital that this be done.

Before passing from the subject of attacks upon antiaircraft elements let me place the matter before you in this light: every bomb or machine-gun bullet used by the enemy against our elements cannot be used elsewhere; every foot of altitude lost or second wasted in attacking antiaircraft batteries has prevented the enemy just that much from attacking any other area. Thus, by being a target we are accomplishing our principal mission.

We are solely defensive troops. The Air Service has both offensive and defensive rôles to play and in their defensive rôles they have a very

similar mission to ours. It is part of our mission to cooperate in every way with the Air Service. You must realize that both services are essential. You must further realize that the attack of our own aircraft upon hostile aircraft is the best possible means of defense to be afforded. The Air Service, however, cannot always be present in sufficient numbers, at the proper altitude, time, and place to counter all hostile attacks, nor can they see at night. Therefore we must assist the Air Service to place the proper number of planes at the proper altitude, time and place by maintaining a careful and continuous surveillance over the enemy air movements and furnishing information based thereon. We will engage all targets within range but we must cease firing when our own planes are in a position to attack and permit them unhampered action. It cannot be too firmly impressed upon you that if the Air Service and Antiaircraft Service are not on cordial terms someone is failing in the performance of his military duties because the close liaison necessary between the two services cannot be maintained except through personal contact.

Having put before you our principal mission and the necessity for cooperation with the Air Service in accomplishing that mission, we shall discuss briefly the three classes into which antiaircraft defense naturally falls: namely—Front Area, Rear Area and the special case of large cities like Paris, London or New York.

The front area is the area immediately in rear of the Infantry lines and may be considered as the corps area. The terrain here is replete with all the offensive and defensive personnel and matériel to be used in combat (except the Air Service which is farther to the rear.) We cannot consider isolated units, in planning a defense, but must so arrange our elements that the entire zone is covered at all times. Thus we will have a band of protection paralleling the entire front. Following are the facts which influence us in disposing of our principal weapons:

First, we must engage the enemy as soon as possible, which is to say, over his own lines. If we locate our guns and machine guns at maximum range from our front lines, the enemy could operate at will over our most advanced elements and we should not be accomplishing our mission. The first line of guns and machine guns should be located, therefore, about half their maximum horizontal range from the front. To cite a concrete case, the maximum horizontal range of our 2600 f.s. guns, when firing at 6000 yards altitude, is 6000 yards. Our first line of guns should be about 3000 yards from the front from which point they can engage a hostile plane 3000 yards within the enemy lines. Similarly the first line of machine guns should be about 500 yards from the front.

Second: The defense must be continuous in width. The enemy soon determines a gap in the defense and utilizes that knowledge for a safe passage over the lines.

Third: The defense must be extended in depth in order that planes attempting to cross the lines will be under fire as long as possible.

We should not place the searchlights close to the front for various reasons. In the first place they would draw fire from both ground and plane within the congested area. Secondly, the obvious reason for placing searchlights close to the front is to enable the gun batteries to engage targets caught in the beam. On the other hand I believe front line batteries should never be called upon for night firing nor can they properly do so and my experience with French batteries bears this out. French front line batteries never fired at night. Consider that an Antiaircraft battery is on duty continuously from daylight to dark. How long, do you think, would it continue to function if it were on duty from dark to daylight as well? The human system must have some sleep. Bear in mind, now, that I am prescribing a general policy and I say it should not direct that antiaircraft troops will not engage in sleep. Of course in an emergency we should go night and day as long as we could move.

One further point is that the gun batteries will be unable to organize for night fire if the front (and hence their positions) is shifting at all.

For these reasons, therefore, the lights should be placed in rear of the gun positions. Here they will be extended across the width to be defended so as to form a solid band of lighted zone through which planes must pass before reaching the vulnerable areas in rear. Here the lights themselves will turn planes back and they may be assisted by third line machine gun and gun sections *detailed* and *positioned* for that exclusive reason, or night pursuit planes may attack such hostile targets as are illuminated.

The following is a resumé of our duties as front area defense troops, each duty, you will note, being consistent with the primal mission emphasized in the beginning.

First: To maintain a continuous surveillance over the air and furnish a complete record thereof to G-2 and to the Air Service. This is an intelligence duty and permits the Air Service to take the necessary combat measures and assist G-2 greatly in predicting enemy operations. This applies both day and night.

Second: To cooperate with the Air Service to prevent, by our fire, hostile airplanes from crossing into our territory, and if such crossing is made to prevent them from accomplishing any mission. This is our principal combat duty and applies only to the daytime.

Third: To protect observation balloons. Of course this is included in the preceding duty, but it is a special class of fire in which we must be thoroughly trained and is mentioned separately for emphasis.

Fourth: To furnish a band of illumination through which hostile planes must pass to reach sensitive areas to the rear. This is the principal

combat duty of the searchlight battery and applies, of course, to the night time only.

The defense of a rear area is altogether different from that of the front area. We may consider the rear area as being the Army and G. H. Q. Areas. Here will be found the vital elements that enable the combat forces on the front to exist and function, large Air Service units; ammunition dumps, regulating stations, and other component parts of the Services of Supply; factories, railroad bridges, cities, training areas and innumerable other things the destruction of which would be of value to the enemy. This total area is too vast to consider for an instant inclusive protection, as in the case of front line defense, but we must resort to selective protection. Each individual city, railhead or other area is a separate problem which must be solved distinctly from all others.

Here our mission is slightly narrowed down. We are to protect that individual area about which our elements are disposed. Any other duty would be of secondary importance. For example we will assume that a regiment has been ordered to Mitchell Field for its protection in war time. Our mission in that case would be stated as follows:

First: To prevent hostile aircraft from approaching within bombing distance of Mitchell Field.

Second: To transmit intelligence of approaching attacks to Mitchell Field, to Headquarters of the Antiaircraft Defenses of New York City and to all nearby cities, towns and camps.

Third: To prevent all hostile aircraft from passing the defenses and reaching New York City. Here, you will note, we are functioning as an advance defense for New York City, the importance of which as a target for enemy aviators is self evident.

In rear area tactics we are more concerned with bombing planes than any other type and we will organize solely for night fire. We should organize such a surveillance system that surprise is impossible so that our own planes can be warned and have sufficient time to take the air and meet any daylight bombing raids. Our principal responsibility is for the night time.

It is impossible to prevent an aviator from dropping bombs. We must do the next best thing and make him drop them in the wrong place; on ourselves, if need be. Any conceivable sort of deception, trickery or concealment may be called into use to do this. Insufficient time is available to go into the subject of false defense, luminous camouflage, luminous barrage, defensive balloons and other defensive aids, so I am compelled to confine myself to direct defense by our three principal weapons; guns, machine guns and searchlights.

The guns should be located about 2000 yards from the defended area for two principal reasons: First, because it is essential to engage the target as far from the defended area as possible and keep him under

fire for a greater time, and second, because as he approaches to within bombing distance a battery close to the defended area would, at this critical time, have its most unfavorable firing conditions, that is, vertical.

Another point to remember is that once you have properly covered an area by fire from your batteries, to increase the strength of the defense add the additional guns to the positions already selected rather than add new batteries. In other words we want a shotgun effect. For night fire a four-gun battery is infinitely superior to two two-gun batteries.

The searchlights are located in platoons of 4, on a square about 2000 or 3000 yards to the side with the gun batteries in the center of the platoon. Particular care must be taken not to locate a searchlight near a vulnerable area, because it will draw fire. Furthermore, their location must not disclose to the enemy the exact position of the area being defended.

Machine guns are located close to the elements likely to be targets for the enemy and to one side of his probable line of approach so as to fire on a small angle to his path.

Before planning a defense we must first study the location of the enemy aviation units and their flying courses to the area defended. In flying across country to a relatively small target aviators must follow a definite guide, as a road, railroad, river, canal or other clear mark on the terrain. These probable avenues of approach must be determined and the defense extended and strengthened along these avenues in the order of their probability.

The third and last defense problem is that of a large city. Here we must have inclusive defense, because the entire city is a target and must be completely surrounded and filled with defensive measures. There is, properly speaking, no avenue of approach to a large city. No matter how well the streets and buildings are darkened the city can be seen for miles away and attacking formations need use no landmarks to reach it. There is, however, a direction of approach. For example the planes bombing Paris approached from the North. This does not by any means assure that they will not circle the area and finally attack from the South and therefore the South cannot be neglected but by far the greater percentage of attacks will be delivered directly because of the added flying time necessary to circle an area the size of Paris. The North-East and North-West of the city itself, however, are equally liable to attack. The Paris defenses were strengthened to the North, North-East and North-West and were extended North from Paris by advance elements to the front.

Suppose we were developing a complete defense for New York City in the case where powerful enemy air units were in being to the South, for example in North Carolina. Our intelligence system would extend to as near North Carolina as the territory held by our troops would

permit. The combat defense of the city would extend at least to a line from Sandy Hook through Perth Amboy, Rahway and Montclair to New Rochelle and thence would close through Jamaica and Rockaway Beach to Coney Island. Within this boundary would be all the guns and searchlights we could muster, strongest to the South and the defense growing denser as the actual boundary of New York is approached. The machine guns would be selectively sited in the outer defenses wherever an important railroad bridge, factory or other target would tempt the enemy. Within New York the all important financial district would be completely surrounded by machine guns located in such vantage points as the upper stories of the Woolworth Building. Large factories furnishing supplies for the functioning of the Army, power plants and important buildings would be cared for. An alert system covering the entire city and suburbs would be arranged. A corps of experts would deal with the question of overhead cover for the populace. The message center for the headquarters of that defense would require a switchboard room comparable with many present telephone exchanges. Such a defense would not be measured in Regiments but in Brigades.

To my mind the defense of Paris was one of the most remarkable achievements of the war. The true facts are so little known that I shall quote a few to bear out my assertion.

In 1918 Paris was attacked by 483 enemy airplanes of which number only 37 were able to pass the defense and fly over Paris. Seven percent of the attacking planes, therefore, were able to reach their objective. Furthermore 18 of the 483 were destroyed by antiaircraft fire. To regard it from another angle, the total weight of bombs carried in the raid of the 15th of September, 1918, was 22,000 kilograms, but such was the efficacy of the defense that during the entire year the total weight of bombs actually dropped on Paris was 11,680 kilograms; or approximately half of the amount dispatched in one raid. Bear in mind that this was night defense against an unseen enemy and add that item to the ordinary difficulties confronting the antiaircraft artilleryman.

You realize that time was available this afternoon for generalities only. The mass of details necessary for a complete study of Antiaircraft tactics would require hours. I can assure you, however, as I have assured the officers of the 212th and 539th before that the entire 62nd Regiment is more than willing at any time to assist you in arriving at a solution of the many antiaircraft problems, both tactical and technical, that may at first seem difficult.

The efficacy of an Antiaircraft Defense is not in any way measured by the number of planes brought down by it, but by an intangible value "the amount of protection afforded." The American gun batteries in France destroyed one plane per thousand rounds fired and the first battery in particular shot down two planes in the first 120 rounds fired. Our first machine gun units had 41 planes to their credit in

slightly over a month. These figures by no means measure "the amount of protection afforded," but they are the only measurable quantity we can refer to and we are justly proud of them. With such a wonderful record behind us, and with the defense of Paris figures available, whenever I meet anyone who cannot conceive of the Antiaircraft units accomplishing anything, I cannot help but wonder if he is not related to the expert who predicted that the submarine and the aeroplane would never be of value in warfare, or perhaps to the farmer who saw a giraffe for the first time and remarked "There ain't no such animal."

Field Telephone Troubles, Repairs and Tests

Prepared under the Direction of First Lieut. J. E. Harriman, C. A. C. Communications Officer, 61st Art. Battalion

THE following are telephone troubles most commonly encountered in military field telephone work, together with the tests and remedies to be applied. In this particular instance the EE-5 telephone, monocord switchboard and lines of twisted pair, steel strand field wire laid on the ground or on any convenient supports, are especially considered.

I. *a. Trouble*—Home station cannot ring distant station.

b. Causes—(1) Improperly made line connections at telephone.
(2) Open circuit in line.
(3) Magneto of home station out of adjustment.
(4) Receiving circuit open or broken receiver.
(5) Bells of distant station out of adjustment or burned out.
(6) Short circuit in line.

c. Tests and Remedies—
(1) (a) Examine your own line and ground connections to see that they are clean and bright.
(b) See that the ends of line do not touch each other at the binding posts, as this will cause a short circuit.

(2) If line is short examine for breaks. If line is long test for open circuit as described below in par. X.

(3) Hold hand set to the ear with thumb switch depressed and turn magneto. If the magneto is in good shape a vigorous buzz will be heard in the receiver when the armature is rotated, also the armature will turn somewhat hard. If there are no indications that the magneto generates any current, the contact springs must be examined for dirt, grease, being bent out of shape, and not making or breaking contact properly. Clean contacts and bend them back into shape. If magneto still fails to generate current the armature is probably burned out or the magnets have become weak, and must be remagnetized or replaced.

Note: In most magneto telephones the home station bell is rung when the magneto is operated, consequently indicating that the magneto is alright, but in the type EE-5 telephone the home station bell does not ring when the magneto is operated.

(4) Put receiver to your ear and work thumb switch up and down. If the receiver is in good shape a series of clicks will be heard. Repairs to the receiver can not ordinarily be made in the field.

(5) If after making the above tests and finding magneto and receiver in good condition, the distant station is able to call you, the bells of the distant station are probably out of adjustment or burned out and must be replaced or repaired.

(6) A shorted line may be detected by the magneto armature turning hard. Disconnect one side of the line from the phone and while turning the crank touch the binding post with the line end. If there is a short circuit in the line a heavy drag will be noted on the magneto and a fat spark will result when the line is pulled away from the binding post. Test for short circuit in line as described in par. X below.

II. *a. Trouble*—Distant station can not ring home station. Troubles same as in I above and same tests should be applied.

