The FIELD ARTILLERY Journal

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MAY-JUNE, 1940

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IN THIS ISSUE

WE PROMISED, when the German invasion of Poland began, to furnish our readers lessons of that war as fast as material became available. Colonel Hartmann's article (FAJ Jan.-Feb.) was secured in furtherance of that promise — an article which already has been widely quoted in this country and in Europe. Continuing this policy of supplying our readers with the latest obtainable military lessons, we present herein further data gleaned from the Polish campaign. Captain H. D. Kehm, the compiler, is an instructor at the Field Artillery School, Fort Sill.

THE AUTHORS of "Close-in Defense of Field Artillery" have had extensive experience with various types of small arms and are thoroughly conversant with their possibilities. Captain Hart (VMI '27) is a practicing lawyer in civil life; Captain Haines (Princeton '29) is an investment counsel.

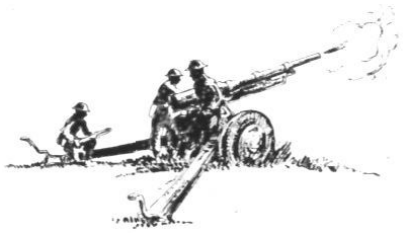
IT HAS OFTEN been said that there is nothing new in marching horse-drawn artillery. Possibly so; but, as Gen. Danford pointed out, there is much that has been forgotten. Lieut. McDowell's "Wagon Wheels" is not offered as something novel on this subject, but is printed as a darn good story which contains some worthwhile reminders. The author is now a student at the Aviation Ordnance Course at Langley Field.

CAPTAIN A. S. BENNET, author of "VP Aiming Point," was the originator of the method of lateral-displacement corrections contained in FM 6-40, it having been proposed first in his article in the FIELD ARTILLERY JOURNAL, November, 1925. He feels that the method suggested herein is an improvement on the older one. Captain Bennet is an instructor in the Field Artillery School.

CAPTAIN W. F. MILLICE, who writes on a subject always important in this day of motorization, has had considerable experience organizing and instructing at various service motor schools. As we go to press he is Artillery Officer IX Corps, Third Army maneuvers.

MAJOR LLOYD HANNA is an instructor at the University of Illinois, Lieut. T. H. Marshall is a chemical engineer at the University of Kansas. Corwin Robbie is the pen name of one of our senior NCO's; when last seen by the editor he was a communications expert. He has contributed to several service magazines.

VALUABLE PROFESSIONAL material in the shage of Gunnery Problems continues to be furnished by the Field Artillery School; heartfelt thanks are also due the School for the tactical problem featured in this number.



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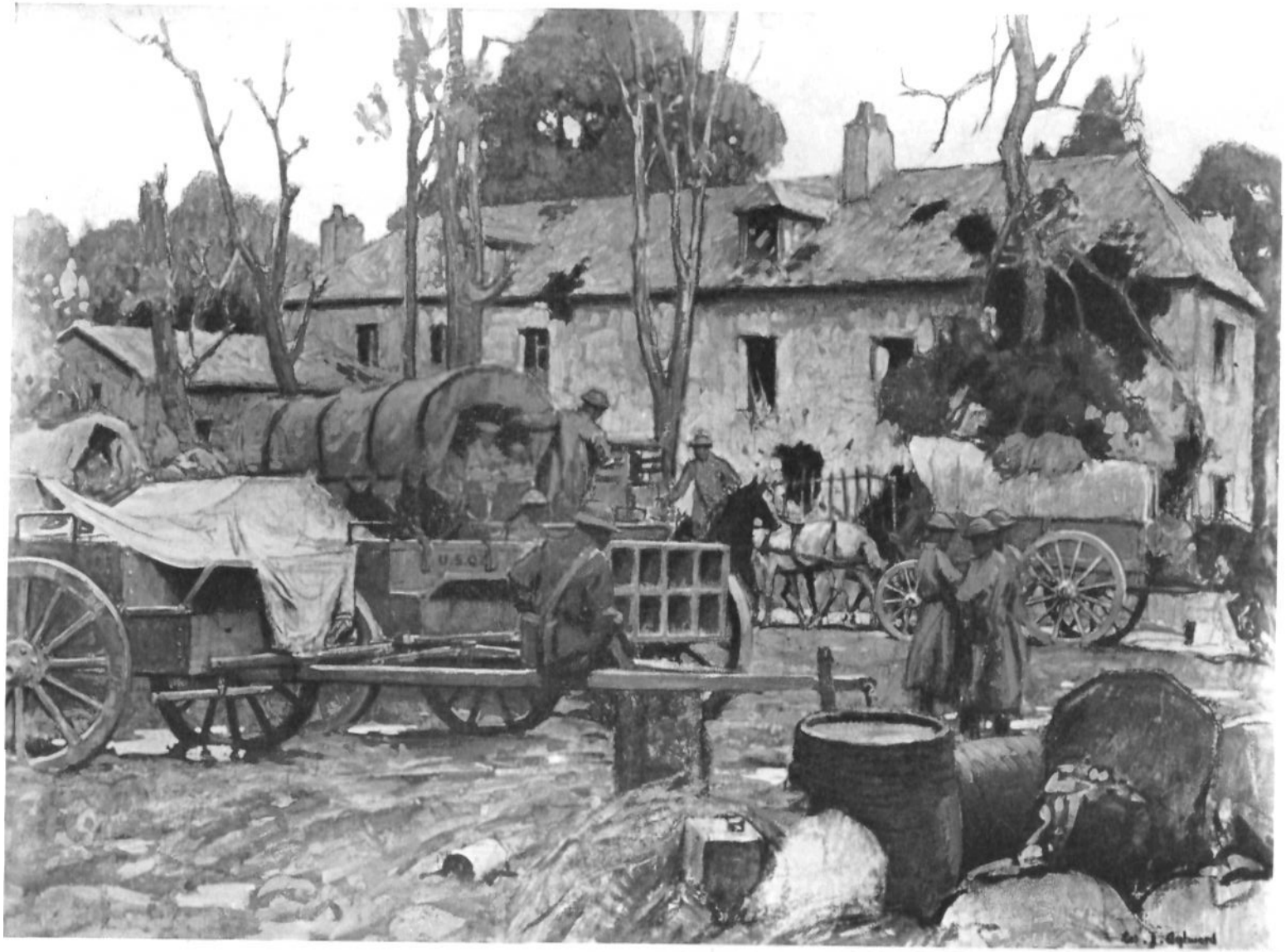

Capt. H. J. Aylward

The Advance through Mont St. Pere

C A N W E A R M ?

By Major General William J. Snow, USA-Ret.

In the original manuscript of these memoirs, the entire subject of personnel and training is finished before taking up the matter of materiel. But the turn recently taken by events in Europe suggests to me that perhaps it might be well to break in here with a brief article on the question of how long it takes to produce guns and ammunition in quantity; for it is generally believed that the Allies are far behind Germany in the provision of war supplies, and we are vastly worse off than the Allies. Consequently it may be worthwhile to refresh our members with the lessons learned twenty-two years ago.

No amount of last-minute willingness to provide ourselves with arms, and no appropriation of money no matter how generous, can atone for prior non-provision of tools, skilled workmen, and manufacturing facilities. I wonder how many of our young field artillerymen of today are familiar with the amount of time it takes to take a field artillery weapon, even under the accelerated conditions of wartime? The table on following page, taken from the results of our World War experience, give this information more succinctly and yet more completely than an extended discussion. I commend it to your close study.

It will be noted that the 8-inch howitzer (and its carriage) were made by the Midvale Steel Company. They were making this weapon for the British at the time we entered the war, and we simply gave them an order to take some for us. It will also be noted that it took ten months to make the first carriage, and the howitzer for the carriage came along about the same time. But it will also be noted that it took twenty-eight months to get into quantity production—that is, it took *two years and four months* before we could get them as fast as we wanted.

As to the 9.2-inch howitzer, it took a year to get the first one and we never did get into quantity production. This also was a British weapon that we adopted simply because we could get it (and we were making quantities of ammunition for it for the British); but the war was over before we got the first one and we do not know how long it would have taken to get all we wanted.

As to the 155-mm. gun (GPF), it will be noted that the recuperator was the limiting factor and that it took a year to make the first one; we got it about the time of the armistice. As to the 155-mm. howitzer, Dodge Brothers came through magnificently with a recuperator in nine months, about the same time as it took to make the carriage and tube; so we may say that we got the first of these weapons in nine months; and in about a year we were in quantity production.

As to the 240-mm. howitzer, again the recuperator was the limiting factor and it took a year and a month to get the first recuperator and about six months to get into quantity production. The term "quantity production" as applied to this howitzer is a misnomer, for the howitzer forms a striking case of the lack of wisdom in going into production on any cannon upon which insufficient research and development work has been done. Its history is as follows: As a result of the Russo-Japanese War, the Russians felt the necessity for a heavy howitzer. They accordingly designed the 280-mm. one, to be mounted on a Schneider carriage (French), and the combination was tested in 1911. It was satisfactory and a considerable number were built, both for the Russians and for the French, in the early days of the war, and they continued in use until the end of hostilities. By the time we entered the war, it was thought that 240 would be a better caliber than 280 and so the former was adopted. Our Ordnance officers went to France and inspected this weapon; they consulted Schneider and no trouble was anticipated by either the French or ourselves in its production. In addition, the Schneider Company sent technicians over here to assist in its manufacture and contracts were made in June, 1917, for production. In spite of this, the war was over before deliveries began. Part of the delay was due to a partial redesign to adapt the weapon to American manufacturing methods. The first howitzer blew up; so did several successors, made with slight changes, and it was not until about ten years later that all wrinkles were straightened out.

So much for the heavy field artillery weapons. (I omit all discussion of the 4.7-inch gun as it is now obsolete and its World War history is not pleasant reading.) Now let us look at the light guns.*

Under the organization of our army during the World War, the numbers of heavy and light guns were about equal; or, in other words, every time we made a

*The discussion of why we adopted the French "75" is rather lengthy, and will be reserved for a later installment.

Contracts from the World War memoirs of the first Chief of Field Artillery show how unpreparedness cannot be remedied overnight

TIME STUDY OF FIELD ARTILLERY CONTRACTS

Materiel	Contractor	Date of contract	Elapsed time between date of contract and first delivery	Monthly capacity of plant	Time elapsed between date of contract and attainment of plant capacity
75 mm cannon, Model 1897	Wisconsin Gun Co.	Aug. 29, 1917	1 year	48	1 year, 6 months
75 mm cannon, Model 1897	Symington-Anderson Co.	Nov. 23, 1917	10 months	207	1 year, 2 months
75 mm recuperators, Model 1897 (French)	Rock Island Arsenal	Apr. 16, 1918	8 months	50	1 year, 3 months
75 mm recuperators (1897)	Singer Mfg. Company	Mar. 26, 1918	1 year	75	1 year, 3 months
75 mm carriages, Model 1897	Willys-Overland Co.	Apr. 17, 1918	5 months	400	1 year, 1 month
4.7-inch Gun, Model 1906	Northwestern Ord. Co.	July 19, 1917	1 year, 1 month	33	1 year, 10 months
4.7-inch Gun, Model 1906	Watervliet Arsenal	Aug. 6, 1917	11 months	36	1 year, 2 months
4.7-inch Gun, Carriage	Walter Scott Co.	July 1, 1917	1 year	14	1 year, 3 months
4.7-inch Gun, Carriage	Rock Island Arsenal	July 23, 1917	6 months	43	1 year, 3 months
4.7-inch Gun, Carriage	Studebaker Corp.	Dec. 21, 1917	8 months	50	10 months
155 mm Howitzer	American Brake Shoe Co.	Aug. 20, 1917	7 months	286	1 year, 2 months
155 mm How., Recuperators	Dodge Bros.	Nov. 1, 1917	9 months	495	1 year
155 mm Howitzer, Carriages	Osgood-Bradley Car Co.	Oct. 27, 1917	9 months	62	1 year, 2 months
8-inch Howitzer	Midvale Steel Co.	Feb. 8, 1918	6 months	28	8 months
8-inch Howitzer	Midvale Steel Co.	Apr. 5, 1917	8 months	26	1 year
8-inch Howitzer, Carriages	Midvale Steel Co.	Oct. 2, 1918	5 months	12	6 months
8-inch Howitzer, Carriages	Midvale Steel Co.	Oct. 8, 1918	3 months	33	8 months
8-inch Howitzer, Carriages	Midvale Steel Co.	Apr. 4, 1917	10 months	28	10 months
155 mm Gun (G. P. F.) Cannon	Bullard Engineering Co.	Dec. 13, 1917	7 months	41	
155 mm Gun (G. P. F.) Cannon	Watervliet Arsenal	Mar. 24, 1918	2 months	21	
155 mm Recuperator	Dodge Bros.	Nov. 1, 1917	1 year	361	
155 mm Gun, Carriage	Minnesota Steel and Machine Co.	Nov. 7, 1917	9 months	135	
9.2-inch Howitzer, Cannon	Bethlehem Steel Co.	Jan. 26, 1918	1 year	Production stopped before plant capacity reached	As above
9.2-inch Howitzer, Carriage	Bethlehem Steel Co.	Jan. 26, 1918	1 year		
240 mm Cannon	Watervliet Arsenal	Nov. 20, 1917	1 year	15	1 year, 7 months
240 mm Recuperators	Otis Elevator Company	Dec. 22, 1917	1 year, 1 month	74	1 year, 4 months
240 mm Recuperators	Watertown Arsenal	Sept. 1, 1917	1 year, 1 month	60	1 year, 6 months
240 mm Carriages	Standard Steel Car Company	Nov. 16, 1917	1 year, 1 month	78	1 year, 4 months
240 mm Carriages	Watertown Arsenal	Sept. 1, 1917	1 year, 1 month	34	1 year, 7 months

heavy gun or howitzer, of any caliber, we had to make a light gun. An examination of the table shows that to make the first gun tube required from ten months to a year and to make the first recuperator required from eight months to a year; the carriage, less the recuperator, took less time. But to get into quantity production required one year and three months. Assuming that we do as well in the next war, there are two deductions to be made from these figures. These are:

First.—For more than the first year of the war it must be fought with such field artillery weapons as are on hand when hostilities break out.

Second.—Even if new and better weapons have been designed, tested, and are ready for production at the outbreak of the war, they cannot be supplied in quantity for less than about a year. Actually it will take longer than this, for two reasons:

(1) After the gun, recuperator and carriage are manufactured, they must be assembled, proof-fired and then distributed to the troops; this is a matter of several months.

(2) When the U. S. entered the war there was already in existence in this country a large munitions industry, developed by manufacturing for the Allies; there is no such industry now. Everybody knows that our government arsenals cannot produce a tenth part of what we need in war, therefore this munitions industry must be built up first. This means the erection of factories the making of machine tools, dies, jigs, fixtures, etc. and their installation in the factories and the training of mechanics to operate the special machinery. So, considering all these facts, I would say that the length of time as given so far in this article should just about be doubled; or, in other words, about two years.

Everyone is familiar with the unprecedented amount of artillery ammunition consumed in the World War. Everyone knows how it exceeded even the wildest previous estimates. Everyone knows how the unforeseen consumption in the early days of 1914 caused a check in the operations of all opposing armies until stocks of ammunition could be built up. Everyone knows how the French soldiers had to be recalled from the front to work in ammunition factories, and the same procedure followed in Great Britain. And I think that everyone knows that the United States, as the principal industrial neutral nation, was called upon by the British to supplement their home production, which proved fortunate for us, for in the three years of war before we

became a belligerent, a great munitions industry grew up in this country and much technical knowledge of this hitherto almost unknown industry was developed here and was consequently available when we entered the war, in April, 1917. I do not for a moment want my remarks to be understood as belittling the work of the Ordnance Department in providing artillery ammunition; I am merely stating one of the factors that helped it succeed as well as it did.

In connection with ammunition production, I want to invite the attention of the reader to the Report of the Graham Investigating Committee after the war, whose figures and deductions concerning artillery and artillery ammunition are sometimes quoted as showing a lamentable failure of our artillery and ammunition program. This Committee's figures may be correct (probably are), but the conclusions are entirely misleading. After every war in which the United States has been engaged, a Committee of Congress has been appointed to report "On the Conduct of the War." This country is governed by politicians; therefore if the investigating committee (generally called a "Smelling Committee") is of the same political faith as the party that fought the war, the report is a whitewash. If the Smelling Committee is of the opposition party, the report is a severe arraignment, showing inefficiency, incompetence, waste, and generally graft and corruption. The Administration was Democratic during the war; the Graham Committee was a Republican one; its chairman was Congressman Graham, a rugged, honest, Scotchman from Illinois—but a Republican, as were also a majority of the committee.*

The Graham Committee's exhaustive investigation took three years and the Report is published, I think, at seventeen volumes. On the subject of artillery ammunition, the Committee says:

"We had 689 contracts for 75-mm. shell on which we expended $301,941,459.00; of these shells we fired 6,000.

"We had 142 contracts for 3-inch shell on which we expended $44,881,844.00; none of these shells reached the firing line.

"We had 439 contracts for 4.7-inch shell on which we expended $41,716,051.00; of these shells 14,000 were fired by our forces.

"We had 617 contracts for 155-mm. shell on which we expended $264,955,387.00; none of these shells ever reached the firing line.

"We had 239 contracts for 9.2-inch shell on which we expended $54,389,377.00; none of these ever reached the firing line.

"There were 17,689,406 shells delivered before the Armistice and 10,211,389 shells delivered after the Armistice, or 37 per cent of the total after the war."

Of course the above extracts are so phrased by the Committee as to indicate waste, extravagance and inefficiency—to put it mildly. But let us examine this for a moment. The total number of rounds delivered both before and after the Armistice was about 28 million; how much of a supply was this? In October, 1918, I had in my possession figures showing that in the week ending September 26th the British alone had fired 3½ million rounds—2½ million during the last 3 days. At that rate our 28 million was only 8 weeks' supply. The average British expenditure during the entire war was 12,700,000 per month; at that rate our 28 million was only 2 1/3 months' supply—certainly not excessive. And our army was growing; by the time of the Armistice we had more men on the Western Front than the British and French combined, with the possibility of our taking over the war in 1919. Then again, the frequent expression "none ever reached the firing line" in the above extracts was really due to shortage of shipping, for which the War Department was in no way responsible; nor is the implication that all ammunition should go to the firing line correct—probably close to a million rounds a month were needed in training far from the firing line. But the point I want to call the reader's attention to here is the *time* it took to get into production, with the consequent shortage of ammunition in the meantime. We began to develop the munitions industry on a large scale in the United States in 1914 to fill Allied contracts. In 1917, 3 years later, when we entered the war, contracts were placed for large amounts for our own use. Another year and a half of war elapsed, bringing us to the Armistice; and at that time we had received only 63 per cent of the ammunition contracted for.

I think I have shown that the amount contracted for was not excessive; but whether it was or not, is more or less immaterial; the point to be noted is that in four and one-half years after starting the ammunition industry in the United States, and spending untold sums of money on it, only 63 per cent or about five-eighths of the amount desired was obtained by the War Department. Today the munitions industry is again dead in this country. Do not think that it can be revived overnight in case of war; based on our experience in the last war the only way we can get enough ammunition in the next one is to provide a reasonable reserve *now* in time of peace and, in addition, have civilian factories annually manufacture a small amount on W. D. contracts, thereby assuring the existence of tools, dies, jigs, and fixtures, and manufacturing knowledge.

We ought *right now* to be converting our factories to produce war supplies!

*My first meeting with Mr. Graham was under the following circumstances. One afternoon I received a telephone message from the Secretary of the Graham Committee to report for examination at a designated hour the next morning. I so reported and found the Committee examining a witness; his testimony lasted all day and I also discovered that there was another witness to come ahead of me. Finally about 5:30 PM, the Committee adjourned and the Chairman directed all the witnesses to report again the next morning at a designated hour. As everybody started to leave the room, I went up to Mr. Graham, introduced myself, and told him that as he still had one witness to come ahead of me, and as I had agreed to attend an important portent meeting the next morning in the War Department involving the disposition of millions of dollars of surplus property. I would appreciate it very much if he would let me report to him in the afternoon instead of the morning. He looked at me in a quizzical way took me by the arm, walked me over to the corner of the room, where both faced the wall, and said, "General, you don't know it, but have already secretly investigated you and you are all right; you need to come back here at all." And was I relieved! That was the beginning of a

A dispassionate and analytical discussion of the events leading up to the present European situation.

◆

By Colonel Conrad H. Lanza, FA.

ORIGINS of a MAJOR WAR

A NEW SERAJEVO

On 25 July, 1934, shortly before 1:00 PM,[1] a very small man was preparing to go out to lunch. He had been working on regulations for production of comedies at the local theatre. He laid down his papers. As he did so, he heard an unusual noise in the hall outside. It sounded like scuffling, possibly fighting, with angry talk. He had been advised that there might be a disturbance during the day, but he had dismissed this as an idle rumor. Now he felt that perhaps he might have been mistaken, for the noise kept growing louder, nearer—was obviously serious.

The very small man believed that it would be better to leave—unobserved. He started for a side door. It was locked. He called his orderly, who was already close by. The orderly lost time finding the right key; then fumbled it. In the excitement, the very small man failed to notice that a group of men had burst into his office.

In his haste to get out, he raised his right arm to pull the side door open. At this instant a conspirator, at a range of about two feet, shot him under the armpit. As the victim fell, he was again shot in the neck, at less than one foot. Stunned, bleeding, bruised, dying, the very small man heard a gruff voice loudly order him to get up—at Attention! He was completely unable to do so.

The conspirators lifted him, placed him on a couch. They gave no medical attention, not even first aid. They made no effort to staunch his blood which streamed away continuously. His request for a chaplain was disregarded. They did give him a glass of water.

The very small man only partly recovered consciousness. He never understood what it was all about. He thought he was among friends, for he recognized that those around him wore the uniform of the guard. He believed that they were trying to protect him. He thanked them for the glass of water, and then, about 3:00 PM, he died. The regulations for production of comedies rested uncompleted on his desk.

This very little man was Chancellor Dollfuss, ruler of the very small state of Austria. He had been assassinated by a group of conspirators, who arrived at his office building at the usual hour for the relief of the guard. They were dressed in the uniform of the new guard, and traveled in two trucks similar to those habitually used plus one dairy wagon. Nobody paid any special attention to them. Everyone assumed that it was the new

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EDITOR'S NOTE: The opinions expressed herein and the conclusions drawn are solely those of the author.

[1]Where hours are shown they are the local time.

guard. They had been admitted without question.

Dollfuss' assassination started a chain of events which startled the world, and has finally led to a major war.

The exact history of the murder of Dollfuss has not yet been ascertained. It has been alleged that it originated in Germany with members of the Nazi party, and was intended to be the first step leading to an early annexation of Austria.

If this was indeed the Nazi mission, it was not at the time accomplished. As soon as the foregoing events became known, Il Duce of Italy, Mussolini, mobilized a strong force at the Brenner Pass and announced that if any attempt was made to interfere with the independence of Austria, Italian troops would enter to support the Austrian government. From France came a clear statement that if Italy should need help it would be forthcoming. Czechoslovakia and Poland, allied to France, expressed a determination to assist in supporting Italian intervention.

Under these circumstances Germany may have recognized that it would certainly be inadvisable and probably impracticable, to proceed further with the intention of then annexing Austria. At any rate, the opportunity was lost, and if such a plan existed it was abandoned. The mission was not.

LEBENSRAUM

Sometime later, and prior to March, 1935, a new and better plan was adopted. Never published, it is indicated only through subsequent events. At first these were believed to be isolated. Later they were recognized as related to one another in such a logical and thoroughly prepared way that they could scarcely have been a matter of chance.

The new plan was a development of the idea expressed in Hitler's *Mein Kampf*, to unite under one flag all German-speaking peoples, peacefully if possible, by war if not. The doctrine as to *vital space*, meaning expansions of territory to afford resources for an increasing population, was added in later revisions. The original plan provided for a succession of limited steps, so chosen that each would facilitate the next one. The possibility that a major war might occur had to be considered, but this was to be avoided and not risked until rearmament had been completed. In the meantime caution was to be used; publicity as to intentions concealed, and care taken not to antagonize powerful nations which might be hostile.

GERMAN REBIRTH

The first step was to increase the army, the navy, and the production of munitions. Reorganization of industrial and economic conditions was included, especial attention being given to manufacturing for export sufficient articles to cover the cost of importing war materials not obtainable locally. To pay for these with funds available, imports of food were reduced. Partial rationing of the population followed as a necessary consequence. The German people made few objections to any hardships involved. It was explained, and accepted by them, that inconveniences were temporary, and were required to free their country from the humiliating servitude of the Versailles Treaty. It seemed to be a worthy mission.

Annexations of those adjacent territories which were mainly occupied by Germans were provided for in the plan. This was to be undertaken after the army and navy had been built up to a point where it could undertake a war with reasonable prospects of success. For the time being, efforts were concentrated on reorganizing the homeland, so that it could be well fitted to accomplish its self-imposed task.

A dictatorial form of government was adopted, which had the power and the will to initiate and carry through appropriate measures in the correct order and at the right time. War was prepared for, secretly at first, openly later. The press and radio were controlled; they published nothing that would indicate the intentions of the government. There were no public discussions; no votes were taken; no one was consulted except the experts.

There were obstacles to the execution of the plan. The treaty of Versailles was still binding. It had established boundaries for Germany and prescribed the size of its army and navy, intended to be maintained primarily as a police force. The provinces west of the Rhine were unoccupied; all frontiers were without defenses and open to invasion.

The German army contained only 102,000 officers and men. This number was indeed supplemented by other forces more or less disguised as police, veteran organizations and athletic associations. However, in all only about 250,000 men were available. There was no heavy artillery, not much light artillery; no tanks nor armored vehicles; no air force, no ammunition reserve. Important resources for war were lacking, or were materially deficient in quantity, particularly iron, copper, tin, rubber, oils, and other raw materials.

Who would be likely enemies?

France was the most dangerous. She had an army of around 400,000 men, splendidly trained and equipped; large reserves; unlimited resources. She was in a position to rapidly invade the unprotected Rhine provinces, or cross the Rhine into south Germany. With her superior forces she might do both.

Next most serious possible opponent was the British Empire. Britain's overwhelming sea power was a threat; it would enable her to enforce a blockade. Germany, having a small navy, was in no position to fight the British on the sea. As long as dependence was placed on overseas imports, a blockade might become decisive. Until Germany was in a position to carry on in spite of a blockade, and until the west frontier was sufficiently fortified to stop the French army, nothing must be done to antagonize the British and the French.

Next there was Italy. Since the World War this country had improved her military forces, and under the energetic Duce her enlarged army had become a competent force. She might march north into Austria or Bavaria. This would involve an advance through mountainous terrain—a difficult feat against resistance. But if made in connection with an advance by France across the Rhine, such a move might become dangerous.

Following Italy came Czechoslovakia, who as early as January, 1933, had started, under French advice, the construction of formidable defensive works facing Germany. Her air force of around 750 planes was being doubled, and the ground troops substantially increased. The arming of Czechoslovakia by France, and the alliance between the two states, which was evidently intended especially for war against Germany, had about the same effect on the latter state as if a foreign nation, fearing war with the United States, should arm Mexico with a view to hostile action against our southern border. Germany bitterly resented the alliance and its implied threat.

Finally Poland had to be considered. Poland was tied to France by another alliance. Germany commenced the removal of this danger by concluding, on 25 January, 1934, a non-aggression treaty with Poland. This treaty was secret, and may have been based on unwritten engagements not yet precisely known. From subsequent events it appears that Germany agreed to refrain, during the ten-year life of the treaty, from agitation for return of Danzig and the Polish Corridor. In return for this Poland agreed to disregard events in Austria, and at some future date to actively support a partition of Czechoslovakia, provided Poland received those sections of Czechoslovakia which it considered as predominantly Polish.

A beginning already had been made in 1933 for increased economic and military strength under a four-year program, many features of which were at first disguised. As there was considerable unemployment, labor was available. Imports were regulated by the government; a large part consisted of minerals, oils and other raw materials needed for production of munitions. The plan provided for gradually reducing such imports. Plants to manufacture gasoline from coal and lignite, rubber from tar products, textiles from wood, and for the production of other *ersatz* materials, were constructed. The plan was renewed in 1937 for another period of years, and with the announced expectation that by 1941 Germany would be able to fight a major war regardless of a possible sea blockade.

REARMING OF GERMANY

On 16 March, 1935, Germany announced a return to compulsory military service, in open disregard of the Versailles Treaty, which specifically forbade such action. Foreign protests against such unilateral disregard of solemn engagements were numerous and immediate. Complaints were made to the League of Nations. France proceeded to conclude an additional alliance, this time with Russia, which was signed on 2 May.[2] A new joint treaty with Russia and Czechoslovakia, providing for mutual aid in case of war with Germany, followed on 16 May, 1935. There was a great outcry against Germany.

On 21 May, Hitler in a speech denounced those articles of the Versailles Treaty which imposed on Germany a status of inferiority. But he stated that Germany would respect from every point of view the articles of the Treaty which related to the mutual relations of states, including territorial agreements. He added that should it become necessary in the future to arrange for revisions, Germany would only do so through peaceful methods. He had no intention of intervening in the affairs of Austria, nor of annexing that country, as some had alleged. "The German people wish for peace; it must be possible for the government to preserve it. Germany neither intends nor wishes to interfere in the internal affairs of Austria, to annex Austria, or to conclude an Anschluss." The speech had a good effect in calming foreign opinion.

During this time Germany was negotiating a treaty with Great Britain providing for a German navy equal in strength to 35% of the British strength. This violated another provision of the Versailles Treaty. The British reasons for entering into this treaty were based upon the fact that prior to the World War, Germany had had about a 50% proportion of capital ships, and about 60% for other ships. It was believed that Germany would eventually receive the right to rearm, and that when this occurred, such a favorable proportion as 35% might not be obtained. The present offer looked like a bargain Besides it was evident that Germany was poor, and that she would require a very long time to build up to the 35% limit. The offer was snapped up.

INACTION OF THE DEMOCRACIES

The League of Nations investigated the violation by Germany of the treaty prohibitions against rearming. However, confronted as the League was with British acquiescence in the naval violations, nothing much could be done as to the army violations. Resolutions wen passed condemning Germany.

Germany quietly, rapidly and efficiently proceeded with her program for achieving economic independence. The army and navy were increased; rearmament made prodigious progress.

On 7 March, 1936, Germany took another step. Again violating a provision of the Versailles Treaty, German troops for the first time since 1918 crossed the Rhine and reoccupied the Rhineland provinces. This had been prepared for for about a year. Semimilitary organization, militarized police, and Nazi organizations were practically disguised troops and had been gradually stationed throughout the Rhineland. The arrival of the Regulars,

[2]Not ratified until 27 February, 1936.

not at first in great strength, did not materially affect the military situation. It did affect, as a new and bold violation of the Versailles Treaty, the legal and international aspect.

On the same day Chancellor Hitler addressed the Reichstag. "The new Franco-Soviet Pact (ratified on 27 February) establishes, through Czechoslovakia, which has a similar pact with Russia, a military threat by a great empire. Previously . . . France had treaties of aid with Czechoslovakia and with Poland. Germany had no objection to this, because these pacts differed from the Franco-Soviet Pact, in that Czechoslovakia especially, and Poland, appeared to be following, above all else, their own material interests."

Hitler then proceeded to explain that as the alliance with Russia was new, and in connection with Czechoslovakia was aimed at the heart of Germany, he this day, as a defensive measure only, occupied the Rhineland. "We have no territorial claims to present in Europe. We understand very well that all causes of tension resulting from territorial questions, or from disproportion between populations and areas occupied by them, must not be solved by wars in Europe. We hope that human wisdom will lead to a gradual evolution and to peaceful collaboration."

France, considering the situation grave, consulted her allies. Poland proposed a joint invasion of Germany. This suggestion was referred to Great Britain, who addressed against it. Great Britain was confronted with a world depression; France was just establishing a Popular front government which sought important internal social changes. Both nations felt that plunging into war at this time would be hazardous. Besides, it was believed that as the Rhineland really was part of Germany, its occupation could not be forever denied; further, there seemed to be no imminent danger. No action was taken except to file more protests.

Rumors were constant that in spite of peaceful enunciations by German leaders, Germany was prepared to invade some nation. In a speech on 1 May, 1936, Hitler denied this. He stated, "Rumors are being spread that Germany intends to invade Austria or Czechoslovakia. These are lies."

Poland Demands Share of Spoils

Notwithstanding this statement, Germany did make an effort to dispose of Czechoslovakia. Between June and August, 1936, discussions were had with Austria, Hungary, and Poland, for a joint and complete partition of Czechoslovakia. If these states agreed, Czechoslovakia could be invaded from all directions simultaneously and, under such circumstances, her resistance could probably be overcome before the great Powers could intervene.

Poland was ambitious. She usually was ready to engage in adventures which promised much for little. She had just proposed, in the preceding March, to invade Germany, but now changed sides without hesitation and agreed to participate in a partition of Czechoslovakia, with the understanding that her share would include Teschen and Ruthenia. Austria replied that in view of existing treaties France would certainly support Czechoslovakia, and that if this happened, a general war, for which she was insufficiently prepared, would result. It had been proposed to allot Slovakia less Zips to Hungary. This was tempting, as it was about what Hungary claimed as predominantly Hungarian. She felt, however, that it was wiser to postpone the partition to some future time, for the same reason as given by Austria.

While these negotiations were in progress, Germany and Austria signed an agreement on 11 July, not to interfere in each other's internal affairs.

Russia "Smells a Rat"

With one exception, the world in general does not seem to have known at the time of the secret negotiations for partition of one of the small states of Europe. The exception was Russia. The Foreign Commissar, Litvinov, did not like Germany. He suspected that something underhand was in progress. On 2 October he addressed an inquiry as to whether, in case of need, France intended to go to the aid of Czechoslovakia. If she did, he suggested a conference between the heads of the French and Russian armies, in order that it might be decided in advance just what each would do should the dreaded event arise. The danger passed. Nothing came of the inquiry.

Origin of the Axis

A most important step in the military features of the German plan was the signing on 25 and 26 October, 1936, of a treaty with protocols, between Germany and Italy, which together formed the origin of the now famous Rome-Berlin Axis.

Prior to 1935, Italy had sided politically with Great Britain and France. As late as 1934 she was hostile to German expansion in Austria. A change occurred in 1935, caused by Italy engaging in a war to conquer Ethiopia. Unexpectedly, the British at once showed great displeasure. They mobilized their fleet, strengthened their forces in the Mediterranean, and led the League of Nations in imposing sanctions against Italy as an aggressor nation, extending the principle of national security.

The British action was the result of a popular vote of the English people, which expressed opposition to permitting an invasion of one of the states of the League by another. The English had not forgotten the World War, with its catastrophic loss of lives; they ardently wished to avoid another such calamity. To them the principle of collective security, in which all nations banded against an aggressor, was an excellent method of avoiding a major war. It seemed improbable that any nation would brave world opinion, with the danger of having to fight everyone. But even this possibility might be avoided by using sanctions against the offender, through which he would be deprived of resources essential for a modern

war. As three great democratic countries between them controlled most of the resources and wealth of the world, it seemed that a refusal to furnish loans and resources would stop an aggressor as soon as his stocks were exhausted. Let it be tried! If Italy was the first aggressor under the new principle of international law, let her suffer the consequences of being financially and economically ruined, and of being treated as an outcast among the family of respectable nations.

To the British, and the other democratic states, this looked like a practicable way to avoid going to war themselves, while still enforcing peace and order and compliance with international laws of decency. It did not occur to the people that a main reason why Italy wanted Ethiopia was to acquire resources to free herself from domination by a small group of foreign nations.

France had desired no enmity with Italy. Neither her people nor her government placed much reliance in collective security. They foresaw that ultimately they would be involved in war with Germany, and that when this happened they would sorely need the aid of the British. So they believed it best to join the British in the policy of sanctions. The United States was sympathetic. Though not a member of the League, she entered into the spirit of the occasion, and the government managed to curtail exports to Italy in excess of former peacetime amounts.

Whether the sanctions were not severe enough, or whether they were applied for too short a time, has never been decided. Anyway they failed to stop the war; Italy completed her conquest in record time. So Italy had no great reason to complain of the sanctions.

The action of the democratic states had included denunciations of Italy as a violator of the rules of the League, and as an unfit associate with whom other nations should deal. Italy strongly resented this opprobrium, freely administered upon her. She grew hostile to the democracies.

Germany had not participated in the sanctions. She was Italy's friend in need, who supplied credits, loans, and kind words when they could be found nowhere else. Incensed, deeply hurt against her former allies, Italy turned toward Germany and concluded an alliance.

For Italy, the alliance promised support in case of a major war, and an end to her then political isolation. For Germany it meant that her south boundary was protected. It thereby released German troops for use in other theaters of operation, and made it unnecessary to go to the expense of fortifying one frontier. The nature of the protocols attached to the treaty have not been divulged. They appear to have covered, among other things, a definition of the special spheres of influence of the contracting powers.

To the democratic nations, the association of Germany and Italy seemed to be a rather natural result of two totalitarian states having common ideals opposed to those of the liberal nations. Neither of these states was yet very strong; both together did not have sufficient wealth and resources to wage a major war. It was regretted that Italy had left the camp of the great Powers; but this was not very serious, and in no way warranted discontinuance of the principle of collective security exercised through the League of Nations. This still seemed to be a worthy effort to maintain peace in a world troubled with a depression. Let any one who started trouble, or engaged in a war, accept the consequences through universal condemnation, through sanctions, and if necessary through force. To Germany and Italy, and also to Japan, the issue appeared to be that they were justified in attempting to find economic independence by suitable expansions. They realized that the democracies did not agree with them, and that they were engaged in a dangerous game. They had to act with caution.

RUMORS AND ALARMS

During 1937 there was considerable discussion and repeated alarm caused by allegations that Germany intended to absorb Austria or attack Czechoslovakia. It was known that Germany desired to regain her boundaries as they existed in 1914, and to go beyond these to include minorities in adjacent countries. It was apparent that Germany was rearming rapidly, and that there must be some definite purpose in this. It seemed probable that either Austria or Czechoslovakia might be attacked. Great Britain and France, while realizing the situation, were not seriously concerned. It was believed that Italy would never consent to German absorption of Austria, and that under this condition Austria could be maintained as an independent state. Czechoslovakia, with her forts, her army, and her alliances with France and Russia, looked like a tough proposition for any aggressor—even for Germany. Then there was no definite information as to any proposed aggression, only rumors. No immediate danger was expected.

In Austria, the general feeling was that Germany intended to annex that country, notwithstanding agreements as to its independence. A large percentage of the population thought that although annexation might have its evils, it was the only practicable way to redress wrongs imposed by the treaties of Versailles and St. Germain. Some Austrians were of the opinion that it might be worthwhile uniting Austria with Czechoslovakia. They agreed with those who desired annexation with Germany that from an economic point of view Austria could not much longer continue as an independent state. They preferred Czechoslovakia because it was a democracy, a compared with a totalitarian Germany. The majority of Austrians thought that the ultimate solution would be that, as Germany would absorb both Austria and Czechoslovakia by 1940, there was not much use opposing the inevitable.

Czechoslovakia noted that the German press accused them of preparing the airdromes for Russian forces to be employed in an assault upon Germany, of their being Communistic, of their being members of an inferior race. They observed that Chancellor Hitler had assured Belgium

and Holland that Germany had no designs on them, and would respect their neutrality in case of war, but that no such guarantee had been offered to Czechoslovakia.

