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**APRIL-JUNE**

**THE  
FIELD ARTILLERY  
JOURNAL**

**EDITED BY**

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**THE UNITED STATES FIELD ARTILLERY ASSOCIATION  
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**MAJOR GENERAL C. P. SUMMERALL, UNITED STATES ARMY**

Brigadier General Commanding, 67th Field Artillery Brigade, Rainbow Division; Commanding 1st Field Artillery Brigade, 1st Division; Major General Commanding 1st Division; Commanding 5th Army Corps; Brigadier General U. S. Army, February 16, 1919

AMERICAN EXPEDITIONARY FORCES OFFICE OF THE  
COMMANDER IN CHIEF  
France, March 27, 1919

Major General Ernest Hinds,  
Chief of Artillery,  
American E. F.

My dear General Hinds:

As the time approaches for the return home of the greater portion of the Artillery of the American Expeditionary Forces, it gives me great pleasure to extend to you and to all officers and men under your command my heartiest thanks and congratulations for their share in the successful conclusion of the war.

Rushed to France with but the most preliminary training and here assigned to new materiel and unaccustomed methods, they overcame all difficulties by their energy, determination and devotion to duty, affording to the Infantry that powerful support without which success would have been impossible. From the earliest days of our active participation in the battle, the officers and men of all branches of the Artillery won the admiration of our allies. They cooperated effectively in stopping the great attacks of the enemy, and in making it possible for us to take the offensive. In the Meuse-Argonne operations, they overwhelmed him at a critical point in his lines, making possible the advance of our troops, which jeopardized his communications and made the surrender or annihilation of a large part of his troops inevitable.

No less deserving of praise is the work of the officers and men of the training staffs at the several schools and Training Centers. Deprived of the opportunity to serve at the front, they carried on with real, energy and efficiency, the instruction of the Artillery, a task no less essential than the actual combat work in the firing line.

To all units and individuals under your command I desire to express my thanks, and the thanks of their comrades of the American Expeditionary Forces. Our interest in their welfare will continue, accompanying them to their homes and back into civil life.

Sincerely yours,

A handwritten signature in cursive script, reading "John J. Pershing". The signature is written in dark ink and is positioned below the typed name "John J. Pershing".

# THE FIELD ARTILLERY JOURNAL

VOL. IX

APRIL-JUNE, 1919

NO. 2

## Notes on the Employment of Artillery and Machine Guns in Offensive Operations

[EDITOR'S NOTE.—*The following notes embody the views with reference to the methods for obtaining a superiority of fire of one of our most distinguished field artillery officers, Major General Charles P. Summerall, United States Army, Commanding Fifth Corps, A. E. F. It is an expression of the methods that were employed successfully in the Fifth Corps. To quote General Summerall: "While it may appear elementary and perhaps only a repetition of prevailing ideas, I regret to say that such ideas are not sufficiently understood. To my mind, superiority of fire is the most important element of success in war and the one which demands our greatest study. It can only be obtained by the proper employment of artillery in sufficient quantities and in conjunction with machine guns."*]

### HEADQUARTERS FIFTH ARMY CORPS

AMERICAN EXPEDITIONARY FORCES

FRANCE, 6 January, 1919.

*Training Memorandum No. 13:*

1. The following notes on the employment of artillery and machine guns in offensive operations are published with a view to placing in the hands of the troops the experience of the recent campaigns for use as a guide in preparing for training and for similar employment.

2. Any initial assault will include: first, the capture of more

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or less prepared infantry position close to our front line, and this position will offer serious resistance by infantry and machine-gun fire; second, a further penetration to the enemy's light gun lines; and third, a still further advance to his rear lines or to the positions occupied by reënforcements. All positions are echeloned in depth with infantry and machine-guns in successive lines, extending at least as far back as the light gun lines. It must be expected that the enemy will make a strong, if not the strongest, resistance at a rear position, which may be almost as far back as the principal light gun lines.

3. While the Intelligence Section furnishes the best obtainable information as to these positions, it has always been found that there were batteries, fox holes, machine guns and trenches at many places not located before the advance.