III. *a. Trouble*—Home station can signal distant station but cannot hear distant station talking.

b. Causes—

(1) Operator at distant station is not pressing down on thumb switch.
(2) Battery at distant station may be dead.
(3) Battery contacts corroded.
(4) Broken transmitter cord at distant station.
(5) Thumb switch at distant station fails to make contact.
(6) Carbon in transmitter at distant station packed.
(7) Broken receiver cord at home station.

c. Tests and Remedies—

(1) Operator should press down on thumb switch when talking.

(2) Take out battery and test with voltmeter. Voltage should read about 3, amperage at least 5. Replace battery if dead or worn out. *Note:* The battery should be connected across the ammeter for a fraction of a second only, as the ammeter is of low resistance and is a short circuit to the battery.

(3) Examine contact springs and battery terminals. Scrape away corrosion if any.

(4) Disconnect hand set and touch battery terminals with receiver and transmitter cord, at the same time pressing down on thumb switch. A click should be heard if there are no breaks in the transmitter cord. Perform (5) below and repeat test. If there is still no click, examine transmitter cord for break and splice break.

(5) Examine contacts of thumb switch. Clean and adjust so that they make proper contact.

(6) This can not be repaired in the field. If the transmitter has water in it, it will not work well. This can usually be detected by a sizzling, cracking noise.

(7) Disconnect hand set and touch battery terminals with receiver cord and common cord. If a click is heard the receiving circuit is all right. If not, examine receiver cord for break and splice

IV. *a. Trouble.*—Distant station can signal home station but can not hear home station talking. Troubles and tests are the same as in III above.

V. *a. Trouble.*—Distant station can not signal operator at monocord switch board, although line is O.K. and signalling apparatus at distant station is in good condition.

b. Causes—

(1) Fuse on switchboard burned out.

(2) Shutter stuck on its hinges.

(3) Armature holding shutter up is out of adjustment or bent.

(4) Coil of shutter release magnet burned out.

c. Tests and Remedies—

(1) Examine fuses and replace if found to be burned out.

(2) Trip shutter by hand by raising retaining latch. If shutter does not drop when latch is raised, loosen shutter and clean hinges.

(3) Disconnect line and connect telephone direct to defective section. Turn magneto crank. If armature vibrates, but does not release shutter, it is bent or out of adjustment and must be bent back in shape and adjusted.

(4) If shutter retaining latch does not vibrate when magneto is turned in (3) above the coil or shutter release magnet is probably burned out. This can not be repaired in the field and a new section must be placed in the switch board.

VI. *a. Trouble*—Night bell fails to operate when shutter drops on any section of switch board.

b. Causes—

(1) Battery run down.

(2) Loose or dirty connections on battery or bell.

(3) Contact points on bell corroded.

(4) Drop shutter does not close circuit of signal bell.

(5) Bell coils burned out.

c. Tests and Remedies—

(1) Test battery with ammeter. It should read about 10 amperes. Replace if necessary.

(2) Examine battery and bell connections. Clean and tighten same.

(3) Examine bell contacts. Scrape off any corrosion and adjust so that they make and break contact properly if necessary.

(4) Adjust drop shutter contacts so that drop shutter closes bell circuit.

(5) With telephone receiver in series with battery, touch bell terminals. If a click is heard, bell coils are allright. If not, repairs

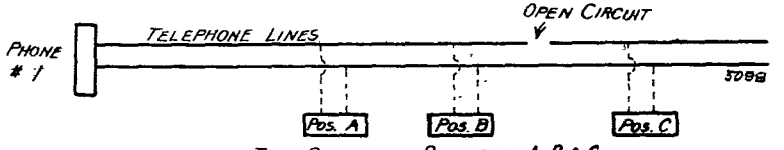
to the coils can not ordinarily be made in the field and the bell should be replaced.

VII. With the exception of replacing a battery, cleaning of contacts, or changing a hand set no repairs should be undertaken by telephone operators unless they have had a special training in telephone repair work.

VIII. The greater part of troubles and interrupted communications are avoided if telephones are examined and tested before they are taken out for service each day.

GENERAL NOTES ON LAYING OF FIELD WIRE

IX. In laying telephone lines with the steel strand twisted pair field wire, care should be taken that all joints are staggered, so that splices are about six or eight inches apart, to prevent short circuits. If the line is to remain in service for several days joints should be soldered, for after they become rusty a very poor connection results, in most cases making service impossible and trouble hard to locate. All joints should be taped, but if tape is not at hand, bare joints will work if



TEST PHONES IN POSITIONS A B & C

FIG 1

staggered enough and they are raised clear of ground. If joints are not soldered when steel strand wire is used, a square knot should be tied to prevent the joint from coming apart. In laying telephone lines they should be tested back to starting point about every quarter mile, so to facilitate the locating of open or short circuits, which frequently happen to the twisted pair field wire, especially if it has been used before. When laying the line, wire should be examined for breaks and damaged insulation and should be repaired at once. Preferably the wire should be spliced and repaired when lines are being picked up, or should be repaired and placed on reels as soon as possible after picking up. Before the reel carts are taken out for laying wire they should be tested for short and open circuits. The wire on one reel should be continuous and have the ends exposed so that it can readily be tested.

X. The accompanying diagrams and descriptions will aid in locating open and short circuits in field lines.

If there is an open circuit somewhere on the line a simple method to locate the open circuit is to connect a telephone instrument on one end of an open circuited line and start out from that end of the line with

a test telephone. The test telephone should be equipped with a pair of test clips so that it can be connected on the line at any place without scraping away the insulation. Connect the test phone to the line at intervals (as at points A & B in the diagram). When a point beyond the break is reached as at point C the tester will be unable to talk to the station at the end of the line and he will know that the break is between him and the station. It is then only a matter of going back along the line testing at points until the break is actually found.

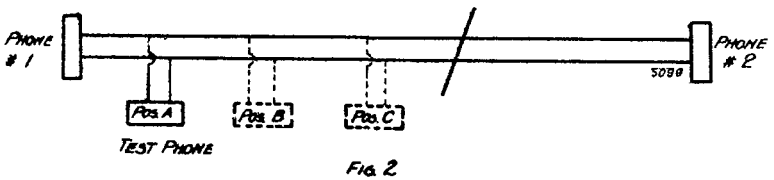


FIG. 2

In locating a short circuit in the line a similar procedure can be followed, but it is better to connect phones and have operators at both ends of the line. The tester can start out from either end of line and snap his test clips on the line at frequent intervals. The farther he gets away from phone No. 1 toward the short circuit the fainter will the communication become. Finally he will not be able to communicate with phone No. 1. He should mark this point on the line and proceed towards phone No. 2 testing at intervals until he can communicate with phone No. 2. He should mark this point. Now the tester has localized in a small section of the line and if examination fail to disclose the short circuit this section can be cut out and good wire spliced in.

The Jones Longitudinal Deviation Ruler

By Major Clifford Jones, C. A. C.

1. The object sought in undertaking the construction of this ruler was to produce a piece of apparatus for determining longitudinal deviations upon which all the required data could be set before the receipt of the angular deviations reported by the observers so that immediately upon receipt of these deviations the over or short could be read without further mechanical manipulation.

It was also desired to limit the size of the apparatus to dimensions which would permit it to be installed in the present plotting rooms, or BC stations, and to produce a design which could be reproduced by battery commanders locally or supplied to them without great expense.

The above requirements have been met with the exception that when shots deviate sensibly from line shots an algebraic addition of two numbers of one or two figures each is required, and if battery commanders are expected to construct the ruler locally they should be furnished with a blue-print chart of scales since the plotting of these scales is quite laborious and also confusing, due to the compensating shifting of the origin which will be referred to later.

2. *Development.* An algebraic formula reduced to logarithmic form has been developed having for known quantities only those ordinarily available in the plotting room or readily obtainable from data furnished by the spotting observers, and having the longitudinal deviation as the unknown quantity. A mathematically correct solution was not sought but accuracy within that of the observing instruments was considered to be satisfactory.

It was found, however, that the only necessary deviation from an exact solution was the treatment, as a parallelogram, of the quadrilateral formed by the intersection of lines radiating from the battery and passing through the target and splash respectively with lines from the observer through those points.

In the following discussion these abbreviations are used:

B—Battery firing, or angle OBT
O—Flank observer, or angle BOT
T—Target or angle BTO
S—Splash of shot
b—Distance OT
o—Distance BT
t—Distance BO

D—Deflection of S in degrees or mils as observed from O
D′—Deflection of S in degrees or mils as observed from B
y—Longitudinal deviation along BT line assuming a line shot
z—Correction to be applied to y to compensate for deflection of shot from target as observed from B
x—Corrected longitudinal deviation
d—Perpendicular distance from T to OS line
d′—Perpendicular distance from T to BS line

These are indicated in the following sketches, Figures 1 and 2.

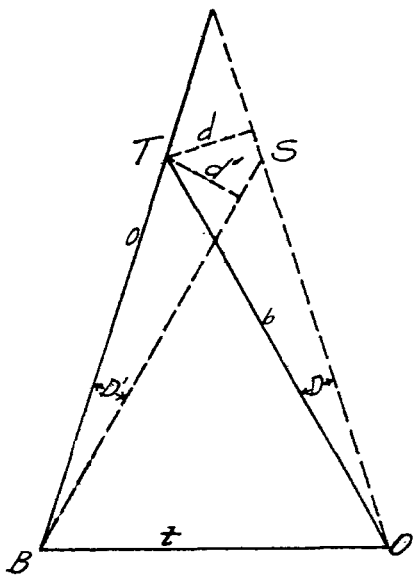


Fig. 1.

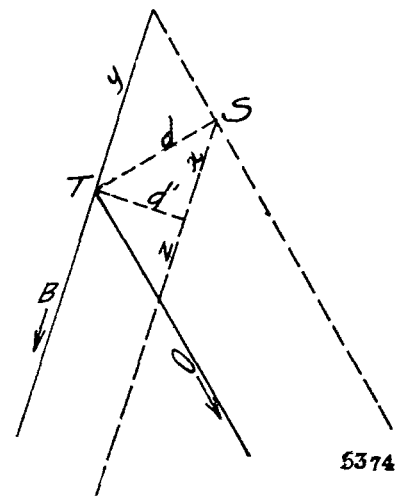


Fig. 2.

The following relations are apparent:

$$x = y - z, \quad \sin T = \frac{d}{y} \qquad \tan T = \frac{d'}{z}$$

$$d = b \sin D, \quad d' = o \sin D'$$

$$T = 180 - (B + O), \quad \sin T = \text{Sin } (B + O)$$

$$\frac{b}{o} = \frac{\sin B}{\sin O} \qquad b = \frac{o \sin B}{\sin O}$$

$$\frac{\sin T}{\sin O} = \frac{t}{o}, \quad \sin T = \frac{t \sin O}{o} = \frac{t \sin B}{b}$$

By substitution we get the following:

$$\text{(a)} \quad y = \frac{d}{\sin T} = \frac{b \sin D}{\sin T} = \frac{b^2 \sin D}{t \sin B} = \frac{o^2 \sin^2 B \sin D}{t \sin B \sin^2 O} = \frac{o^2 \sin B \sin D}{t \sin^2 O}$$

Which is our first equation, all the quantities in the second member being either known from data in the plotting room or from the spotting observers.

$$\text{(b)} \quad z = \frac{d'}{\tan T} = \frac{o \sin D'}{\tan T} = o \sin D' \cot T$$

which is our second equation in which, however, we must obtain T by subtracting azimuth OT from azimuth BT.

$$\text{(c)} \quad z = \frac{o \sin D'}{\tan T} = \left(\frac{o \sin D'}{\sin T}\right) \times \left(\frac{\sin T}{\tan T}\right)$$

$$= \left(\frac{o \sin D'}{\frac{t \sin O}{o}}\right) \times \left(\frac{\sin T}{\tan T}\right)$$

$$= \left(\frac{o^2 \sin D'}{t \sin O}\right) \times \left(\frac{\sin T}{\tan T}\right)$$

which is our third equation, the reason for two developments of z appearing later.

3. *Plotting the scales.* In determining the scale of these scales the first one considered was the y and z scale. The significant readings on this scale lie between 10 and 1000, the difference of the logs of these numbers being 2, and if we use ten as a multiplier of the logs, the readings will be well within the accuracy of the observations and the scale is not inconveniently long when plotted in inches.

The next scale considered is that of the range, the significant readings on this scale lie between 2000 and 25000 and from the y formula we note they enter as squares. The difference between the logs of the squares of these numbers is between 2 and 3, and it is found that by using the same multiplier as above we obtain a scale whose least reading is amply small and which is of convenient length.

Similarly the scales for the other factors were tried out and the multiplier of ten was found to be satisfactory.

To construct a logarithmic slide having readings from minus 12000 (the assumed maximum value of the base t) to plus 25000 (the assumed maximum value of the range o) with the origin placed normally on the ruler would involve a slide of inconvenient length.

This was obviated by assuming the origin ten inches to the left of the reading "10" on scale 6, i.e., the y and z scale, and making compensating shifts of the setting indices and scales, so that the latter show the significant readings only.

This adjustment was made as follows:

(a) Having determined that 10 would be the least reading on the y and z scale this reading is plotted on the extreme left of the scale.

