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**THE  
FIELD ARTILLERY  
JOURNAL**

**EDITED BY**

**HARLEIGH PARKHURST**

**MAJOR, FIELD ARTILLERY, UNITED STATES ARMY**

**THE UNITED STATES FIELD ARTILLERY ASSOCIATION**

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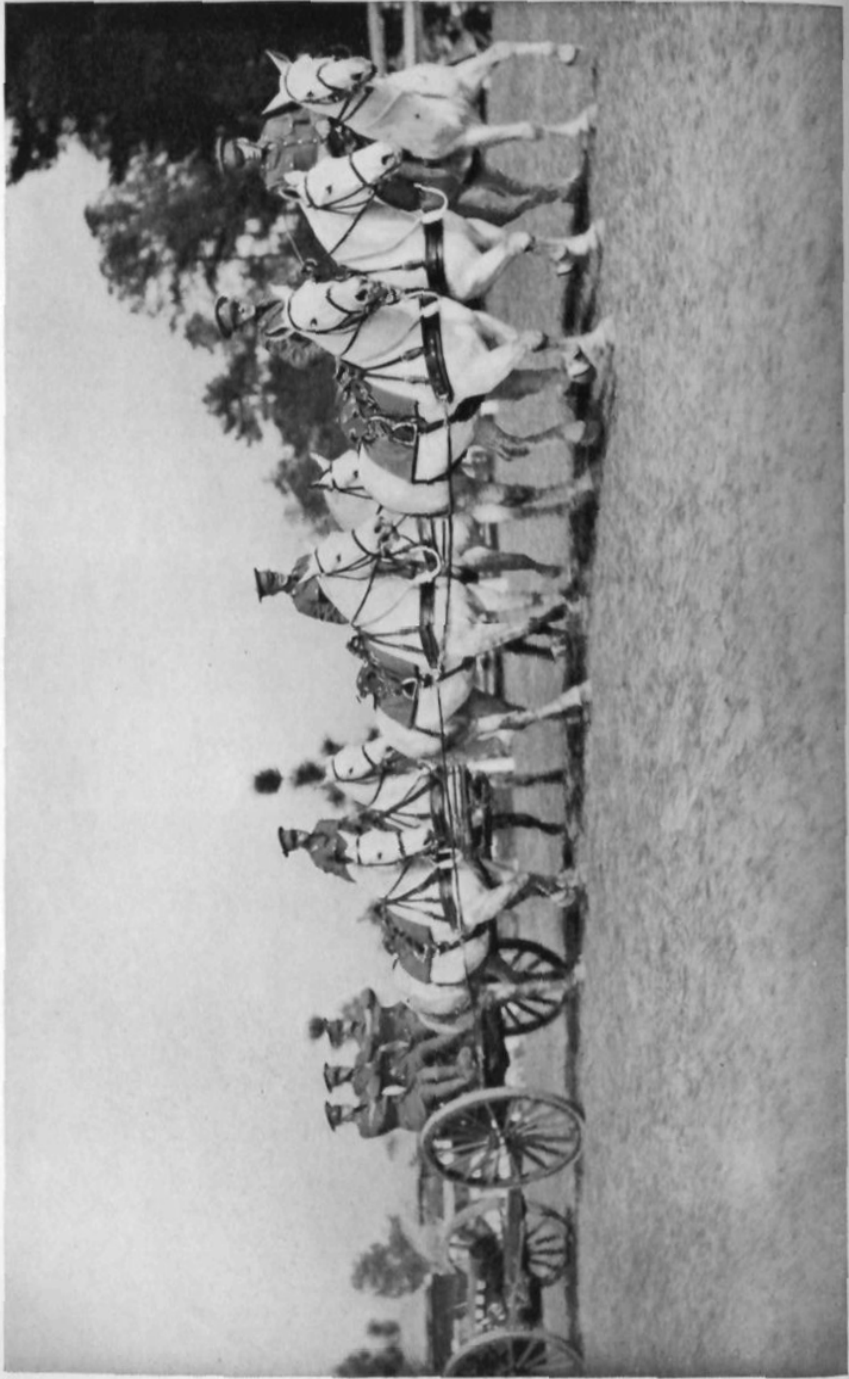
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# THE FIELD ARTILLERY JOURNAL

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VOL. XVII

JULY–AUGUST, 1927

NO. 4

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## FIELD ARTILLERY: PAST, PRESENT, AND FUTURE

BY GENERAL HERR OF THE FRENCH ARMY

(This is the second installment of the translation of General Herr's book.—EDITOR.)

### CHAPTER II, CONTINUED THE FIELD ARTILLERY DURING THE WAR

#### II. STABILIZATION—1915

TOWARDS the end of 1914, the recognized lack of artillery matériel, and especially the exhaustion of ammunition supplies caused the belligerents, in tacit accord, to temporarily suspend active operations, and to entrench themselves on the defensive, while waiting till resupply would permit resumption of the struggle.

Nevertheless the impatience of the French to free their national territory gave birth during the winter 1914–1915 to a series of local actions, and in the latter half of 1915 to a great offensive on a large front. The year 1915 can accordingly be divided into two distinct periods:

The period of local operations (winter and spring of 1915).

The period of large operations (fall of 1915).

#### *First period. Local operations.*

The first attacks undertaken were: Perthes (December-January), Soissons (January), Vanquois (February-March), Les Eparges (December-April), at Perthes again (February-March), Artois (May). These attacks were seriously defective in that they were conducted on too narrow fronts and with insufficient artillery.\* They were costly and the results were negligible. However they had advantages. They contributed to the education of the High Command and of the troops in the employment of artillery. They brought out the importance of liaison between artillery and infantry. They demonstrated the necessity for larger proportions of artillery and permitted the collection of data on the densities of fire necessary for the accomplishment of missions.

These lessons were profited by during the last of these attacks.

At Esparges, in April, there was a series of carefully conducted operations, in which each matériel was assigned judiciously chosen missions with ammunition expenditures commensurate to the results desired. As a result our infantry took an important enemy position with few losses.

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\* At Perthes, March 25, there were 109 heavy cannon on a front of 16 kilometers, or one piece per 146 meters of front.

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In Artois, in May, this new conception of the employment of artillery again demonstrated its worth. For six consecutive days 340 pieces of heavy artillery delivered on a front of 18 kilometers an artillery preparation which was planned in all its details, putting down on the enemy defensive organizations deliberate, carefully observed, and adjusted fire. On May 9th the infantry attacked with practically no loss and advanced several kilometers. In fact the enemy's lines were broken through, but on too small a front (6 kilometers) to allow exploitation. The heavy artillery was still lacking in sufficient mobility for it to participate in this exploitation and the infantry came up against new obstacles which it could not overcome with its own means. The enemy had time to bring up reinforcements and close the breach, and the game was up.

However this experience showed that "after a good artillery preparation, the infantry can advance with little difficulty, and if the attack is on a large enough front, it is possible to break through. The infantry's difficulties commence when the action of the artillery weakens." Up to the end of the war, the results of all the great battles, only confirmed the correctness of this statement. It is the field artillery which, dependent on the number, caliber and range of pieces employed, and on the density and accuracy of its fire, limits the depth of the infantry advance, determines the phases of its advance, and guarantees its success.

During all this period the light field artillery passed through a particularly difficult crisis. Ammunition of careful pre-war manufacture caused no accidents. It was otherwise with the hastily manufactured wartime ammunition. As soon as this was put in service there were accidents; premature explosions which swelled or burst the bores, killed a large number of our best gun crews, lowered the confidence of the personnel and threatened to progressively put all our matériel out of action.\*

Moreover the infantry, which in the beginning had neglected artillery support, commenced to recognize its value, demanded constant support and became more and more exacting. In the stabilized sectors the demands for barrage, for retaliation fire and for harassing fires became more and more numerous and this precisely at the time when a reduced artillery received a daily ammunition allocation of only a few rounds per piece and had to necessarily observe the strictest economy in the expenditure of ammunition.

Finally, because of their insufficient number, the artillerymen were always in the line. The infantry regiments of a division were alternately relieved and rested, but there was never any question of relief for the batteries which were felt to be too small in number to assure the security of the front. The newly born heavy field artillery rendered valuable service. Everywhere its assistance was demanded and everyone wanted to have it fire incessantly to reinforce the action of the light artillery. But the High Command, having future operations in mind and knowing the limited extent of our supply of heavy artillery ammunition especially in powder, reduced its allowances to a minimum and limited demands for its fire. The large calibers as well as the light guns could not satisfactorily meet the demands of the infantry and

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\* In Artois (May, 1915), in one morning, a battalion had to out of 12 pieces blown up. At the end of May there remained only 2400 75-mm. guns.

## FIELD ARTILLERY: PAST, PRESENT AND FUTURE

there frequently resulted misunderstandings whose bad impression lasted a long time.

### *Second period. Operations on a large scale.*

The program of October 14, 1914, commenced to bear fruit in the summer of 1915. The number of heavy field artillery batteries continually increased and we had in August, 272 batteries instead of the original 67. Thanks to the industrial effort of the country and to a studied economy, our ammunition stocks rapidly increased and reached satisfactory figures. The 75-mm. guns lost in the retreat in 1914, or destroyed by premature bursts of defective ammunition the preceding winter, were completely replaced. Trench artillery had been born and its organization was progressing well. Telephone material had been abundantly distributed to the artillery. The air service had increased and had perfected its methods of liaison with the artillery; the planes were equipped with radio and could satisfactorily perform fire adjustment for the artillery.

On the other hand, a better distribution of troops on a better organized and equipped front, and the creation of new divisions made up of territorial units, put more troops at our disposal so that a certain number of large units, divisions, etc., could be withdrawn from the lines. These units trained in rear areas, received replacements and were reequipped with excellent equipment. The army reached a high degree of perfection both as to matériel and morale.

At the same time the general situation had greatly changed to our advantage. The Germans, keeping on the defensive in the west, were fully engaged in Russia. Italy had joined in with us and the British had increased their army. It seemed that the hour had come to make a vigorous effort so that Roumania, Greece and Bulgaria would remain neutral or perhaps even join in with us.

On the initiative of France, an interallied conference was held at Chantilly on July 7th. The proposal of General Joffre for a big offensive as soon as possible on the Anglo-French and Italian-Serbian fronts, was adopted.

On the French front, this decision led to the September battles in Champagne and Artois.

### *The Battle of Champagne; September 25th, 1915.*

Profiting by the experience acquired May 9th in Artois, the French command decided to extend the fronts of the attacks to correspond to the troops available, and especially to correspond to the quantity of heavy artillery which could be placed at the disposal of the attacking armies.

The II and IV Armies, which were to attack in the Champagne had:

- 1100 75-mm. guns.
- 872 heavy artillery cannon.

or:

- One 75-mm. gun per 32 meters of front
- One heavy cannon per 40 meters of front.

Extreme importance was attached to the artillery preparation preceding the infantry attack. This preparation was carefully drawn up in detailed orders which were real *plans of employment*: plans for the destruction of barbed wire entanglements and their flanking defenses;



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counterbattery plans, destruction before the attack, and neutralization during the attack; plan of accompanying fires and protective fires for the infantry.

Three days were given to the artillery for this preparation. It commenced September 22d and was methodically conducted against a strongly organized front bristling with intricate defenses. The artillery, well supplied with ammunition, could fire without counting each round.\* The enemy artillery, completely dominated, reacted very little.

At 9.15 A.M., September 25th, in spite of rain during the night which rendered the ground very slippery, our infantry advanced with no trouble over the whole front and with magnificent spirit submerged the German front lines which were overrun on a front of 14 kilometers. But when it reached the second position, which, established on a reverse slope, had escaped the artillery preparation and was nearly intact, its difficulties commenced. Without giving the artillery time to deliver a new preparation, our ardent troops, flushed with their first success, battered themselves in vain against this second position and suffered cruel losses. Warned by the long three-day preparation, the enemy had hastily brought up his reserves to the zone of attack, and succeeded in closing the breach and reestablishing himself. The methodical attack of the second position was resumed on October 6th, but, in spite of local successes, it was checked and the High Command, knowing that this nice tactical victory could not be the decisive battle, ordered the operations to stop in order to avoid too great losses.

### *The Battle of Artois; September 25th, 1915.*

The X Army attacked north of Arras on a front of 15 kilometers with a view to occupying Vimy Ridge and turning Lens from the south while the British turned it from the north by attacking in the direction of Loos.

This attack was secondary to that in the Champagne. Nevertheless, because of the strength of the enemy defensive organization, the density of artillery was about the same. The X Army had about:

500 75-mm. guns.  
400 heavy cannon.

or:

One 75-mm. gun per 30 meters front.  
One heavy cannon per 36 meters front.

The artillery preparation was organized along the same lines as that in the Champagne, but with some variations in execution. As in the Champagne, at first the advance progressed smoothly towards Vimy Ridge. However, the crest could not be taken; the enemy rapidly brought up strong reënforcements, the fighting became very severe, ammunition began to give out, and the High Command halted operations.

### LESSONS

In the first months of stabilization, the light field artillery, whose peacetime training, as stated in the first chapter, was exclusively for moving warfare, suddenly found itself having to solve problems for

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\* The artillery fired from the 22d to the 27th of September:

1,387,350 rounds of 75-mm.  
265,483 rounds of 95-mm. and 155-mm.  
30,317 rounds of 220-mm. and 270-mm.

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which it was not prepared. It had to adapt itself to new and unforeseen tasks, learn the methods of siege warfare, organize the important command, liaison, and observation telephone nets, often with improvised means, and learn how to build emplacements for its guns and dugouts for its personnel. In this evolution of combat methods, the fortress artillerymen, to whom these problems were in general more familiar, often served as instructors to their comrades in the light field artillery; but the fortress artillerymen often found themselves confronted by unforeseen difficulties. A gigantic intellectual effort was necessary. All worked arduously, perfecting instruction, learning that which had been ignored or forgotten, adjusting old methods to new requirements, sometimes creating the necessary methods.

The problems of fire, especially, absorbed everyone's attention. It had become necessary to fire on unseen targets, and at night, and above all, because the lines were so close together, the fires had to have great accuracy so as not to hit friendly troops. These fires could only be delivered by using the map. But the General Staff map, scale 1/80,000, and even its enlargement on a scale of 1/50,000, were inadequate. The necessity for detailed, accurate, large scale maps was keenly felt. The troops in the line often prepared these themselves\* pending the distribution of artillery firing maps by the survey units. This issue commenced in the spring of 1915.

These fires also required the use of range tables which until that time had been neglected. Pre-war field artillery firing methods gave no consideration to atmospheric conditions. It was quickly noted that the wind, temperature, and atmospheric pressure affect the trajectory and their influence was studied. Very soon, the results of the great number of verifying adjustments which all had to conduct daily, showed that the pre-war range tables were incomplete, and even oftentimes in error. The High Command requested that the War Department have the range tables carefully revised.

At the same time the question of effect of fire was studied. The peace-time firing regulations were almost silent on this subject for the reason that no one thought that the field artillery would ever have to attack such varied and unexpected targets. The local operations in the last part of 1914 and in the early part of 1915 offered the opportunity for tests which furnished the first experimental data on the density of fire necessary for the accomplishment of missions: wire cutting, destruction of trenches, destruction of dugouts, etc.

An attempt was made to deduce from this data, the artillery strength necessary to assure the success of an operation, and in so far as existing resources permitted, there began a rational increase in the proportion of artillery, with respect to the other arms.† It was appreciated that to succeed, a numerous artillery with appropriate matériels for all foreseen missions, was necessary. It was further necessary that this artillery be abundantly supplied and resupplied with ammunition. Finally it was understood that fires must be judiciously planned and not left to the inspiration of the moment, and that it was necessary to foresee in space

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\* For example in the II Army on the Picardy front, in December, 1914; in the 12th Corps in the Champagne, the beginning of 1915, etc.

† We have seen the constant increase of this proportion during 1915; we will see that the proportion kept on increasing up to the end of 1917.

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and in time what fires should be executed and to methodically plan them, leaving nothing to chance.\*

The two large operations in the fall provided a general test of our methods of offense. They showed that the methods deduced from the earlier attacks, particularly the attack in Artois, were correct for the beginning of an operation, since the first position was always taken; but they also showed that the taking of rear positions presented problems which we did not either know how to solve, or, often, even clearly foresee.

### MEASURES TAKEN TO CORRECT DEFICIENCIES

*Bowing up of Cannon.*—The most urgent measure to take was the determination of the cause of burst cannon and the remedying without delay of the malfunctions which caused them. This was the work of the spring of 1915. However, the bursts never did entirely cease, for their causes were many and varied with manufacturing processes, and they kept up until the end of the war.

*First Organization of Heavy Artillery.*—Program of August 5th, 1915. The partial completion of the program of October 14th, 1914, had already furnished by the end of July, 1915, 272 batteries of heavy field artillery (246 horse-drawn, 26 tractor-drawn). These batteries were, in general, equipped with old model cannon, with the exception of a few batteries of 105-mm., Model 1913, and of 155 C.T.R., Model 1904.

These resources were far from being adequate, and the Commander-in-Chief requested the ordering of modern matériels, especially the 155 howitzer. Models of two types of this matériel had been built before the war, one by the Schneider Company, and the other by the Saint-Chammond Company. Without waiting to determine the respective merits of these two cannon, and in order to gain time by having all the factories working simultaneously, the Commander-in-Chief's recommendation was approved that both types be constructed, and that the organization of units to be equipped with these matériels be actively pushed. The units were even organized without waiting for the delivery of the new matériels and they were temporarily equipped with available old matériels.

There were thus to be raised as soon as possible:

- 100 batteries of heavy tractor-drawn artillery.†
- 400 batteries of heavy horse-drawn artillery.

These units, organized in battalions, but not yet into regiments, were temporarily attached to armies which reassigned them to corps according to the requirements of operations. However, during the September offensive, it was recognized that this attachment of short duration, had

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\* This was the origin of the *Plans of Artillery Employment*, which later had such a development, and on which we will touch from time to time to note some details of the evolution.

† Let us remember that at mobilization there was only one tractor-drawn battalion of four batteries, each with 6 120-mm. guns, Model 1878. At the close of 1914 there were 8 battalions, of 2 batteries, of 6 guns each. At the time of the offensive of September 25, 1915, the tractor-drawn heavy artillery consisted of 19 battalions, 6 in Artois with a total of 64 cannon (48 120 mm. guns; 8 100-mm. guns; 8 155-mm. howitzer) and 11 in the Champagne with a total of 116 cannon (84 120-mm. guns; 16 100-mm. guns; 8 155-mm. guns; 8 220-mm. mortars). Of the other two battalions, one was on the Aisne, the other on the Somme.

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many disadvantages administratively and tactically, and it was decided to organize the battalions into regiments. There were to be organized, beginning October 1st:

(a) Twenty regiments of horse-drawn heavy artillery. Each regiment to consist of twenty batteries organized into three groupings.

Two of these groupings to consist of 5 batteries each (3 batteries of 105-mm. guns and 2 batteries of 120-mm. guns); it was intended that each of these groupings would constitute the heavy artillery of an army corps.

The third grouping to consist of 10 batteries (theoretically: 2 battalions of 2 batteries each, of 155-mm. guns, and 2 battalions of 3 batteries each, of 155-mm. howitzers); this grouping was either to be assigned as the heavy artillery of an army, or to remain under the direct orders of the Commander-in-Chief.

(b) Five regiments of tractor-drawn heavy artillery, each consisting of 12 gun batteries and 12 howitzer, or mortar, batteries. These regiments received such matériel as was available from stocks accumulated by stripping the fortresses, by new manufacture, and by modifications of old matériel.\* This tractor-drawn artillery was to be the mobile reserve of the Commander-in-Chief and of the Commanders of groups of armies.

Such was the first organization of our heavy field artillery. This general framework permitted of utilization of existing stocks of matériels, new organizations were incorporated as they were raised, and modern matériels were added or little by little substituted for old ones.

The organization of the tractor-drawn artillery into 5 regiments was merely a temporary expedient. Hardly a month had passed before it was decided, November 1st, 1915, to organize 10 regiments, numbered from 81 to 90, each consisting of 6 gun battalions and 6 howitzer battalions, all of 2 batteries each. However the organization of these units took a long time and was only completed in April, 1918. It is easily understood how an organization as complicated as tractor-drawn heavy field artillery could not be improvised overnight. Although the stripping of fortresses immediately provided old model guns in quantities sufficient to fill the gap until modern guns were manufactured, and although the same source also furnished a personnel of noncommissioned officers and gun crews from the fortress artillery (active, reserve and territorial) which was capable of absorbing large reinforcements coming from the light field artillery, infantry and cavalry, the question of automotive matériel, tractors, trucks and reconnaissance vehicles, and especially the question of drivers and mechanics, gave rise to endless difficulties. It was necessary to procure for the tractor-drawn artillery alone, more than 1800 tractors, 8500 other automotive vehicles and around 15,000 drivers† and this had to be done simultaneously with

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\* Pending manufacture of modern matériels, the batteries were armed mostly with 120-mm. guns and some with 155-mm. guns, 155-mm. howitzers, 220-mm. mortars and even 100-mm. naval guns.

† In order to recruit and train drivers, a drivers' school was started in November, 1914, at Vincennes. This school, up to the time of the Somme Offensive in July, 1916, furnished the tractor-drawn artillery with more than 10,000 trained men, many of whom had had no previous experience, but were often simple farmers who knew nothing about motors.

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raising the other automotive units which had to be built from the ground up during the campaign (truck trains, auto-cannons, high-powered heavy artillery, and, later, portée artillery, tanks, etc.).

*Codification of Doctrines.*—From the various offensives in 1915, the High Command and the artillery learned valuable lessons in the tactical and technical employment of artillery. Two regulations of great importance, based on these lessons, came out at the end of the year or early in 1916—*The Regulations of November 20th, 1915, on the Employment of Heavy Artillery*, and *The Regulations of January 16, 1916, on the Conduct of a General Offensive*.

The Regulations of November 20th, 1915, laid down the principles of organization of artillery command in battle. They made official those methods of counterbattery organization which had already generally been adopted by commanders. The fight against the enemy artillery, the necessity and efficacy of which had been shown in all the battles of the year, was studied and regulated. It was set forth that, in principle, counterbattery should be conducted by the Army Corps, as being the smallest unit having a sufficient front to properly conduct it. It was provided that in each Army Corps there be organized an Artillery Information Service (S.R.A.) with the functions of collecting, coördinating, and rapidly exploiting, all information useful to the artillery concerning the various targets on which it might have to fire. Besides the information which the S.R.A. received from the front line troops, especially from artillery observation posts, and from the air service, the S.R.A. had its own agencies: sound-ranging sections and flash-ranging sections (S.R.O.T.). These sections, still few in number, were really army units.

Relative to the technical side, the Regulations of November 20th, 1915, indicated accurate fires for destruction, to be obtained by aerial adjustment and by developing ground observation. They set forth the possibility of improving the accuracy of fire by the application of topographical methods, by using the same lot of ammunition, and by the calculation of corrections due to atmospheric influences.\* They thus were the first milestone on the fruitful road the artillery followed in 1917 and especially in 1918.

*The Regulations of January 16, 1916*, is the first official document which, correcting the errors of the Field Service Regulations of 1914, specified artillery preparation of attacks. They enunciated the following principles:

(a) A general offensive should consist of coördinated operations simultaneously conducted over large fronts and comprising a series of successive attacks, each of which necessarily is *limited in depth of advance by the possibilities of artillery preparation*.

(b) To prevent the enemy from bringing up reserves, constituting a new front and reestablishing himself, these attacks should follow each other as rapidly as possible. To this end, it is necessary to employ a considerable amount of artillery so as to limit the length

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\* Meteorological corrections, at this time, were furnished by the air service.

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of the preparation and that the artillery regain the ability to maneuver which had been lost in the long period of stabilization.\*

(c) Liaison between the artillery and infantry should be close and continuous so that infantry might always have artillery support. To this end artillery liaison detachments should be formed and maintained with the supported infantry. The command posts of the two arms should be close to each other.

The dearly bought lessons of the beginning of the campaign was the source of all these principles, which established a tactical doctrine distinctly different from that which served as a basis for our pre-war regulations. These principles contained the germ, if not the substance, of the evolution which developed during the war. If their application did not give results in 1916, it was because we did not have sufficient artillery, cannon and ammunition, to undertake attacks on such large fronts and to repeat the battering of the enemy's lines often enough to crumble them; also because the artillery yet did not have the technical methods which, later on, secured better results with less expenditure of effort, added the effect of surprise to the effect of mass, and almost entirely freed the artillery from the limitations of terrain and the influence of atmospheric conditions. It was not until 1918 that the artillery received at all completely the development recommended by the High Command in 1915; that the artillery, due to the Nation's effort, was in possession of perfected matériel; that the artillery, due to its own labor, was in possession of perfected firing methods; and not until this time had it acquired the power to assure victory.

*Creation of Training Centers.*—Tactical doctrines had been modified and firing methods perfected and it was essential that without delay all artillerymen be acquainted with these changes. Officers must be furnished for the numerous new units which had been created. Many new matériels were being issued to the service, with which all should be familiar. To sum up, the completion and unification of the instruction of all artillery officers was necessary. For this purpose, two kinds of schools were organized:

(a) At Chalons, Amiens and Toul, *heavy field artillery training centers* were organized to function from December, 1915, to February, 1916, inclusive. Field and subaltern officers from all elements of the army were ordered to these in successive classes. These officers were taught, the lessons drawn from the battle in Champagne, the Regulations of November 20, 1915, the firing methods of heavy artillery, what was known about improving accuracy of fire by use of ammunition of the same lot, calibration of cannon, range table corrections, etc. . . .

(b) In each army, a light field artillery firing center prepared young regular officers and the best reserve officers as battery commanders for the newly raised units, and to replace losses by combat or through reliefs for duty in the zone of the interior.

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\* It should be noted, as especially applicable to the heavy artillery, that many of our batteries as soon as they were mobilized were put on the front and, because of our paucity in artillery, had never since been relieved. Accordingly these batteries had never had a chance to maneuver, and could not justly be criticized for losing mobility which they had never had the means or time to acquire.

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These courses gave excellent results. In addition they uncovered the lack of homogeneity due to insufficient liaison between light and heavy field artillery. Accordingly, when the schools were reopened, after the interruption caused by the crisis at Verdun, care was taken to fuse together the two subdivisions of the arm.\*

### III. STABILIZATION (CONTINUED), 1916

The accomplishing of the artillery programs of October 14, 1914, and August 5, 1915, was actively pushed during the winter of 1915–1916. The French High Command counted on having *by the close of spring 1916*:†

- 4500 75-mm. guns.
- 2500 mobile heavy artillery cannon, horse- or tractor-drawn.
- 2400 cannon manned by the fortress artillery.
- 190 high-powered cannon.
- 60 naval cannon.
- 1200 trench mortars, 58-mm. and 150-mm.
- 350 trench mortars, 240-mm.

In the meantime the heavy field artillery and light field artillery training centers were training officers for the new units.

Ammunition stocks were built up rapidly.

Immediately after the attacks in September-October, there was undertaken a complete reorganization of the French front in order to strengthen it defensively, to put it in condition for the offensive, and to gain reserves. Large units were successively relieved from the front lines and rested in rear or trained in the great camps organized in November, 1915. These large units were located near railroad lines, all details for rapid movement were worked out, and thus they furnished a very mobile reserve for the High Command.

In addition, towards the end of 1915, the allied governments decided to maintain close contact by conferences, and the allied high commands united, with General Joffre presiding, to decide upon a common course of action. This action was translated into great offensives undertaken simultaneously, or at least at times sufficiently close together so that the enemy could not move his reserves from one front to another. In this way, it was decided early in February to conduct a great Franco-British Offensive astride the Somme about July 1st.

With the artillery strength listed above, the French High Command, on its part, planned an offensive on a 50-kilometer front south of the Somme.

However, the German High Command, in spite of its successes on the eastern front, appreciated that victory could only result by crushing France. It knew the Allies intended taking the offensive and wished

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\* As has been done in our Army by the National Defense Act.—EDITOR.

† This is another example of the great and inevitable delay between the adoption of an artillery program and its practical realization. To begin large scale manufacture it is necessary to adapt factories, construct or purchase machines, install them, get them in operation, supply raw materials, furnish workmen. The drafting work alone requires thousands of drafting man days (sometimes 15,000 to 20,000). It is six or eight months before the first complete unit is completed and three or four more months before quantity production is reached. Accordingly there was no exaggeration in figuring that the program of August, 1915, could not be completed before the end of spring, 1916. In fact, the time estimated was shown to be insufficient.

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to prevent this; it decided to attack Verdun before the end of the winter.

### (A) VERDUN, FIRST PHASE: FROM FEBRUARY 21ST TO JULY 1ST, 1916

In order that the Crown Prince might surely take the fortress of Verdun, which escaped him in 1914, the Germans brought formidable resources into play; to those units already in the sector, they added four specially trained army corps of shock troops. The attacking troops were supported by the largest array of artillery which had been seen up to that time, comprising more than a thousand heavy cannon of all calibers, of which the greater part were 380-mm. and 420-mm. mortars. Taking advantage of the wooded nature of the region and of the long nights, to hide preparations from our aerial observation, this artillery was deployed with the greatest secrecy.