4. The capture of the above-noted positions include suppressing the enemy by a superiority of fire and then taking physical possession of the enemy's forces by our infantry. The assaulting battalions are charged with the latter task. It is, therefore, the duty of the other troops to suppress the enemy's fire, and thus free the assaulting battalions to advance without firing and without serious losses until the disorganization of the enemy gives him no advantage over the assaulting battalions. When this superiority of fire is not delivered, or is not delivered in the right place, the assaulting battalions must obtain it by means with which they are furnished. This causes a check in the advance and may even stop it entirely.

5. Theoretically, an advance once launched, should never stop. If the final objective is not too distant, the assaulting battalions should be ordered to proceed to it without halting. There are practical considerations, however, that cannot be ignored in planning a deep penetration. After a line moves forward, unexpected developments continually affect its cohesion and its progress. It is fundamentally necessary to preserve the integrity of the units and the coöperation of all arms, in order either to overcome the enemy's defense or to resist his local counter-attacks. Thus, successive objective lines are often

## ARTILLERY AND MACHINE GUN OPERATIONS

necessary to enable the assaulting battalions to re-form from the disorganization that invariably results from the capture of a strong position, from a long advance, or from an advance through woods, or difficult ground; to prevent the artillery barrage or concentrations from leaving the infantry, thus causing the line to stabilize; to allow time for the artillery and the machine-gun companies to complete changes of position forward to support a further advance; to afford a short period of rest for the assaulting battalions before making an attack on another position; or to permit a passage of lines for throwing fresh troops against successive strong positions. Those intermediate objectives should be as few as possible, and the following conditions should govern their location:

6. They should be beyond obstacles such as trench organizations, small patches of woods and other features of the ground that would probably cause disintegration of our troops. They should not be near enough to any hostile resistance or obstacle to enable the enemy to prevent an easy resumption of the advance. They should be far enough from any enemy positions, villages, woods, or other probable locations of the enemy, in their front, to permit shrapnel exclusively whenever adjustments can be made or bursts can be observed. *All classes of fire should be observed and continually adjusted.* Sudden bursts of fire from all the artillery during a few minutes are very effective, and if made frequently at probable hours for our attack, they confuse the enemy and may cause his barrage to be slow in falling when the actual assault is made.

7. A similar schedule of fire from all machine guns should be executed against targets within their range. Great activity of our machine guns produces a corresponding inactivity of the hostile machine gunners.

8. When the enemy cannot be completely surprised, every assault should be preceded by a preliminary bombardment of from two to six hours. This period does not give the enemy sufficient warning to make additional dispositions to meet the attack, and if there is no pause between the bombardment and



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the fire covering the advance, our infantry should be in the enemy's trenches before he knows of the assault. The duration of this bombardment must be limited only by the ammunition supply. It is better to deliver fire at a maximum rate than to employ slow fire over a longer period. The targets should be restricted to the known enemy positions and batteries from which fire can be delivered upon our infantry at the moment of jumping off. The intention is to neutralize those forces or units that might hurt our infantry as its advance begins. Fire for interdiction upon rear areas or upon roads to prevent movements in rear would be of little value at this phase of the action. At least one 155 howitzer should be assigned to every known or suspected enemy machine-gun positions. The 8" howitzers and howitzers of larger calibre should fire on strong points in the hostile trench system and on woods and towns. The 105-mm. and 155-mm. rifles, with such heavy howitzers as might be required, should be assigned to all known enemy batteries so as to place at least two guns on each hostile battery. The 75-mm. guns should be devoted to the near trench systems and connected shell holes and fox holes. Non-persistent gas should be freely used for neutralization, especially against hostile batteries, and at least one 75-mm. battery in each battalion should fire shrapnel exclusively against the enemy's trenches and machine-gun positions.

If there is sufficient daylight preceding the bombardment, all batteries should fire a few adjusting shots according to a schedule during one or two hours preceding the bombardment. This can generally be done during the summer season. Otherwise the adjustments must be made the preceding day, so as not to betray our intentions to the enemy.

During the preliminary bombardment all machine guns, with the general exception of those attached to the assaulting battalions, must be employed with a maximum rate of fire against enemy trenches, machine-gun positions, edges of woods, fox holes, etc. Their fire must be carefully coördinated with that of the artillery by conferences between the chief of artillery

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and the division machine-gun officer in such a way that every point will be covered by a maximum of fire available. Every effort should be made to use oblique or enfilading machine-gun fire, and thus increase the effect by bringing the targets under a cross fire.