A Red Herring

October, 1937, saw the German press conducting a violent campaign against Czechoslovakia, alleging oppression of minorities and hunger and disorders. German troops appeared on the Czechoslovakian border, although ostensibly for maneuvers. The Czechs rushed work on improving their already strong fortifications. They believed that a German blow would fall upon them; the same opinion existed in England. Throughout Europe there was unrest, wondering, waiting against hope that a German attack against someone, somewhere, sometime, would not occur.

Czechoslovakia consulted, among other Powers, Italy, who she believed was opposed to German expansion towards the Mediterranean. To the inquiry of their ambassador, Count Ciano, the Italian foreign minister, on 18 December, 1937, stated that Italy was not interested in the destiny of Czechoslovakia. "However, I desire to give you advice. Reach an agreement with Berlin, with Budapest, and with Warsaw, and do it soon and freely, and before you are forced to do so by the inevitable force of events. You will make a serious mistake if you forget recent and past experiences, and if you close your eyes to facts, through continuing to trust in illusions on the value of so-called collective security." These remarks indicate that Count Ciano was aware of the final fate intended for Czechoslovakia, and that Italy had agreed thereto, probably in one of the protocols of the treaty of alliance with Germany.

Hitler Estimates Situation

On 4 February, 1938, Chancellor Hitler relieved certain generals holding key positions in the army, including the minister of war and the chief of staff. There may have been other reasons for this move, but among them appear to have been the opposition of army leaders to risking war. They knew that public opinion in Great Britain, France and the United States was alined strongly against Germany, who was looked upon as a disturber of the peace. The generals considered that these three powerful nations might fight against Germany. There were a host of small nations, all of whom feared that if Austria or some other small state were invaded it would establish a precedent and destroy their ideal of security through the League of Nations. They might easily join the three great democratic Powers. The generals believed that the danger was too great, and that to avoid it the German policy should be changed so that no invasions of other lands should be made.

To these argumnts were opposed those of the militant Nazis. Their idea was that if territorial adjustments could be had which would unite under one flag all German peoples through peaceful means, they would be the first to urge such a course. However, eighteen years had passed since the Versailles Treaty, and in this period the only adjustment secured by peaceful methods was the return of the Saar, and this only because the Versailles Treaty had provided for it. In every other case the former enemies of Germany had objected to all expansion, whatever the reason presented. It was true they had stated they would consider, through the League of Nations, grievances submitted; but in practice the League acted for the benefit of the democracies, and under its rules requiring unanimous consent to all decisions it could not alter an existing situation to the detriment of the democratic Powers who refused their consent. Germany had asked for return of its former colonies, and had received nothing except letters, more or less polite, suggesting that this was not an opportune time to bring up this question, or giving other explanations for not complying. Austria in 1918 had desired union with Germany; the treaty of Versailles specifically forbade it. There was opposition in England and France against any project which would increase the power or resources of Germany, regardless of the wishes of interested parties. There was specially strong opposition to absorption of German peoples in Czechoslovakia and Poland, as this would increase the strength of Germany and decrease that of French allies. To unite the German folk under one flag, war must be risked. Naturally if the mission could be accomplished without war it would be done, and certainly everything possible would be undertaken to avoid a major conflict.

Chancellor Hitler sided with the militant party. He thought that the mission was so important that the risks must be accepted. He remembered an old German proverb, *erst wiegen, denn wagen* (first consider, then act). He was of the opinion that after providing, as far as was humanly possible, for possible complications, the leader should make a bold decision, then ruthlessly carry it out. He removed the generals who did not agree with him, replaced them by others who did. He issued instructions to proceed with the next step in the 1934-35 plan, which was to be absorption of Austria.

In certain circles in England a policy of appeasement toward the totalitarian states was at this time in vogue. There was a division of ideas among government officials as to whether to resolutely risk war by opposing further expansions of the totalitarian states, or whether to admit discussion on this subject and possibly make minor concessions. Those favoring appeasement appeared to be temporarily in the ascendancy. On 19 February, 1938, Mr. Eden resigned from the British cabinet as minister of Foreign Affairs. As he had been a determined and vigorous opponent of expansion by Italy and Germany, this change in the British government encouraged these two states to a considerable extent. In England it was hoped this move would tend to peace, by enabling an arrangement to be arrived at between the democracies and the totalitarian states, which would involve not too important concessions to the latter.

HITLER DECIDES TO ACT

Chancellor Hitler believed the time to act had arrived. He made a speech on 20 February in Berlin. He would not tolerate the oppression of 3,500,000 Germans in the Sudeten. Germany would no longer be indifferent to the fate of ten million Germans in Central Europe, who were separated from their motherland contrary to their will. Further oppression and mistreatment of these minorities would lead to energetic counter measures.

This speech was interpreted abroad as ushering in some intended movement. The majority thought it might be against Czechoslovakia. They believed that although the next German threat might be in this direction, Germany was not sufficiently strong to start a major war, and that the danger, while present, was probably not serious. The secret as to what and where the German move would fall was well kept. Outside nations obtained no precise information. They noted that Germany was agitating for return of her former colonies. It was clear that she was in no position to attack these directly. It seemed possible that the threats towards Central Europe were intended more to induce Great Britain and France to cede colonies to avoid a European war, which in fact Germany could not and would not engage in.

The foreign minister of Czechoslovakia on 4 March, 1938, announced in a speech that interference by another Power over Germans residing in Czechoslovakia was incompatible with the sovereignty of the state, and would be resisted by arms. The British and French press supported this view. Plain statements like these were thought to be sufficient to deter Germany from attempting to seize that part of Czechoslovakia, known as the Sudeten, lying along the German border, and which was mainly inhabited by Germans. Further agitation was expected, but no overt act.

AUSTRIA IS ABSORBED

On 9 March, 1938, Hitler ordered the concentration along the Austrian border of a number of infantry and mechanized divisions, to be ready by 8:00 AM, 12 March, to advance to the *liberation* of that country. The mobilization was completed ahead of time—by evening of 11 March. At this very hour a *request* arrived from Vienna asking for intervention by Germany to prevent alleged grave internal disorders. At 10:00 PM German troops crossed the frontier. This move was a complete surprise to the world. It found Great Britain and France unprepared.

There was no opposition. Austria was occupied on 12 March. The next day a proclamation was issued, legalizing the annexation of Austria to Germany, now to become known as the Ostmark, which was the original name for this state when established by Charlemagne some eleven centuries earlier. The first paragraph was copied from the Austrian Constitution of 12 November, 1918, and read: "Austria is a state of the German Reich."

No one knows how many Austrians desired annexation. The validating vote at the election was nearly unanimous, but is open to suspicion that it was too well organized—not a free vote. The best available evidence indicates that a majority did favor annexation. They may not have favored the manner in which it came about.

The ease with which Germany took over the country was due to two principal facts. First, the Austrian working classes were strongly opposed to the last independent Austrian government. They considered it as controlled by clerics and capitalists, while the workers were telegated to a low, unsatisfactory condition. They welcomed the Germans. Others felt that a decided change in the government was needed. Not specially favoring union with Germany, they felt this idea was worth trying, and they did not object. Second, those opposed to any kind of annexation were a minority. They were unorganized and, being surprised by a night entry of German troops with a subsequent rapid advance, were completely unable to offer any resistance.

There was indignation abroad over this German success. It was realized that Germany had received a substantial increase of population—about 6,500,000—there by increasing her military strength. To this was added valuable resources of iron, lumber, and other commodities. Overnight a possible future enemy of the democracies had become increasingly formidable.

There was considerable wonder as to the reaction of Italy to the annexation of Austria. It was argued that the sudden move had been as much of a surprise to Italy as to other countries. Only a few years before, Italy had taken such decisive steps to show her disapproval of such a move that it seemed that she could not possible favor it now. It seemed as if a dangerous neighbor had arrived on her frontier, something to which she could never agree. This might be a first step in weaning Italy back to the side of Great Britain and France. Maybe it had been a mistake to allow Italy to join Germany, and if Italy felt the same way, here might be the opportunity to rectify a previous unfortunate misunderstanding.

There is no direct evidence as to whether Mussolini was surprised by the German annexation, or as to whether it was made contrary to his wishes, and Italian interests. The indirect evidence is overwhelming that he did know of the German intentions, and had acquiesced.

Mussolini, a student, can read German. On the very first page of *Mein Kampf*, Hitler wrote that he was been at "Branau . . . on the border of two German states whose reunion we young men, at least, should make our life work." Thereafter Hitler develops the idea of a union between Germany and Austria. It seems improbable that when Italy concluded an alliance with Germany in 1936, Mussolini failed to read *Mein Kampf*, or if he had that no one told him about it, or that during the

discussions preceding the signing of the treaty, nothing was said about Austria. To suppose that Mussolini was ignorant as to German intentions in this direction is to suppose that Mussolini and his advisers lacked ordinary intelligence. It seems more reasonable to assume that the Italians were aware of German desires in this direction, and that as part of the price of the alliance secured by them, they surrendered their former objective to maintain an independent Austria. Mussolini may not have known, in advance, the date of annexation.

COMMENTS

Why did Germany, while agitating against Czechoslovakia, select Austria for her first annexation? There were excellent reasons.

First, a sentimental one. It was Hitler's first ideal, the first mission he had designated for himself. Austrian by birth, German by adoption, it was natural for him to want to unite these two states.

Second, barring foreign intervention, which it was hoped to avoid by rapidity of action, annexation would be easily accomplished. Its people were German, largely in favor of annexation. The country could be incorporated into the homeland without delay. It afforded valuable reserves and resources, which would become immediately available.

Third, strategically Austria afforded an improved line of departure should it become necessary later to fight Czechoslovakia. It would now be possible to attack this country from three directions. As Czechoslovakia had not fortified her Austrian frontier, it was improbable that she would be able to withstand for long such a converging attack, provided it was launched before new fortifications could be erected and manned.

Fourth, possession of Austria afforded direct access to Italy. In case of war, reserves and resources could be exchanged by a route which could not be readily interrupted by the British or French. If all foreigners were removed from the line of communication over the Brenner Pass, considerable secrecy could be had.

Fifth, from the Italian point of view German possession of Austria would be advantageous should there be war with Yugoslavia. Relations between Italy and her Balkan neighbor had been none too good. Their land frontier was about 100 miles long, is mountainous and easily defended. Yugoslavia felt reasonably certain she could stop an Italian advance by land. However, with Austria occupied by Italy's ally, the situation changed. The new joint frontier which might have to be defended was more than doubled. More serious was the fact that this frontier from the Yugoslavian side formed a protruding salient; penetration of either side by hostile forces might involve a military disaster. Owing to this danger Yugoslavia fell away from her former close political association with France and became neutral.

Sixth, occupation of Austria afforded Germany a direct connection with Hungary. This small state was decidedly hostile to Great Britain and France, former enemies of the World War, and responsible for the dismemberment of their country, and for refusal to entertain any propositions for rectifying what the Hungarians thought had been a crime. France had arranged an alliance between Czechoslovakia, Yugoslavia, Poland, and Rumania, expressly to prevent the Hungarians from recovering their lost territories. German occupation of Austria cowed Yugoslavia, threatened Czechoslovakia, made it possible for German and Italian troops to reach Hungary. It placed Hungary in line for possible recovery of her lost provinces. She associated herself, under the new conditions, with the Rome-Berlin Axis.

Annexation of Austria strengthened Germany directly and at practically no expense. It strengthened Germany and Italy strategically, and broke French control of the Balkan States, changing them from allies to neutrals.

(In an early issue Col. Lanza continues his exposition of the causes of the present war by discussing the Czechoslovakian affair.—EDITOR.)

FLASH!

Military attache office to be established in Bolivia.

★

A fleet of general purpose motor vehicles, of experimental types and designs, operated and maintained by War Department personnel, will be assembled at Holabird QM Depot early in June and sent to various posts for display and tests by Branch Boards.

★

Food Containers: 2,000 insulated food containers have been used and tested as to suitability during late maneuvers.

★

Reserve Officers on extended active duty with Regular Army may be promoted while on such duty, provided new grade is not above highest authorized for detail they are serving.

★

Type Army Corps, consisting of 2 square and 1 triangular divisions and corps troops, contains 280 pieces of artillery, 102 antitank guns, 363 mortars, 1,104 machine guns, 12,350 semiautomatic rifles, 104 tanks and scout cars, 39 airplanes, 3 balloons, and 8,000 vehicles.

Incidents of the Campaign

World War—German advance into Warsaw

Combat Experiences of Small Units

Great soldiers frequently point out that lessons learned in a war are often quickly forgotten in the peace which follows. This appears to be especially true so far as the details of the art of commanding small units is concerned. Field exercises and map maneuvers have definite limitations in teaching many procedures and practices which must be second nature or routine when live ammunition is fired by a real enemy. Military history is so often written with the idea of teaching strategic and tactical lessons, as applied to large units, or of extolling the "Heroic Hundred and Hundth" or the "Fighting Frumpty-Fumpth," that it gives the company officer with no combat experience little upon which he can base an estimate of the practicality of our peacetime training.

Some writings on the Polish Campaign of last September have been remarkable exceptions to this general rule. One of them, in the December issue of *Military wissenschafliche Rundschau*, relates a series of experiences of small units in that technically masterful campaign. The incidents presented here were selected from that series because they should be of interest and value to field artillerymen and because they shed light on the validity of some of our accepted or proposed procedures. Each summarized incident (they have not all been translated in detail) is followed by one or more quotations from certain of our military publications. No conclusions have been drawn. The reader must do that for himself.

I

THE NIGHT 31 AUGUST-1 SEPTEMBER, 1939

Tents have been struck, it is raining, and outwardly all is quiet, though countless messages and orders are pouring through the ether. We are bivouacked just

Poland 1939

A Digest by Captain H. D. Kehm, FA

1939—German advance into Warsaw—the same car line

short of the border prepared to advance. The footsteps of our 2nd Company have died out. Now it is our turn. As we march along, my comrades and I are thinking of home, parents, friends and sweethearts. All that is in the past. Before us lie the night, uncertainty, war, battle, and perhaps death. There are no superficially patriotic "Hurrahs" as tractors towing the heavy mortars lumber by, giving us the comforting knowledge that our artillery is with us. Each of us comprehends the hard facts of this night and is looking them in the face as a German soldier should.

As we approach the assembly area, the company commander meets us with orders. The platoons are assigned to areas and positions are occupied. Details are sent out to cut fences so that the progress of the attack that is to take place at dawn will not be hindered. The rain has changed to a heavy fog and we must exercise our arms and legs to keep warm.

The minutes are passing slowly. Closer the hands of the clock move to 4:30 AM when we understand the artillery is to open up. But that time comes and passes—nothing happens. Then, at 4:45, a single round is fired, then another, and now more and more. The projectiles howl over our heads into hostile territory. With tense nerves we are staring into the fog toward that invisible wall—the border.

The war has begun.

* * *

"The conduct of the average man in battle is governed more by instinct than by reason. By instinct he is gregarious and prefers to fight in the group. He is beset with fear of the unknown, especially at night and when alone, and therefore seeks security in the group. He readily accepts symbolic ideals implanted by tradition and national culture and will fight for these ideals when he is aroused . . . ."

"A hastily or poorly trained unit is likely to fail in a critical moment due to demoralizing impressions caused

by unexpected events in combat. This particularly is true in the first engagements of a unit. Therefore, training and discipline are of great importance. . . . ."

—FM 100-5, pars. 100 and 106.

II

AN ARMORED TRAIN IN THE BATTLE OF KONITZ, 1 SEPTEMBER, 1939

Our armored train was given the mission of seizing the station yards at Konitz[1] and holding them pending the arrival of an infantry regiment. We knew that the three bridges between the border and Konitz were prepared for demolition, but we estimated that a rapid advance would catch the enemy unprepared and permit us to cross the bridges before they were blown up. Under cover of a heavy fog we started for Konitz from just short of the border at 4:15 AM. We crossed the bridges safely and halted at the station. There was no opposition. The station was occupied and a radio report to that effect sent to the Corps by 5:10 AM.

Soon thereafter, shots begin to fall. The battle around the station is on. The first prisoners, railroad officials and members of the military station guard, begin to come in. We lock them in the waiting rooms.

Initially only 15 of our men were detailed for the occupation of the yards. Now more are needed. They are chosen from volunteers from the machine gun sections.

[1]Konitz is a railroad center a few miles inside the western border of the Polish Corridor.

With the Pommeranian 32d Division in the Corridor

The enemy has spread the alarm and the hostile strength is rapidly increased. The Poles blow up a bridge behind the train and near the station. In order to obtain a better field of fire for machine guns and cannon, the train moves away from the station, toward the under stroyed part of the bridge.

At the station, the fighting is intensified. The enemy has brought up machine guns, infantry cannon, and anti-tank guns. Our commander decides to call in his troops. A messenger sent to order them back is killed. The train must return to the station and, for the third time pass over a subway which runs under the tracks. A Polish demolitions crew moves toward the subway; our machine guns put them out of action. By means of whistle signals our men are called in. They climb aboard bringing their prisoners with them. The train moves out over the subway again. This time hand grenades are used to stop the hostile demolitions crew.

Gardens, patches of woods, and numerous small buildings scattered over the area near the station facilitate the defense. Our forward gun puts out three heavy machine guns at a range of 150 meters, and, when the chief of section and the gunner become casualties, the cannoneers man the gun. The machine guns mow a path through a hedge behind which Polish riflemen are known to be stationed. The after gun puts a round into a house, 70 meters away, into which some of the enemy have been seen to disappear. All this time the train is moving slowly so as not to present a stationary target.

Shell splinters cause the first casualties inside the train. They are suffered by the crew of the forward gun. In spite of them the gun destroys the place from which the fire came—a water tower—with a direct hit at fifty meters.

Antitank guns are now firing on us at short range, and presently a round penetrates the command turret and kills our train commander. The second-in-command takes his place and moves from the artillery observation turret to the command turret.

Suddenly there is a terrific explosion. Men and equipment are hurled about. The train has run on a bridge just as it is blown up. The rear car falls with the bridge. Though off the track, the gun car in front of it is still coupled to the train. We are ordered to uncouple both cars. The personnel changes cars and the order to move forward is given. The train cannot move! Antitank gun fire is intensified, and, 1,500 meters away, a Polish battery goes into position and begins to adjust on us. Now there is only one solution—everybody out! Weapons and ammunition are thrown out and our machine guns go into action near the train. The prisoners remain aboard.

At this time, about 10:30 AM, the infantry point arrives. However, it is in no position to relieve us yet. A the hostile artillery fire is intensified, setting some of the cars afire and blowing up the ammunition in the forward gun car, we are forced to give way some 200 meters.

Our heavy machine guns are laid on the main hostile firing positions in the near edge of the town. Presently the infantry, after an artillery preparation, envelops the enemy from a nearby farm and the station. We are relieved, and assemble in the vicinity of our train.

* * *

There appear to be no published American doctrines concerning employment of, and attack against, armored railway trains. Our tank and mechanized cavalry doctrines, however, appear to apply:

"If properly supported it (mechanized cavalry) can seize an objective but cannot hold it for a prolonged period. . . ."—FM 100-5, page 9.

* * *

"The normal missions of artillery will usually preclude its employment against tanks by direct laying except for its own protection. However, in some cases, artillery in position may have reasonable fields of fire for direct laving in some directions and be able to fire effectively on tanks which have penetrated or eluded other antitank defenses. It may also be possible on call to place prearranged concentrations on defiles in the route of advance of enemy tanks.

In the absence of adequate antimechanized units, single guns or platoons may be detached for close-range defense at vital points. They are held silent in concealed positions until hostile tanks appear in localities where they may be taken under direct fire.

"In any case, all light batteries must be prepared to fire promptly by direct laying on any tanks which can be so attacked."—FAB 224, pages 280-81.

III

BAPTISM OF FIRE. THE ASSAULT ON THE FORTIFIED (BUNKER) POSITIONS AT MLAWA[2]

The beginning of the war was a matter of marching for us. Our regiment was in corps reserve. Tonight we are assembled in a woods, waiting to relieve another battalion which is now in action. Company commanders are assembled while the battalion staff goes ahead to gain information from the units to be relieved. Our company utilizes the available time to complete setting equipment in order and to issue rations and coffee. A motor messenger calls us forward and we advance, making every effort to preserve silence. When we arrive at the point where we are to meet representatives of the units to be relieved, we can find no one. An inquiry directed at the battalion staff reveals the fact that there has been some error in the orders concerning the relief. There are no German troops in the sector assigned to us—a sector that must be occupied. We must, therefore, advance under cover of darkness and, before dawn, dig in on a position we can defend.

As we advance from the woods we see in some of the Polish dead, the first evidences of the reality of the war.

[2]Mlawa is just across the southern border of East Prussia and due south of Allenstein.

German heavy battery (21-cm. howitzers) on the march in Poland

We pass them silently. In each of us they raise certain thoughts. For the World War veteran, they bridge the gap of the years since 1918; for the younger soldiers, they demonstrate that there is a difference between war and maneuvers.

Presently we reach a suitable position and make contact with the regiment on the left. The company digs in, one platoon in advance, the other two in depth behind it. By dawn of Sunday, 3 September, the whole company is hidden in foxholes. Those not on watch are fast asleep. Just at dawn the Polish artillery sends us a Sunday greeting and our artillery replies promptly. But the hostile counterbattery fire is so effective that our batteries must make frequent changes of position. This artillery concert lasts a long time and the young soldiers have a hard time adjusting themselves to it. Around 9:00 AM we begin to sense that our fire is gaining superiority. The Polish fire becomes more spasmodic and far more erratic.

Yesterday it was rumored that since a previous assault on the Polish position north of Mlawa had failed, a tank attack was to be made today. The plan was said to call for enveloping the position from south of the city to force the Poles out. On Monday the infantry was to advance against the position. Could there be a change? War is always uncertain. Soon we learn that we are to attack today.

At 11:00 AM we advance. The two rear platoons are brought forward, one to close a gap between our company and the one on our right, the other to remain in reserve.

The dominating observation held by the Poles and the fact that they are occupying the forward edge of a crest, wooded for a depth of 3 kilometers, offers an attacker little prospect for success. A closer study (made with field glasses) shows that the position consists of concrete emplacements; machine gun nests—sited to give flanking fire; connecting trenches; tank traps; tank barriers made of railroad irons set in concrete; and barbed wire entanglements, with passage ways blocked by chevaux de frise. The approach to this position is down a slope to a depression, 800 meters wide and perfectly level at the bottom,

and then up a slight rise just in front of the wire entanglements. What an objective for an infantry battalion with two rifle companies in assault!

The battalion commander in person delivers the orders for the advance to the edge of the depression. He carefully points out on the ground the zones of advance and the lines to be reached. Hardly has he finished, when he is called to the rear to receive urgent orders over the telephone in person.

The platoon commanders are assembled and given their objectives and boundaries. The formation remains the same: Two platoons in assault, the third in reserve in rear of the center of the line.

It is now noon and just as we are advancing with the leading elements of the left platoon there is a terrific droning and buzzing in the air. And now we see something that previously we infantrymen had seen only in the movies: Unit after unit of our own air forces—dive-bombers and pursuit planes. There must be a whole squadron or more. Hardly have they moved over our heads when they begin to dive, plunging down until we are sure that they will hurtle into the ground. But no, they rise again. We can see the bombs they are dropping on the fortified line and the wooded area behind it. Great clouds of smoke and debris rise into the air. The attack is repeated several times in the course of ten minutes. Only during the last attack do Polish antiaircraft machine guns become active. One of them hits a plane. It bursts into flames and one man jumps with his parachute; the others are carried down in the fall which ends in a terrific detonation in the woods, and a burst of flame which rises high toward the sky.

Although there had been no order to attack the line, now was plainly the time for an assault on the enemy position, before his troops can recover from the shock of the bombers' attack. Orders are given and one platoon is already in the depression emplacing its machine guns—company headquarters have advanced with it to guide the assault—when orders from the battalion direct us to withdraw to our initial positions.

German Light Field Howitzer "18" during maneuvers prior to outbreak of the war

Under cover of the woods we proceed to the rear in small groups. As we arrive on our positions the battalion staff dictates an order for the new attack. It is to be supported by heavy machine guns, infantry cannon, antitank guns, and artillery. Another air attack is to be made also.

The company utilizes the respite thus afforded to eat. The kitchens had been moved forward. Each squad details one or two men to carry food to the front lines. Some few individuals isolated well forward by hostile fire have to do without. The company commander goes to sleep. He is presently awakened to receive an encoded telephone message that H-hour is to be at 5:20 PM. At this time the artillery is to begin a fifteen-minute preparation, and after that we are to assault the position.

Thirty minutes remain. Orders are discussed with the platoon leaders. The commanders of the heavy weapons units, who have arrived in the meantime, are given their instructions. The heavy machine-gun platoon is directed to neutralize the hostile machine gun nests, the attached light infantry cannon is given the same general mission, but is assigned specific point targets. The three antitank guns are ordered to fire on the hostile observation turrets.

For the first time in this war, our heavy weapons are to be given an opportunity to demonstrate their value. They do so admirably. Under their protection the battalion advances with our company (the 1st) in advance and the 2nd company echeloned to the left rear. With only slight losses the open space in front of the wire barrier (it varied from 600 to 800 meters in width) is crossed in just under one hour by alternate fire and movement. The fire of the machine gun company is especially effective.

Our most serious opposition comes from the hostile machine guns which are emplaced so as to deliver flanking fire on us. Despite our heavy fires, these machine gun nests remain in action with a stubborn tenacity. A field of lupine and a potato patch affords us some cover. Every one sticks his nose into the ground and digs like a flounder in the sands on the shores of the Baltic. Only our artillery causes us misgivings. It is firing short. We are constantly sending up green rockets to have the fire lifted.

It is 6:30 PM by now, and the sinking sun to our flank and rear forms a striking contrast to the burning buildings and towns before us. From there bursts of flame and debris rise into the sky. The right platoon cuts a path through the wire. To our left appears an opening which the Poles had not had time to block. The company rushes forward; as darkness falls the fortified position is safely in our grasp.

* * *

Having decided to fire a preparation, its duration and intensity should be determined by considering the strengh of the enemy defenses . . . the morale of the troops engaged. . . . Ordinarily, a preparation does not exceed 6 hours and may be as short as 20 minutes.

—FAB 224, page 93

* * *

"When practicable, the time at which the artillery fire is to lift is arranged in advance. When this is impracticable, it lifts on prearranged signal, such as a rocket from the infantry, on call from the infantry (directly or, preferably, through the artillery liaison officers), or because of the observed need therefor."

—FAB 224, page 281.

* * *

"The organization of systematic *flanking fire* constitutes the basis of defensive dispositions."

—FM 100-5, page 172.

* * *

"Such (air) attacks will cause delay and demoralization of the troops."—Tactical Employment of the Air Corps (Tentative). 1937. C&GSS. Page 59.

* * *

"All available firearms should be employed. Even the automatic pistol is an effective weapon against planes which fly very low. Units must be trained to halt and create a zone of fire through which the attacking planes must fly. . . ."—IM-D, FAS (1938). Page 2.

IV

Ammunition Supply

At Graudenz I was on duty as a messenger one night at our battalion CP, some 600 meters behind the front lines. Throughout the day we had continuously driven the enemy back. Burning buildings lighted the horizon. From time to time star shells were fired to disclose the Polish movements. The artillery was delivering intermittent harassing fires. Individual machine guns fired short bursts now and then, and single infantry cannon let loose occasional rounds. No one seemed anxious for serious action.

Suddenly all is changed. The heavy machine guns fire belt after belt. The trench mortars fire steadily, and through it all are heard the staccato bursts of the light machine guns. Red rockets go up—the enemy is attacking! Every piece of our artillery lays down its barrage. Gradually quiet returns. The attack has been repulsed.

A messenger appears. He reports that ammunition for the heavy machine guns is running low and that it was only the fire of the heavier weapons which stopped the attack. When the machine gun, the infantryman's friend, runs short of ammunition something must be done. The battalion commander directs me to secure a vehicle and fetch ammunition in belts from the combat train. He tells me to break open the locks of the ammunition vehicles if necessary. The train is somewhere to our rear.

I hurry to the commander of the antitank platoon in the vicinity and tell him the situation. Certainly, I can have a truck, and a driver too. The driver is a wonder;

German munitions cart moving up under fire

at top speed he weaves his way through trees and over fire-swept parts of the road. We meet several groups of vehicles. None of them is our train and no one knows where it is! Again the red rockets go up. Over the noise of the motor I hear the sound of light machine guns, infantry cannon, and trench mortars. Now we also hear the bursts of hand grenades. Have the Poles reached our positions? Gradually the firing dies away. We still need the ammunition!

We make a sudden turn in the road and there we see ammunition vehicles. We have not found our combat train. We are at the division refilling point. "Have you any ammunition in belts?" I ask the noncommissioned officer in charge. "Have you a permit to receive it?" he replies. "Good God! Do you think I made this trip for pleasure?" In angry expletives I tell him of the situation. I am able to load thirty boxes on the truck; that will do for a starter.

Now the big task is to get it to the guns. In a few minutes we are back at the CP. The battalion commander is delighted. We cannot take the truck forward, so all available men are detailed to carry the ammunition to the guns. At extended intervals and distances, and moving by rushes, we cross the open fire-swept area between us and our front line. It is no simple task to advance by rushes when you are carrying four loaded ammunition boxes.

Suddenly someone calls to us out of the darkness, "Ammunition?" We answer, and are greeted with shouts of joy. The machine gun company commander slaps us on the back and says: "Now let the Poles come on." Just as we are preparing to leave, pandemonium breaks loose again. Another attack is on and we have the satisfaction of seeing the heavy machine guns stop the attack with the stuff we have just delivered.

* * *

"When an empty train arrives in the vicinity of the control point, the train commander will proceed to it and obtain a written order on a refilling point. . . ."—The Administrative Handling of Ammunition in the Field, 12-9-39 (Proposed by Chief of Ordnance). Page 5.

* * *

"Except for motor vehicles issued as an aid to the movement of active weapons, such as prime movers or weapons carriers, all of the trucks of a unit should be considered as a pool of transportation to be used as required."—Notes on FM 100-10 FSR ADMINISTRATION (Proposed), Page 6.

V

THE EMPLOYMENT OF RADIO BY A COMMUNICATIONS BATTALION

When our motorized divisions crossed the Polish border on 4 September our radio personnel began a period of extreme activity. It soon became evident that encoded radio communication between organic and attached units was necessary not only for tactical purposes but also for all administrative matters. On the march in hostile territory no other means were available. Postal service was slow and constantly interrupted, motorcycle messengers were unreliable because of the bad road conditions and because they were invariably shot down at night even when they traveled in pairs. Radio proved its value in brilliant style.

Interference caused by the daily changes in weather conditions, by constant jamming by hostile interference stations, and by broadcasting demanded the most skillful work on the part of the operators at our stations to provide commanders with continuous means of communication. If a station failed, it was immediately replaced by one of the reserve stations which always moved directly behind the command echelon on the march.

Especially good work was required of the crews of the station which maintained communication to the flanks or rear. Constant shifts in the attachment of radio crews from one command to another called for great adaptability and reliability in the maintenance of radio traffic. Frequent changes in codes added to the problem.

A particularly high point in the employment of radio was reached during the withdrawal of the division. We were advancing via Zarki and Jedrzejow with the mission of driving on beyond the Lysa Gora[3] to Wierzbnik and Kamienna. A staff officer from GHQ met the division while our staff was marching near Lysa Gora. He brought orders directing us to break off the pursuit and to return to Jedrzejow—by now about 100 kilometers to our rear—where we were to be made available to the Army.

This withdrawal placed a tremendous burden on the radio stations with the division command echelon. When the orders were received the reconnaissance battalion was already at Wierzbnik engaged with Polish troops. The very difficult task of having this battalion break contact with the enemy and take up a new direction of march was accomplished at the most propitious time only because radio was available. By means of the radio the advance of the division was halted, subordinate commanders were called to report to the division commander and the return march was initiated and controlled. The heavy radio traffic during this movement was expertly handled by operators who in many cases had been at their sets for four days and nights without relief.

The division remained at Jedrzejow only one night. Then it was ordered to push on vigorously in a pursuit to the Vistula via Opatow. Here again it was necessary to effect all administrative as well as all tactical control by means of the radio. Radio nets were overloaded for hours at a time. Bad road conditions served to make transmission and reception very difficult. However, all traffic was handled while the division was on the move, and at no time was command jeopardized by failures in radio communication.

During the night of 7-8 September one element of the radio section was improperly guided during a fog and became separated from the remainder. The three stations remaining with the division commander carried all traffic for several hours until the other element could be located and brought back under the personal direction of the commander of the communications battalion and the commander of radio company.

In the engagement on 8 and 9 September at Lipsko and Siepielow radio traffic increased to such an extent that during the night of 9-10 September the stations in operation had to confine their traffic to handling only coded messages. Two radio units (*trupps*) had to be taken from the reserve and employed in decoding and encoding. It required constant vigilance on the part of commanders of the radio units to see that no errors occurred. This was especially difficult in view of the fact that many operators had not left their sets for days and some of them fell asleep at the instruments. The bringing up of additional reserves was rendered very difficult because the route of advance was under constant attack by hostile forces attempting to force their way through us to the Vistula.

* * *

"Radio is used as a means of signal communication between all combat units down to and including battalions, squadrons, individual airplanes, and certain vehicles of mechanized units, for liaison and fire control, and for the control of forward combat units to include the company in some situations. . . .

"Radiotelegraphy is the normal means of radio communication. . . .

"Radiotelephony is limited to special uses such as between airplanes, between airplanes and ground, between vehicles of mechanized units, between ground station and vehicles, for artillery fire control and liaison, and for control of forward combat units.

"Radio communication within a tactical unit on the march may be established at prearranged times and places or between vehicular stations accompanying the units and operating while actually on the march. . . .

"The range and quality of radio communication are, in general, independent of conditions of roads and traffic. . . . Vehicular sets, however, are affected by conditions of roads and traffic. Weather conditions may have a serious effect on range and quality. . . .

"Radio communication can be readily intercepted by hostile stations. This disadvantage necessitates the

[3]The general location of the area in which the action described here took place is just northwest of the confluence of the San and the Vistula.

habitual encoding of messages when transmitted by radio. . . .

"Hostile radio stations can interfere deliberately with our radio communication."

—FM 24-5, pages 83 and 84.

VI

THE ENGAGEMENT OF THE 3D BATTALION 63D INFANTRY ON 20 SEPTEMBER AT TOMASZOW

Late on 19 September the 3d Battalion 63d Infantry was north of Tarnawatka (see Sketch 1) in regimental reserve behind the left flank of a defensive position. That evening a pioneer company on a security mission on Hill A, to our left front, reported that it required further support to prevent a hostile break-through in its sector. The division artillery commander also expressed concern for the safety of the batteries in position near the pioneer company. One of our companies, the 9th, reinforced by a heavy mortar section and a pack radio section, was ordered to take over

Sketch 1

the mission of the pioneer company (which was to be attached to the 9th) and to cooperate with the artillery. Communication with battalion was to be by cyclist messenger. The remainder of the battalion bivouacked in a Polish village.

By midnight the 9th company had occupied its position and was in touch with the pioneer company and the forward batteries. It reported that sounds of fighting and artillery fire were coming from the direction of Tomaszow, about 20 km. to our front.

Around 2:00 AM the battalion was reinforced with an infantry cannon platoon and ordered to take over the mission of its 9th Company. We moved out at 3:00 AM. Just short of the position the battalion was halted, machine guns were prepared for action, and ammunition hand grenades, and signal rockets were issued.

After consultation with the commanders of the 9th Company and the artillery the battalion commander decided to place only elements of the machine gun company and the cannon platoon in position. Because of the signs of enemy activity to the front, he proposed by telephone and in writing that an attack be made toward Tomaszow to assist other German troops engaged there. Preliminary plans for such an attack were made.

At 6:30 AM the regimental commander informed the battalion commander that the regiment would attack at 7:00 AM with the 1st Battalion east, and the 3d Battalion west, of the Tarnawatka-Tomaszow road to seize the high ground northwest of Tomaszow. The 3d Battalion was ordered to seize the hills just south of Dabrowa Lodge.

The company commanders, cannon platoon commander, and the supporting artillery battalion commander were assembled on Hill A to receive the battalion order.

The order was given verbally. It described the enemy situation, the regimental and battalion objectives, and the regimental scheme of maneuver; and contained the following detailed instructions:

Hill B was designated as the initial objective of our battalion.

11th Company was ordered to attack on a front of 300 meters with its left on the highway.

10th Company was to follow, echeloned to the right rear at 300 meters, in attack formation.

9th Company, in reserve, was to follow the center of the battalion at 500 meters until it reached the woods at C.

The mortar sections were to remain attached to the companies.

One section of the machine gun company was to cover our advance over the swamp from position on Hill A. The remainder of the machine gun company was to advance with the leading company.

The cannon platoon was attached to 11th Company to support its assault platoon moving along the highway.

The artillery battalion was ordered to cover the advance of the battalion over the swampy area by being prepared to fire on the initial objective and the woods due west thereof. Thereafter it was to give close support to the attack. The artillery liaison party was ordered to accompany the infantry commander.

Communication to 10th and 11th Companies was to be by radio.

While the subordinate commanders were issuing their orders, a reconnaissance squad of cyclists was sent ahead with the mission of determining whether the enemy was covering the highway and if so the nature and strength of his forces.

The attack started on time and the battalion crossed the swampy area without receiving any hostile fire.

The reconnaissance party returned with 50 prisoners and reported that both sides of the road were strongly held. Heavy howitzers were said to be emplaced in the woods on the ridge at C.

The battalion commander ordered the 10th Company to move abreast of the 11th and to extend the attack by advancing on a front of 500 meters. By 7:45 AM the initial objective was reached. Statements of prisoners confirmed the reports of our reconnaissance party as to the strength of the hostile artillery in the woods at C. We also located several machine guns there.

The battalion commander therefore decided to continue the attack only after an artillery preparation had been fired on the woods at B. The request was transmitted through the liaison party and also through the infantry regiment. Request was also made that one battery be sent forward to advance close behind the infantry battalion CP. The battery was sent forward and a preparation was fired by our light battalion reinforced by a heavy battalion, from 8:30 to 8:45 AM.

All heavy infantry weapons were moved forward for the renewal of the attack. The accompanying artillery battery was in action, ready to fire by 9:00 o'clock. As son as reports from the front line companies and battalion observers indicated that the enemy was preparing to evacuate the woods at C, the attack was renewed, that is, shortly after 9:00 AM. About this time the battalion commander was warned to be on the alert for a surrender by the Poles.

The enemy machine guns were effectively neutralized by our artillery. In front of the left flank of the right company our own artillery fire held up the advance. When it was not lifted after several rockets had been find, our infantry was ordered to advance around the flanks of the fire.

After the battalion entered the woods on the ridge at C a gap developed between the two companies. A master sergeant, advancing in the gap to reconnoiter a road, captured some 40 prisoners after killing their commander. Snipers hidden in the trees kept up an effective fire. When the southern edge of the woods was reached Polish artillery and machine guns firing from the hills south of Dabrowa Lodge enfiladed the 10th Company. The 9th Company was brought up to close the gap between the companies and to attack the flanks of Polish position. The attack succeeded, and assaults by this company and the 10th soon cleared the heights. A Polish battery was captured in the act of limbering up.