At 7 A.M., February 21st, a bombardment of unheard of violence began which lasted nine hours. Fire and communication trenches were almost completely obliterated. The defenders were forced to take shelter in their dugouts and the front lines were completely isolated from the rear. The infantry attack was launched at 4 P.M. Some of our front-line units were surprised in their dugouts, but others valiantly defended their positions. Our 75-mm. guns, firing at good range and often with direct laying, on the attacking masses, caused enormous losses. The enemy did not make much of an advance.

The following days the bombardment was resumed with the same intensity and continued to disorganize our lines and wear out their defenders. Each artillery preparation was followed by an infantry attack. Undergoing frightful losses, the enemy thus advanced slowly until February 25th and took by surprise Fort Douaumont, which was not defended.

Beginning with the 26th of February, the arrival of reinforcements resulted in stopping the enemy along the line, Hill Talou—Hill Poivre—Haudremont—Douaumont—Hardaumont.

The operation having been stopped in the center, the Germans resumed it on the two flanks, Mort-homme and Hill 304 on one flank, and Fort Vaux on the other. All through March they battered themselves against these two regions, always employing the same method—an extremely violent bombardment in which hundreds of thousands of shell were fired in a short time on the points to be attacked, and infantry attacks in mass, following these bombardments.

In the beginning, the enemy suffered cruelly from our 75-mm. barrages; they then attempted to obviate these losses by preceding all their attacks with fire for destruction on our artillery. These fires, executed by massive concentrations from several units of different calibers, were extremely murderous to our batteries, several of which literally went up in thin air, guns and gun crews.

On our side, we too tried, by similar methods, to destroy the enemy artillery, but the lack of range of our cannon rendered the task difficult.

The only result obtained by the Germans in March was the taking of the slopes of Mort-homme.

A general attack astride the Meuse, April 9th and 10th, mounted on the same elaborate scale as that of February 21st, succeeded only in taking the top of Mort-homme. The German losses were great, and



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during the rest of April, the enemy confined himself to local attacks, which were violent but without great results.

In May, the improvised positions which we had taken during our withdrawal, commenced to be solidly organized. The artillery, which had been severely tried in the first attacks, was partly reconstituted. We received reënforcing heavy artillery and could take a more aggressive attitude. The Germans kept up their attacks, and there resulted oscillation back and forth around Mort-homme, Hill 304, and Fort Douaumont.

In June, the Germans, seeing the Allied attack on the Somme coming, tried to finish Verdun at any cost. Their objective was the plateau running from Souville to Fleury which still covered Verdun on the northeast. They first attacked Fort Vaux, June 1st to 7th, and then, June 8th, the region Thiaumont-Fleury-Souville. The most critical days for us were June 22d and 23d; after a formidable artillery preparation, the Germans reached the outskirts of Fort Souville, but could not take the fort itself and they could not go on, for the great Allied attack on the Somme was launched and they were obliged to divide their forces.

### LESSONS

The Germans at Verdun used, in the main, the methods we had inaugurated the year before in the Champagne and in Artois; utilization of numerous and powerful cannon, massive fires for destruction, artillery preparations preceding all infantry attacks. However their richness in heavy artillery, equipped with modern rapid-fire, long-range matériels, allowed them to perfect these methods and to considerably increase their suitability and power. The long-range of their cannon facilitated putting down converging concentrations which had a marked matériel and morale effect. The length of their artillery preparations were considerably reduced without any sacrifice of effect, thanks to the rapidity of fire of their cannon, which allowed firing in a few hours, a tonnage of ammunition which took days to fire with slow fire cannon.\* Thus the initial preparation, on February 21st, lasted nine hours and was appreciably more violent than our preparations in September which lasted three days. This reduction in duration gave the precious advantage of conserving for the attack, strategical surprise; for, in just a few hours, the enemy has not the time to move his reserves and reënforce the menaced zone.

Moreover it should be noted that the Germans, knowing from personal experience the preceding year, how valuable it was to the defender to be warned long in advance of the enemy's projects, took the most minute precautions at Verdun not to reveal their intentions; the attack preparations, various offensive installations, artillery reënforcement, accumulation of ammunition stocks and supplies of all kinds, entry into lines of the attack troops, all these were executed by them with remarkable discretion, adroitly taking advantage of the wooded nature of the terrain and of the long winter nights. Although they did not deceive our local command, whose attention was attracted by a thousand significant indications and who warned General Headquarters,

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\* It may even be stated that reducing the duration of fires increases their efficiency, the moral effect of losses being inversely proportional to the time during which they occur.

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they at least succeeded in leaving our High Command in doubt and indecision. They thus obtained at least strategical, if not tactical, surprise, and the shortness of their artillery preparation assisted in this surprise.

During their initial attack the German counterbattery was not particularly strong. Our batteries were often caught under violent fires, but they seemed to be zone fires without any particular objective. This cost the Germans dear. Our 75-mm. batteries, which had in part escaped this indiscriminating preparation, remained for the most part capable of firing and well showed it at the beginning of the attack which was particularly murderous to the German Infantry. But the Germans quickly realized the error they had committed and in subsequent attacks they undertook the methodical destruction of our artillery by concentrations of an unheard of violence. The result was in accordance with the effort expended and whole battalions of our artillery were frequently obliterated or, in any event, rendered practically powerless. This demonstration of brute force conquered the resistance of those among us, still numerous, who, in spite of the reiterated advice of the best artillerymen, still refused to believe in the efficacy of counterbattery.

So, the experience at Verdun, where we were on the receiving end of the enemy fires, supplemented that of 1915 when we were on the sending end. This experience moreover fully confirmed the former lessons and again gave us, this time in the flesh, valuable data on the densities of fire required to obtain a certain result, as for example, to surely put out of action an enemy battery, to stop an infantry attack, etc. . . .

The Germans demonstrated the irresistible offensive power of artillery; the French showed its unquestionable defensive power. And, it was recognized that, on the offensive or defensive, power was a function of the number of cannon used and the tonnage of ammunition consumed. The false idea, or at least falsely interpreted, of the *individual power* of the rapid-fire gun and its *absolute efficiency* over a front corresponding to sweeping fire, was definitely abandoned. Even where there was no infantry, the 75-mm. barrages alone had often succeeded in stopping the enemy assault echelons, but only when one battery did not have to defend more than 100 meters front. This was far different from the 800 or 1200 meter, or even greater, fronts, which were assigned certain barrage batteries on other parts of the front.

But the conclusion was soon reached that in place of limiting ourselves to stopping attacks, it was much more logical to prevent them from taking place. Experience showed that every serious attack was preceded by the assembling of assault troops in the front lines and the arrival of reinforcements with which the attack was to be fed. For the defense, the best solution was to profit by this preliminary assembly of assault troops on the base of departure, where their massed condition rendered them particularly vulnerable, and to crush them with fire before they could assault. As for the reinforcements, instead of awaiting their arrival, it was much better to block them off by dense fires put down on points they must pass, such as defiles, trench intersections, crossroads, narrow valleys. Finally the enemy artillery must not be allowed to execute its preparation unhampered but an attempt should be made to at least hinder it. These preventative fires as a

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whole, constituted a veritable counter-attack with fire executed during the enemy artillery preparation. They were in fact a *counter-preparation* and this name was, with good reason, officially given them at Verdun. One very clear lesson drawn from all these engagements was the importance of heavy concentrations of fire. One quickly becomes accustomed to a continuous fire of light density, which can be escaped by taking shelter or by leaving the beaten zone, and the losses from which, scattered over considerable time, can be replaced as they occur. But one cannot become habituated to massive avalanches of shells, suddenly arriving from several directions at the same time, leaving no time to take shelter, and in a few minutes causing serious losses which disorganize units for considerable time. These losses, by their suddenness, have a demoralizing effect which even the best troops overcome with difficulty.

The two opposing artilleries employed such concentrations. But, as we have noted before, the French artillery was handicapped by the short range of its matériels which frequently prevented using an adequate number of cannon in the same concentration.

More and more range, larger and larger calibers, rapidity and more rapidity of fire, greater and greater numbers of cannon, more and more ammunition: such was the lesson of Verdun. Such was the path which everyone became more and more convinced must be followed.

But the deployment of a powerful artillery armed with perfected cannon and richly provided with ammunition accomplishes nothing unless this redoubtable mass is ably handled by the Command, and unless its immediate commanders know how to make the most of its qualities. Relative to this, the battle of Verdun brought to light grave errors in our tactical doctrine and in our technical training, errors which the offensive battle of the preceeding fall had already disclosed, but the gravity of which had been hidden by an undoubted tactical success.

In the offensive, where one keeps the initiative, in which one acts according to a prepared plan and under conditions well known to all engaged, and in which the adversary submits to the will of the attacker and can only parry his thrusts, the artillery as a whole preserves freedom of action and its rôle is relatively easy; the errors that it may commit are compensated for by the superiority of means it always possesses, at least in the beginning; these errors have only minor consequences and are forgotten in the general success.

The defensive, on the contrary, is burdened with the other end of the mortgage, and suffers all the inconveniences thereof. In particular, the engagement of the artillery and its conduct of fire is a perpetual improvisation. It has, unceasingly, new and difficult problems, for which it must instantly find an adequate solution under penalty of not fulfilling its mission and often, of being crushed and destroyed; the least error may be fatal.

The difficulties of the defensive were well demonstrated at Verdun. The violence of the first German attacks forced the French High Command to throw into the battle many large units (divisions, etc.) reinforced by any non-divisional artillery which might be available. The rapid usury of effectives and the prolonged fighting required frequent reliefs, incessantly repeated. As a consequence, especially in the first few weeks, the infantry of divisions, being generally brought

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up in trucks, went into action before its artillery could arrive. This infantry melted away like wax and was soon withdrawn from the front. Its artillery in its turn went into action, but under strange commanders. The artillery was more slowly used up than the infantry, however it stayed in line longer and often supported several divisions successively.

The following consequences resulted from these conditions:

All commanders of large units and of artillery groupings had to handle much larger quantities of artillery than they were accustomed to.

Tactical relationships between organizations were constantly broken up.

Any methodical preparation of the artillery's entry into action was impossible because of the defensive form of the battle.

To meet these difficulties, uniformly instructed, perfectly supple artillery, capable of instantly conforming its fire to the exigencies of a constantly changing situation, was necessary. It was necessary that the artillery groupings, placed sometimes under this commander, and sometimes under that commander, all talk the same language and be exactly interchangeable. Finally a common tactical doctrine to govern, in the absence of orders due to the continual rupture of liaison, was necessary, so that all artillerymen faced by a certain situation, would react in the same way.

Instead of all this, what did we have?

The artillery groupings successively attached to a large unit, did not know the ways of doing things in that unit. On the other hand, certain methods these groupings brought with them, which often had been tried out successfully in the preceding fighting, were unknown to the Command to which they were momentarily assigned, and there was not coördination between the command and the troops. Finally, when the interruption of communications put subordinate commanders on their own resources, these commanders, in default of a positive tactical doctrine, were hesitant or made unforeseen decisions, which were the cause of disorderly, uncoördinated, actions.

### MEASURES TAKEN TO CORRECT DEFICIENCIES

*Heavy Artillery Program of May 30, 1916.*—By the end of the spring of 1916 we already had, resulting from the partial accomplishment of the program of August 5, 1915, about 400 batteries of heavy field artillery. But there began to be a shortage of artillery reservists as the class of 1914 had all been assigned to the infantry and none to the artillery. A personnel crisis threatened in the artillery and necessity required transfer of men from other branches, dismounted cavalrymen, incapacitated infantrymen, men from the supply branches, etc., etc. . . .

On the other hand most of the newly organized units were still armed with old matériels. The preceding winter a large number of modern matériels had been ordered manufactured.\* The Schneider

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\* As follows:

440 105-mm. guns, Model 1913.

500 155-mm. howitzers, Schneider and Saint-Chammond, Model 1915.

40 220-mm rapid-fire mortars, Model 1915.

62 280-mm. mortars, Model 1913.

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works had delivered nearly all the 105-mm. guns, part of which as we have seen above, were on order before the war. With this exception the completion of all these matériels was greatly behind expectations:

The delivery of 155-mm. howitzers which was planned to begin in March did not actually start until May;

The manufacture of the 155-mm. gun, G.P.F., had barely started;

The Creusot Company had stopped the manufacture of 155-mm. guns Model 1877-1914, in order to manufacture a more powerful gun, the first units of which did not arrive at the front until early in 1917, under the name of the 155-mm. gun M. 1917, and which was not delivered in quantity until the end of 1917;

The 220-mm. rapid fire mortars did not appear on the front until March, 1917;

Finally, one battalion of 280-mm. mortars, ordered before the war, was ready in February, 1916, but at the end of that year there were only a total of five battalions.

In the meantime Verdun had unquestionably shown the importance of heavy, rapid fire, long range, matériels. Accordingly the Commander-in-Chief authorized, May 30, 1916, a program for the organization of heavy, rapid fire, field artillery along the following general lines:

The heavy field artillery was to consist of:

1st. Twenty horse-drawn regiments each consisting of:

Two army corps heavy artilleries each with two battalions of 105-mm. guns and two battalions of 155-mm. howitzers.

One army heavy artillery consisting of two battalions of 155-mm. guns and two battalions of 155-mm. howitzers.

All these battalions were, in theory, to have three batteries.

2d. Ten tractor-drawn regiments, each consisting of:

A gun grouping (six battalions of 155-mm. or 145-mm. guns).

A howitzer grouping (four battalions of 220-mm. and two battalions of 280-mm.).

All these were to be two battery battalions.

This organization took into account the acknowledged necessity of having:

Rapid fire howitzer units capable of preparing the infantry attacks and mobile enough for the changes of positions required in an attack of the enemy's positions;

Long range gun units powerful enough to counterbattery distant, casemated enemy batteries;

Very powerful howitzer units to destroy especially strong points, particularly those with concreted dugouts.

The conclusions of the official report on this program ended as follows:

"The above program represents only a part of that which will finally be essential to meet all requirements recognized as necessary. This final organization should provide two battalions of 155-mm. howitzers for each Infantry Division and a four battalion regiment of heavy guns (two battalions of 105-mm. and two of 155-mm.) for each army corps. The tractor-drawn heavy artillery should remain apart as a reserve at the disposal of the High Command."

However on May 30, 1916, there were in existence only a very

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small part of the matériel necessary for the complete realization of this program and it was necessary to manufacture what was lacking, as follows:

- 960 105-mm. guns.
- 2160 155-mm. howitzers.
- 1440 155-mm. guns.
- 320 220-mm. mortars.
- 80 280-mm. mortars.

But all that the two great Creusot and Saint-Chammond establishments could promise was 60 155-mm. howitzers per month, and the manufacture of the other cannon was still slower. Many months were to pass before the manufacture was completed, in fact, the armistice came before the program was accomplished in all details, and we were to once more learn to our cost that modern artillery cannot be improvised and that it is extremely dangerous to await the time it is needed before starting its construction. Once more it should be noted that every matériel included in the program of May 30th had been designed and several units had been built before the war and all that was necessary was to start quantity production of a design whose development was complete.\* Had it been necessary to create this artillery from the ground up, that is to say, to make all the preliminary studies, to go through all the indispensable design work, to conduct the service tests, a year or eighteen months more would, undoubtedly, have elapsed before the program was accomplished.

While waiting the progressive delivery of the new matériels we had to make the best of existing matériels, and since the greatest defect of our old cannon was lack of range, the Ordnance made an effort to improve them in this respect: the carriages were modified to permit of increased angles of elevation and to withstand stronger powder charges; muzzle velocities were increased; the shapes of projectiles were improved so as to lessen air resistance and thus increase range. Considerable improvement was obtained but not enough, however, to make our old matériels equal to the German matériels.†

*Regulations of May 27th on the Employment of Artillery in the Defensive.*—  
In order to standardize and coördinate the methods of

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\* It is interesting to note that since the war the U. S. Field Artillery has been striving to bring the development of a new series of modern matériels to the modest status so depreciated by General Herr, and that far from depreciating such a status, we would, in this era of limited funds, consider ourselves fortunate in attaining it.—EDITOR.

† The following table shows the results obtained and the ranges of similar German guns:

French guns				German guns	
Caliber	Former range	New range	Gain in per cent.	Caliber	Range
90 mm.....	7700 m.	10500 m.	36	.....	.....
120 mm.....	9200	12400	34	13 cm.	14400 m.
155-mm. Gun M 1877..	9800	12700	30	15 cm.	} 15600 m.
155-mm. Gun M 1877— 1914.....	9800	13500	37	On carriage with shields	
155 mm. Howitzer M 1881–1912 .....	6200	7800	25	15 cm. howitzer	8300 m.

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employment of artillery in the battle of Verdun, the commander of the Army of Verdun had prepared brief regulations which were to be given all new units arriving in the sector. These regulations, based on the experience of the first two months of the battle, were immediately accepted by the Commander-in-Chief, and made authoritative for the whole French army. In them are found stated for the first time, the principles for the employment of artillery in the defensive battle; organization of command, defensive fires (barrage and counter-preparation), counterbattery, concentrations.

*Center of Artillery Studies.*—We have enumerated above the deficiencies in the instruction of our commanders relative to the employment of artillery, which were shown to exist by the battle of Verdun. General Petain, impressed by the seriousness of these deficiencies, decided in May to give General Herr the mission of remedying the situation, by creating an organization charged:

With collecting the information necessary for studies concerning the employment of artillery;

Aided by this information, with defining how the artillery should be handled in battle, that is to say, placing artillery tactics on a firm foundation;

With examining the methods of employment which had been devised here and there under the pressure of circumstances, if necessary submitting them to methodical experimentation, which battle conditions would not allow; with retaining such of these methods as proved themselves and after approval by the High Command, to indoctrinate them. In a word, to establish unity of doctrine;

With perfecting the technical instruction of artillery officers, making them familiar with the results of studies on firing questions, and with all progress made in the arm;

And finally, with informing the commanders of large units as to principles of employment of artillery, drawn from the above studies.

The institution thus created under the direction of General Herr opened June 8th, under the name of the *Center of Artillery Studies*. It was at first intended for officers of the Group of Armies of the Center, but on June 27th it came under General Headquarters and received officers from all the French armies. Very soon, its usefulness was universally recognized, and the services it rendered were everywhere appreciated. Its reputation grew and the allied armies sent officers to attend it, a fruitful measure which had the most fortunate results.

This organization was from the beginning, not run as a School, in the sense of having professors charged with teaching an inspired doctrine on the one hand, and on the other, students docilely and passively accepting this instruction. Its aim was to be a center of mutual instruction where the attendants, general and field officers of all arms, came to refresh themselves and become acquainted with the latest ideas, but above all to place in common their experiences acquired at different parts of the front under diverse conditions and on varying terrain; they were invited to present their opinions on all questions concerning the employment of artillery and to justify them; their ideas were listened

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to, courteously discussed, and if they merited, were adopted and promulgated; so each was an instructor for the others.\*

### (B) FRENCH OFFENSIVES

#### *The Somme; July–November, 1916*

In spite of its violence, in spite of the usury of our effectives, in spite of the anguish to which it gave birth at various times, the battle of Verdun did not cause the French High Command to abandon the idea of the combined attack decided on the winter before and which was to be delivered, in concert with the British, astride the Somme. However, the terrible fighting on the Meuse resulted in a considerable reduction in our resources and an offensive on the large scale originally planned was no longer practicable as far as we were concerned. The front of attack which was originally planned to be 50 kilometers was, after all the successive reductions required by our diminishing resources, brought down to 15 kilometers. However, the number of available divisions and our resources in artillery allowed us to take advantage of the lessons of Verdun and to support the attack on this 15 kilometer front with a density of fire greater than had been used in the Champagne.

The artillery deployed by the VI Army, which was to make the attack, consisted of:

- 444 75-mm. guns.
- 228 heavy howitzers.
- 300 heavy guns.
- 56 heavy high powered mortars.
- 61 heavy high powered guns.
- 360 trench mortars.

or:

- One 75-mm. gun per 34 meter front.
- One heavy cannon per 28 meter front.
- One high powered heavy cannon per 120 meter front.

The artillery preparation began on June 24th and lasted seven days. The attack was launched on July 1st. The infantry penetrated the enemy lines with few losses, easily reached the assigned objectives and got ready to go on as soon as the artillery had once more prepared the way.

Unfortunately the British Army on our left did not meet with the same success. The French front was too narrow for further advance without the British and we were compelled to halt and wait until they had caught up with us.

The Germans, at first surprised by the violence of our attack, profited by this halt to summon reserves from all parts of the front. Little by little equilibrium was reestablished. From then on we had to advance by successive pushes which became more and more costly and less profitable, until in November bad weather forced us to suspend operations. In the battle of the Somme we were no more successful in breaking through the front than in our attacks the preceding year in

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\* The Center of Artillery Studies functioned at Vitry-le-Francois during the whole war with short interruptions caused by great crises which recalled all officers to their combat posts. It continued after the armistice, and in May, 1919, was moved to Metz where it continues to function with great benefit for the instruction of the Command and of artillery commanders.



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Artois or in the Champagne, or than were the Germans in their Verdun offensive. Nevertheless the battle of the Somme had considerable effect, by using up the Germans materially and morally,\* by obliging them to divide their forces, and by disengaging Verdun. Several months later, the Germans tacitly admitted this usury and the anxiety it had caused and was still causing them, by voluntarily withdrawing to the Hindenburg line to shorten their front.

### *Verdun, Second Phase; August–December, 1916*

Our attacks on the Somme drew the enemy reserves and forced them to relax their efforts at Verdun. Our II Army immediately took advantage of this to take an increasingly offensive attitude. A series of well-prepared attacks resulted in regaining ground, little by little.

In order to more completely disengage Verdun, an attack was staged, the end of October, on a greater front (7 kilometers): the main objective was retaking Fort Douaumont from which the Germans could overlook Verdun. The preparation began October 21st and lasted three days. On October 24th our troops, attacking with marvelous dash, retook Fort Douaumont. November 2d, after a new artillery preparation, they entered Fort Vaux, in a few days reestablishing, with a minimum loss, our lines as they were early in March.

December 15th, a new attack, preceded by a four-hour preparation, was launched on a 10 kilometer front. Our troops easily advanced and took all their objectives in the center and on the left. On the right, results were more difficult of accomplishment. Be that as it may, on December 18th we occupied, practically, our front as of February 25th. The Germans, beaten on the Somme, also saw taken away from them in a short time all that they had so painfully conquered at Verdun.

### LESSONS

All the offensives of 1916 are marked by a common characteristic; namely, the always more massive, and at the same time, always more methodical, employment of artillery. The infantry, noticing in each attack that their losses diminished as artillery support was augmented, unceasingly increased its demands: it demanded that the cannon destroy barbed wire and trenches, that it silence enemy cannon and machine guns, and finally that it accompany the advance step by step with a protective curtain of projectiles.

From then on the artillery had to deliver preparations for attacks, methodically organized to the last detail, with nothing left to chance. The enemy organization was thoroughly studied from aerial photographs to discover all their important points. Each of these points was dosed with the necessary quantity of projectiles of appropriate type and caliber. Missions were assigned to the various matériels in accordance with their characteristics.

These preparations were so violent that everything was destroyed, turned upside down, pulverized, and sometimes the terrain thus treated, transformed into a field of joining shell holes, became almost impassable for the infantry.

The infantry then went over the top, but it only advanced behind

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\* We do not know exactly the German losses in killed and wounded, however, some idea can be formed based on the captures of the French and British, which were upwards of 105,000 prisoners, 350 cannon and 1500 machine guns.

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a very dense rolling barrage, a veritable wall of projectiles which moved on before it and protected its flanks, neutralizing all the enemy's weapons before the infantry ran up against them, and stopping counter-attacks.

Before the attack the enemy's artillery was the objective of systematic *fires for destruction* whose object was to put out of action the greatest possible number of batteries; at the beginning of the attack those which had escaped destruction were taken under *neutralizing fires* which kept them from intervening and thus freed our infantry from their barrages which were so dreaded.

Finally, heavy long range cannon put down interdiction fires on the rear areas. These methodical bombardments had for their objects, stopping the arrival of reserves by preventing them from using routes of approach, and destroying camps, railheads, ammunition depots, etc.

To fulfill all these missions the artillery had to deploy a constantly increasing number of cannon. The assault divisions\* had 2 or 3 regiments of 75's, and from 12 to 15 batteries of heavy howitzers; the army corps each had from 20 to 25 batteries of heavy guns; more than 100 long range guns were attached to an army. In all, there were placed in line for the attacks about 70 cannon per kilometer whereas in the 1915 offensives only from 50 to 55 per kilometer were deployed.

Ammunition expenditures were in keeping with the number of cannon and with the work demanded of them: artillery preparations took an average of a ton of ammunition per running meter of front attacked. On the Somme from June 24th to July 10th, there were fired:

2,013,484 rounds of 75-mm. ammunition.

519,165 rounds of heavy artillery ammunition.†

And we will see that this logical development continued until it reached its culmination in October, 1917, at La Malmaison.

But the proportion of modern rapid fire cannon in our heavy artillery was only one-ninth by July 1st, and only one-fifth by December. Our old matériels put over these great quantities of ammunition at too slow a rate. Accordingly, in spite of the inherent disadvantages of long preparations, which excluded any possibility of surprise, the High Command could not reduce their length: they reached a length of seven days on the Somme, three and four days at Verdun, whereas the Germans, all of whose heavy artillery was quick firing, could abbreviate their preparation on February 21st to nine hours, and as we have seen, this preparation was successful.

Another cause figured in slowing up preparations. Our artillery was not yet prepared to deliver, with sufficient accuracy, fires which had not been adjusted by ground or air observation. All counterbattery, all fire missions on distant targets, and a great many fires for the

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\* These divisions had only three infantry regiments and the effective strength of the regiments was much smaller than was the case in the infantry regiments of the A.E.F.—EDITOR.

† On the day of attack, July 1st, the expenditures reached:

270,000 rounds of 75-mm., or about 2700 tons.

80,000 rounds of heavy artillery shell or more than 4000 tons.

30,000 rounds of trench mortar shell, or more than 1200 tons.

Total about 8000 tons, or the capacity of 27 trains of 30 cars each. This intensive firing was very hard on the matériels; from July 1st to October 24th; the VI army used up 746 cannon, burst or swollen.

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destruction of defensive works, required aerial observation. The number of available airplanes, the enemy aerial activity, and weather conditions, influenced the functioning of aerial observation and consequently the effectiveness of the artillery. Even with numerous aircraft, with good aerial observers, even when confronted by an inferior and completely dominated enemy aviation, even during good weather and long days, all of which conditions applied in July, 1916, this detailed work of adjustment and control, was extremely long and laborious.

The mission of the artillery for the initial attack, for which there was time and means to study, plan, and regulate all details, was relatively simple. As time passed and the attack progressed it became more and more difficult for the artillery to accomplish its mission. It must operate in a torn up region in which the enemy defensive organization could scarcely be determined from aerial photographs. Changes of position and ammunition supply must be accomplished in an absolutely chaotic terrain. Worse than all, the enemy artillery had had time to pull itself together, reestablish itself, and replace its losses.

Accordingly from these operations the lesson was drawn that only in the initial attack is there a good chance of seriously disorganizing the enemy. To accomplish this, the attack must quickly penetrate very deeply, in any event to the zone of enemy artillery deployment, so as to seize those batteries which had not been destroyed by fire, and thus hinder the reconstitution of the enemy artillery. But to obtain this result, our artillery must have a range greater than, or at least equal to, that of the enemy. However, during this whole year we were always in the opposite situation. It was for this reason that every one insistently demanded that the range of our cannon be steadily increased. In the meantime our cannon always had to fire at extreme range using the largest charge, which increased the wear on the matériel and accelerated its wearing out.

The heavy artillery must also be made more mobile. What we were using was not, correctly speaking, heavy field artillery: all of these old matériels had been designed for siege and garrison artillery, and their mobility was insufficient for them to follow the infantry after its first advance, especially in the pock-marked terrain resulting from great artillery preparations.

Finally, the battle of the Somme clearly showed that we did not have enough artillery. In a battle several months long, batteries must be relieved from time to time or their personnel will become exhausted by fatigue and their matériel by wearing out or through lack of maintenance. It does not suffice therefore to have only the number of cannon strictly necessary to provide the density required on the various fronts according to their greater or less activity, but there must also be reserves to assure the indispensable reliefs. This lesson was well appreciated by the High Command but the manufacturing establishments were so hard pushed that the Commanding General never succeeded during the whole war, in procuring the number of cannon he needed. Not only was the program of May 30th never accomplished, but we will even see, later on, that beginning with the middle of 1918, the number of our matériels decreased and that a grave crisis would not have failed to occur if the armistice had not come to end hostilities.

## FIELD ARTILLERY: PAST, PRESENT AND FUTURE

### MEASURES TAKEN TO CORRECT DEFICIENCIES

*Creation of Railroad Artillery.*—An innovation of the year 1916 was the utilization in quantity, in the battle of the Somme, of a new subdivision of the arm, the railroad artillery (A.L.G.P.) which had just recently been created.