9. The question always arises as to whether to cover the advancing infantry by concentrations upon areas known to be occupied by the enemy or by barrage fire over the entire enemy territory.

If it could be definitely determined that the enemy occupied certain positions and did not occupy others, it would manifestly be proper to confine the artillery to the known targets and not waste ammunition upon unoccupied areas. No intelligence system has yet reached the state of progress whereby such accuracy can be insured. As a matter of fact, the enemy's area in the case of any organized position, is occupied almost completely. He shifts his machine guns and even his infantry from time to time. Many machine guns in position never fire in order not to betray their position. These conditions prevail at least as far as the enemy's light gun lines. Beyond them, the defenders may locate themselves in every kind of position, behind crests, in woods, in front of woods, along roads, in bushes, hedges and grain fields, in the edges of villages, on open slopes, and wherever else a favorable field of fire can be found. Under such conditions, it is impossible to tell definitely the spots from which his fire will be delivered. The same conditions prevail as to the location of the hostile artillery. Invariably batteries have been located where they were never suspected, and horses and cannoneers have been shot down by barrage fire when they would have had perfect freedom of action if concentrations against known positions had been adopted. No portion of the enemy's territory can therefore be left untouched by our fire. The infantry will best be served in all cases by a dense barrage. The substitution of concentrations, while plausible, is a compromise that may be rendered necessary by the inability to supply sufficient guns to deliver barrage fire, or to procure a

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sufficient amount of ammunition. In either case it must be expected that the deficiency will be paid for by the losses to the infantry.

10. The barrage, however, cannot consist of a single line of fire. The depth of the covering fire must at every moment of the advance embrace positions from which hostile machine guns can fire upon our infantry. This depth may be assumed as extending to a distance of not less than 800 metres from the leading wave. The best combination of fire consists of a line of 75-mm. high explosive shells with I.A.L. fuses immediately in front of the infantry; a line of well-adjusted, low-bursting shrapnel 100 metres in front of the high-explosive shells; concentrations and lines of 155-mm. howitzer shell 300 metres in front of the shrapnel; and concentrations of 155 mm. and 8" howitzers and other types of heavy artillery from three to five hundred metres in front of the preceding 155-mm. shells. When the artillery is not sufficient to form a barrage in depth such as that described, it is better to form such a barrage by devoting all of the artillery available to a portion of the front and to have the line advance short distances by brigades, or even by regiments, under the cover of such fire. At the same time the enemy's batteries must be neutralized throughout the advance as described for the preliminary bombardment. Non-persistent gas should be used against positions that cannot be reached by our infantry within two hours from the time the gas is fired. No restriction should be placed upon the action of the infantry, but they must be protected from any evil consequences of our own fire without causing them to exercise any precautions against it.

A smoke screen should be dropped in front of the infantry immediately before the advance begins, and thereafter enough smoke shell should be mixed with the line of the barrage immediately in front of the infantry to hide the infantry from the enemy's machine guns and artillery. As a rule, these results may be accomplished by having all 75-mm. guns of the first line fire smoke shell from "H" minus three minutes to "H," and thereafter fire a proportion of one to four of smoke shell. A

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smoke screen should also be placed and maintained on the exposed flank of our infantry. In order to enable the assaulting battalions to place themselves closely behind a barrage, it is a good procedure to have the barrage hang on the enemy's front from "H" minus ten or "H" minus five minutes to "H." Every line of the barrage and the concentrations must lift according to the schedule, so as not to endanger the infantry as it advances. Throughout the advance, there must be close and effective liaison between each assaulting battalion and the artillery, and a battalion or a regiment of artillery must be placed subject to the call of each assault battalion commander, in addition to the assignment of accompanying guns. The assault battalion commander through his artillery liaison officer must be able to adjust and control the fire of all artillery units placed subject to his orders. In general, he should confine himself to utilizing the fire of the artillery. The responsibility for keeping the batteries placed and in condition to respond to his needs at all stages of the advance rests upon the artillery regimental and battalion commanders concerned. In case the barrage should leave the infantry, it must be stopped or recalled to some well-defined line by the division chief of artillery. In case communications cannot be maintained with the artillery of the division, the infantry brigade commander will take similar action through the artillery regimental commander in liaison with him.