By 10:00 o'clock the entire battalion was on its objective and was laying heavy and light machine gun fire on the fleeing enemy.

Just as orders for the displacement of the artillery and infantry cannon were being issued, instructions came from regiment to suspend firing and hold our positions because a surrender was being arranged.

Several hours later the battalion was informed that the surrender had been effected. The battalion was ordered to establish strong outposts and to bivouac in its position.

Conversation with officer-prisoners developed the fact that we had struck the flanks and artillery position-areas of the Polish troops. A security force of one infantry battalion had been placed to meet our advance. The plan was to allow us to advance to within a short distance of the position and then defeat us with artillery and infantry fire.

The Polish officers displayed great courage and tenacity in the face of desertion and panic among their men. Prisoners reported that our massed artillery fire on the edge of the woods at B created pandemonium in the Polish position.

We lost only 4 killed and 6 wounded because our artillery fire and the determined attacks demoralized the enemy. No less than 100 Polish dead were counted in the zones of advance of the 10th and 11th Companies. In an attack which lasted 3½ hours with a one-hour interruption we covered a distance of 6½ km., most of it wooded, and defeated a hostile infantry battalion and a strong artillery force. We captured 7 officers, 572 men, 16 field guns, and numerous weapons of smaller caliber.

German infantry in the attack on a Polish village

"*Oral* and *dictated orders* have particular application to smaller units. Whenever practicable, they are given by pointing out and identifying localities and terrain features on the ground.

"The assembling of commanders or their representatives to receive orders is advisable only when the situation permits their absence from their units."

—FM 100-5, page 61.

* * *

"The improvements in artillery communications and methods of support and the development of a suitable infantry close-support mortar indicate that the employment of division artillery as accompanying artillery will be most exceptional."—FAB 224, page 20.

* * *

"There is, for the assaulting infantry, considerable moral value to be gained from an artillery preparation in many situations. This aspect should be considered in all cases where the worth of a preparation may be questioned on purely material grounds."

—FAB 224, page 279.

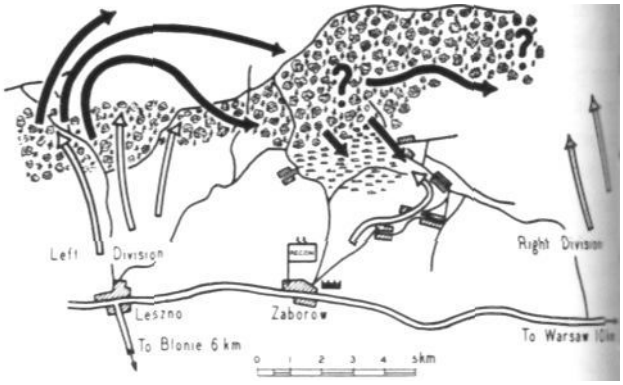
* * *

"Since infantry command posts usually are not suitable as observation posts, it is obvious that the liaison officer cannot perform his dual function of adviser and observer wholly at the command post. However, when making the initial preparations for an operation or when a new phase of an operation is being planned, the infantry commander will usually be at his command post and it is during this period that the services of the liaison officer as artillery adviser are most valuable. He should be at the command post. After the action starts, the infantry commanding officer will place himself generally at an observation post. This normal location of the supported-infantry commander will simplify the liaison officer's problem, since he is thus located not only where he can observe the fire of his batteries, but also where he is in personal touch with the infantry battalion commander, who is the one to decide whether artillery fire will most assist his advance and who has authority to call for that fire."—FAB 224, page 55.

VII

A Motorized Artillery Battery in Support of a Motorized Reconnaissance Battalion

Some elements of the Polish troops which were surrounded in the vicinity of Kutno were able to get away through the wide wooded and swampy areas in the direction of Warsaw. To prevent them from attacking the rear of the German troops engaged near that city, several divisions were ordered to positions north of the Blonie-Warsaw road with the mission of attacking these elements and destroying them. In the course of these engagements a gap occurred, north of Zaborow, between two of our divisions which were fighting north of the Lesno-Warsaw road (see Sketch 2). The gap was about 6 km. wide and presented an opportunity for the enemy to break through to the south.



Sketch 2

Originally an infantry battalion reinforced with a battery of light field howitzers (105-mm.) was assigned the task of covering the gap. It had hardly occupied its position when it was withdrawn for use elsewhere and replaced by a reconnaissance battalion. The battery remained in its firing position and was attached to the reconnaissance battalion, which was assigned the mission of closing the gap and preventing the enemy from emerging from the woods to the north of Zaborow and breaking through to the south.

Little was known of the enemy situation except that the woods were occupied in force.

The mobility of the scout cars of the battalion made it possible to cover the wide front and to retain the bulk of the battalion in a position of readiness near the command post. From this point it could be moved quickly for employment in any direction. At the same time, protection of the battery in its firing position and of the command post was facilitated.

The employment of the battery had to be suited to the situation. In order to cover the maximum front without shifting the pieces in the firing position, it was necessary to select a position well back. This in turn required that there be several highly mobile observation posts. Close liaison between the battery and the command post, to insure the mutual interchange of information, was essential. On the suggestion of the battery commander the firing battery and the motor park were located in the immediate vicinity of the battalion command post.

The terrain, which was quite flat and covered with small patches of trees, afforded only limited observation. It was out of the question to have one observation post to cover the entire front. The following scheme was employed:

A fixed OP, established about 1,500 meters to the front of the battery, afforded observation to the southern edge of the woods over a narrow front due north. This OP served for close-in observation and security for the battery. Communication to the battery and through the battery to the battalion CP was by wire. Two highly mobile OPs were established by sending forward two officer-observers in combat cars and giving each of them a pack radio for communication with the battery. Each

of these OPs worked in close liaison with an officer of the battalion who had a scout car and radio communication with his battalion CP. A detachment of combat cars was with each of these parties. One group reconnoitered to the north and the other to the northeast of Zaborow. Because road conditions were better in that direction, all the Polish sallies which took place were made northeast of the town. The artillery observer in that sector had a busy time. His task was twofold. He had to be prepared, by barrage, to prevent any attempt at a break-through, and to take under fire and destroy, or drive back, any Polish troops that could be induced to attack the scout car party with which he was operating.

It was obviously impossible for these limited forces to effect a complete barrier along the southern edge of the woods and absolutely prevent any Poles from getting out. When small units such as cavalry squads did energe they came under observation of one of the observers. They were immediately reported to the command post and were dealt with by artillery fire or by suitable detachments sent from the battalion.

The efficiency of such a plan naturally rests upon the dependability of the communication. This was assured by having four radio sets operating with the forward observers.

Several times hostile elements came between the forward observers and the gun position. This occurred sometimes because artillery fire could not be employed without endangering our observers. Furthermore, we desired to reserve the artillery fire for laying barrages on the edges of the woods and to conserve ammunition. Hence every effort was made to defeat or capture the enemy with other means.

The effectiveness of our artillery fire forced the Poles to make their efforts to escape farther and farther toward the east. This they were encouraged to do, because there they fell into the hands of the division to the east of us.

By using the methods described here the reconnaissance battalion and its battery were able to accomplish the assigned mission with marked success until they were relieved by an armored division.

* * *

"When a security detachment is large enough to project artillery and when it can reasonably be expected that artillery assistance will be needed, artillery is attached to the security detachment."—FAB 224, page 197.

* * *

"The proximity of good observation usually has a decided influence upon the selection of artillery positions. This is true especially in the case of artillery with advance guards, rear guards, and flank guards. . . . The ground and routes over which the enemy is likely to operate are kept under constant observation where possible. . . . The necessity for good observation may require observation posts at a considerable distance from the batteries.

"Artillery with security detachments employs the most simple system of signal communication. . . . . Radio is used, when practicable, in order to reduce the necessity for laying long wire lines."—FAB 224, page 198.

VIII

THE EMPLOYMENT OF AN ARTILLERY FORWARD OBSERVER DURING THE CROSSING OF THE NAREW

On Sunday, 10 September, the OP of our heavy battery was located in a deep trench in the forward edge of a woods. In front of us the ground fell off to the Narew River some 300 meters away. On the opposite bank was the Polish fortified position. We had been in action all that day. The hostile position had been continuously bombarded by our artillery and other heavy weapons. The infantry was to assault it today after another short artillery preparation.

German 15-cm. howitzer near Warsaw

Except for small groups which had gained the other side and dug in, our infantry was located close to the near bank of the river awaiting the order to attack.

"Battery commander on the phone!" In the ensuing conversation we were ordered to send an observer from our present position to report to the CP of the front-line infantry battalion which our battery was to support in the advance.

Our observer took with him his firing chart and two of us who carried a portable radio set.

We were to be separated from the observer during the actual river crossing, and had designated a meeting point well to the front.

We crossed the Narew in a small boat which we pulled

along a rope stretched across the river by the engineers.

Polish resistance was augmented by machine gun fire. Hostile artillery began to fire on our infantry. As we came close to abandoned positions we observed that the hostile concrete emplacements, though they were materially damaged, were not destroyed by our fire. In some cases the concrete was more than a meter thick. The effects of direct hits made by artillery and antitank guns were plainly visible. Heavy machine guns still protruded from the sides; one of them was completely destroyed. It must have received a direct hit. A group of our infantrymen broke into the emplacement and brought out some 20 prisoners. Later some of those prisoners told us that though they still had a considerable supply of ammunition the moral effect of our artillery fire had been such as to destroy their will to resist.

The infantry battalion with which we were working was reorganized in a sunken road and then renewed the attack. Initially, resistance came only from small isolated groups which offered no profitable targets for heavy artillery. But later we observed the enemy climbing out of a trench and withdrawing in plain sight in a huge mass. There we had a real target.

By the time we gained communication with our battery OP the observer had computed the data and shortly thereafter the rounds were falling directly on the target. This delighted our infantry, who were now able to advance employing marching fire.

After a few minutes we found we had no contact with units on either flank. Soon we were subjected to fire from three sides. The battalion dug in and was presently fired on by heavy artillery. About this time our observer was injured by a shell fragment. We withdrew to a trench and bandaged his wounds, using all our first-aid packets. We had four prisoners, escorted by one of our own infantrymen, carry him to the rear on a Polish overcoat. No sooner had we done this than we observed that the Poles were preparing to launch a counterattack.

We could see them advancing to the attack from the edge of a town, taking advantage of folds in the ground. We reported the situation to our battery RO who was at the other set and asked that fire be placed on the enemy. We were to observe and report deviations. I heard the commands go to the guns by radio, and presently the battery fired. The burst was a hundred meters short and in line with the target. We reported by radio and presently our salvos were falling on the attackers. After twenty minutes the Poles, to the great relief of our infantry, withdrew.

* * *

"Observers must be pushed well forward initially and advance promptly with the attack."

—FAB 224, page 302.

* * *

"The blast of a shell on detonation is particularly destructive when occurring in a confined space. Blast has a marked moral effect especially on untried troops."

—FAB 161, page 34.

SOME THOUGHTS ON RECONNAISSANCE FOR PIECE POSITIONS

Sites might well be selected with the possibility—no matter how remote—in mind that the position will be occupied for a considerable period, perhaps days or even weeks. The difficult camouflage and circulation-discipline problems will be eased of solution if the BC considers this contingency before occupation. If the position is to be occupied for any length of time, an alternate position should be selected. It should obviously be on the opposite side of the occupied position from any dummy position used. Further, the ammunition dump should be on that side of the occupied position which is toward the alternate position. Next, the dummy position should be chosen, if possible, at a distance from the occupied position which is commensurate with the discovered accuracy of the hostile sound-ranging sections. Registrations may be made from the dummy position; the wire lines should be continued to that position; daily activity and disturbance of the dummy position should take place; circulation in the direction of the alternate position must be kept to a minimum; registration, either at dummy or occupied positions, should be referred by survey to the alternate position.

Other questions to be considered with respect to the position area are: Fortification, accessibility for supply, drainage of area—of surface water and persistent gases, AA and close defense. These are all, of course, subordinate to the major requirement to be able to deliver the assigned fires.

Close-in Defense of Field Artillery

By Captains George L. Hart, Jr., and John W. Haines, FA-RES.

INTRODUCTION

The purpose of this article is to consider the necessity for, and the desirability of, equipping field artillery with weapons for close-in defense against attack by an enemy operating on foot, on horse, or from motor vehicles unprotected by armor. This question is one which seems to have been altogether ignored by military writers, diligent research having failed to disclose a single book or article devoted to the subject. A complete study of the close-in defense of field artillery would require a consideration, also, of defense against attack by armored vehicles and defense against attack by low-flying aircraft. Much has already been written on the latter two subjects. We shall confine ourselves, therefore, to a consideration of defense against an enemy operating on foot, on horse, or from motor vehicles unprotected by armor, and when we refer to close-in defense against enemy attack we shall be referring to this type of attack only.

German antiaircraft machine gun for close defense of the battery position.

MISSION OF FIELD ARTILLERY

At the outset, we wish it plainly understood that we fully realize that the primary mission of field artillery is to support the infantry with the fire of our guns. We have no desire to make infantrymen of gunners, or to suggest the slightest modification of the field artillery mission. We do conceive, however, that in order for the field artillery to perform its mission it must be prepared, whenever the occasion may arise, to repel close-in attack upon the artillery itself.

An excellent example of how the artillery may be saved by the use of its small arms and enabled to continue its mission of supporting the infantry is related in "A Battery of 75's in the Tempest, May, 1918," FIELD ARTILLERY JOURNAL, September-October, 1939. The article describes the experiences of the French 45th Battery in supporting, from successive positions, the withdrawal of French infantry west of Rheims in May and June, 1918. On one occasion the battalion, of which the 45th Battery was a part, was just withdrawing from a position, when:

"At about 300 or 400 meters from the position recently abandoned by the battalion, the enemy infantry made a last effort to reach the road running from Ormes toward Vrigney. They were fortunately stopped by the presence of mind and courage of a machine gunner of the 45th Battery, who quitted his post only after the departure of the last vehicle of the battalion."

The battalion went into position farther to the rear, where it supported the infantry in the defense which finally stopped the German drive.

LIKELIHOOD OF CLOSE-IN ATTACK ON FIELD ARTILLERY

Trench Warfare

In trench warfare of the type so familiar on the western front in World War I the likelihood of close-in attack on field artillery is reduced to a minimum but not altogether eliminated. In such a situation there is a solid line of infantry drawn before the artillery and protecting it from sudden and unexpected attack. With one flank of the line resting on the sea and the other flank resting on the high mountain ranges of a neutral country there is little probability of a sudden flanking movement overrunning the artillery positions before the artillery can execute an orderly withdrawal. Barring a vertical attack, of which more later, the artillery will

be confronted with the necessity for close-in defense of its own positions only when a well prepared frontal attack, such as one of the great drives of World War I, has overrun the infantry positions with such suddenness that the artillery has not been able to displace to the rear before the forward elements of the enemy are upon them.

In the early days of World War I and in the great offensives of 1917 and 1918, both the British[1] and the

Divisional weapons

French field artillery found it necessary, on more than one occasion, to defend themselves with rifles and machine guns against enemy infantry elements which had broken through in an attack.

In a booklet entitled "British Experiences in the War—Field Defenses," published at Leavenworth in 1915 for the guidance and instruction of American officers, the following appeared in the section devoted to artillery:

"On several occasions units of field and garrison artillery have used their rifles to assist the infantry in repelling an attack.

"On one occasion rifle fire of this kind took place at 300 yards' range.

"Officers commanding batteries should therefore make arrangements to insure that their rifles are always at hand and in a serviceable condition, and that the requisite number of men are available and are trained in rapid firing."

War of Movement

In open warfare, particularly in these days of motorized infantry elements, the likelihood of enemy ground attack on field artillery, whether in position, on the march, or in bivouac, is increased many fold over the conditions prevailing in trench warfare. In open warfare there is no solid line of infantry stretching from sea to Alps and protecting field artillery from all but direct frontal assault. To be sure, the artillery will usually conduct its operations from behind an infantry line, but this line will have flanks which are subject to being suddenly turned by an enemy, flanks which enemy horse or motorized elements may completely circle and strike from behind the flanks or even from directly in rear of the line.

Certain tactical situations will require emplacement of artillery well out towards the flanks.[2] These positions in particular will be vulnerable to sudden flanking and encircling attacks even by small enemy groups.

An example of the type of attack which artillery in position may expect under conditions of open warfare occurred during the combined maneuvers of the VI and VII Corps Areas held at Camp McCoy, Wisconsin, in May, 1939. The opposing forces each consisted of a reinforced brigade. During the maneuvers a platoon of cavalry (horse), on a scouting mission, surprised a battery of 155-mm. howitzers in position in some woods. The umpires promptly ruled that the battery had been captured. The artillery commander protested with no little spirit that he could have driven off the cavalry with his Browning automatic rifles. The umpires, doubtless being thoroughly familiar with the limitations of the B.A.R., particularly in the hands of the average gunner, stuck to their decision that the battery was captured.

When there is a rapid advance in open warfare, small groups of combatants and stragglers are likely to be passed over by the advancing infantry. These hostile groups may attack artillery positions and OP's.

The effective support of the infantry by field artillery in the fast-moving situations of open warfare makes well-advanced

[1] A recent issue of *The Gunner* (London) quotes a good example: "On the 21st March, 1918, 177 Brigade, R.F.A., was in action in the area of the 66th Division, covering the extreme right front of the 16th Division. B/177 Battery, commanded by Major Mackay, M.C., fought their guns through the heavy bombardment, till the position was raked by machine guns from the right flank. Detachments were then withdrawn, with breech-blocks and sights, to a trench in the Brown Line, engaging the enemy with rifles. Later, when two of our tanks made a short advance, Major Mackay returned to his guns and put them in action again, doing very effective work at close ranges, all the time under heavy fire."—EDITOR.

[2] As, for example, when artillery constitutes part of a covering force.—EDITOR.

OP's imperative. In many situations it will be necessary to place these OP's as far forward as the infantry front lines. (See "German Divisional Artillery in Poland," by Colonel Hartmann, FIELD ARTILLERY JOURNAL, January-February, 1940.) Such advanced OP's will frequently find themselves put to the necessity of defending themselves against enemy attack.

There will be situations when the tactical requirements and terrain conditions will necessitate the placement of artillery OP's somewhat beyond a flank which is resting on sharply rising ground. Such an OP may expect to be attacked by small enemy patrols.

While artillery on the road and in bivouac is more likely to be attacked by mechanized units, the possibility of attacks of the latter type cannot be ruled out. The maneuvers of both the Regular Army and the National Guard during 1939 brought to light many instances of the ability of both horse and motorized units to strike far behind the actual battle lines.

In operations in enemy country, field artillery on the march may expect sporadic attacks by civilian snipers and guerillas. Such attacks are not likely to be serious, but they are calculated to be very annoying, particularly if the artillery is equipped with no suitable weapons for defense.

Vertical Attack

The European War is showing us that the large-scale parachute attack is a harsh reality. Apparently the usual major objective of such an attack is to secure air bases or key points in rear areas. Nevertheless there is some indication, as yet unconfirmed, that parachutists have been used to capture fortified works. This being the case, artillery in position may well expect to be visited by infantry dropping from the skies; indeed, there is evidence in recent German and Italian writings that attack of artillery in position is a logical and likely employment of parachute troops. (See Col. Mancinelli in *Rivista di Artigleria e Genio*, March, 1940.)

It is not hard to envision that such an attack, properly planned and reasonably well executed, under favorable circumstances of weather and terrain, would have great possibilities. And how better could it be used than in attacking artillery? A group of parachute troops dropped near artillery positions twenty to forty minutes before a coordinated dawn attack is made might be able to accomplish results in silencing batteries that would very seriously hamper the support by the artillery of the infantry defense effort. Large numbers of parachute troops would not be needed, nor would it be necessary for them to form into large tactical groups after they had landed, in order to be effective. Small groups of from eight to twenty men, with light machine guns and good automatic rifles, might cause great damage among the batteries by direct attack and by disruption of communications while the main attack was taking place on the front or flank.

Definitely, the latest developments in Europe make critical the question of supplying our batteries with an adequate number of weapons for close defense.

WEAPONS PRESENTLY CARRIED BY AMERICAN FIELD ARTILLERY, AND SUITABILITY FOR CLOSE-IN DEFENSE

Guns and Howitzers

Many artillery officers have been heard to proclaim that the best weapons for close-in defense of field artillery against enemy attack are the guns and howitzers of the batteries. Where the caliber of the gun or howitzer does not exceed 105-mm., where the carriage may be traversed quickly over a wide arc, and where the gun or howitzer can be fired by the gunner who is laying on the target, it is a suitable weapon for close-in defense against mechanized attack. However, a gun or howitzer, even in calibers of 105-mm. or less, is not a suitable weapon for defense against surprise attack by quick-charging cavalry (horse) or by dismounted troops which have approached on foot or in motor vehicles. Six or eight trained riflemen disposed around a battery position could pick off the four gunners before it was known to the artillery that the riflemen were present, and successive cannoneers could easily be disposed of as they attempted to take the gunner's place. Even if the battery were able to begin firing before the gunners were picked off, a concealed rifleman at a range of 150 to 300 yards presents a poor target for a gun or howitzer. Further, the artillery should be able to continue its mission of supporting the infantry while repelling any attack against the artillery, except one in force, and this can hardly be done if the same weapons must be used for both purposes.

Pistols

At the present time the primary weapon for close-in defense of field artillery is the Colt .45 caliber semiautomatic pistol. Under the 1939 tables of organization a horse-drawn regiment of 75-mm. divisional artillery consists of 1,375 officers and enlisted men and is equipped with 1238 pistols. A 75-mm. gun battery consisting of 135 officers and enlisted men is equipped with 129 pistols.

In penny fiction and horse operas the pistol is a singularly effective weapon. In actual practice it is singularly ineffective. The capabilities of the weapon itself are very limited as to range and accuracy, and in the hands of the soldier of average training the limitations inherent to the weapon are exaggerated by general ineptness. More time is required to train a man in the expert use of the pistol than in any other small arm.

The normal effective range of the pistol is generally considered to be 25 yards, with a maximum effective range of 75 yards. "Normal effective range" is a term which it is difficult to define exactly. As applied to the pistol, we would interpret the term to mean that range at which the soldier of average training could hit a target the size of an upright man nine times out of ten. Judged by such a standard the normal effective range of the .45 pistol is nearer to 15 yards than it is to 25 yards.

Some remarkable results have been obtained with the pistol. We have seen the weapon used effectively on a stationary bobber target at 200 yards, but this was done by men who habitually shoot through the "D" course with an average of 95% or better. There are few such men in the Army in peace time; in war-time their number, when compared with the total number of men involved, is infinitesimal.

As the primary weapon of close-in defense of field artillery the pistol is more ornamental than useful.

Rifles M-1 (Garand)

Under the 1939 Tables of Organization the Browning automatic rifles, formerly carried by the Field Artillery, are supplanted by that very excellent weapon, the M-1 rifle. A light regiment (horsedrawn) is now equipped with sixty-six of these rifles, with six rifles assigned to each gun battery. This is a movement in the right direction. However, it is but a short, timid step where a broad, bold leap was needed.

The sturdiness and simplicity of construction and reduced recoil of the M-1 rifle makes it an ideal weapon for use in close-in defense of artillery. It will stand a great deal of hard usage and take a considerable amount of grit and dust in its action without resultant misfires or other malfunctions. Because of the reduced recoil, single rear peep sight, and semi-automatic operation of the M-1 rifle, a recruit can be taught to use it effectively in a shorter period of time than for any other small arm.

Although we are now armed with this excellent weapon, we are not equipped with a sufficient number to provide for adequate close-in defense. The BC of a gun battery in position would find it impossible so to dispose his six rifles as to furnish adequate security to all elements of his battery. The most reasonable disposition would appear to be to assign two rifles to the firing battery, two to the OP, and two to the limber position. In this manner, all elements would be furnished some protection, but the protection would be adequate for no element.

WEAPONS CARRIED BY FOREIGN FIELD ARTILLERY FOR CLOSE-IN DEFENSE

Germany

Germany has gone further in providing weapons for close-in defense of its field artillery than has any other nation. In the German field artillery all officers and noncommissioned officers are armed with the 9-mm. pistol; enlisted men are armed with the 7.9-mm. carbine and with hand grenades. In addition to the foregoing, all mounted men carry sabers of the curved blade, cavalry type, and all enlisted men not mounted carry the bayonet. This armament is further supplemented by eighteen light machine guns per regiment of divisional artillery.

It appears that German thoroughness has met the problem of the close-in defense of artillery and has even gone somewhat beyond the necessities of the situation. The sabers, bayonets and hand grenades with which the artillery is equipped seem so much surplusage. It may also be argued that 2,800 rifles for the 3,100 officers and men of a divisional artillery regiment is somewhat on the heavy side.

Japan

The Japanese answer to the problem of close-in defense of field artillery is light machine guns in quantity. The light regiment of artillery of a "heavy division," with a strength of approximately 2,700 officers and men, is equipped with 138 light machine guns. The light regiment of a "light division," with a strength of approximately 2,600 officers and men, is equipped with 72 light machine guns. The officers carry a pistol and a modified form of the two-handed saber.

The proportions of one light machine gun to every 20 men in the artillery regiment of a "heavy division" and of one light machine gun to every 37 men in the artillery regiment of a "light division" seem too great. A lesser number of machine guns, supplemented by rifles, should furnish adequate protection and simplify the problem of transportation of small arms weapons.

The saber is more likely carried by the officers for sentimental reasons than as a useful tool for artillery defense.

Rumania

In the Rumanian divisional field artillery the officers and noncommissioned officers are armed with revolvers and sabers. All other enlisted men are armed with carbines. There appear to be no machine guns, light or heavy, in the artillery.

The sabers carried by the officers and noncommissioned officers add little to the security of the artillery. The lack of machine guns in the artillery is probably due to a shortage of these weapons, there being a supply insufficient to fill infantry demands.

Sweden

Sweden provides two weapons for the close-in defense of artillery. The 9-mm. pistol is carried by officers and the 6.5-mm. carbine by enlisted men. It is felt that in the event of war Sweden would equip the artillery with some of the very excellent light machine guns manufactured in that country.

Turkey

A regiment of divisional artillery in the Turkish army has a strength of approximately 1,250 men. Its officers carry pistols, and the regiment is equipped with a total of four machine guns. The supply of good small arms in Turkey is thought to be limited.

France and Britain

French field artillery operating on the western front places its reliance primarily on heavy machine guns to

protect itself against close-in attack. The British field artillery on this front relies on light machine guns for this purpose. No information is available at this time as to the equipment of the French and British artillery which is part of the Allied Near Eastern force. Judging from the experiences of the British in Palestine in World War I, it is thought likely that the Allied artillery in the Near East is armed with something more in the way of small arms than a few light and heavy machine guns per regiment.

Suggestions as to Types and Quantities of Small Arms to Be Furnished American Field Artillery for Close-in Defense

Rifle M-1

The M-1 rifle should be adopted as the primary weapon of the field artillery for close-in defense. In the gun battery all drivers and all cannoneers should be armed with the rifle. All privates in the BC detail, except linemen, should be equipped with rifles. In the regimental and battalion headquarters batteries all privates, except linemen, should be equipped with rifles and in the combat trains and in the service battery all privates should be so armed.

The rifles of mounted men should be carried in a saddle boot, those of dismounted men in boots attached to the vehicles on or in which they ride. When in bivouac or in position rifles should be stacked in some location where they will not interfere with the normal duties of the men, but where they will be available for instant use in case they are needed for defense.

Pistols

While the .45 caliber pistol has distinct limitations as to range and accuracy, it is a small, compact weapon that can be easily carried with a minimum of interference to the free action of the man carrying it. The pistol should be retained for use by all officers and by enlisted men who are not armed with the rifle. It should be used to supplement the fire of the rifles in the event of attack.

Machine Guns

The rifles and pistols suggested above for use by the field artillery should be capable of successfully repelling any close-in attack that the artillery will ordinarily be subject to. However, there are likely to be occasions when the artillery will find itself subject to determined enemy attack in such force that a volume of fire cannot be laid down by the rifles and pistols sufficient to repel the attack or hold it off until an orderly withdrawal has been accomplished. In order to be prepared for such situations machine guns should be furnished to the artillery. Either the Browning .30 caliber water-cooled gun or the Browning .30 caliber air-cooled gun are available for this purpose. The water-cooled gun is somewhat more accurate and is capable of a greater sustained rate of fire than is the light gun. However, the light gun is a very excellent weapon and by reason of its little weight, as compared with the water-cooled gun, it is much better suited to use by the field artillery. One man can carry both the light gun and its tripod without appreciable effort.

Each gun battery and each combat train should be equipped with two light machine guns.

Training in Use of Small Arms

There is a very pronounced tendency in the army generally, and in the field artillery particularly, to slight and neglect training in the use of small arms. The largest part of the instruction is given in a most perfunctory manner and by instructors who are poorly equipped for the job. At the present time the average gunner using a pistol has difficulty in hitting a broad barn door at ten paces. It is a shortsighted policy that places tools in the hands of man and does not teach him to use them. All of the weapons suggested herein for use by the field artillery will prove of little avail in close-in defense if the personnel that is carrying them is not trained in their efficient use. Any man, not afflicted with palsy, can be taught to use small arms effectively, but no man is born with this ability.

We conclude that not only should the field artillery be equipped with the suggested weapons, but training programs should be adopted that will insure their efficient and effective use. In the words of Colonel Hartmann ("German Divisional Artillery in Poland," supra):

"The time devoted to training with infantry weapons is not wasted."

ORDERS

The infantryman never understands his orders, but executes them and renders reports.

The cavalryman never understands his orders, but executes them and never renders reports.

The artilleryman understands his orders and executes them, but never renders reports.

The engineer understands his orders, executes them backwards, and makes observations.

—French military proverb.

BIGGER BERTHA?

The German invasion of Holland has a possible by-product concerning which the British have been speculating for several months. It is known that the Germans have built a number of long-range cannon of the type shown in the accompanying illustration. If they have been willing to release photos of this weapon, which appears to have a length of at least sixty feet, a caliber of about 21 cm., and a possible range of 50 miles, what then are the characteristics of their secret guns of extreme range? *The Gunner* (London), March, 1940, discusses this matter, in part, as follows:

Uncorroborated reports reach us that Hitler is building a super Big Bertha to shell London. This gun is 125-130 calibres. This means that its length is equal to its interior diameter, 280 mm., multiplied by 125 or 130. It is thus 35-36.4 metres (115-118 feet) long. The initial velocity of the shell is 1,800 metres (5,905.5 feet) per second.

The gun fires at an angle of about 70 degrees, and its projectile thus reaches an altitude of 15,000 metres (nearly 50,000 feet) in the stratosphere—i.e., the upper layer of rarefied air where resistance is practically nil—while still possessing a velocity of 1,200 metres (3,937 feet) per second and an angle of 45 degrees. From that point the projectile behaves as though the gun were firing at this altitude in a vacuum, with an initial velocity of 1,200 metres per second. Because there is no air resistance it travels five times as fast as if it were still in the atmospheric stratum. The shell thus reaches a height of 60 kms. (37 miles), for in a vacuum the top of the trajectory is one quarter of the range. The shell travels nearly 200 kms. (124 miles) in the stratosphere before it slows down to a point at which it obeys only the law of gravity and falls almost perpendicularly to earth.

A point to which the German naval engineers devoted attention was an endeavour to increase the calibre of 210 so as to make it possible to load the shell with a quantity of explosive sufficient to produce much more serious damage than could be effected with the 210. A further study of capital importance was in relation to the gun's elevation.

The present gun, at an angle of 65 degrees, has a range of between 207 and 213 kilometers. Attention has been given to the composition of the explosive—with special reference, it is thought, to the proportion of nitroglycerine. To the strengthening of the mounting particular attention has been given, so that the gun may be fired at very steep angles, thus obtaining the great increase in range which the "little more" in elevation gives.

With this super Big Bertha the Germans are confident of being able to fire on London. But a preliminary would be to secure the island of Walcheren. The Germans calculate that by the construction of a railway of 15 kilometers from Middelburg to near the Westkapell lighthouse they would be brought to within 250 kilometres of London. The great gun could be transported from Germany by rail.

The tests of the gun, concludes the article, have been carried out on the Baltic coast.

A million men at maneuvers are useless, if a sane and reasoned organization does not assure their discipline, and thereby their reliability, that is, their courage in action. . . . Four brave men who do not know each other will not dare to attack a lion. Four less brave, but knowing each other well, sure of their reliability and consequently of mutual aid, will attack resolutely. There is the science of the organization of armies in a nutshell.

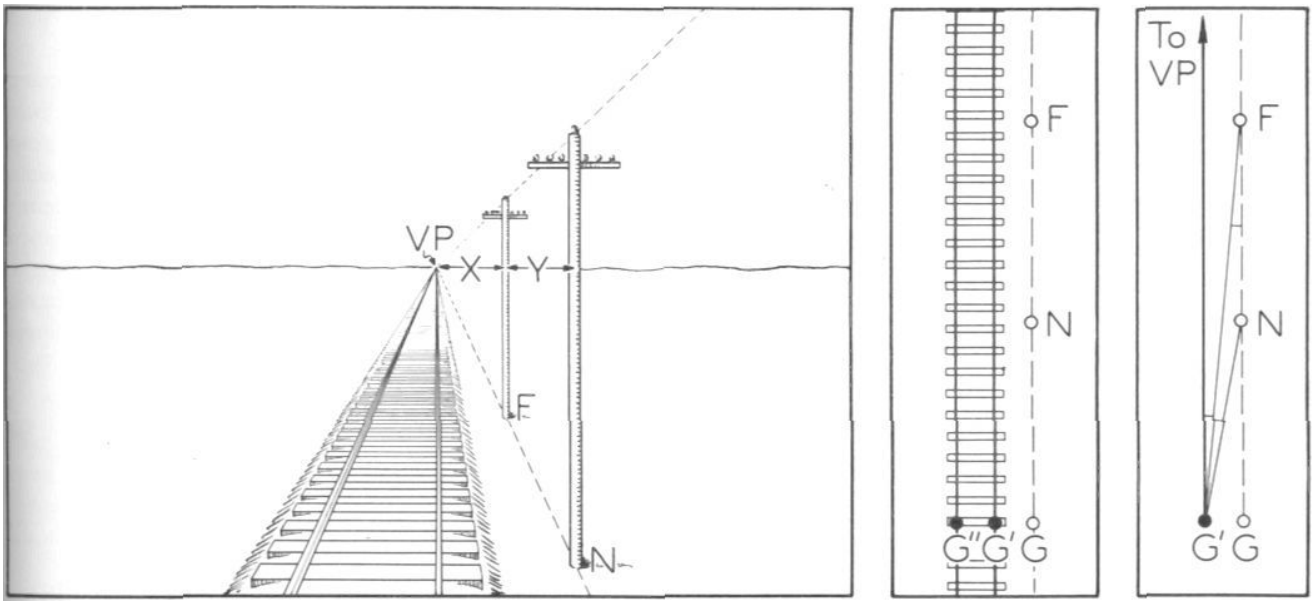
—DU PICQ.

Subscribers! Please note announcement on page 240 relative to changes of address.

AIMING POINT: VP

SHORT CUT TO ACCURATE LAYING

By CAPTAIN ALEXANDER S. BENNET, FA



(1) *(2)* *(3)*

Figure 1

I.—A Review of Perspective

One of the principles of perspective is that parallel lines appear to converge at a single point known as the *vanishing point*, or *VP*. For example, were a person to stand at point G' on the right-hand rail of the railroad track in Figure 1 (2), the view down the track would be as shown in Figure 1 (1). Note that the observer is opposite pole G, which appears in the plan (Figure 1 (2)) but is outside the limits of the perspective drawing since it is on the observer's right. Pole N is approximately equidistant from pole G and the observer. Since the poles are equally spaced, pole N is midway between poles G and F. This makes triangle FNG' (Figure 1 (3)) isoscles, with equal base angles. As the line of poles is parallel to the track (by construction), the angle NFG' equals the angle between FG' and the right-hand rail alternate interior angles of two parallel lines). FG' is therefore the bisector of the angle between NG' and the right-hand rail. Consequently pole F will appear to the observer at G' to be midway between pole N and VP, and offsets X and Y (Figure 1 (1)) will be equal.

If the observer now moves over to G" on the left-hand rail (Figure 1 (2)) he will find pole F still midway between pole N and VP, although the offsets will now appear somewhat larger.

The same relation will hold true if the track is on the right-hand side of the line of poles.

II.—Application to Aiming Stakes

Substituting aiming stakes for poles N and F, and an artillery piece for pole G, (and, of course, eliminating the railway from the picture), we have the situation which occurs during lateral displacement. The vanishing point is no longer materialized upon the ground but its position may be determined by the relation established in I—that the far stake is midway between the near stake and the vanishing point. The gunner may estimate the offset by eye, or measure it on the reticule scale of the sight. He *leads* left of the far stake if the piece has displaced to the left of the line of stakes, and leads right if it has displaced to the right (Figure 2). In either case the vertical hair of the sight is kept on the VP by traversing the piece until the far stake is midway between the near stake and the vertical hair. When the vertical hair is on the VP, the piece is laid parallel to its direction prior to displacement.

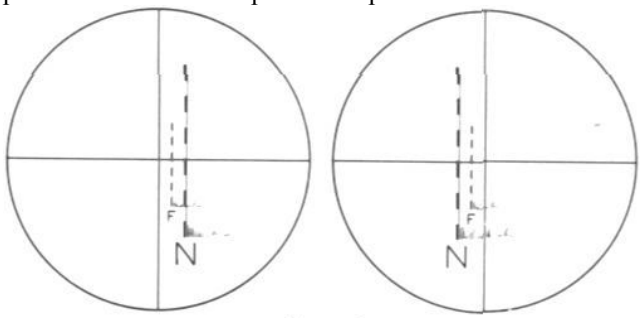


Figure 2

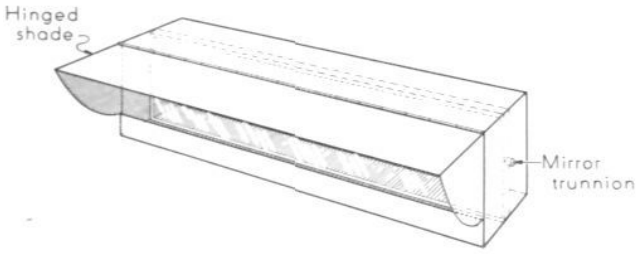


Figure 3

III.—Application to Auxiliary Aiming Point

"Whenever aiming stakes are used, the pieces are also referred to an auxiliary aiming point which is used in case the aiming stakes are knocked down during firing."—Paragraph 29*d* Field Artillery Field Manual FM 6-40, Firing.

For an auxiliary aiming point the aiming box (Figure 3) containing a mirror pivoted on trunnions at each end is installed on the line of aiming stakes at a convenient distance from the piece. The mirror is oscillated in azimuth and elevation until it is perpendicular to the line of sighting which passes through the aiming stakes. This condition is satisfied when the reflected image of the sight coincides with the vertical hair of the sight. Thereupon the aiming box is anchored in place and protected by a covering of dirt, rocks, or sandbags as in Figure 4.