(b) 2000 has been selected as the least reading of the BT scale this is plotted ($2 \log 2000 \times 10 = 66.02$) inches to the right of the zero

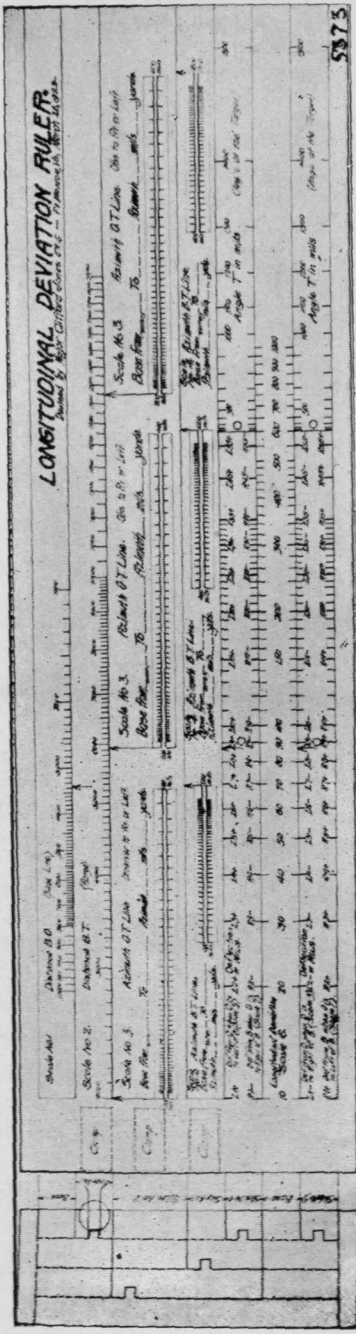


FIG. 3

of this scale, and for convenience of operation the setting index is placed 8.4 inches to the right of the reading 2000 or 74.42 inches to right of origin. (See figure 3).

(c) Three degrees right or left deflection has been selected as the maximum reading on the D and D′ scales; these readings lie 12.81 inches to the left of the zero of the scale. (log sin $3° = 8.719 - 10 = -1.281$, $1.281 \times 10 = 12.81$) and for convenience a reference line is placed .5 inches to the right of this point thus displacing the line 12.31 inches left from the origin. The setting index is placed 8.4 inches to right of this reference line or 20.71 inches to the left of the origin.

(d) By displacing the scale for the base, BO, to the right (74.42 $-20.71 = 53.71$ inches), it will compensate for placing the setting indices on the BT scale and the D and D′ scale at the points indicated in (b) and (c), and at the same time bring the fixed BO scale above the fixed y and z scale.

The actual procedure was to place the BO scales over the y and z scale on the ruler and then determine the positions for the setting indices which would compensate for the shift.

The point 12000 on the BO scale is 2.92 inches to the right of the point 10 on the y and z scale. ($53.71 - \log 12000 \times 10 - \log 10 \times 10 = 2.92$).

(e) No shifts are made of the setting indices on the angle scales from their normal positions.

It will be noted that the angle scales for O and B (shown as Azimuth OT line and Azimuth BT line) are plotted from 25 degrees or 400 mils through 90 degrees or 1600 mils and back to 25 degrees or 400 mils, these points only being indicated. These are reference points and are shown to enable the azimuths corresponding to the various angles to be written in along the top and bottom of the scale after the azimuth of the particular base to be used is known.

Scales representing the $\left(\frac{\sin T}{\tan T}\right)$ factor in the z formula are applied to scales 5 and 7 prolonging these scales to the right and are marked "Angle at the target."

Scales 8 and 9 are for an auxiliary ruler embodying the formula $z = \frac{O \sin D'}{\tan T}$ to be used when T is expected, due to length and direction of the base, to be greater than 25 or 30 degrees and wide deflections are to be expected as in Case III firing.

Scale 8 is the range from the battery, scale 9 is the cot of angles T ranging from 5 to 85 degrees in value. The z scale for use in this slide is the same as scale 6 described above and the sin D′ scale is the same as the scale 7 described above which corresponds to the position of the observer with reference to the battery, i.e., if observer is to right of battery, select scale opposite No. 4 on blue print, otherwise the one opposite slide No. 5.

This auxiliary chart is mounted by applying scales 8 and 6, to a ruler having only one slide, as the fixed scales placing the 10 on scale 6 opposite the 1000 on scale 8. Scale 6 has thus been shifted 20 inches to the right. Scales 9 and 7 are placed on the center slide between scales 8 and 6. The reading 45 on scale 9 being placed opposite a point (20—12.81=7.19) inches to the left of the point 6.00 and 0.00 reading on

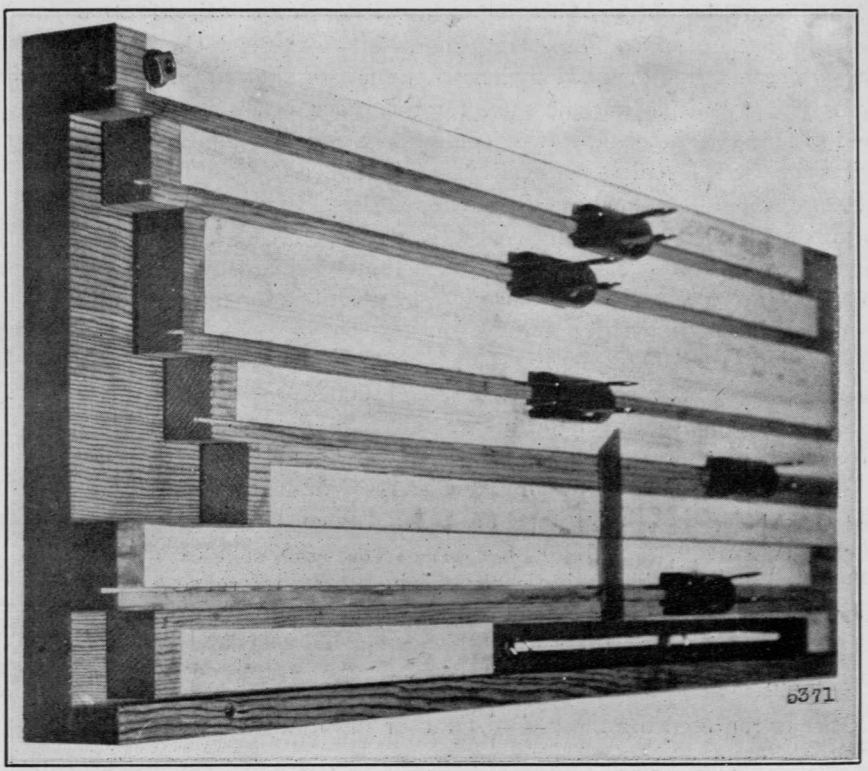


FIG. 4.

scale 7, (see c above). The $\frac{\sin}{\tan}\frac{D'}{T}$ factor thus moves as a unit between the 0 factor (range) above the z reading below, the scales from top to bottom appearing in the order 8 on base, 9 and 5 or 7 on slide, and 6 on base.

4. *Mounting the Scales.* (See Figure 4). The method of mounting the scales on the auxiliary ruler is given in par. 3 in connection with a description of those scales. The main ruler is mounted as follows. Scales 1 to 7 are mounted in their numerical order, 1 and 6 on the base, the others on movable slides. Scales 5 and 7 are interchangeable, the directions thereon indicating which shall be placed in the slot for slide

4 and 5, depending on whether the observer is to the right or left of the battery. A mechanical construction for mounting scales 1 to 7 is indicated in the accompanying sketch of cross section of ruler. (See Figure 3.) Some method of locking scales in place is required to insure accuracy of operation. This may be accomplished by mortising "Bull Dog" paper clips into slides 1, 2 and 3. It will be convenient to make the slides slightly wider than the scales which are to be mounted on them and this in no way detracts from the accuracy of operation. The construction as indicated in the cross section whereby a movement of slide 2 carries with it slides 3 and 4 and a movement of slide 3 carries with it slide 4, is a feature which may be eliminated, but if incorporated will add materially to the convenience of operation.

A simpler mounting may be made by fastening the strips carrying scales 1 and 6 to a board leaving spaces for slides 2, 3, 4 and 5 to lie in their proper positions and providing for locking the slides when desired by "Bull Dog" clips, attached to one scale and running in a saw cut in the adjoining one as shown in Figures 4 and 5.

5. *Numbering of scales 3 and 4.* Having mounted the scale the next step requires data for the base line battery-observer for the numbering of scales 3 and 4. There are three sets of these scales shown on each blue print and if any additional sets are required for more than 3 base lines, they should be mounted on strips for attachment to slides 2 and 3. It will be found convenient if the first design of ruler indicated is followed, to mount these additional scales on the back of the top strips of the slides which are then fastened to the slide base by only two studs and can be readily turned over so as to make the additional bases available.

The scales are numbered as follows: First, note on the scale the battery for which the scale is to be used and the point from which the observer is to operate, together with the azimuth of the line connecting these points, and its length. Determine the azimuth to the nearest degree or multiple of 20 mils of a line normal to the base line and extending towards the field of fire, write this number both above and below the 90° or 1600 mil graduation on both scales 3 and 4; add to this number 65° or 1200 mils, if the observer is to the right (left) of the battery write sum below (above) the reference number 25° or 400 mils on scale 4 and above (below) the same reference number on scale 3; subtract 65° or 1200 mils from the azimuth of the normal and write the remainder above (below) the reference number on scale 4 and below (above) the same reference number on scale 3. Number the intermediate graduations, which are one degree or 20 mils each. It will be found necessary to number only those that are multiples of five degrees or 100 mils. The board may be made universal by securing over one set of scales 3 and 4 a piece of unglazed transparent celluloid on which the above numbers may be placed with pencil and erased when no longer required. It is

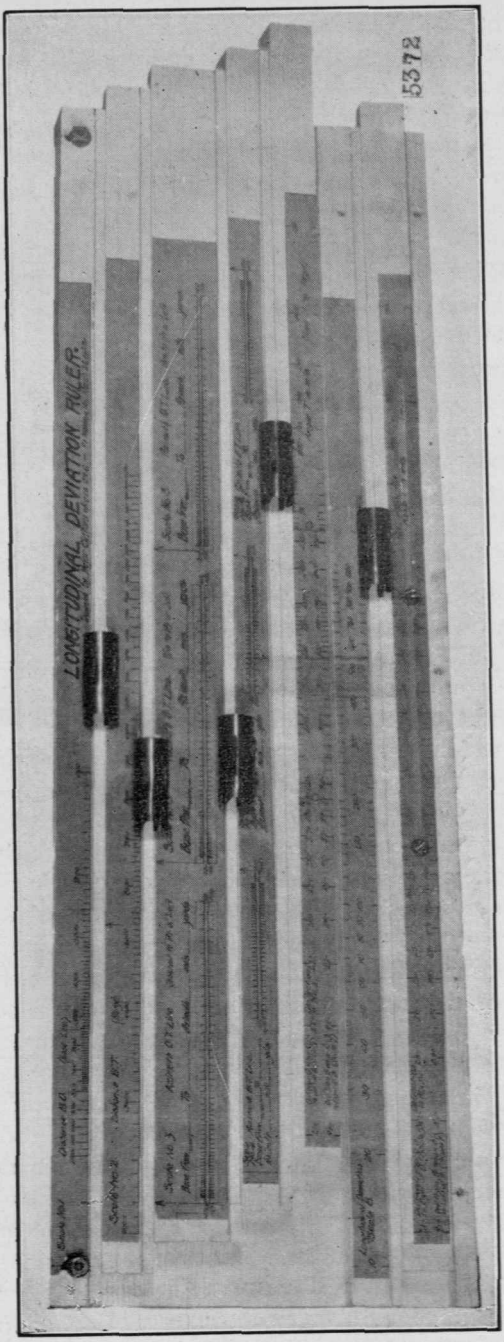


FIG. 5a

evident that if it is considered desirable one of these sets of scales may be graduated so as to read angles to be used in connection with base end stations oriented on each other rather than oriented in azimuth.

6. *Operation.* The operation of this ruler requires a deflection observer at the battery firing, a deflection observer on one flank, one or two men to operate the ruler and a recorder. The rule, including scales 1 to 7 only, may be operated by one man alone, but two of the operations may be carried on concurrently so that rapidity of operation may be secured by having two operators. When the auxiliary ruler is used, only one operator is necessary on the principal ruler, the other operating the auxiliary rule. It is required that we know the distance and azimuth of the observer from the battery.

Previous to the firing of any shot the rule is set up by the operator so that the index on scale 2 is opposite the distance from the battery to the observer on scale 1. The index on scale 3 is set opposite the range to the target from the battery on scale 2. The index on scale 4 is set opposite the azimuth from the observer to the target on scale 3. The index on scale 5 is set opposite the azimuth of the target from the battery on scale 4. Scale 7 is first prepared for setting by placing the OT pointer (See Figure 5) with its right index on the angle T (difference between the azimuths of the target as viewed from the battery and from the observer). This pointer may be mounted on binding clamp screws passing through holes about one-half inch to the left of the setting index and reference line on scale 7, ordinary screw eyes with small washers will answer. Scale 7 is finally set by placing the right edge of the long pointer of the OT pointer half way between the indices of scales 3 and 4; this in effect is setting the pointer on the sine of the angle O using the sine squared scale. It is necessary during this operation for the observer to give the approximate azimuth to the target and for the plotting room to give the azimuth from the battery and the approximate range. Having made this initial set up, the variables will change but slowly. For targets anywhere near a line perpendicular to the base line, the only change of any significance will be a change in range. The ruler is now set for the splashes to be received. The deflection as read by the observer is noted on scale 5 on slide No. 4. The deflections on this slide are followed by "plus" or "minus" signs. This indicates the direction of the deviation and the amount of the deviation is read from scale No. 6 immediately under the deflection read by the deflection observer. If the shot be a line shot this is the correct longitudinal deviation. If the deviation from a line shot is material, however, this reading requires a correction which is obtained by noting on scale 7 on slide 5 the deviation as reported by the observer at the battery and reading the corresponding longitudinal deviation from scale 6. The two results added algebraically give the correct longitudinal deviation. With direct fire, after the first few shots, it should rarely be necessary to correct

the deviation as read from scale 6 under the deflection sent in by the observer. For Case III firing where a lateral deviation is to be expected it will be more convenient to dispense with slide 5 entirely using the auxiliary ruler in determining the corrections due to the lateral error. This ruler is operated by bringing the angle at the target, scale 9, opposite the range to the target, scale 8, and reading the longitudinal deviation on scale 6, opposite the deflection observed from the battery, scale 7. The correct longitudinal deviation being determined as in the preceding case by the algebraic sums of the deviations determined by the deflection observed by the observer and from the battery.