11. The machine-gun plan must embrace in the covering fire all machine guns except those attached to the assaulting battalions. As a rule, the machine-gun barrage should be laid down 300 metres in front of the line of 75-mm. high explosive shell and it should lift in accordance with the artillery barrage table.

12. In order to maintain the covering fire throughout an advance against successive positions, batteries and certain machine-gun companies, especially those of the division machine-gun battalion, must be displaced forward as the attack progresses in time to render constant support. Barrage and concentration tables must show the limiting areas for our fire at all

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times, and no guns must be permitted to fire short of the limit for the moment except upon an unmistakable request from the assaulting infantry or upon orders from higher authority.

In order to execute the necessary movement of guns, it is a good practice to restrict the use of roads to the front to the artillery and machine-gun companies, ammunition train, ambulances and engineer train for at least twenty-four hours. Engineer troops must be attached to all artillery units to repair roads and bridges. The artillery, however, must not hesitate to march across country whenever the roads are blocked or for other reasons are impassable. Machine-gun companies must promptly abandon their transportation when it cannot progress, and must advance with the men carrying the machine guns and the ammunition.

The assaulting battalions must open fire upon reaching any objective or other enemy resistance where hostile targets are presented. It must be borne in mind that the real objective for the assaulting battalions will generally be found in the enemy's rear area, where they can receive least support from their own artillery and machine guns. Every precaution must therefore be exercised to conserve the ammunition supply and to preserve the integrity of the commands for a final effort at the end of the advance. It will frequently be impossible to supply ammunition or food to the assaulting battalions within forty-eight hours after the advance begins. These troops must therefore rely upon the ammunition in their possession not only to capture a final objective, but to hold it against enemy local counterattacks. Where, however, the ammunition of the assaulting battalions has been dangerously depleted during the advance, they should be relieved during the first night by support battalions, whose ammunition should be intact. As a rule, assault battalions are not, however, to be relieved unless such relief is made necessary by the lack of ammunition or unless they have become disorganized or suffered excessive casualties. Where succeeding day advances are expected to meet with strong resistance, it is a good practice to make new assaults with fresh battalions.

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13. After the infantry has captured the enemy's organized positions, the advance should continue by exploitation. Scouts should everywhere locate the enemy, and the artillery and machine guns should subject him to a preliminary fire before the infantry advances. This fire should take the form of successive concentrations similar to barrage fire, and should continue by lifting progressively as the infantry advances. Where the advances must be made through extensive woods, it is better to send the troops through them at night, following roads and trails in dispersed columns along the edges. The artillery and machine-gun companies must maneuver to support the troops as each position is secured. Where telephone wire or other means of liaison are not available, batteries must not hesitate to place themselves close enough to the infantry to see their needs and to support them without any form of communication.

During an advance by exploitation, every effort should be made to surprise the enemy. Where a surprise is possible, artillery and machine guns should not be employed until the enemy's fire indicates that he is aware of the operation.

14. The crossing of streams should be executed by methods of exploitation. Units must not hesitate to send forces or detachments across them as soon as they are reached by any improvised means that can be obtained. The element of surprise is the chief factor of success. Artillery and machine-guns should not be employed until the enemy discovers the presence of our troops, as our fire serves merely to attract his attention and to hasten his opposition. A prepared crossing of a stream should be preceded and covered by artillery and machine-gun fire in the same manner as an advance against an organized position. If, however, there is not sufficient artillery to deliver an effective fire against the entire front, it is better to rely upon surprise during the night and not apprise the enemy of our intentions by an insufficient fire. When the enemy discovers the crossing, the infantry should be immediately protected by all available means. The defense of a river line is organized in precisely the same manner as the defense of a prepared position.

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If the enemy's fire can be suppressed, as has been described for a prepared position, no serious difficulty should be experienced in quickly crossing a considerable body of troops during the night by rafts and improvised bridges.