When the piece displaces laterally the reflected image of the sight displaces an equal amount. When the gunner lays on the image the line of sighting becomes again perpendicular to the plane of the mirror, and therefore parallel to the line of sighting prior to lateral displacement (perpendiculars to the same plane are parallel to each other). The piece is accordingly laid parallel to its original direction.

The aiming mirror is, in effect, an *orienting plane* whose azimuth determines the azimuth of any line of sighting laid on it. The reflected image of the sight constitutes a materialization on the ground of the direction of the vanishing point discussed in I and II.

During darkness a screened light attached to the sight and directed toward the aiming box will be reflected back to the sight by the aiming mirror, thus furnishing an illuminated aiming point. This light may be switched on by the gunner for an additional check on laying or to take the place of the aiming stake lights in case the latter become inoperative during firing.

IV.—Summary

The vanishing point has all the characteristics of a perfect aiming point, being fixed, continuously visible, and as distant from the piece as possible. As the vanishing point is at an infinite distance from the piece all parallax in laying is eliminated.

The use of VP aiming points by a battery localizes displacement corrections to the sections, in fact with such aiming points displacement errors should never occur. Neither is it necessary to shift periodically either aiming stake, although it may be convenient to reestablish alinement with the vanishing point after excessive displacement by shifting *both* stakes. No changes in the deflection of individual pieces are necessitated by displacement corrections when the VP is used as an aiming point.

V.—General Application

The use of VP aiming points may be extended to include the orientation of instruments at observation posts, declinating stations, and place marks along the orienting line by the establishment of aiming stakes for each instrument supplemented by an aiming box.

In night occupation of position the laying of batteries and the orientation of instruments are facilitated by VP installations. The individual piece or instrument need be only roughly located over its marking stake, as any displacement error is corrected by the VP aiming method.

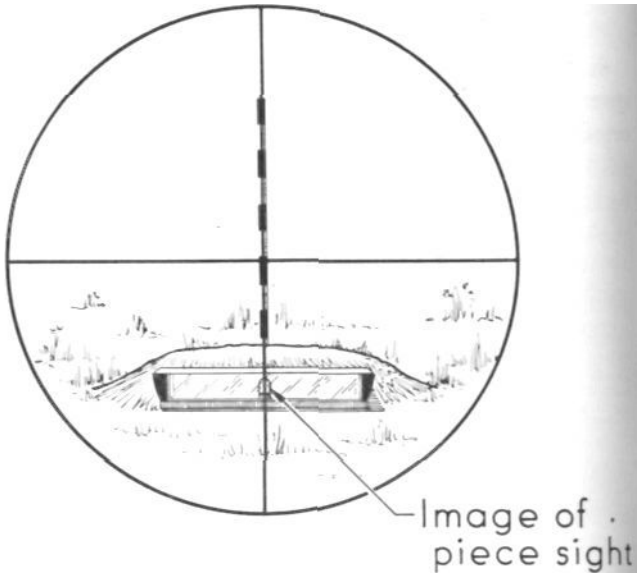
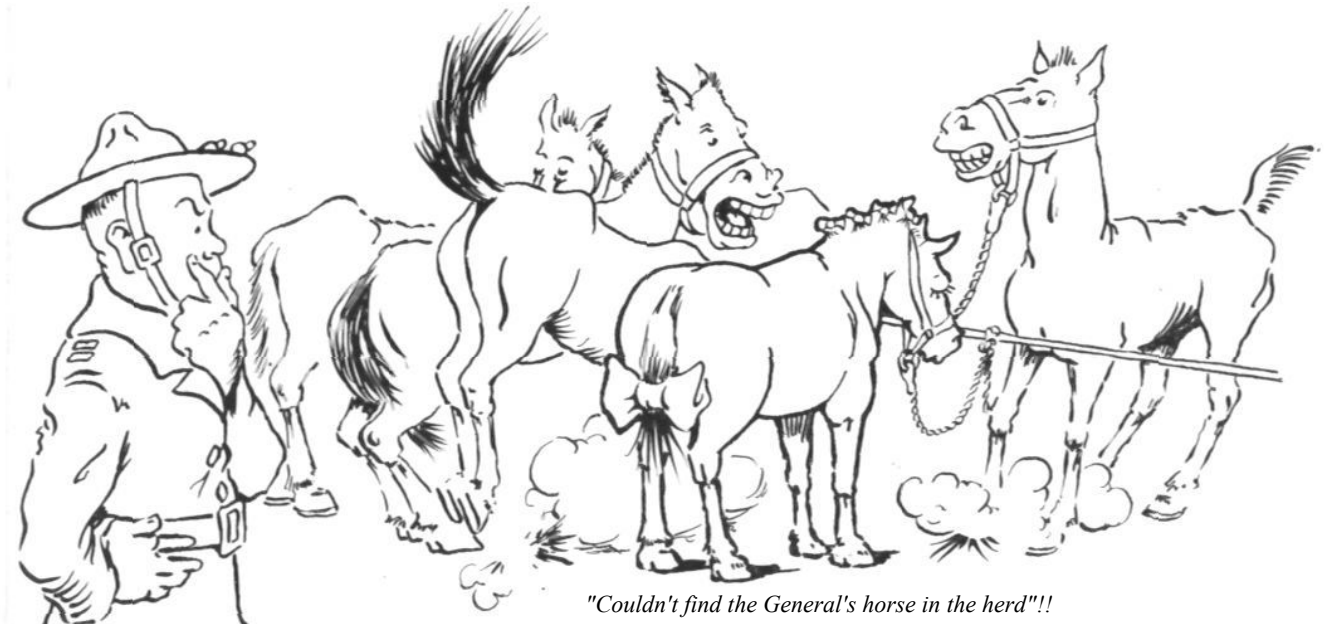


Figure 4

For the St. Mihiel offensive in 1918 the artillery with the American First Army amounted to 750 batteries, or the equivalent of 40 brigades. These 200,000 artillerymen equalled numerically the infantry at the front. In point of materiel and munitions the artillery greatly exceeded all other forces present combined.



"Couldn't find the General's horse in the herd"!!

WAGON WHEELS

By Lieut. George C. McDowell, FA

Illustrated by Capt. Rex Chandler

Fort Sill, Oklahoma
January 3, 1939.

Dear Bob:

Remember the arguments and discussions we used to have as roommates at West Point two years ago concerning horse-drawn and truck-drawn artillery; their various capabilities and limitations? Neither of us at the time had the experience to quote facts from our own observations, but nevertheless we argued. Recently, however, the battery to which I belong, Battery E 18th FA, completed a 421-mile *motor convoy* march to Fort Sam Houston, Texas, and a *return horse-drawn* artillery march from Fort Sam Houston, Texas, to Fort Sill, Oklahoma, in 14 days, with the loss of only two horses. Needless to say, I learned plenty concerning both horse and motor marches, so I thought I'd write and tell you about it in case you ever leave motorized units and serve with horses.

During the month of October rumors had been going around that one of the batteries in the 18th F. A. was going to Fort Sam Houston to march some horses and guns back to Fort Sill; the 12th F. A. was to be motorized and we were getting part of their horses and guns for the two new batteries that were to be formed in the 18th F. A. After a time the rumors died and we thought no more of it; our work continued as usual. On November 23 the battery was out firing for the students of the F. A. School, when Capt. Brimmer, the Battery Commander, drove up in his car, holding a paper in his hand. Seeing both the executive and the safety officer standing behind the guns shivering he said, "You might as well get used to that as I've just received notice that we are to leave Monday for Fort Sam Houston to march some horses and materiel back here; the whole battery is to go."

The following four days were filled with excitement and preparation; extra men had to be attached from other organizations; tentative supply plans had to be arranged; money for the payment of the men in San Antonio had to be obtained; in fact those four days seemed to have exceptionally short hours in them. The transportation to Fort Sam Houston was to be accomplished by the trucks of the disbanded 2d Ammunition Train together with the trucks of our own Service Battery; the Ammunition Train trucks were being transferred to the 12th F. A., while the Service Battery trucks were to return with us. Since I kept a journal of the entire march, I'll let extracts from the daily entries tell the story.

We left Fort Sill at 5:30 AM November 28, and marched to a C.C.C. camp at Brownwood, Texas, arriving at 7:35 PM. The transportation consisted of 22

"I didn't know the Army used horses to pull guns any more"

Dodge 4 × 4 cargo trucks, 4 Reo station wagons, 1 Chevrolet pick-up, 1 Chevrolet station wagon, 9 Dodge 4 × 2 trucks, and 1 Chevrolet ambulance. Our personnel was 210 enlisted men and 6 officers.

The first halt made after leaving Fort Sill was at 6:50 AM. A refueling halt at Graham, Texas, at 10:45 AM allowed the entire convoy to be refueled in an hour from a two-pump filling station. By refueling the truck pulling the rolling kitchen first and sending it on to a point 2 miles south of town, hot coffee and sandwiches were ready to be served when the convoy arrived. At 6:05 PM the convoy arrived on the outskirts of Brown-wood and was again refueled from two previously arranged-for tank trucks. During the refueling a police escort was obtained to lead the convoy on the difficult and circuitous route to the C.C.C. camp after dark. Over 13 hours was spent en route today.

This particular phase of our trip today was a new experience for me; outside of what we had learned as cadets, most of which I had forgotten, I knew little concerning truck convoy movements. Moreover, we had truck drivers with slight experience in long-distance driving; but under Capt. Brimmer's guidance and Lt. Parker's trouble shooting, we have made about 240 miles this first day.

The reception we received at this C.C.C. camp has been most cordial; the officers have gone out of their way to make us as comfortable as possible on this cold night.

The second day we marched to Fort Sam Houston, 181 miles. This day's march was marked with frequent interruptions because of mechanical trouble with the trucks, but at no time was the column delayed; when any truck had to fall out, the last truck in the column capable of towing fell out with it. One 4 × 4 Dodge had its transfer case burn out, locking the drive shafts to both front and rear wheels; to tow it we removed both drive shafts. However, the major tragedy of the day occurred when the oil lines on the ration truck and water trailer truck went out at the same time, requiring both to drop to the rear for repairs. No one thought they would remain long; they could easily catch the convoy at the next halt. Noon came, necessitating the refueling of the whole convoy at Fredericksburg, but still no ration or water trucks, or any sign of the trucks dropped off with them.

At 1:00 PM, when all available trucks had been refueled at a filling station, Capt. Brimmer instructed me to take the convoy and go on to San Antonio sans grub or water.

After an hour's elapsed time of viewing mesquite-covered limestone knolls, the station wagon belonging to Capt. Brimmer passed mine and skidded to a stop down the road. As I slowed down to pass, the driver announced the approach of the kitchen truck, adding in a loud voice that hot coffee would be available. After we had carefully selected a likely looking roadside dining hall, dismounted the men, and straightened a chaotic, rapidly-formed, shouting mess line, the mess truck arrived. The saddened expressions on the faces of the men when handed two dry sandwiches with no water or coffee had to be seen to be appreciated. Still, despite the lack of other refreshment until we reached here this afternoon, the men took it in a humorous vein.

The consideration shown us by the officers and men of the 12th F. A. was something never to be forgotten. All our officers were quartered in the Fort Sam Houston Officers' Club, rent free, while our men were divided equally among the organizations of the 12th, and placed in squad rooms where in some instances their own men had to move into the attic. You can imagine how it made us feel, considering the fact that we had come prepared to camp on the parade ground.

Several points in marching truck convoys were successfully demonstrated. It was not necessary to use markers on well-defined highways, and no vehicle became lost from the column. However, each driver was given a written sequence of towns through which we were going to pass in case he did become separated from the column. Since the drivers were inexperienced we found that by spotting officers throughout the column and having each officer keep his vehicle at the same speed as the leading vehicle, "whip" in the column was eliminated. Also we traveled on many different numbered highways, but by the officers spotted throughout the column following the highway number markers we experienced no difficulty; it was as simple as driving one's own private car and following the map.

November 30, 1938.

Today we checked all Ordnance and Quartermaster property except the 247 horses, which will be done tomorrow. All the men were paid, and from the number seen in San Antonio tonight they are really seeing the sights.

There seemed to be a never-ending stream of saddles, bridles, feed bags, and blankets; spare parts and tools for eight 75-mm. guns and four 37's; cleaning and preserving materials—soap, sponges, rags, axle grease, candles, and other equipment to be counted and locked up until we leave. The officers and men of the 12th are giving every conceivable form of cooperation in this transfer.

December 1, 1938.

Today everyone earned their pay and then some; all day we straightened out equipment and horses. At 5 PM this afternoon we harnessed every horse and moved around the block on a practice march to see if we had forgotten any horses or equipment preparatory to leaving in the morning. Wagons are completely loaded to the bows, three filled with ordnance, spare harness for the caisson teams, horse covers, blankets, trace chains, spare wheels, and so forth, the other three with barrack bags of the men plus "loot" collected in San Antonio.

We hope that in the morning every man will recognize his pair of horses and proper place in the formation for the march.

We made our farewell call on the commanding general this morning.

December 2, 1938.

There were tears in the eyes of the old soldiers of the 12th F. A. this morning as they lined the gravel road across the parade ground to watch their horses depart. We moved out in column toward the north. One chief of section was down at the stables at daylight to tell his horse goodbye, and it was a very touching moment to the few of us who saw it. Two bands played as we left, and one battery fired a four-gun salute as the tail of the column cleared the spot where Col. Bailey and the other officers of the 12th stood; a most ceremonious send off.

No sooner had we cleared the post, descending the steep asphalt New Braunfels Avenue, than three teams slipped and fell. It required ten minutes to get them up. Our first introduction to asphalt! We were suspicious from then on. We marched in three platoons, with the led horses equally divided between the three. The day's march proceeded with the usual halts at hour intervals, and camp was reached shortly after noon at the Classen Ranch.

Capt. Brimmer found out that we had left four horses, but they finally showed up personally escorted by the First Sergeant.

Our truck train will continue to supply the battery from Fort Sam Houston for the next three days.

Since the battery has approximately 30 per cent recruits, much lost motion occurred in making camp this afternoon, but of course that will adjust itself with time; 59 recruits out of 182 men.

Capt. Hale, V.C., joined our forces this morning prior to our departure. From now on he will be the one who gives "fire" in case any horse must be destroyed.

Col. Gladish (veterinarian at Fort Sam Houston), told Lt. Hayden today, on the latter's return to Fort Sam Houston for forage, that we have the 2d Division Commanding General's horse with us in our herd. We have tried to find him but as yet he still remains indistinguishable from the other 246. It might become slightly embarrassing if General Rowell comes out to find his mount a swing horse in some gun-carriage team.

Pvts. Scott and Roberts were injured as a result of being thrown from their horses, and Pvt. Pruitt was kicked. However, all are able to continue with the column. It is surprising the number of red rags appearing in the horses' tails.

The horses received were of all ages; from new untrained remounts to aged animals. To a certain extent this fact explains the injuries to the men. Our knowledge of some of the horses consisted in the one-day word-of-mouth discussion the 12th F.A. men gave to our men. Our knowledge of the rest was learned by sad experience. Eighteen of the horses had come from other units at Fort Sam Houston, so naturally the men of the 12th knew nothing about them. Moreover, the horses had received no conditioning prior to the march other than the normal routine in the 12th F.A., but most of the horses had been reshod by the horsehoers of the 12th before we arrived. Capt. Hale described the general condition of the horses we received as average. We marched 17 miles today. On this march we did not water on the road, but watered from two cattle tanks one hour after our arrival at the Classen Ranch. A second watering was held in the dark at 7 PM.

December 3, 1938.

Today's march started off with thrills, chills, and spills. No sooner had my platoon, the 2d platoon, begun moving out of camp when one team started running away. It was finally stopped by the drivers heading the animals into a thicket of mesquite. After untangling the horses and getting them quiet, the men started out on the road again only to have a second runaway. The off swing horse hit the gun ahead with such force as to turn the gun over. The horse suffered severe shoulder injuries, necessitating his return to Ft. Sam Houston. Both incidents occurred before daylight. Fortunately none of the drivers were hurt. About 10:30 AM Lt. Parker decided to change the draft horses in his section with spare animals which were being led at the rear of his column, just to see what kind of spare draft he had. On resuming the march one of his teams ran away, but was finally brought under control through the cool work of the lead driver in turning the whole team into a guard rail along the highway. When I came by with the second platoon Captain Brimmer told me not to change my draft completely as Lt. Parker had done.

As yet, we have not located the General's horse, but if he is with us, he already has been in draft. He might have had something to do with some of these runaways today.

As I mentioned before, our knowledge of each horse's characteristics was limited. Also, flickering lanterns, clanging trace chains, fumbling recruits, and mismated teams on these dark mornings certainly did nothing to allay the nervousness of any horse. Consequently, we had runaways on leaving camp. However, we soon learned the particular horses that caused trouble and from now on they stay among the led horses until after daylight. The recruit drivers, through being kicked and tossed, have acquired more knowledge of how to handle certain difficult individual horses.

Since the day's march was relatively short (20.7 miles) no attempt was made to water on the road, but all the horses were watered, fed, and groomed starting one hour after arrival in camp. This day marked the first day of feeding the field ration instead of the garrison ration, as well as the abandonment of a watering

formation after reveille. The number of horses that drank was so small that the time consumed could best be employed to better advantage in breaking camp.

Johnson City, Texas, December 4, 1938.

At 4:00 AM this morning, Lt. Bailey had some difficulty taking over his newest duty, even after some personal instruction last night by Captain Brimmer. In addition to being Chief Wagon Master, marching the third platoon, he now must crawl out of a warm bed into a cold, wind-blown tent, and light the gas lantern in the officer's tent. Though scantily clad he did it this morning with two matches and the advice of six other sleepy officers.

The march today was the first of our long pushes, and if the rest go as easily and smoothly as today, we undoubtedly will make Ft. Sill in our scheduled time. All the horses are in excellent condition and seem none the worse from their 31.9 miles march today. At 9:45 AM we stopped for two hours to feed the men and animals at the Blanco State Park; it is a very beautiful park, extending 8 miles west of the highway.

The fact that each platoon has so many spare animals trailing immediately behind that can be thrown into draft the moment a draft horse shows signs of weakness aids greatly the clockwork precision and smoothness of the march. At present we are having more soreness and more minor injuries with the men than with the animals.

The country through which we are now passing is primarily composed of sheep ranches. It is too hilly and rocky for anything else; however, these hills and rocks make for beautiful scenery and tend to relieve momentarily the strain of continuous driving.

On our arrival at the Perdernales River the horses showed considerable weariness in spite of the fact that approximately 18 draft and led animals were changed during the day. Yet they were all surprisingly free from harness galls and sores. This excellent condition may be attributed to the fact that the hourly rests on the march were for the horses and not the men. Collar pads were pulled to the side, breeching raised or lowered to counteract wearing spots, and the feet given a rigid inspection for rocks and loose shoes. This hourly attention to the horses had to be drilled into the recruits at first, but now they take pride in keeping their horses in excellent condition. In another day the instruction by the officers and non-coms will have dwindled to a mere word here and there.

Brownlee Ranch, Texas, December 5, 1938.

Tonight the horses are beginning to show signs of having done a little work. We are now 96 miles out of Fort Sam Houston, having made only 27.9 miles today. All horses are surprisingly free from galls and sores, and are still far ahead of the men in physical condition. One horse felt so vigorous this afternoon after we made camp that he

"One horse felt so vigorous . . . he bit Lieutenant Parker in the back"

bit Lt. Parker in the back, tearing his jacket and shirt, not to mention the large bruise inflicted. By necessity Comrade Parker will sleep on his side tonight.

The tank trailer loaned us by the 77th F.A. before leaving for Fort Still is all that is keeping this march progressing. It is hauling water night and day for both men and horses; in fact, the trailer is out at this moment getting another tank of water to last through breakfast in the morning. Six refills have been made so far today.

Capt. Hale and Lt. Hayden made an unsuccessful attempt to buy hay in Lampassas this afternoon. Local price is 30 cents for a 40-pound bale, but they decided it could be bought in Fort Worth cheaper. At present we have a two days' supply with us.

Our last supply truck going to Fort Sam Houston is leaving in a few minutes. After tonight we must depend on local purchases.

Our two-hour halt today came at 10:15 AM at a small stream 3.6 miles south of Marble Falls. There the animals were watered and fed, and the men were given a hot meal. However, we have experienced some difficulty in watering the horses tonight; the horses empty the water troughs on this ranch faster than the troughs will fill.

Before leaving Fort Sill a map reconnaissance for both the route to Fort Sam Houston with the motor convoy and the return trip with horses was made. In the former instance paved roads with little traffic was the chief consideration, while in the latter the shortest feasible route was selected. The motor route proved to be excellent but unfortunately, when Lt. Hayden made his three-day motor reconnaissance of the return route on his way to Fort Sam Houston, he found few widely-separated streams for watering. It hasn't rained in this part of Texas since last July and almost all streams are dried up. This condition had not been foreseen, and, as a matter of fact, was impossible to predict from the

ordinary road maps available. Consequently, when Col. C. P. George, our regimental commander, arrived in San Antonio and studied the poor watering conditions, he cut our previously planned return from 17 days to 14 days, in order that we might camp close to water at nights.

Lampassas, Texas, December 6, 1938.

Capt. Hale reported at supper tonight that shoulder galls were beginning to show, but on the whole the horses were in good condition. One horse slipped and fell on the pavement this morning and can put no weight on his left leg. Capt. Hale says he will wait until morning before deciding any course of action for the horse; the animal was led all day at the rear of the wagon train.

Since we left camp early this morning we have seen no water except that which we have hauled in the trailer tank or obtained from a filling station at the daylight watering in Burnet. This condition has necessitated watering both men and horses from the 300-gallon trailer tank. Exclusive of the daylight watering in Burnet, 2,100 gallons have already been consumed and the truck is out filling again at this moment.

Lt. Parker's back is still very sore; my guess is that he will continue to sleep on his side for several nights to come.

At the evening feed for the horses Capt. Hale supervised the distribution of 25 grams of table salt for each horse; it was mixed with the oats in each nose bag.

Tonight we bathed.

Our rate of march up to date has been fairly slow; Capt. Brimmer put a limit of a five-minute trot out of each hour. He and Capt. Hale, with Sands, the horseshoer, could always be expected to be seen at least once an hour watching our horses, looking for weak ones, inspecting the shoeing, and offering suggestions for improving marching conditions. The condition of the animals was not uniform, and it was pointed out to us that we traveled only as fast as the weakest ones. Consequently, they must be conditioned before stepping out. We are traveling on the side of the road, keeping off the pavement as much as possible except in dodging mail boxes, culverts, and the like. Some of the mail boxes we didn't dodge so well during the hours of darkness! The reason in keeping off the pavement was not only on account of the traffic but also because of the condition of the horses' feet. As Capt. Hale pointed out, the feet were like flint on account of the lack of moisture and would not expand properly. The gravel roadsides lessen the pounding on the horse's feet, although they make the draft more difficult.

Cow House Creek, 8 miles south of Hamilton, Texas,

December 7, 1938.

Today's march of 36.7 miles began at 4:31 AM, after we had reveille at 3:30 AM. It was the longest distance made to date in our 14 days' schedule. Needless to say there are some tired men and horses in this camp tonight. Lt. Parker's platoon led all day and made the trip in slightly more than 10 hours; the other two platoons took a bit longer. Lt. Bailey walked his wagon train all the way, while I trotted less time than Lt. Parker to make it in less than 11 hours. However all the horses arrived in excellent condition. With the spare horses in each platoon, no one horse is allowed to stay in draft until he fatigues himself unduly. In my own platoon today I put horses in draft that were reported to me in San Antonio as never having been in draft before. They looked like they ought to make good draft horses, so at the halts we put them in one at a time with a team of old horses. Only one gave any trouble, and by switching him from off to the near lead he went along pulling quietly. The rest eased into the collar like old horses. Lt. Parker and Lt. Bailey stated that they are doing the same with their spare draft horses.

Our whole trip was made today without a noon halt; only the hourly halts and water halts were made. After two days of arriving in camp late in the afternoon, Capt. Brimmer decided to exclude the two-hour halt, and this system seemed to work exceptionally well; the horses stood the long march better, and the men enjoyed the rest in the warm afternoon sun. About 8:00 AM apples were passed out to all the men while they watered their horses, and again at 11:30 AM an apple, along with a small pie, was handed each man. While marching, the men were given something to eat every four hours to alleviate that gnawing feeling that develops between a man's belt buckle and his backbone. A satisfied man on top makes a more satisfied horse underneath.

About 1:00 PM this afternoon we watered the platoons successively by buckets from a hose at a gasoline filling station in Evant. All the townspeople came down to the square to see the horses and guns; even school was recessed while we were in there.

The horseshoers on night duty worked all night in camp last night in order to get 18 horses ready to travel this morning.

An additional tank trailer arrived from Fort Sill this morning. We now have two 300-gallon tank trailers and could use two more in this country.

Hico City Park, Hico, Texas,

December 8, 1938.

This morning we started 30 minutes earlier than previous mornings. The mornings are getting colder, making sleeping difficult; consequently, we might as well be putting miles behind us. The recruits in my platoon who took one hour and forty-five minutes to feed the horses, eat, and break camp, the first morning, have cut the time to less than one hour now; old field soldiers in seven days!

Six miles south of Hico this morning, one of my guns

became unlimbered while we were trotting, plowing a large furrow in the hard packed limestone road. On hearing one of the men yell, I looked back to see lead horses, ridden horses, and piece sections emerging in all directions from a cloud of white dust, all attempting to avoid the loose gun. Fortunately, no horse hit the unlimbered piece.

The Hico city park on the southern edge of Hico, comes close to being my idea of an ideal camp site. The stream for watering horses is fast-running and shallow, with gravel bottom and sloping banks. The camping area is large enough to accommodate the entire command. Furthermore, it is next to the highway and easy to maneuver wagons and carriages about in the darkness. It is certainly made to order for our requirements of a camp site.

This radio playing loudly here next to the kitchen seems to be rather a strange piece of equipment to have on this march. It is a battery set complete in its case; Captain Brimmer obtained it for the battery in town this afternoon; Captain Hale got it to working after it was brought out here. It does make civilization seem closer.

The battery basketball team, not having had enough road work today, played the Hico high school team in Carlton gym at 3:30 PM. The score was 22 to 14 in favor of Hico; too much horseplay in the game.

Stephenville State Park, Stephenville, Texas,

December 9, 1938.

Our perfect camp site for last night proved to be a boomerang; it was too close to town. Naturally the proximity to town and its effect on our breaking camp next morning was something far afield to me. I wondered at the time why Captain Brimmer let out an expressive grunt when he saw the place which the advance party had selected, but I was not long in learning. There were too many civilians about camp willing to show the men the fundamentals of Southern hospitality, even though it was a dry town.

We left camp at 4:10 AM and at 10:00 AM the first platoon arrived on the outskirts of Stephenville. At the request of the town citizens, through Lieut. Hayden, this platoon waited for the other two to close up in order that we might go through in one body. The town streets were lined with people as we passed. One remark I overheard from a man wearing a ten-gallon hat standing on the curb was. "I didn't know the Army used horses to pull guns any more."

These horses seemed to take these thirty-mile days in stride; in fact, some of them appear to be putting on weight. All of them are in excellent condition now, having travelled 208.4 miles in eight days. Each platoon was watered successively this morning at a stream about 11 miles from Hico, and again from the lake in the Stephenville State Park on arrival in camp. Captain Hale had salt added again to the morning meal. The men are all in good physical condition now also; Lt. Wilkerson (our Medico) reports that two men, sick the other night, are now well and no new cases of sickness have developed in spite of the below-freezing temperature early each morning.

These past three days we have not stopped for a noon halt, but have kept pushing to our next camp, usually arriving around noon. After taking care of the animals and eating, the men sleep during the warm afternoon. This system seems to work much better for all concerned.

Mineral Wells, Texas, December 10, 1938.

This morning my platoon was slated to lead, and we would have been out at 3:30 AM except for one fact; we had another horse become temperamental. Before he got through with his acting, he caused one carriage to run away, broke a hook on the double tree, and tore up a perfectly good set of wheel harness. After taking him out of draft with the aid of 8 men, chaining the single tree to the double tree, and harnessing another horse, we got away in the lead at 3:55 AM. The other horses by this time had become quite excited, and this, coupled with the fact that the drivers were scared, caused the same carriage to run away once again in the first hour on the road. A change of drivers remedied this last condition.

Everything went as scheduled in all platoons until we arrived at the suspension bridge over the Brazos. The load limit on the bridge of 7,000 lbs. necessitated taking off the lead and swing horses, sending them across, and then having the wheel horses pull the guns across. The sway in that bridge made both men and horses cross with anxious, perplexed looks on their faces; perhaps a 150-foot drop to the river, in case of a break-through, is enough to make any horse or man glance twice at a rising and falling floor.

At the Baker Hotel tonight we bathed again, and once more the laws of chance were against me; seventh and last in line for a shower. The men were taken to an athletic club, where they received a much needed bath.

This morning the BC forgot to pass out apples at the first watering to my platoon. They were not passed out until our second watering, after crossing the Brazos River bridge, but I heard about it all morning from the men in my platoon. These men have got quite used to having their daylight apple; consequently, any forgetfulness on the part of the apple detail is soon brought to the platoon leader's attention.

Jacksboro, Texas, December 11, 1938.

One cook held up the movement of the whole battery this morning; by his rising late, breakfast was late, and no part of the battery left until 4:45 AM. Since most of the men have got used to clipping off 10 to 12 miles before dawn, counting hours before dawn, and miles

after dawn, the five miles we made during darkness with about 27 left for daylight made the day seem quite long. Lt. Parker stated that he had three horses slip and fall on the pavement today, but only one was skinned up badly. Lt. Bailey broke two poles in the wagon train on the washboard high shoulder. I only had a broken side-strap from a bucking wheeler, and one man tossed on the pavement by a bucking remount just replaced from draft. The man wasn't hurt, but his two loose horses created an uproar for a few minutes when they doubled the column at a dead run.

Since the loads in the wagons have become lightened and the whole wagon train is able to travel as fast as the other two platoons, they have become a cocky outfit. This morning an hour after leaving camp, my platoon was halted immediately behind Lt. Parker's for the hourly halt. Lt. Bailey halted his wagon train as soon as my platoon had halted. There was scarcely any talking going on; the only noise in the cold, still darkness was the scattered clank of a trace chain or the stamp of a horse's hoof here and there. All at once a deep voice from the wagon train boomed, "Hey, Corporal Stidham, you-all need any collars up there?" To this Cpl. Stidham replied proudly, "No, no runaways this morning." Then came the deep sarcastic reply, "Well, it's certain you don't need any breeching."

We watered the whole battery in Perrin at 8:30 AM from water troughs for the draft horses, and buckets dipped into the water barrels of three gas stations for the single mounts. The whole column was watered in less than 40 minutes. This system of the watering detail going ahead with the two water tank trailers, spotting the canvas troughs full of water to be used as each platoon comes up, seems to work quite well.

Wheel horse on sit-down strike

Windhurst, Texas, December 12, 1938.

As usual, my unpredictable wheel horse had to do his morning acting this morning; he laid down in the harness and refused to get up and pull. Nevertheless by removing the harness, placing two halter ropes and four men on him and dragging him away from the pole, we put in another wheeler, and got away at 3:55 AM. The first wheeler then got up very nonchantly and allowed a man to lead him all day. What a horse!

Today's march was cold and uncomfortable. The cold wave reported on the way yesterday struck with a vengeance last night; in fact, all day it has been getting colder, and at present Captain Hale, self-appointed weather expert, estimates the temperature to be about 38 degrees and dropping all the time. Of course, the wind blowing across this bleak Texas plain makes it seem twice as cold. All the men are now working on beds for tonight, now that the horses have been watered, fed, and groomed. A number are pitching double shelter tents, and packing dirt around the bottom instead of relying on the usual "tarps" from the limbers.

The most important point of today's march was the speed. The total elapsed time divided into the total distance gave a speed slightly greater than four miles per hour. This elapsed time included all hourly halts, and a thirty-minute halt. Of course, the cold weather plus the fact that we trotted an average of twelve minutes each hour, made this speed possible. In general the horses are in excellent physical condition; all the galls and sores heal up twice as quickly by leading the animals along for a day or two than by attempting to pasture them (to be picked up later) with some farmer. Captain Hale last night sent into Fort Sill for a horse-trailer to evacuate some lame horses. The trailer arrived this afternoon and three were loaded; the attempted loading of another caused the assistant driver to get kicked and nearly caused the horse to kill himself. If he objects so strenuously to a free ride to Fort Sill he can just hobble along.

Lt. Wilkerson just came into this cold tent, saw everyone standing about silent and shivering, turned to Lt. Parker and said, "Call up the furnace man and tell him to put in some more coal."

Lt. Hayden has just driven by the tent in the pickup, returning from Wichita Falls. He is proudly puffing his chest out, beaming from ear to ear and yelling that he was officially greeted by the mayor and given the key to the city; in his hand he holds a big fire-hydrant wrench.

Burkburnett, Texas, December 13, 1938.

Today's march was led by the wagon train. An average of over 4 miles per hour was maintained all day, including passage through Wichita Falls and a 30-minute water halt. Because of the fact we made 41 miles, the horses are very tired tonight as well being foot-sore. By morning, however, they will be raring to go again.

Tonight's camp is just a mile or two south of the Red River, and several of the men walked up to the bank this afternoon to see Oklahoma! I know now how the 49ers felt when they first looked on California.

The weather has turned quite cold, but with only two days to go we can stand anything. We watered at daylight from canvas troughs spotted 15.7 miles from Wind-thorst, using the two tank trailers to haul the water from Wichita Falls. Lt. Hayden's key to the city, the fire plug wrench, came in quite handy.

For passing through Wichita Falls Lt. Hayden contacted the Chief of Police and arranged for a motorcycle escort and guide through the city for each platoon. The paved streets made the footing for the horses rather precarious; each small decline on a paved street had to be negotiated with the brake set and the horses in draft in order to keep the wheel horses from sliding down on their hocks. Using these precautions we had no horses slip.

Five Miles South of Geronimo, Okla.,

December 14, 1938.

Last night proved to be the coldest night of the whole march; in fact, there was little sleeping done by anyone after midnight. Captain Brimmer's small gas stove proved to be more inadequate than usual; Lt. Hayden still insisted that we should have bought that small, potbellied wood stove he saw the second day, but Captain Brimmer came back with his usual 2:45 AM reply that he still didn't believe Lt. Hayden could afford to pay for a burnt pyramidal tent. The Lister bag was frozen, all canteens belonging to the men were frozen, the fire hose and tank trailers were frozen; the horses had ice all over their whiskers, and both Captain Hale's and Captain Brimmer's joints creaked as they crawled out of their bedding rolls. But in spite of this fact both Captains beat all the Lieutenants out of bed. (Last sentence inserted by order of chief censor, Captain Brimmer.)

This morning Capt. Brimmer and Lt. Hayden were going forward in the pick-up to inspect this camp site, when the car stopped with a clogged gas line. Capt. Brimmer, not being a qualified driver of government vehicles, got out and pushed, while the lieutenant supply officer sat behind the wheel and shouted encouragement. A five-cent candy bar failed to appease Capt. Brimmer when he got to thinking he should have been the one sitting behind the wheel. The drumhead court for Lt. Hayden's trial tonight has not as yet convened, but it is certain he will buy catsup or pickles for the officers' mess table.

Fort Sill, Okla., December 15, 1938.

We left camp at the usual time and marched with no water halts until we arrived at Post Field Gate. There we waited *one hour* to make our arrival coincide with the 9 AM reception planned by Col. George. Each battery in the 18th F.A. was lined along Randolph Road from the Fire Station to Battery E stables as we filed up the road, led by the 1st F.A. Band. The march ended as we pulled all the materiel and horses into our own area.

Nine horses were sent to the Veterinary Hospital to be treated for injuries; the rest were immediately taken to the pasture by the men of Battery F. The men that took them to the pasture stated that every horse made a complete circle of the large pasture at least twice as soon as his halter rope was unsnapped. Evidently the horses are enjoying their newly won freedom.

In summarizing the important points of this march there are several items that were brought home to me forcibly. The first one is the importance of a motorized service train accompanying a horse-drawn artillery unit in the field. Without the use of our truck train and advance detail to go forward to the next camp site, set up the kitchen and necessary tentage, carry and distribute the forage to each platoon's picket-line area, arrange for watering on the road, and transport several hundred pounds of kitchen supplies and baggage, the elapsed time of the march would have been much longer. By comparison a 498-mile horse-drawn artillery march from Fort Douglas, Utah, to Fort D. A. Russell, Wyoming, in the spring of 1908 required 26 days on the road at an average of 19 miles per day. By carrying a three-days supply of forage in escort wagons accompanying the column their speed was reduced. Our truck train, relieving the burden of the escort wagons to a large extent, allowed us to average over one and a half times their speed each day.

Another important point was the fact that we marched by platoons with about twenty-minute intervals between each. Also, within each platoon the sections were spaced to avoid the dust of the section just ahead. I marched my platoon with two gun carriages in the lead (we had no caissons on this march), and the reel cart and led horses of this section followed some 50 yards behind. The next two gun carriages and led horses were spaced at approximately the same distance. This system worked quite well and allowed the horses and men to march in the minimum of dust. Cinches were not loosened at any time while on the march, and only two saddle sores appeared. However, the men were dismounted to walk along beside the draft horses or to lead their two horses several times each day. This relieved the pressure on the horse's back and also allowed the men to get warm, even though it reduced the speed of the column.

The necessary shoeing was accomplished by the two horseshoers we had in our own battery and the three attached from other 18th F.A. units before leaving. About four times during a day's march one of the horseshoers would go ahead in the station wagon to a point and remain there until all three platoons had passed, watching all horses' feet, as they passed, for worn or loose shoes. He would reset emergency cases on the spot, but usually

be would take the horse's number and give it to the afternoon and night horseshoers. Also any man finding a loose or badly wearing shoe at the hourly halts would give the horse's number to this horseshoer for replacement in camp. This system worked exceptionally well in spite of the fact that it required the horseshoers to work all night a few nights. A total of 303 shoes were used or replaced during the whole march.

Although we marched on pavement only about 10 per cent of the total distance and most of this was passing through towns or around bridge culverts I learned that horses can move on pavement without slipping if they are kept in draft. However, when trotting on pavement the speed of the trot must be reduced to about 6 MPH instead of the usual 8 MPH. On descending any paved slopes the brakes were always set in order that the wheelers could be in draft. More difficulty was experienced with single mounts slipping than with the draft horses.

Only 16 per cent of our horses were on sick report at any time during the march and most of these cases were injuries resulting from kicks or tred wounds. Also 16 per cent of the horses we received from other units at Fort Sam Houston were on sick report during the trip. Approximately 55 per cent of the draft horses were in draft the whole distance.

It might be interesting to know how our staff functioned. Any plans to be made were formulated at meal time; if there were any instructions for the men they were relayed through the chief of sections at the same time. Capt. Brimmer says that he had a perfect staff. He and Capt. Hale watched each platoon's departure on to the road every morning, saw that the gas lanterns were lit, guard posted to control traffic, horses checked as to number so we wouldn't leave any, kerosene lanterns lit and on carriages along the column and that everything was in order.

While not mentioning any names, it seemed funny to me that somehow or other all the kickers and runaways would be tied on my line and some of my best draft would appear in another platoon, but it didn't take me long to teach those horses how to untie themselves and get back where they belonged.