The British, coming in on our side, had assured the aid of their powerful navy and from the beginning of the war had freed us from any anxiety as to the security of our coast line. The numerous powerful coast artillery guns, as well as many long range matériels from some unused warships, were accordingly available. It was natural to think of putting these guns to some use on our land battle front, but first it was necessary to give them mobility which they lacked. Because of their enormous weight no other means of displacement was possible except by railroad, standard or narrow gauge.

The High Command considered that an artillery thus created should have a number of advantages. It would fire very powerful projectiles, much more powerful than those of any heavy field artillery; it would have considerable range; finally, because of its type of transportation it would have very great strategical mobility. This latter quality was particularly valuable; it allowed all cannon which could be mounted on railroad carriages, to be classified as field matériels, and used as such; thus it placed the High Command in the position of being able to quickly concentrate at any point of the front, the powerful matériel made up of large guns thus mounted.

In October, 1914, a Board called the Railroad Artillery Board was constituted with the mission of planning the installation of our coast artillery and naval guns on railway carriages. The Board called on the three great metallurgical establishments, Creusot Schneider works, Saint-Chammond, and the Batignolles works, for help in the solution of the problem.

The first matériels out were:

- 305-mm. Saint-Chammond seacoast gun and carriage mounted on drop frame railway car.
- 95-mm. seacoast gun on railroad trucks.
- 19-cm. seacoast gun and carriage on railway trucks.
- 274-mm. naval gun on railway carriage.

In May 1915, the first battalion of 19-cm. matériels (8 guns) took part in the Artois offensive, where it established itself as a high class machine. For the attacks of September, 1915, in Champagne some of the following matériels were already available:

- The 305-mm. A.L.V.F. (Railroad artillery).
- The 270-mm. seacoast mortar on railroad carriage.
- The 240-mm. quick firing gun on railroad carriage "à échantignolees."\*
- The 274-mm. A.L.V.F. (Railroad artillery).
- The 16-cm. naval gun.
- The 100-mm. and 14-cm. naval guns.

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\* TRANSLATOR'S NOTE: There is no brief English equivalent of this expression. The mount of this carriage was a very heavy simple wooden one such as was used to mount gun tubes at proving grounds for test purposes. A description of this (and other carriages) may be found in "Manual d'Artillerie Lourde," by Colonel Alvin and Major André, also in "Les Cannons de la Victorie," by the same authors, both published by Charles Lavauzelle, Paris.

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In February, 1916, at Verdun only a few battalions would be used because of difficulties encountered in bringing in the matériel and because of the lack of railway tracks available for firing.

During the winter of 1915–1916 so many matériels were mounted on railway carriages that it became necessary to give them an independent organization under a general officer who would supervise matters pertaining to production and employment at the front. The new organization took the name of *high power heavy artillery* or A.L.G.P. (War Department order of March 28, 1916).

As fast as it was developed, the new subdivision of the arm was organized into groupings; matériels were grouped in accordance with their characteristics as follows:

- The mortar and howitzer grouping.
- The long range gun grouping.
- The grouping of 32-cm. guns on sliding mount.
- The grouping of river gunboat guns.

A part of these matériels were assigned to the three army groups, the Armies of the North, the Armies of the Center, the Armies of the East. The rest remained in general reserve under the command of the Commander-in-Chief.

Regulations were published in May pertaining to these units, their relationship to the Command and the general principles of their employment. The Army groups assigned the railroad (A.L.G.P.) matériels to armies; these ordered and regulated entry into action; the direct handling was delegated to local commanders.

The first important collaboration of the artillery thus organized took place on the Somme. This operation was long under preparation and there was time to build a well developed system of firing tracks and to bring into position a great many units (56 large mortars and 61 guns). Their effective action was a great surprise to the German Army whose artillery, particularly, suffered from the fire of our railroad artillery (A.L.G.P.). However, commanders being unfamiliar with this arm, it was not always used to the best advantage. In theory it was used as follows:

*Heavy Mortars* (270 C, 293,370).—The difficulties encountered in Artois in 1917 in the conquest of important villages led to the use of the heavy mortars for firing on the numerous strongly organized villages which dotted the enemy's front. They were attached, just like ordinary heavy artillery, to army corps, which often reassigned them to their divisions; the divisions quite naturally used them in the same way they used their own heavy artillery. Generally full advantage of their long range was not obtained and their costly projectiles were spent on targets for which smaller caliber weapons were suitable. Their employment was therefore only fair, but wherever they were used they showed a particularly efficacious power.

*Guns*.—The guns were used to accomplish three kinds of missions:

First, Interdiction at long range: 43 firings. In this way the railroad from Ham to Chaulnes was destroyed at a point 22 kilometers from our lines, obliging the Germans to suspend traffic beyond Ham.

Second, Destruction, closer in: 99 firings. This prolongation of

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the action of the heavy mortars, had the great advantage of permitting the increase of the depth of the first advance: in this way the village of Flaucourt, located beyond the range of the heavy mortars, could be destroyed by the heavy guns, and thus could be included in the first day's objective.

Third, Counterbattery: 62 firings. The heavy guns attacked enemy batteries which, because of their distance or the amount of protection, could not be attacked by ordinary heavy artillery. The 32-cm. matériel especially, demonstrated its remarkable qualities as a long range counterbattery weapon.

*First Stage of the Realization of the Heavy Field Artillery Program of May 30, 1916.*—Included in the program of May 30th, was a project for replacing with quick firing matériels the following cannon:

- 100-mm. gun.
- 120-mm. gun.
- 155-mm. gun M-1877.
- 155-mm. howitzer Model 1881–1912.\*
- 220-mm. and 270-mm. de Bange mortars.

The new cannon were under manufacture when the program was adopted but the scheduled deliveries could not be made because of the large quantities ordered, and the lack of labor and of raw matériels. Only the 155-mm. howitzers, Schneider and Saint-Chammond, were, as we have noted before, regularly delivered at the rate of about 60 per month, and as they were delivered, took the place of the 155-mm. howitzer Model 1912.

In the meantime, in order to immediately accomplish a preliminary modernization of the heavy field artillery, the following measures were taken:

Between October, 1916, and January, 1917, the 100-mm. guns of five battalions, the tubes of which had been worn out in one year's fighting, were withdrawn from service; several batteries equipped with the 155-mm. gun Model 1877 were rearmed with the 155-mm. gun Model, 1877–1914.

A number of 220-mm. mortars with wooden platforms were replaced by 220-mm. mortars A.C.S. (mounted on Schneider improvised carriages), an adaptation which, however, gave only mediocre results.

Pending deliveries of the 145-mm. gun M-1916, use was made of 14-cm. guns taken from the cruisers *Carnot* and *Charles Martel*, for which the Saint-Chammond company made wheeled carriages. These emergency matériels arrived at the front between September and November, 1916. However, they were unsatisfactory and were withdrawn after a few months' service.

Relative to tractor-drawn heavy field artillery, the first five of the regiments planned for in the program of May 30th were complete in August, 1916; the other five were being organized and by the end of 1916 there were 79 tractor-drawn battalions. But of these 79 battalions, only 17 were armed with modern matériel and, of these, twelve had only improvised matériels such as 155-mm. gun Model 1914 and the 14-cm. gun Model 1910, destined to be withdrawn from service.

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\* The 155-mm. quick firing howitzers (C.T.R.) Model 1904 were all worn out and had been withdrawn from service.

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*Chiefs of Artillery.*—The question of chiefs of artillery had been completely neglected before the war: the rôle foreseen for field artillery in battle was so limited that it had not been considered necessary to provide for coördination of its use.

The army chiefs of artillery, which in the old days existed in our military hierarchy, were eliminated a long time before the war. Under pressure of necessity they were reëstablished the latter part of 1914.

A chief of division artillery with distinct and well defined functions did not, properly speaking, exist. The colonel commanding the artillery regiment of the division was supposed to accompany the division commander as a technical adviser, leaving the immediate command of the batteries to his lieutenant-colonel. But the colonel was not provided with a trained staff worthy of the name; he only had his regimental staff; moreover he retained his responsibility as regimental commander in addition to his rôle as a staff officer. Very soon, after the first battles in 1914, his lieutenant-colonel was taken away, and he was left alone to carry on the many functions of his dual rôle.

The army corps chiefs of artillery were the only ones officially authorized; they were provided with a very limited staff. However, their utility was widely discussed. There was a marked tendency to limit their rôle to that of supervising ammunition supply and maintenance of matériel. Many maintained that their presence answered no need and that they had no well defined function. The accomplishment of the program of August 5, 1915, by which the army corps heavy artillery groupings were created, introduced a new functionary in the military hierarchy, the commander of the army corps heavy artillery, who combined with his tactical functions those of an administrative commander of the heavy batteries.

No official text clearly and precisely defined the functions, duties and responsibilities of these various echelons of artillery command or laid down the relations which should exist between them and with the commanders of large units.

It was with this completely unsatisfactory command organization, that the artillery fought through 1914 and 1915, and faced the difficulties of the battle of Verdun.

The experience of this battle showed that the division artillery commanders could not command, unassisted, the important artillery groupings, of varied and constantly changing composition, which were unexpectedly placed under their orders. In the summer of 1916 the first measure was taken, that of giving them a field officer assistant.

However, it was soon seen that this was insufficient. On the Somme the divisions frequently attacked with an average of six to eight battalions of 75's and ten to twelve heavy howitzer batteries; likewise, the artillery of attacking army corps sometimes reached a figure of twenty-five heavy batteries. The handling of such quantities of artillery was an overwhelming burden for a commander of a 75-mm. gun regiment or for a heavy field artillery commander with only two assistants officially assigned.

The Commander-in-Chief, assailed by unanimous complaint, recognized the necessity of a better organization of artillery command. Orders of December 9, 1916, set forth the respective functions of the chiefs of army, corps and division artillery and laid down the principles

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of inter-subordination among them and of their subordination to the commanders of large units. By these orders, the command of the division artillery was separated from that of the 75-mm. gun regiment, and all chiefs of artillery were allotted staffs in accordance with their requirements.

These orders of December 9, 1916, really constituted the charter of chiefs of artillery. The prescriptions of these orders governed until the end of the war. It should be understood that the solution which these orders present is an imperfect one. These orders did not create a chief of artillery for groups of armies, in which echelon of command, nevertheless, coördination is just as necessary as in the lower echelons. They erroneously neglected to give adequate assistance to the army corps heavy artillery commander, who should, like the chief of division artillery, be freed from the cares of direct command of a regiment, and should be provided with an adequate staff in keeping with the burdens imposed on him. Also it seems that these orders were concerned with diminishing the *command* rôle of chiefs of artillery, in order to give an exaggerated importance to their poorly defined and questionable functions as *technical advisers*. Finally these orders unquestionably did not give chiefs of artillery either the status or rank to which they were entitled by reason of the quantity of troops under their orders and by reason of the continually increasing importance of field artillery in battle.

Imperfect as was this first tentative organization, it cannot be denied that it marked considerable progress; henceforth field artillerymen knew definitely their prerogatives, duties, rights and responsibilities; henceforth they were equipped to effectively play the complex and difficult rôle falling to them in battle. In consequence the most fortunate results in judicious and effective use of the field artillery followed.

*Regulations of December 16, 1916.*—The experience of the various attacks on the Somme, which were delivered in accordance with the principles set forth in the Regulations of January 16, 1916, allowed us to clarify the prescriptions laid down in those Regulations. A new document, *The Regulations of December 16, 1916, concerning the purpose and methods of a General Offensive*, systematized all these prescriptions. These Regulations emphasized the destructive power of field artillery; they indicated in detail the conduct of artillery preparations: adjustment of fires; use of aviation; required densities of various types of fires; the form of accompanying fires; methods of destruction and neutralization in counterbattery. In a word, they were a very exact resumé of the current ideas on the use of field artillery. These regulations allow us to follow the evolution which had taken place in the ideas as to tactical employment of field artillery, and to see the intimate relation which the characteristics of modern matériel bear to its tactical employment.

Relative to the technique of fire, the Regulations emphasized the absolute necessity of continually observing and controlling fire; they affirmed the importance of ground observation and specified that accurate fire depends on continuous observation; they assigned, apropos of this, an especial value to aerial observation. It must not be forgotten that the battle of the Somme marked the apogee of artillery aviation; equipped with good observers, protected by a pursuit aviation



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markedly superior to that of the enemy, this artillery aviation could, with complete freedom, conduct long and detailed adjustments on all sorts of targets, but more especially on enemy batteries and with remarkable success.

*Creation of the R.G.A.L. (General Headquarters Reserve of Heavy Field Artillery).*—We have seen how, during 1916, the long range heavy artillery was organized and the brilliant part it took in the Somme offensive.

The tractor-drawn heavy field artillery underwent during this same year a parallel but completely independent development; of the ten regiments planned by the Program of November 1, 1915, five were entirely completed by August and two others were being formed at the close of the year. These regiments rendered invaluable service to the High Command. Their mechanical traction permitted them to move, under their own power, several hundred kilometers in a few days, and gave them a valuable strategical mobility,\* which made them a remarkable instrument for maneuver.

In spite of the conclusive results obtained by this new field artillery, it must be recognized that at first its development took place in an unsympathetic atmosphere. It was reproached with having skimmed the cream for itself by taking a large number of the best officers from other field artillery units. The local command looked with disfavor on these new organizations, which, not belonging to any division or corps, were not under complete control and were suspected of wishing to establish a separate organization. Even the High Command itself, still unfamiliar with the services this artillery could render it, did nothing to give the newcomers the importance they merited.

However, during December, 1916, the plans of the Allies, which, as we will see a little later, contemplated a series of successive attacks at several points along the front from Dunkerque to the Carso, brought forth a new conception. Quite naturally attention was drawn to these powerful matériels which could be rapidly moved from one theater of operations to another no matter how far off. This mobility, which allowed these matériels to successively take part with little delay in large operations conducted at distinctly different parts of the front, was appreciated as making them incomparably powerful instruments for maneuver by fire. In a word this mobility made these matériels a true *strategic reserve* for the High Command. Striking with this tool now here, now there, to-day in the Champagne, the day after to-morrow at Dunkerque, the following week in Italy, the High Command could conduct the battle to its liking and could make the full weight of its will felt everywhere at the proper time.

But if these tractor-drawn regiments were to play this leading rôle they could not remain independent one from another, receiving orders from and responsible to General Headquarters direct. They needed an immediate commander. Furthermore it was not advisable that the long range heavy artillery (A.L.G.P.) and the tractor-drawn heavy artillery (A.L.T.) continue to operate separately, each one on

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\* For example, a tractor-drawn heavy field artillery regiment in action at Frise (Somme) in January, received orders February 25th to go to Verdun and was assembled by March 4th in the region Possesse—Vanault-les-Dames, after having covered 300 kilometers in seven days—over roads which at first were covered with snow and then broken up by thaws.

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its own hook and without coördination. In order to assure the indispensable coördination of their efforts and in order to obtain the best results in battle, it was necessary to unite them in a single organization.

This reorganization was the work of General Nivelles, who, as soon as he became Commander-in-Chief, took steps, as recommended by General Buat, to unite the A.L.G.P. and the A.L.T. under one centralized control. In order to emphasize the importance he attached to this new organization, General Nivelles put it under the command of a general with the rank of Army Corps Commander.\*

It was in this manner that the General Reserve of Heavy Artillery (R.G.A.L.) was created January 7, 1917.

Regulations dated February 14, 1917, laid down the organization of the R.G.A.L. which was comprised of three divisions:

1st division: the old A.L.G.P.

2d division: the ten tractor-drawn regiments already in existence or in process of being formed.

3d division: the artillery served by naval gunners, either on barges or river gun boats, or on land.

Each division was commanded by a general (or colonel). At all times an officer from the R.G.A.L. was attached to the staff of each group of armies. During operations a field officer with a staff from the R.G.A.L. was attached to each army. For operations, R.G.A.L. units were placed under the orders of the general commanding the army artillery, who could moreover, delegate this command either to army corps or even to divisions.

In addition to his personal staff, the general commanding the R.G.A.L. had at his disposal:

A R.G.A.L. center at Mailly, consisting of an ammunition train, repair shops, motor transport sections, construction batteries, training centers, etc.

A railway service, consisting of railroad construction batteries, a school for engineers and firemen, matériel depot, etc.

A mechanical traction section.

The functions of the commanding general of the R.G.A.L., as set forth by the Regulations of February 14, 1917, were briefly as follows:

To give technical advice to the Command relative to the assignment and employment of R.G.A.L. units;

To act as a permanent inspector of the personnel, matériel, and supply, of all R.G.A.L. units;

To command such R.G.A.L. units as were retained in reserve under the Commander-in-Chief;

To plan and supervise such training and reorganization of R.G.A.L. units as might be required to prepare for a particular operation;

To submit recommendations to the Commander-in-Chief relative to all personnel and matériel matters pertaining to the R.G.A.L.

Upon taking command, the commanding general of the R.G.A.L. issued regulations to his subordinates relative to their functions and how they should be accomplished. He especially emphasized the requirement for close liaison between batteries of all calibers operating in the same region in order that coördinated action might obtain. He

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\* It was natural that General Buat, the father of the idea, should receive this command.

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emphasized the necessity for groupment commanders keeping their subordinates informed during operations of the infantry situation. To sum up, he ordered that the R.G.A.L. units act in concert and in close liaison with all other combatants.

He pointed out that the R.G.A.L. was a "Tactical Instrument." These tactics were outlined in a lecture delivered at the Center of Artillery Studies at Vitry-le-Francois by Colonel Maurin, commander of the 1st division as follows:

"The R.G.A.L. has been formed not only because of the necessity for obtaining cohesion in the scattered elements of the heavy artillery—but also for the *purpose of maneuver*.

"Up to the present time our attacks have been launched on more or less extensive fronts, but always on one front. We have made preparations during weeks and weeks in certain sectors, thus there was no surprise to the enemy, except as to the zero hour.

"Larger quantities of very mobile heavy artillery permit planning another solution for the problem.

"On a front equipped throughout to receive this artillery, successive battering will be done, shaking with fire, first one part of the front, then another, until the time comes when, against a final part of the front, we can make a specially prepared and really decisive effort.

"Thanks to this *artillery maneuver* we can use up the enemy and secure for ourselves the advantages of surprise.

"The organization of the R.G.A.L. permits of planning and preparing this maneuver; but it must be understood that the execution of it must be entirely *under the control of the local command*. This is a point which cannot be too strongly emphasized.

"There will be no question of installing batteries, or even ammunition and supply trains, in an army area, without the approval of the army commander, or by delegation, of his artillery chief.

"Likewise a plan of employment for R.G.A.L. units cannot be drawn up except upon information furnished by the army or corps artillery information service.

"What is necessary to accomplish is a constant close liaison between the R.G.A.L. command, charged with organizing, training and mobilizing its units, and the local command which uses them.

"To this end the R.G.A.L. permanently attaches field officers to groups of armies and to armies. Through this group of detached officers the R.G.A.L. Command keeps in touch with the requirements, and even of the desires, of the armies and groups of armies and can accordingly recommend to the Commander-in-Chief the most judicious assignment of available resources in guns, ammunition and personnel.

"A decentralization is thus begun which will become more and more effective as larger numbers of cannon delivered by the factories and larger stocks of ammunition, permit of a more intensive use of the R.G.A.L."

(To be continued)

# "STATESMANSHIP OR WAR"

BY BRIGADIER GENERAL JOHN McAULEY PALMER, RETIRED

A REVIEW BY MAJOR J. N. GREELY, GENERAL STAFF

COLES PHILLIPS died the other day. He was widely known as a painter of pretty girls. The week before he died there appeared in a popular magazine an article by him on the raising of homing pigeons. It appears that he took more interest in this subject than in the monotonous task of drawing one pretty girl after another. At any rate the article was well written and gave a very human picture of the trials, tribulations and triumphs inherent in attempting to produce on a sound economic basis, the best type of homing pigeons. The article should, of course, have been read with the greatest interest by the pigeons in Mr. Phillips' loft. However, it is probable that these most interested parties proceeded to the normal routine of eating, mating, and flying without the slightest notion as to what Mr. Phillips was trying to do.

Brigadier General John McAuley Palmer, retired from active service last year. This officer has had an exceptionally interesting and useful career. He is possessed of an imagination and ability to express himself which is rare among professional soldiers. This unusual combination of qualities has made him of continuing value to the military establishment. It was taken advantage of by the Legislative Branch of the Government in enacting the general amendment to the National Defense Act which followed after the war with Germany. General Palmer probably had more to do with the basic legislation under which the Army of the United States functions than any other one individual. The President, the Secretary of War, the Chief of Staff, the Chairman of the interested committees of the Senate and the House, may all have had more to do with the resulting law than he did, but each of these represented the responsibilities of his office. General Palmer spoke for himself alone. It should not be inferred that this legislation represented his ideal, but his ideas are interesting in considering the results of this legislation. He has recently set them forth in a book entitled "Statesmanship or War." This book should, therefore, be of personal interest to every army officer. It explains, to some extent, the genesis of many of the problems with which the average army officer is concerned. It outlines a possible future toward which the military establishment may conceivably trend. However, it is probable that most officers will not read this book, but will continue with

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their normal routine of instructing R.O.T.C. students, conducting correspondence courses for Reserve Officers, inspecting National Guard units, teaching C.M.T.C. boys to ride, issuing property, and doing Officer of the Day tours with only the vaguest idea of what General Palmer intended or intends the military establishment shall become.

"Statesmanship or War" will never be a best seller. It is not exciting enough. General Palmer writes with the restraint of a scholar rather than with the color of an enthusiast. It will always remain, however, a valuable discussion of national defense by a man who knows a great deal about it. The subject itself makes this book of interest to any thinking soldier who likes to analyze existing conditions and who likes to try to look into the future.

It is this latter tendency which opens the most fascinating fields for speculation. The future military establishment of the United States will naturally be a part of the United States of the future. It is perhaps presumptuous for any professional soldier to predict what this will be. General Palmer himself is perhaps as well equipped as any living soldier to make an educated guess. He is a student of political as well as of military history. He has had practical experience in large and small military adventures, and has had perhaps even more practical experience in attempting to mould his own little world nearer to his heart's desire by means of legislation.

General Palmer sees the United States of the future as a sort of a magnified Switzerland, content within itself and with any trade exploitation limited largely to the Western Hemisphere in conformity with the spirit of the Monroe Doctrine. He feels that we should leave development of the Far East in Far Eastern hands, and that Japan is best equipped for this task. He is not so definite about Africa or southern Asia, but the whole trend of his book indicates that he believes the exploitations of undeveloped parts of these continents can best be left to nations which concerned themselves with these matters in the past. He looks to a complete economic isolation of the two Americas, even going so far as to suggest that if the United States wants to be assured of a continuing supply of rubber, it should take steps to see that sufficient rubber is grown in Central or South America. This obsession of his, that the two Americas constitute a natural unit, is a little puzzling to a North American who feels no more kinship with a Venezuelan than with a Manchu or an Arab. We might need the same Army and Navy to exploit the South America of the future as we would need to exploit China or the Sahara.

General Palmer seems to feel that the United States of the future should be content with its present magnificent home, with the

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rest of America for development in case our own back yard should not raise enough to support our growing families of necessities or desires. It is at least open to question as to whether the United States will remain so content. At present, it may be assumed that we are pretty well satisfied with ourselves. Everybody has a car and the manufacturers are maintaining that this is a two-car country. We go out of it only incidentally. We may go north for Scotch, or south for tequila, east for culture, or west—to the Far East again—for romance. On the whole we supply our own wants very creditably. It is possible that this condition is abnormal and that prosperity on the present scale within ourselves is impossible. In this case two courses of action suggest themselves—the first is to pull in our horns, restrict our luxuries and settle down to enjoy life within our means. This is a mode of life which many Americans have found attractive as practiced in France. History has many parallels for it—in the Peru of the Incas, in Egypt, in China, and in Japan before Admiral Perry opened it up.

This is the American attitude that General Palmer assumes in making his plea for statesmanship instead of war. But is he certainly right about this? History hardly seems to bear him out. Since the Revolution we have had four wars. In each of them instead of adopting a "respectably defensive posture" we have started out of our own territory and adopted the offensive ourselves. We are barely one hundred and fifty years old, yet our Army has fought in France, Germany, Italy, Russia, Siberia, China and the Philippines as well as in Canada and Mexico. One of the few places in the world where we have not intervened by arms is South America, which General Palmer assumes to be the one continent involved in a "respectably defensive posture" and in which we have any business to be fighting. This talk of a defensive attitude and of wars for defense only is as old as the United States, but the method of defense which we have invariably adopted in the past is to step out of our own back yard and hit the other fellow before he hits us.

Is there any reason to suppose that this attitude will change on the next occasion when the interests of the American people are involved in international controversy? Our big business concerns may be driven out of Mexico, China and the Orient without real threat of war so long as the prosperity of the people is not disturbed. However, if a time ever comes when our factories shut down because American goods are barred from foreign markets, what will be the attitude of the great manufacturing class? Will it go quietly back to the farm or will it demand action to open up fresh markets?

Aside from opening up this fascinating problem, General Palmer's book is not exciting. It is too evenly balanced to be that.

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The solution he proposed is of interest, however, to every soldier. As I understand it, its essentials are as follows:

- a.* Restriction of American action to the Americas.
- b.* Establishment of a Department of National Defense charged with the defense of American interests within these limits.
- c.* A Navy capable of acting only within these limits.
- d.* A Regular Army sufficient to garrison Panama and perhaps Oahu, and to provide the skinniest possible framework necessary to hold a citizen army together.
- e.* A citizen army consisting of a highly efficient National Guard.
- f.* A reserve force consisting of graduates from the National Guard system who desire inactive duty on a reserve list.

The above is all involved in General Palmer's plan for the adaptation of the Swiss military system to the needs of the United States. Like any other system it could probably be made to work, but this does not prove that it is a good system. The Swiss system is based on compulsory military service in peace time. General Palmer seems to feel with the rest of us that the United States of to-day would not adopt a compulsory system, nor does he feel that the compulsory feature is necessary for us. He proposes instead volunteer service designed to attract to the most responsible positions in the military service, the ablest personnel. As to how the ablest personnel is to be persuaded to shoulder these responsibilities he is a little vague. Evidently not by money reward. Economy is set forth as one of the advantages of his plan. Just as evidently not by any social preferment. This was the method by which imperial Germany secured the best personnel in the country for its officers and General Palmer is violent in his denunciation of any such system. He probably feels, as do the rest of us, that the sentiment of the United States is even more rabid against such class distinction than it is against compulsory service. It is in this failure to suggest any workable method for attracting the best men of the country into semi-permanent military service that I feel General Palmer's solution falls down.

It is hard to confound General Palmer by words from his own mouth. The book seems to me full of contradictions but its tone is so temperate, his statements are so qualified, that it is difficult to put a finger on any sentence and say "this is wrong." Perhaps, however, this is one of them—"Swiss training methods and Swiss military economics are quite separable from their system of compulsory service. They are just as applicable in principle to any given number of American volunteers as they are to the Swiss number of Swiss conscripts." This, as I understand it, is to say that because

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Switzerland can conscript an able young Swiss, pay him five cents a day, and make a pretty good soldier out of him in two or three months that America can persuade a similar young American to enlist and do the same thing with him.

On the other hand, the book is full of excellent stuff ably expressed by a man who is a real student and an authority on the subject of which he writes. The following statement probably expresses very well the feelings of a good many thinking officers, Regulars, National Guard, and Reserve; it is particularly interesting as coming from a man who had so much to do with framing our present military system—

"Just as the citizen training camps are the logical feeders to the National Guard, so the National Guard should be developed as the logical feeder of the Organized Reserves. Unless this policy is adopted, the time is approaching when the great reservoir of reserve officers will become a military weakness instead of a source of strength. It will be filled with individuals who hold high military rank without military discipline or experience."

Perhaps the most human touch in the whole book is a tinge of frustration, of disappointment. General Palmer had more to do with the adoption of the present military system than any other single officer, and yet we find him advocating a change in it. The truth is, probably, that practical politicians found his dreams not always practicable. Past action in which he played so prominent a part arises to confront him. He was involved, to a certain extent at least, in the creation of the present Officers' Reserve Corps, which has now risen to something over 100,000 commissioned officers without anybody to command. This great body of acknowledged superiors is always going to deter the average American youngster in peace time from volunteering his services as a private or corporal in the unselfish spirit of which General Palmer dreams.

It is perhaps unfair to indulge in such a lengthy criticism of a really excellent book without suggesting something constructive. However, it might be possible to point out to General Palmer that the Army of today, which he had such a large part in organizing, is functioning pretty well. The Regular Army is perhaps unbalanced in the proportion of officers to soldiers, but its officers are excellently trained. The principal complaint against it at present lies in the acknowledged tendency of the ablest and most ambitious junior officers to resign and seek a higher scale of living in civilian life. The National Guard, I think, is generally believed to be better than it ever was before. The enlistment of the educational system of the country in national defense by means of the R.O.T.C. is a



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benefit to the college, to the Army, and to the individual. It insures that the officers of the future will be drawn from the best possible sources. The C.M.T. Camps have interested the entire country in the Army and have benefited thousands of boys. Even the unwieldy Officers' Reserve Corps will be an asset rather than a liability if properly handled; and we can have faith that it will be properly handled. The present system, modified by time, may prove the answer to the problem that General Palmer presents. It is perfectly capable of insuring efficient military action not only in Nicaragua, but in Manchuria or Abyssinia if the policy of the country should so dictate.