15. All artillery plans for an assault should provide accompanying guns for the assault battalions. It must not be understood that these guns can fire only from the vicinity of the battalion. From the first, they must enter into the fire action, and they must be advanced only to positions from which fire can be delivered. They are not held in hand to the same extent as the machine-guns, 37-mm. guns or Stokes mortars. It is explained in "Notes on Recent Operations, No. 4," that "since protection for a small unit is more easily obtained than for a large one, accompanying guns can be advanced further than batteries to give close support to the infantry." They are not expected to march quietly on the heels of the infantry. On the contrary, they must generally be posted under cover, and they must advance rapidly from cover to cover much like the accompanying machine-guns, and without dropping so far behind the infantry that the personnel cannot see for themselves the needs of the infantry and bring immediate assistance. They maintain liaison with the battalion commander by runners in the same way as the accompanying machine-gun companies. The difficulty in their employment is the same as that which exists with reference to the employment of the other special arms, viz., obscurity of the target. Machine-guns are the principal targets, and, as has been explained, it is well-nigh impossible to tell the spots from which they are being fired. If they are in woods, bushes or grain fields, they cannot be located even approximately. In the open, behind crests, they are so well concealed that their presence is not even suspected. Assault battalion commanders must be assisted by the liaison detachments from the accompanying guns, as in the case of the other special arms. Liaison officers must be especially trained and skilled in locating targets, and they must take the initiative in directing fire upon them. An assault battalion commander is greatly loaded

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by details and responsibilities. He must not be expected to initiate every action of his auxiliary arms. The liaison officers should suggest, advise and report to him with reference to the employment of the accompanying guns, the machine-guns, the 37-mm. guns and the Stokes mortars. The reason why these weapons have been so little used is that too much was expected of the battalion commander, and he was unable to think out plans for the different elements and give the orders for their use when the emergency existed. These duties must be decentralized, but the battalion commander must coördinate the use of the special arms so that they will not endanger his scouts and his advanced elements, and that at the same time they will best facilitate the progress of his command.

C. P. SUMMERALL,  
Major General, Commanding.



# The Employment of the Artillery—Fifth Army Corps Argonne—Meuse Operations

BY LT. COL. SHEPHERD

EDITOR'S NOTE.—*In connection with the following article, the comments of Major-General C. P. Summerall, the Corps Commander, are of interest.*

## HEADQUARTERS FIFTH ARMY CORPS

American Expeditionary Forces

France, November 2, 1918.

From: Commanding General, V Army Corps.

To: Brigadier General D. E. Aultman, Chief of Artillery, V Army Corps.

Subject: Commendation.

I desire to convey to you and to the officers and soldiers of all Artillery serving in this Corps, my profound appreciation and my high admiration of the brilliant manner in which the Artillery of all classes has performed the difficult tasks allotted to it, especially during the advance on November first.

Although the Artillery has been constantly in action day and night, sustaining the battle since the beginning of the present offensive, it has responded with a self-sacrificing devotion to duty and a superb efficiency that is beyond all praise. While our dauntless Infantry have advanced against the enemy's prepared positions with a courage that elicits our greatest admiration, it must be recognized that without the powerful and skilful coöperation of the Artillery, it would have been impossible to accomplish the results which they have so brilliantly achieved.

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The tremendous volume of fire, the skilful arrangement of all objectives, and the perfect coördination with the Infantry and machine guns, have made the action of November first a model of completeness, and it must stand as a tribute to the able administrative officers who conceived the plans, and to the technical ability and the fidelity to duty of those who executed them.

I beg that you will convey to the officers and soldiers of all units of Artillery, the foregoing sentiments, and will assure them of my abiding wishes for their continued success in the campaigns that lie before them.

C. P. SUMMERALL,

*Major General, Commanding.*

### *I. Organization and Functioning of the Artillery Supporting the Corps.*

#### *(a) Divisional Artillery*

Number of units employed

Missions

Efficacy of Fire

Relations with the Corps Artillery

#### *(b) Corps Artillery*

Composition

Missions

Efficacy of Fire

Relations with the Army Artillery

### *II. Notes on the Artillery Information Service of the Corps.*

*(a) Mission of the A.I.S.*

*(b) Sources of Information*

*(c) Difficulties encountered.*

### *III. Notes on the Ammunition Service.*

*(a) Ammunition Allotments*

*(b) Means of fulfilling requirements of the batteries*

*(c) Difficulties encountered.*

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AMERICAN EXPEDITIONARY FORCES, FRANCE  
CONFERENCE, 1ST AMERICAN ARMY, HELD AT  
NOGENT-EN-BASSIGNY MONDAY, JAN. 27TH, 1919.