Our veterinary corporal rode in the rear mountain wagon with his medicine chest. Capt. Hale had his emergency kit with him, and he and Capt. Brimmer "worked" the column with the station wagon. Sometimes the column was one-half to three miles long, depending on the difficulties on the road, time of departure from camp and conditions at the watering places; the platoons were sent on independently as soon as they had completed watering. Since the platoon was the march unit and marched independent of the other platoons, stress was placed upon the fact that there should be subdivisions in the platoons, carriages should not be closed up, lead teams should not be out of draft and the individual riders should be subdivided with quiet horses in the lead, plenty of room between individual riders, all with loose reins and no jigging. I won't say that it was always perfect, but that was our aim; road space was no factor. Of course, I don't mean to infer that our staff didn't get on a horse because they did, but it was usually during the "peaceful" hours of the march when runaways weren't expected. Arrangements for watering had to be made and the proximity of camp called for a reconnaissance of picket

Captain ("Chief") Brimmer made the march mounted

lines, water, and the like. So the staff had to arrange these details. Lieut. Wilkerson likewise worked the column with the ambulance, so we had two pieces of motor transportation almost always within call.

Lt. Hayden, as Class B agent officer, supply, recruiting, reconnaissance, mess, and summary court officer, had his hands full and never failed us. Rations were paid in advance to the Battery Fund and supplies were purchased first at Fort Sam Houston, then locally, and finally at Fort Sill when the forage trucks started to meet us. He was likewise transportation officer and kept his trucks running a good part of the day and night. (His ham and beans and beans and ham will long be remembered, but, as he says, there wasn't a stomach ache in the crowd.)

Well, Bob, here's hoping this letter will be of value to you some day.

Sincerely, GEORGE.

Captain W. F. Millice, FA., offers

The Modern Picket-Line

Hints for Motor-Convoy Operation

The mobilization of several streamlined divisions, in which the horse and mule are entirely replaced by motor vehicles, leads the writer to the following suggestions.

Maneuvers in the past few years have disproved the theory, advanced by many, that every adult male is a possible military vehicle driver and that every wayside mechanic is an army motor vehicle repair man. Anyone who has ridden in a convoy has soon found that the monotony and fatigue experienced by both the man and the vehicle are far greater than in the operation of a single vehicle over the same terrain. Military drivers will at times be forced to undergo long periods with little or no sleep. In order that the driver may deliver the cargo at the appointed place, at the appointed time, convoy commanders should reduce drivers' fatigue as much as possible. Drivers' fatigue is caused by many things, among which are the following: Successive days without sleep; successive days with variable sleeping conditions; lack of experience in convoy driving; mental and physical fatigue due to closed cab; backing and filling in column; traffic or other road conditions; and a combination of time and distance between halts.

Most of the above-mentioned causes of drivers' fatigue can be reduced. In certain emergencies, the first two are difficult to avoid. However, the commander should keep these points in mind: Convoy driving experience can be increased by practice, before the emergency arises, special attention and individual instruction being given each driver during the practice period. Even in a new car, engine fumes are present in the cab. If the commander, regardless of weather conditions, requires that at least one cab window be fully open at all times, fatigue due to engine fumes is practically eliminated.

A certain amount of backing and filling will occur even with veteran convoy drivers. This is caused by sharp turns, rough crossings, other traffic, hills, stops at railroad crossings, momentary inattention on the part of the driver, and operation of the convoy with insufficient distance between vehicles. The writer suggests the rule of a distance in yards between vehicles equal to three times the speedometer reading, and the operation of the convoy in platoons of ten to fourteen vehicles, with gaps between platoons of three hundred to four hundred yards. When operated under this rule the leading platoon may close the interval to a certain extent when passing a sharp turn or other hazard, yet allow the leading vehicle of each platoon in rear to maintain his road speed to the same point as the leading vehicle of the column, before it is necessary to slow for the turn. If the platoon gap is not left, frequently as many as 30 or 40 vehicles may jam on one bad turn.

Further reasons for this type of operation, in addition to reducing accidents, is readily seen from the following calculation: At thirty miles per hour a platoon of 12 vehicles plus a 400 yard gap would occupy a road space of 1480 yards. Roughly, this approximates a spacing which, according to latest texts, makes an air attack unprofitable.

The writer would like to explain how the recommended vehicle interval of three times the speedometer reading was obtained. In an experiment* which used many types of passenger cars and trucks, the latter with and without trailer loads, the following results were obtained: The average driver, operating the average vehicle, was able to stop his vehicle in 44 feet. Drivers' reaction time, that time required for the average driver to remove his foot from the accelerator and apply it to the brake pedal and move this pedal one fourth of the way to where braking effect is first obtained, was found to be from one-half second to one and one-half seconds, the

*A speed of 30 MPH was used for ease in making calculations.

average being about three quarters of a second. In three quarters of a second the vehicle had moved 33 more feet. Another test required of the various drivers was as follows:

The driver was required to read signs with various numbers and letters along the roadside to prove that his eyes were focused ahead. At a certain command the driver read three of his cowl instruments and then the next sign at the roadside. Experienced drivers were able to perform this test in about one and one-half seconds, in which time the vehicle had moved 66 more feet. Another item which this test attempted to measure was the mental reaction time of the many drivers tested. This was taken as the time required after the halt signal was given before the driver started to move his foot from the accelerator. Of course a very wide variation of results was obtained by this test, due to mentality of the driver, fatigue, and the various types of signals used. This, however, is bound to occur under actual road conditions, as well as in the test, since the necessity for a stop may be signaled in many ways. The minimum average for this test was about a half second, in which time the vehicle moved 22 feet. There are many other factors which might at times distract the driver's attention from his duty but no fair method could be devised for measuring this. By adding all of the above distances (that is, (1) stop distance, (2) driver's reaction time, (3) time for reading instruments, (4) driver's physical action time) and adding approximately 50% as a safety factor for added fatigue, a glance at his rear vision mirror or other delaying cause, we arrive at the recommended distance of three times the speedometer reading.

To reduce fatigue, it is recommended that there be an interval of from two to two and a half hours between halts in the forenoon and from one to two hours in the afternoon. After the shakedown halt during the first hour out of camp, these halts need not be long unless the vehicle is having trouble. Five minutes or less will normally suffice for the driver to check his vehicle and its load and be prepared to move again. The duration of a halt can be less than five minutes if the commander will leave platoon gaps instead of closing by battery or battalions.

The distance between two vehicles mentioned above not only lessens drivers' fatigue but also vehicle fatigue. It has been the writer's experience that even old drivers cause abnormal wear on brakes, tires, clutch, and engine when operating at closer distances than that recommended here.

Furthermore, tests have shown that there is added vehicle wear caused by not leaving platoon gaps. A fleet of fifty 1½-ton trucks was operated over state highways; civilian traffic, both urban and rural, was encountered for a distance of 247 miles. The vehicles were of identical make, with speedometer reading of from 1200 to 1500 when the trip started. All had been adjusted by the same three mechanics under the supervision of one motor sergeant. All drivers were men who had had many thousand miles of convoy experience. The distance between vehicles was three times the speedometer reading and a constant speed, so far as possible, was maintained by the leading vehicle. *No platoon gaps were used*. That evening on refilling for the following day a variation of 5 gallons of gasoline consumption was noted between the first and last vehicles. Had the gasoline been measured in half pints, each vehicle's place in column could have been determined. After transporting other troops on maneuvers for about two weeks the convoy returned over the same route, with the same load and same drivers. On the return trip the convoy was organized into four platoons. The return trip started at sea level and finished at a point several hundred feet above sea level. Gas consumption varied less than one gallon per truck on the return trip. It is believed that the above experience proves that both vehicle and drivers' fatigue is lessened by the use of platoon gaps. Also, the return trip was made in one and one half hours' less elapsed time than the trip out. Some of this time was saved at the halt, since platoons were more quickly closed than the whole column.

Fatigue due to night driving without lights is especially severe. Practice for the modern military driver in night driving, both on the road and cross country, is vital. Many devices for aiding the night driver have been suggested. The following one was used with success, and although airplane observers were told the area in which certain marches were being made by over a hundred vehicles, they were unable to pick up the convoys, even though they came down to less than a thousand feet. In preparing for the march, all lights on the vehicles, including stop lights, were disconnected or the fuses removed. Tail-light bulbs, hooded and the bulbs dipped in OD paint* were left lighted. (The modern military vehicle has a suitable taillight hood if the bottom, left open to display license plate, is closed.) Two similarly hooded lights were provided for the front of each vehicle. Each driver was made responsible for the direction taken by the driver immediately behind him. Several marches of several hours' duration, about one half of each across country, were made without guides; all vehicles arrived at the proper place without loss of time. Plane observers were unable to locate the columns even though they knew the area in which the maneuvers took place. When flares were dropped, each vehicle was required to stop immediately. Observers report that moving vehicles can be seen by the light from flares.

*Or, bulbs of lower candle power may be used.

Driver fatigue can be minimized by observing certain precautions

ARTILLERY EPISODE

1.—Revolutionary War.—The beginnings of our artillery. Washington and Knox; Boston and Ticonderoga.

Prior to the Revolutionary War the colonies had furnished troops to all the British campaigns in America. This had been true of artillery as well as infantry; artillery companies had been raised at one time or another in most of the colonies, and these companies had served alongside British artillery, thus absorbing British methods. Some few companies maintained their organization between campaigns, as units in the militia.

When hostilities began at Boston, a regiment of American artillery was raised in June, 1775, under command of Colonel Richard Gridley, a retired British officer, consolidating into a single command various artillery companies. This regiment served as the nucleus upon which later organization was based.

So much for the troops and their system of instruction; but what of the guns? These were hard to get; each colony had a few, but cherished them carefully and was slow to give them up to the Continental authority. What few were in the hands of the troops were mostly light field pieces, and the urgent need at Boston was for heavier guns to maintain the siege and permit a definite attack. Events two hundred miles away supplied the answer.

Even before the battle of Bunker Hill, Benedict Arnold had suggested that there must be plenty of guns for the taking, at Ticonderoga and the other fortresses on the route to Canada. Upon his own application he was commissioned a colonel and authorized to raise 400 men for the purpose. He hastened at once to Lake Champlain, leaving his men to follow. Here he found Colonel Ethan Allen of Vermont, engaged on the same mission by authority of the Connecticut Assembly. Having

no force of his own at hand, Arnold could make no claim to the command, and served as a volunteer under Allen.

With the events at Ticonderoga we are all familiar, but it may be interesting to digress for a moment from our artillery subject and give the story as told by a British officer who served in Howe's army. (Charles Stedman, "History of the American War," London, 1794.)

"A volunteer, of the name of Ethan Allen, assembled of his own accord about fifty men, and proceeded immediately to the environs of Ticonderoga, commanded by Captain De La Place of the 26th Regiment, who had under his command about sixty men. Allen, who had often been at Ticonderoga, observed a complete want of discipline in the garrison, and that they even carried their

Crown Point was taken easily a few days later. The attention of all concerned was thus turned toward a possible invasion of Canada, and the guns which had been Arnold's original objective were forgotten.

Now there was, in the Cambridge camp, a young man whose name, Henry Knox, is extremely familiar to all our present-day artillerymen, especially when the time approaches for the annual Knox Trophy competition. He had been the keeper of a prosperous and fashionable book shop in Boston, and had used the facilities of the shop extensively in keeping up his hobby of military study. He also went in strongly for military training, and as early as 1768 he had joined the local artillery company. Between theoretical study and practical exercises, he had become a

By Brigadier General Oliver Lyman Spaulding, USA-Ret.

supine negligence to the length of never shutting the gates. Having disposed his small force in the woods, he went to Captain De La Place, with whom he was well acquainted, and prevailed on him to lend him twenty men, for the pretended purpose of assisting him in transporting goods across the lake. These men he contrived to make drunk; and, on the approach of night, drawing his own people from their ambuscade, he advanced to the garrison, of which he immediately made himself master. As there was not one person awake, though there was a sentry at the gate, they were all taken prisoners. On the commander's asking Allen by what authority he required him to surrender the fort, he answered, 'I demand it in the name of the Great Jehovah and the Continental Congress.'"

And here we may pause to remark that it is a tradition in the family of one of Allen's men that his greeting to Captain De La Place, when he had succeeded in waking him, was "Come out of that, you damned old rat." Both the informal greeting and the grandiloquent demand sound probable; Allen may have used both. But to resume from Stedman:

"The stores taken at Ticonderoga were between 112 and 120 iron cannon, from six- to twenty-four-pounders; 50 swivels of various sizes, 2 10-inch mortars, 1 howitzer, 1 Coehorn, 10 tons of musket balls, 3 cart-loads of flints, 30 new carriages, a considerable quantity of shells, a warehouse full of materials to carry on boat-building, 100 stand of smallarms, 10 casks of very indifferent powder, 2 brass cannons, 30 barrels of flour and 18 barrels of pork. The prisoners were 1 captain, 1 gunner, 2 sergeants and 44 rank and file, besides women and children. Captain De La Place, notwithstanding his shameful conduct, was not brought to a court martial, but was suffered to sell out."

reasonably competent artillerist and military engineer. As an individual volunteer he had joined the besieging force under General Artemas Ward at Cambridge, and had been employed by Ward and later by Washington in laying out fortifications. For what happened next, we may quote from Noah Brooks' "Henry Knox, a soldier of the Revolution," Putnam, New York, 1900:

"The siege of Boston had now (November, 1775) begun in earnest. But the need of siege guns was severely felt by the patriot army, and men began to cast about in their minds for some means to procure guns of sufficient weight and range to throw shot into the beleaguered town. The fertile and inventive mind of Knox conceived the daring enterprise of sending to Fort Ticonderoga, on Lake Champlain, to drag thence the supply of ordnance captured by Ethan Allen and then lying there unused. Knox's plan was submitted to Washington, who, after careful scrutiny, gave his approval to the difficult and hazardous undertaking. Cannon must be had or the siege would be indefinitely prolonged, if not ultimately abandoned. Knox's plan was to make the journey to Fort Ticonderoga while the snow and ice combined to render streams passable and roads feasible for sleds and sleighs. In open water, he urged, boats could be employed, and the total expense of the expedition on which so much depended, and which could be successfully carried out, need not be more than $1000. This sum was fixed as the limit of immediate and needful expenditure; but in one of Knox's account books we find this brief and comprehensive entry: 'For expenditures in a journey from the camp round Boston to New York, Albany and Ticonderoga, and from thence, with 55 pieces of iron and brass ordnance, 1 barrel of flints, and 23 boxes of lead, back to camp (including expenses of self, brother and servant),

£520.15.8¾.' In his final instructions to Knox, Washington said that the want of cannon was so great that 'no trouble or expense must be spared to obtain them.'

"General Philip Schuyler of New York was instructed by Washington to render to Knox every possible assistance in his expedition to Ticonderoga; and Knox, after securing sundry small stores of ordnance in the city of New York, wrote to his wife that he was thankful to leave so expensive a city. He reached Albany December 1st, and was cheered on his way by Schuyler, who rendered great assistance then and afterward in the way of securing transportation. The winter was severe, the roads unbroken, and the snow deep. Oxen in large numbers were necessary for the hauling of the cannon, and these animals were secured at considerable trouble in the thinly inhabited regions through which Knox traveled.

"He reached Ticonderoga on the 5th of December, and, at once collecting the coveted ordnance, began his homeward journey. His inventory of the arms shows that he took away 8 brass mortars, 6 iron mortars, 1 howitzer, 13 brass cannon, 30 iron cannon, a barrel of flints and a quantity of lead. The heaviest of the artillery were brass 18- and 24-pounders; truly a noble acquisition for the expectant besiegers of Boston. A letter from Knox to Washington, dated at Fort George December 17th, gives us a vivid picture of some of the difficulties encountered on the homeward trip. He says:

"'I returned to this place on the 15th, and brought with me the cannon, it being nearly the time I computed it would take us, to transport them here. It is not easy to conceive the difficulties we have had in transporting them across the lake, owing to the advanced season of the year and contrary winds; but the danger is now past. Three days ago it was very uncertain whether we should have gotten them until next spring, but now, please God, they must go. I have made 42 exceeding strong sleds, and have provided 80 yoke of oxen to drag them as far as Springfield, where I shall get fresh cattle to carry them to camp. The route will be from here to Kinderhook, from thence to Great Barrington, and down to Springfield. I have sent for the sleds and teams to come here, and expect to move them to Saratoga on Wednesday or Thursday next, trusting that between this and then we shall have a fine fall of snow, which will enable us to proceed farther, and make the carriage easy. If that shall be the case, I hope in sixteen or seventeen days' time to be able to present to your Excellency a noble train of artillery.'

"One of the difficulties encountered on the way to Albany from Fort Ticonderoga was the necessity of ferrying the heavy cannon across pieces of open water. This was accomplished by means of 'gondolas,' as the flat-bottomed scows then in use were called. * * * * Knox's hindrances are further hinted at in a letter which he wrote to Washington from Albany, Jan. 5th, 1776, as follows:

"'I was in hopes that we should have been able to have the cannon at Cambridge by this time. The want of snow detained us for some days, and now a cruel thaw hinders us from crossing the Hudson River, which we are obliged to do four times from Lake George to this town. The first severe night will make the ice sufficiently strong; till that happens, the cannon and mortars must remain where they are. These inevitable delays pain me exceedingly, as my mind is fully sensible of the importance of the greatest expedition in this case.'

"The route of this novel expedition lay over the Green Mountains and the wild passes of that range, and down through the hill country of New England, by 'roads that never bore a cannon before and have never borne one since.' On his way up to Ticonderoga from Albany, Knox passed a stormy night sleeping on the floor of a rude log cabin which served as a wayside inn for chance travelers through that sparsely populated region. His bedfellow was Lieutenant John André, who had been taken prisoner by General Richard Montgomery at St. John's, and was now on his way to Lancaster, Pennsylvania, to await an exchange. It was a strange chance that brought together these two men under the same blankets in a remote cabin in the wilderness. Years later, Henry Knox was to serve on the military tribunal which sentenced André to the ignominious death of a spy. Now, all unconscious of what Fate had in store for them, they passed the greater part of the night in conversation."

And with this, we close our quotation. Having left Cambridge on November 15th, Knox was back there on January 24th. His route is now marked by a series of bronze tablets. With these guns in condition for use, Washington felt strong enough to make a move. On March 2d he opened a bombardment of the city water front. Under cover of this, on the night of March 4-5, a strong force from the Roxbury lines seized Dorchester Heights, from which position heavy guns could command both the city and the ship channel. Working under high pressure, this party had a formidable fortification well under way before daybreak.

Howe's first instinct was to attack, and dislodge the Americans, and troops were concentrated for this purpose. But he soon gave up the idea; it was clearly out of the question. The heights were steep, and Bunker Hill had indicated what kind of resistance might be expected. Moreover, Washington held a force on the Cambridge water front, with boats, prepared to cross over and make a counter-attack.

Nothing remained but to evacuate the city. Supplies were already short there; Howe had been depending upon shipments from Nova Scotia, the West Indies, and the southern colonies. With the new Dorchester batteries, these were cut off, and he had no reserve. The decision was reached with reluctance, for while the possession of Boston was of little advantage to the British, its evacuation was a heavy blow to their prestige.

GUNNER IN LUZON

PART IV

Flanking Operation 1899 Style

By Brigadier General Ernest D. Scott, USA-Ret.

DESCRIPTION OF THE TERRAIN

The central valley of Northern Luzon extends roughly north by northwest from Manila to the southern shore of the Lingayen Gulf, 120 miles. Its width is approximately 60 miles, its east and west limits practically impassable mountain ranges. Near its center and visible throughout its extent rises conical Mt. Arayat, an extinct volcano 3,000 feet high. The central portion of the floor of the valley is nearly level, has many deep stream beds with soft bottoms and numerous swamps. Of these the most important from a military point of view is the Pinag de Candaba (Candaba Swamp to the Americans). It lies in the southeasterly part of the valley, measures 20 miles north and south, 10 miles east and west. It is wholly impassable in the rainy season—and for some months after—and almost so even at the height of the dry season. Two large rivers rise in the mountains to the northeast of the valley and flow across it. One, the Rio Grande de Pampanga, flows diagonally across to the southwest and empties into Manila Bay. The other, the Rio Agno, crosses the northern part of the valley and empties into the Lingayen Gulf. Even during the dry season these rivers are subject to sudden rises due to rains in the mountains where they head. There are many smaller streams, generally tributary to the two mentioned. All too often the streams were in little canyons worn in the rock with which the whole country was underlaid.

Most of the valley is cultivable but in 1899 the density of population was much greater in the western part of the valley, the provinces of Pampanga, Tarlac and Pangasinan. These were traversed by the single-track, narrow gauge Manila-Dagupan Railway. The eastern provinces, Rizal, Bulacan and Nueva Ecija, showed in abandoned fields and townsites every evidence of having once been very populous. It was understood that they had suffered most in the revolution of 1896.

East of the Candaba Swamp the country resembled our western prairie region, a gently rolling plain gradually rising to the foothills of the eastern mountains. It was traversed by numerous small streams, generally sandy or rock bottomed, their courses marked by bamboo or timber, the country between prairie or old cultivation.

Southeast of the Candaba Swamp the eastern mountains throw off a sort of spur to the west. This area, about ten miles broad and twenty miles north and south, is very hilly, is traversed by three considerable streams and numerous smaller ones, and offered a great variety of jungle, open prairie, dense forest, and abandoned fields. It had then no roads except very poor ones between Norzagaray and Baliuag, and between Bocaue and Norzagaray, and the few trails were literally not much more than the word "trail" suggests. A beautiful park land—but a terror for military operations, as we were to learn. Even the clear, rushing streams were a menace—nothing could convince Americans that such water should be boiled before drinking.

ORGANIZATION OF LAWTON'S EXPEDITION

The Insurgent capital was Malolos, a town on the railway twenty miles from Manila. The main Insurgent forces were between the two — 16,000 strong according to their commander, General Luna. On March 25, 1899, our 2nd Division under General MacArthur began the advance. The Insurgents stubbornly resisted but by March 31 their capital had fallen. It was reestablished at San Isidro, about 30 miles to the northeast. The bulk of the forces withdrew to positions along the railway, the remainder to the rough country southeast of the Candaba Swamp described above. From here they so successfully harassed MacArthur's line of supply—actually cut the railway twice—that extended operations against them were deemed necessary. MacArthur's force was too small to undertake this and also continue the advance along the railway, so the 1st Division under Major General Henry W. Lawton was ordered up from the South Line to undertake it.

General Lawton had established 1st Division Headquarters at San Pedro Macati, and its G.O. 20, April 19, 1899, enumerated the troops for what became known as

"Lawton's San Isidro Expedition." They were the 22nd Inf., 1st North Dakota Inf. (2 bns.), Gale's squadron 4th Cav. (dismtd.), Hawthorne's Mountain Battery (2 guns), and Scott's Platoon Light Battery D 6th Arty. The assembly place was the La Loma Church, a couple of miles north of Manila, and there the 3rd Inf. was added to the force, bringing its strength to 66 officers and 2,354 men.

Late one afternoon we marched through Manila—first time in town for most of us in three months! Northeast of Manila near La Loma Church we found the bivouac and settled down for the night. Hawthorne's mountain battery was close by. A contract surgeon named Ernest Kinloch Johnston had been attached to my command and we soon became warm friends; with the officers of Hawthorne's battery we talked over the outlook and then settled down for sleep. But I was soon summoned to headquarters and on arrival was questioned as to artillery policy in the coming operations. I at once called attention to the fact that Hawthorne was my senior, and as senior artillery officer in the command, was, by regulation, Chief of Artillery, and the proper person to consult. My admiration and friendship for Hawthorne were such that I made quite a point of the matter, but to no purpose. For some reason the Staff did not want to consult Hawthorne or recognize him as ex-officio Chief of Artillery, and said so. One of them jokingly conferred the title on me and it was frequently used as a pleasantry thereafter. Actually, I was consulted on artillery matters daily. It was most embarrassing when after the conference had broken up, I was told to acquaint Hawthorne with his orders for the morrow—orders that were based on my recommendations. However, the latter were about what he would have made himself. Chiefly they were that the mountain guns would habitually march in the advance guard, the field guns in the main body, and the use of either to be left to the judgment of the battery commander.

"General Field Order No. 1" prescribed that the command would march at five o'clock on the morning of April 21, and it contained provisions intended to obviate the necessity of issuing orders daily. Chief of these were that the advance guard of today should be the rear guard of tomorrow; that each regiment as it reached the head of column of march should provide the new advance guard for next day; that the artillery should retain its positions in column of march from day to day. Quite probably this automatic system was not adhered to strictly, but it was never revoked. Quite probably details for the morrow were arranged at the evening conferences without much reference to GFO No. 1. Type-writers were few and the mimeograph unheard of. Quite naturally brevity was the rule and the verbal order much in vogue. I have a few samples of orders of those days, some typewritten and some in longhand, on official paper, telegraph blanks, sheets from pocket notebooks, and tissue paper, signed by everything from an aide to a major general.

The 1st North Dakota Infantry was designated as advance guard for that day, the 22nd and 3rd Infantry in that order as main body, the cavalry as rear guard and in charge of trains.

THE ADVANCE ON NOVALICHES

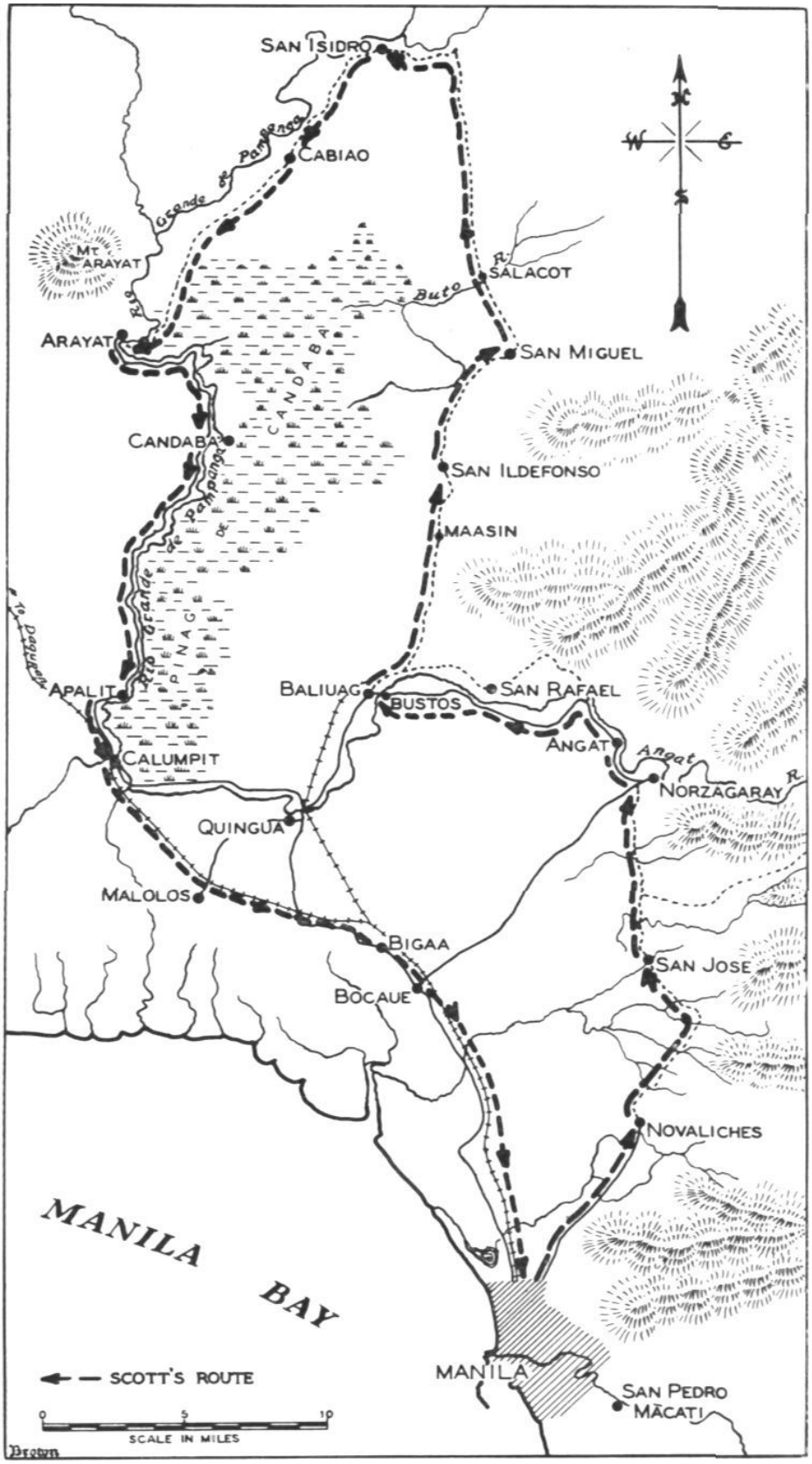
Our first objective was the town of Novaliches, distant ten miles. On March 25 Hale's brigade had started for that place from our position, had a sharp fight two miles out, was unable to find a passable road, and swung off to the northwest, joining MacArthur's right the next day. That was about all the information we had as to what lay before us. Actually the road was fairly good and by noon our infantry were in possession of the town. The advance guard had a light skirmish about halfway there and a quite severe one a couple of miles further along. I do not recall hearing the mountain guns and my own did not get into action.

Noon found the infantry and Hawthorne's battery settled in billet or bivouac, my battery a short distance south of the town and separated from it by one of those deep stream beds previously referred to. It was perhaps fifteen feet deep and little wider, the stream itself ankle deep. The road entered a narrow cut that ran diagonally to the stream, steeply down, and then with a sharp curve to and across the stream, where a similar cut led up and out. Both cuts were just too narrow for the length of our axles. A search far to either flank failed to reveal any other crossing, and there was no material suitable for bridging to be found. I had yet to learn that *sleds* were much used by the natives of that section; an easy solution would have been to dismount the guns and limbers and take the parts through the narrow passage by sled, and then reassemble. I found the stone to be soft enough to chip out with picks, so tried the plan of rolling a limber down as far as it would go, then chipping away the rock at one or both ends of the axle. It worked, but somehow the axles of succeeding carriages did not hit the chipped-out spots, and required nearly as much work as the first to pass. It was tedious and hard work, requiring some hours to complete. We finally reached the town at nearly four o'clock, and settled down for a much needed rest. But almost immediately came a summons to headquarters, where it was explained to me that a situation existed on the north side that called for artillery—a small force of the enemy was on a hilltop whence they were annoying the north edge of town by intermittent rifle fire. I promptly suggested that Hawthorne be called on to dislodge them, but this was vetoed by Captain Birkhimer, the Judge Advocate, who seemed to be doing anything except functioning as such. He was an artilleryman himself, hence the deference of the rest of the Staff. Why he waited hours for my guns to come up when Hawthorne's were at hand I never knew, nor why he chose my heavy field guns for a job eminently suited to the light mountain guns.

We went off to the north side to look the situation on over. Our outposts were along the north edge of the

town. Off to the northeast, little more than a thousand yards, the top of a small rounded knoll rose above a forest of bamboo and timber. It was free of brush or other high growth, grassy, and crowned by a trench. Aimed rifle fire could reach the edge of the town, random fire (but still deadly), could reach half the area of the town. Why this dangerous nuisance had been permitted to continue for hours I do not know. A battalion or even a company of infantry could have gone through the woods and cleaned the place out in half an hour. We scouted around for some time but the only place I could find for a gun position was a small field directly in front of the trench and about 1,000 yards from it, and this could not be occupied except in full view.

We returned to headquarters, where I strongly urged that infantry be sent to take the place; artillery fire might inflict some casualties, might even cause the enemy to withdraw, but they would probably return, and the artillery could not keep driving them off indefinitely. This view was accepted and infantry would be used—after my bombardment! So off I went and brought one gun up through the town to the vicinity of the firing position. The men were very tired and I wished to spare them as much as possible, so I had a gap cut in the fence on each side of the little field. The team took the gun at a smart trot through one gap, halted in the middle of the field, the traces were unhooked and the team dashed through the apposite gap and out of sight of the enemy. The gun and limber were quickly swung into position, but the enemy was on the alert and before the first shot was fired brought down a perfect storm of bullets from what I estimated as about thirty rifles. And they maintained a fairly accurate fire for some minutes,



Route of the San Isidro Campaign

until we had delivered a number of rounds at them. A bullet passed through my shirt, another through the sponge bucket, several hit the limber and the gun carriage, one—a 45 Remington—found lodgement in the forearm of one of my men. Actually it was about as hot a corner as I ever was in. Then occurred what I had often noticed before and was to often notice again—a few rounds of artillery fire and the Filipino accuracy was at an end—their bullets fell all over the map. To our great relief. Then the inherent nature of the Malay asserted itself, "Half devil and half child," as I have quoted Kipling before. They found that they could wait until the flash of the gun, then duck below their parapet before the projectile arrived—it became a game! They disappeared at the flash, reappeared after the burst, waved their hats to us and worked their rifles more or less vigorously until the next flash. The trench presented rather a difficult target at such a short range. A shell striking its face or short of that did no damage, one at its crest simply passed on and burst far to its rear. Shrapnel, well placed, could only drop a few of its bullers in the trench; none, in all probability, low down in it. So the defenders were fairly safe. I longed for the other gun; when they ducked at one flash, I could see that a shrapnel from it met them as they rose. However, at last a lucky shell struck and burst right in the trench. The smoke cleared slowly, three or four Filipinos appeared, fired a few parting shots and disappeared—without waving their hats! Soon Krag rifle fire could be heard off to the east—our infantry working through the woods toward the knoll. I sent the gun back and accompanied Birkhimer to headquarters, where that officer embarrassed me greatly by his fulsome praise of me. It was all out of proportion to the importance of the affair. But his ballyhoo had the effect of making me solid with the Staff.

On to San Jose

Our next objective was San Jose, distant six miles—but it was to take two days for wheeled vehicles to make it. Even the infantry only got in on the morning of the second day, and that with little or no enemy action. My position in march was at the tail of the main body, which proved fortunate, for it gave more freedom of action than farther forward, trying to maintain certain distances. For the next two days we certainly needed that freedom of action. I had special authority to keep my escort wagon with the guns, on the ground that it carried our reserve ammunition. We cut roads through jungle, we widened trails, we repaired bridges, we improved ford approaches, we corduroyed soft spots. We got our guns and wagon through but our construction work was too unsubstantial and our methods too impracticable for the trains following us; they had a terrible time—two days from daylight till long after dark making six miles.

A shaky or broken down bridge had to be carefully examined and then made passable with material secured on the spot. We learned some things about tropical woods. For instance, I selected a straight fine tree about a foot in diameter for a particular purpose and started to fell it. My first swing embedded the axe head—the wood was soft and wholly useless. A pile being needed, a suitable tree was selected, felled and trimmed, and skidded with difficulty onto the bridge. Then I had it rolled into the water, to be up-ended in place. That log disappeared as though made of lead — all our labor wasted. That wood could be heavier than water never entered my head.

Crossing these wretched bridges—and some fords—was ticklish business calling for special measures. Often the contents of wagon and limbers had to be carried over by hand. Then the empty vehicle would be rolled on the end of the bridge, prolonges attached to the end of the pole and carried to the other side. There mule or man power was applied, and the vehicle—guided by one man at the risk of his life at the pole—would be drawn over. Once the guns had to be unlimbered and drawn over separately. Some fords had to be negotiated similarly. The labor devolved on my little command of thirty-two men can perhaps be better imagined than described. No soldiers ever showed greater courage and endurance.

We were never too far behind the infantry and on the second day we passed through San Jose to a good bivouac and with the cheering knowledge that the road on to Norzagaray would present no such difficulties as we had already surmounted. This news came from a troop of the 4th Cavalry who had just arrived from that town.

A force had been detached from the 2nd Division to join Lawton at Norzagaray. It was under the command of Colonel Owen Summers, 2nd Oregon Inf., and comprised that regiment and the 13th Minnesota (each less one battalion), the troop of cavalry, and one gun from a Utah light battery. It had marched from Bocaue over a fair road and without opposition while we were toiling in the wilderness. At Norzagaray it had quite a skirmish, after which Colonel Summers sent his cavalry off toward San Jose to find Lawton. Next day, at Norzagaray, Lawton attached the troop to his headquarters, the gun to my command, and issued "General Field Order No. 2," making the rest of Summers' command a provisional brigade.

March to Norzagaray

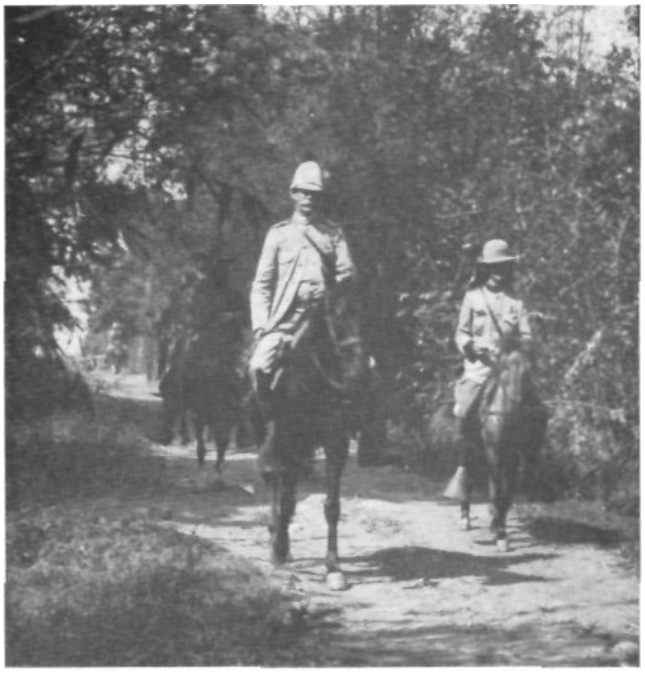
Next day we resumed the march in high spirits—but a trooper's idea of a good road is likely to differ materially from a gunner's. Our escort that day, a dismounted troop of the 4th Cavalry, under "Little Jim" Parker, preceding us, marched cheerfully along without a thought for us. We had struck road difficulties and when we came to good going at last our escort was nowhere to be seen. Its tracks were plain enough on the road but had nothing fresh about them, while at the numerous stream

crossings the water carried up on the bank by their passage had dried. It seemed evident that they were at least an hour ahead of us.

Where the infantry were I did not know. The road ran northerly and was crossed at intervals of a quarter to a half mile by streams, well marked by dense forest growth. The country between was open, rolling, grass or old cultivation. Each stream line was a possible ambush and was approached with trepidation, the open beyond it was entered with relief. Towards noon some blue uniforms were seen only a few hundred yards away on our left flank, in fact were reported several times in an hour; but no firing occurred. They were evidently scouts merely observing us. What force might be beyond them, how accurate its knowledge of our isolation, what it might do in the premises, were serious questions for me. If attacked in the open we could put up a good fight and the sound of the guns would bring our infantry; if attacked at one of the wooded stream crossings our guns could not be used and our revolvers would not save us from capture or massacre.

About noon we were on a rise that afforded a good view in all directions. It was about half a mile back to the stream we had last crossed, and about the same to the next ahead. Off to the west, less than that distance, could be seen some Insurgents watching us from a low crest. The tracks of our escort continued on the road to the north. A branch road ran off to the east towards the mountains. And astride it was a long skirmish line of our infantry, more than a mile away and moving steadily along. What had drawn them off squarely at right angles to the direction of the main road I never learned. But that settled matters for me and I decided to stay right where we were, where we would be safe while daylight lasted at least, and meantime the infantry would get back on the proper road and probably would get little further along than where we were, because of fatigue. Camp for the night was likely to be established somewhere near.