7. *Remarks.* In the above discussion both mils and degrees are referred to, the longitudinal scales are the same in either case but scales 3, 4, 5, and 7 must be graduated in the angular measure to be used. Charts covering both these are available and will be supplied by the Coast Artillery Board upon direct application.

The proper place for the operator of this ruler to be situated is either in the plotting room or B. C. station of the battery firing and the personnel operating it should belong to that battery. The advantages of this arrangement are that the battery commander will feel the same assurance as to results obtained by the spotting section as he now feels for those obtained by his range section. He will know immediately when *observations* are approximate, therefore what reliance he should place upon the deviations reported and in case an observation is lost, he will be immediately aware of this and will not delay his firing waiting for information which is not available. The observers will also function more efficiently in identifying splashes where several batteries are firing upon the same target. The battery observer knowing the time of flight and having the correct direction can call splashes to the more distant observer.

It is found in actual tests that readings within the accuracy of the observations may be taken from the ruler with only approximate preliminary settings and longitudinal deviations, even in cases where there were wide lateral deviations, can be announced by the spotting section in from 8 to 15 seconds after the splash. The greater part of this time is required for the observers to note the reading of their instruments and for transmitting the data.

The details of the construction of this ruler have been gone into more thoroughly than would appear to be necessary but it is believed that the same principle may be applied to the solution of other of our fire control problems and that a thorough understanding of the methods followed in devising this ruler may enable officers of the service having similar problems, to devise apparatus constructed along these lines which may be superior to the graphical methods to which we have been so long committed.

A Spotting Chart

By First Lieutenant J. F. Stiley, C. A. C.

THE spotting chart described herein is fairly well known to the service. During the war a chart constructed on the same principle was used for bilateral observation of fire on land targets. For many years before the war such a chart was used at some American batteries for observation of fire on moving targets. That it was not used more generally was due to the prewar prohibition of any range correction at target practice other than that determined by trial shots. Recognition of the fact that a battery must be prepared to correct its fire when splashes can be seen has brought forth a number of spotting devices and it is the purpose of this article to describe the spotting chart and how it may be used to best advantage.

A—THE SPOTTING CHART

A section of a spotting chart is shown in Figure 1. It consists of intersecting pencils of rays in contrasting colors superimposed on a series of black range circles which are concentric to the battery. One set of rays is drawn from a station at or near the battery; the other set is drawn from a station on the flank; these stations may be the base end stations. A scale of 1-inch = 200 yards is satisfactory although charts to a scale of 1-inch = 100 yards have been used.

Range circles for each 100 yards are drawn. Each 500 yard circle is drawn heavier than the intervening circles. Each 1000 yard circle is heavier than the 500 yard circles.

The interval between the rays from the spotting stations is in multiples of five one-hundredths of a degree or it may be in multiples of one mil. The interval will depend upon the distance from the observing station, i.e., for a target close to the observer, rays drawn one mil apart would be too close together for speed in finding an intersection after the splash. The rays designating each whole degree (or each 20 mils) are drawn heavier than the intervening rays and these heavy rays are properly numbered in azimuth. The rays from the station at the battery are numbered to facilitate approximate location of the position of the target. The rays from the flank station are numbered in order that the chart may be used to determine the deviations of trial shots fired at a registration point.

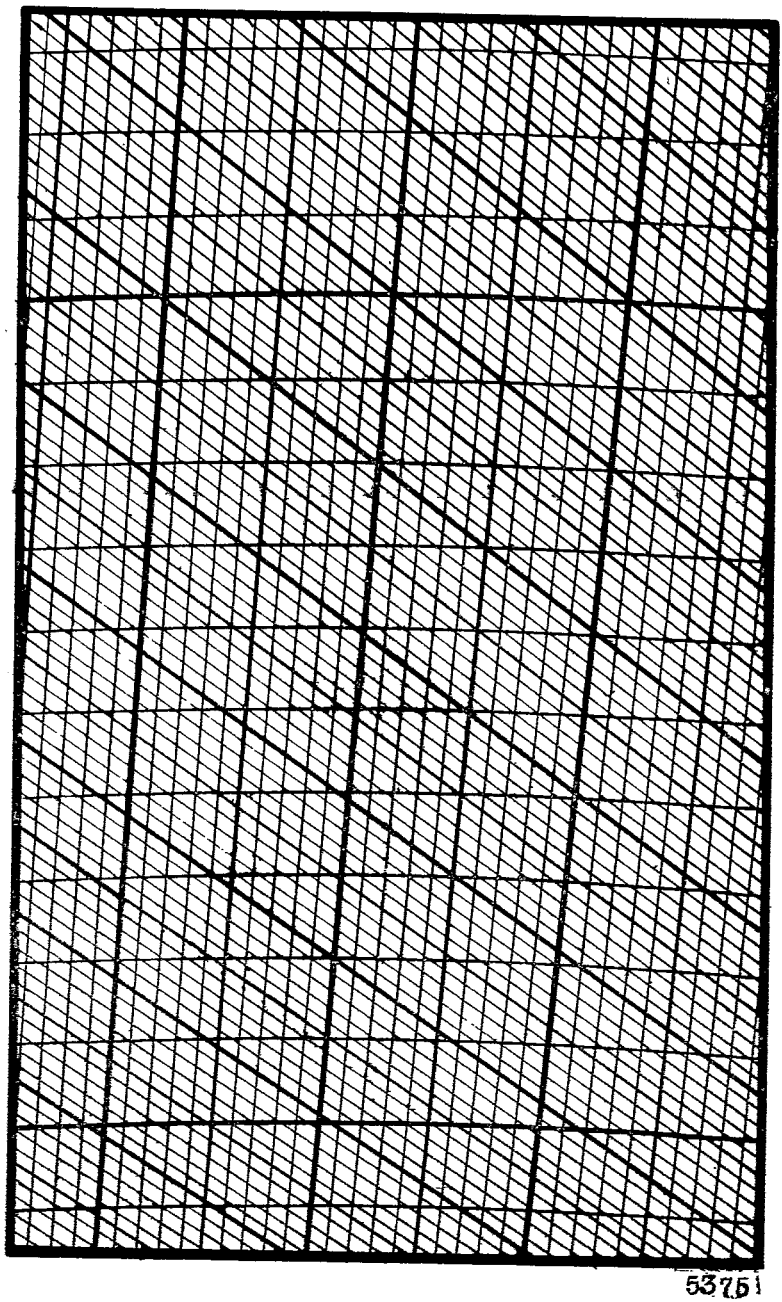


FIG. 1.

In operating the chart, an exact location of the set-forward point is not necessary. If the chart be placed in the plotting room and the battery station be fairly close to the battery-target line, the set-forward azimuth and range as sent to the guns, or the last arm-setting called by the primary armsetter of the plotting board may be overheard and used to determine the approximate position of the target,—(within 2 of 3 degrees of azimuth and several hundred yards of range.) The operator of the spotting chart marks by a pin or otherwise the approximate location of the target at a convenient intersection of rays and nearly the proper range circle. He is connected by telephone to one or both observers depending on where the chart is located. He receives the angular deviations from the spotters, usually as right or left of the target, determines the position of the splash with respect to the target, and from visual inspection or by means of a small scale, measures and calls out the magnitude of the deviation as over or short.

B—ADAPTABILITY OF THE CHART

In a recent service practice at Fort Eustis, indirect fire by 155-mm guns at a moving target, six trial shots were fired at 10 second intervals. The registration point was accurately located on the spotting chart by data determined on a Cloke plotting board. The azimuth of the splashes were reported by the spotters. The position of each splash and the deviation of the group center of impact from the registration point were determined on the spotting chart. This procedure had the advantage of permitting the rest of the range section to track the target during trial fire and resulted in a quick transfer of fire from the registration point to the target. The elapsed time from the command "Commence Firing" for trial shots to the discharge of the first shot *at the target* was 2 minutes and 15 seconds and this time can be decreased. The time of flight of projectile was 25 seconds.

Fire at the target was by 2-gun salvos. Splashes of a salvo were a second or two apart. Deviations were reported as right or left of the target. Over 90 *percent* of the individual splashes were observed and deviations obtained from the spotting chart. A few splashes were lost by the spotter on the flank. The spotter near the battery reported lateral deviations to a blackboard operator in the plotting room. Due to the rate of fire and the difficulty of coordinating data for individual splashes, the spotting chart operator assumed that all splashes were sufficiently near the battery-target line to cause no material error in the longitudinal deviation. About 3 salvos per minute were fired. When these guns fire *at will* a rate of 5 shots per gun per minute can be attained. When this is the case splashes are arriving at better intervals for spotting than is the case in salvo firing. It was the opinion of the officers present at the practice that, granting visibility at the target, more than 85 percent of the deviations of splashes from a 4-gun battery firing at will

can be obtained by a well trained spotting section. This is a rather remarkable conclusion. The practice is cited as showing the possibilities of the spotting chart in rapid fire.

The chart is simple, accurate, quick in operation, and as well adapted to trial fire as to fire for effect. Its construction and operation are nearly self evident. Any man who can use drawing instruments can make one. The accuracy inherent to the chart is limited only by the draftman's skill and pains in making it. The faculties of a nimble mind and ability to concentrate are assets to an operator, and speed in operation of the chart is limited by the degree to which the operator possesses these faculties. An operator at Fort Casey, Washington, during the firing of Battery Schenck in 1919, reduced bilateral reports and called out the deviations about 5 seconds after each splash. A small device of xylonite for interpolating between rays, and for reading lateral deviations in angular measure when a spotting station is on each flank, has been used at some fixed batteries.

C—A UNIVERSAL CHART

In the past the spotting chart has had the disadvantage of requiring a new chart for each battery position or flank station. The time and labor required to make one was considerable and was multiplied by the necessity for having several charts in order to cover the battery's field of fire.

This disadvantage has been met by devising a means for making a chart, or series of charts, quickly and with little labor.

Figure 2 shows part of a set of black range circles printed on map bond paper 40 to 50 inches wide. The length of this sheet is 90 to 100 inches or there may be two shorter sheets with suitable overlaps in range. The scale is 1-inch = 200 yards. The maximum range of visibility of splashes from terrestrial stations is about 20,000 yards.

The line A-B radiates from the battery. Because the range circles are concentric to the battery the line A-B is a line through a point in the center of any area in the field of fire for which a chart is desired.

Figure 3 shows a part of a pencil of rays from a spotting station. The interval between rays is in multiples of five-hundredths of a degree. No range circles are on this sheet, which is of the same dimensions as the sheet of Figure 2, but the thousands of yards from the spotting station are shown occasionally to facilitate orientation. There are two sets of these sheets; one contains a pencil of red rays, the other a blue or green pencil. They are of transparent glazed paper and when superimposed on the sheet of Figure 2 the net effect will be as shown in Figure 1.

To assemble the chart, the range and azimuth from the gun of a point P in an area of the field of fire for which a chart is desired, are obtained from the plotting board. The line through this point is the line AB figure 2, and P is located thereon. The ranges and azimuths of P from

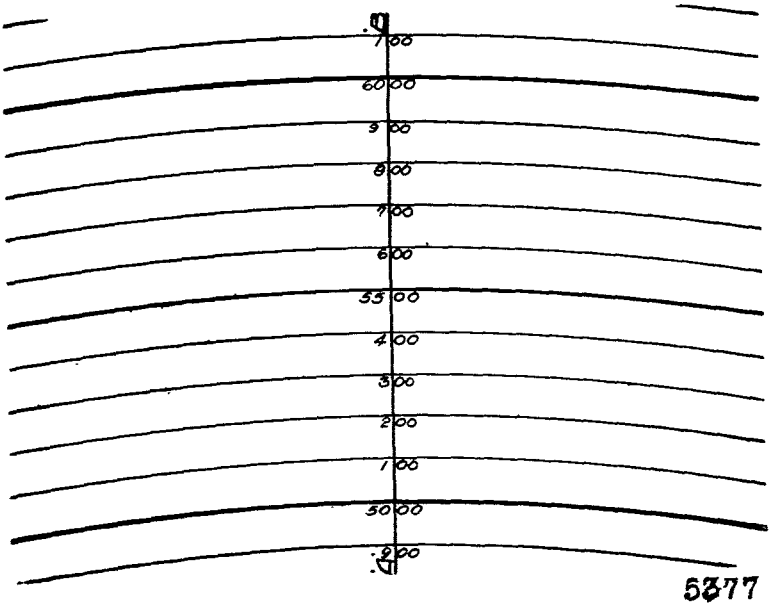


FIG. 2.

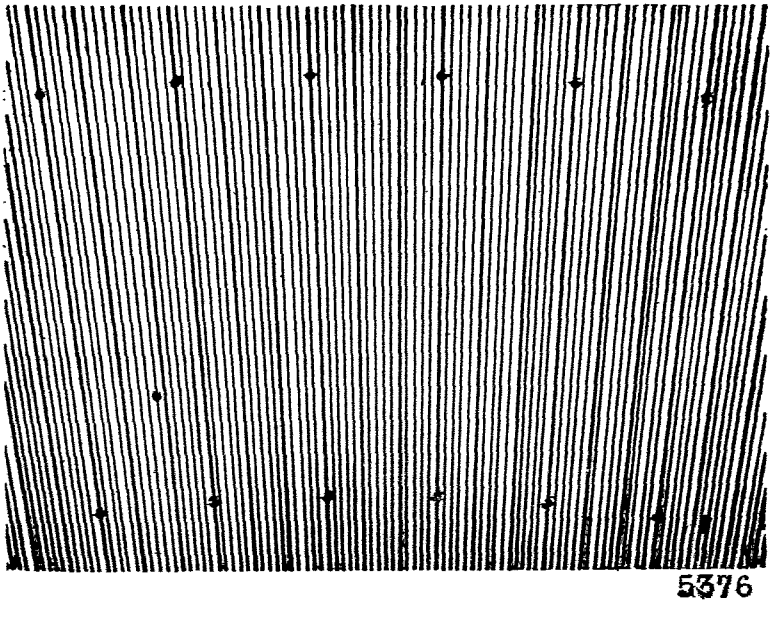


FIG. 3.

each spotting station are obtained easily from the plotting board, or these data can be computed in a few minutes. The difference in azimuths between the line AB and the line P—spotting station is the angle at P.