Finally, the Army of the United States will not go wrong so long as it continues to attract to its ranks such able, unselfish, and far-sighted individuals as the author of this book.

# LATERAL BRACKET ADJUSTMENT AND THE USE OF THE LADDER METHOD

BY MAJOR J. E. McMAHON, F.A.

DUE to the importance of having the observation in the field artillery well forward and on the most advantageous terrain, the necessity for lateral adjustment of fire has become greater and greater during the last decade as the knowledge of field artillery and its proper use has increased, and the systems of communications have improved. Lateral adjustment of fire, of course, includes both the precision and bracket or hasty method. As each of these is a lengthy study in itself, I will not attempt to discuss both but will confine myself to an explanation of lateral bracket adjustment, its purpose, use and the different methods in vogue in the field artillery as prescribed by our firing regulations and as borne out by experience at The Field Artillery School. Although some of the principles of lateral precision adjustment are involved, it will be assumed that the reader has a thorough knowledge of those in order to make this discussion less voluminous.

Lateral bracket adjustment consists of inclosing the target within a deflection bracket and within a range bracket as quickly as possible. As dealt with in this article it will comprise percussion and time (shrapnel) bracket adjustment. The field artillery in battle will be called on to give its sister branch—the infantry—the very closest support possible. If it cannot do this, it fails in the accomplishment of its mission and in the reason for its existence. In order to give this support, close liaison will be imperative, which will necessitate the placing of observation posts as far forward as possible and in the majority of cases somewhat to the flank; also the liaison officer with the infantry might in a great many cases be compelled to adjust fire himself, and he will seldom be advantageously placed to have axial observation. Consequently, all officers responsible for the proper conduct of fire will find themselves confronted with the task of adjusting their fire from observation posts to the flank and should therefore be thoroughly familiar both in theory and in practice with the methods used in lateral adjustment. Again, in providing this close support to the infantry, most of the targets which appear will be transient, or those of opportunity, which will require a quick adjustment in order to obtain any effect at all. Therefore the time element will be of the utmost importance, and methods will have to be used and advantage taken of all possible information which will permit the fire for effect necessary to carry out the mission assigned. The officer firing will be compelled

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to balance in his mind several factors which deal directly with this time element:

- (a) The methods and means of computing the initial firing data.
- (b) Subsequent changes in the initial data in order to bracket the target for range and deflection.
- (c) When to use the entire battery in the adjustment in order to obtain more and better information.
- (d) The importance of taking advantage of terrain sensings and any bit of information that would lead to a determination of the range and deflection brackets.
- (e) The size of the deflection and range brackets necessary before commencing fire for effect.
- (f) The proportionate amount of time to be devoted to the computation of initial data, to fire for adjustment, and to fire for effect in order to carry out the mission.

In computing the initial data for lateral observation all the methods used in axial observation including the parallel, prismatic compass, plotting, etc., can be utilized but with varying degrees of accuracy. The offsets in the parallel method will usually be quite large (greater than 330 mils) so that they will not be particularly accurate. The prismatic compass produces fair results but has the same objection as the parallel method—the target offset will be large and therefore only approximate. However, as only one offset is necessary it is more accurate than the parallel method. The plotting method, usually classified as one of the quicker ways of computing firing data, is the most accurate but requires slightly more time than any of those mentioned above. If an accurate map were available, in a few cases accurate data could be obtained but this will very rarely happen, as the maps will not be available and sufficient time cannot be spared to obtain the data in this way.

Of course, it is most desirable to place the initial fire as close to the target as possible in order to facilitate a quick adjustment, but the officer firing must first consider whether it will be better to compute the initial firing data hastily which will require more time for actual adjustment, or whether to take more time in the initial computation and therefore less time in the subsequent adjustment. A personal factor will enter into either case but the mission assigned must be accomplished, so that a quick estimate of the situation must be made with a decision to fit the case. Other factors which will influence the situation are terrain, conditions of observation and size of the observer displacement. Instead of using the gunner's quadrant to give the proper elevation the range is set off on the range drum. The reason for this is that the advantage of obtaining more speed is considered paramount to the greater accuracy which

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the quadrant method would give. To sum up, it must be remembered that the attainment of speed is forced upon the officer firing, and accuracy must be sacrificed to a certain degree.

Before proceeding further, it will be best to discuss in general the methods used in this kind of firing. They may be divided into two classes:

- (a) When the observer displacement is approximately 100 mils.
- (b) When the observer displacement is greater than 100 mils—too large to permit the methods used in (a).

In lateral precision adjustment it is necessary to bracket the target both in deflection and in range. Due to the fact that all of the missions for which lateral bracket adjustment is used will be those of neutralization, hastier and less accurate methods of obtaining these two brackets will accomplish the desired results. In the first case—when the observer displacement is approximately 100 mils—the deflection bracket is much easier to obtain than the range bracket. Weighing all of the elements involved—tactical situation, mission, speed, accuracy, etc.—it has been found that the best results can be obtained by using the methods for adjustment prescribed by regulations and experience for *axial* bracket adjustment. However, in following these in order to obtain the maximum number of sensings for range, it will be necessary to make slight changes in deflection to correspond to the range changes made in seeking the proper range bracket. These deflection changes are small and can be easily estimated but are quite necessary because it is only by keeping the maximum number of rounds near the observing line that the range bracket can be obtained accurately and quickly. In the second method—when the observer displacement is greater than 100 mils—the target must be included in both a range and deflection bracket. The deflection bracket will be more difficult to obtain as the observer displacement increases. It will be remembered that in lateral *precision* adjustment when the observer displacement lies between 100 and 300 mils, deflection changes are used to place rounds falling at a distance from the observing line on that line, and for an observer displacement greater than 300 mils range changes will be used to obtain the same results. Again taking all the elements effecting the case into consideration and in addition the advantage of learning and abiding by one method, rounds falling at a distance from the observing line will always be brought on that line by changes in range. An additional advantage of this method is that it avoids the confusion and difficulty in the proper computation of the deflection bracket, which is present when deflection changes are used. However, when it is perfectly apparent that the deflection is greatly in error and that it would require

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large changes in range to place the rounds on the observing line, the deflection change considered necessary to obtain this result should be made, after which the rounds should be brought on the line by range changes. In any case, the range change necessary will have to be estimated and then improved by trial during subsequent firing.

As the initial data is usually in error and particularly when a shortage of ammunition exists, it is better to open up with one round and continue to fire in that way until more definite information can be obtained. When, in the opinion of the officer firing, more information can be obtained by using a platoon or the entire battery, they should be used. The range bracket desired before going into fire for effect varies with the nature of the target, the mission, the tactical situation and the time available. It is the same for any particular target as that prescribed by regulations and experience for *axial* bracket adjustment. The deflection bracket sought should be approximately twice the width of the sheaf necessary to fire for effect on the target. Its value in mils usually corresponds to 160 yards, that being twice the width of the sheaf necessary to cover a target without sweeping. It is necessary to obtain one sensing for both deflection and range at each limit of the bracket considered suitable, before going into fire for effect. Bold changes in deflection and range must be made initially in order to *surely* include the target within both a deflection and range bracket on the first shift in deflection and first change in range. Changes in deflection will vary from 50 mils to 250 mils. It is much better to make too large a change and hence bracket the target the first time, than to make too timid a change. In order to keep the rounds on the observing line, changes in range to correspond to the deflection changes desired will always be made. These may be obtained by any one of the methods given below:

(a) Making the comparative estimates and then improving them by trial in subsequent firing.

(b) Making the *approximate* corresponding changes given in this table:

Observer displacement	Value of range change. Meters or yards	Value of deflection change in mils
100 to 200 mils.....	100	5
200 to 300 mils.....	100	10
300 to 800 mils.....	100	15
800 to 1,300 mils.....	100	30

(c) Obtaining the deflection change corresponding to a 100 yard or meter range change by dividing one-tenth of the observer

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displacement by the range gun-target in thousands of yards. Example: Observer displacement, 600 mils; range gun-target, 4000 yards. Deflection change corresponding to 100 yard range change, 15 mils. This is approximate and is only fairly accurate when the observer displacement is less than 800 mils, but it is accurate enough to use in all cases. It is more accurate than the method given in (b). In order to make use of the methods outlined in (b) and (c) it will be necessary to know the value of the observer displacement. This can be obtained more accurately by plotting, but the target offset in the parallel method of computing the initial deflection can be used keeping in mind that for values greater than 330 mils it is inaccurate.

Before opening fire on a particular mission, a parallel sheaf should be formed by actual firing by the Executive (the most accurate), or by some of the other methods prescribed in regulations. An 80 yard sheaf should be used for targets of average width. No attempt should be made to change the sheaf during fire for adjustment as the dispersion in range makes it impossible to determine the proper change. This has some disadvantages, of course, but for the average officer in the average case this limitation is deemed necessary. The proper width of the sheaf for maximum effect can be determined by subsequent fire. Generally a sheaf wider than 80 yards should not be used but a narrower sheaf may be used if sufficient information is obtained during the adjustment to warrant such a change and the nature of the target calls for a narrow sheaf.

When firing time (shrapnel) bracket adjustment the height of burst to be used will depend largely on the terrain features and on the condition of the ground—whether it is dusty or muddy. If it is the former, the patterns of the shrapnel bursts will probably be readily seen and will give a great deal of information on account of the length of the pattern. In this case a corrector should be used which will give a proportion of air bursts to graze of three to one. When the ground is muddy and the patterns cannot be seen it is better to have a proportion of one air burst to three grazes. During the period that one gun only is firing the height of burst should be adjusted as well as possible. It must be remembered that when it is necessary to change the corrector, in order to adjust it to give the proper proportion of airs to grazes, it will, in most cases be necessary to make a corresponding range change in order to keep the burst on the observing line. For instance, if air bursts are obtained directly over the observing line but too high to give information in regard to deflection or range, the corrector will have to be lowered and the range shortened a corresponding amount to keep the rounds on the observing line. It should be remembered that the pattern is in front of the actual burst and therefore in order to get the

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maximum amount of information, the bursts should be slightly short of the observing line.

The question of when to bring in the platoon or battery, if fire for adjustment has been begun with one gun, is not rigid but depends on the judgment of the officer firing, terrain, conditions of observation and a great many other elements. In the general case the battery is brought in when a 100 mil deflection bracket is split. In a great many cases, sensings for deflection and range will be obtained from the terrain, and these will afford sufficient information to warrant bringing in the battery immediately. In some cases the position of the target with respect to the surrounding terrain features, will be such as to make it impossible to obtain much information from the firing of one round. In that case the battery should be brought in immediately. Again if information cannot be obtained from rounds from one gun falling over and short when fired at ranges differing by 100 yards, the battery should be brought in. It is only by taking advantage of every bit of information obtained from sensings, that the officer firing can judge properly the time to bring in the battery. If the initial data is considered accurate, if fire has been registered, or if a good firing chart has been prepared, fire may be opened initially with all four guns.

The problem given below will illustrate some of the points discussed above:

Target—accompanying gun.

Mission—to neutralize.

Observation post—on the right.

Observer displacement—750 mils (target offset).

Battery is laid on a base point (with a parallel sheaf).

Initial data—obtained by the parallel method.

Visibility—excellent.

Wind—from the left.

Matériel—battery of French 75-mm. guns.

Terrain—dry and dusty.

### 1. *Initial Commands:*

Base deflection, right 360.

Site, plus 5.

Shrapnel.

Corrector 35.

No. 1 only.

One round.

4000.

Remarks: Initial data hastily prepared, therefore one gun is used.

*Observations:*

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Battery Commander: Air doubtful, deflection over. Terrain sensing shows that a large error exists in the initial deflection shift.

*Position of Burst:*

125 mils left of observing line.

2. *Commands:*

Right 100.

Down 5.

4000.

Remarks: Deflection seen to be in error so deflection shift is made to place burst near observing line.

*Observations:*

Battery Commander: Air doubtful, deflection doubtful.

*Position of Burst:*

20 mils left of observing line.

3. *Commands:*

Down 5.

4200.

Remarks: Range increased to place burst on observing line—amount estimated.

*Observations:*

Battery Commander: Graze doubtful—deflection doubtful.

*Position of Burst:*

10 mils right of observing line.

4. *Commands:*

Up 3.

4100.

Remarks: To get burst on O-T line.

*Observations:*

Battery Commander: Air short—deflection short.

*Position of Burst:*

Line short.

5. *Commands:*

Left 50.

Battery salvo right.

4400.

Remarks: Splitting the deflection bracket and bringing in the battery.

From table of approximate values 100 yard range change corresponds to 20 mils in deflection (observer displacement is 750 mils).  $\frac{50}{20} = 2.5$ . Therefore 300 yard increase in range is given.

*Observations:*

Battery Commander: Graze doubtful, air short, air doubtful, air doubtful, deflection short.



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### *Position of Bursts:*

<i>No. 4</i>	<i>No. 3</i>	<i>No. 2</i>	<i>No. 1</i>
4 left	3 left	Line short	5 right

### 6. *Commands:*

Left 25.

4500.

Remarks: Splitting the deflection bracket and firing at a range which should keep rounds on the O-T line. No attempt made to change distribution.

### *Observations:*

Battery Commander: Graze doubtful, air short, graze over, air doubtful, deflection correct.

### *Position of Bursts:*

<i>No. 4</i>	<i>No. 3</i>	<i>No. 2</i>	<i>No. 1</i>
4 left	Line over	Line short	6 right

### 7. *Commands:*

Left 3.

On No. 2 Close 3.

Up 3.

2 rounds.

4500.

Remarks: A line over and a line short from different guns in the same salvo indicate a correct deflection and also give positive information upon which to base a change in distribution. Ready to go to effect.

The question of taking every advantage of all possible sensings cannot be emphasized too much. The officer firing should carefully look for information given by drifting smoke, shadows, and dust in order to assist him in shortening the time for adjustment. "Bigger and better" sensings should be constantly in the Battery Commander's mind.

In general when a deflection bracket of twice the width of the sheaf desired for fire for effect and the proper range bracket have been obtained, fire for effect can be commenced. However, if at any time during the adjustment, indications show that the deflection is nearly correct and the range bracket has been obtained, fire for effect should be begun at once. The principles governing fire for effect after *axial bracket adjustment* apply in *lateral bracket adjustment*.

The method described below is not authorized by regulations nor has it been given a fair tryout in practice but it has considerable merit and possibilities. Its use produces very good results and tends to speed up the fire for adjustment due to the fact that more

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sensings can be obtained and a deflection bracket procured more quickly. This method will be known as the "Ladder Method of Lateral Bracket Adjustment." It is an adaptation of one of the British methods of ranging.

This method includes two different procedures: (a) One in which fire for adjustment is opened with the entire battery, each piece firing at a different range, the ranges increasing in arithmetical progression from either flank. (b) One in which the deflection difference is made much greater than that required to produce parallel fire thus causing a very wide sheaf, and all guns are fired at the same range. Either method can be used in all cases but in order to produce the best results the use of each is applied to particular conditions existing.

The first one is used when the observer displacement lies between 300 mils and 1300 mils. The sheaf should be parallel and each piece fired at ranges differing by either 100 yards or 200 yards increasing in arithmetical progression from either flank. A converged sheaf would give a more accurate idea of the deflection bracket as it would trace the line of fire better on the ground, but as the observer displacement increases, the probability of getting deflection sensings would decrease. In order not to make the method too complicated, it is thought that opening fire with a parallel sheaf will produce the best results in the end. The gun on the flank toward the observer should be fired at the shortest range because the approximate line of bursts is more nearly parallel to the observing line than perpendicular to it, and, consequently, not considering the terrain there is a greater probability of deflection sensings. It will be recalled that the obtaining of a deflection bracket, when the observer displacement lies between the limits given above, is more difficult. Example: Observer on the left. Conditions warrant a difference of 200 yards in range between adjacent guns, No. 1 will fire at 4400, No. 2 at 4200, No. 3 at 4000 and No. 4 at 3800. Or if the observer is on the right and conditions warrant a difference of 100 yards in range between adjacent guns, No. 1 will fire at 3200, No. 2 at 3300, No. 3 at 3400, No. 4 at 3500.

The question as to whether 200 yard or 100 yard differences in range should be used cannot be definitely settled except by experience. Some of the factors which influence the choice are the width and length of the target, the degree of accuracy with which the initial data is calculated, the size of the observer displacement, the kind and condition of the terrain, and whether percussion or time (shrapnel) fire is being used. There are a great many more sensings on terrain in the ladder method than in any other, consequently with this in consideration it is difficult to set a hard and fast rule

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as to when to use the 200 yard or 100 yard difference. Given below are some cases in which each should be used.

(a) 200 yard difference in range:

1. When time (shrapnel) fire is used.
2. When the initial data has been hastily prepared.
3. When either time (shrapnel) or percussion fire is used and the target is above the average in width or of great length, *i.e.*, parts of a trench system. In this case the size of the observer displacement has a large influence on the apparent length and width of the target.
4. When time (shrapnel) or percussion fire is used and the terrain is flat or rolling and all four bursts can be seen.

(b) 100 yard difference in range:

1. When percussion fire is used.
2. When either time (shrapnel) or percussion fire is used and the target is very small in width and length.
3. When the terrain is very hilly.

It is difficult to draw the line between cases (a) 1. and (b) 1. but it must be remembered that a 200 yard difference should be used whenever possible. The apparent length of the pattern and drifting smoke would permit this in most cases when time (shrapnel) fire is used. Again, it is difficult to draw a distinct line between cases (a) 4. and (b) 3. but if the terrain is such that the line of fire may be accurately shown by the line of bursts a 200 yard difference should be used. One disadvantage of using the 200 yard difference is the fact that all the bursts will not be in the field of view of the observing instrument.

The procedure in using the ladder method is somewhat different of course, from that used in the methods prescribed by regulations but it is thought that as far as possible these should be linked together so that as many of the principles in force in the usual methods of lateral bracket adjustment should be followed in the use of the ladder method. Therefore, no departure will be made from these principles except when necessary and any complicated methods will not be discussed as they tend to slow up the fire and cause unnecessary confusion. In both cases of the ladder method, range changes should be used to place the round or rounds on the line. When the range difference method is used fire is opened up with all four guns—sheaf parallel, guns set at different ranges. As soon as a deflection sensing is obtained a bold change in deflection is made and a range change necessary to keep or place a round from one of the interior pieces on the observing line. If this salvo

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gives a sensing for deflection, the deflection bracket is split and all guns fired at the proper range. This will be the case when the initial shift in deflection is not over 120 mils. The proper range may have two meanings: 1. If a range bracket has been obtained in the two salvos this bracket is split when the deflection bracket is split. 2. If a range bracket has not been obtained the proper range will be the one which will keep the rounds from the interior pieces on or near the observing line when the deflection bracket is split. Of course, it will be the extreme case when a deflection bracket is obtained in two salvos, but if no sensings for deflection are obtained on the first salvo, a change in range is made to place one of the rounds from an interior piece on the observing line. It will be entirely a matter of judgment of the officer firing as to when all guns should be brought in at the same range. If the first deflection shift is greater than 120 mils and the target is of average width, it will be better to split the deflection bracket and fire with the same difference in range between adjacent pieces as was used in the initial salvo.

There would be a great many times, when the best results would be obtained by reducing this range difference as the deflection bracket was narrowed, but in order not to make the intricacy of the method overshadow the speed, it is thought best not to change the difference between ranges until all the guns fire at the same range. There will be cases when, if the deflection used is close to the correct deflection of the target and a 200 yard difference in range is used, no sensings will be obtained due to too great a difference in range. It is thought, however, that the fact that the deflection is very nearly correct can usually be seen by the officer firing and the guns can all be fired at the same range on the next salvo. Due to the fact that by the time two or three salvos have been fired so many different ranges will have been covered by the separate guns that a range bracket, usually based on the sensing of one round at each end, will have been obtained. This may occur in one salvo long before the proper deflection bracket has been obtained. At any rate it will be possible to decide on what range will give the best results.

For example: Guns fired as follows: No. 1—3600, No. 2—3400, No. 3—3200, No. 4—3000. No. 1 was sensed as air over, deflection over (on observing line) and the others as airs doubtful. Then a deflection shift of 120 mils in the proper direction was made with a corresponding range change of 600 yards (observer displacement about 800 mils). The new ranges fired would be: No. 1—3200, No. 2—3000, No. 3—2800, and No. 4—2600, in order to place a round from an interior piece on or near the observing line. No. 1 was sensed as air over, deflection doubtful (terrain

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sensing), No. 2 as air doubtful, No. 3 as air short, deflection short (on observing line), No. 4 as graze doubtful. The deflection bracket was split and also the range bracket (3200 from No. 1, 2800 from No. 3) and all guns fired at 3000. From the time when all guns are brought in at the same range, the same principles are applied during the remainder of fire for adjustment as are used in the methods of lateral bracket adjustment prescribed by regulations.

When the calculation of the initial data is fairly accurate or when percussion fire is being used it is thought best to use range differences of 100 yards. When the first sensing for deflection is obtained, the deflection shift does not have to be as bold as when range differences of 200 yards are used and should hardly ever exceed 100 mils. Of course, if the initial data was seen to be in great error, a bold change in deflection should be made. The remaining procedure is the same as when range differences of 200 yards are used.

When the observer displacement lies between 100 and 300 mils the sheaf is widened and all guns fire at the same range. In this case the range bracket is usually more difficult to obtain than the deflection bracket. Range changes, however, are used to place the rounds on or near the observing line. With percussion fire, and a target 10 to 12 mils wide, the greatest probability of obtaining at least one round near enough to the observing line to be sensed is produced when the sheaf is opened 10 mils wider than parallel. If time (shrapnel) fire is used the sheaf may be opened much wider—25 mils more than parallel. As soon as a sensing for deflection is obtained, a shift in deflection should be made with a corresponding range change to place or keep one of the rounds fired from an interior piece on the observing line. The initial shift depends on how accurately the initial data has been calculated and also on how wide the initial sheaf is. In most cases the initial shift will not be as bold as in the first method of ladder adjustment described above; 60 mils would be considered a bold change in this case but must be entirely a matter of judgment of the officer firing. As soon as a deflection bracket has been obtained, it should be split, the sheaf narrowed to parallel and guns fired at the proper range. Fire for adjustment is continued until a deflection bracket of twice the width of the sheaf desired for fire for effect is obtained and an approximate range bracket. Care should be taken when deflection shifts and corresponding range changes are made to keep the center of the sheaf near the observing line so that the probability of obtaining a sensing may be increased. As in the range difference method the question of when the sheaf should be narrowed to parallel fire is a matter of judgment of the officer firing. In the usual case it will be when the initial deflection bracket is split. It can be easily

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seen that the range difference method of lateral bracket adjustment might have a distinct advantage in obtaining a range bracket when the observer displacement lies between 100 and 300 mils, especially when the calculation of the initial deflection is accurate, due to the fact that a range bracket might be obtained in one salvo. But the calculation of the initial deflection is usually in error and by opening the sheaf instead of firing each gun at a different range the probability of getting at least one round on or near the observing line is much greater.

The corrector should be adjusted during fire for adjustment to give the best sensings as discussed in the first part of this article. When the range difference method is used and the country is rolling or hilly considerable difficulty will be had in judging the proper corrector but no principles can be laid down and each case must be estimated according to the circumstances.

There are no suitable commands for the range difference method in our regulations. The present system would be too cumbersome and slow. It would not be a difficult matter to improvise suitable commands however.

The same principles governing fire for effect would be used in the ladder method as those discussed for other methods earlier in this article.

# NOTES ON TRAINING POLO PONIES

BY CAPTAIN WESLEY J. WHITE, F.A.

TO CORRECTLY cover the subject of training polo ponies, it would be necessary to cover an almost unlimited number of cases. As most polo players well know, every pony has its own equation, and seldom two are alike. However, there are certain steps, which, if followed with judgment will expedite the training. A great many things must be considered before one can decide the best method to use. It would be folly to use the same methods of training on a highly bred, nervous pony, that one would use on a coldblooded "Dog."

Shortly after I had taken up the game of polo I realized that handy ponies were one of the many requirements, so I began to look about for ponies. One day when going through the Remount Depot, I saw what I thought would make a fine pony. The Commanding Officer of the Remount Depot let me have him. In about two months I had him playing, and he played just as well then as he ever did. As a result of that success, I formed an opinion about training ponies that took me some time to forget. In my mind all I had to do was to get any green pony, give the "beggar" a little "stick and ball" work, and as soon as he ceased to display any fear, put him into the game. That works for the short bred "dogs" but try it on the thoroughbred, seven-eights, or three-quarters-bred horses and the result is a spoiled horse in nine cases out of ten.

While I was stationed on the Mexican border my regiment received a car load of horses from Ft. Reno. Among them were several polo prospects. My Commanding Officer assigned me what I considered the best prospect of the lot. I went to work on him and in about two months I thought he was ready to play. This pony was very fast and I was proud of his speed. I played this pony one period. I never could stop him after that. He was well bred and an excellent prospect, and if I had not rushed him into the game too soon he would have made a fine pony. That was not the only horse that I spoiled. It took many lessons, and some were expensive, to learn that one cannot rush the training of a pony.

The above cases are mentioned to bring out one point. That is one can never tell the best training methods to pursue until the individual pony has been studied.

Personally I like my ponies hacked a lot in their early training and all during their training. It keeps their dispositions "sweet" and their nerves calm. There is nothing more nerve racking to a

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pony than to take him into an enclosure day after day and repeat the same thing over and over. I have seen men take their ponies, and give them the same lesson in stopping day after day, until the poor horses would get so tired and nervous that they would revolt against such treatment, and the rider thought it was the fault of the ponies that the dispositions were a bit faulty, and as a result meted out ill-advised punishment which more often than not started a battle in which the man lost. As a general rule when a pony is misbehaving, there is a good reason, and the smart horseman soon finds out what it is and corrects it. I have found it a good policy to take a pony out for a quiet ride, and when one comes upon a suitable piece of ground for training to put his pony through a few movements, turn him about, stop him a few times, and work him fast for a couple of minutes, then pull him up, stroke him on the neck, and move along with the quiet slow ride. About two or three such ten-minute periods in one afternoon is a good work out, and I think it keeps a pony sweet.

After the pony goes quietly at all gaits, turns correctly, that is, on his haunches, and changes leads on his changes of direction without going disunited, other training should be started. This training should include facing on-coming ponies, bumping, or riding out if you like, and stick and ball work. They can all be worked together, a little of each every day. I always like to work polo ponies in pairs. Many things are accomplished, when that is possible, in much less time. Two horses can be taught to face or meet on-coming ones by the two riders starting at a walk, gradually increasing the gaits until they pay no attention to each other. The riders should then take their polo sticks and continue to go in the opposite direction, and as the ponies become accustomed to the sticks of their riders, they are at the same time becoming accustomed to the sticks of the riders about them. The same care should be used in this training as in the early training. Do not over-do it. Watch your pony's disposition. When you observe him becoming irritable, or before he starts to, if he has been working nicely for you, reward him and let him off. Remember that your pony has nerves. If he is worth a dime, he will not put up with much abuse.

After your pony goes quietly with the stick, place several new balls about the field. I say new balls so as to be sure that they are white, which is very important. Ride by them and if your pony pays no attention to them, you may start tapping them about, using the half stroke. It is very important during this stage of training that your pony is not hit with a stick or ball. If he gets the idea that he is going to be hurt when you swing your stick, your troubles will be multiplied many times. Another very important thing at this time, and at all times, is to not unconsciously jerk the bit when



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hitting at the ball. This is the surest and quickest way that I know to ruin any pony, old or new.

Not long ago I observed a game of polo. Playing in this game was a player who seemed to be having a great deal of trouble with his horses. Every time he hit at the ball his horse looked as if he were jumping a hurdle. The fault was not that of the horse. When this individual hit at the ball he used the third point of support (the bit), and he used it in such an abrupt manner that the horse jumped and threw his head into the air trying to escape the punishment. So many of us forget that a horse is not a machine. When we burn out a bearing we can get it replaced but when we tear the bars from our horses' mouths, and knock the legs from under them, it is seldom that the "mechanic" can replace them. I try to ride with a loose rein so as to avoid touching my pony's mouth and I have missed many a ball rather than take a chance of hitting my pony's leg. It is a good policy to place one's hand on the neck just in front of the withers when hitting at the ball. If one does that it is seldom that your horse will be hit by the bit.

When your pony answers all your questions satisfactorily; that is, handles at the will of the rider, is not afraid of other horses or riders, nor afraid of the stick and ball, he is ready for the slow, training game. When I say a slow training game, I mean just that.

Get from four to ten players together on the practice field and mill about after the ball, with a lot of meeting each other, light bumping, but very little running. A few such games are very beneficial to young ponies. As the ponies get so they take the scrimmage quietly these training periods should be increased in speed. Just as soon as any pony shows signs of irritation he should be taken out of the period and given further quiet training. Care should be exercised not to try to speed up the periods too soon.