Soon the coffee was boiling and then our regular noon visitor appeared from nowhere—General Lawton, who often came to the battery for a cup of coffee and bit of hard tack and bacon. I had a blueprint of a Spanish map of this country and it is a curious fact that it was almost the only map of any kind in the whole Division. It showed the road net very well and our fork was easily located. One or two of the General's staff were with him and soon one was on his way to change the direction of march of the infantry. We were standing about and eating our meager lunch when an amusing diversion occurred. Very stern orders had been issued against taking for any purpose, any property of the natives, but particularly food. From a thicket a little distance off came a small carabao calf with one of my men at his heels—and unquestionably fresh meat in his mind. The calf saw us and changed direction to pass about fifty yards away. I forgot all about orders and ran to head him off, ending my rush in a desperate flying tackle. It knocked the calf partly over, and my arms closed round his hind



Gen. Lawton and staff on road to Novaliches

legs, but he brought them free with one jerk and was off. I picked myself up and returned somewhat crestfallen to the razzing that was waiting me. Bruises and abrasions made by the calf's hocks and hoofs on my face and body felt anything but pleasant, and my discomfiture was complete when it suddenly dawned on me that I had openly and in his presence attempted a violation of the Division Commander's order against looting food. But he enjoyed the whole affair so much I doubt he ever thought of his orders.

Infantry appeared coming up in our rear, so we resumed the march and overtook our escort in the very next stream crossing. They had not sent back a patrol to look for us or even posted a lookout on the road they had traveled; it would have seen us at our noon halt. The trouble with escorts generally was that no one gave any definite instructions to the commander, the latter had no text to draw on as to his duties, a foolish question of "command" was usually entertained, and I was usually junior to the commander. On one occasion during this expedition I was a bit annoyed by some infantry at the opening of an engagement. They filled the ditches along the road where I wanted to get the guns out in the field—somehow created the impression of being in my way, underfoot, as it were. Then appeared a very irate infantry major who jumped on a lieutenant and with much profanity demanded to know why he did not have his company up on the line. The young man responded with, "I have been ordered to guard this G— damned battery." It was my first intimation of the purpose of the infantry. I had refrained from saying how their presence in and around my gun position was annoying

me, but the word "guard" caused me to boil over and I jumped on that lieutenant very heartily. This incident was forgotten like many another, but brought to memory many years later by the officer himself, Colonel Tenney Ross.

The question of escorts for artillery is so simple that trouble should never arise. The artillery has its mission, dictated by higher authority or by circumstances; the escort has its mission of protecting the artillery in the execution of that mission, from enemy action; each uses the methods of its arm in the execution of its mission. But in war as in peace maneuvers it seemed that the senior of the two—battery or escort commander—simply could not get away from the idea that he must command both, or at the least, influence the action of the other. And officers argued in good faith for this attitude. Many years after the Insurrection, as an instructor at the Army Service Schools, I wrote a monograph on the subject hoping to teach the simple rule stated above, and end the perennial argument.

But to return to the narrative. Late in the afternoon we arrived at Norzagaray, a town very picturesquely located on the west bank of the Angat River, rushing down through wooded hills that piled higher and higher towards the eastern mountains. A fight was in progress a mile or two up the valley and firing was intermittent until dark. Also a few Insurrectos, apparently operating singly at points in the surrounding hills, kept up a sniping fire on the town and the American bivouacs.

The trains were still struggling to come up, food was very scarce, and it was evident the command could never be supplied over the route it had come. A decision was made to go downstream to Baliuag and there establish a base.

DESCRIPTION OF THE TROOPS

A look at the assembled First Division, 3,600 strong, might be of interest. As for appearance, no unit could lay any claim to smartness. The Regular infantry, being newcomers, had newer clothing, and their officers had and tried to enforce, strict ideas as to its care and wearing. Old-time Regulars and the Volunteers sought comfort before appearance and had grown quite indifferent to the latter. Any changes of clothing that troops started out with had been discarded in the wilderness—except perhaps a suit of underwear and pair of socks—and all clothing was sweat soaked and stained with mud and vegetation. But the troops looked businesslike, in a rough and ready sort of way.

General Lawton always wore full khaki and a white helmet. Members of his staff occasionally appeared in flannel shirts. Some field officers appeared to cling to at least one khaki coat—to wear "in town" on days of inactivity.

All troops wore brown campaign hats creased in the middle, fedora style, blue flannel shirts, khaki or duck breeches or trousers, canvas or leather leggins, web equipment, a blanket roll over the left shoulder. The hat was a wretchedly cheap affair, disreputable after a week's wear.

Army field train—1899 style

Shirts from pre-war stocks were excellent and retained their color, those supplied by war contractors were shoddy, generally misfits, shrank badly, and faded from blue to every shade of green, pink and magenta. They were worn open at the neck, the sleeves rolled to the elbow—or cut off. The khaki was the popular Hong Kong, a light brown, that retained its color and dimensions until worn out.

Youthful beards and mustaches, much affected by "veteran" troops, still further detracted from any appearance of smartness.

Our transport was perhaps the most gypsy-like the American Army ever knew. General Lawton rode a full-sized American horse and I think there were a few more, but for the most part Filipino ponies sufficed. There were some mule-drawn escort wagons and ambulances, some pony carts, and many native carts drawn by carabao in the train. Exhaustion from labor and heat had finished off many animals—and men. The Volunteers had been in the field since MacArthur's advance began on March 25, and had supplemented their meager allotment of official transport by a truly astonishing collection of victorias, calesas, carromatas, carts of every description—anything on wheels. There seemed to be enough to carry the men's rolls and plenty else. It was nothing to see chairs tied to the sides of vehicles, or officers riding in carriages on the march!

The one mounted cavalry troop had ponies. There were no geldings in the islands and those stallions were perhaps a degree more vicious than elsewhere. They would fight even in harness and shafts. Mares were not permitted within the limits of Manila; one of them going down a street would have provoked an equine riot! The troopers had their troubles with them, especially in camp. Picket lines were extensive, since each pony had to be so tethered that he could not reach with teeth or heels the pony on either side of him. All night long at least some of those little devils were kicking, pawing the ground, and screaming defiance to the others. There was none of the pleasant quiet of an American picket line. They

disturbed the rest of everyone within a quarter of a mile. On the march their principal value was in saving their riders some fatigue, and they could on occasion carry men quickly to some point not too far away. But they tired quickly under the heavy American and his pack, they could jump nothing, they bogged down easily in soft ground. "Better than nothing" was the verdict.

At that time the prescribed hand weapons of the light artillery were a revolver for all mounted men, plus a heavy saber for the noncoms; I am not sure that the drivers did not have them too. For the gunners and cannoneers it was a short, broad knife. The revolver was a single-action Colt .45-calibre. Its barrel was short and its accuracy nil. The sabers had never been unpacked since our arrival in the Islands and we had discarded the knife for the revolver. Moreover, I had supplied half a dozen rifles or carbines for each section, "just in case." A couple of years later I was commenting pretty freely on the prescribed armament of the artillery soldier, when an old major playing solitaire nearby interrupted with "Young feller, I was on the Board that prescribed it." It seems the revolver barrel was short to prevent damage to the saddle by its muzzle, and the knives given to the gunners and cannoneers to make them entirely dependent on the guns for their own protection. The first needs no comment — a soldier's life against a bit of leather. The second was a hold-over from the Civil War when in short-range fighting men sometimes forgot their guns and resorted to hand arms. Our style of fighting in the Islands was much the same, albeit our enemies were no such marksmen as the Southerners. Many times we were under fire that we could not return with the guns, and the temptation was strong on the men to take a hand with the rifles. Once four or five did so, exasperated by our inactivity; once a crack gunner—old John Clarke—when our guns were in action, so far forgot himself as to seize a carbine, take a prone position beside his gun, and start shooting.

Since we had no caissons a box of shell was normally carried under the limber and one of shrapnel on each axle seat. When fast movement was necessary these were dropped off, and the gunners and cannoneers mounted the limber, carriage and off mules. Extra ammunition had to be carried in wagons or carts.

WE MOVE DOWNSTREAM

April 28 saw the Division billeted in Norzagaray and Angat, two miles downstream, with covering forces two miles further down and reconnaissance parties north of the river trying to find a road to the northward. Part of the command was still back along the wilderness route, salvaging transportation and supplies, and forwarding others sent out from Manila.

That evening Lawton decided that further advance northward so near the mountains was impracticable, that his command could never be supplied over the route it had come, that a base nearer the railroad was imperative, and issued orders for an advance on Baliuag, ten miles downstream and clear of the foothills.

At noon of the 29th the advance began on the south of the river and met little opposition at first. But eventually opposition became such that the whole force became deployed on a wide front and progress reduced to a snail's pace. My method of operation in this as in other operations was to have the guns move forward from time to time, keeping just out of rifle range of the enemy. Meantime I went forward with the scouts to get early information of the ground and the enemy, if any. When firing began I sought to determine where and when my guns might be useful. That day I spent hours in the dangerous occupation of reconnoitering just behind the firing lines of our infantry. It was easy to distinguish the fire of the Mausers and Remingtons from that of our Krags and Springfields. A light fire by the former would be heard in one direction, quickly drowned by the heavier volume of the latter; our infantry were prodigal with ammunition. The uproar would drop to scattered shots, then break out in another direction. Several times I sent for my guns but when they trotted up the opportunity had passed. It was while waiting for them that I observed the incident (related in Part II) of the soldier recoiling from each advance of his squad and then running forward to his place.

At last it seemed that the enemy had reached a line on which he meant to make a stand, but I succeeded in getting one gun in action well up on his left flank and opposition soon ceased. Our forces to the north of the river had made better progress and were in possession of San Rafael, after several light skirmishes. Our affair south of the river is referred to in General Lawton's report as "One hour's spirited engagement."

And now to the surprise of all came the order to withdraw to our bivouacs of the night before. It was disheartening. However, the enemy let us depart in peace. That evening the news leaked out that Otis, at his desk in Manila, had decided that Lawton, in the field, was going too fast for his supplies, and ordered him back to await their arrival. Many an officer in the circumstances would have sent acknowledgment from Baliuag a couple of hours later, and pleaded fait accompli to remain there, but not Lawton. He demanded instant and implicit obedience of his subordinates; he gave the same to his superiors. But he sent his views by wire to Manila. Otis replied that supplies were being forwarded on the Bocaue-Norzagaray road and besides, there was a Filipino peace commission in Manila and "We will be very quiet while they are here." Two days later he authorized the advance to continue.

On May 1 I reported to Colonel Summers, commanding the Provisional Brigade, reinforced now by a battalion of the 3rd Inf., and Gale's dismounted squadron 4th Cav., at Angat. Next day we moved out about noon, fording the Angat River. The column on the south

side—1st North Dakota Inf., 22nd Inf., Hawthorne's Battery—under Lt. Col. Trueman, N. D. Inf., marched about three PM. The orders to both were to proceed to "about where the engagement took place on April 29."

Our column had two skirmishes before reaching San Rafael, and "Scott's guns chased the enemy across the river at San Fernando." My memory has faded as to that action, and I find no San Fernando on the map.

Action West of San Rafael

The south column had been meeting opposition which seemed to be increasing. Action on our side had ceased but we were not pushing on; perhaps no further orders had been received since those to proceed to "about where the engagement took place on April 29," which had been done. I could not get across the river to reconnoiter, or see anything to warrant my firing. Near the river to the west of San Rafael I came to a deserted barrio with some of our infantry lying down short of it. After asking their commander to see that I was not shot up, I rode on into it. At its opposite side I came on the bank of the Angat—here called the Baliuag—and on the opposite bank were trenches extending in both directions. Groups of Insurgent soldiers were seated or standing along them. On my side the barrio ended in a sort of "village green" about fifty yards wide, bordering the stream, and on it stood a single building, stone, perhaps fifty feet long. Nowhere could I find a place in the tangle of shacks, garden fences, and trees for my guns without a lot of hard labor that would have to be performed under fire, since it could not be done without attracting the attention of the enemy. I decided on a daring procedure that would have been suicide with a capable foe; it was to bring the guns up on the run around the stone building, and go into action between it and the river bank, the teams to take cover behind the building.

I counted on the suddenness of the move, the excitability of the Filipinos, and the quickness with which we could get off the first shrapnel, for success. I returned to the battery, explained what was to be done, stripped the carriages of spare ammunition and other impedimenta, mounted the cannoneers, placed myself at the head of my little column, and we started. My little pony had a hard time keeping ahead of the mules, but we reached the stone house and were passing in front of it before those astonished Filipinos woke up. At least no fire came from them until I had raised my hand for the halt and yelled "Action Right."

Then it began in plenty but fell off after our first fire. I found I had but two guns. The Utah was missing. I ran to the corner of the building expecting to see the team down in the road, but no—the section was in the shelter of the building. Needless to say it promptly got in line. After the action the sergeant explained: As we passed through the village I had noticed Colonel Summers and some of his staff coming into the road. It seems he did not approve of what he saw, and yelled to the guns to get behind the stone building. My men paid no attention; the Utah section, which was in rear, obeyed.

The enemy fire soon ceased, I did a little "shelling the woods" in likely places, our infantry fire south of the river had practically ceased. I ceased fire and waited for a worthwhile target, for I simply had to economize on ammunition. Suddenly a loud and angry voice directly behind me demanded to know why I was not doing something. I looked around. It was General Lawton on his big black horse, his face working in fury. I tried to explain what I was intending to do, but got nowhere He damned me and told me to get busy and drive the enemy out of the woods. I turned back, sick at heart and went to work, sending shell and shrapnel hither and yon. Suddenly he called out, "That's more like it," and rode off. I slowed our fire and soon stopped it altogether. We had one casualty, Private Betzold, wounded in the arm.

That evening I took a written request for ammunition to headquarters and asked that it be sent by courier to Manila, as extremely urgent. Soon came the summary I expected. The General fiercely demanded to know why, and told me my ammunition report of the day before showed so-and-so on hand. I told him there was not enough for another engagement such as that of today. Presently he left an opening and I told him that in my opinion half we used had been wasted, but that it was by his personal order. I was very angry with the way I had been treated and quite willing to be hung for a goat rather than a sheep. However, he cooled down, directed that the message be sent, and never again raised his voice to me. In his report on the expedition it is stated that this artillery action was under the personal direction of the Division Commander. I'll say it was!

Capture of Baliuag

Next day the advance was resumed on Baliuag, now only five miles away. On our side of the river a skirmish led, as usual, to a deployment on a frontage of a mile or more, and somewhere about halfway to our objective a remarkable situation presented itself. We were on high ground with an unbroken view over the plain to the west. On the plain, going north on the Baliuag-Maasim road and little more than a mile distant, was a long column of Insurgents, in blue and white clothing. It was an ideal target and while the guns were coming up I was studying it through my glasses. There was something queer and others noted it too. We soon made it out: The soldiery were flanked on our side by women and children. Somebody urged me to fire on them anyway but nobody ordered me to do so; and I should have refused. Colonel Summers promptly detached Gale's squadron to take a road leading to Maasim, in the hope of heading the column off. Meantime General Lawton sent four officers and men with a white flag to demand its surrender. The

Blitzkrieg—1899 Style. The burning of Bocaue.

party got to about six hundred yards of the column, was fired on heavily and retreated. Gale made a desperate effort to reach Maasim first but did not succeed. And when he arrived at Baliuag that evening thirty-five of his men were being carried—eight of them comatose—from heat and exhaustion.

We moved on to Baliuag and on the way I was able to aid the column on the south of the river who were having quite a brush at Bustos. Official records show the range to have been 2,300 yards—the only instance in the whole expedition when I was able to fire at more than a few hundred yards.

Baliuag was not much of a town but we were able to billet in shacks—an improvement over bivouac. We hoped for a well-earned rest. Part of the command got it, too much, in fact, for eleven days became tiresome; but part were on their way next day. My command were of the former.

Battling for Tomatoes

Supplies came from Bigaa by road and from Quingua by water, both towns being on the railroad. Hearing that canned tomatoes had arrived I rushed my mess sergeant to the commissary with a requisition, but he returned empty handed. I happened to be in Hawthorne's billet when he reported, and that officer got highly indignant—the Commissary Officer had no right to withhold the tomatoes when he had them in stock, "Regulations, etc., etc.," and off he went to see about it. He soon returned, beaten and boiling! The Commissary Officer had refused to listen to him and ordered him out of his office! Also he had "sprung rank" on him and I think that hurt most; he, a graduate of the Naval Academy, a lieutenant of artillery for a dozen years, put in his place by a captain of volunteers of less than a year's service! "Boots, Boots; who is this *Captain* Boots, anyway?" The scorn in his voice rings clear today. And he cursed our military system till I left. Soon after returning to my shack an orderly came to say that the Commissary Officer wished to see me. He had come with the supplies from the railway and I had not met him. He demanded to know who that lieutenant of artillery was who had tried to tell him how to run his business. I explained and soothed his rumpled feathers. Then he told me there were not enough tomatoes to go 'round, that he would give my small command all I had asked for, "but don't you give a can to that fellow!" When they arrived there was enough to give a can to each man in both batteries, but Hawthorne refused flatly to let me so distribute them.

To those who know only the bounteous ration of the World War this may seem a very trifling incident, but any veteran of the Philippines will appreciate that it was not. Hardtack and bacon were standard in the field, sometimes potatoes, beans, and onions could be had, coffee was rarely rendered more palatable by sugar or milk, fresh fruit could only occasionally be had, butter was unknown, as was jam. Canned tomatoes were a much sought-after luxury. They were put up in cans too large for convenience in carrying, but a soldier would carry one in his hands all day long for the delight of drinking from it in the evening.

Resuming the Advance on San Isidro

The day after our arrival at Baliuag General Lawton sent Summers with his Provisional Brigade north on the road to Maasim. The enemy had rallied there and put up a stiff fight. The Utah section had accompanied the brigade; the 3rd Infantry and Hawthorne's battery joined soon after. A section of Light Battery D came up from the railway and joined me.

We all anticipated early marching orders but now Otis became alarmed for our safety and everything marked time for about ten days. Otis reported strong enemy forces in the country we had just traversed and our doughboys wore their legs off trying to find them; he reported enemy supplies being accumulated in places and doughboys were sent to see; he reported 2,000 Insurgents at Antipolo (?) and 3,000 at San Miguel, halfway to San Isidro. Our reconnaissance parties had numerous

brushes with the enemy, but none of any consequence, and nothing indicated strength. At last Otis gave permission to move. Lawton reinforced Summers with the Scouts, sent him Captain Birkhimer as his personal representative, and the 1st Division started for San Isidro, twenty-five miles to the north.

The Scouts were an organization created by Lawton while we were in the Angat-Norzagaray area. It comprised about forty men, mostly from the North Dakotas, and was commanded by a civilian named Young, whose previous history I do not know. Captain Birkhimer took it upon himself to direct these men—actually led them at San Ildefonso, San Miguel, and Salacot. They preceded Summers' troops, a company of infantry trying to keep within supporting distance. At San Ildefonso they routed a strong force of the enemy with little help from the support; at San Miguel eighteen of them routed with heavy loss a force many times their number. Birkhimer and the twelve surviving scouts were given the Medal of Honor. A few days later, at Salacot, they found the Insurgents burning the bridge over the deep Bulo River, and drove them to their trenches beyond it. But the bridge was in a fair way to be destroyed, the infantry support was coming up on the run; the scouts dropped the fight and under the close fire of the enemy saved the bridge. The twenty-three survivors were recommended for the Medal of Honor. Young was wounded at San Miguel and died, Harrington succeeded him and was killed at the bridge. A truly remarkable organization.

To return to my own narrative. The troops at Baliuag moved north on or about the 13th, following Summers' command through Maasim. There was little to record except that our knowledge of bridges and bridging was somewhat enlarged. We had confirmation of what we already suspected, that an apparently sound bridge built of timber was likely to collapse, while one wholly of bamboo was likely to stand up under many times the weight we estimated. The many barrios we passed through presented an appearance different from those in the past. The inhabitants had found that Americans did not shoot them on sight and had mostly returned to their homes. Every shack displayed a white flag, men uncovered as we passed, women and children peeped from windows. All tried to display friendliness. Scouting parties sent out on lateral roads met with no opposition.

On May 16, at San Miguel, my battery was attached to the 22nd Inf., and that afternoon we marched to Salacot and went into bivouac. But at nine PM we were on the march again and at eleven PM reinforced Summers. The Utah section rejoined. The news was that the enemy was in position between us and San Isidro and evidently prepared to make a stand. General Lawton was expected up but Summers would command in the expected battle. Orders would be issued in the morning. I was up at daylight and went as far as I dared on the road. It was narrow and bordered by ditches, not large but narrow and deep, impassable for guns except over culverts at rather long intervals. The fields were old rice paddies and I could find no passable places through them; the road remained therefore my only possible route of advance. Colonel Summers' plan was simplicity itself—four regiments of infantry deployed as skirmishers, one to the left of the road and the others to its right, my battery on the road, its leading gun on the skirmish line.

I ventured to express a little of the disapproval I felt for this arrangement and was asked what I proposed. I explained the road situation; when the action began the guns might not be near one of the culverts, would have to go on to the next one ahead since they could not turn back in the narrow road, might not get into action as quickly as might be desirable, and might get shot up badly before they could get into action. What I wanted was to have them follow the line at a reasonable distance whence they could quickly advance to position; I would do as I habitually did, go forward with the scouts and study how best to use them. He replied that the guns would march as directed; and wound up with a contemptuous, "What are you afraid of?"

That stung! I forgot his rank and informed him in vigorous language that the question was not one of fear but of common sense, that his order placed the battery where it would be least useful and most exposed—a half dozen rifles firing along the straight road might kill off every mule before they could possibly escape. He told me to "Go ahead; if your mules get shot we'll get your guns along somehow." As it turned out, the battery was subjected to very little fire. The leading gun unlimbered and managed to go into action in the road and fired a few random shots; the others could not cross the ditches into the field nor be turned round and sent to the rear; the little column formed the most prominent object in our lines and was only a thousand yards or so from the Insurgents when the action began, and stayed there till it ended; yet the only casualties were a slight wound on the hand of the Sergeant in charge of the leading piece and two of the mules mortally wounded. I don't think the Insurgents ever had a good look at that column, due to a bamboo bordered stream bed along the front of their position.

Having given my orders for the march and, so far as I could, such instructions as might be useful in emergency, I rode off after the scouts, accompanied by Captain Birkhimer and his orderly. I had no orderly, as mine was the only mount in my command. At the stream bed above mentioned there was a small stone bridge, its arch slightly higher than the roadbed. Beyond, a few of our scouts, in pairs, were making their way under cover towards a rather densely wooded area three or four hundred yards distant. Off to our right at what we estimated to be a mile a spattering fire of Springfields was fast growing in volume and being answered—also in increasing volume—by Remingtons and

Mausers. The locations of the opposing parties seemed to remain stationary. We talked the situation over and agreed that for some reason the enemy had seen fit to take up his position east of the road instead of astride it, perhaps had a strong flanking position prepared. If this were true, artillery would have its chance there, so we started east up the stream bed to find out. The bed was broad and shallow, not over three feet below the general surface of the country and spattered with clumps of bamboo and brush. I think we forgot that we were passing across the front of our approaching infantry and out of their view. We had progressed several hundred yards when all Hell suddenly broke loose! The regiment of regular infantry just east of the road had halted a few hundred yards short of the stream line and begun a heavy fire on it; the bush we had watched our scouts approaching was actually strongly held by the enemy, and they now returned the fire with vigor. We were about midway between the opposing lines, unnoticed by either. Of course most of the fire was passing over, but the crashing of volleys, the ceaseless rattle of individual fire, the cracking of bullets, the popping of bursting bamboo, made an inferno. We dropped off our ponies and started for the bridge. Dismounting reduced the chance of stopping a bullet but it slowed our progress. A Filipino pony is the equal of any burro in stubbornness and is hard to lead. We went in single file and the last man had a time of it trying to drag his pony along. But we made the bridge and, leaving the orderly to hold the ponies in the stream bed, Birkhimer and I tan out on the bridge waving our hats at our infantry line which was firing from the prone position, not a hundred yards away. Fortunately they recognized us as Americans at once, and ceased firing. Then we mounted and found some relief for our feelings by thrashing those ponies into a run down the road. A few shots from the one gun in action, fired well beyond our infantry, was all we could do to forward the action. In half an hour or so the firing had died away, we took up the march and soon came into open country with our long lines of infantry traversing it toward the town, a mile or so beyond them. There was no opposition. The enemy had taken a flank position and withdrawn to the northeast, uncovering the town, which thus escaped bombardment.

San Isidro

When we reached town it had already been divided into districts for billeting—the artillery, of course, forgotten. At headquarters I was told to squeeze in somewhere. After some search I gave up and bivouacked in the plaza by the church. Soon my men made a startling find in a basement room of the convent. A Navy officer named Gilmore and about eight men had been captured some time before and not since heard of. Their names in charcoal were on the walls of the room with a date of only two days before. They were to be rescued more than six months later, on the Apayao River, a couple of hundred miles away.

The Doctor and I found a very nice little house just across the street, unoccupied—and the reason appeared when we entered it. It had about a six-foot-high basement or lower story. The upper story had fine floors and other woodwork and was well furnished. It was entered by a stairway from the basement. As we started up this there appeared at the top a leper, a loathsome creature with most of his fingers and toes gone and some of his facial features. We recoiled, then, pistol in hand, made him stand aside while we investigated. We quickly decided that it was not his home and that he had probably been left by the owner to scare the Americanos away. So we took possession and relegated him to the basement—a mistake! Sometime later we were seated at table eating lunch and pluming ourselves on having gotten such a fine billet, when up the stairs came the lieutenant colonel of the Oregon regiment with a couple of his staff. He glanced around, expressed his admiration of the place, and told us to beat it as he meant to take it for himself. I summoned the leper and told them he was the owner. They were more shocked than we had been and fled at once. But outside they had a talk in undertones, and returned. The colonel looked at Johnston and asked if that was not a caduceus on his collar—the insignia of the Medical Corps. Johnston admitted it was. "Well, if a Doctor can take the chance of living in a leper's house we can." They let us finish our lunch and accepted an offer of coffee.

Withdrawal to Manila

It was decided to evacuate the territory we had conquered. Part of the troops marched back as they had come, part were transferred to MacArthur's, the 2nd Division, along the railroad. I was to march with the latter, with only my own platoon, returning to Manila by rail from some point.

The occasions must be rare in history when a column started out as ours did. It was to traverse a country that had not yet been visited by American troops, but the movement started like that of the march to camp or barracks from a peace maneuver. At 3 PM the infantry took the road in column of fours, the artillery and ambulance company bringing up the rear. There was neither advance nor flank guard, not even a point. The colonel in command—a Regular of many years' service—rode with his staff at the head of the column and had asked his artillery commander to ride on his left. We were approaching a sharp turn in the road when suddenly there came a blizzard of bullets from directly in front. Something hit me with great force in the chest and I found myself on my back in the ditch. A bullet had hit my pony over one eye and it was his head that had sent me over his croup. Someone caught him; I mounted and rode back rapidly to get the guns. Some bright person afterwards told an amusing story of my "flight from

the battle," and years later some malicious person repeated it in a club, as a fact to my discredit. Fortunately, perhaps, some present knew the facts and one, William Kenly, later Major General, promptly squelched the canard.

It turned out that the insurgents had taken up another flank position, this time on the other side of the Rio Grande de Pampanga, about a hundred yards wide at that point. Our road had followed the river for some miles, then out across a broad bend. At the point where it again touched the river the insurgents had a line extending to the south, a company or two I judged. This was what had brought our march to such a sudden stop. Across the river, on a bank slightly higher than our side, was the heaviest earthwork we had yet encountered. It was built as though to resist artillery fire, and well manned. The usual trouble was had in trying to find a place whence the guns could fire on it. At last I selected a spot in a banana thicket, right at the river bank, opposite and about a hundred and fifty yards from its easterly end, and on a line about thirty degrees from that of the work—almost enfilading it in fact. The work was ten or fifteen feet above the gun position, so it was impossible to drop shell into it; but shrapnel might do some good.

I had the banana plants cut away until only a thin screen remained between us and the enemy, and managed to get the guns in, hub to hub, without attracting attention. Heads were visible along the parapet and some rifles were at work when our gunfire began and the shrapnel bullets tore up clouds of dust all along the parapet. What a surprise it must have been! But the old adage is true, even with Filipinos, "You cannot shoot an enemy out of a position." And our commander made no attempt to cross the river. Upstream some volunteer troops did cross and could have swept down into the rear of the work, but they were ordered to withdraw. So a desultory action continued all the rest of the afternoon. At one time, for some reason that I cannot now recall. I had both guns fired simultaneously. At one such blast the left gun missed fire. Our little colonel stepped squarely in front of its muzzle and raised his glasses to see the effect of the fire, not having noticed the miss. I was speechless, but the gunner, a husky Dane named Sparrevohn, with one sweep of his mighty arm send the Colonel flying against the banana plants at the side of our emplacement. Darkness ended the tiresome affair.

I had no idea that the enemy would not be attacked and driven out in the morning. The river was very low and I thought it might be fordable. Some of the men wanted to get a bath in the river and I gave them permission, jokingly adding that they might find out if they could wade across. Two of them—Bard and Brady by name—actually did so, finding good bottom and the river easily fordable. I took these men with me to headquarters and reported to the colonel. He thanked me, said the men should be commended, but his orders did not contemplate adventures across the river.

The next morning was hazy. About daylight the whole command moved by the flank to the south far enough to escape observation from across the river, then went on till it struck the road again. Yes, an American brigade with artillery made a detour to avoid a foe inferior in number, equipment and everything else.

A short march brought us to Cabiao, where we went into camp until about 3 PM, when we moved on and went into bivouac about a mile above the crossing of the Rio Grande at Arayat.

Next morning we sat around for hours waiting for orders. It was hot and still. Lawton's headquarters had arrived and I went there to make inquiries. I found that it was intended to cross the river, that a raft was being built, and that a ramp was being cut in the bank for troops to march down to it. I watched the work for some time and concluded it would be night or next day before our crossing began and went back to make my command comfortable for the long wait. But comfort could not be had where we were, so after a time I returned and got permission to examine the river for fordability. I took two or three men who could swim, we found tracks indicating that at some stage of the water native carts had crossed, so stripped and went in. We found the bottom good and the depth such that if we tried fording, at least one pair of mules in a team would be off their feet at one spot. Back to headquarters and reported, and permission to try the crossing was given by Lawton himself. We marched to the place, rigged up a narrow raft or catamaran with a couple of old bancas, and ferried over the powder and the guns—to lighten the loads on the carriage. I had acquired two escort wagons by this time. Each was unloaded, its canvas cover placed under the body, and reloaded. We made a mistake in not lashing the body to the running gear—the water buoyed them up almost to the top of the standards and we narrowly escaped losing our food supplies. When the vehicles were ready we took them in one at a time, men armed with long switches swimming or wading alongside the animals. As the water deepened, drivers and swimmers applied the lash, and the mules plunged through the deepest portion with no great difficulty. Everything was across and we were settled in bivouac when the first doughboys crossed on the raft. The whole command might well have crossed as we did, using the raft as a point of support at the deep place. On that hot day the men would have suffered less from a wetting than they did from sitting on the hot ground under that burning sun, for trees were few and the bushes too low for much shade but high enough to interfere seriously with air movement.

That day copies of a telegram from the President of the United States were distributed:

"May 18. Hot Springs, Va. Convey to General Lawton and the gallant men of his command my congratulations

upon their successful operations during the past month, resulting in the capture this morning of San Isidro. William McKinley."

Next day, May 22, we marched to Candaba, where the other platoon rejoined. On the 23rd we marched to Apalit with the North Dakotas and a battalion of the 9th Inf., leaving the Utah section as part of the Candaba garrison. A short march on the 24th brought us to Calumpit, where we crossed the Rio Grande on the railway bridge and went into bivouac. Next day we entrained and in a jolting ride of three hours covered the thirty miles to Manila.

It had been a very interesting month and we all looked forward to more of the same. We had had no deaths but 21% of the men I started out with were in the hospital. The rest looked well but I fancy few were quite the men they were when we started out. Poor food and water, daily increasing heat, fever, diarrhoea and dysentery were taking toll of their energy. As for pride in "D Bat'ry," they had plenty!

HOME-MADE "ROAD RUNNER"

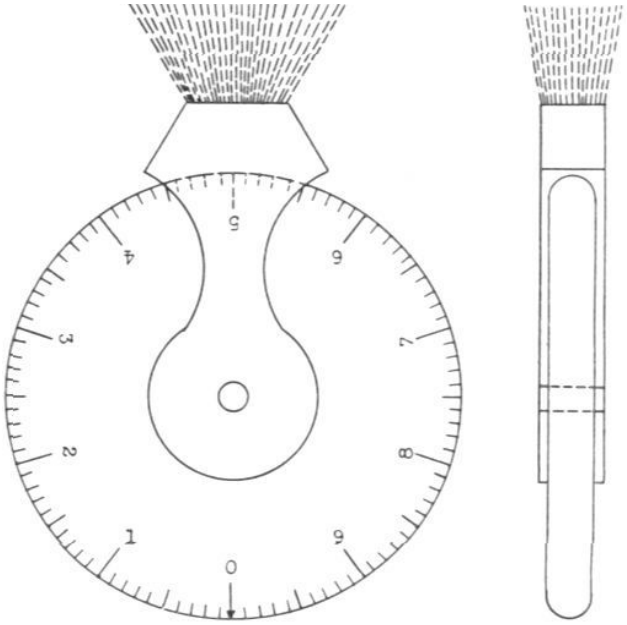
By Lieut. T. H. Marshall, FA-Res.

The solution of map problems involving the movements of troops and trains is complicated for many officers by the lack of a suitable map measuring instrument. Few Reserve Officers, particularly, own such a gadget. The field artillery plotting scale printed on paper, combined with protractor and scales furnished with the army extension courses, even though deemed suitable and accurate, is at best a slow, time-consuming, cumbersome method of measuring map distances.

The ordinary disc-type secretarial eraser has been found helpful in facilitating the measurement of such distances. This simple device is available on nearly every office desk, or it may be purchased at a very nominal price. With the aid of this tool, one may literally "roll down" the road, and a distance may be measured and checked in a fraction of the time consumed using the ordinary plotting scale. Irregular roads may be measured with ease, and with due care accurate measurements can be made.

The calibration of the rubber disc on the secretarial eraser is simple. There is adequate space for calibration on either side wall. These lines may be drawn as radii from any point on the circumference. The use of several colors will facilitate the ease of reading. There are two general ways of calibrating the disc. First, a map plotting scale and the disc of the measuring device may be synchronized, or second, simply calibrate the disc with any number of equally spaced divisions.

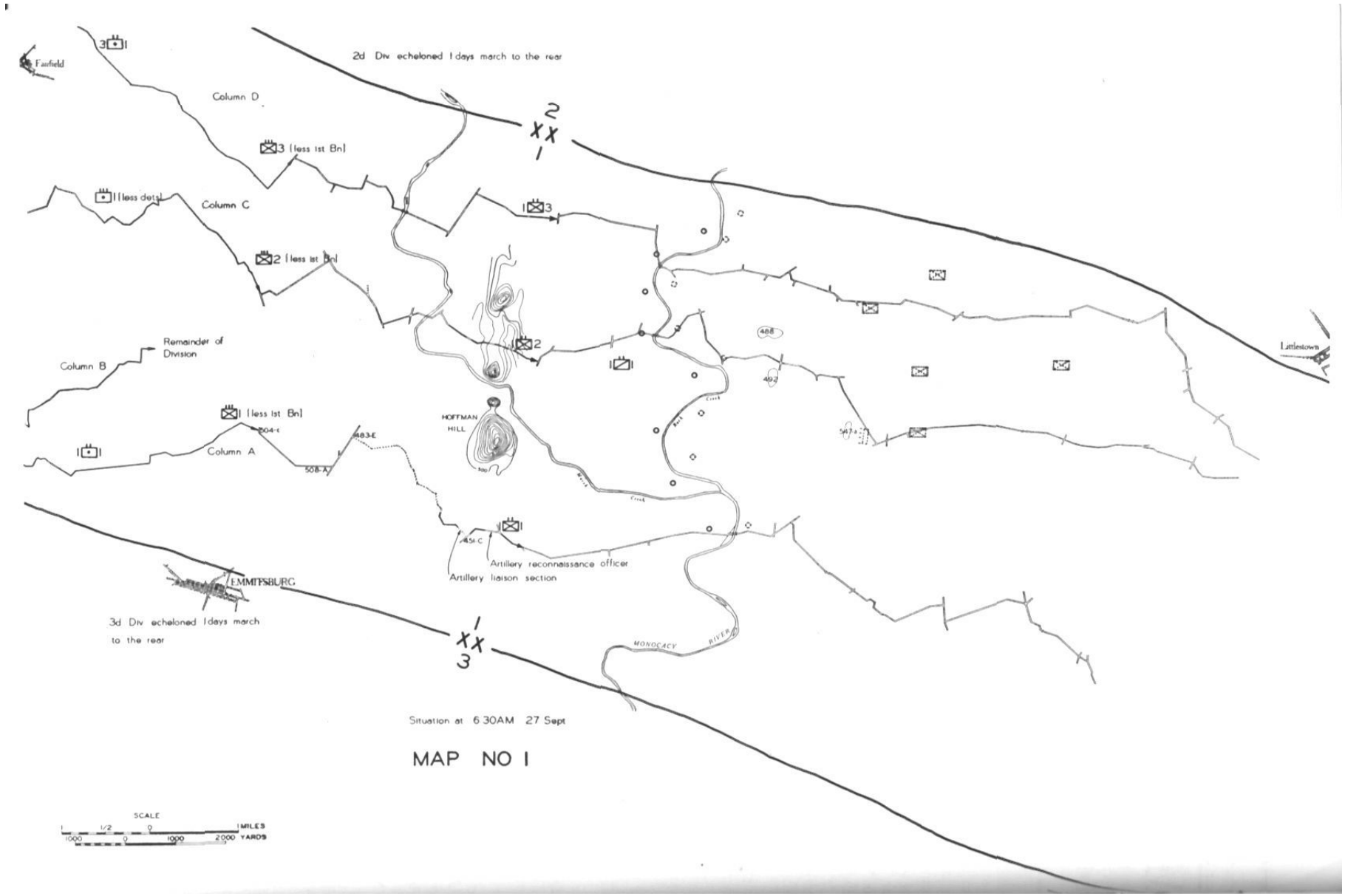
Grid scales on different maps are seldom identical. The paper on which a map is printed is subjected to varying weather conditions, thus causing the paper to contract or expand because of atmospheric (humidity) variations.



The measuring procedure is simple; roll the marked disc over any route on the map selected. Determine the total and fractional number of revolutions. Every printed map has a scale. Roll the disc over the map scale the same number of total and fractional revolutions, and the distance measurement has been determined. This procedure has been employed in a number of instances. It is accurate and time-saving. Wear on the surface of the eraser will not affect the calibration. This method is given preference because errors caused by shrinkage or expansion of the map are automatically compensated.