Ten inches (or a multiple thereof) are measured from P on AB and a perpendicular to AB drawn at this point. A table of tangents from any hand book containing natural trigonometric functions will give directly the required distance in inches to be measured along this perpendicular for determining the point through which a ray from P to the spotting station must pass. This point is located and the ray drawn to a convenient length.

Having due regard for the hundredths of degrees of the azimuth of the line P—spotting station, a ray on one of the sheets of Figure 3 is selected, and a pin pushed through the ray at the range of P from the spotting station. The small figures indicating thousands of yards in Figure 3 aid in locating the pin. This sheet is then placed over the sheet of Figure 2 and the pin pushed into P. The sheets are revolved around the pin until the ray from the spotting station makes the required angle with the line A-B. Thumb tacks or paste are used to preserve this orientation. Other methods for orienting the transparent sheets will suggest themselves. Another point on line A-B can be selected and all the necessary data determined easily on the Cloke plotting board without any calculations. The shrinkage of printed sheets is negligible and can be minimized if desired by orienting in the manner suggested.

The sheaf of rays from the other spotting station is superimposed and oriented in the same manner. All sheets are trimmed to the required size and those pieces not used stored away for future use. Numbering the rays to proper azimuths can be done quickly and in pencil. As many charts as may be needed to cover the field of fire can be prepared in this manner.

Each battery can have a supply of about fifty of each of these sheets. Unused sheets can be kept in cardboard mailing tubes properly marked to indicate contents and will have little bulk or weight.

The cost of plates, paper and printing is not prohibitive. A tracing is placed over the prepared surface of zinc plates and a transfer to the surface of these plates for lithographing is accomplished in a manner analogous to blueprinting. It is understood that the Engineer Reproduction Plant, U. S. Army can make all the plates for about $200. The matter of having the plates made and the sheets of Figures 2 and 3 distributed is being considered by the Coast Artillery Board.

EDITORIAL

In Appreciation

AFTER a connection of four and a half years with the JOURNAL, during exactly four years of which I have flourished the editorial pencil, whirled the editorial swivel chair, and joyously violated all traditions of stilly calm in the editorial sanctum, the time has come for me to relinquish the pencil, chair and sanctum. I let go with some regret, for the JOURNAL has grown to be something nearer to my heart than any red-headed step-child. However, this regret is tempered by the assurance that the JOURNAL is going to the hands of an able and loyal Coast Artilleryman, Major Joseph A. Green. Through many years of acquaintance I have acquired a profound respect for the accomplishments and personal qualities of Major Green, who with his greater length of service, wider experience, and the broadened viewpoint of a Leavenworth graduate, will be able to afford a greater service to the Coast Artillery through the JOURNAL than I have been able to.

Rightly or wrongly, I have felt that I could best accomplish the work I had to do by fostering a frankly personal relation with the Coast Artillery readers of the JOURNAL. The very natural trend of this policy has afforded me lots of fun, and the cordial reactions of Coast Artillerymen everywhere—as I like to say, "from Maine to Manila"—cause me to think that the results have justified the method.

In keeping with this personal point of view, I wish to make of record the appreciation I feel for the personal relations which combine to make the last four years a period in my service which I will always remember with particular satisfaction.

First of all, I must express an especial appreciation for the confidence and support of the Chief of Coast Artillery, Major General Frank W. Coe. I hope that the Coast Artillery may realize how fruitful for real progress in Coast Artillery efficiency has been the broadminded policy of the Chief of Coast Artillery to permit and encourage the really free and open discussion of all matters in which the Coast Artillery is, or can be, interested.

I have keenly appreciated the confidence and assistance of each of the Commandants of the Coast Artillery School in the last four years, as well as the support, advice, and cooperation of the Executives, instructors in the Coast Artillery School and the close and helpful associations with all the succeeding members of the Coast Artillery Board.

For whatever of success or acceptability the JOURNAL may have attained since October, 1919, no one knows as well as I how large a share of the credit is due to the succession of my Assistant Editors, torn away one after the other by the exigencies of the service; Major William C. Foote, 1st Lieutenant Claude L. Kishler, Major Joseph C. Haw, Captain Charles D. Y. Ostrom, Captain Nelson Dingley, and Captain Donald L. Dutton. Severally they have brought to bear a variety of talents, and a unanimity of initiative and enthusiasm, whose impact on the JOURNAL deserves a full measure of recognition.

My catalog of appreciation would be grossly incomplete if I failed to speak of the loyal interest and zealous efficiency of the administrative and producing personnel who have served the JOURNAL. Limitation of space forbids the individual mention of each member of the force, but especial recognition is due the following: Sergeant Charles R. Miller, who for years has been the JOURNAL Office Manager, and whose accuracy, industry and interest are beyond praise; Master Sergeant Alfred J. Johnson, the foreman of the Print Shop, who as a Captain during the war, operated the immense A. E. F. printing establishment at Tours, and whose executive ability, unerring typographical taste, and undaunted resourcefulness have enabled the Print Shop to surmount the frequent emergencies which have confronted it; Master Sergeant Albert M. Crawford, Foreman of the Bindery, also an officer in the War, a real master in the art of bookbinding, and systematic to a degree which alone has enabled him to cope with the frequent inundations of work confronting a Bindery with limited personnel and machinery; Master Sergeant William R. Sprague, Assistant Librarian of the Coast Artillery School since July, 1909, with the exception of the period from July 30, 1917, to May 10, 1919, when he served in the A. E. F. as a Coast Artillery officer in all the grades including Captain, and whose indefatigable ability in bibliographical research as well as his able handling of the JOURNAL'S Book Department, have been indispensable, and Miss Eleanor Lund, whose knowledge and supervision of the multitudinous details of record keeping required for the Printing Plant have been encyclopedic and unerring.

Finally, a full meed of appreciation is due all the Coast Artillerymen, Regular, National Guard, and Reserve, without whose support by subscriptions and patronage of the Book Department, contribution of material for publication, and helpful suggestion and criticism, the maintenance of the JOURNAL would have been impossible.

All of us realize that the period of reorganization following the War

has been full of uncertainty, and has presented a series of situations which have been justifiably discouraging. Because of the existing conditions, I have felt that the JOURNAL could render an especial and timely service as an available focal point for the stimulation of courage and enthusiasm, and for the consolidation of Coast Artillery spirit. The commonly accepted conception of a professional journal is that it act as a mirror to reflect the thought and achievements of the distinctive clientele which it serves. I have wittingly caused the COAST ARTILLERY JOURNAL to diverge from this tradition to the extent that it should function not only as a *mirror* but as a *searchlight*, to reveal the targets which should challenge our effort, and to pierce the clouds of uncertainty and depression, seeking to illuminate the silver lining. Happily the silver lining is often there. Hope and enthusiasm are not the dead ashes of an impractical idealism, but are still the inner fire of life. Every turn in the military and naval affairs of the world has deepened my conviction of the necessity and importance of fostering Coast Artillery development. Would that every necessary turn could be taken in the affairs of the Coast Artillery itself which would insure to every individual the paramount satisfaction which many of us already share—that we are, first of all, *Coast Artillerymen!*

Chaturanga

NOW this *had* to be written, if for no other reason than that some of the officers forming the coterie of chess players at Fort Monroe dared the Editor to write an editorial on chess! But this was a dare easy to take, for the writer not only finds chess an absorbing diversion which banishes trouble and worry to the limbo of forgetfulness: he believes the practice of chess to be one of the best means of developing the peculiar blend of mental qualities necessary to the military commander. If as a result, here and there an officer may be persuaded to test this belief, the expenditure of space and effort will have been justified.

We may be reminded that Napoleon, whose maxims command the respect of each succeeding generation of soldiers, was devoted to chess. It is said that Frederick the Great required his officers to practice and study chess. If true, everyone familiar with the game will recognize that it was because Frederick realized the value of this game in developing generalship.

The *strategy* and *tactics* of chess are often spoken of. It is idle and artificial to attempt to draw a close parallel between the strategy and tactics of chess and those of war. This is not to deny that in a very real sense, chess has its strategy and its tactics, which the initiated have come to recognize, and which, alike with the strategy and tactics of

war, possess certain attributes which are clearly marked as pertaining to the domain either of strategy or of tactics, along with others which merge qualities both of strategy and of tactics.

The serious argument for the practise of chess as an aid to military efficiency is based on the following specific means of training presented by the art of chess:

1. Appraisal of combat intelligence
2. Estimating the situation
3. Arriving at a decision
4. Developing skill and judgment in tactical execution of a plan
5. Developing singlemindedness, to the end that intriguing opportunities for minor forays may be avoided, and the main plan be adhered to so long as the situation remains such that the plan continues feasible
6. Acquiring a knowledge of the significance and interdependence of the factors of force, time, mobility and space (terrain)
7. Mental concentration and carefulness
8. Quick thinking (when playing with a time limit)
9. Last but not least, courage.

Now it will be observed that all of the qualities just enumerated are indispensable to the art of military command. If it can be shown that these mental qualities are susceptible of development by chess play, the case for the value of chess to the military man will be established. Let these contentions be examined in order.

1. *Appraisal of combat intelligence.* From the beginning of a game, all the hostile forces, represented by the opponent's pieces, are on the board in plain sight. It might then be inferred that there is none of the uncertainty left as to enemy dispositions and movements which in war demands the appraisal by a commander of such fragments of information as are afforded to him by combat intelligence. However, in both war and chess, the commander wants to know not only what his opponent *has done*, but what *he is going to do*. In chess, the variety in the characteristics of the pieces, coupled with the almost unlimited number of permutations afforded by the board, leave open to conjecture a number of possible moves to the opponent which frequently, through the course of several moves, very nearly approaches the infinite. Consequently the chess player is led to consider constantly, not only the present positions of the hostile forces, but the character and sequence of the moves made by his opponent. A consideration of this evidence, coupled with such knowledge as a player may have of his opponent's skill and temperament, and the calculable advantage or disadvantage of the possible immediate moves of the hostile pieces, inevitably impels a player to increase his skill in divining the opponent's intentions.

2. *Estimating the Situation.* Without embarking on an exhaustive discourse concerning the theory of chess, it may be said that every

evenly contested game embraces three well marked phases, the *opening*, *midgame*, and *end game*. These correspond in military operations to the *strategical concentration* of the opposing forces in the theater of operations, the *tactical combat* of the originally deployed forces, and the decisive *exploitation*, involving the use of all reserves (the King and previously withheld pawns in chess.) Now in a game of chess it is especially necessary that at the commencement of each of these phases, each player combine such appraisal as he has been able to make of his combat intelligence with a consideration of the possibilities of action open to himself by the factors of *time* (the relative gain or loss of *moves*,) *force*, *mobility* and *space*, (represented by the relative numbers, characters and dispositions of his remaining pieces as compared with those of his opponent,) into an estimate of the situation which should dictate whether he should resort to an offensive or defensive plan. Naturally, with each move of both forces, this estimate must constantly be revised, and the player must be quick to judge when the continuance of an offensive plan must be temporarily abandoned, or when a change in the situation permits him to relinquish the defensive, and assume the offensive.

3. *Arriving at a decision.* To the uninitiated, the fact may be surprising that on the conventional and highly artificial terrain of the chess battle, there are frequently many more choices of logical decision as to course of action than are generally presented to the commander in war. Strategically, the decision may be—to attack strongly the hostile King position, by either right or left flank or the center, without losing time for full deployment; to take the offensive but only with the aid of all the pieces; to assume the defensive, with its variations; perhaps most characteristic of all, to *castle* early and thus fix the strategical framework of one's own defensive dispositions as well as the objective of the hostile attack, or to postpone castling as long as possible and thus keep the hostile attack organization from crystallizing. Tactically, one may decide on one of several characteristic pawn formations which may be chosen to stabilize either flank or the center, to neutralize particularly the mobility of either a hostile bishop, knight or rook; one may decide to fight the midgame largely with pawns, or to reserve pawns for the endgame.

4. *Tactical execution of a plan.* The numerous tactical openings, such as the *Ruy Lopez*, *King's Gambit*, *French Defense*, *Giuoco Piano*, etc., have taken form, sometimes hundreds of years ago, as the result of experience in executing or counteracting some of the tactical ideas embodying different plans of operations. The best procedure in attack and defense has been so well determined through the accumulated experience of many thousands of players, that for about twelve moves any well played game will fall into one of less than a hundred beaten paths. However, after about a dozen moves the numerical possibilities of variation are so limitless that the path is not charted, even if one had mastered the

records available in some thousands of books in chess literature. Consequently there is full scope for initiative and for the exercise of individual temperment and tactical skill. As truly as in military tactics, there has been deduced a code of tactical *principles*, which are based on the several properties of the pieces and the board, and on the end to be attained. These principles are available in numerous standard books on chess. The point of interest in the present discussion is that tactical success in chess, as in war, comes from skill obtained in practice, when tempered by reflection, analysis and imagination.

5. *Developing singlemindedness.* One of the surest marks which betrays the unskilled chess player is his disregard of *time*, by using moves to "chase pawns," perhaps temporarily unprotected, or to yield to the fascinating temptation to gain a piece for a pawn, when the object of attack is outside the critical zone of operations. As in war, there is always a main theater of operations, and there should be a definite plan. The singleminded commander will only embark on minor operations when clearly they will help and not impede the main plan.