THE EMPLOYMENT OF THE ARTILLERY OF THE 5TH ARMY  
CORPS, IN THE ARGONNE-MEUSE OPERATIONS, SEPT. 26TH-  
NOV. 11TH, 1918.

### I. *Organization and Functioning of the Artillery Supporting the Corps.*

I INTEND to speak first about the organization of the Artillery of this Corps during the Argonne-Meuse operations. The number of Divisions in the Corps varied between three, which was the number on the jumps-off of September 26th and October 9th, and two, which was the number on October 4th, October 14th, and November 1st. At all times these Divisions were supported directly by an amount of Artillery vastly greater than their normal organization, and in almost every case by a mixture of French and American units. It was the general rule to reinforce the Field Artillery Brigade of each Division by adding either an entire Brigade of 2 light regiments and 1 heavy regiment, or else by a regiment of 3 Battalions of French 75's motorized, known as "Artillerie Portée," and one or more Battalions of French 155 howitzers. In addition, the fire was intensified at the beginning of the operations by the use of 9" howitzers, 280 mm. howitzers, and 120 mm. long guns. Trench mortars of all calibers were also used freely by the Divisional Artilleries in the preparation for September 26th, but were used very sparingly thereafter.

The Corps Artillery consisted, practically throughout the operations, in the equivalent of 4 Regiments of heavy caliber: 1 of 105 long, 1 of 155 S. Howitzer, 1 of 155 St. C. Howitzer, and 1 of 155 long, of both old and new model. These organizations were all French and all horse-drawn. From October 4th until October 14th an American Regiment of British

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8" howitzers, the 59th C.A.C. served as a part of the Corps Artillery, but was on the latter date split up and placed under the command of the Divisional Artillery Commanders in line.

One Brigade of 155 G.P.F., commanded by General Davis, was assigned by the Army Artillery to work in liaison with the 5th Army Corps, and eventually was incorporated in the Corps Artillery. On November 3rd, 16 hrs., the following message was received from Army Artillery: "Does 5th Corps want a Pursuit Battalion of G.P.F.'s?" The offer was naturally accepted at once, and at 16.30 o'clock General Davis reported by telephone that the 1st Battalion of the 57th C.A.C. had left its positions and was ready to go forward to accompany the attack.

On November 6th the entire Davis Grouping, 18 Batteries of G.P.F., was attached to the Corps Artillery, to replace the French Regiments, one of which was ordered away that same day, the others following suit on the 9th.

I may say here that so perfect was the spirit of coöperation between the Army Artillery and the Corps Artillery, that it was absolutely immaterial whether the Davis Grouping was in liaison with the Corps, or actually attached to it.

On account of the unsatisfactory communications existing in the initial stages of the operations, it was found necessary as early as October 4th to organize the 4 French Regiments of Corps Artillery in 3 mixed groupings. Two of these groupings were assigned to support the 2 Divisions in line, and were put at their complete disposal for counterbattery work. A liaison officer and detail were maintained at the P.C. of the Divisional Artillery thus supported, and requests for fire were transmitted directly, without passing through higher headquarters. Each of these groupings consisted in from 4 to 5 battalions, partly 105 longs, partly 155 S. Howitzer, and the remainder 155 Court St. C. Howitzer.

The third grouping of Corps Artillery was kept under the direct control of the Heavy Artillery Commander, 5th Corps, and consisted simply of 2 battalions of 155 long, 1 of L. 77, and 1 of L. S. 17.

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The Heavy Artillery Commander, 5th Corps, maintained command over all three of his groupings, and as counterbattery officer, assigned them their general missions.

The operations were conducted in a series of bounds by the assaulting infantry, as is shown on the chronological map. Each attack by the infantry was preceded by a violent Artillery preparation by all calibers, including destruction of known enemy organizations, such as Montfaucon on September 26th and the Kriemhilde and Freya Stellungen on November 1st; harassing with H.E., shrapnel, and non-persistent gas of all possible assembly points; and long-range interdiction on the roads. On the first day this bombardment lasted 6 hours, increasing in intensity toward "H" hour, but thereafter it may be said without exaggeration that as soon as any line of objectives was captured, the artillery began a systematic preparation for the next assault, and continued with varying degrees of intensity, always reaching its climax at the new "H" hour.