If ever I came down from Mars I would be able to tell immediately which armies on Earth had been longest away from the battlefield. They would be able to go everywhere very quickly but would have no fire power when they got there.

—CAPTAIN HENRY J. REILLY


Fairfield
2d Div echeloned 1 days march to the rear
Column D
3 (less 1st Bn)
(less det's)
Column C
2 (less 1st Bn)
Remainder of Division
Column B
1 (less 1st Bn)
Column A
HOFFMAN HILL
Littlestown
EMMITSBURG
3d Div echeloned 1 days march to the rear
Artillery reconnaissance officer
Artillery liaison section
MONOCACY RIVER
Situation at 6.30AM 27 Sept
MAP NO 1
SCALE
1 1/2 0 1 MILES
1000 0 1000 2000 YARDS

The 75-mm. Battalion in Attack,

Meeting Engagement

It has been noted that the solution of a field exercise is influenced greatly by the initial orders issued by the commander; it is difficult, if not impossible, to eliminate by later action the confusion caused by faulty initial orders. It also has been observed that commanders do not anticipate probable future action. In offensive action, forward displacement must be anticipated, and plans must be prepared for its prompt execution when ordered.

In any tactical situation, prior to the occupation of position, the artillery battalion commander must do the following:

1. Learn from the supported commander the scheme of maneuver of the supported unit, and, based on this scheme of maneuver, plan the supporting fires.
2. Reconnoiter for observation posts and positions from which the desired support can be given.
3. Move subordinate commanders forward so that they are available to receive orders.
4. Move the battalion to a rendezvous so that batteries will be available to battery commanders as soon as the latter are prepared to place them in position.
5. Make a plan, and issue orders to have the plan properly executed.

If the battalion commander understands that the above steps must be taken, he can concentrate his efforts on the best method of employing his battalion in the particular situation.

The purpose of the following problem is to illustrate the actions and orders of the artillery battalion commander and the employment of his staff in the initial occupation of position and in the formulation of plans for displacement. This problem was written to illustrate points which most frequently give difficulty to a commander and staff of limited experience.

It illustrates a procedure which can be followed, with obvious modifications, in the solution of all tactical problems of this type.

THE FIELD ARTILLERY SCHOOL
DEPARTMENT OF TACTICS AND COMMUNICATION
1939-40

ARTILLERY TACTICS ILLUSTRATIVE PROBLEM NO. 14

75-MM. BATTALION IN ATTACK, MEETING ENGAGEMENT
(Triangular Division)

SECTION I

1. SITUATION.—*a*. Maps: Nos. 1, 2, 3, and 4 herewith (Special Map No. 9, Army Extension Course).

b. Opposing forces.—(1) Blue is concentrating in the Cumberland Valley (25 miles west of Emmitsburg (41-34)); Red east of the Susquehanna River (50 miles northeast of Emmitsburg). Each is known to contemplate early operations.

(2) Blue divisions are organized as indicated in Tables of Organization for the Triangular Division.

(3) Red organization is the same as Blue except that Red divisions contain no organic medium artillery. Red is known to possess a small air force.

c. Mission of the 1st Division.—The mission of the 1st Division was contained in the I Corps march order, extracts of which are as follows: "Advance in zone of action (see Map No. 1); secure the line: Monocacy River—Rock Creek by dark, 27 September, and the line: Stumptown (58-28)—Littlestown (63-39) by dark, 28 September."

d. Events prior to 6:30 AM 27 September.—(1) The 1st Division, with the 1st Squadron 1st Cavalry Regiment (Composite), 101st Observation Squadron, and x x x x x attached, marched east in four columns from bivouacs west of Fairfield (37-44), early 27 September.

(2) The 1st Squadron 1st Cavalry Regiment (Composite), which was covering the advance of the division, was held up by hostile cavalry and infantry detachments along the line indicated (Map No. 1).

(3) The division aviation had reported hostile infantry and artillery dispositions as indicated on Map No. 1.

(4) The division commander had decided to attack without delay, enveloping the hostile south flank. The following plan had been announced:

The advance guard battalions of columns A, C, and D, under division control, to relieve the cavalry, drive

in the enemy covering detachments, and seize the line: Hill 547-a (53-37)—hill 492 (52-38)—hill 488 (52-39).

The 1st Field Artillery (75-mm. guns) to furnish direct support to the advance-guard action. The 1st Battalion 2d Field Artillery (155-mm. howitzers) to be in general support.

* * * * *

e. Situation at 6:30 AM, 27 September.—The elements of the 1st Division are located as indicated on Map No. 1. The Commanding Officer 1st Battalion 1st Field Artillery, with his party (less the reconnaissance officer's car and personnel), are at the head of the main body (right column). The artillery battalion reconnaissance officer and the instrument section are forward with the advance-guard. An artillery liaison officer with certain enlisted personnel is with the advance-guard commander. At this time (6:30 AM), a messenger from the 1st Field Artillery met the artillery battalion commander and delivered the order from Colonel "1st Field Artillery," shown on Map No. 2.

f. Miscellaneous.—All streams shown on the map are fordable.

2. FIRST REQUIREMENT.—*a*. Actions and orders of the Commanding Officer 1st Battalion 1st Field Artillery after his receipt of the regimental order and prior to going forward from RJ 504-C (42-37).

b. Route and destination of the Commanding Officer, 1st Battalion 1st Field Artillery after he leaves RJ 504-C.

NOTE 1: The battalion commander's party is organized as specified in the transportation chart to accompany T/O 6-26 P (Triangular Division). (Page 225.)

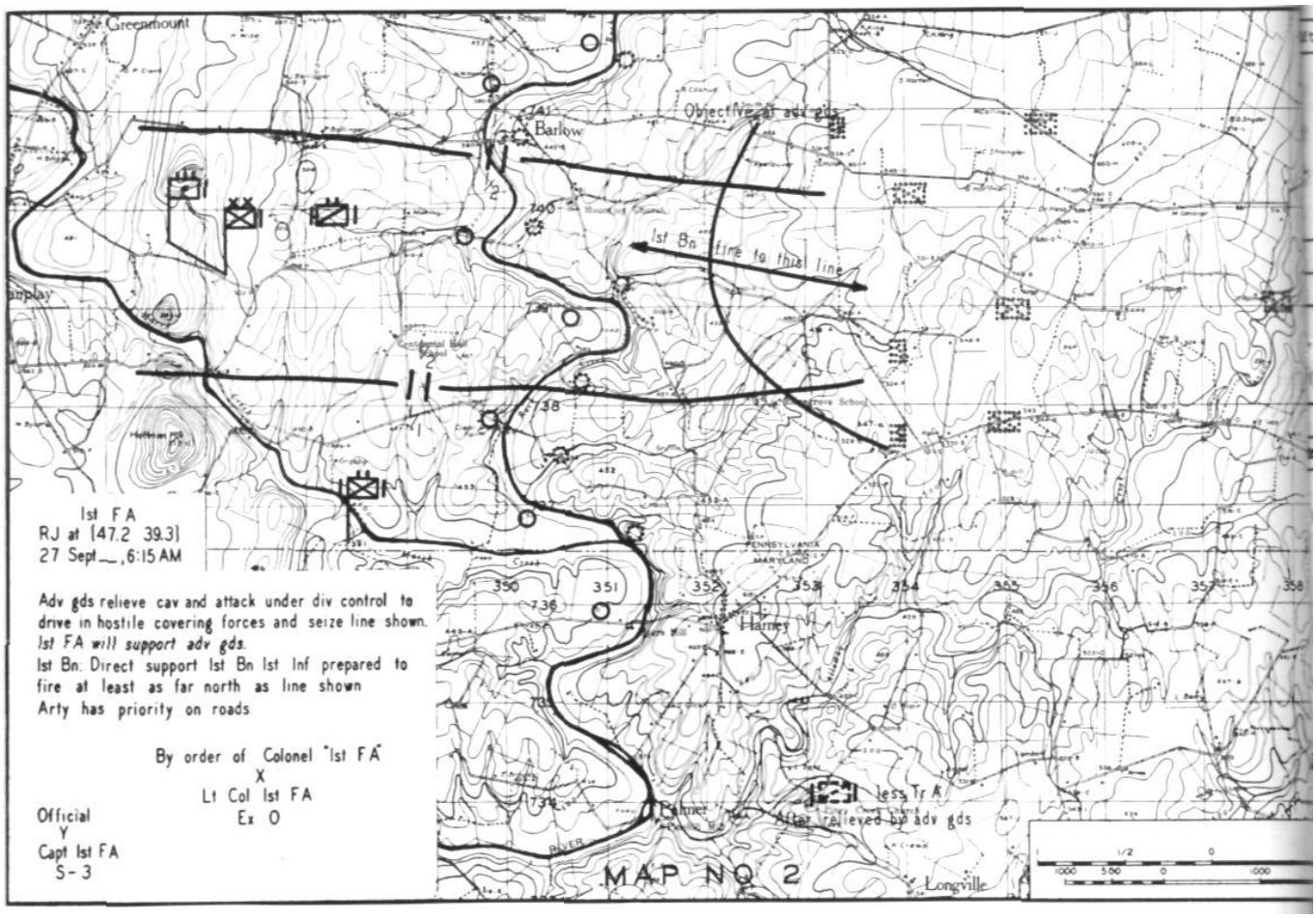
SECTION II

3. A SOLUTION OF FIRST REQUIREMENT. — The actions and orders of the Commanding Officer, 1st Battalion 1st Field Artillery were as follows:

He assembled the staff officers of his party, explained the situation; and had S-3 prepare Map No. 3 and send it to the battalion executive officer by motorcycle messenger. He then told S-3: "The party will move at once we are going to the command post of the 1st Battalion 1st Infantry at RJ 391 (48-36)."

b. Route and destination of the Commanding Officer, 1st Battalion 1st Field Artillery: RJ 504-C-CR 508-A (43-37)—RJ 483-E (43-37)—RJ 451-C (46-35)—road bend at (47.8-35.3)—north to the command post of the 1st Battalion 1st Infantry at RJ 391 (48-36).

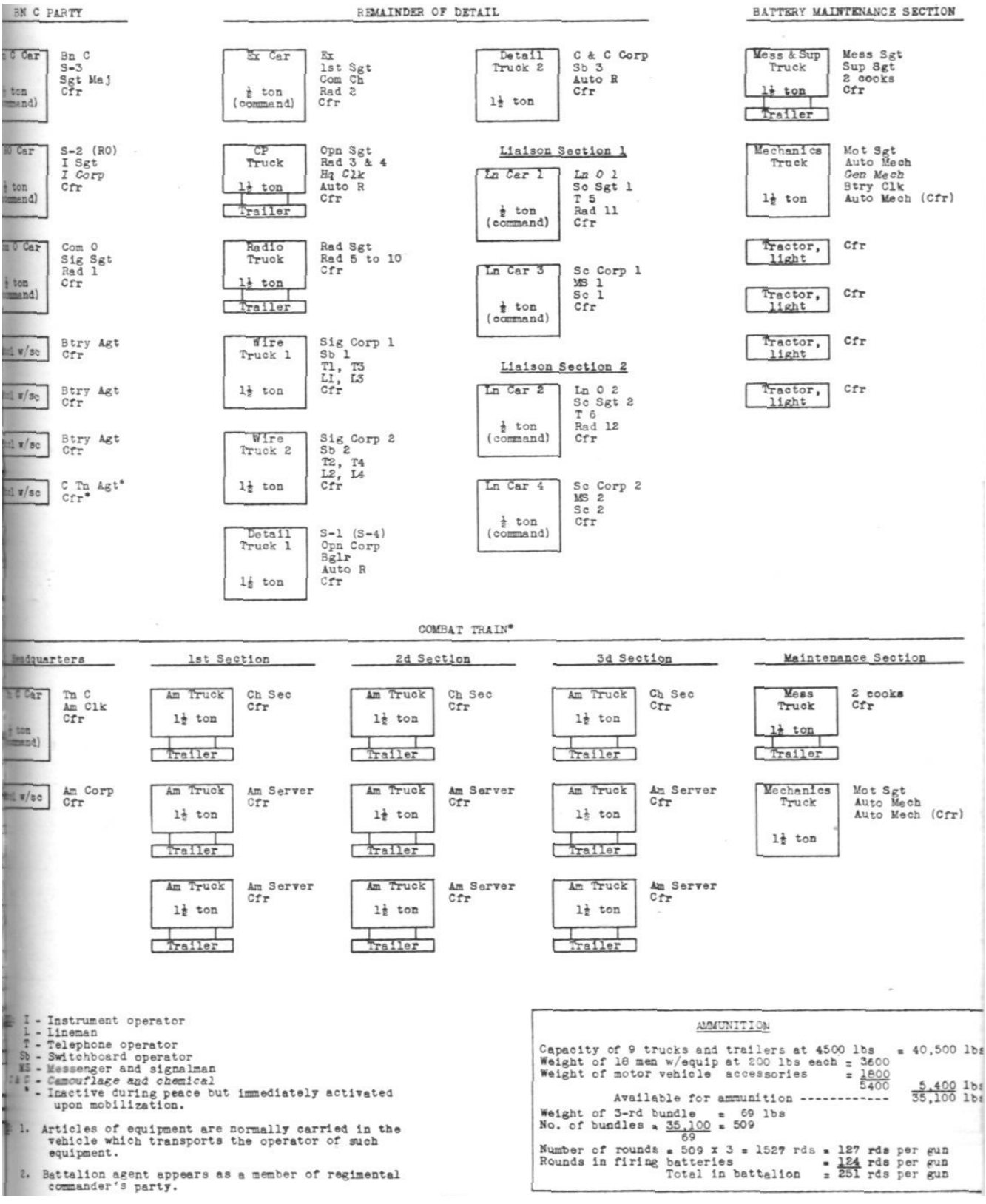
4. DISCUSSION.—The artillery battalion has been as-



FIELD ARTILLERY HEADQUARTERS AND HEADQUARTERS BATTERY AND COMBAT TRAIN, BATTALION, 75-MM GUN, TRUCK-DRAWN

(*Transportation Chart to accompany T/O 6-26 P*)

(*"TRIANGULAR" DIVISION, PEACE STRENGTH*)



I - Instrument operator
L - Lineman
T - Telephone operator
Sb - Switchboard operator
MS - Messenger and signalman
C & C - *Camouflage and chemical*
* - Inactive during peace but immediately activated upon mobilization.

1. Articles of equipment are normally carried in the vehicle which transports the operator of such equipment.
2. Battalion agent appears as a member of regimental commander's party.

AMMUNITION

Capacity of 9 trucks and trailers at 4500 lbs	=	40,500 lbs
Weight of 18 men w/equip at 200 lbs each	=	3600
Weight of motor vehicle accessories	=	1800
		5400
Available for ammunition		5,400 lbs
		35,100 lbs

Weight of 3-rd bundle = 69 lbs

No. of bundles = $\frac{35,100}{69}$ = 509

Number of rounds = 509 x 3 = 1527 rds = 127 rds per gun

Rounds in firing batteries = 124 rds per gun

Total in battalion = 251 rds per gun

signed the mission of direct support. This indicates that the bulk of its fire missions will be those requested by the supported-infantry commander.

Before the artillery battalion commander can complete his plan for the employment of his battalion, he must contact the supported-unit commander, obtain the infantry scheme of maneuver, and, in as much detail as possible, find out where and when supporting fires are desired. To expedite the occupation of position by the battalion, the subordinate commanders should be brought forward to be available at the proper time and place to receive orders. The remainder of the battalion should be brought to a rendezvous to be available when subordinate commanders are prepared to take over their units.

The order sent to the battalion executive for the movement of the battalion should be sent by messenger and not by radio. All possible details should be placed on the map. The importance of the message would warrant using an officer as messenger, were one available, but S-3 and the communication officer are the only officers present with the battalion commander, and their duties incident to the occupation of position are so vital as to preclude the use of either of them to convey the message to the battalion executive.

The artillery battalion commander when going forward to contact the infantry commander should go over the route that the battalion will use.

5. SITUATION CONTINUED.—*a*. At 7:00 AM, the artillery battalion commander and party arrived at RJ 391 (48-36) where they met the infantry battalion commander and obtained the following information:

Time of attack: 8:30 AM.

Line of departure: Line now held by the cavalry.

Scheme of maneuver: To attack in column of companies, in the order A, B, C.

Company A to advance east along Marsh Creek and capture hill 452 (51-37), then to assist Company B in the capture of hill 547-a (53-37).

Company B to turn northeast at the ford at (49.7-36.6), advance up the creek north of hill 452, assist Company A in the capture of hill 452, then advance and capture hill 457-a.

Company C, initially in reserve at (48.5-36.5), to maintain contact with the 1st Battalion 2d Infantry on the left and the cavalry on the right.

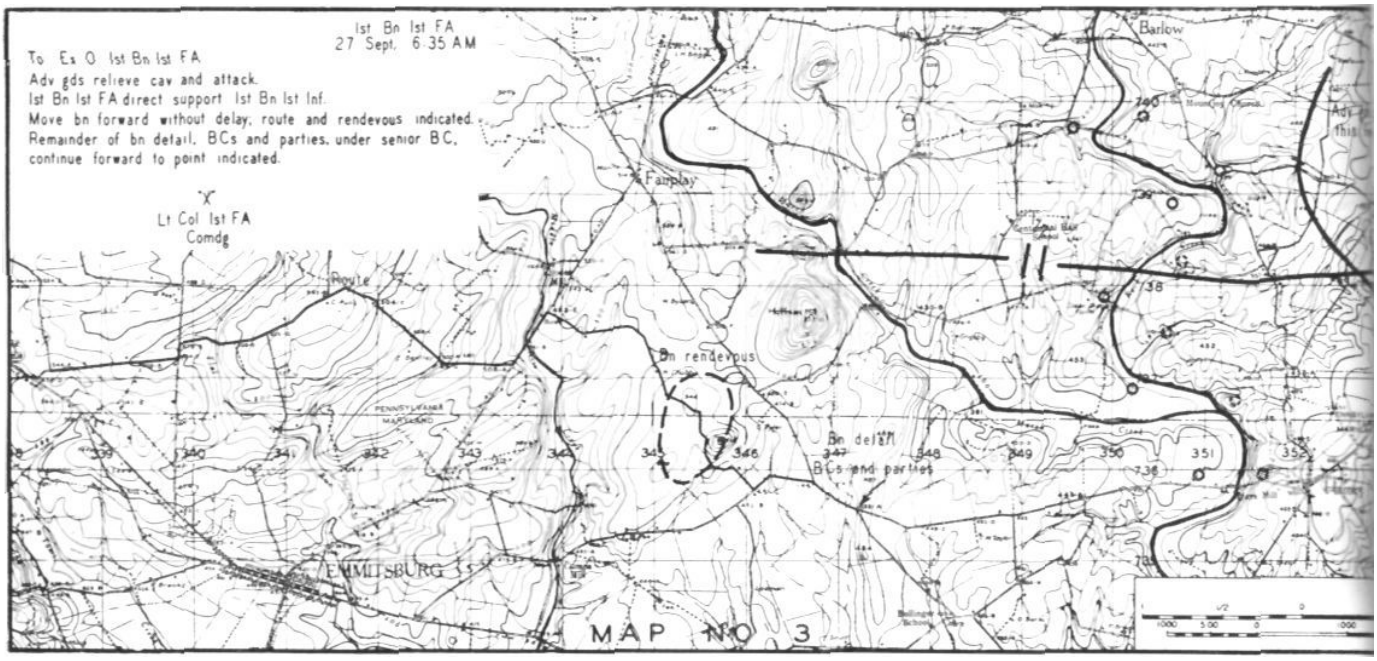
Company D to support the attack from initial positions on the ridge north of RJ 445-A (49-35).

Axis of signal communication: RJ 391—RJ 389 (50-37)—CR 452-A (51-37).

b. The battalion reconnaissance officer, who had been marching with the advance guard, reported to the battalion commander with the following information: That fair observation of the area east of the Monocacy River can be found on hill 484 (47-35), hill 487 (47-35), and hill 486 (47-36); that in the stream valley east of hill 486 suitable gun positions can be found, but that there is little overhead cover in that area; that the stream crossing at (48.6-36.8) is suitable for crossing truck-drawn light artillery.

c. After studying the map and considering the report of the reconnaissance officer, the Commanding Officer 1st Battalion 1st Field Artillery decided on and announced the following: To seek gun positions for Batteries A, B, and C east of the line: Hill 487 (47-35)—RJ 430-B (47-37); to determine if suitable observation can be located on hill 453 (49-37) and on the ridge north of CR 445-A (49-35); to have staff officers and battery commanders report at 7:40 AM on hill 487 to receive the battalion order.

6. SECOND REQUIREMENT.—*a*. Orders, if any, issued



or sent, prior to leaving RJ 391 (48-36), to the following officers:

(1) Battalion communication officer.
(2) Battalion reconnaissance officer.
(3) Senior battery commander (officer in charge of battalion detail, battery commanders and parties).
(4) Battalion executive.

b. Actions of the battalion commander after issuing the above orders and prior to issuing the battalion order.

SECTION III

7. A SOLUTION OF SECOND REQUIREMENT.—*a*. Orders issued by the battalion commander prior to leaving RJ 391 (48-36) were as follows:

To communication officer: "Select position for battalion command post in this vicinity; prepare plan of communications; report with recommendations by 7:40 AM on hill 487 (37-35); have signal sergeant accompany me."

To reconnaissance officer: "Reconnoiter for observation on hill 453 (49-37) and on ridge north of RJ 445-A (49-35); select a battalion reference and base point; prepare plan of survey; report with recommendations by 7:40 AM on hill 487."

To senior battery commander (*sent by messenger*)*:* "Conduct battalion detail and battery commanders and parties to hill 487; battalion order to be issued on forward slope of that hill at 7:40 AM."

No order was sent to the battalion executive at this time.

b. Leaving S-3 at the infantry battalion command post to arrange the details of the supporting fires, the battalion commander, accompanied by the signal sergeant, reconnoitered for suitable areas for battery positions along the stream north of RJ 391 (48-36) and in the vicinity of RJ 420-D (48-36); after locating and deciding on position areas for Batteries A, B, and C, he went to hill 487 (47-35), where he received reports and recommendations from staff officers as they returned to that point, and prepared notes preparatory to issuance of the battalion order.

8. DISCUSSION.—Speed is vital in this situation. The battalion must be prepared to deliver fire when the attack is launched. The ideal is to have plans made and orders issued so that the guns go from march column to position without stopping. The party is organized for the purpose of assisting the commander in the planning and reconnaissance necessary to the issuance of the order for the occupation of position. The time and place where reports are to be made should always be specified.

In this situation, the battalion commander's reconnaissance was hasty. He did not seek definite positions and observation posts for the firing batteries, but rather areas from which he is certain the assigned mission can be accomplished.

While this preliminary work is being accomplished, the subordinate commanders should be moved forward so as to be available at the desired time and place for orders.

Since the assigned rendezvous is well forward, the battalion was not moved. The batteries would be released when sent for by battery commanders.

9. SITUATION CONTINUED.—*a*. The situation at 9:30 AM, 27 September, is as indicated on Map No. 4. The artillery battalion commander, reconnaissance officer, liaison officer 1, and certain enlisted members of the battalion detail are at the infantry battalion command post, liaison officer 2 and his section are establishing the new battalion observation post as indicated (Map No. 4) and are in radio communication (SCR 194 set) with the battalion command post. The battery reconnaissance officers, with certain members of their battery details, are at the new battery observation posts as indicated (Map No. 4) and are in radio communication (SCR 194 set) with their batteries. Wire is being run forward to the new observation posts. Personnel at the initial observation posts are prepared to displace forward to the new observation posts as soon as wire communication is established.

b. At 9:30 AM, the following message was delivered to the Commanding Officer 1st Battalion 1st Field Artillery:

TIME FILED 9:20 A MSG CENT No. 10
HOW SENT Tg.
MESSAGE

NO. 8 Date 27 Sept.
TO CO 1st Bn 1st FA

As soon as the 1st Bn 1st Inf has captured hill 547-a (53-37), commence displacement by echelon to position west of that hill within present zone of action of 1st Bn 1st Inf. Two batteries to be prepared to fire on hill 608-a (56-40).

CO 1st FA 9:15 AM
"X"
Capt 1st FA S-3

c. The Commanding Officer 1st Battalion 1st Infantry informed the artillery battalion commander that he expected to capture hill 547-a by 10:15 AM.

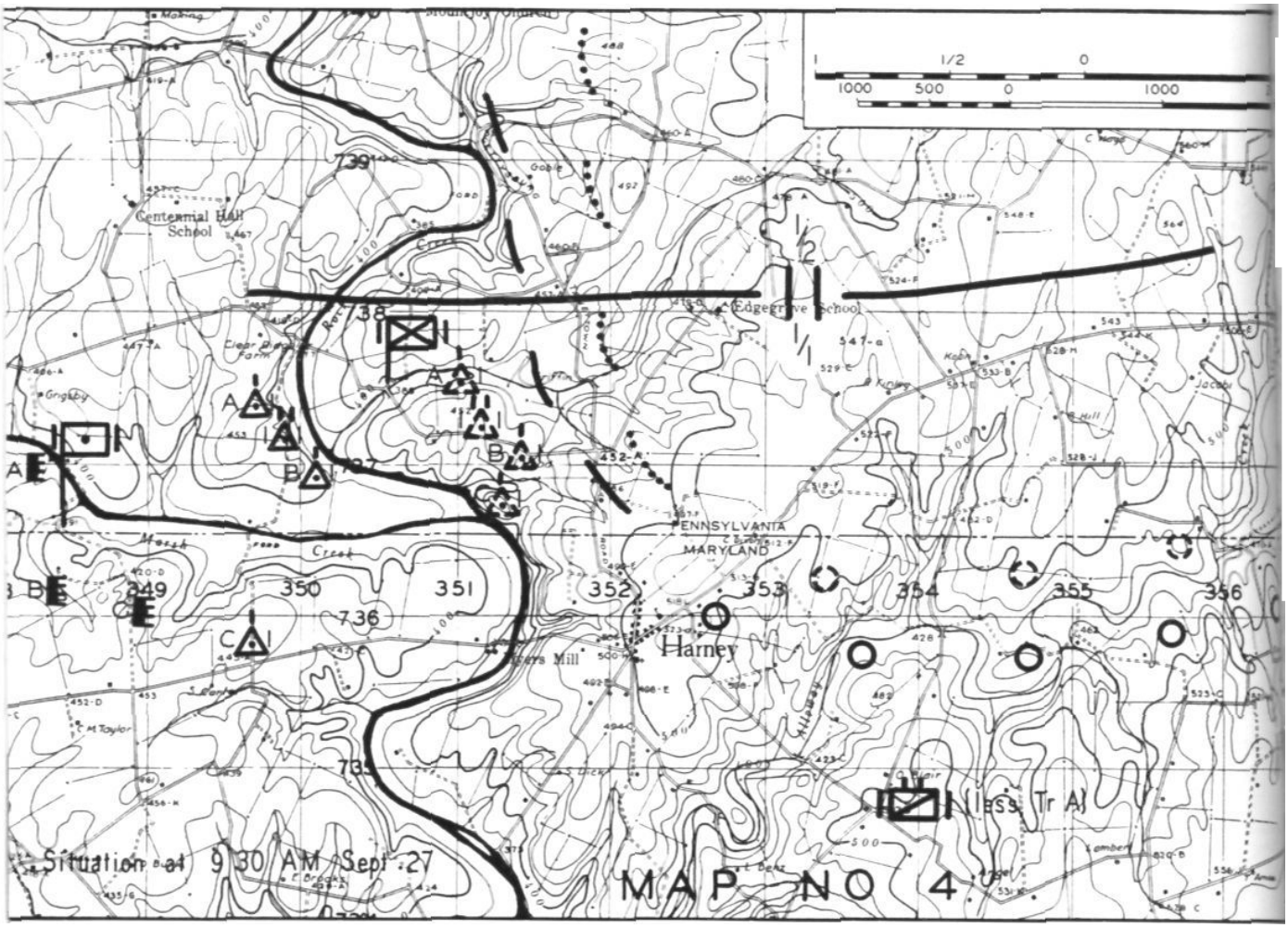
10. THIRD REQUIREMENT.—So much of the artillery battalion commander's plan for the displacement as pertains to the following:

a. Employment of the battalion staff and detail.
b. Instructions to battery commanders concerning reconnaissance.
c. Method of displacement of the battalion.

SECTION IV

11. A SOLUTION OF THIRD REQUIREMENT. — The plan of the battalion commander was as follows:

a. Liaison officer 1 and his section to continue liaison with infantry commander. Liaison officer 2 and his section to be in charge of the battalion observation post. The reconnaissance officer with a small party to follow



the infantry, reconnoitering for positions west and south of Edgegrove School (52-38); to report with information obtained to the battalion observation post by 10:15 AM. S-3 and the communication officer with enough personnel and equipment to establish a command post and communications net, to be prepared to move on five minutes' notice to the vicinity of CR 452-A (51-37). The remainder of the staff and detail to remain at the command post 1st Battalion 1st Field Artillery until it is closed. The old command post to be closed when the last battery is ordered forward. The battalion commander to go to the battalion observation post; to supervise the fires of the battalion, to keep in close touch with the infantry situation; and to be prepared to order the initiation of the displacement at the earliest possible moment.

b. Battery commanders with key enlisted personnel and one wire truck, to be prepared to move on five minutes' notice for a reconnaissance as ordered by the battalion commander.

c. To displace Batteries A and B initially; Battery C to displace as soon as the first echelon is in position.

12. DISCUSSION.—Command, reconnaissance, and communications personnel should be pushed forward as far as reasonable safety permits. The different members of the staff should have plans made in anticipation of the next operation. In this situation, the executive should have had warning orders or instructions already issued to the battery commanders and staff to cover a displacement. When the battalion commander's orders are received, all that should be necessary should be the filling in of such details as the time to move, route, and destination.

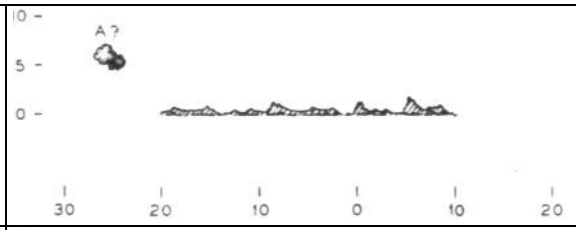
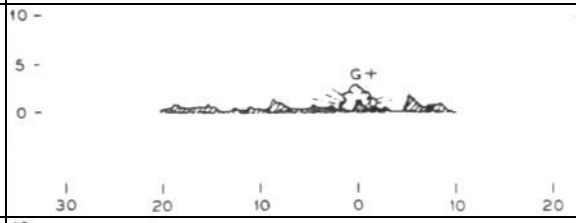
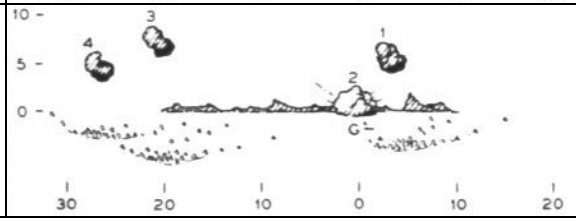
In this situation liaison officer 2 is used at the battalion observation post. The S-2 is normally charged with the installation and supervision of the battalion observation post; however, in the tables of organization used for this problem, the duties of S-2 and reconnaissance officer are assigned to a single staff officer, and the importance of reconnaissance prior to displacement prohibits the use of this staff officer at the observation post. Liaison officer 2 is readily available for liaison duties should the situation require the establishment of additional liaison.

The new position must have a command and communication system installed by the time the first battery is in position.

PROBLEMS IN GUNNERY

TIME BRACKET LATERAL, SMALL T.

Target: Infantry in fox holes in vicinity of line of bushes. Mission: Neutralization. Materiel; 75-mm. Gun, (M2), on the left. Ammunition: Time Shell. T = 180, r R = 0.7, s = 5.

Commands	*Results*	*Remarks*
Battery adjust, BDR 160, Cv 3500, On No 1 op 8, Site 305, Kr 30, No 2 1 Rd, 3600		First round of the day. Point of impact not seen, but it is possibly 15 mils right of burst.
R 10 (or 5), D 10, 3600		
R 10, U 5, BL, 3400		Deflection and range short. Height of burst good for effect.

Next command: L 5, B 1 Rd, 3500.

Comments.—For time shell, an effective height of burst is approximately 15 yards. During adjustment it is normally better to establish *both ends* of the final range bracket with a height of burst between 0 and 2 mils. Then, before going into fire for effect, the burst is raised by using the site only; this does not change the burst range, or further complicate the range adjustment.

In some situations the corrector may be changed before firing for effect, but it must be remembered that this changes the effective range; for example, raising the corrector 5 mils, at a range of 3500, is equivalent to shortening the burst range by 150 yards. Sometimes (as in this problem) the height of burst of the last salvo is good for effect; but any range bracket must be accepted with caution if one limit has been established with air bursts and the other with graze bursts.

In this problem the adjustment is sufficiently complete to warrant fire for effect at once. The graze bursts at 3600 and 3400 gave bracketing trajectories; the height of burst of the last salvo is good for effect. Should the corrector remain unchanged, or should the mean point of burst be lowered to the ground followed by a raising of the site? Before listing a few other solutions, the rounds fired for adjustment should be visualized. The height of burst of the salvo (graze burst considered) is 4 or 5 mils, as measured at the battery. The mean point of burst is approximately 140 yards short of the mean point of impact. If the corrector remains unchanged, it is apparent that 3400 cannot be the short limit of the range bracket. The exact range errors of the two graze bursts (at 3600 and 3400) are unknown, but considering various possibilities, it appears that, for effect with the present height of burst, 3500 may be 100 yards short of the adjusting line of bushes. In any case if the first two volleys are fired at 3500 and 3600 they should be within the desired zone and they will furnish information upon which to base the rest of the fire. Other solutions are:

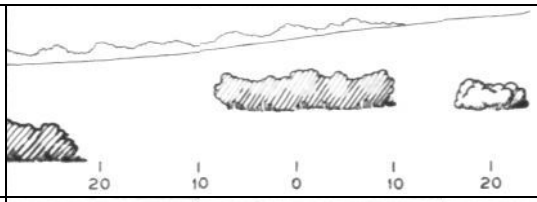
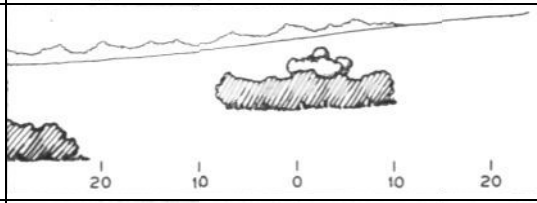
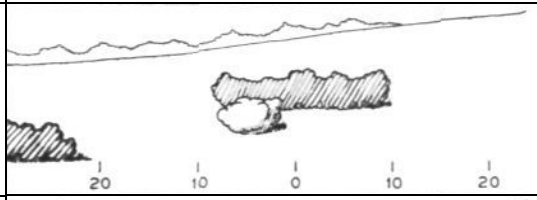
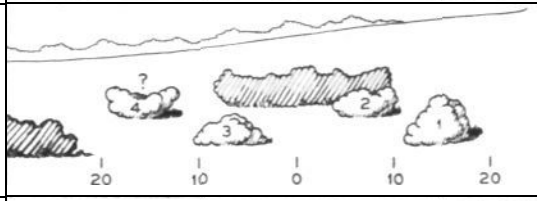
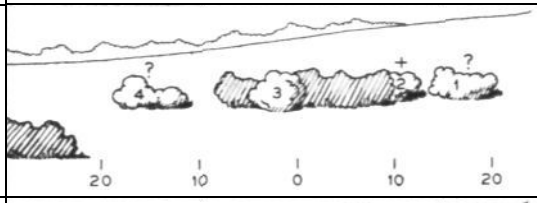
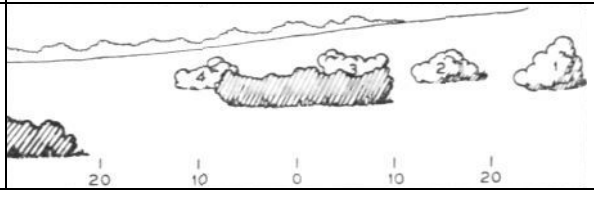
(1) L 5, B 1 Rd, 3600 (followed by 3500).
(2) L 5, B 2 Rds, 3600.
(3) L 5, B 1 Rd, 3700 / 3600 } or vice versa.*
(4) L 5, D 4 (or 5), Site 310, B 2 Rds, 3500.
(5) L 5, D 4 (or 5), Site 310, B 1 Rd, 3400 / 3500 } or vice versa.*
(6) L 5, D 4 (or 5), Site 310, B 1 Rd, 3600 / 3500 } or vice versa.*

In lateral fire, with time shell, range adjustment becomes easier as the angle T increases. The observer, by moving more toward the flank, gets in a better position for measuring or estimating the range errors.

*It is normal to fire two volleys at once, for early effect. Any changes in zone fire, if necessary, may be made afterwards.

PERCUSSION BRACKET, LATERAL, SMALL T.

Target: Enemy command post in the vicinity of a group of trees. Mission: Neutralization. Materiel: 155-mm howitzer, on the left. Ammunition: H.E. Shell, Quick Fuze T = 280, r R = 0.8, c = 7, s = 5.

Commands	*Results*	*Remarks*
Battery adjust, BDR 200, Cv 6000, On No 1 op 11, Sh Mk I, Ch 5, FQ, No 3 1 Rd, Q, 330		25 mils right of No. 3's part of target.
L 20, 330		
R 15, 302		
L 10, BL, 316		Deflection and range short.
L 5, B 1 Rd, 323		Range correct. Deflection approximately correct.
330		Command for this volley is given before seeing the first one.

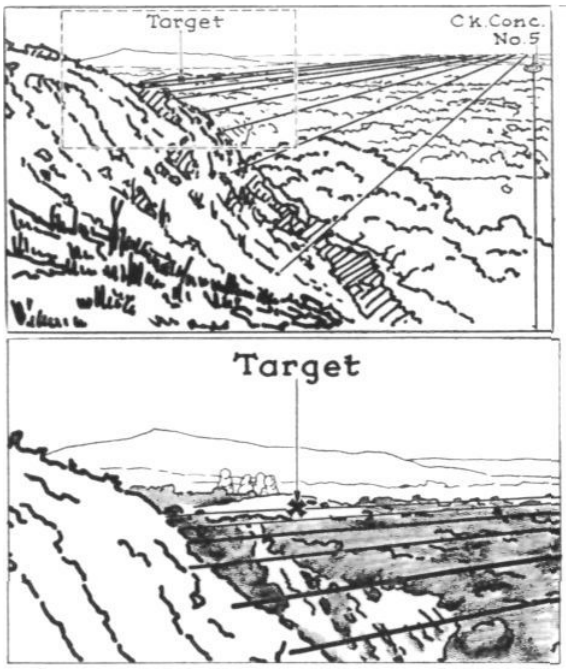
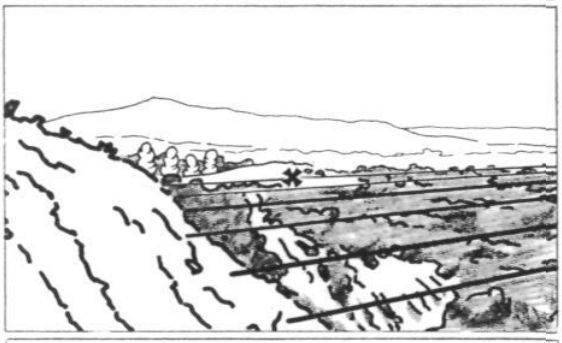
Next command: 316.