About three years ago I was stationed in Hawaii. The Hawaiian Polo team had just shipped twenty-five horses from the Hawaiian Division to the Pacific coast for the spring tournaments. While we were there playing, California became infected with the hoof and mouth disease. The result was that we left all our ponies on the Pacific coast. We sold our private ponies and the government ponies were distributed to the troops in the states. When we returned to Hawaii we were dismounted, except for a few old broken down "dogs" that were on their last legs.

There was only one thing to do, and that was to buy green ponies and go to work. The officers of the regiment to which I was assigned worked on Saturday afternoons and built a riding pen. We purchased from two to four ponies each and started a systematic method of training. From green ponies we built up a string in eight months within one motorized regiment, that was a major

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factor in tying with the two well mounted civilian teams for the Island championship. For a period of four months we did no playing. After that we started slow pony-training games. And from there we worked our ponies into the finished product.

All turns at polo, to be correct, should be made on the haunches. In a fast game one does not stop and think about aids. That must have been done before the game. The pony must respond willingly and promptly.

In the Army we have two classes of polo players. One group who do no training on their ponies, and the other group who overtrain, or over-school their ponies. The player who does no training usually rides "Hell for leather" from the time he goes on the field until the end of the period, or until his pony, in self-defense, takes him from the field.

Officers who over-school, usually find that their ponies play well in slow games. After the play gets beyond the speed to which the horses have become accustomed by their training, they usually find that they have trouble in getting them to "rate." I mention this to bring out the point that before a pony is allowed to go into a fast period, he must be schooled at all speeds.

If you have not had the opportunity to train your pony in company in slow games, try the following method. It works. After you have your pony to such a state of training that you think he is ready to play, try him before you allow yourself to be embarrassed by having him grab the bit and take you for a ride during a chukker. To try him, warm him up and then "go crazy a-horse-back" for about five minutes. If he handles well with you making him extend, stop, turn, twist, and bend, it is a safe bet that you will not have much trouble in the game. If he gets excited I would advise more schooling in the faster gaits. That is, school as fast as your pony's temperament will permit. Care must be exercised not to allow your pony to go "stale" or get "sour."

After you have your ponies trained and playing, remember that tact on the rider's part is very essential in all things. A few of the most important things are: (a) Very little stick and ball work with playing ponies; (b) care of legs on and off the field; (c) careful adjustment of all equipment, most especially the bit; (d) remember the bit is an aid, not a point of support.

A couple of years ago I purchased a little thoroughbred mare that had played some polo. When I got her she was so nervous that all I had to do was to let her see the polo field and I needed more than "three points of support" to stay on the top side. I gave her to my wife and forgot her, as far as polo was concerned. In about six months I noticed that she was going very quietly. I rode her out to the field. She proved to me that a thoroughbred

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seldom forgets. When she stepped between the sideboards "she saw the red flag" and for two more months she was kept a safe distance from the field. During that time I found that she was not afraid of stick, ball, man, or beast, but I could not stop her once she got under way. I tried a Mexican spoon bit on her as a last resort. It was the making of her. I trained her with it, and played her on a high port pelham. She turned out to be the best pony I ever played.

Sometimes one must try several bits before he gets one that the pony likes. But keep trying until you have tried them all. A good playing pony is worth several bits. I believe in training ponies with a little sharper bit than I play them in. They have a more wholesome respect for the bit if that method is followed. Very little can be said about the type bit to use. Each pony presents a different problem. The important thing to remember is that if your pony is not properly bitted he will not play good polo.

Just a word about the selection of prospective ponies: As a general rule, men who are just taking up polo are very anxious to play. For this reason it is very hard to get them to keep their green ponies out of the game, if they show the least inclination toward making polo ponies.

I advise the purchase of prospective ponies that have had at least one year of work, if the purchaser expects to play. Otherwise it will take at least one year, and more generally eighteen months before a green pony can be trained sufficiently to play, and few players have the patience to wait that long. And another important point in getting a horse with some training: You have a line on his disposition. A horse without a good disposition is seldom worth keeping for polo. To sum up, one must watch the disposition of his ponies, always trying to keep them "sweet." Vary work from day to day. Train them with other horses and also alone. Demand obedience, but keep in mind that if a pony has enough intelligence to play polo, he will resent ill treatment. Polo is a game of superior horses only. In 1924 during the open championship matches at Meadowbrook a team had reached the finals with a limited number of ponies. They had won several important cups during the season and in doing so they had injured several ponies. They were three thousand miles from home and had no way of getting more ponies for the finals. The Captain of this team was an excellent horseman and horsemaster. I think that he had more affection for his horses than any man I ever saw. I recall that the day of the final game, after the Captain had mounted his other three players he had three sound horses left for himself. One of these was a big chestnut that he was especially fond of, and the horse knew he was fond of him. As the game started I saw this man on

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his favorite horse. During the first chukker he was no outstanding performer. The fourth chukker he rode him, and again he was no marvel, and then came the eighth chukker with the score tied. This game was one of the most thrilling contests I ever witnessed. It was a real battle. The Captain of the team was the only man on the field, on a pony that was playing his third chukker. That was a big handicap. It was during this chukker that "Red" as he was named, repaid his master for the confidence he had placed in him. He outran every horse on the field. I recall the final run that decided the game. The ball had just been stopped in front of the goal post. It was "Red" that had placed his master in position to stop it, by outrunning two or three horses, and it was "Red" that passed the field carrying his master to the attack, that won the battle. If there was ever a game won by a horse, that one was.

Some very flattering offers were made for Red, but he was carefully placed in an express car and returned to his home in California.

I learned a great deal observing this gentleman's methods. His motto was, "kindness" in training, and care, both on and off the field.

I know of nothing that is more detrimental to the game of polo than to see horses bleeding at their mouths and sides. The rules prevent the use of sharp spurs. The same rule should be applied to sharp bits, on the field.

If all players would keep in mind that polo, as a sport, ceases to be a sport, when the ponies that make it the "king of all games" are tortured, they would give their ponies more intelligent thought and be more tolerant of their mistakes.

Remember that ponies, properly trained and ridden, grow to love the game.

There are many technical books written on "How to train Polo Ponies" but the real test of a polo horseman is, "How do his ponies perform, and how does he keep them performing?"

The answer is, horse-sense and tact.

# USE OF THE 75 AS AN ACCOMPANYING GUN

BY COLONEL PEGAZY, FRENCH ARMY

(A synopsis by Captain L. V. Warner, F. A., of an article appearing in the *Revue Militaire Française*, March, 1927. The article, also published in pamphlet form by Berger-Levrault, Paris, is a reproduction of a lecture given by Colonel Pegazy to the officers of the Army on the Rhine.)

"FOR better or worse, the 75 has been placed at the disposal of the infantry as an accompanying gun. How shall we use it?"

In answering this question Colonel Pegazy borrows frequently from a memorandum published by the Army of the Rhine June 22, 1925. The concluding message of this memorandum expresses the theme of Colonel Pegazy's lecture:

"Poorly employed, the 75 accompanying guns are totally destroyed without accomplishing anything.

"Properly employed, they can render in certain cases very great service."

The study is divided into three parts:

1. TECHNICAL CHARACTERISTICS OF THE 75.
2. PRINCIPLES OF EMPLOYMENT.
3. EXAMPLES FROM THE LAST WAR.

## 1. TECHNICAL CHARACTERISTICS OF THE 75 FIRING AT CLOSE RANGE

This article mentions only the technical characteristics that senior officers of infantry should know in order intelligently to employ the 75's under their command.

The memorandum of June 22nd specifies clearly that close range for an accompanying gun is between 1000 and 2000 meters and not 500 meters as some believe. The technical reason for this will be explained later.

The most important technical properties can be classed as follows:

Flatness of the trajectory,

Precision of fire,

Sound wave of the impact.

*Flatness of the Trajectory.*—The trajectory is very flat; and as the range decreases this flatness increases. Of all the technical handicaps, this is the most serious. For a range of 500 meters (normal charge) the maximum ordinate of the trajectory is only one meter.

This characteristic is of course not so pronounced when firing reduced charge.

*Precision of Fire.*—When one speaks of precision, the infantryman

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always thinks of accuracy of fire on a vertical target and of the danger zone. The accuracy of infantry weapons increases as the range decreases.

Except in case of fire on vertical objectives, such as tanks, the artilleryman is interested, not in the danger zone of the unexploded projectile but in the danger zone of the fragments after impact and in the precision of the point of impact. This point of impact is often less precise for short ranges than for medium ranges. The new 75 tables show that for shell with normal charge the probable error is:

- 24 meters at a range of 500 meters,
- 21 meters at a range of 1000 meters,
- 16 meters at a range of 2000 to 3000 meters,
- Maximum precision between 2000 and 3000.

With reduced charge the probable errors are as follows:

- 9 meters at a range of 500 meters (not carried on tables),
- 7 meters at a range of 1000 meters,
- 9 meters at a range of 2000 meters,
- Maximum precision at 1000 meters,

and clearly greater precision than with full charge:

- 7 meters probable error as compared to 21 meters. This is a great advantage for the reduced charge.

*Sound Wave of Impact.*—There is a sound wave of the impact of the shell when the shell travels faster than the sound wave from the muzzle of the gun. This is true for the shorter ranges.

This sound wave of impact has a morale effect that must be considered. The shell arrives without warning; the cracking noise which accompanies it is very disturbing and makes it difficult for one to determine the exact position of the gun which is firing.

This phenomenon is produced only by the normal charge which gives that charge one advantage over the reduced charge.

### 2. PRINCIPLES OF EMPLOYMENT

Colonel Pegazy next considers: the organization of the accompanying gun detachment, the approach march, the position of readiness, the mission, the battery position, and the withdrawal from battery position.

*Organization of the Unit.*—The accompanying gun or guns should be called a battery: a battery of one or two pieces. The word battery is used to indicate that the commander of the one or two guns has need of the same independence and the same means of command as a battery commander.

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He must have an executive to command the unit while he is with the infantry commander and while he is reconnoitering.

He must have mounted messengers.

He must have the necessary personnel and material to establish a telephone line.

As a result the detaching of a single accompanying piece is a heavy loss to a battery. It is a loss not only on account of the gun and ordinarily two caissons, but also takes from the battery its best lieutenant, its best noncommissioned officer, a number of scouts and signal men. The battery is, as a result, disorganized. It is better at times to detach the whole battery for the accompanying mission. In this event the guns, not being used on the mission, may be left in a reserve position.

Concerning the caissons of a "battery" of one or two guns, the memorandum June 22nd recommends a ratio of two caissons to each gun, one of the caissons to be left in a position of readiness.

As for munitions, it is best always to carry a large proportion of reduced charge shell for reasons explained above.

*Approach March.*—In regulating the approach march one must always remember the extreme vulnerability of artillery on the march.

The consequence of this vulnerability is felt especially by a single accompanying gun because it has no means of replacing casualties among men and horses.

The infantry commander must not require the accompanying gun to march with the infantry column.

Again the memorandum of June 22nd covers this point. It says: The approach march must be made by bounds—from cover to cover. Between two covers the section or platoon of artillery can generally pass without damage, if the terrain permits rapid movement and if the detachment has only artillery fire to fear. It cannot, however, hope to move fast enough to escape destruction from machine gun fire, firing direct fire and within range.

It is necessary then to avoid, first, terrain under observation which does not permit rapid movement; and, secondly, terrain under observation which may be within range of the enemy machine guns.

*Position of Readiness.*—Before going into battery position the chief of the accompanying unit should report to the infantry commander the possibilities of artillery action, receive his orders and make his reconnaissance. During all this time, he leaves his unit in a well sheltered position, the so-called position of readiness.

Under the pretext of accompanying the infantry, there is often a tendency to choose this position of readiness too near the front lines.

The factor which retards the entry of artillery into action is

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almost always the reconnaissance. The change from the position of readiness to the battery position requires only a few minutes' time. The position of readiness itself should be chosen in such a way as to avoid long lateral marches along the lines to the eventual battery position.

*Battery Position.*—A gun in position is even more vulnerable than a moving gun. In order that the accompanying mission may succeed, the gun must not be seen while going into position.

*Missions to Give to Accompanying Artillery.*—Before reconnoitering and occupying his position the artilleryman should receive his mission from the infantryman who commands him. For example:

In the offensive, to fire upon a designated target which is holding up the infantry.

In the defensive, to be ready to fire, usually toward the flank, on a designated portion of terrain.

Before giving the artilleryman his mission the infantry commander must remember that he is commanding both infantry and artillery; he must consider the problems and difficulties that the situation presents to both arms. He cannot give the artillery a certain target, for instance, if it is too defiladed for the artillery trajectory, if it is too close to friendly troops, or if the only artillery observation post which can see it is too far from any possible battery positions.

*Withdrawal from Battery Position.*—The fire has been delivered. Ordinarily the piece has not been well defiladed and it has been discovered by its fire. The memorandum of June 22nd recommends not to delay in changing position and to warn the infantry that the withdrawal will draw fire from the enemy. The precautions are the same as those for going into position: leave without being seen. Often the reaction of the enemy will be so rapid and the terrain so open that it will be necessary to delay the withdrawal until the infantry has advanced or until nightfall.

*Favorable and Unfavorable Terrain.*—The terrain must be neither too wooded nor too open. If the terrain is too wooded the guns cannot fire and if too open the guns cannot approach close enough to the front lines.

The most favorable type of terrain is that which presents a succession of wooded areas separated by open spaces of a width varying from 800 to 2500 meters.

### EXAMPLE NO. 1.

June 1st, 1918.—Near Autrèches.

The English front has been broken, the Germans are advancing.



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The dispositions are as indicated on sketch No. 1, with the French line passing through Autrèches.

The mission of the three French battalions around Autrèches is to gain time to permit the organization of a strong position to the south. There is no supporting French Artillery.

A weakness develops in the French line near the Brunehaut road and the Germans concentrate their machine guns and minenwerfers on that point.

At this moment a German platoon of 77's tries to gallop across an open space into position about one kilometer southeast of Thiolet. A concentration of machine guns of the center French battalion kills or wounds the horses, drivers and cannoneers. The 77's never fired during that battle.

### *Lesson*

The German artillery was accompanying victorious troops who thought they were pursuing a defeated enemy. It was a time for audacity; the German artillery had it but it was audacity poorly directed. The German artillery commander thought he could go into position in plain view, 1500 meters from the French machine guns. The consequence was total destruction without profit. He should have placed his platoon in a position of readiness behind the farthest advanced cover, in this case near the Grange-des-Moines, then made a reconnaissance which would probably have led him to choose one of the positions to the west or south of Thiolet, observation post in advance of his guns, telephone communication, and a range not over 2500 meters.

Some may say that this is not accompaniment, that it is direct support. One must not be a slave to words. The mission is to fire on the enemy before being destroyed oneself. The name given to the operation is of little importance. The important thing is to succeed.

### EXAMPLE NO. 2.

September, 1914, after Morhange.—Beginning of the battle of Grand Conronné.

Advance French line at the border of the Saint-Paul forest. (See sketch No. 2.)

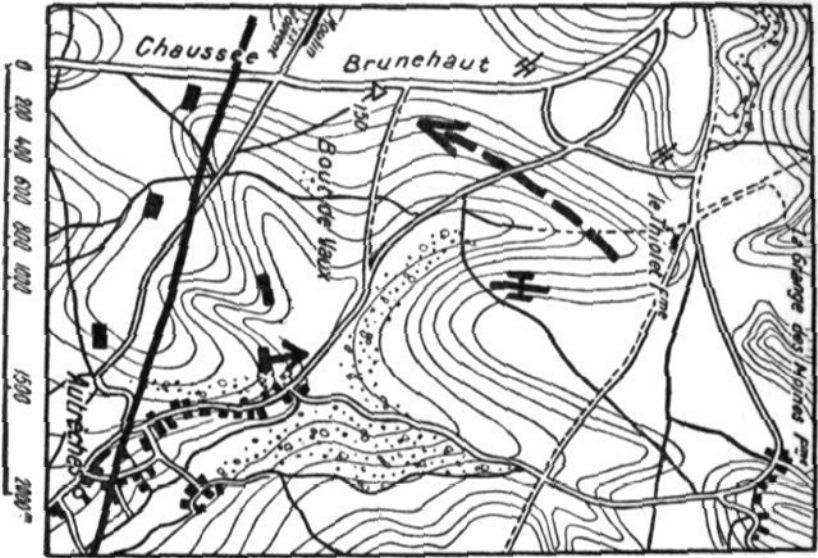
Advance German line in the position indicated on the sketch, supported by a very annoying battery which infiltrated the road Rémoréville-Buissoncourt.

A French battery at 1, its Captain at 2, communication by telephone with 2400 meters of wire.

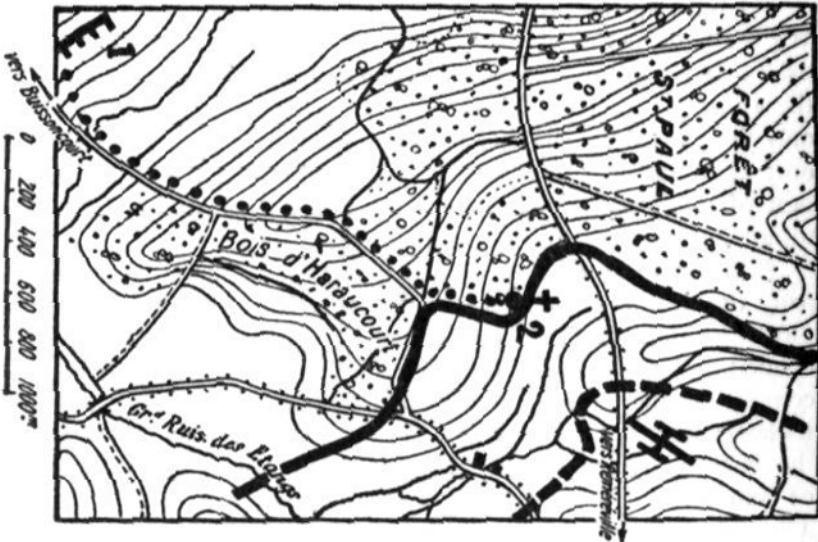
The Captain is 300 meters from the enemy battery. He fires and destroys it in minutes.

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SKETCH No. 1.



SKETCH No. 2.



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### *Lesson*

The German battery closely accompanied its infantry; the French battery directly supported its infantry. However we should not quibble over words. On one side there was a battery in plain view; on the other a concealed battery which destroyed the other without itself receiving the slightest damage. It is of little importance whether we call the position of the French battery one of support or accompaniment. It succeeded and remained intact for another mission.

The two battery commanders had the same audacity and courage; but one of them in order to fire, had to have his guns with him in a forward position; and he sacrificed them uselessly. The other knew how to fire regardless of the respective positions of his battery and his observation post. All he needed was telephone communication.

The author adds that in the future all that is needed to make "direct support" really "immediate accompaniment" is "radio."

### CONCLUSION

In conclusion Colonel Pegazy's message to the assembled officers was in sum:

"I have spoken to you only of the 75. That was my subject. We are here to follow instructions; we are not charged with establishing a program for new accompanying matériel. Except for the 155-mm. trench mortars (few of which are mobile) we have only the 75 and we shall have only it for a long time. Do not look only at its defects; see also its good qualities and try to make the best of the situation while awaiting a new type of matériel, learn to accompany the infantry with the 75.

"What a beautiful mission it is for the artilleryman to accompany the infantry. He knows that the advance zones are also the most glorious. Let us be bold but let our audacity be coolly calculated and meditated. The courage to imitate is not the type of courage of the German artilleryman north of Autrèches who died uselessly with his men and horses. Imitate the type of courage of the French artilleryman at the Saint-Paul forest and the courage of hundreds of other artillerymen who succeeded in similar cases. They almost always succeeded because they knew how not to warn the enemy of their presence except by their shells.

# THE FLYING BATTERY COMMANDER

BY CAPTAIN P. T. QUINN, F.A., (D.O.L.)

FLYING is becoming popular, the world is taking to the air, and with it goes the military service. More and more are our operations being controlled by airplane. While aërial cavalry will never take the place of "foot" infantry, yet their work is daily becoming more important. This is especially true for the Field Artillery. In the next war, be it stabilized or moving, we can expect a far greater number of aërial shoots; we must have observation and the air offers the broadest field of view. It eliminates the necessity of very distant observation for long range guns (when the target can be seen), and it gives us direct view of otherwise hidden targets. Artillery *must* depend upon the air. With this development comes the query: should the battery commander fly, should he do his own shooting from the air, or should he, as at present, turn this over to a trained observer from the Air Corps? The answer to this question may determine a new policy of training, and any change should be based upon a large amount of experience with the present system and that proposed by some field artillerymen. There are two schools where opposing methods are (or have been) taught, one the Field Artillery School at Fort Sill, where the artillery officers make at least one adjustment from the air, the other the Advanced Flying School at Kelly Field where observers are trained. On their data the change, if any, should be made.

I have had the good fortune to serve with both schools. I fired from the air at Fort Sill; I served in charge of the radio and commanded the firing battery with the observation class from the Advanced Flying School at Camp Stanley, and while my small experience is not conclusive, it is sufficient to justify suggestions.

That which struck me about the aërial firing at Fort Sill was the ease with which an adjustment is made from the air. Once you have picked out your target (not always an easy matter) the shooting is simple. Bursts near the target can't be missed, they show up like a "sore thumb" and knowing the buzzer code it is an easy matter to telegraph down the "overs" and "shorts." There is little thinking to do, the battery makes the necessary changes, all that is needed is good eyesight. After firing from ground observation posts, it is like sitting in the stage box at a good show.

But there are certain points in which the flying battery commander must be trained. He must know machine guns and machine gun firing. Unless observation planes are built for three—pilot, observer, and machine gunner—it is not fair to ask the battery

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commander to go up without this knowledge. And to know machine guns as we in the Field Artillery know them is not enough. At present our knowledge of the guns is small. The battery commander is able to take them down, correct a few jams, and has fired a few rounds at Fort Sill, and a few more in annual target practice. This will not do if he is to depend for his life upon machine guns when in the air. He must know them thoroughly, must become a master of aërial gunnery, competent to defend his plane from attack.

As well as knowing machine guns the flying battery commander must learn the buzzer code. Experiments with the control of fire by voice from the air have been carried on elsewhere, but at Kelly Field the dependence is upon code, and instructors say that they find it more reliable. The ratio of problems fired by code to those fired by voice is ten to one, and sometimes in those fired by the latter method the voice has faded out and we have come back to code in the end. Even were improved sets available, we would still have to depend upon radio telegraphy unless room can be found in the net for voice communication. This means that the battery commander must study and constantly practice with the buzzer. The code is not difficult, but there are other schools, and it takes time to attain speed and ease; without daily practice it is soon forgotten. Will the busy battery commander have the time to devote to this?

The procedure is a simple matter. You call the station on the ground and receive an answer by panel or radio. When this is accomplished, the plane flies out to identify the target. This may be a difficult business for any but a trained observer. Ground forms are deceptive and camouflage will increase the difficulty. It is hard enough to identify a simple target in the open. Once this is done the rest is clear sailing. The first bursts spotted—and if near the target they are easily seen—it is only a matter of sending down the amount over and short and left and right. The adjustment is continued until the battery is satisfied with the bracket. If the battery commander is to do his own adjusting, the only figuring necessary is for the deflection correction, which takes only a few seconds. There is no need for a more than cursory knowledge of artillery methods.

Experience with the Air Corps at Camp Stanley has shown the need for close liaison. The observer must know the artillerymen, the battery firing, the battery commander and the battery must know the habits and the peculiarities of the observer. This is accomplished at Camp Stanley by sending the observers during their tour on the ground, up to the command post (which is at the battery) to watch the firing, and by stationing an Air Corps officer who

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knows the fliers at the position of the guns. As the firing proceeds each side learns the ways of the other. In wartime this system will work even better, for the same observers will serve for a long time with the same batteries. It would be well if the fliers in turn could live with the batteries for long periods. It is good to have connection from radio station to battery without intermediate control, and a direct line to the landing field.

It is hard enough in time of peace to find time for the ordinary training of the battery commander—what in war? Will he have time to learn machine guns as he should know them, and to become an expert at the buzzer code? Will he be able to keep his knowledge of each by constant, daily practice? I rather doubt it. Battery training, schools and administration will interfere behind the lines, at the front there is always enough to keep him busy. We should remember that it is with reserve officers that we will be concerned mostly. They will need brushing up on purely artillery subjects and will scarcely have the time to specialize in air firing. Time is so valuable in war that it must be apportioned minutely and there is so much to learn that an added topic may disrupt schedules. The battery commander is the busiest man in the army, must he give time to learn that which another may do as well? There is no magical formula to air firing, as concerns the observation it is simpler than ground work. The experiences of the observers from Kelly Field where they have only a short artillery course, show that with this short training a man can fire a good bracket or precision adjustment from the air. Why then take valuable time away from the artilleryman for air firing?

What are my conclusions? To leave the battery commander on the ground. To continue the present system with air corps observers, who however, should receive their artillery training from artillery officers specially detailed for that work. Or, if the artillery is to take over this branch of observation, change the tables of organization, add an "Air Officer" to the battalion staff. Let him be trained in the usual way but with an added three or four months' course in aerial firing and machine guns. He will have time to keep in practice being for one purpose only, he will divide his time between the airdrome and the batteries keeping in close touch with each. He will know well his artillery brothers, he will be one with the pilots. And he will save that worried, wearied man, the battery commander, for the work for which he is needed.

# **ADOPTING A COURSE IN MILITARY HISTORY FOR A FIELD ARTILLERY RESERVE OFFICERS' TRAINING CORPS UNIT**

BY FIRST LIEUTENANT WILLIAM P. BLAIR, F.A.

THE field artillery is a complex branch. Do not most of us readily admit this? Therefore, it is only natural that the merest mention of the word "article" in connection with the title "FIELD ARTILLERY JOURNAL," should immediately conjure in our minds conceptions of a treatise abounding in technical, mechanical, and mathematical antics of thought and delineation. It is true that the field artilleryman devours such mental food greedily, but a pinch of the so-called classical and cultural subjects, now and then, certainly does add flavor to endeavor. No presumption is made, however, that this article belongs in either category, and it can perhaps lay no claim to distinction except to furnish the reader a comfortable relaxation after the perusal of those more akin to the Arm. It is the intention of the writer to herein narrate the circumstances leading to the adoption of a course in military history in a university unit of Reserve Officers' Training Corps, to depict the reasons for its inclusion in the curriculum, to set forth some of the points brought to mind in the preparation of the instructional matter, and to list the schedule selected.

Professors of Military Science and Tactics of Senior Units of Reserve Officers' Training Corps at some of our educational institutions often find themselves confronted by problems quite different from any encountered elsewhere in the varied service rendered by officers of the United States Army. Especially true is this at colleges and universities where military training is elective on the part of students. Many of these questions pertain to student enrollment which must not at any time fall below one hundred in the unit if the latter is to remain. At certain units, coöperative measures from civilian agencies will be almost nil, while those in opposition will be even more than moderately positive. No intentional assistance is going to be obtained from the activities and clever but false arguments of the varieties of pacifists, paid agitators, and other unwitting or willful enemies of our glorious nation. Hence, officers on R.O.T.C. duty must rely much upon their own good sense. The successful solving of any situation depends frequently upon the resourcefulness and activity of those before whom the difficulty appears. Spirit and determination are, as we all know,

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characteristic of officers of our army. But to good field artillerymen, the "redoubtable field artillery," what are mere difficulties???

Each institution will have its own particular quota of problems arising, or we might say quota of "its," varying in nature according to local conditions. These "its" will separate into two groups, one being concerned with agencies outside the realm of military control and the other being concerned with those within such control. Since army officers can act officially solely on the latter, remarks herein will be limited in general to this group.

And only one of the many "its" which visited our unit will be discussed here. This particular one became manifest when it was discovered that most of our students did not take much interest in the course in Matériel, except in evading it. How preposterous! It was a well-conducted course, too. Had anyone ever before heard of an individual not liking the subject? Was it conceivable that even one young man had elsewhere and previously been found who had failed to get a thrill from learning the nomenclature of the parts of the French 75-mm., M. 1897, Gun Carriage, from being able to trace the movement through the parts concerned, occasioned by turning the traversing handwheel clockwise, etc.? We officers all remembered that we had found the subject of Matériel highly interesting???. However, it was felt that these candidates for reserve commissions must be given an adequate knowledge of Matériel, and it must be administered in a manner attractive enough to induce them to expend some time and effort in study. Reserve Officers' Training Corps students in universities where military training is voluntary can be forced very little. They must be tactfully led and appealed to through reason. A successful course must not only be one which gives broad instruction, but it must be interesting. With these ideas in mind, what was to be done?

At the particular university we have been speaking of, the Professor of Military Science and Tactics willfully gave "it" to certain of his junior officers after first deciding on a general plan of cure. The new sufferer was to work out the details for the convalescence of all concerned, even though he did not in his inexperience at first agree with the proposed measures.

The general plan was to dilute this "terrible" matériel course with an admixture of military history. The latter was to be the orange juice for the cod-liver oil. In order for the student to take an interesting but instructive course in weaponry, battle, tales of heroism and action, he would have to master the mechanical intricacies of the traversing mechanism and the secrecies of the recuperator as well.