6. *Appreciation of force, time, mobility and space.* The tyro knows that the queen is the most powerful of the pieces, and so assumes that the queen has the most *force.* He does not know that pieces and pawns alike have the same force—the power to capture. A pawn may capture a queen. The quality in which they differ is *mobility*, and the queen is the most powerful of the pieces because she can reach farther and in more directions than the others to attack or to threaten. One's available *force*, then, is not necessarily measured by a preponderance of major pieces or pawns, but by the number of threats which can be brought to bear on the critical square at the decisive time. The *time* of chess is the move, and the successful utilization of time consists in the economy of moves. One of the hardest lessons for the chess student to learn is the inexorable fact that he cannot afford to waste a single move, for in even games the victory often comes to the player who can force or trap his opponent into wasting just one move. *Mobility* is a quality inherent in the several pieces, limited by the laws governing the character of their moves. Generally speaking the more mobile pieces are the more valuable because they can the more quickly be brought to bear to attack or defend a critical point. It is for this reason that they should be protected until their sacrifice may be made for a decisive end, and likewise, tactical skill involves the ability to clear the path for the attack of a mobile piece when the necessity for its employment arises. The control of *space* on the board corresponds to the control of territory in war. It is almost too obvious to mention that the more squares one can occupy by protected pieces or pawns, or that one can threaten, the more will the mobility of the hostile pieces be restricted and consequently the more difficult will it be for the opponent to concentrate sufficient force for the successful attack or defense of the critical point. All that has

just been said, while concerned with the conventional forces and terrain employed in chess, points to an analogy in the military art, the powers and limitations of the various arms, the use of ground, and to the necessity for skillful employment of this knowledge in tactical method.

7. *Mental concentration and carefulness.* The real student of chess has a feeling akin to contempt for the "woodpusher," the man who thinks he knows chess because he "learned the moves several years ago." In addition to the gradual acquirement of all the elements of skill suggested in the preceding paragraphs, the real chess player has learned that he cannot relax his concentrated attention, cannot let his mind slip, for a single instant. In a well played game, one false move is enough to be, and generally is, fatal. Indeed in any game free from errors, the outcome of the game can generally be traced to one move. Every game is a series of critical decisions. With equal concentration and care on the part of both players, the result hinges on relative inferiority in experience, judgment or insight in the making of some one decision. How essential then that concentration and care should not be relaxed. Some men are better chess players than others simply because they exercise better self control. In war the lives of men are at stake and in the hands of leaders, who to be successful, must be able "to perform under pressure." In chess lies an economical way to help acquire this priceless ability "to perform under pressure."

8. *Quick Thinking.* The uninitiated, who may have watched with amusement the silent deliberations of two chess players, perhaps will be moved to scornful laughter at the suggestion that chess play can be used to develop the faculty of quick thinking. Yet the chess player who has sat in a tournament with a time limit of twenty moves an hour, knows that to evaluate correctly the dangers and possibilities inherent in thirty-two separate units, singly and in combination, is a task which demands that not a moment be lost if the game is not to be forfeited by exceeding the time limit.

9. *Courage.* While it is not true in chess as in war, that "the moral is to the physical as three is to one," yet in serious chess, courage is truly necessary to success, and it should be true that some of the qualities of courage gained at the chess board can be carried over to buttress the kind of courage needed for leadership in war. Many a chess player of known strength wins numerous games simply because he "has a bluff on" his opponent from the start. If you are engaging an opponent you know to be superior, defensive decisions and plans are indicated, and it takes a quality quite akin to courage to recognize a turn in the situation which justifies a swing to the offensive. Again, it often happens that at some time after he has made a particular move, a player recognizes that it was critically faulty, and whether or not the opponent has recognized the opportunity, a certain courage is neces-

sary to prosecute further an operation which should turn out to be a losing battle.

Now, although what has gone before is perhaps too much, it is not "A Complete Treatise on the Art of Chess." Prompted by the experience of a long devotion to chess as a pastime, what has been said is a serious effort to point out the possible value of chess to the military profession. That chess possesses the virtues ascribed to it is not an accident. Remember that chess antedates the dawn of history, and through the experiments of thousands of men in countless generations has been developed into the symmetrical and logical art which we have today. As the "chaturanga" of the Hindus, chess made its appearance in recorded history in the seventh century. Successively its westward spread challenged the minds of Persia, Arabia, the Mohammedan World, and Europe. In the record of history are shown the variations and innovations which finally resulted in the practical stabilization of the laws of chess in the twelfth century, since which time no important changes have been found necessary.

To the person of analytical and systematic tendencies, chess has an especial appeal as a hobby, in that it lends itself easily to the recording of one's games, for subsequent analysis and study. Furthermore, no game has so exhaustive a literature as chess. A visit to the stack room of the Library of Congress showed more than a thousand modern works on chess. As a final suggestion, based on a personal acquaintance with nearly all the recent textbooks in the English language, the writer would suggest as the one best book for the beginner who intends to make a serious study of chess, Edward Lasker's "Chess Strategy."

There can be no finer remembrance than the understanding friendships with many Coast Artillery officers, which have been cemented over the chess board in the long winter evenings of these last years. Before the firelight dims and dies, may every pawn of their effort march with the power of a queen!

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The American Legion and National Defense

There is perhaps nothing of greater importance than that the regular military service and the American Legion should understand each other thoroughly. In order to further this understanding the JOURNAL presents the following extract from the Address of National Commander Alvin Owsley of the American Legion, delivered at a District Conference in Des Moines, Iowa, quoted from the American Legion Weekly of June 29, 1923:

"The American Legion has declared that it stands for a proper national defense. No true American would be willing to turn the power of our Government over to a few chosen men undertaking to be the militarists of the country. But just as

t would be unwise for America to adopt a policy of militarism, just so would it be unwise for that great pendulum carrying the weight of American popularity with it to swing over into that column where stands the pacifist. There stands the alien who did not go with you in the time of war but claimed his foreign birth in order that he might not serve America. And there is that crowd over yonder who are going across America urging the children, especially boys, to sign their names and give their pledges that they will never enter the military or naval forces of this country. And then there is that other crowd that has got a yellow streak down its back so broad that it showed all over America when real manhood was necessary in the Great War. You and I only need to do one thing—that is to stay ready and hold true to a safe, sane and conservative policy of having an adequate military force on land and a sufficient United States Navy on sea.—"

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A Tardy Acknowledgment

The Editor had fully intended to include with Colonel Wyllie's article, "Coats of Arms and Badges of the Coast Artillery Corps," which appeared in the August JOURNAL, a note intended to give due credit to Master Sergeant Edward C. Kuhn, C. A. C., for executing the drawings of the Coast Artillery Coats of Arms, from which the cuts were made to illustrate the article. However, through an unwarrantable oversight in the hurly-burly of affairs, this intention was over-looked. Consequently, it is desired to make such amends as may be possible to Sergeant Kuhn by the present acknowledgement, made with the keen appreciation of the Editor for the service which Sergeant Kuhn has rendered to the JOURNAL and its readers.

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COAST ARTILLERY BOARD NOTES

"Communications relating to the development or improvement in methods or materiel for the Coast Artillery will be welcome from any member of the Corps or of the service at large. These communications, with models or drawings of devices proposed may be *sent direct* to the Coast Artillery Board, Fort Monroe, Virginia, and will receive careful consideration."—

JOURNAL OF U. S. ARTILLERY June, 1922.

Work of the Board for the Month of August, 1923

A. NEW PROJECTS INITIATED DURING THE MONTH OF MAY, 1923.

1. **Project No. 141, Powder Charges for 16-inch Gun with 2100-lb. projectile, and 2340-lb. projectile.**—The Coast Artillery Board's recommendations were to the effect that three charges should be used with this gun.

2. **Project No. 142, Elevation Tables for 12-inch (B. C.) 975-lb. Projectile, for Battery Smith, Coast Defenses of Manila and Subic Bays.**—These were furnished by the Coast Artillery Board to Department Ordnance Officer, Philippine Department, Manila, P. I.

3. **Project No. 143, Searchlights for Mobile Artillery.**—The Board recommended that six searchlights be provided per coast artillery railway or tractor regiment and that this matériel, together with a complement of one officer and sixty enlisted men be assigned to the headquarters battery of each regiment.

4. **Project No. 144, Suggestions for Improvement of Certain Coast Artillery Materiel, together with a Suggestion for Broadening the Role and Training of Coast Artillery (Antiaircraft) Personnel.**—This project had its origin in a letter from Major R. R. Welshmer, C. A. C., Walter Reed General Hospital, Washington, D. C., wherein he recommends such design of antiaircraft artillery as will permit of firing at 5° depression for use in emergency against ground and moving (water) targets. Major Welshmer's recommendations are concurred in by the Coast Artillery Board, and report is being prepared.

5. **Project No. 145, Review of Training Regulations No. 435-220, The Battery Command.**—These regulations are being studied by the Coast Artillery Board.

6. **Project No. 146, Conversion of Whistler-Hearn Plotting Boards to Cloke Plotting and Relocating Boards.**—Twenty Whistler-Hearn Plotting Boards are to be converted to Cloke Plotting and Relocating Boards; six of these will be sent to National Guard units.

7. **Project No. 147, Barrel Wrench for Head Space Adjustment.**—This wrench was designed by 1st Lieut. G. W. Trichel, C. A. C. It will be given a test by the Coast Artillery Board.

8. **Project No. 148, Antiaircraft Tripod for .50 Caliber Machine Gun, (Water-Cooled).**—In progress.

9. **Project No. 149, Memorandum on Observation of Fire for Coast Artillery.**—This project was initiated at the request of Colonel W. E. Cole, C. A. C. The Board recommended that a Memorandum on Observation of Fire for Coast

Artillery, which appears as an inclosure to the report on this project, be published to all officers of the Coast Artillery Corps.

10. **Project No. 150, Goodall Deviation Computer.**—The Board is in receipt of a description of a spotting device designed by Lieut. J. C. Goodall, C. A. C. Authority has been granted for the shipment of this device from San Francisco, Cal., to the Coast Artillery Board, upon receipt of which it will be given a thorough test.

B. Projects Previously Submitted on which Work has been Accomplished.

1. **Project No. 2, Tactical Employment of Sound and Flash Ranging Equipment.**—The Coast Artillery Board made a study of a "Sound Position Finding System," submitted by Captain H. H. Blackwell, C. A. C. A new design of plotting board was a feature of this proposal. The conclusion was reached by the Board that while the methods and devices proposed by Captain Blackwell were theoretically correct, there were a number of practical objections to the proposed system and that even if realized practically, it would be more complicated than the system now undergoing development.

Lack of space prohibits publication of the report. Officers interested can obtain a copy of the proceedings on this project by writing to the Coast Artillery Board.

2. **Project No. 136, Ordnance Equipment Chart, Antiaircraft Artillery Regiment.**—The proceedings of the Coast Artillery Board on this Project, as submitted to the Chief of Coast Artillery, were as follows:

I. General Discussion.—

1. These charts were referred to Major O. L. Spiller, C. A. C., Advisory Member of the Coast Artillery Board, commanding the 61st Artillery Battalion, Antiaircraft, Fort Monroe, Va., and to Captain Dale D. Hinman, C. A. C., instructor in antiaircraft matters at the Coast Artillery School at Fort Monroe, Va. The following conclusions and recommendations are based upon conferences between these officers and the members of the Coast Artillery Board.

2. The absence of comment herein on any specific point covered in paragraph 3, letter Chief of Ordnance to Chief of Coast Artillery of May 31, 1923, File O. C. C. A. 475/027N1 attached, may be taken as concurrence by the Coast Artillery Board.

II. Conclusions.—

1. *Automatic rifles.*—The elimination of the automatic rifle from issue to antiaircraft artillery organizations appears justifiable. The weapon is of doubtful value against aircraft. Protection against low flying planes is essential but automatic rifles are believed inferior to machine guns for the purpose.

2. *Machine guns.—a.* The number of machine guns allotted to organizations other than machine gun batteries should be as follows:

2 per gun battery
12 per searchlight battery (1 per searchlight)
4 per headquarters, gun battalion
2 per headquarters battery
3 per service battery.

b. This should result in an increase in the total number of machine gun mounts, and accessories from 53 to 75.

3. *Trailer, Antiaircraft Machine Gun, Item 119.*—This item should be eliminated. No antiaircraft machine gun trailer should be adopted until the .50 caliber weapon is in service.

4. *Fire Control Equipment, Telescope, Antiaircraft, Model 1920, Item No. 177.—a.* While the remark in paragraph 3 of the reference letter of Chief of Ord-

nance, May 21st, 1923, regarding the elimination of this telescope is not understood clearly, it is believed that it refers only to the telescope alloted in Section VII-a. Circular 26, War Department, 1922. In the draft of the Ordnance Equipment Chart, Item 177, three telescopes are alloted per regiment, one per antiaircraft gun battery, and this allotment should not be changed.

b. The development of a 3 power telescope of the general characteristics given in paragraph 3 of the reference under *Fire Control Equipment* is desirable. One of these should be issued to each of the following:

(1) Regimental headquarters
(2) Machine gun battalion headquarters
(3) Antiaircraft gun battalion headquarters
(4) Machine gun battery.

5. *Articles for Instructional Purposes, Items 206 and 209.*—The issue of subcaliber apparatus for firing .30 caliber ammunition is not desirable. Six tubes for firing .50 caliber ammunition should be manufactured for experimental purposes. Adoption of these as standard equipment would follow the conclusion of satisfactory tests.

6. *Ammunition.*—It is believed that the allowance of machine gun ammunition specified in Circular 26, War Department, 1922, should not be changed until the .50 caliber gun is adopted.

III. Recommendations.—

1. That in addition to the machine guns allotted to machine gun batteries, machine guns be allotted as follows:

2 per gun battery
3 per service battery
2 per headquarters battery
4 per headquarters gun battalion (to include combat train)
12 per searchlight battery (1 per searchlight),

and that an increase in mounts and accessories be made to conform with this allotment.

2. That no antiaircraft machine gun trailer be adopted until the .50 caliber gun is in service.

3. *a.* That the telescope, antiaircraft model 1920, shown as Item 177 on the draft of the Ordnance Equipment Chart be allotted as shown.

b. That there be developed a 3 power telescope of the general characteristics described in paragraph 3, letter O. O. to the Chief of Coast Artillery, May 31, 1923, File O. C. C. A. 472/027N1.

c. That issue of this improved telescope be contemplated as follows:

1 per regimental headquarters, antiaircraft
1 per machine gun battalion headquarters, antiaircraft
1 per gun battalion headquarters, antiaircraft
1 per machine gun battery.