Comments.—The size of the 155-mm. shell burst facilitates sensings, especially when contrasted with a distinct group of trees.

When the adjustment is good enough to warrant fire for effect, it is good enough to fire volleys at two ranges immediately. Further adjustment, if needed, continues throughout fire for effect. However, in this problem the range adjustment is correct; further firing may or may not call for a small change in deflection.

ADJUSTMENT OF FIELD ARTILLERY FIRE BY A FORWARD OBSERVER

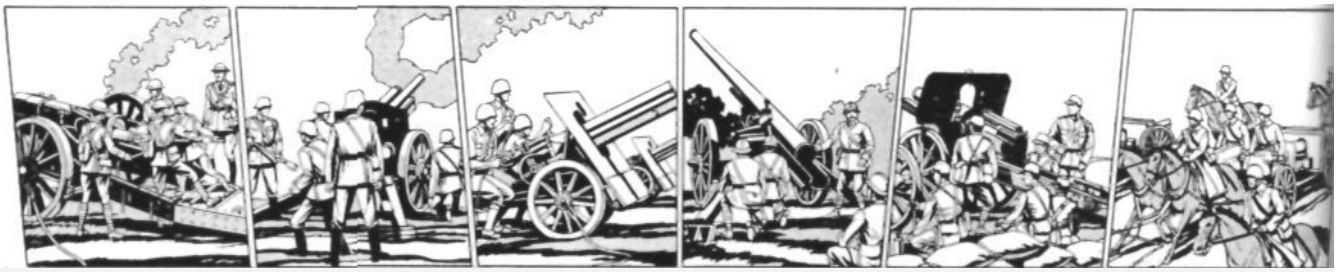
Fire unit available: 1 battalion, 155-mm. howitzers (2 batteries), which is reinforcing the fires of a light battalion.
Target: Infantry weapons in vicinity of terrain feature. Mission: Neutralization. (c = 9)

Sensings and Commands	*Results*	*Remarks*
Observer to FDC: "Check concentration No. 5, 1100 right, 300 over, infantry weapons, ready to observe, FIRE." FDC to observer: "Conc. No. 24, Adjust Battery C." FDC to Battery C: "L 220, Cv 5000, on No. 1 op 12, Sh Mk I, Ch IV, FQ, BR, Q 340." FDC to observer: "Battery has fired." Observer to FDC: "100 left, 400 over."		Battalion has just fired on Check Conc. No. 5 which, among others, was marked on an oblique photo furnished the observer. Neither battery has yet registered on a base point. The displacement of the target, to the left side of the field of view, causes the observer's deflection sensing to be inaccurate. (The lines vanishing on the horizon pass through the base piece of the adjusting battery.)
FDC to Battery C: "R 20, 304." FDC to observer: "Battery has fired." Observer to FDC: "300 left, 100 over."		The observer, after noting his first deflection error, decides to make a bold deflection shift which will surely bracket the target.
FDC to Battery C: "R 65, 295." FDC to observer: "Battery has fired." Observer to FDC: "100 right, range correct, fire for effect."		The last volley leaves little doubt as to the range and deflection needed for fire for effect.

Next command: L 20, B 1 Rd, Zone 286-304.

Comments.—This problem illustrates the need for accurate initial sensings; also the difficulty of sensing errors along lines that are at right angles to each other, although they do not seem so to the observer.

If possible, the forward observer should be furnished a photo, map, or sketch, which not only shows the relative positions of points that he can recognize, but also furnishes a scale. His initial sensings will then approach measurements instead of being estimations which usually require extra ammunition. Three salvos for adjustment are not excessive, but, with a photo or map, an initial range error of 500 yards should not occur. Furthermore, an accurate initial salvo is more easily identified when other rounds are falling nearby.



FIELD ARTILLERY ABROAD

ARTILLERY STAFFS. Lt. Col. Ignacio Moyano in "Ejercito," Madrid, No. 1, February, 1940. Translated by O. L. S.

The war is over. We have not all had the same experience, or faced the same problems; we cannot undertake to formulate a doctrine. All we can do for the present is to point out the needs that were felt; and one of the principal ones is an organized staff, with proper specialization and with adequate training. Such staffs cannot be improvised, for their duties are complex. The new officers have brought most laudable enthusiasm to their work; but, nevertheless, this improvisation has, as a rule, compelled commanding officers to perform in person most of the duties incumbent upon them, working themselves to exhaustion. In many cases, too, they have been compelled to eliminate, for lack of assistants, many features of their proper command functions, thus reducing the efficiency of the arm.

The functions of the staff are, first, to assist the commanding officer in the exercise of his command; and secondly, to harmonize and facilitate the action of his subordinates, and provide his superiors with such information as they require in making their decisions. Its organization must depend upon the specific missions to be accomplished. It is not possible to prepare a few diagrams which shall indicate all details of organization, even within the same echelon of command; there must be a sharp distinction between those units intended for close combat in mountainous country, operating alone, like sharpshooters firing at such targets as they can see, and heavy artillery firing by the map, on a broad front and in great depth, with the assistance of advanced or aerial observers.

The duties incumbent upon the staffs are of four types—operation of the command post, intelligence, communication, and survey. A brief study may serve to state the problems; they can be solved only by more detailed study and experience.

COMMAND POSTS

In the first place, we should not forget that a command post is a place from which command is exercised. At it should be assembled all the necessary means of action, and an organization should be created independent of the person of the commander, such as to give him a certain liberty of movement permitting him to visit the troops, to transfer his personal activity to another command post, or to prepare for future operations. Mean while the mechanism of command should not be interrupted; superior orders should be executed, and unforeseen events should be met with all means available. The commanding officer sets up and supervises the mechanism, but the machine should be able to operate provisionally without him.

To this end, the command post must have a chief, usually the chief of staff, who shall remain always at his post, and shall relieve the commanding officer of all details of command; who shall recommend to him from time to time solutions to be adopted, by means of the intelligence, liaison or communication systems, for the problems to which combat gives rise; who reminds him of the technical requirements of the moment; who drafts orders embodying his decisions, and is responsible for their distribution.

A command post must be *selected*. In general, for at least a part of the time it must be at an observation post the great source of information; but this will depend upon the mission to be carried out. There are, for example, *supporting* observation posts, from which detailed

San Matteo Gallego front, August, 1937, during the artillery preparation.

and clear observation may be obtained of a zone, limited in space and time, within which our infantry is to move. There are also observation posts for combined action, from which a large area may be observed, but as a rule imperfectly. Only exceptionally can there be found posts from which it is possible to see the whole country and see it well, for a considerable length of time.

But this is not all. In the selection of a command post we must consider facility of communication, the time available for laying wire, the matter of security, and the method of observation of fire. Clearly, it is matter of no little difficulty to select a command post without previous reconnaissance; the work calls for officers of perfect training, possessing our absolute confidence. In country such as ours we must be prepared to use command posts at a great distance from the batteries, so that it will require hours to reach them and many kilometers of wire to connect them.

In a command post, thought must be given to both mterial and technical organization. Material, for the reason that there must be at least some degree of protection and concealment, and that the necessary instruments, maps and means of communication must be assembled there. Technical, since a method of work must be devised which will suffice for translating out desires—the targets which we may see and wish to attack—into ranges and deflections, the only language which the egoistic gun knows.

Before the war we devoted much time to the study of map firing, upon targets which we discovered or which were indicated to us on the map. The war has taught us to fire by the field glass, upon targets visible to us or to others. In the one case, the fire depended upon quality; in the other, upon quantity, and very often we had not the guns nor the ammunition. These points should not be forgotten, in the study of new methods for target designation and determination of data on the map.

INTELLIGENCE

Information must always be available as to the enemy, the general situation of our own troops, and the ground. To secure, collect, study and distribute this information, there must be at each command post a specialized group, in actual communication and full understanding with the corresponding groups in the inferior, superior and lateral echelons. This system is known as the Artillery Information Service. Every artillery commander is thus automatically the chief of his own artillery information service; and he is responsible also for seeing that its results are available to others concerned.

In dealing with an organized position, in preparation for a breakthrough, it is not difficult, by patient work at several observation posts, to identify, one by one, all the works and fortifications of the enemy, and to note them in a panoramic sketch—which, methodically and accurately prepared, becomes an actual topographic document, by means of which we may locate them all on the map and compare the locations with air photographs.

These sketches have proved, moreover, to be an exceptionally valuable means of liaison and interchange of information, with higher command and with the other arms. We should not neglect to practice them; but it is difficult to make them, not merely on account of the difficulty of drawing, but by reason of the difficulty of seeing the ground and distinguishing points. This we learn by study of the country.

But it is not sufficient to discover and locate the works themselves, for they will not all be occupied nor will they all have the same importance in the proposed attack. When the time comes it will be necessary to determine which of the works are *live,* utilizing the slightest indications of hostile activity. This can be accomplished only by adequate observation.

Do not wait, captain, until someone shows you a target, to begin to study it. If you do, your fire will be too late, and the infantry which you are supporting will have been stopped. From your observation post, make yourself a part of the engagement, recognizing all the difficulties which will be met, so that you can deal with them swiftly when ordered. What will be your despair, captain, if you know nothing; if you do not see and recognize the hill marked with a tree? For there will be many such hills, and only one is holding up out action.

Direct observation may not be sufficient; need will be felt of further information of our own troops. This may be secured by means of forward observers distributed over the principal combat zones, and establishing contact with the subordinate units in action at the decisive points. A difficult mission, it is true, but clear and precise.

Liaison among commanders of combat groups requires time. It can best be secured by community of doctrine; by joint study of the ground; by full understanding of the purpose of the operations; by the creation of an organization in which infantry and artillery go into action with the same ardor, and in which the artilleryman appreciates his full responsibility to the infantryman, as his support and protector. It is useless to suppose that the problem of liaison is solved by the messages sent in by an officer to whom we have given a difficult task.

A very special and appalling task is presented by fire upon the hostile artillery. We can say little of it, for the Red artillery opposing ours was insignificant; and nevertheless, what hard times we had trying to silence it! This kind of information is the most difficult to obtain. All kinds of special means are employed to secure it; above all, the airplane, without which counterbattery is out of the question. But the great essential is organization.

In defensive situations, study of the enemy's artillery may be left to the artillery information service of the corps or the army. But on the offensive, when situations change rapidly and information must be interpreted and used without delay, the task must be turned over to the artillery information service of the group charged with counterbattery. In general, this group will have no organization

Escudo front, October, 1937; an artillery concentration during the bombardment of Puerto del Escudo

for the purpose; there must be a special counterbattery staff and headquarters, which may be assigned as required, with all its own means of inquiry, to the commander whose responsibility it is to silence the enemy's guns.

It is not always easy to know the exact situation of our troops, which have been in contact with the enemy all day; they themselves hardly know where they are. And yet it is necessary to move at daybreak. How uncertain action must be, for lack of this information! And what surprises await units which have pushed their observation posts up into No Man's Land!

The ground, the passability of the roads, the condition of the bridges, the general possibility of concealing our guns—all these things must be known with certainty before taking any action. The only way to secure this information is to send out officers, mounted or in motor cars, in various directions, toward the end of the day.

COMMUNICATIONS

Telephone lines constitute, for the present, the fundamental network for command and intelligence for artillery in action; and it is the only means which may be used safely. We can not easily give them up.

True, it is expensive to lay them, especially when observation posts are several kilometers apart and material is scarce. Interruptions and breaks in the line are frequent, if great care has not been taken, before starting out, to inspect the wire and to clean the terminals. Much time is required, especially if a map study has not been made before laying them, or if the details are not sufficiently trained, so that everyone has his own special task to perform—to lay the wires, adjust them, make connections, and test the lines.

But when all these details have been taken care of; when we have assured a maximum output for our lines by an iron discipline for the operators and centrals; when we have worked out a code, to make our communications more rapid — then our telephone communications will cease to be that terrible enemy which pursued us over all the mountains in Spain, leaving us helpless after many days of labor.

In every case, the establishment of an artillery net is a complex problem, which must in general be worked out beforehand, taking into account the time required, the available material (always insufficient), and the lines already laid or to be laid by superior echelons. To simplify the net and to double the lines—these are the two great objects to be sought.

Simplification is so important that it has sometimes influenced a deployment or an organization of command. At Tremp, the simplification of the lines which had to cross the deployment zone of the infantry led the two artillery groups of the army corps to interchange battalions, each one keeping those with which there was the best prospect of maintaining communication.

Doubling lines is necessary, if we are to have even a minimum of certainty. Study should be made, to make the wires of one unit assist another, and to enable us to secure connection by more than one circuit even if detours in the line are necessary. And dispositions must be made so that communication may be established at the earliest moment, and so that the net may be steadily improved. A judicious selection of centrals may be the answer.

A center of communication previously selected and installed in the zone of deployment of the guns may be useful as an information center, from which orders may be given and the deployment supervised. Lines may readily be run from it to the guns and to the observation

posts, without interfering with liaison. Later a second center may be established in the zone of observation posts, thus closing all the nets. This simple system must always be adapted to the specific case.

With radio we have had little experience. Still, we owe a debt of gratitude to those admirable details of the artillery of the Moroccan Army Corps. The few radio sets that were provided for the various army corps rendered excellent service; and how much we envied the captains of the Condor Legion,[1] changing observation posts rapidly, each with his radio equipment!

In the future, radio will supplement the principal telephone lines. In war of movement the battery can fire at once, without waiting for the arrival of the wire. The group commander can deal with his forward observation posts with the greatest facility. The battery may use it in special cases in communication with the battalion, the battalion with the group, the group with higher command. In special cases only; for the last-mentioned class of communications can generally be assured by telephone, and the radio is terribly indiscreet, so that confidential messages concerning tactical situations can not be entrusted to it.

Another great advantage of the radio is rapidity. Suppose that every unit equipped with a radio keeps it tuned to a specified wave length, and each higher commander sending his messages on the same length; how easy it will be to concentrate various units upon a single target!

But use of the radio calls for training special details; for knowledge on the part of officers which cannot be gained over night; for constant care of the material by skilled workmen. This means organization of the details, use of the equipment according to a schedule, preparation of time tables, assignment of wave lengths, provision of codes and keys—in a word, preparation for action. Do not forget this.

But neither telephone nor radio will always suffice. We must at times go back to the messenger, mounted or in a motor car. Flags and signal lamps, which we seem to be on the point of forgetting, will still be useful.

SURVEY

All the technical possibilities of coordination and intelligence in the artillery are dependent upon good topographical preparation.

When the zeros of all the instruments are clamped on the north, it is easy to study the ground with a simple contractor. When the base deflections of all the guns are accurately determined, how quickly we can get off our first shots! When all the observing instruments are laid parallel, a target may be designated by calculating a single parallax.[2] And when we can keep the pieces parallel to the instruments, it is easy to calculate rapidly the data for many batteries.

During the war not all our officers gave survey the importance to which it is entitled; nor did it occur to them

Battery command post on the Zuera front

that by this means they could add to the effectiveness of their arm, adapting topographical methods to the circumstances.

At Toledo, on a front which had been stabilized for months, we found accurate reference points, which enabled us to locate accurately our guns and their targets, and to calculate our firing data.

In Catalonia, on the Serge, there was always fog, which lifted only for three or four hours of the day, so that we had to take advantage of our opportunities. The compass (of which, skeptical at first, we became ardent admirers) and even the signposts along the highways, enabled us to lay the guns and the instruments, so as to be ready to take advantage of the first instant of daylight.

It is not always possible to apply accurate survey technique; but it is essential, young officers, to have a mastery of it, so as to get, whenever possible, accurate and reliable results. When this can not be done, then it should be possible, without too much inaccuracy, to work out by eye, with a pencil point, such operations and such measurements as we had no time to do by other methods.

All artillery survey is summed up in a few very simple things: Know the locations of the guns, the observation posts, and the targets, on the squared map; and know where the map north is, from the guns and the instruments. All the rest is simple calculation.

Topographical operations must be carried out from points on the ground, whose location on the map is accurately known—from triangulation points down to the artillery deployment zones, to provide convenient reference points for the firing batteries; and up from the pieces and the observation posts, to solve firing problems.

To accomplish this work, two survey organizations seem necessary—a strong one in each battalion, working for the whole unit without drawing upon the batteries unnecessarily; the other, higher up, perhaps in the army corps, working according to the classic topographical methods, over an extensive zone, on a continuous and ordered plan. To connect the two, the ranging section of the artillery group may serve.

We must get away from the old idea that every staff is precisely like every other, except for size. Neither survey nor intelligence can work in watertight compartments.

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[1] German volunteers.

[2] Gen. O. L. Spaulding proposed this method for our service 23 years ago. See FAJ, Vol. VII, pp. 335-36.—Editor.

MUZZLE BURSTS

This page is for "Letters to the Editor," or any other random thoughts which readers wish to share with others. Let your conscience be your guide. *The Field Artillery Journal* pays for all "Muzzle Bursts" accepted.

THE LANCE OF ABEN HABUZ

With the problem of national defense exciting more comment and controversy in the press and radio as each day brings its disturbing news from abroad, I am reminded of the perfect system of national defense recorded for us by Washington Irving in his stories of the Alhambra. The legend, according to Irving, runs as follows:

A Moorish king of Granada, one Aben Habuz by name, had consolidated the fruits of his victories in the province of Granada and, having reached an advanced age, was all set for a large order of status quo. Unfortunately, there were several Christian princes of neighboring, unconquered territory, the "have-nots" of those days, who insisted on more lebensraum and, by their repeated forays into Granada, kept the old gentleman in the saddle long after his jockey muscles had lost their elasticity.

A happy solution to the problem was provided by a famous astrologer. He constructed a high tower overlooking the surrounding plain and, in a room atop the tower, installed a large board roughly representing the province of Granada. The centerpiece of the board was a statue of a Moorish knight in full armor, with lance at rest; the perimeter of the board was covered with wooden soldiers representing the armed forces of all possible enemies. Whenever an invader crossed the border, the mounted Moor turned in the proper direction and pointed his lance at the invader, whereupon the king took the miniature lance in hand and belabored the wooden soldiers in the area it had indicated. Application of the butt end of the lance meant extensive hospitalization in the ranks of the enemy but application of the point gave the invader "the works" and the king loved blood. The beauty of it was, the fool thing worked in field tests and the king returned to the peace of his harem, the proud possessor of the world's first Fire-Direction Center.

Now that the real subject of this article has been indicated, let me hasten to assure you that the writer is not a reactionary, opposed to all innovations in field artillery, but one who has used the FDC in its simple, original form and found it excellent. As a member of the 1st Battalion 84th FA, I participated in demonstrations of the FDC for two classes of the Command and General Staff School, first as battery commander and later as battalion executive in charge of the fire-direction center. On both occasions, battalion concentrations were fired on targets indicated by the visiting student officers, in less than the allotted time of one minute and, on the last occasion, all the detail work at the FDC was performed by Thomason Act reserve officers who were on duty with the battalion. The FDC as we employed it was simple and effective, and the battalion commander Maj. W. C. Green, was complimented on the performance of his unit. BUT—*we continued to superimpose the FDC on a normal battalion setup based on wire communications* and did not seek that mythical solution to the artillery support problem wherein a few passes of a deflection fan over a firing chart are expected to cause concentrations to sprout like mushrooms in standard areas, neatly circumscribing all dangerous enemy elements.

Conversations with devotees of the FDC, and recent articles appearing in the JOURNAL have convinced me that the enthusiasm of the experimenter is leading us away from some of the basic principles of field artillery and that it is time to remove some of the frills from it before regimental commanders conceive a super FDC and send battalion and battery commanders still farther to the rear. Specifically, I consider recent proposals and practices at fault in the following respects:

(a) Withdrawal of battalion and battery commanders to the rear.
(b) Substitution of radio for wire as the basis of communications.
(c) Centralization to such an extent that the battalion is becoming a 12-gun battery, and that battery details are obsolescent.
(d) Lack of simplicity in command and communications.

I will attempt to establish the truth of my own convictions by a brief discussion of each of the above lettered items.

(a) Since the first announcement of the FDC, battalion commanders and, to a still greater extent, battery commanders have been removed from active leadership in the fire fight and withdrawn to the rear. These officers, the best qualified to select and conduct fire on targets, have been removed from the line of observation, the battalion commander to establish and maintain the entente cordiale with the infantry regimental commander and the battery commanders to conduct fire from the immediate vicinity of their gun positions.

A far cry from the battery commander who chalked his aiming point on the gates of Pekin!

The following quotations from the article by Col. Hartmann of the German army, writing in the JOURNAL on his recent experiences in the Polish campaign, point the finger of modern experience in an entirely different direction. He writes of the artillery battalion commander: "The post of the artillery battalion commander

should be on a line with the battery observation posts—that is to say, as just indicated, generally in the front lines with a small staff. The desirability of close contact with the infantry regimental commander should not tempt him to depart from this principle." As to the battery commander I quote further from the same source. "The good or poor effect to be obtained by a battery, assuming well-instructed gun crews, depends entirely on the battery commander. None of his subordinates can make good the mistakes that he makes in going into position, or compensate for his lack of skill in firing."

(b) Not being an expert on communications, I wouldn't care to state that a radio set will not be produced which will replace the telephone, but, having used the latest type issued, I feel confident in stating that such a radio set has not yet been produced and, to improve your chances of continuous communications it is still necessary to underlay every radio channel with wire at the earliest possible moment. I do know from practical experience that even the weak output of a third 194 set can be made to interfere with communications between a pair of the same type over short distances; and communications experts tell me that it will be a simple matter for the enemy to deny us voice radio for several miles in rear of our battery positions. This fact must be generally known by field artillery officers but, in spite of it, we find enthusiasts for the FDC relying on the 194 set alone for communications with all forward observers even to the extent of removing the wire from the gun batteries and replacing it with 194 sets as the only means of communication between OP's and their guns. As regards battalion and battery communications I will venture to predict in paraphrase that "when it comes to shell fire, they will do their work on field wire" and, in the case of those battery commanders who have been collectivized if not liquidated by the FDC they will "kiss the bloomin' boots of 'im that's got it."

(c) When I observe the tendency toward centralization running as strong as was indicated in the article by Maj. Wallace in the January-February issue of the JOURNAL, with battery commanders withdrawn from their OP's to CP's in the immediate vicinity of their guns and with no part to play in the conduct of fire except to lay out and check the work of their gunnery sergeants and corporals, I am reminded of the enthusiastic comment of my battalion commander to his battery commanders when the FDC made its first appearance in the 13th FA in Hawaii: "We'll break up the battery details," he declared, "put all your trained men in Headquarters Battery, and have a real fire-direction center." To his credit let me add that, after trying it out on the range, this battalion commander, although an enthusiastic experimenter, recognized the limitations of the scheme. We didn't lose our trained NCO's and we held out wire, although battery commanders who could see the targets were frequently shunted out by an enthusiastic young S-3 back to the FDC who threw the sheaves of the three batteries around the landscape with the greatest of ease. Every target meant a battalion concentration to him.

What does Col. Hartmann have to say about centralization, in his article previously referred to? I quote: "The command of the batteries by the battalion is, at the outset, centralized through concentrations in the sector of an infantry battalion or company. As the attack progresses, this centralization weakens, and the support is handled by special orders such as: 1st Battery will support the attack of the 2nd Company." Imagine the problem of one of our collectivized BC's on receipt of such an order! He has been in the immediate vicinity of his guns checking the work of his gunnery sergeant in converting "250 R-400 S" into a fire command, has seen none of the action, and has no wire.

(d) The lack of simplicity in command and communications is probably not so serious if the three principles already discussed have not been violated too completely. If the FDC has been superimposed on a normal battalion setup based on wire, if our battalion and battery commanders are in the line of observation where they belong, and centralization has not been carried out to the extent that it is impossible to send a battery on an independent mission, then it will make little difference whether the FDC falls of its own weight or as a victim of enemy artillery fire, a minor item which we seem to be forgetting when we lay all our eggs on one plane table. The principle of simplicity and the extent to which it is being violated in our FDC experiments are too obvious to require further comment. Another quotation from Col. Hartmann, however, seems to have been penned for my present purpose: "War of movement puts an end to any complications of peace time training. Such methods simply fall to pieces. Only things which are simple and primitive can stand the test and insure success. This does not mean that certain elaborations are useless; but their use requires time which may be available under conditions approximating position warfare, but not in actual war of movement. *The limit of their usefulness, in general, is at the point where they cause material increase in the difficulty of training newly raised units*."

So, what to do about the FDC? Throw it away? Decidedly not. The basic idea of recording the adjustments of the several batteries on one chart, thereby enabling a battalion staff officer to concentrate the battalion quickly, was splendid. Its abuse comes in turning the fire fight over to a staff officer who is not even in the line of observation. Maj. Wallace, in his article previously referred to, states that the battalion executive, in charge of the FDC, is "usually the best informed person on the situation in the infantry regiment-artillery battalion combat team." How can he be when he hasn't even seen the battlefield? As if in reply to that statement Col. Hartmann writes: "Never to lose sight of those lines (infantry front lines) is the secret and the gospel of any effective artillery support."

To summarize briefly: Let us save and perfect those

elements of the FDC which enable the battalion commander to concentrate the fire of his battalion more effectively than he can do by such simple methods as directing A Battery to cover B or B Battery to extend the fire of C to the left. In saving and perfecting those elements let us remember that

(a) Wire is still the chief reliance of the field artillery for communications, and voice radio has still to prove its worth in combat.

(b) Battalion and battery commanders are leaders, and should be instilled with the desire to close with the enemy. Their desire to get forward and continually improve their observation should be limited only by their communications and the range of their guns.

(c) Excessive centralization weakens each of the component parts and increases the difficulty of meeting new and possible strange situations.

—MAJOR LLOYD M. HANNA, FA

IT TAKES ALL KINDS . . . .

"It takes all kinds of people to make a world," we've heard. But must there be so many different kinds? Can't we Field Artillerymen make up our minds as to just how we want to accomplish things and then let every blooming one of us work toward that end? Of course not; individuals must develop their initiative.

We can afford to let rank—Generals and Colonels—have their own way, their "pet ideas," but there must be a stopping point shortly below the Colonel if we are to maintain an organization in the peak of efficiency with high-caliber morale.

Example of retarding efficiency and breaking an organization's morale:

Captain Bright joined us in January, took one look at the pioneer tools and barked, "Get that paint off; shine the metal and varnish the wood-work!" Two weeks later the Old Man fairly beamed when he looked upon his handiwork.

Two months later Lieutenant Smooth relieved the Old Man. As soon as he had signed for the property, and the Old Man had cleared the main gate, Lieutenant Smooth frowned upon the pioneer tools, and said: "I'd like black paint on the metal and OD on the wood. . ."

This could go on and on as long as battery commanders come and go—and they come and go frequently these days. Add to pioneer tools all the other miscellaneous materiel and equipment assigned to a battery, and you have a job changing the paint scheme—a job that will require valuable time that could have been better spent on gunnery, communications, or other vital training.

We might take a page from Kipling:

"It ain't the guns or armaments,
Or the funds that they can pay,
But the close cooperation—
That makes them win the day,
It ain't the individual,
Or the Army as a whole;
But the everlasting teamwork
Of every bloomin' soul."

—CORWIN ROBBIE

WHERE SHOULD THE COMMANDER BE?

Napoleon said that the art of war is simple—it is only the execution of it that is difficult.

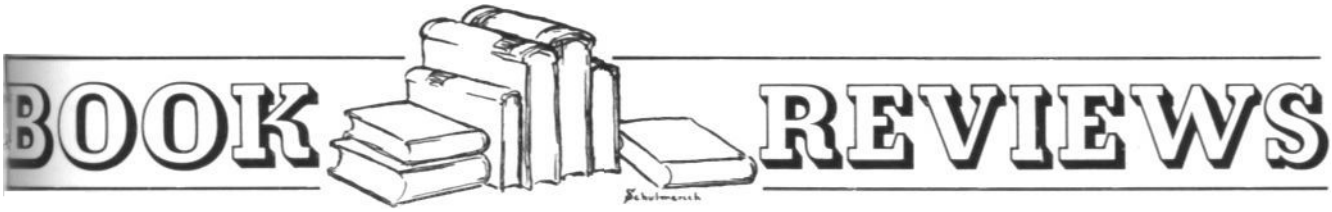
The military policy having been determined by the government, the war is in the hands of the military commanders. It is for them to carry the war to a successful end. Then it is time for execution, which starts with the military intelligence operations. From time to time commanders make decisions and issue orders in accordance with teachings; but the responsibility for continued execution is broken only briefly, while the commander makes his decision and issues new orders.

Military history teaches that fewer mistakes are made in orders issued than in the execution of orders. It appears that the commanders who failed did not have sufficient personal knowledge of the situation. The best commanders have seen with their own eyes. Some will say that conditions have changed; that a commander can no longer ride a white horse up and down the front line, observing dispositions and encouraging the men. But the principle remains the same and, although advancement in weapons and transportation have changed the aspect of the battlefield, it should be remembered that the advancement of communications, aviation, and motors now offer compensating means to permit the commander to see with his own eyes and to be seen by the troops while, at the same time, keeping in touch with the command post from which his orders emanate.

The commander should spend most of his wakeful hours observing the operations, either from the air or from a fast vehicle. He thus will be able to "get the jump" on the enemy and also give a boost to the morale of the troops by his energy and presence. Many commanders spend too much time at the command post with feet under a table and telephone in hand. Shouldn't they let the staff do the home work while they establish true command liaison by visiting the troops rather than by having each subordinate group send officers to them?

Haven't we become too academic in our operations? Haven't we turned the command post into a class room where we solve map problems as we do at schools? Since our combat power really depends on the morale and fighting ability of the individual soldier, shouldn't we become less of a stranger at the front and depend more on the staff to function in a harmonized manner, as we taught it in garrison?

—LIEUT. COL. H. CRAMPTON JONES, FA.



MANEUVER IN WAR. By Lieut. Col. Chas. A. Willoughby, Inf. The Military Service Publishing Company, Harrisburg, Pa., 1939, 268 pages, $3.00.

The author, well qualified by service on the faculty of the Command and General Staff School as well as by education and training, to write on his chosen subject, has produced a valuable reference work. He takes up the historical basis of modern tactics, enunciates and discusses the principles of war, then proceeds to a detailed treatment of the various phases of maneuver in war. Each topic and subtopic is admirably illustrated by a historical example; and these are made clear, in the traditional Leavenworth style, by a well-drawn plate—there are 181 of these plates in the book. Chapters 9, 10, and 11 are especially valuable, for they treat of the Spanish War, the Ethiopian campaign, and the Sino-Japanese War. Students of military history who do not keep scrap books of current wars (and how few of us do!) will welcome this handy brief history of recent conflicts.

BORDER CAPTIVES. By C. C. Rister. University of Oklahoma Press, 1940, 220 pages, $2.00.

This department will not confine its efforts to reviews of books on military subjects. Occasionally will appear notices of works of more general interest, as well as books adding to the knowledge (through exposition of the historical background) of the localities in which our readers may be stationed. *Border Captives* is of this class. It will be particularly interesting to people stationed in Oklahoma and Texas, for it deals with the various kidnappings perpetrated in the period 1835-76 by the Comanche, Kiowa, and Cheyenne Indians. The famous case of Cynthia Ann Parker and her halfbreed son Quanah is told in detail; and many other fascinating true stories. Mr. Rister is an experienced researcher and author; and his first chapter, dealing with the daily camp life of the Indians, is the best that this reviewer has seen.

MY MOTHER IS A VIOLENT WOMAN. By Tommy Wadelton. Coward-McCann, New York, 1940. 121 pages. $1.25.

Every army family will enjoy reading aloud Tommy's hilarious opus. Tommy, young son of a major in the Cavalry, discusses his family, his life on the post and in school, and more ambitious themes such as the growth of radicalism in the U. S., with a combination of uninhibited youth and dry wit which will be envied by older and more experienced writers.

"My father's name is Thomas Dorrington Wadelton," says Tommy in his first chapter. "He is fifty years old. He appears very intelligent. . . . . When my mother diets she weighs 125 pounds. When she does not diet she gets pretty fat. Most of the time she diets. . . . . She says she has lied so much about her age she doesn't know how old she is." And with this he is off at a gallop through one of the funniest books we have read in many a day.

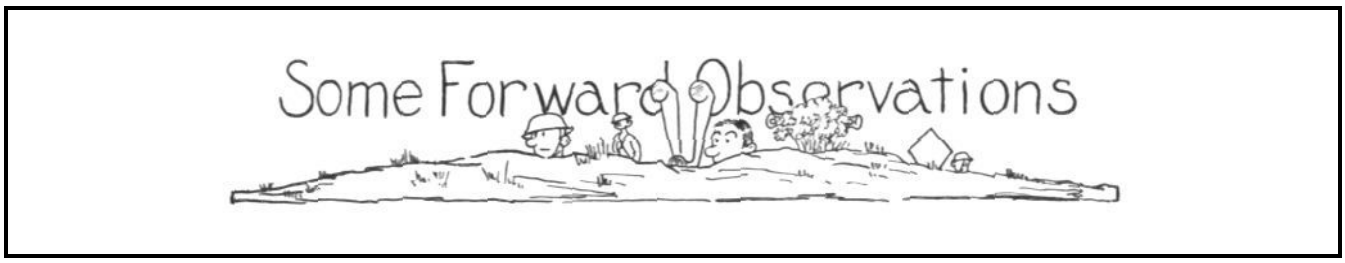
STALIN, CZAR OF ALL THE RUSSIAS. By Eugene Lyons. J. B. Lippincott Company, Philadelphia. 292 pages. $2.50.

This biography of Stalin, by the author of "Assignment in Utopia," adds little to what has already been written about the Russian dictator. In discussing the purges of 1934-1939, Mr. Lyons states that some 30,000 officers of the Army, the Navy and the Air Force were "liquidated by death, incarceration or exile." The campaign in Finland made plain to all observers the inevitable result.

ROMAN EAGLES OVER ETHIOPIA. By Col. P. A. del Valle, USMC. The Military Service Publishing Company, Harrisburg, 1940. 201 pages. $2.50.

The 40-page *Introduction* to this history of the Italian conquest of Ethiopia is the most interesting portion of the book. The author, detailed as an American observer with the Italian Army, succeeded in visiting several of the battlefronts, and even participated in one exciting engagement. He evinces throughout a strong admiration and sympathy for the Italians. There is also a good description of the difficulties of terrain and climate which confronted the Italians. Evidently Ethiopia bears, in some respects, a resemblance to Mexico.

The Italians were faced with serious problems of logistics and sanitation in Ethiopia, as well as by a brave though poorly equipped enemy. In this matter of equipment, Col. del Valle brings out clearly that the things which tip the balance in favor of a modern army against a primitive one are, first, artillery; and second, airplanes. Throughout his account, phrases like the following recur: "The superior fire power of the Italian mobile artillery was the deciding factor in both engagements. . . . . In all cases the intervention of the artillery decided the action. . . . . Badoglio was an artilleryman, and in the use of his own arm was brilliantly successful. . . . Not until the Italian artillery and aviation got into action was the enemy repulsed. . . ." And so on. The author stated that, although aerial bombardment was an excellent *supplement* to artillery fire, as a *substitute* it was a mistake. Of the campaign as a whole the author felt that it was well planned and well executed. "Italy had come a long way since 1896."



Δ OUR GENIAL CONTEMPORARY the editor of *The Gunner* writes in his March issue: "With some apprehension we approach the critical month of March. *Blitzkrieg?* No; something of which the outcome is much more uncertain. March is the month when annual subscriptions to *The Gunner* are renewable. Last year we had to send out five hundred reminders . . . . readers may not be aware that our staff consists of exactly two persons . . . and all the work, down to the licking of stamps, has to be done by one or the other of them. So it is up to you, reader, to renew your subscription without waiting for a reminder. Thank you!"

To all this we add, on our own account, a fervent Amen. Our situation differs from the above in two main respects only. Every month is March for us; and we have so many reminders to send out that extra clerical help must be employed. The expense of that and of the hundreds of dollars' postage is a dead loss to YOUR association. Fortunately, however, we have a gadget for licking stamps. Our delinquent subscribers fall into two main classes: One group, by far the larger, who are good solid citizens and pay up after a few reminders; the other—luckily only a handful—who ignore repeated reminders, until finally they become *whopping* delinquents. To this small and select group we can only say, "Maybe you know what you are doing. But we do not recommend such a method of gaining distinction."

Δ THIS MAGAZINE sometimes prints foreign articles composed almost entirely of things which U. S. artillerymen already know or think they do. An example is Col. Moyano's article in *Field Artillery Abroad*. Yet there is a good reason for this procedure. It is just as important to know that faithful old methods which have worked in school and maneuver are efficacious in battle, as it is to be informed concerning new-fangled ideas and gadgets which war has produced. It helps to keep us from pursuing the razzle-dazzle to the exclusion of more prosaic but reliable ways. Neither should we reject lessons from any war with the oft-heard remark, "Oh, but that was a special kind of war." *Every war is a special kind of war*. There is no *average* war.

Δ HERB JONES thinks that to string out an artillery battalion over three thousand miles, as illustrated in the map on page 108 of the March-April issue, is a trifle excessive. As a matter of fact, three thousand yards was a bit too much.

Δ WE KNOW WHEN we are licked. This business of trying to make changes of address from official orders is too much. While there is nothing—well, practically nothing — that we would not do for our customers changing addresses from official orders has simply passed the bounds of human capability. Here are a couple of actual examples of why this is so: (a) Lieut. Blank was a student at Sill, then was assigned to the Nth FA for temporary duty during the maneuvers. The Nth, whose home station was at Fort Holy Smoke, went to Camp Jackson thence to Benning thence to Louisiana; in the meantime its home station has changed to Fort Jiminy Crickets, but it may never go there, as there is some talk that at least part of it will be stationed at Camp Jumping Jupiter. In the meantime Lieut. Blank has been ordered to foreign service, his orders changed once, then revoked; and he is on leave. Where should we send his JOURNAL? We don't know; neither does the AGO; neither does Sgt. Pierce in the Chief's office. And the current issue of the "Blue Book" admittedly contains errors. (b) Lieut Col. Doe has gone to duty with the organized reserves in Los Angeles. At least, so the official orders said. But the Post Office will not deliver a JOURNAL to any such address; we get it back, with 6 cents postage due, and Col. Doe is out his magazine.

So—beginning with June first we will change your address as many times as you like, or your rank, or the spelling of your name (a delicate subject); *but only when you tell us to do so*. Please give us your cooperation in this matter; it means a considerable financial saving to us all.

Δ HERE IS an example perhaps even more striking: We send a statement of account to Battery C 14th FA addressed (we should have known better than this) to its old home address at Fort Snelling, Minnesota. Reply containing remittance comes from Fort Benning Georgia, on stationery bearing the letterhead of Battery A 79th FA which has been corrected to Battery C 19th FA. The check is on a bank in Anniston, Alabama, and there is a note stating that the new address is APO something or other at Alexandria, Louisiana. By this time we suspect that our records are faulty and that we ought to hasten to the Munitions Building for enlightenment. And we have a definite feeling that the address of the above battery, by the time this JOURNAL is out, should be Fort Knox, Kentucky.

This column reproduced from THE READERS' GUIDE shows how the subjects have been indexed.

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