The function of this course in military history was to trace and study the salient features in the development of weapons, tactics,



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strategy, logistics, and command from the earliest recorded times down to and including the present. In other words, it was to be a history of the development of the art of war. The course as finally adopted did not have that title, however, as it was felt that the sensibilities of certain conscientious and well meaning, but as we know, poorly informed and wrongly opinioned people in our community would be alarmed at such a virile name. Several of the more blunt, matter-of-fact officers were in favor of this name nevertheless, but they were overruled by their more politic brothers, and the course was mildly christened "Fundamental Military History."

There are some very good reasons for the inclusion of such a course in the curriculum of an R.O.T.C. Senior Unit, and so far, no good arguments against it have been brought to our attention. An officer or any candidate for a commission should study military history for the same reasons.

The vast majority of our population is profoundly ignorant of and entirely indifferent to military matters. Hence few students in our colleges and universities have a proper background for pursuing R.O.T.C. work with much real enthusiasm. Without such a setting, many who start the basic course finish the two years grudgingly and finally have no desire to enter the advanced course. The advanced course student gives the nation the most return for the time, energy, and money expended in the training, for he is eligible for a reserve commission upon completion of his course. Warfare, having naturally adopted most of the discoveries incident to the vast strides made by science in recent years, requires specialists. The tendency nowadays is for the military student to lose sight of the "ensemble" of warfare in endeavoring to master a single item, such as gasoline motors, communications, machine guns, ballistics, etc. Any officer who is going to become a leader of armies must not overlook the "Big Idea" in the necessary consideration of the countless details. A good course in military history, received in his first year basic, will give the student this "ensemble" which will often inspire him to continue his military drills and studies with relish.

One not infrequently hears the argument advanced that the spending of time on the battles and performances of Alexander, Hannibal, Caesar, and others is merely an expression of hero worship, and that the instruments and methods of recent warfare are so different from and more advanced than those of ancient days that a study of the deeds of the old "Captains" means only wasted effort. But all know that he who would become a great painter or sculptor goes to the modern studio to get his technique, but that he derives his general ideas and inspiration from the old masters. So it

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is with the General. Tactics have changed a great deal, but the fundamental principles of warfare have remained unchanged. Curiously enough, the ancient Greeks were nearly as far advanced in the art according to the extent of the development of their resources, as we are to-day according to that of ours. All truly great military leaders have acknowledged their indebtedness to the "Great Captains" of antiquity.

No one with any judgment at all would recommend that Differential Equations or the Theory of Least Squares be studied before following out a progressive schedule of arithmetic, algebra, geometry, etc., in the attempt to become a great mathematician. Just about as little probability exists for the acquirement of a thorough and well rounded knowledge of the art of war by failing to take up the study from the beginning and progressing chronologically and in logical sequence.

Many opportunities will present themselves for utilizing various incidents in history, viewed in perspective, for showing students in a conclusive manner the errors in much of the present time dangerous propaganda spread by internationalists, pacifists, communists, and other idealists and radicals. Along these lines, however, the instructor must confine his statements to facts, allowing the students to draw their own conclusions. The aim should be to present the truth, but nothing must be said which by a slightly twisted quotation might bring discredit upon the military service.

It was at first endeavored to find a book which would cover the entire extent and mission of the course with a view to its adoption as a text. After a rather lengthy search, none was found, and it began to be realized that it is improbable that any one book could be made to adequately take in so much time and development. There was even no one set of volumes which did. Some authors had written suitable works covering parts of the expanse, but always one or more periods of growth were omitted. From the beginning of recorded history to the present is truly a stupendous duration. It would be possible to write a book covering the most salient features of the expanse, but so far as we know, this has not yet been accomplished in a form appropriate for study by candidates for reserve commissions, and especially by the young college candidate who has everything to learn. Thus, it soon became apparent that it would be impracticable to require the use of textbooks because of the number of expensive books which the student would have to purchase. The alternative was to give a lecture course.

An important advantage lies in the lecture course system for such a subject, in that the instructor can carefully eliminate from his lectures all material, contained in the reference books, which is contrary to War Department doctrine.

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The probability of success in mapping out a good course, particularly that of a series of lectures, is considerably enhanced by access to the proper reference books and the selection of those most applicable. For history lectures, more unbiased accounts can be given if the texts of a number of different authorities are considered on any one point. However, the average young officer-instructor has not yet read military history very extensively, and he will have the time available to study only a limited number of books in preparing a lecture. The references pertaining to a lecture should be brief enough to enable the instructor to go over them thoroughly on the evening preceding the delivery. An attempt to study too great a mass of material will result in most cases in giving a haphazard and faltering lecture, for such a big assignment cannot be read a sufficient number of times in the available period of preparation to get in mind the points to be presented. Therefore, it will be necessary in preparing a schedule to select only two or three books with pertinent references to apply per lecture. To choose the books most suitable requires an examination of many, and to the novice it is no easy matter. Thousands of histories have been written, but most of them are largely political in nature, and while many of them mention battles and wars, they omit just those points of especial interest to the soldier. Some of our most renowned history professors are of little help in this branch of the subject without a special study on their part. A good library which has an exclusively military section will save one a great deal of time and labor in working up such a course. But unfortunately, military books seem to be almost entirely wanting in the libraries of many of our educational institutions.

A course of lectures in military history comes more nearly to approaching in form the strictly civilian courses given in a university. Thus it admits of being compared by students and college authorities with other of their courses as to merit. Gunnery, tactics, and matériel do not, for most civilians are too ignorant of these subjects to make intelligent comparisons. (Many will be found, however, who in their lack of knowledge will attempt to argue that there is little of practical value or of mental stimulus to be obtained from a study of such subjects.) Hence, in order that many individuals who are now skeptical, may become convinced of the value, academic as well as patriotic, of the teaching of military science in our colleges, and in order to maintain the confidence of our students, it is quite essential that these lectures be at least as good in quality as the best given in the institution. This will often be found to be a high goal, as there are not infrequently one or two professors in a university who are famed for their lecture courses. However, a well educated officer will generally be able, because of his training,

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to give by proper application a course which, for its logical and progressive presentation and its well rounded form and general value, will compare favorably with the best given by his civilian brothers.

One of the most important aids to the instructor of such a course is the possession of a fitting schedule-outline to follow as a guide. Any strong, graceful, beautiful structure must have a correct foundation and framework.

Students take a great deal of interest in the lectures, but care must be exercised that the topics of instruction are varied and that too many battles are not included. Choose only those battles bringing out the greatest basic lessons or those which illustrate best the advancement of the art of warfare in the age considered. Use them as points of mental rendezvous for maintaining interest in connection with descriptions and discussions of organization, supply, weapons and equipment. Employment may similarly be made of the characteristics, personalities, and habits of the great military leaders. Take up briefly the peculiarities of the peoples, and the national policies and pertinent features of the governments, but avoid needless or extended digressions on points of political history. The college proper will have ample of the most excellent political history courses taught by specialists. It would be no less inane to trespass on their field than it would be for the average pedagogue to attempt to teach Gunnery and Conduct of Fire.

Three lectures a week will be found to suffice for the good of the student. Any more than three will cause him to "go stale" on the subject. The same will hold true for the instructor, for he will often have to repeat each lecture three or four times depending upon the number of sections in the class.

A set of books entitled "Great Captains," written by Theodore Ayrault Dodge, has been found to be most valuable and, as may be ascertained from the schedule below, these volumes have been used more extensively than those of any other author. They carry the subject through in a very complete and interesting manner from the earliest times of record up to and including Napoleon. There is only one very important omission in the time mentioned; *viz.*, in connection with Frederick the Great. Dodge's style, method, and descriptions are such that the minimum of alteration of subject matter by the instructor is required for presentation to the class. Each chapter is headed by a summary of that discussed therein. This enables the instructor to rapidly secure the principal events occurring between two consecutive lectures or to readily ascertain prominent points of a certain period without reading a large amount of extraneous matter. The synopses of events contained in Creasy's "Decisive Battles of the World" are also useful for this purpose.

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The works of Dodge are replete with charts, maps, plans of battles and tactical maneuvers, portraits, and cuts of uniforms, arms and equipment. These may be either drawn enlarged on the blackboard or on a cloth drawing paper. The latter method is the better as the cloth charts are a matter of permanent record and can be brought out when desired for reviews. It will take several months of an officer's spare time to prepare these charts, but the time is well spent, for neat charts which can be used to graphically augment the explanation of various points discussed, or to illustrate formations, movements and features of terrain will aid much in clearly presenting the subject. In several years, they will represent, in the aggregate, a considerable saving of time and work over the blackboard method.

A book entitled "Warfare," by Spaulding, Nickerson and Wright, has proved to be of assistance. It treats of the subject matter up to and including the time of Frederick the Great in a condensed, conclusive manner, from the broader viewpoint of men having a thorough understanding of warfare to-day. In its bibliographical lists, there are shown the titles, authors, and brief reviews of the numerous works consulted by them. These lists are good in that the sources for finding helpful information are often indicated.

The instructor should upon preparing a lecture and while the contents thereof are still fresh in his mind, make notes which will serve as reminders to him during the lecture. It is too much to expect of the average man to prepare three lectures a week in addition to his other duties and to deliver these lectures with an unhesitating tongue without the prompting of notes. The notes should include references and hints to the instructor, and if properly prepared, they will save him a deal of time in preparation for the lectures given the next year. They act as a repository of information already collected, and make it possible to devote more time to enlarging on this information at the next rendition. An effort should be made to improve them each time with the final object in view of leaving a complete set of typewritten and neatly bound notes which will be intelligible to a successor, who may thus be enabled to at once continue the improvement and building up of the course.

A most valuable help in giving the lectures will be the possession of a set of appropriate wall maps showing Western Asia, Northern Africa, and Europe for the various historical periods. The account of a campaign means little unless it can be followed on a map. An excellent set is the Westermann's Classical and Historical Map Series, which may be purchased from Rand McNally and Company.

The schedule of our course is given below, as it is believed that it may be of interest to many, and moreover may be a source of assistance to some officers in the necessary study of military history.

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In most posts and regiments, the commanding officer requires his officers to study a certain amount of military history, or to read other military books than the training regulations of his own arm. In many cases, the officer is not provided a schedule, with the result that his study and reading are haphazard. Any novice who follows this schedule through will find that as a reward for his study, he will be enabled to derive a much increased value from the reading of the many excellent military books written in recent years. The reference books will be found in the average post military library.

It is realized that further improvement can be made on the schedule. In many cases, there may exist better references. Now and then, perhaps, a rather important topic or battle in the portrayal has been omitted. However, it must be considered that only thirty-three hours are allotted for the course, more perhaps not being feasible in a Field Artillery Reserve Officers' Training Corps Unit. Also American military history is thoroughly covered in a special course given in the last year of the advanced course. The schedule has been revised from time to time since first devised, and an effort is being made to continue its improvement.

### SCHEDULE-OUTLINE OF FIFTY MINUTE LECTURES IN FUNDAMENTAL MILITARY HISTORY

NO.	SUBJECT	REFERENCES
1.	Brief outline of lectures. Weaponry, military organization, and tactics of the early Jews, Egyptians and Greeks. The place of the leader.	"Great Captains, Alexander" (Dodge), pages 1–53. "Warfare" (Spaulding, Nickerson, Wright), pages 3–34. "Psychology and Leadership," Vol. 2, 1925, of <i>General Service Schools Press</i> , pages 8–14.
2.	Greek and Persian armies of the fifth century, B.C. The Battle of Marathon.	"Great Captains, Alexander" (Dodge), pages 56–91. "Warfare" (Spaulding, Nickerson, Wright), pages 44–71.
3.	The Macedonian Phalanx. The art of fortifications and sieges. Early years and education of Alexander the Great.	"Great Captains, Alexander" (Dodge), pages 134–187. "Epochs of Ancient History—Rise of the Macedonian Empire" (A. M. Curteis), pages 34–37, 85–88. "Warfare" (Spaulding, Nickerson, Wright), pages 75–81.
4.	Darius of Persia and the extent of his empire. Battle of Issus, a Macedonian victory in spite of being cut off from communications.	"Great Captains, Alexander" (Dodge), pages 223, 295–342. "Epochs of Ancient History—Rise of the Macedonian Empire" (A. M. Curteis), pages 93–98, 112–127. "Warfare" (Spaulding, Nickerson, Wright), pages 81–86.

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NO.	SUBJECT	REFERENCES
5.	Battle of the Hydaspes. Battle of Gaugamela (Arbela). Use of the wedge. Flying wings.	"Great Captains, Alexander" (Dodge), pages 361–386, 541–565. "Epochs of Ancient History—Rise of the Macedonian Empire" (A. M. Curteis), pages 134–142, 182–186. "Warfare" (Spaulding, Nickerson, Wright), pages 87–96.
6. Written Quiz.		
7.	Origin of Carthage. Character of the Phoenicians. Fortifications. Composition and organization of the army. The Carthaginian Phalanx.	"Great Captains, Hannibal" (Dodge), pages 1–30.
8.	Origin of Rome, the great rival of Carthage. Government. The Roman Legion. Early army of Rome, 500–350, B.C. Roman army of the 3rd Century, B.C.	"Great Captains, Hannibal" (Dodge), pages 33–72. "Warfare" (Spaulding, Nickerson, Wright), pages 101–109.
9.	Roman rank and discipline. Equipment and rations. Fortification. Camp duty and war in the Roman army. Officers. Rotation in command. Trains. Policy.	"Great Captains, Hannibal" (Dodge), pages 73–99. "Warfare" (Spaulding, Nickerson, Wright), pages 101–109.
10.	Early Roman wars, 400–272, B.C. The Roman legion <i>versus</i> the phalanx. Battles of Heraclea, Asculum, and Beneventum.	"Great Captains, Hannibal" (Dodge), pages 102–121. "Warfare" (Spaulding, Nickerson, Wright), pages 109–112.
11.	Early life and education of Hannibal. Hannibal establishes himself in Spain and crosses the Alps. Stratagem. Battle of the Trebia.	"Great Captains, Hannibal" (Dodge), pages 143–277. "Warfare" (Spaulding, Nickerson, Wright), pages 115–120.
12.	Turning the Romans' strategic flank in the march through the Arnus Marshes, 217, B.C. Battle of Lake Trasimene, a lesson on "Security on the March."	"Great Captains, Hannibal" (Dodge), pages 278–314. "Warfare" (Spaulding, Nickerson, Wright), pages 120–122.
13.	Battle of Cannæ. The "withdrawing salient." Example in excellent handling of cavalry.	"Great Captains, Hannibal" (Dodge), pages 360–380. "Warfare" (Spaulding, Nickerson, Wright), pages 122–126.
14.	Battles of the Metaurus and Zama. Personality and character of Hannibal. Power over men. Contrasted with Alexander.	"Great Captains, Hannibal" (Dodge), pages 538–560, 592–653. "Warfare" (Spaulding, Nickerson, Wright), pages 129–139.
15. Written Quiz.		

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NO.	SUBJECT	REFERENCES
16.	Cæsar's youth, education, and early service. Cæsar's method, his army, and employment thereof. The siege of Alesia, 52, B.C. Engineering and logistics used.	"Great Captains, Cæsar" (Dodge), pages 36–49, 283–309, 338–380. "Warfare" (Spaulding, Nickerson, Wright), pages 158–172.
17.	Camps, sieges, and ballistics pertaining to Cæsar's army. Battle of Pharsalus, 48, B.C. Cæsar, the man and soldier. Alexander, Hannibal, and Cæsar.	"Great Captains, Cæsar" (Dodge), pages 382–399, 556–576, 755–779. "Warfare" (Spaulding, Nickerson, Wright), pages 177–180.
18.	The decline of military art. The victory of Arminius over the Roman legions under Varus, A.D. 9. The Battle of Chalons, A.D. 451. The Battle of Tours, A.D. 732. The Battle of Hastings, A.D. 1066. Joan of Arc's victory over the English at Orleans, A.D. 1429. The era of cavalry, 378–1315, A.D.	"Decisive Battles" (Creasy), pages 119–227. "Warfare" (Spaulding, Nickerson, Wright), pages 290–320. "Great Captains, Gustavus Adolphus" (Dodge), pages 1–9.
19.	Reappearance of infantry, 1315–1500. The Swiss pikeman. The English longbowman. The use of gunpowder. Changes in tactics, 16th Century. The revival of military art. The Swedish army. Changes in organization and tactics, 1523–1632. Early life and training of Gustavus Adolphus.	"Great Captains, Gustavus Adolphus" (Dodge), pages 10–85. "Warfare" (Spaulding, Nickerson, Wright), pages 372–411.
20.	Battle of Breitenfeld. The Crossing of the Lech. Battle of Lutzen. Gustavus, the man and soldier.	"Great Captains, Gustavus Adolphus" (Dodge), pages 257–271, 312–317. "Warfare" (Spaulding, Nickerson, Wright), pages 471–484.
21.	Army organization and tactics from the early 17th to the early 18th Century. Turenne in Holland, 1672. The Battle of Blenheim.	"Great Captains, Gustavus Adolphus" (Dodge), pages 569–591, 723–736.
22.	Written Quiz.	
23.	Frederick the Great. The Seven Years' War. The Battle of Leuthen, 1757. Use of an oblique order of attack by echelons.	"Great Captains, A Course of Six Lectures" (Dodge), pages 142–177. "Warfare" (Spaulding, Nickerson, Wright), pages 557–572.
24.	Army organization, tactics, and administration at the end of the 18th Century.	"Great Captains, Napoleon" (Dodge), pages 1–50; Vol. I.
25.	Battle of Valmy. Napoleon, the youth and the company officer.	"Great Captains, Napoleon" (Dodge), pages 63–74, 131–175; Vol. I.



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NO.	SUBJECT	REFERENCES
26.	How a Napoleonic army formed for battle. Contrast of Gaulic and Teutonic methods.	"Great Captains, Napoleon" (Dodge), pages 164–184, 308–340; Vol. II.
27.	Battle of Austerlitz.	"Great Captains, Napoleon" (Dodge), pages 266–307; Vol. II.
28.	Battle of Waterloo. Napoleon, the man and soldier.	"Great Captains, Napoleon" (Dodge), pages 553–713; Vol. IV.
29.	The Battle of Saratoga. The Siege of Yorktown.	"The Revolutionary War and the Military Policy of the U. S." (F. V. Greene), pages 96–131, 259–281.
30.	Operations against Vicksburg. The Battle of Gettysburg.	"A Bird's Eye View of our Civil War" (Dodge), pages 93–101; 132–161.
31.	Lessons of the War of 1870. The Battle of Sedan. The Russo-Japanese War.	"Tactical Deductions from the War of 1870" (Boguslawski). "Lessons of the Russo-Japanese War" (De Negrier). "Decisive Battles" (Creasy), pages 459–472.
32.	The First Battle of the Marne.	"Decisive Battles" (Creasy), pages 507–517. "The World War" (Howland), pages 1–57.
33.	Résumé.	

# SUPPLEMENTING TELEPHONE COMMUNICATION IN FIELD ARTILLERY REGIMENTS

BY LIEUTENANT WILBUR S. NYE, F.A.

THE following article will discuss the use of telephonic communication in Field Artillery units higher than the battery, dealing especially with the battalion and regimental nets. The telephone is used by battery personnel for generally different purposes than that for which it is utilized by higher headquarters, and the training of the battery telephone operator is properly the subject for a separate article.

The telephone traffic which passes through the battalion and the regimental nets is naturally divided into two main classes, *i.e.*, tactical and administrative. The more important tactical messages should be sent by telephone or runner, but many other messages, especially of an administrative character, could very well go by some other means. It is the purpose of this article to suggest a supplementary method.

At certain times during combat the traffic over the telephone becomes very heavy, and it must be supplemented, or in case the lines go out, supplanted by other means of communication. In such circumstances we must rely on runners, on radio, or on visual communication. There are ways, however, of utilizing the lines even though the circuit be so disturbed that telephones will not operate successfully.

The rapid transmission of tactical messages is frequently of utmost importance and the introduction of the field telephone before the war promised to supply a quick, accurate means for the commanding officer to transmit his orders and at the same time maintain the personal touch with his subordinates which the big scale of modern warfare had heretofore made impossible.

Two factors have combined to partially defeat the realization of that ideal. First, there is the fact that the amount of technical and tactical detail involved in the conduct of Field Artillery in modern engagements requires the employment of a larger staff than in the past. Second, the number of messages and orders emanating from such a staff has made it difficult for these officers to personally transmit these messages over the telephone.

The message center has been devised to meet the problems of communication resulting from the increased staff work. This message center is supposed to receive, transmit, classify, register, and

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file all messages which go through it and which are not sent verbally from one officer to another. It also handles all coding and decoding.

An officer's time is considered too valuable for him to act as a telephone operator. As a result enlisted men, usually privates, are provided for this important duty, and all 'phones are manned by these operators, with the possible exception of battalion headquarters, where one staff sergeant is furnished by the tables of organization to perform all message center duties as well as act as telephone operator.

Let us see how this system actually works in practice. Before discussing the work of the telephone operators themselves, it might be well to say that the existing types of matériel issued are, in general, satisfactory, and will work if properly used. The average telephone operator, however, is far from satisfactory. Such a man should at least be able to speak and write fairly decent English. If he has a strong accent due to foreign extraction, or happens to hail from some section of the United States where a dialect prevails, it is practically impossible to understand him over the telephone. The messages he takes down are usually written under adverse conditions, and unless he is able to write or print legibly, the result is apt to be unintelligible. If in addition, he is trying to listen with one ear to the instrument for the incoming message, while he balances a message book on one knee and scrawls on the fluttering page with a broken pencil, and listens with his other ear to irate inquiries as to the "cause of the delay" from some officer, it is not unlikely that the result will be imperfect.

The average operator is not sufficiently conversant with the technical phrases and terms used in combat messages to be able to understand what he hears coming in broken groups over the telephone. An elaborate pronunciation chart has been provided to enable him to spell such words. Even if he can remember to use this chart in times of stress, the results obtained are not always accurate, and the loss of time involved may be fatal. The battalion commander will frequently stand by listening to an operator laboriously mispronouncing and misspelling the words of some vital rush message. If he has great self-control he will refrain from snatching the hand-set from the operator's fingers to transmit the message himself; even if he can withstand this temptation he will usually turn to the nervous communications officer hovering nearby and order him to "put another operator on that 'phone." When this equally unsatisfactory change has been made, another alibi must be offered. Telephone batteries, or the 'phone itself is changed, or perhaps a new line is run out. All because of an incompetent operator, whose training may be deficient, but whose inherent qualities are such that no amount of training would suffice.

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Some officers in charge of this kind of work will argue that *their* men are well trained, and can send messages smoothly and quickly. It will usually be found that these men can only send type messages, on which they have practiced for some time. A new list of words, or an unusual message would likely give them trouble. While it cannot be denied that persistent and intensive training will eventually produce telephone operators well enough trained to give good results, it will be found that the time spent is all out of proportion to the results obtained. Furthermore, since in time of peace there is seldom more than one officer on active duty with battalion or regimental headquarters batteries, if this officer devotes too much of his time to the telephone operators, he will sadly neglect his other equally important details—the radio, instrument, and scout men. In time of war there would be more officers, but the army could not mark time while the telephone operators are being groomed.

Despite the fact that great stress has been laid on the training of telephone operators, it would be well to frankly admit that the average operator is nevertheless unsatisfactory. It has not been generally realized how important this man is, and how high his qualifications should be to make him acceptable as a means of transmitting vital data. As a matter of fact, if an organization is fortunate enough to secure a man sufficiently educated, possessing the correct amount of native intelligence and knowledge of military verbiage, together with enough training to make him a good telephone operator, he will at least be made a corporal, and probably should be a sergeant major.

Many organizations still struggle along with the system as prescribed. Other commanders have resorted to the expedient of more or less dispensing with message centers and enlisted operators. They order extra telephones to be placed in their command post, and transmit messages personally to their subordinates or have it done by members of the staff, notably the Plans and Training Officer. This practice may be satisfactory during peace-time maneuvers, but during combat it would surely prove inadequate.

The following supplement to the telephone is suggested—a means by which the good features of both methods enumerated above may be combined, and some of the defects eliminated. In brief, it is suggested that telegraphic means of communication be added. This is not a new idea, but at first thought may be regarded with horror as being too technical for Field Artillery and too difficult to install and maintain. It is hoped that a detailed examination of such a plan will dispel these fears.

Before the field telephone came into general use in modern armies the telegraph was extensively employed between higher headquarters than the brigade, and frequently was extended to lower echelons. It has generally been operated, however, by signal corps troops exclusively.

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The telephone was welcomed by line organizations as a more rapid and less technical means of communication. The personal contact element especially recommended it, and it was believed that anyone, whether trained or not, could readily converse over a 'phone. The supplementary use of a telegraph will enable commanders to get back to that ideal use of the telephone.

At present the telegraph is used between units higher than the brigade with such success that its reliability is unquestioned. It long ago passed the experimental stage. In recent large maneuvers in our army the use of the telegraph was extended to units lower than the division, and was operated by line troops in these lower units. It is believed that results were uniformly successful.

In this discussion it is proposed to use some form of telegraph in the regimental, and perhaps even in the battalion nets. No equipment is regularly issued for such purposes, but there are on hand several types of instruments which may be drawn from signal supply officers on memorandum receipt. It is not believed that the usual type of telegraph sounder should be used, for that would involve an inadvisable change of equipment, and would also necessitate the training of operators to receive sounder signals.

Some type of buzzer is better adapted for use within the Field Artillery regiment. The old buzzer 'phone could be used, and it has one feature which especially recommends it. This instrument operates on direct current and since the current values are exceedingly small, its use is more or less secret as its impulses cannot be picked up by the ordinary inductive type of listening-in set.

The other common instrument is the familiar service buzzer, which can also be used either as a buzzer or as a telephone. It has one distinct advantage in that its impulses are very strong, and it can transmit code over a leaky circuit, or can even jump a break in the wire. It operates with an alternating current, however, and is not as secret as the buzzer 'phone. For use in the Field Artillery where the lines are seldom near enough to the enemy to fear tapping or inductive listening-in, and where breaks in the circuit from other causes are more likely, the service buzzer is probably the better of the two.

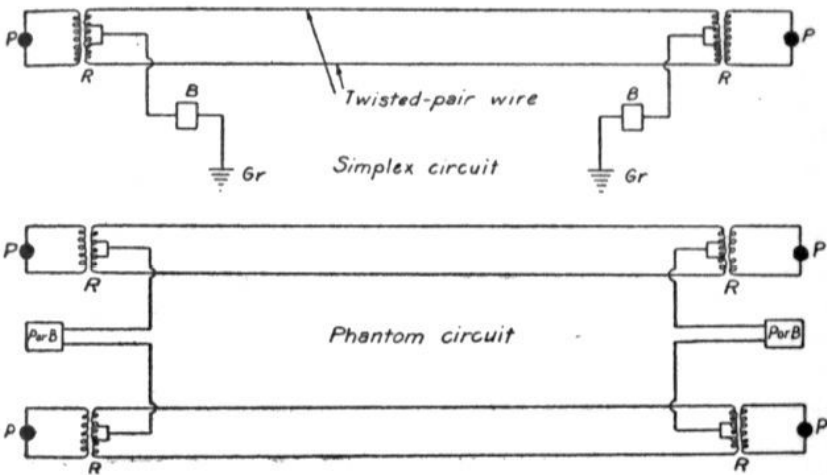
There are various methods by which these supplementary instruments can be installed in the existing telephone net. Enterprising communications officers will devise means of their own. The simplest plan is to place buzzers at each headquarters, and connect them direct, either with additional wires, or by utilizing one of the two trunk lines already laid. These instruments would then all be connected in series, and operators would have to listen for their own call letters, just as in radio, or commercial telegraphy.

A second way is to connect the buzzers through the various

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switchboards. No new trunk lines would be laid, but each buzzer would occupy the same status as an additional local telephone connected by a short wire to the switchboard. In this way each buzzer could be installed in the message center, and a party would be called up, exactly as if the 'phone were used. Each impulse from the buzzer key will cause a drop to fall on the switchboard, and the sharp sound in the head-set will distress the operator. It is possible to install an auxiliary device for the call-up, such as a small bell.

A third method, perhaps the best, is to "simplex" one of the telephone circuits. This is accomplished by using a repeating coil at each terminal. In this way the existing telephone lines can be used without interfering with



**P = Telephone or switch board unit; R = Repeater Coils; B=Buzzer, Gr=Ground**

telephone conversation. A sketch of the hook-up when a buzzer is used in this way by means of a "simplex" circuit is shown.

If two pairs of wires are installed between switchboards a "phantom" circuit may be employed. By this means either an additional telephone or a buzzer may be used without employing a ground return. Under the same conditions, however, two buzzers might be employed by using "simplex" circuits, as compared to one buzzer with the "phantom" circuit.

The buzzer should be established in the message center, connected by one of the means enumerated above, with the other stations in the net. A trained code operator is assigned. This man can then devote his time entirely to the sending and receiving of all messages specified by the Message Center Chief. It is also possible to use the buzzer in the radio station as an adjunct to both the radio and the telephone. It could be operated by one of the radio detail. This method is only recommended for organizations which are extremely short of men.