4. The issue of subcaliber apparatus for firing the .30 caliber ammunition is not recommended.

5. That six subcaliber tubes for firing .50 caliber ammunition be manufactured for experimental purposes and tested with a view to their adoption as standard for subcaliber. This action eventually should simplify supply problems and enhance the value of subcaliber practice for antiaircraft organizations.

6. That the wartime allowance of machine gun ammunition specified in Circular 26, W., D. 1922, be left unchanged until the .50 cal. machine gun is adopted.

7. That except as noted above, and in File OCCA 475/027N1, the attached draft of the Ordnance Equipment Chart, Antiaircraft Artillery Regiment, War Strength, dated June 1, 1923, be approved.

3. Project No. 140, Final Report, Service Test of Caterpillar Adapters

for 8-inch Howitzer, Mark VIII-1/2—The proceedings of the Coast Artillery Board on this Project, as submitted to the Chief of Coast Artillery, are as follows:

Conclusions.—

1. The caterpillar adapters are unsatisfactory on account of the excessive difficulties of maneuvers in going into, and withdrawing from position, and the friction and racking effect on good roads.

2. The standard wheels of the 8-inch howitzer are unsatisfactory on muddy roads, and maneuvering across country in limited to fairly good ground.

3. The platform required for use with the wheeled mount when the ground is soft is troublesome on the road and requires an excessive time to emplace.

Recommendations.—

1. That the experimental caterpillar adapters be not adopted for use on the 8-inch howitzer.

2. That the development of a wheel or caterpillar adapter for the 8-inch howitzer be attempted, with the following in view:

a. Less unit ground pressure than the present wheel.

b. Less traction resistance and greater flexibility than the experimental adapter.

c. Weight on the trail to be low enough to permit easy handling by the gun section.

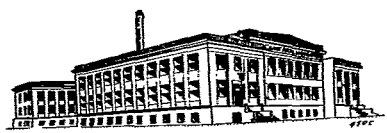
d. Elimination of the platform or development of a more portable one.

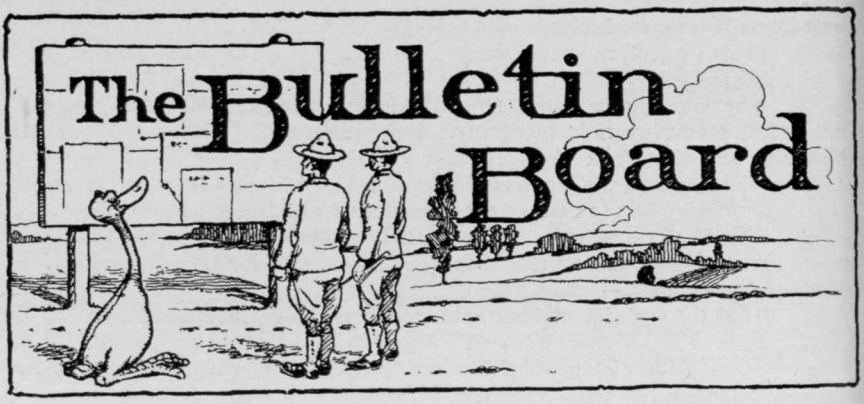
Discussion.—

1. The 8-inch howitzers now on hand will be an important factor in the early part of a war and a material improvement in their maneuverability which can be affected in a comparatively short time would be of considerable value.

2. The side slipping of the wheeled mount on muddy roads and the impracticability of attempting maneuvers over ground which could readily be negotiated by the tractor demonstrated the unsatisfactory character of the present wheels. On the march of the 51st Artillery from Camp Jackson, S. C. to Fort Eustis, Va., it was found necessary to tow the platform separately.

3. In the comparative tests of wheeled mounts and caterpillar adapters for 155-mm guns, in which the wheeled mount was maneuvered on roads and on difficult terrain as readily as the caterpillar mount. it was demonstrated that it is not necessary to reduce the unit ground pressure of a mount to that of the tractor. and that a considerable degree of flexibility of the mount may be retained.





Members of the C. A. Reserve Officers' Camp, Fort Winfield Scott, Calif., July, 1923

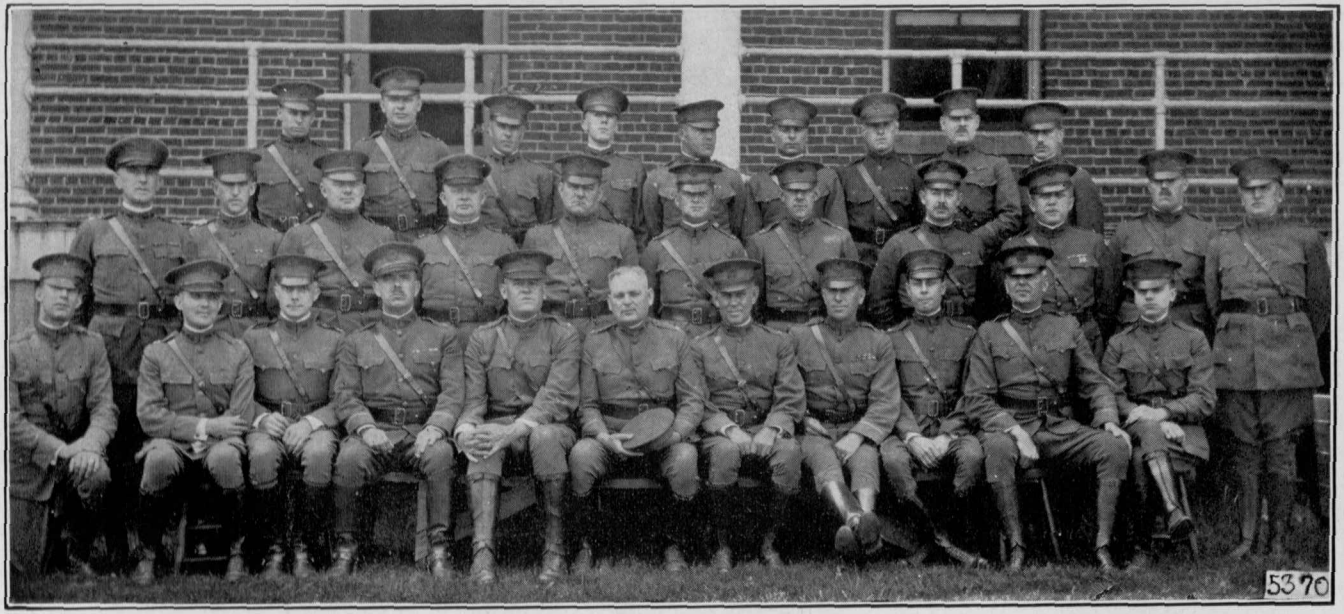
FIRST ROW, BEGINNING AT THE LEFT: CAPTAIN J. G. DEVINE, CAC, ADJUTANT, MESS AND SUPPLY OFFICER; MAJOR FRANK DRAKE, CAC, SENIOR INSTRUCTOR; MAJOR C. McN. FROST, CA-ORC; MAJOR C. K. WING, CAC, EXECUTIVE OFFICER; MAJOR G. W. FISHER, CA-ORC; MAJOR E. A EVANS, CA-ORC; MAJOR C. N. KIRKBRIDE, CA-ORC.

SECOND ROW, BEGINNING AT THE LEFT: 1ST LT. H. J. L. ATWOOD, CA-ORC 2ND LT. EUGENE TAYS, CA-ORC; 2ND LT. D. F. SELLARDS JR., CA-ORC; CAPTAIN A. S. ALLEN, CA-ORC; CAPTAIN SMITH LEE, CA-ORC, 2ND LT. T. P. GALE, CA-ORC; CAPTAIN C. O. BROWN, CA-ORC

THIRD ROW, BEGINNING AT THE LEFT: 1ST LT. T. L. WITHERS, CA-ORC; 2ND LT. E. N. OSTROM, CA-ORC; 1ST LT. M. E. KURTZ, CA-ORC; 2ND LT. G. W. COOPER, CA-ORC; 1ST LT O. O. TAYLOR, CA-ORC; 2ND LT. C. K. NIBLACK, CA-ORC;

FOURTH ROW, BEGINNING AT THE LEFT: 1ST LT. A. K. BOECKMANN: CA-ORC; 2ND LT. G. I. MILLER, CA-ORC; 2ND LT. W. T. NILON, CA-ORC; 1ST LT. J. W. KENDALL, CA-ORC; CAPTAIN A. C. GRIFFIN, CA-ORC; 2ND LT. ALAN OSBOURNE, CA-ORC; 1ST LT. R. A. PETERS, CA-ORC.

The Four-Day School for C. A. Officers, Rhode Island N. G. at Ft. H. G. Wright, June 25-29, 1923



FRONT ROW, LEFT TO RIGHT: 2ND LT. R. J. REGNIER; CAPT. HOMER CASE; CAPT. S. W. ANDERSON; MAJOR G. A. TAYLOR; COL. R. S. ABERNETHY, COMDG. C. DEF. OF L.I.S.: COL. C. L. D. WELLS,; LT. COL. H. L. STEELE; LT. COL. T. H. HAMMOND; MAJ. J. J. COLLINS; MAJ. J. D. WELLS; 2ND LT. J F. FRAPPIER.

SECOND ROW, LEFT TO RIGHT: LT. COL. F. W. STOPFORD; CAPT. J. W. CRUICKSHANK; CAPT. G. C. ANDERSON; CAPT. M. F. HAYES; CAPT. B. G. V. ZETTERSTROM; CAPT. E. D. WOLF; CAPT. G. H. FLECK; CAPT. CHRYSTIE MCCONNELL; 1ST LT. H. A. SATHER; 2ND LT E. W. MOORE; 2ND LT. H. D. ALLEN.

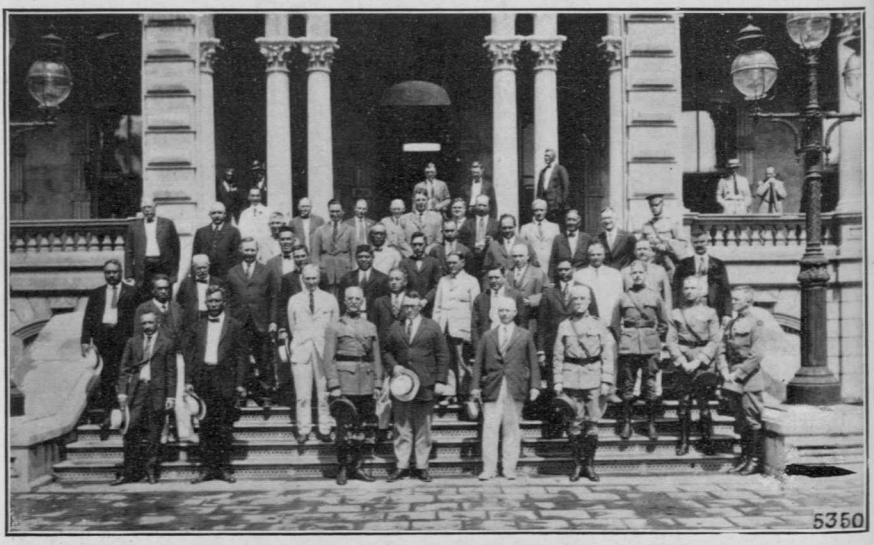
BACK ROW, LEFT TO RIGHT: 1ST LT. J. R. W. HALL; 1ST LT. A. L. NEWMAN; 2ND LT. HENRY WALSH; 1ST LT. ERNEST SANTANGINI; 2ND LT. J. T. OLIVER; 1ST LT. C. H. NOLAN; 1ST LT. P. A. CLARKIN; 1ST LT. F. O. LIND, 2ND LT. G. S. R. MOORHOUSE.

Coast Artillery Activities in Hawaii

Here we have a series of pictures, taken by the Signal Corps, U. S. Army, which almost tell their own story of some of the Coast Artillery doings in and around Honolulu. The Hawaiian Coast Artillery District, with every modern type of fixed coast defense gun, mines, railway artillery, and a whole regiment each of G. P. F.'s and antiaircraft artillery, may well claim the interest of Coast Artilleryman as the most compact and complete Coast Artillery command in existence today. That the Hawaiian Coast Artillery District is a live wire outfit may be inferred from these brief notes, selected from the news which is constantly reaching the Editor's desk in various ways.

TERRITORIAL LEGISLATURE VISITS HAWAIIAN COAST DEFENSES

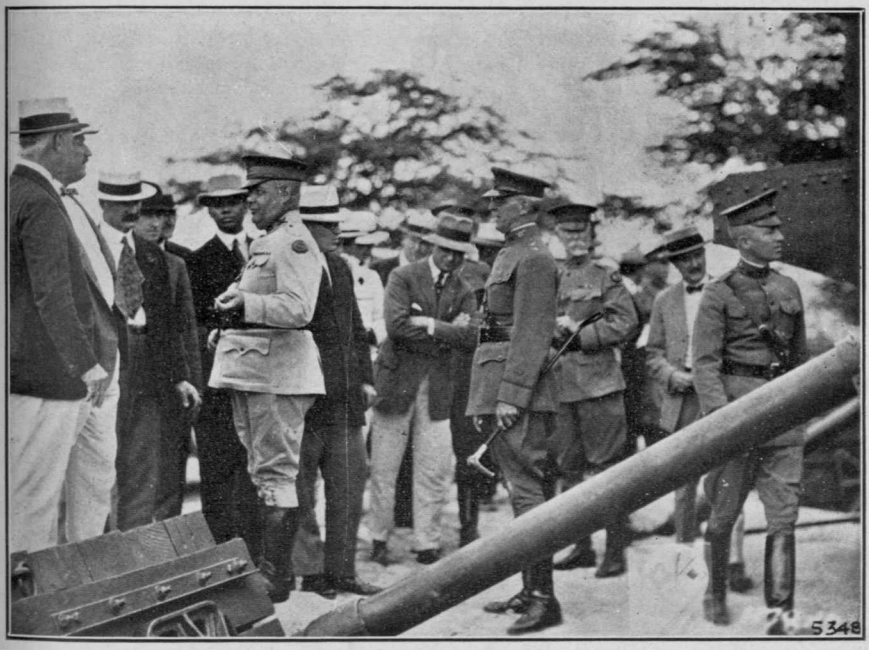
On March 8, 1923, for the first time in the history of Hawaii, the Territorial Legislature visited the Coast Forts of Oahu. The members of both houses were furnished motor transportation by the military authorities, and were accompanied by Brigadier General John D. Barrette, the commander of the Hawaiian Coast Artillery District, and by Major General E. A. Helmick, the Inspector General of the Army, who happened to be engaged in an inspection tour at the time.