The satisfactory effect of this liberal use of great quantities of artillery is shown by an Order of the 88th German Division dated October 30th, 1918, which warns the troops as follows: "In the last days considerable losses have been occasioned by enemy artillery fire. These are only to be prevented when the troops dig themselves in well. Moving about in prominent places is without object, as the American Artillery places all landmarks and woods under fire." Many casualties from our gas shelling have been reported by prisoners belonging to enemy first-aid companies. These men testified that "in the 169th Regiment, 32nd Division, there were 100 gas casualties in the 1st Battalion, October 30-31st when it was at Landres-et-St. Georges, and in the 2nd Battalion of the 170th Regiment at Chateau-de-Landreville at the same time, there were 50 casualties. Two field hospitals at Verrieres had 300 gas cases November 1st and 20 of these men died that day."

Abundant proof throughout the First Army was obtained, showing that our Artillery fire had not only caused tremendous casualties, but had interfered with communications, cut off

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the supply of food and ammunition, and destroyed the enemy's morale.

The successive attacks of the infantry were preceded by a rolling barrage of the light guns, reinforced by a series of concentrations on sensitive points by the heavier calibers. In the attack of November 1st there were 272 pieces of 75's alone on a front of 6 kilometers, which gave a density of about 1 barrage gun for every 22 meters of front. This number of guns was not excessive, but just barely enough to give good results. A standing barrage of H.E. was put down for 10 minutes before the jump off, and during the last 3 minutes of this period two-thirds of the batteries fired smoke shell, in order to create a screen in front of the Infantry.

At H hour the barrage went forward, according to the barrage chart, which was constructed with great attention to the accidents of the terrain, varying the rate of advance from 100 meters in 4 minutes to 100 meters in 8 minutes. One Battery in each battalion of 75's fired low-bursting shrapnel at a range of 200 meters greater than those firing H.E. In each battery firing H.E. 1 gun fired smoke shell (No. 3). The 155's fired a series of standing barrages, lifting as the Infantry advanced, so as to fall at least 500 meters beyond the rolling barrage. The "8" howitzers were also used to increase the density by concentrating on the Bois des Hazois, Arbe de Remonville, Bayonville et Chennery and LeFoy Bois. By this means we succeeded in maintaining in front of the advancing infantry a fire-swept zone of about 1000 meters depth.

That the Barrage rate was well calculated is proven, I think, by the reports which came in continually during the advance—for example: "7 o'clock, from Illustrious, 30 prisoners taken at LaDhuy Farm; 8 o'clock, from 1st F. A. Brigade, everything moving O.K. on our right, the Division on our left is not quite up with the Marines; 9.20 o'clock, from 67th F.A. Brigade, Infantry advancing on schedule and leaning up against barrage; 9.50 from 57th F.A. Brigade, objective reached, Hill 273 captured, 600 prisoners taken, including 21

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officers; 12 noon from 2nd Division, Infantry on 2nd objective 10 minutes late."

The principal mission of the Corps Artillery was counter-battery, but during the periods of preparation it also executed interdiction and harrassing fire. As the information regarding enemy batteries during operations of this character could not be reliable enough to warrant the undertaking of long and costly destruction shoots, the following method of combatting the enemy artillery was employed: During the preparation, violent concentrations of about 5 minutes' duration on the regions known to be occupied by enemy batteries, were executed by all the Corps guns able to fire. One region after another was thus subjected to a deluge of shells of different caliber and arriving from different directions. As soon as the Infantry had started to advance, all known enemy battery positions were systematically neutralized by a steady fire of a few guns on each position, which as the infantry approached, lifted to more distant targets. In the operation of November 1st it had been planned to use part of the Corps Artillery to reinforce the bombardments of enemy organizations. This was not done, however, until the attack was well under way, because on the evening previous to the attack we received from the Air Service a set of very excellent photographs, revealing a quantity of new batteries which had taken advantage of the poor visibility of the last week, to install themselves. In order to neutralize these batteries properly, it was necessary to use not only all of the Corps Artillery, but also one complete battery of 155 C.S. from each of the Divisional Artilleries.