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The procedure used could be an abbreviated form of radio procedure, depending on how the net was established, and how much of a call-up is necessary. However the procedure will be sensibly shorter than telephone procedure with all its repeating of operator numbers, message center numbers, etc. The messages may or may not be repeat-back or "G" messages, but until the reliability of the operators is well established, it is advisable to have all messages repeated back for a check. The slight loss of time involved is more than compensated for by the assurance of absolute accuracy.

It may be thought that it will be burdensome and difficult to train the additional code operators. It must be remembered, however, that these men are trained in lieu of expert telephone operators. Their training can be accomplished without the especial attention of each separate organization commander through the use of battalion or regimental code schools. In fact, these operators can be more easily and quickly trained than good telephone operators. No especial educational qualifications are necessary. The operator does not have to understand what he is transmitting or receiving, and the ability to spell difficult words is not necessary. All he must do is send dots and dashes and print legibly. Fewer men need be trained than for telephone work, and an additional advantage will be found in the fact that there will be built up a reserve supply of code operators available for radio or visual signaling. The man power saved by using no enlisted telephone operators or a very few of them can then be released for other duties, such as additional line guards. That is an important duty during combat, and inadequately provided for in the tables of organization.

Let us see what would result from the installation of a buzzer system. In the first place the buzzer in the message center would transmit and receive most of the messages which now clog the telephone net. These messages would be quickly dispatched, and they would be accurate. The transmission would be accurate because the operator merely sends what is written and is not concerned with spelling or with the sense of the message. A repeat-back gives an absolute check, letter for letter. The transmission would be fast because any qualified operator can easily receive at least twelve words per minute. It is indeed seldom that a twelve-word message can be sent by telephone in one minute, using enlisted telephone operators. It will be found that the buzzer message can often be sent and checked back while telephone operators are still struggling with the heading of the same message. It must be kept in mind that both types of messages have to be written down by the operator, and that while a buzzer operator can perhaps write no faster than the telephone man, his freedom from worry as to spelling, etc., allows him to print each letter as fast as it comes over the wire.

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With a buzzer installed in the message center, the telephone lines would be relieved of traffic to such an extent that the commander and his staff would at all times have 'phones available for personal conferences with subordinates. Messages too important to be intrusted to illiterate telephone operators, and requiring too lengthy a conversation to permit the use of buzzer could be sent by staff officers. That is really the function of the telephone. Under such a system the battery commander would no longer receive, through a telephone operator, such a message as, "You will at once take under fire all *sleeping* targets. I am sending you another truck load of *animation*.—C.O. 2nd Bn," or—"Send your vehicles back to the rear *hash-line*."

The telephone would at last be used for the purpose originally intended and in the manner guaranteed to give best results. The greater percentage of routine matter would be handled through the message center by radio, buzzer, or courier. A noticeable improvement would be made in the whole communication system, and the absence of amateur telephone operators would give a more polished and smooth-running appearance to communications problems and field maneuvers.



# FOREIGN MILITARY JOURNALS A CURRENT RÉSUMÉ

ENGLAND

## "The Journal of the Royal Artillery," April, 1927

IT IS a constant pleasure to go over this magazine. Good artillerymen all over the world have their pleasures, their problems, their enthusiasms, and their troubles. An artilleryman who is also a good linguist can undoubtedly read with profit articles from French, German, Spanish, and other technical artillery journals. However, it is hard for an officer with a slight knowledge of a foreign tongue to follow a technical discussion. This difficulty does not exist in reading a journal written in the same language.

In addition it seems as though we really had more in common with the British Army than with any other Army. During the war our relations with the French were perhaps more intimate than with the British, but since the peace it is in the British military establishment that we find most basic analogies for our own problems. We both have a permanent military establishment without conscription, backed up by some sort of a framework into which the resources of the country can be fitted in time of war. We both have responsibilities all over the world which some time puzzle us. And we both have complications due to the high price of living which are the source of constant preoccupation to the readers of THE FIELD ARTILLERY JOURNAL as well as to the readers of *The Journal of the Royal Artillery*.

It is somewhat difficult, therefore, to pick out of this British Journal the articles which are most suitable for review. Almost without exception they are of considerable interest to American artillerymen.

"Shells," by Colonel H. R. W. M. Smith, D.S.O. "The shell is really the weapon of the artilleryman—the gun but the instrument which sends it on the last stage of its long journey from the factory to the target." This is the way in which Colonel Smith opens up his discussion. He divides his lecture into three parts covering quantity, condition, and design.

His discussion as to the quantity of shells required is perhaps the most interesting. Acknowledging that this is a matter for decision by the General Staff he feels that the best advice of artillerymen is required on the subject. He starts with the assumption—a very fair one—that any nation going to war at the present time will be short of requirements in shells for the first twelve months

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of war and goes into discussion as to the best procedure in view of this fact. In so far as Colonel Smith offers a solution at all, it seems that he feels that much can be done with the design of a shell to increase its value and, therefore, to make one shell do the work of two. His discussion of the conditioning of shells is also interesting, particularly his assumption that the recent disastrous explosion at the Naval Arsenal in Picatinny was due to over-congestion in storage. His conclusions as to the necessity for care of stocks of ammunition and a continuing turnover are along lines that our own studies have indicated to be sound. His conclusion is as follows:

"History shows that . . . an early decision has occurred and may well occur again—even if the development of mechanised vehicles does not carry with it all the results foretold by our most advanced prophets. We must be careful that in preparing to win our war in the second year we do not lose it in the first. This we can aim at by a wise expenditure of such resources as we have—and for this purpose we must know what is available—by improved gunnery, by care of existing stocks, by improved designs, and perhaps above all by a ceaseless search for, and transmission and coördination of information on the battlefield. I would repeat what I said at the beginning that the shell is the gunners' weapon."

**"Training for War,"** by Major General H. H. S. Knox, C.B., D.S.O. This officer is Director of Military Training of the British Army. On account of its source, this lecture delivered before the Royal Artillery Institution, is particularly interesting. General Knox says "You all know . . . that the object of training is to fit units for war. Our difficulty is—What does war mean? What do we want to produce by our training so that our Army will be fit for war? With an Empire such as ours we may have to fight in the cockpit of Europe; in the deserts and jungles of Africa; or in the mountains and wastes of Asia." With the world responsibility which the United States carries to-day, the above is perhaps as true of our own country as it is of England.

General Knox divides his discussion into remarks on training of the officers—senior and junior—noncommissioned officers, and men. His remarks are not entirely applicable to our Army, particularly in the emphasis placed upon the responsibility of noncommissioned officers for training. We tend rather to place this on junior officers. However, the discussion is interesting as is also the cropping up here of various small problems familiar to our own Army, such as the large number of training manuals.

In delving into the future, General Knox first acknowledges

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the tendency toward mechanization. He feels, however, that it is a mistake to assume that the development of mechanical efficiency alters in any respect the principles of war. So far as the artillery is concerned, he says "What of the artillery? Post-war developments do not alter the necessity for artillery support. Tanks in certain countries form an efficient substitute for close-support artillery, but the tanks themselves require support. I cannot see any mechanical contrivance within sight which will do away with the necessity for artillery, though I see many which will increase the effectiveness of artillery."

**"Shrapnel and H. E.,"** by G. S. C. The question raised herein is this—"Is it sound policy to retain shrapnel for our Field Artillery?" The author has compiled tables on this subject. It is a little unsafe to accept such tables as absolutely correct. Probably almost any table could be constructed and almost any deduction arrived at from the files of any War Department or War Office. However, these tables are undoubtedly correct enough to indicate that Great Britain alone plans to provide a higher percentage of shrapnel than of shell in artillery ammunition. The tables show that Japan at present is doing the same thing, but notes that as that Army is being remodeled somewhat along French lines, the percentage of high explosive is very likely to increase in the future.

This article is particularly timely in so far as the question of the percentage of shrapnel to shell in our own Army has recently been brought up again. This article claims that British tests show that shrapnel is most effective against personnel in trenches, particularly in shallow trenches; while against troops in the open, it is generally acknowledged that properly used shrapnel is most valuable. For other targets, such as troops in the woods and machine guns, the author feels that shrapnel is as valuable as shell; while against more protected targets, it still has its uses.

These conclusions appear to have been drawn from tests conducted by the British Ordnance Committee. There remains, of course, much to be said on both sides.

**"Army Life in India To-day,"** by Lieutenant General Sir George MacMunn, K.C.B., K.C.S.I., D.S.O. This is the most interesting article in the Journal on account of its human appeal. It is not in any way a Field Artillery article, but has perhaps a special appeal to the mounted service. General MacMunn speaks very frankly of the financial condition of the young British officer of to-day. It appears to be much the same as that of our own. He shows that young officers without independent means have to be very careful, even in India, to best arrange their lives at small

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expense. He finds that the best in play, amusement, and social life centers around the horse or some other form of athletics. He paints a picture which will be familiar in many aspects to our own officers who have served in the Philippines and which is applicable to a certain extent to service anywhere.

**"The Jumna Kadir at Delhi in the 19th Century,"** by Golandaz. This is another article dealing with India and written apparently by a gunner. It is an interesting reminiscence of experience in pig sticking, a sport which has never spread into our service, and which consequently retains the interest of novelty.

The following other articles appear in this same issue:

"Artillery Umpiring."

"Coast Defense Fire Control Methods."

"The Mechanical Stomach."

"Buenos Aires and Monte Video, 1806, 1807."

"Motorisation of a Division."

"An Artillery Course at Metz."

"Intercepted Conversation."

### FRANCE

#### **"Revue d'Artillerie," April-May, 1927**

**"Power Brakes,"\*** by Captain P. Prevost, is a description of various types of motor vehicle brakes, in which the action of the foot on the pedal contracts the brake bands through the agency of some mechanical power other than the usual system of rods and links.

There are apparently, in current use abroad, two systems of power brakes. First, the suction type which depends on the suction effect of the motor, and second the direct power type which depends either on the power of the motor or centrifugal force induced by some moving part, such as the propeller shaft.

In the suction type the foot pedal operates a valve set on the vacuum line between the engine and a brake cylinder. The creation of a vacuum in this cylinder operates a piston connected to the usual brake links. It is interesting to note that this system is used on the popular Citroen.

The second type is based on a rotating disk or drum driven by a pinion in the transmission or connected directly to the propeller shaft. By pressure on the pedal a second disk, linked to the brake

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\* NOTE: Attention is drawn to the number of articles on different phases of automotive engineering which are appearing in this magazine as an indication of the interest, by the French Army, in motorized artillery.

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bands, is forced into contact with the rotating part. Brakes of this character are now used by the Renault, Rolls Royce and Hispano-Suiza. The latter make has introduced the refinement of adding a differential gear on the front wheel brake system to automatically vary the pressure on the outer and inner wheels.

In all of the systems described above, there is also employed direct action braking by the foot pedal, for auxiliary use at low speeds, where the power effect is small. It is claimed that power brakes greatly reduce the possibility of locking the wheels in addition to affording a much greater force in stopping a heavy car.

It would seem that such added intricacy is unnecessary for light passenger cars but would be of much value on high speed trucks.

**"Location of Units of the French Artillery."** In the May number is published the location of the various active units of the French artillery. The number of the various types of regiments are given below.

Horse-drawn, Divisional Artillery—30 regiments numbered between 1 and 64 inclusive. Of these 23 are stationed in France, 5 in Germany and 2 in Morocco. A French divisional regiment contains 75-mm. guns and 155-mm. howitzers.

Horse-drawn Heavy Artillery—11 regiments numbered between 101 and 130 inclusive. All of these are stationed in France.

Mountain Artillery—2 regiments, the 93d at Grenoble and the 94th at Nice.

Foot Artillery—4 regiments numbered between 154 and 163, all of which are in France.

Tractor-drawn Heavy Artillery—7 regiments numbered between 181 and 196. One regiment is in Germany and the rest in France.

Portée Artillery—17 regiments numbered between 301 and 365, all of which are in France.

Railway Artillery—2 regiments, the 371st and 372d, both in France.

Antiaircraft—5 regiments numbered from 401 to 405 inclusive. All of these are stationed in France except part of the 402d which is in Germany.

Horse Artillery—5 groups numbered between 1 and 6. All are stationed in France except the 4th which is at Treves in Germany.

Separate Battalions—Of these there are 8 numbered from 1 to 8. They are all in North Africa except the 6th which is an observation battalion with companies at St. Cloud and Mayence.

In addition to the above fighting units there are 16 separate battalions and 6 separate companies of Artillery Workmen which correspond to our field ordnance units, the French, not having a separate ordnance corps.

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**"Modern Fortifications,"** by Alexis Von Schwarz. The writer of this rather lengthy article is said to have been a lieutenant general and engineer in the Imperial Russian Army and at present to be a professor in the Military Academy at Buenos Aires. The article appearing in the *Revue D'Artillerie* is a translation of only three chapters of a large treatise with a brief preface by the translator, explaining that the part now appearing in French for the first time has special application to the defensive problems for which France still seeks a solution, along her eastern frontier.

Citing the rapid capture of various fortresses in 1914 by the Germans, he gives as the causes the great superiority of the artillery of the attacking force, and faults in the planning of the permanent defenses. The chief of these was lack of depth. The permanent fortresses were more a single line of defense than a fortified zone. Also between the fortresses there was little in the way of defensive works, the lack of which permitted isolation and piecemeal destruction of the separate forts. Lastly, the fact that the forts themselves were on high ground and plainly visible, made them easy targets for heavy guns. As a result of the war, plans for fortifications must foresee a deeply fortified zone in which all shelters for men and supplies are below ground. To these requisites General Von Schwarz adds invisibility, which he claims can best be obtained by the planting of trees all over the fortified zone.

With the above ideals in mind the writer then examines in detail six different schemes of fortifications devised by as many different officers who have studied the question since the war.

### **"Revue Militaire Française," March-April, 1927**

**"The Art of War,"** by General F. Camonge, is the final portion of a more complete study entitled "The Art of War Through the Ages." In this article General Camonge discusses: the École de Guerre, the World War, conclusions drawn from a study of the World War, and the probable aspect of the next war.

The War of 1870–1871 exposed the incapacity of the French General Staff; and the École de Guerre was created in 1876 to correct this condition. The aim of the school was to develop not only good students but also men of character and initiative. Foch, Pétain and others are proof of the school's success.

In his discussion of the World War, General Camonge touches but lightly on the war of position. He believes that only a war of movement gives victory and he explains that the long period of position warfare was unavoidable. To characterize the situation and to indicate the remedy he quotes General Pétain:

"The break-through is not an end in itself, but merely the means to arrive at open warfare, in attacking the enemy on one or

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both of the flanks formed by the rupture. To accomplish this task we must have a preponderance of men, cannon, and munitions. The effort is immense and the cost colossal. We must not be afraid to face the difficulties; it is not in denying their existence that we shall succeed in solving them."

General Camonge draws various conclusions from his study of the World War. The war showed the necessity of unity of command. The use of army groups facilitated and simplified the control of a great number of large units. The "Strategic Reserves" which Napoleon used so often, played a very useful part in the ultimate victory.

Joffre and Foch used their reserves in a very different manner. In reality, Joffre had no reserves; he had to reënforce the menaced points by drawing troops from other parts of the line after the weakness became apparent. In this manner he played the rôle of a "director" or "regulator."

On the other hand, Foch "animated" and inspired his forces by the way he handled his reserves. He was better able to assure the execution of his plans. He made effective and timely use of his reserves, realizing that: "it is better to send reënforcements in time, that is to say, before the enemy's attack, rather than to send a greater number later."

By means of this method of warfare and because of his continual and personal observation and intervention he facilitated the control of army groups and unified the allied efforts. Foch applied the maxim: "The Commander-in-Chief must incessantly control the common action of his forces and see to it that no part of it is inactive at the crucial moment. When the moment has come to act, it is expedient to use all units. The least these units can do is to neutralize a fraction of the adversary. If they rest inactive they are themselves neutralized."

In looking to the future the author feels that the next war will be to the death. It will be general. It will be general in that all great nations will be involved. Moreover it will be general in that there will be no noncombatants among the citizens of these nations. Preparation for this war involves economic and industrial as well as military mobilization.

General Camonge next passes to the purely military features of the next war.

The Artillery of to-morrow will have longer range and more destructive projectiles. The production and transportation of matériel and munitions will be a very difficult problem.

The Infantry will remain the predominant arm which assures possession of conquered territory. The number of its auxiliary weapons will grow. The French 97-1915 rifle will perhaps be

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replaced by an automatic weapon. The infantry will also be strengthened by a larger caliber machine gun (at least 15-mm.). The Hotchkiss machine gun is still an excellent weapon, and the Stokes mortar is satisfactory, but the 37-mm. gun lacks power and the proper type of accompanying artillery remains to be found.

In addition to the small accompanying tank, the French are studying heavier types for breaking through defensive positions: a twelve-ton tank capable of a speed of 15 kilometers per hour and even a hundred-ton tank.

The aviation will continue to grow in importance due to the increasing radius of action and the capacity to carry heavier loads of explosives and personnel. One can easily foresee the execution of great destruction in the extreme rear areas and the transportation of entire detachments beyond the lines.

General Camonge insists upon the necessity of being ever alert to make sure of any new scientific discovery, to look to the future, and not to study only the past. However, with all this increasing importance of science in future warfare, military strategy is not dead. Applied by capable and well-trained officers it will win future wars as it won the last war.

Lieutenant Colonel Laure continues "**The Campaigns of an Infantry Division.**" In the March and April numbers he traces the history of the 13th Division from Verdun, February, 1916, to Malmaison, October, 1917.

During the summer of 1916 the infantry battalion was reduced from four to three companies. The fourth company of each battalion was sent to a division depot. This new organization gave the division a flexible reserve and as the companies were alternated between the reserve and the front line, permitted continual instruction in the use of the latest type of auxiliary weapons.

The coöperation between the various arms continued to improve. The artillery was constantly and uniformly active in destroying obstacles which impeded the infantry advance. It had also learned not to increase the intensity of fire before the infantry attack. Earlier in the war this practice had signaled the infantry jump-off to the enemy. The aviation had also become more capable in directing artillery fire. Officers of aviation and artillery visited the division C.P. several times daily in order to receive instructions and to bring photographs showing the effect of the artillery fire upon the enemy positions. The day and hour of an attack was fixed only after the complete execution of a destructive artillery preparation.

The infantry became more familiar with the new weapons, particularly with the automatic weapons, which had largely replaced the infantry rifle. Whereas at Artois there were 3500 rifles in the



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division, at the Somme there were only 1600. The good effect of this change was shown by the fact that at the Somme the casualties were only 26 per cent., as compared to 50 per cent. at Artois.

In December, 1916, the infantry division was reduced from four to three regiments. This organization did away with the brigades. This change met with considerable opposition but produced a much more effective organization, since it conformed with the policy of reducing the number of infantrymen in all units from the company to the division. The original over-abundance of men in each unit led to excessive casualties. Moreover in diminishing the infantry in each division, the number of divisions was increased. This change increased strategic power and at the same time established between the different arms a proportion better adapted to the new tactical conditions.

Malmaison was essentially an artillery battle. Here the infantry played a subordinate rôle; it occupied the ground that the artillery conquered. It must be understood, however, that this was a very special type of operation.

It was necessary at that time to revive the sinking moral of the French infantryman. General Pétain instructed his army commanders to prepare a certain number of operations, which they were to conduct very methodically, leaving nothing to chance, in destroying everything that might stop the attack of the infantry troops. There was to be no exploitation of success beyond very definite objectives. The sole aim of these operations was to revive the confidence and offensive spirit of the French soldier.

This was a real battle of attrition. Its purpose was not to gain ground but rather to wear out the enemy without sacrificing the French infantry. The mass of artillery at Malmaison reached an unprecedented density of one piece to each five meters of front.

The expenditure of artillery ammunition was tremendous. The division fired from 400 to 500 tons daily. During this preparation the 21st Corps expended munitions whose value was estimated at 89,588,000 francs. It can be seen what a demand it would be upon munition factories if such a special type of artillery battle should be generalized and if it should always be the mission of artillery to conquer and the infantry merely to occupy.

In the April number, Lieutenant Colonel Paquet concludes his article **"Before the German Offensive Against Verdun."**

**"Offensive Maneuver,"** by Colonel Mayrand also appears in the April number.

**"The Torch,"** by Captain deGoule, is a dialogue which portrays military life and spirit during the Napoleonic period. The

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philosophy expressed in this little dialogue is eternal and universal; it expresses the emotions of the modern soldier quite as well as those of the soldiers who served with Napoleon.

### GERMANY

#### **"Artilleristische Monatshefte," November-December, 1926**

**"Antiaircraft Fire."** This is a continuation of the article begun in the September-October, 1926, number of the *Monatshefte* by Lieutenant-Colonel v. Keller, of the German Army. A summary of the first installment appeared in the May-June, 1927, number of THE FIELD ARTILLERY JOURNAL. Therein, the author deduced the basic equations underlying the conduct of antiaircraft fire. In the present installment, the author shows the practical application of these equations and suggests a new method of fire for combating airplanes.

As an example, a hostile plane is selected, flying at 4000 m. altitude and first observed at extreme range (about 10,000 m.). The initial range  $R_1$ , as determined by the range finder, is 9500 m. The tracking of the target then begins. At the end of 6 seconds, the angular movement is measured as  $d = 1^\circ 24'$ , and the new range  $R_2$ , as 9200 m. The distance  $F$  which the plane travels in the elapsed 6 seconds is determined from Equation (1):

$$F^2 = R_1^2 + R_2^2 - 2 R_1 R_2 \cos d. \quad (1)$$

Substituting, we find  $F = 390$  m.; and  $f$ , the speed of the plane, is  $\frac{390}{6} = 65$  m./sec.

From Equation (2),

$$\sin \phi = \frac{R_2 \sin d}{F} \quad (2)$$

we find the initial flight angle  $\phi_1$  to be  $35^\circ$ , and the flight angle at the end of 6 seconds,  $\phi_2 = \phi_1 + d = 35^\circ + 1^\circ 24' = 36^\circ 24'$ .

In the average battery, it will take 10 seconds to announce and set off the firing data, and then to load and lay the piece. The angular movement ( $d_n$ ) of the target during the elapsed 10 seconds can be determined from Equation (3).

$$\tan d_n = \frac{F_n \sin \phi_n}{R_n - F_n \cos \phi_n}. \quad (3)$$

By substituting the previously determined values,  $F_n = 10 \times 65 = 650$  m.;  $R_n = 9200$  m.; and  $\phi_n = 36^\circ 24'$ , we find  $d_n = 2^\circ 33'$ .

The distance  $R_a$  to the target, at the instant the gun is fired, is found by Equation (4):

$$R_a = \frac{R_n \sin \phi_n}{\sin \phi_a}. \quad (4)$$

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By substituting,  $R_n = 9200$  m.;  $\phi_n = 36^\circ 24'$ ;  $\phi_a = \phi_n + d_n = 36^\circ 24' + 2^\circ 33' = 38^\circ 57'$ , we find  $R_a = 8700$  m.

These values of  $d_n$  and  $R_a$  give us the position of the target at the instant of firing. In order to hit the target at  $P_t$ , an additional deflection must be set off to allow for movement of the target during the flight of the projectile. This angular movement is obtained from Equation (5):

$$\sin d_t = \frac{f \sin \phi_a}{v} \tag{5}$$

in which  $f = 65$  m./sec. and  $\phi_a = 38^\circ 57'$  are known. The average velocity  $v$  of the projectile for the predicted range  $R_t$  can be determined with sufficient accuracy by means of a graph similar to that in Fig. 5.

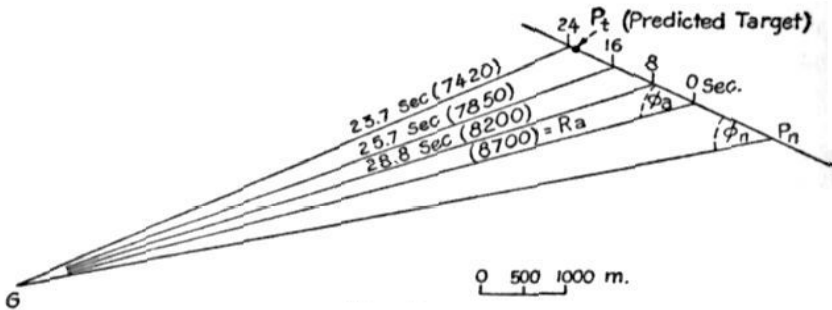


Fig. 5

In this graph, the time of flight is given for different ranges radiating from G, the assumed position of the gun. The line  $P_nP_t$ , making an angle  $\phi$  with the direction of fire, shows graphically the direction of the flight of the plane. This line  $P_nP_t$  is subdivided into seconds to the same time scale as the range lines. The point of intersection of the flight line  $P_nP_t$  with the particular range line having the same time as the point of intersection on the flight line, will mark the point where target and projectile will meet. In our example, we find by interpolation that these two lines cross at 23.9 seconds, and that the corresponding range is approximately 7450 m. Referring now to a prepared range table, we find the average velocity  $v$  of the projectile for this range to be 312 m./sec. Substituting the above values for  $f$ ,  $\phi$  and  $v$  in Equation (5), we find  $d_t = 7^\circ 34'$ . The range can now be determined more accurately from Equation (6).

$$R_t = - \frac{R_a \sin \phi_a}{\sin (\phi_a + d_t)}, \tag{6}$$

from which we obtain  $R_t = 7500$  m., which verifies the approximate range taken from the graph.

The angle of inclination which must be given to the observing

## FOREIGN MILITARY JOURNALS

and sighting apparatus in order to measure the true deflection angle is determined by Equation (7):

$$\sin \nu = \cot \theta \tan y_1 \quad (7)$$

from which we obtain  $\nu = 39^\circ 56'$ .

Now in practice, these equations are not used. All the calculations are reduced to tables of convenient form covering all the possible values, thus permitting a rapid solution of any problem. The determination of the firing data begins as soon as the target is sighted, and is continued without interruption throughout the subsequent tracking and firing, so that at any instant the data may be taken from the data sheets or calculators, and applied to the guns.

Two sets of tables are used, one for tracking and the other for the actual firing data. The tracking tables are used to determine the values of  $f$  and  $\theta$  which form the basis of the firing data tables. The first tracking table called the F table is in the following form:

R <sub>1</sub>	R <sub>1</sub> - R <sub>2</sub> =											
	100 m.			200 m.			300 m.			etc. to 800 m.		
	<i>d</i> =			<i>d</i> =			<i>d</i> =			<i>d</i> =		
Meters	1°	2°	3°	1°	2°	3°	1°	2°	3°	1°	2°	3°
10,000												
9,900												
.....												
9,500							346	436	526			
.....												
9,000												

By interpolation, the proper value of F can be determined. Thus, in our example, we found  $R_1 - R_2 = 9500 - 9200 = 300$  m.;  $d = 1.4^\circ$ . Going to the 300 m. column of the table and interpolating between 346 and 436, we find  $F = 382$  m. Dividing this by 6 seconds, we find the speed of the plane,  $f = 64$  m./sec.

The second tracking table is called the  $\theta$  table and is in the following form:

F =	370 m.		380 m.		390 m.		etc. to 800 m.	
	<i>d</i> =		<i>d</i> =		<i>d</i> =		<i>d</i> =	
R <sub>1</sub>	1°	2°	1°	2°	1°	2°	1°	2°
10,000								
.....								
9,500			25°	57.5°	24°	55.5°		
.....								
9,000								

Entering this table with  $F = 382$  and  $d = 1.4^\circ$ , we find by double interpolation  $\theta = 37.7^\circ$ . Had we taken F to the nearest 10, that

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is 380 m., we would have had  $\theta = 38^\circ$ , which is sufficiently accurate and saves time.

Knowing  $f$  and  $\theta$ , we are now able to select the appropriate firing table which is in the following form:

$f = 65\text{m/sec.}$		$\theta = 40^\circ.$				Target approaching.				
Range of target when data are announced	Range of target when command to fire is given	Firing data to be announced								
		Altitude = 3000 m.				Altitude = 4000 m.				etc. to 6000 m.
		$a$	$d$	$v$	$t$	$a$	$d$	$v$	$t$	
.....										
9,400										
9,300										
9,200	8,700					$13 \frac{3}{16}$	$8 \frac{3}{16}$	$42 \frac{1}{2}$	23.9	

In the above table,  $a$  = elevation set off on the tangent sight of the gun;  $d$  = the deflection;  $v$  = the inclination to be set off on the sight and observing instruments;  $t$  = the time setting of the fuse. We find these data are in close agreement with those determined by the equations. The differences are due to the fact that  $\theta$  was taken as  $40^\circ$  instead of its exact value which is  $37.8^\circ$ .

Due to the speed of the target, its ability to change its course of flight in a three dimensional direction, the short time that it will be under fire, and the unavoidable approximations that must be accepted in determining the values of  $f$  and  $\theta$ , the problem confronting the battery commander is not so much one of precision fire as it is one of covering with fragments, in a short period of time, a target zone within which the target will probably be located. What will be the size of this probable target zone?