ON THE STEPS OF THE HAWAIIAN CAPITOL BEFORE THE START

The first picture shows the Legislature and some of the officers who accompanied them, standing on the north steps of the Capitol Building, just prior to starting on the trip. The group of four in the front and center, includes, from the reader's left to right, Major General E. A. Helmick, Mr. L. A. Judd, President of the Senate, Mr. C. H. Cook, Speaker of the House, Brigadier General J. D. Barrette.

The next snapshot includes a number of the members of the Legislature, grouped around a 12-inch Railway Mortar, listening to Colonel Louis R. Burgess, who is giving them the keen dope. Behind Colonel Burgess stands General Helmick, while in the background, beyond General Helmick, is General Barrette.



COL. L. R. BURGESS TELLS THE SOLONS HOW IT'S DONE

PRESENTATION OF REGIMENTAL COLOR TO THE 64TH ARTILLERY

GENERAL SUMMERALL PRESENTS COLOR TO 64TH ARTILLERY

Our next picture was taken on the occasion of the presentation by Major General Charles P. Summerall, Commanding General, Hawaiian Department, of a new Regimental Color to the 64th Artillery. On the left of General Summerall may be seen Colonel Robert E. Wyllie, commanding the 64th Artillery, who has just received the color in behalf of the Regiment. Behind the Department Commander and Colonel Wyllie stands General Barrette. On the right of the line of the staff, beyond General Summerall, stands Colonel William F. Hase, now General Staff Corps, but first of all a Coast Artilleryman, Chief of Staff of the Hawaiian Department. Others to be seen in the staff line are Major Leslie McNair, G. S. C., G-3, H. H. D.; Colonel Gordon G. Heiner, C. A. C. commanding C. D. of Honolulu; Major Chas. A. French, C. A. C., Hdq. H. C. A. D.; Lieut. Geo. Foster, Aide to General Summerall; Lieut. Geo. R. Burgess, Aide to General Barrette.

COAST ARTILLERY FROM FORT RUGER FIRING PHOSPHOROUS BOMBS, AMERICAN LEGION CARNIVAL IN HONOLULU, JULY 4, 1923

COAST ARTILLERY DEMONSTRATION, JULY 4TH.

The brilliant display shown here was occasioned by the American Legion Carnival in Honolulu on July 4, 1923. A night demonstration was put on by the Coast Artillery, which included the use of ten searchlights from Battery A, 64th Artillery, and also the firing of 750 phosphorous bombs by a detachment from Fort Ruger. The fantastic illumination which these bombs furnished is indicated by the accompanying photograph.

CONGRESSMEN VISIT FORT KAMEHAMEHA

Recently Congressmen C. F. Curry and C. A. Newton were accompanied by Major General C. P. Summerall and a party of high army officers on a tour to Fort Kamehameha. As they reached the military reservation the party was given a salute of 17 guns accorded to a Congressional committee on an official visit. Battery I, 55th Artillery, formed the guard of honor outside the headquarters at Fort Kamehameha and rendered the general salute while the 55th band played appropriate airs. The party was received by Brigadier General John D. Barrette, commanding the Hawaiian Coast Artillery District, and his staff. The gun park of the 55th Artillery was first visited and then the 41st Artillery Battalion. Here the party saw active demonstration and use of the 12-inch railway mortars.

The First Battalion, 55th Artillery demolished a floating target four thousand yards at sea, firing six salvos. The party was much impressed with the accuracy and speed with which the work was accomplished. An exhibition of antiaircraft guns was given that sets a record for guns of this type. These three-inch guns averaged six shots to every ten seconds. A demonstration gun drill of twelve inch, long range rifles completed the tour of the party at Fort Kamehameha.

Luncheon was served at the residence of Major General C. P. Summerall at Fort Shafter. Afterwards the party motored to Schofield Barracks where they were received by Major General C. T. Menoher, Commanding Hawaiian Division, and were escorted through the barracks and the station hospital.

The Fort Monroe Reserve Officers' Camp, 1923

By Major Richard F. Beirne, C. A. R. C.

Training with organizations using the particular weapons to which they had been assigned featured the course of instruction which was given the Coast Artillery Reserve Officers during their two weeks' camp in the Coast Defenses of Chesapeake Bay this year. Those reserve officers who had elected service with the antiaircraft organizations were given practical training with the antiaircraft units at Fort Monroe, and those who had been assigned to fixed coast defenses had as their major task, work as emplacement and plotting room officers, as well as in the B. C. Stations.

The general course covered all of the weapons and matériel used in the Coast Artillery Corps. This system enabled the Reserve officers attending the 1923 camp to specialize in their particular assignment, and at the same time familiarize themselves with the work of other units. The general course included the organization and operations of coast defenses, organization and operations of a fort command, operation of the elements of the fixed defenses under night conditions, emplacement and tactical employment of heavy artillery matériel, antiaircraft battery and searchlight drill, establishment and maintenance of field lines and other communication systems used with antiaircraft organizations, practical solving of orientation problems peculiar to antiaircraft work, instruction in antiaircraft machine gun operations, and a road march by the 61st Artillery Battalion, (Antiaircraft) in which the Reserve Officers participated.

These practical features were supplemented by theoretical instruction in the Coast Artillery School, including conferences on the preparation of range tables, calculation of initial firing data, solutions of type problems, dispersion and the law of probabilities, adjustment of fire and blackboard firing with a discussion of the methods illustrated. Problems in mobilization and other subjects were submitted to the reserve officers and written solutions were required.

Not only with a view to giving practical instruction to the younger reserve officers, who had not seen active service, but with the idea of bringing up-to-date

Members of the C. A. Reserve Officers' Camp, Fort Monroe, July 29-August 12, 1923

(From Reader's left to right in each row)

FRONT ROW. 1st Lieut. Clarence A. Sutton, 2nd Lieut. Paul O. Langguth, 2nd Lieut. Peter J. Stevenson, 1st Lieut. Samuel H. Tinsley, 1st Lieut. Edmund B. Ilyus, Major Richard F. Beirne, 2nd Lieut. Will B. Murphy.

SECOND ROW: Captain Robert E. O'Connor, Captain Ulric J. Memgert, 2nd Lieut. Joseph A. Kelly, 2nd Lieut. Allen M. Murphy, Major Thompson Short, 1st Lieut. Lloyd A. Corkan, 1st Lieut. Bradford Noyes, Jr., Lt. Col. Bowman Elder, Major Vincent H. Drufner, Major William R. Maull, Lt. Col Edwin A. Ziegler, 2nd Lieut. Gilman S. Rowe, Lt. Col. George M. Small.

THIRD ROW: Major Earl W. Thomson, 2nd Lieut. George R. Cunnington, 2nd Lieut. Trevor M. Heath, 2nd Lieut. Theodore C. Sedgwick, 2nd Lieut. Galen F. Oman, 2nd Lieut. James I. Martin, Captain Arthur V. Henry, 1st Lieut. Joseph H. Bromley, 2nd Lieut. Frederick Lomas, 2nd Lieut. George E. Dement, 2nd Lieut. William W. Downing, 2nd Lieut. Lewis H. Hamilton,

FOURTH ROW: Captain John W. Callahan, 2nd Lieut. Ivan L. Craig, 2nd Lieut. James W. Coleman, Captain Floyd G. Brightbill, 1st Lieut. Walter K. Porzer, 2nd Lieut. Frank H. Moore, 1st Lieut. Harold R. Reed, 2nd Lieut. Thomas M. Evans, 2nd Lieut. Clarence Allender, 1st Lieut. John E. Bullock.

the knowledge of the older and more experienced officers, instruction was given in the duties of battery commanders and range and emplacement officers. Close order infantry drill, the organization of messes, purchases of rations, accounts and other paper work were featured. Almost daily there was active work in firing with service ammunition the major caliber seacoast guns with both day and night firing with the antiaircraft guns. This was supplemented by sub-caliber firing and an analysis of practice with a critique. Orientation of seacoast mortars and the firing of the mortars at Batteries Ruggles and Anderson on moving targets consumed a large part of one day of the course.

Another day was given over to a trip to Fort Eustis, where eight-inch howitzers, 155-mm. G. P. F.'s and twelve-inch railroad mortars were fired. The visit to Fort Eustis also included an inspection of the large amount of heavy artillery matériel and the motor equipment at that fort. Two afternoons were spent at Langley Field, where, through the many kindnesses and courtesies extended by the officers of the Air Service, the Coast Artillery reserve officers were given the opportunity of inspecting all matériel and participating in actual flights, giving them experience in aerial observation of the coast defenses and surrounding terrain. The reserve officers of the Air Service were in training during the same period at Langley Field and a return visit was made by them to the Coast Defenses at Fort Monroe, where practical demonstrations were given on the antiaircraft guns and machine guns.

Much pleasure was expressed by the reserve officers attending this camp over the success of the course and the policy of having both practical and theoretical training. In all, fifty-two reserve officers attended the camp, including three lieutenant colonels, five majors, five captains, twelve first lieutenants and twenty-seven second lieutenants. These reserve officers came not only from the Third Corps Area, but from the Fifth Corps Area as well. The latter had attended the Reserve Officers' Training Camp in 1922 at Camp Knox and had applied for training in 1923 at a regular Coast Artillery Station. Much gratification was expressed by them over the favorable indorsement of their petition. One regular officer from the Third Corps Area and one from the Fifth Corps Area were on active duty under the Camp Commander and were especially well fitted to serve as liaison officers between the camp commander and the reserve officers of their particular areas.

At the conclusion of the camp, resolutions were passed by the Reserve officers attending, expressing their gratitude to the Commanding Generals of the Third and Fifth Corps Area, the Chief of Coast Artillery and the regular officers in charge of the camp for the cooperation accorded them in securing this instruction. In these resolutions, the reserve officers stressed the marked benefit which they received from the opportunities given them to command regular troops stationed at Fort Monroe. The close order drills were supplemented with frequent ceremonies, including regimental parades and inspections and escort to the color.

The reserve officers were accorded the privileges of the Fort Monroe Club during the camp and at the close of their course arranged for the purchase and presentation to the Club of a copy of the painting recently presented by the Republic of France to the American Legion. In this painting the artist portrays the part played by America in serving as an ally to France and other nations in the World War.

Rhode Island Publishes Military Directory

The Rhode Island Sector of the Association of the United States has recently published and distributed an attractive paper covered pamphlet of 48 pages which is intended to inform any interested person in the State of Rhode Island of the

details of military activity within the borders of the State. Following a concise introduction embodying the statement of present military policy, are short chapters giving the location, personnel, organization and history of the various units of the Regular Army, National Guard, the Organized Reserves, the R. O. T. C. and the C. M. T. C. which may be considered to be affiliated with the State of Rhode Island. On the face of it, this is an idea which is worthy of emulation in all other parts of the country. With such a book as this in his hand no one with interest of any sort in military activities within a state, need fail to be hooked up with some military unit through lack of information as to where and what it is.

Composition of C. A. Rifle Team Squad

At the time of going to press, the Squad from which is to be selected the Coast Artillery Rifle Team, now working out at the Wakefield Rifle Range, is composed as follows:

1. Capt. J. T. Campbell
2. Sgt. Otto Bentz
3. Lt. L. L. Lemnitzer
4. Cpl. J. J. Dyba
5. Lt. H. I. Borden
6. Sgt. E. B. Porter
7. Cpl. G. B. Grigsby
8. Capt. C. E. Loucks
9. M. Sgt. Otto Hahn
10. Capt. F. S. Swett
11. Sgt. J. Wertzberger
12. Lt. L. A. White
13. Capt. M. H. Parsons
14. T. Sgt. J. Christian
15. Capt. E. F. Olsen
16. Maj. C. W. Baird
17. Lt. G. W. Nichols
18. Lt. E. W. King
19. Sgt. G. B. Ping
20. Sgt. P. J. White
21. Cpl. J. Chiovaro
22. Lt. R. W. Crichlow
23. Cpl. H. O. Peters
24. St. Sgt. F. W. Hardsaw
25. T. Sgt. T. T. Peterson
26. Pvt. M. J. McAlhaney
27. Cpl. J. Hall
28. Lt. M. G. Cary
29. Pvt. 1cl. J. Henson
30. Sgt. L. Stewart
31. Sgt. W. L. Leslie
32. 1st Sgt. L. Razga
33. Pvt. J. S. Jezouit
34. Capt. E. R. Reynolds
35. Cpl. O. Smith
36. Cpl. H. Bramlett
37. Capt. J. W. Barker
38. Cpl. Jack Crawford

This list is arranged to show the shooting standing of the members of the squad as of August 18th, and of course does not include the Team Captain, Team Coach, nor the members of the separate Coast Artillery Pistol Team.

Impact

The JOURNAL wishes to announce the appearance of the initial number of "Impact," the official Bulletin of the Coast Artillery Corps of the Second Corps Area. If this newest journalistic medium of the Coast Artillery subsequently lives up to the standard set by its first issue, it will be a live news sheet which no Regular, Reserve or National Guard Coast Artilleryman in the Second Corps Area will fail to read from cover to cover. The cover, by the way, is a very attractive design which is due to the artistic skill of Captain C. L. Wahle, 212th Artillery (A. A.), N. Y. N. G. In its twenty-five mimeographed pages, "Impact" includes a wealth of timely information as to the doings in the Second Corps Area. "Impact" is on the target, may it there remain!