Due to the approximate values of  $f$  and  $\theta$  that are used, the maximum range error may be as large as  $\pm 125$  m. The depth of the target zone may, therefore, be taken as 250 m. This depth can be covered at all ranges by the fragment zone of the time shrapnel (clock fuse) fired by a four-gun antiaircraft battery.

The height of the target zone will probably not exceed 100 m., which is the maximum change in altitude that a plane can make during the time of flight of the projectile. A hostile plane is more likely to seek safety by going higher than by coming to a lower level, but nevertheless we shall take 200 m. as the height of the target zone. Now the actual dispersion in height of modern antiaircraft guns is so small, that it will not cover the target zone. This must, therefore, be accomplished by echeloning the range (elevation).

In the same way the lateral dispersion of modern antiaircraft guns is insufficient to cover the target zone in width. Since this width may be considerable, due to changes in the speed and direction

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of the target, the width of the target zone must be covered in a relative manner by firing successive volleys, and by delivering this fire in such a manner that it will arrive at the predicted point both before and after the target reaches this point. This is possible since both the observation and the laying are direct, and the battery commander is able to give the command to fire at any instant. It is advisable, therefore, to add 5 seconds to the 10 seconds which experience has shown are required to announce and set-off the data, and lay the piece, making a total of 15 seconds. If at the end of 10 seconds, the battery commander observes that the target will arrive at the predicted point in 5 seconds, he gives the command to fire at the end of 12 or 13 seconds. If his observation shows that the target will reach the predicted point sooner, the command to fire is given at once. If the target slows up, the command to fire is withheld until the target is from 2 to 3 seconds from the predicted point.

Volley fire is used habitually, each gun firing a burst of 3 rounds in 6 seconds. In this way the center of burst is placed on the center of the target zone. Plus and minus errors in all directions should be equal. In order to cover the target zone in height, the volley must be staggered in range (elevation). Since the height of the target zone is  $\pm 100$  m., the corresponding elevation bracket is  $\pm 2^\circ$ .

The next question is to determine the probability of obtaining an effective hit. The dimensions of the target zone are 250 m. in depth, by 200 m. in height, by 300 m. in width, giving a volume of 15,000,000 cu. m. Now, with one volley of 12 shrapnel, a volume of 83,000 cu. m. can be covered with a density of  $\frac{1}{4}$  hit per cu. m. which density is necessary to obtain an effective hit. To attain this density of fragments within the entire target zone would require  $180 \times 12 = 2160$  rounds. In other words, 2160 rounds would have to be fired to assure an effective hit on a target anywhere within the target zone. Considering now the methods used during the war 1914–1918, we find that the German antiaircraft fire brought down one plane with the following number of rounds:

In 1915.....	11,585	rounds
1916.....	9,889	rounds
1917.....	7,418	rounds
1918.....	5,040	rounds

While these figures show a gradual improvement in the technique of antiaircraft fire, they also show that with the method suggested in this article and with certain improvements in fire-control instruments, better results can be attained and that the effectiveness of antiaircraft fire can be increased 60 per cent. over that attained at the end of the war.

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The most important improvements to be made are in the sight. This should be given an attachment which will permit the sight to be tilted by an amount equal to the inclination angle  $\nu$ , thereby causing the gun to be laid with the true deflection. Furthermore, in addition to the telescopic sight, an open sight must also be provided so that the assistant gunner may quickly bring the target within the field of view of the telescopic sight operated by the gunner.

The only fire-control instruments needed by the battery headquarters detail are a range-finder of the self-contained base type, an observing and azimuth measuring instrument, two stop-watches and the tables described above.

Quick location and identification of the target is facilitated by having the gunners and operators of observing instruments oriented on a base point. As soon as a hostile plane is located, all gunners and operators can be directed thereon by the simple command: "Target (description); Azimuth (so much); Elevation (so much); Commence tracking." The firing data are announced as follows: "Elevation, 132; Deflection, right, 82; Inclination, 425; Fuse, 24." The command: "Fire," is then given when the battery commander observes the target in the proper position with respect to the predicted point.

As in all firing technique, simplicity is of paramount importance in time of war. This condition, it is believed, is fulfilled by the methods proposed in the article.

## CURRENT FIELD ARTILLERY NOTES

### **83rd Field Artillery Now Horse-drawn**

THE First Battalion, 83rd Field Artillery, on duty as a demonstration unit at the Infantry School, Fort Benning, Georgia, is being changed from a tractor-drawn to a horse-drawn battalion.

This conversion is desirable because the instruction at the Infantry School deals primarily with the Infantry division, in which, according to the Tables of Organization, all of the field artillery is horse-drawn. Hence the student officers in the solution of map problems and terrain exercises are required to compute road space, rates of march, and areas for camp sites, on the basis of horse-drawn artillery. Therefore, it is desired that demonstration artillery with which they actually work should be horse-drawn instead of tractor-drawn.

For this conversion, the following animals were required: horses, draft—234; horses, riding—104; mules, draft—44.

There has been no change in type or caliber of the pieces, this organization being equipped with the French 75-mm. gun.

### **Troop Changes at Fort Sam Houston, Fort Sill and Fort D. A. Russell**

To better utilize existing permanent housing facilities for the comfort of troops and to effect an economy by dispensation of the necessity for upkeep of wooden wartime barracks, the following troop movements were ordered in June to take place immediately:

4th Infantry Brigade (less 3rd Battalion, 20th Infantry) from Fort Sam Houston, Texas, to Fort D. A. Russell, Wyoming.

3rd Battalion, 20th Infantry, from Fort Sill, Oklahoma, to Fort D. A. Russell, Wyoming.

1st Battalion, 38th Infantry, from Fort Logan, Colorado, to Fort Sill, Oklahoma.

2nd Engineer Regiment from Fort Sam Houston, Texas, to Fort Logan, Colorado.

4th Cavalry Regiment (less 1st Squadron) from Fort D. A. Russell, Wyoming, to Fort Meade, South Dakota.

13th Cavalry Regiment from Fort D. A. Russell, Wyoming, to Fort Riley, Kansas.



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As a result of this move, 80 officers and 2600 enlisted men will be transferred from temporarily constructed wartime barracks at Fort Sam Houston and housed in permanent quarters.

The movement of foot troops will be by rail. The transfer of the two cavalry regiments will be made by marching overland. The distance to be marched by the 13th Cavalry from Fort D. A. Russell, Wyoming, to Fort Riley, Kansas, is 615 miles. The distance to be marched by the 4th Cavalry from Fort D. A. Russell, Wyoming, to Fort Meade, South Dakota, is 410 miles.

The movement of the 13th Cavalry to Fort Riley, Kansas, will make possible the organization of a reënforced Cavalry Brigade, for demonstration purposes at the Cavalry School, to consist of the 2nd Cavalry, the 13th Cavalry, the 1st Machine Gun Troop, Battery "A," 9th Field Artillery and Company "A," 9th Engineer Combat Battalion (mounted).

In view of this transfer of the Fourth Brigade, Second Division, from Fort Sam Houston, Texas, to Fort D. A. Russell, Wyoming, and in order to retain all units of the Second Division within the same Corps Area, Fort D. A. Russell will be transferred from the Ninth Corps Area to the Eighth Corps Area, command to pass at 12:00 noon, September 1, 1927.

### **The Bearcat Hymn Book**

The 76th Field Artillery has just published an attractive pamphlet under the above name. As indicated by the title, it is primarily a collection of field artillery songs. There are in all twenty-five songs, including the original words of the "Caisson Song" and also a few of the many later variations of that song; "Mountain Battery Song"; "The Red Guidon"; "O'Reilly's Gone to Hell"; "The Recruit"; "Seven Long Years." The music is not given but in some cases the tune is stated. An index of the songs is included.

The first five pages are given to the World War history of the 76th Field Artillery and a summary of its battle participation.

On the back cover is shown the regimental coat of arms, and the following: "The first Artillery to cross the Marne." "The first Artillery to cross the Meuse." "When the Armistice was signed the guns of the 76th Field Artillery were nearer Berlin than the guns of any other Allied Artillery."

### **Changes in Instructions Relative to Administration of the Officers' Reserve Corps**

The Secretary of War has directed issuance of instructions for a number of changes in the administration of the Officers' Reserve Corps, exclusive of federally recognized National Guard officers.

## CURRENT FIELD ARTILLERY NOTES

The effect of these changes will be as follows:

1. Whereas formerly promotion to fill vacancies was dependent upon a certificate of capacity, which was obtained only by conformity to a prescribed standard, the forthcoming regulations will permit substitution of 300 hours' work in the preceding five years. Fifteen days' training will be counted as 100 hours of such work.

2. Time required in each grade prior to promotion will be as follows:

As a 2nd Lieutenant .....	3 years
As a 1st Lieutenant .....	4 years
As a Captain .....	5 years
As a Major .....	6 years
As a Lieutenant Colonel .....	7 years

Total ..... 25 years

3. For promotion above the grade of Major, in the cases of those who were not officers in the World War, qualifications must be shown either by graduation from the General Service Schools or by the passing of special examinations.

4. When vacancies exist and the Secretary of War authorizes promotion to the grade of Brigadier General in the Officers' Reserve Corps, selection will be limited to the eligible list of Colonels who have demonstrated their qualification by examinations and practical tests.

5. Whereas in the past in some cases assignment to units has been made of officers living outside the geographical areas of such units, hereafter promotion will be made to such vacancies from officers within the unit area.

6. More responsibility for administration of the Officers' Reserve Corps will be placed upon Reserve officers by provision for a board of Reserve officers, acting on an inactive status, in each Corps Area. These boards will advise on cases of separation and re-appointment of Reserve officers, and also will advise Corps Area Commanders with reference to other questions pertaining to the Organized Reserves and the Officers' Reserve Corps.

7. The Unassigned Section of the Officers' Reserve Corps will be discontinued. In lieu thereof, the privilege of assignment, and active-duty training will be accorded only to those officers who, during the five-year period of an appointment, have obtained a certificate of capacity, performed 200 hours of military work, completed a correspondence school course, or obtained the necessary certification from their Chief of Branch.

8. Regardless of their eligibility for assignment, and active-duty training, all field officers may be re-appointed in the same grade and

## THE FIELD ARTILLERY JOURNAL

branch. Captains and Lieutenants, however, having received one re-appointment during which they were ineligible for assignment, and active-duty training, and not having maintained the required standards of work during this second appointment will be given a third appointment only upon the recommendation of a board of Reserve officers convened in their Corps Area.

9. The Executive for Reserve Affairs will serve under the Assistant Secretary of War (Colonel Hanford MacNider), to whom the Secretary of War has delegated supervision of the administration of the Officers' Reserve Corps and the Organized Reserves.

### **Purchase of Officers' Private Mounts**

In a letter dated June 15, 1927, the War Department directs that in order to secure uniformity in the interpretation of paragraph 2, Army Regulations 605-140 (purchase of private mounts by the Government), the following will govern.

The authorized number of private horses of a mounted officer may be purchased by the Government:

When he is ordered to duty beyond the seas.

When his status is changed from that of a mounted to that of a dismounted officer.

When he is ordered on change of station to duty at a place where Army Regulations do not authorize the shipment of mounts.

### **Washington Artillery of New Orleans**

The results of the Annual Armory Inspections for the National Guard units are always either a source of worry or of satisfaction to organization commanders, depending largely on the progress the units have made during the preceding year.

Among these organizations which have just cause to be proud of their inspection reports, perhaps, none have a better claim than has the Washington Artillery of New Orleans—officially the 141st Separate Battalion, Field Artillery (Horse), La., N.G. This Battalion consists of three firing batteries and the Headquarters Battery. In the entire Battalion there was not one adverse rating and with few exceptions each organization was rated Very Satisfactory in every phase of its work.

This rating was obtained after a most thorough inspection by Major Gordon H. McCoy, F.A. (D.O.L.). In his remarks to the entire Battalion after the inspection, Major McCoy stated: "On my arrival your Battalion Commander earnestly requested me to make my inspection most thorough. I have done that and I desire to tell you that I am particularly well pleased with what I have seen."

## CURRENT FIELD ARTILLERY NOTES

In the report the following remarks occur: "This Battalion is well balanced and efficient and from my knowledge of National Guard units is far above average and rates with the best."

Lieutenant Colonel Raymond H. Fleming, New Orleans, is in command of this organization and Major R. M. Howell, F.A. (D.O.L.), is the Regular Army Instructor.

### **A Motor Horse Ambulance**

In the July 13, 1927, issue of the *Veterinary Bulletin* (The Veterinary Corps, Medical Dept., U. S. Army) is a description of a horse ambulance body made in the Quartermaster Carpenter Shop, First Cavalry Division, and used on a G.M.C. three-quarter ton chassis. It is stated that this ambulance can be built by any good carpenter and without much cost. Two drawings, showing details of construction, are included. By the use of this ambulance about three hundred horses have been evacuated without accident.

### **First Sergeant James E. Powell Retires**

On July 7, 1927, 1st Sergeant Powell, Battery E, 12th Field Artillery, was retired after thirty years' service in the Army. In honor of Sergeant Powell, Colonel P. S. Golderman, Commanding, ordered the 12th Field Artillery to pass in review before its departing comrade. The orders read were in part as follows:

"The Regimental Commander desires to congratulate First Sergeant Powell in the name of all the officers and men of the 12th Field Artillery upon his record of loyal and faithful service. He is proud to have them pass in review before this seasoned soldier and wishes them to emulate his splendid service. God speed and success in all his further undertakings is the wish that Sergeant Powell carries with him from his comrades of the 12th Field Artillery."

### **A Caliber .22-.45 Pistol**

Shortly after the Armistice, the Ordnance Department started the development of a modification of certain parts of the service pistol to allow its use as a .22-caliber practice pistol. By removing the slide and certain other parts from the caliber .45 service pistol and substituting the modified parts, the pistol became a seven-shot automatic weapon firing the .22-caliber long rifle cartridge.

A number of the modified parts were made and were under test. Before a decision was reached as to the value of this device, the Colt Patent Firearms Manufacturing Company proposed a similar device on a slightly different principle. As this latter device seemed to have certain advantages over that developed by the Ordnance

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Department, work on the latter was discontinued and subsequent development was carried out by the Colt factory, the following remarks referring to their device:

There is no difference in the outward appearance of the experimental pistol and the caliber .45 pistol except in the size of the bore. The chief difference in the two pistols is in the component parts of the slide. The recoil-spring of the experimental pistol is shorter and lighter than the recoil-spring of the .45 pistol. The recoil-spring plug and the recoil-spring guide are slightly altered to fit the lighter recoil-spring. The slide of the experimental pistol also differs from the .45 pistol slide in that the extractor is attached to the rear of the barrel. The magazine is modified so as to hold seven cartridges, caliber .22.

The experimental pistol was found to be of the same inherent accuracy as the .45-caliber pistol in both slow and rapid-fire, but due to the lessened mental hazard in firing the .22-caliber pistol, better scores were generally made with this weapon than with the caliber .45 pistol.

This .22-caliber pistol will not only afford indoor instruction for recruits and unqualified men, but is a means of keeping qualified men in good shooting condition and of further developing good shots.

In the illustration shown, the lower group of parts are common to both calibers. The upper left group comprises the parts which are used when firing .22-caliber ammunition, and the parts on the upper right are those used with the service cartridge.

The pistol is now under test by the Field Artillery Board. The Cavalry and Infantry boards have completed their tests, the conclusions being that the pistol is suitable for use as a gallery practice weapon. A definite decision may be expected after the completion of the tests by the Field Artillery Board. It will afterwards probably be subject to a general service test.

It is estimated that the cost of the .22-caliber parts will be approximately three-fifths that of the complete service pistol.

### **Polo Notes**

*Army Polo.*—The Army has four National Polo Association Championships to defend this summer as follows:

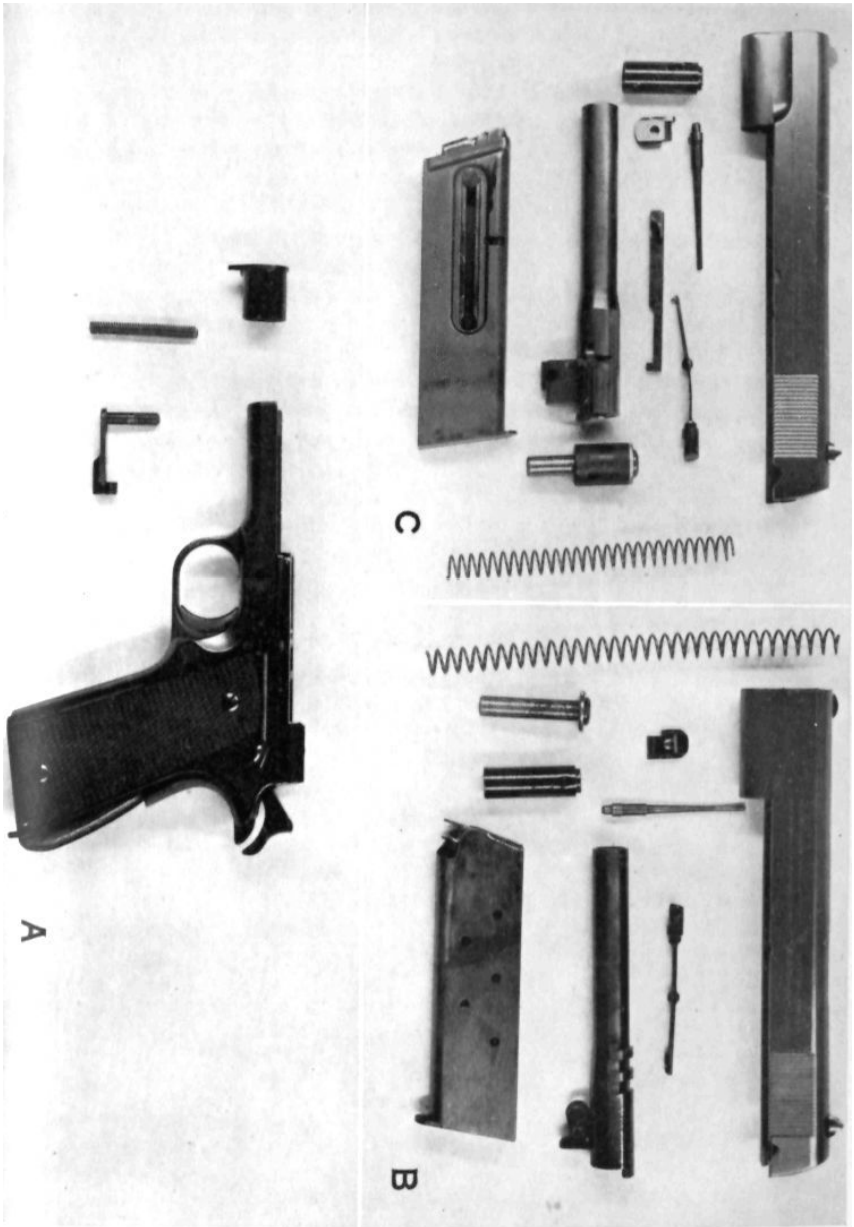
The Junior Championship.

The Inter-circuit Championship.

The Twelve-goal Championship.

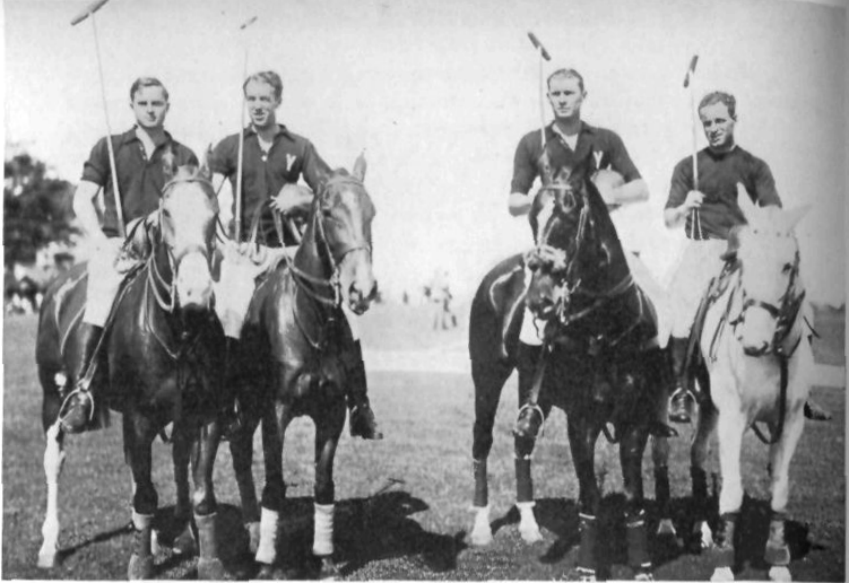
The Championship of the Hawaiian Islands.

In addition to the above, the Army will compete for the first time in the Open Championship.



THE .22-45 CALIBER PISTOL

GROUP A. PARTS COMMON TO BOTH CALIBERS; GROUP B. PARTS USED WITH .45 CALIBER SERVICE PISTOL; CARTRIDGE; GROUP C. .22 CALIBER PARTS.



THE CHAMPIONSHIP YALE FOUR

F. C. BALDWIN, C. R. BARRETT, W. F. C. GUEST, R. W. SIMMONS.



11TH FIELD ARTILLERY, BASKETBALL CHAMPIONS, SCHOFIELD BARRACKS

LEFT TO RIGHT: SGT. H. E. SHANNON, CPL. B. SIMMONS, 1ST SGT. D. F. SEIPT (CAPTAIN), CPL. J. D. FRENCH, SGT. C. R. LEHMKUHL, SGT. L. J. HOELSCHER, PVT. O. K. BOLINGER, SGT. E. NELSON, PVT. J. LEVINSON, PVT. A. B. MCSWAIN, LIEUT. J. V. COLLIER (COACH).

## CURRENT FIELD ARTILLERY NOTES

Major General Charles P. Summerall, Chief of Staff, has shown great interest in the Army's participation in the above tournaments and has enthusiastically supported the program prepared by the Army Central Polo Committee headed by Colonel N. E. Margetts, F.A., a veteran player and one of the Army's strong backs.

*The Junior Championship.*—The Junior Championship of the United States, one of the big events of the polo season (for 20-goal teams), was played at the Philadelphia Country Club, Bala, Pa., in July. In preparation for this and other matches the Central Polo Committee collected the best obtainable Army mounts at Mitchell Field, Long Island, in May, and the following players to represent the Army in the Junior, Open and other championship matches:

- Capt. C. A. Wilkinson, Cav., No. 1.
- Capt. G. C. Benson, 16th F.A., No. 1.
- Capt. C. H. Gerhardt, Cav., No. 2.
- Capt. Peter P. Rhodes, 14th F.A., No. 3.
- Capt. J. S. Tate, 16th F.A., No. 3.
- Capt. G. E. Huthsteiner, Cav., No. 4.

Capt. Peter P. Rhodes, F.A., the highest handicapped Army player, who is being groomed for International Polo, captains the Army team. Practice games were held during June with the Meadowbrook Magpies, Eastcott, etc. In the first and only practice game at Meadowbrook, the Army showed its strength against a higher handicapped team composed of:

- "Buzzy" Smith.
- "Sonny" Whitney.
- "Mike" Stevenson.
- "Bobby" Strawbridge.

And won 17 to 6, a remarkable performance.

The first game of the Junior Championship was played on July 2d with the following line-up:

Army	vs.	Phila. Country Club.
No. 1, Wilkinson.		No. 1, Dixon.
No. 2, Gerhardt.		No. 2, Guest (Yale).
No. 3, Tate.		No. 3, Wister Randolph.
No. 4, Huthsteiner.		No. 4, Barclay McFadden.
Score—Army, 15; Phila. Country Club, 5.		

This was the second game in which this Army team had played together, and the remarkable team play exhibited gave great promise of its future work. Wilkinson played a sensational game and



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scored 7 goals, Tate and Gerhardt each accounted for 4, Tate being strong on both offense and defense. Huthsteiner played his position admirably.

### Second Game, Junior Championship.

Army	vs.	Bryn Mawr.
No. 1, Wilkinson.		No. 1, George Earle.
No. 2, Gerhardt.		No. 2, Cecil Smith.
No. 3, Tate.		No. 3, Clark (Harvard).
No. 4, Huthsteiner.		No. 4, B. K. Gatins.

Score—Army, 12; Bryn Mawr, 8.

This was an absolutely nip and tuck affair: The Army was never headed, but the score was tied three times. Finally the Army drew ahead and had clear sailing the last two chuckers.

In the final game of the Juniors the Army met Rumson, the line-up being as follows:

Army	vs.	Rumson
No. 1, Wilkinson.		No. 1, Strother Jones.
No. 2, Gerhardt.		No. 2, G. Balding.
No. 3, Tate.		No. 3, R. Williams.
No. 4, Huthsteiner.		No. 4, E. Shaw.

Score—Army, 13; Rumson, 11.

The Army started off beautifully, hitting in top form almost immediately, and was leading 10 to 4 at the half.

After the half, Rumson took a brace and began scoring. The excitement was tremendous when Rumson tied the score 10–10 in the seventh period, and took a lead 11–10 in the middle of that period. The seventh period ended with the score tied 11 all.

In the eighth and last period the Army went in to do or die and scored two goals, giving them the Junior Championship again. General Summerall attended the game, with Colonel Margetts, and gave the Army team a talk before the game. The parade of ponies and presentation of teams to the Chief of Staff was a picturesque and stirring scene.

The Army Team is now preparing to enter the Open Championships at Meadowbrook and although their mounts are not as fast as those of some of the best civilian teams, they should make a good showing. Captain Rhodes, whose individual handicap was too high to permit him to play in the Junior, will be available to the Army Team in the Open Tournaments.

In the next issue it will be possible to report the results of the Intra-circuit Tournaments which are being held among 12 goal teams throughout the entire country to decide which eight teams will represent the different circuits at the Inter-circuit finals to be

## CURRENT FIELD ARTILLERY NOTES

held at the Point Judith Polo Club at Narragansett Pier, R. I. The Fort Bliss Team, composed of

No. 1, Capt. B. C. Bridges,	No. 3, Lieut. E. F. Thomson.
No. 2, Capt. C. E. Davis,	No. 4, Maj. J. K. Brown,

has already won the Southwestern Intra-circuit Championship, and will be seen at Narragansett Pier in August.

Major Brown was on the Fort Leavenworth Team that won the Inter-circuit finals last year.

*Polo at Yale.*—Yale was the first University to take up Polo and has had great success not only in winning tournaments, but in developing players of note. For awhile, with the substitution of the motor for the horse, it looked as though our winning Internationalists would grow old and nobody would be developed to replace them. With intercollegiate polo we now have a constant feeder for the clubs of the National Polo Association.

In 1922, through the generosity of Mr. Louis E. Stoddard, Chairman of the United States Polo Association and a Yale man, a string of Texas ponies was secured and turned over to the Yale R.O.T.C. The game was started entirely as an R.O.T.C. affair under Major R. E. D. Hoyle, then P. M. S. and T. The ponies were trained in the Armory the first winter and some informal indoor games played with teams from the Riding Club of New York and Squadron A. After the first season, Harvard, Princeton, V.M.I., Norwich, V.P.I., and other college teams took up the game.

At the first Intercollegiate Match held at Fort Hamilton, N. Y., which was given most enthusiastic support by Major General Bullard, commanding the 2nd Corps Area, the Yale R.O.T.C. team won its first Intercollegiate Championship. Polo players who witnessed these matches were greatly impressed by the brand of Polo played by these youngsters, none of whom had played Polo before entering college. Before the first group of players graduated from college they were rated at one or two goals handicap each, which was considered an excellent beginning. Yale has at present such men as W. F. C. Guest and C. R. Barrett, the former carrying an outdoor handicap of six goals, and the latter who began his Polo career at Yale already carrying a handicap of three goals.

Last year Yale was successful in winning the National Indoor Open Championship as well as the Intercollegiate Indoor and Outdoor Championships. The Yale Team felt that great credit was due Major Arnold, F.A., P.M.S. and T., who has coached the Yale Polo teams for the last three years.

This year Yale was defeated in the National Indoor Tournament (Class A) by the strong Brooklyn Riding and Driving Club by the very close score of 8½ to 7.

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No Intercollegiate Indoor Tournament was played this year, but the "Eli" Team showed its supremacy by winning all of its intercollegiate matches during the season. In the game against West Point the Yale Team was handicapped by the absence of Guest, who was playing on the Varsity Tennis Team, but nevertheless won by a score of 7 to 4.

The Championship Intercollegiate Outdoor Tournament was held at the Westchester Biltmore Polo Field at Rye, N. Y., between June 16th and 25th.

Yale was represented by the following team:

No. 1, F. C. Baldwin.

No. 3, C. R. Barrett.

No. 2, W. F. C. Guest.

No. 4, R. W. Simmons.

Substitutes, O. M. Wallop and J. H. H. Phipps.

With this team Yale won the Intercollegiate Polo Championship of the East on July 25th by defeating Harvard, 8 to 5. Princeton was second with three victories and one defeat by Yale; Harvard won twice and lost twice; West Point had one victory and three defeats; while the Pennsylvania Military Academy at Chester, Pa., lost all four games played.

This is the third time the Yale Team has won the General Bullard trophy.