Throughout the operations, the Army Artillery, Davis Grouping, coöperated with the Corps Artillery in the preparatory bombardments and attacks. As a rule, the G.P.F. guns had been used exclusively on very distant targets until the attack of November 1st, when they were employed in an intensive bombardment of enemy organizations in the Bois des Hazois, Cote 253, and Bois l'Epasse. For an opinion on this use of the G.P.F.'s, I cannot do better than read an extract from Memorandum No. 10, 1st Army Artillery, dated 4th November:

## THE EMPLOYMENT OF THE ARTILLERY

"In the attack of 1st November one Corps asked for preparatory fire by 155 mm. G.P.F.'s on objectives about a kilometer in front of its line. The fire was delivered accurately and very effectively by a distant Army Artillery Grouping. Moreover, fire from G.P.F.'s preceded this Corps' attack during a whole day, not as a barrage, but according to a predetermined program. See the Boche communique as to the character of the artillery fire and as to the result—a piercing of the Hun artillery position."

I can say on behalf of the Corps Artillery that we, too, are proud of the Boche's opinion of our fire, as shown in the following quotation from special Memorandum of the Corps A.I.S., dated November 8th.

"November 5th: Prisoners continue to praise our artillery fire. A prisoner belonging to the 136th Foot Artillery Battalion states that on November 1st the entire personnel of his battery left the position for the rear because of the effectiveness of our fire. On the 2nd, they were ordered to return, but this prisoner was captured before he reached the guns.

"Prisoners of many field artillery units captured since October 31st, report that the American artillery has caused heavy losses in their units, and they are unanimous in praising our artillery's accuracy. Prisoners of the 104th Field Artillery Regiment state that on October 17th alone their regiment lost 150 men from shell fire, on battery emplacements, and they are not informed as to additional losses in the regimental trains, to the rear. Early November 1st, their battery emplacements were shelled so effectively that all communication with the rear and with the Infantry was quickly cut off, and the batteries were practically put out of action. In the 7th Bavarian Field Artillery Regiment, the 7th Battery alone lost 115 men between October 26th and November 1st, reducing the effectives with the battery to 30-35 men. On October 31st the 9th Battery of the 10th Field Artillery Regiment lost 9 men. Similar figures are reported from large numbers of batteries.

"Many of the prisoners captured on the 1st state that the



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reason they were taken is that our artillery concentrations were so effective that they were confined to their shelters and isolated in small groups. Artillery prisoners state that they were unable to serve their guns. In several instances, batteries were unable to fire a shot. There were cases of officers who were entirely cut off from communication with their troops."

After the advance of November 1st many evidences of the demoralization of the enemy Artillery were found on the ground—ammunition strewn for miles along the roads, batteries and single pieces scattered about in positions which could not have been carefully reconnoitered, and men and horses lying dead near the guns. The following remarks on this subject were published by the Corps A.I.S. on November 10.

"A study of the layout in the region of Chennery and Bayonville et Chennery indicates a very disorganized condition of the artillery units opposite our Corps front. While the method of separating the pieces of a battery by relatively long intervals renders neutralization more difficult, it tends to break unity of command. The general layout of batteries northeast of Bayonville indicates a lack of coördination, and also a hasty selection of position.

"It will be noted also that many pieces were located in the ravines under cover of the growth bordering or near small streams. It developed during the preparation for the attack that the selection of these little valleys for gas concentrations and general neutralization fire caused extremely heavy losses. This was particularly true in the region of Chennery. It is also worthy of note that the batteries for the most part were placed in positions convenient to the main avenues of retreat—in this instance the roads running northeast—also that along the roads were many small pockets of ammunition for the use of retreating batteries in intermediate positions."

The news of the general retirement of the enemy first reached us on November 2nd, when the following order was received by telephone from the Army Artillery:

"12.45: Suppress all fire north of the line Briquenay, Germont,

## THE EMPLOYMENT OF THE ARTILLERY

Autruche Osches. Fourth French Army have lost contact with the enemy, and are pushing forward in a northeasterly direction."

The 5th Corps was at this time pushing its exploitation, and plans were immediately made for further advances.

The action of the Artillery in the engagements which followed, consisted in rolling barrages prepared by the Divisional Artillery Commanders, supported with counterbattery by the Corps Artillery. The fire was much less dense than in the beginning of the month, because a number of regiments had been relieved from duty with the Corps, and the organization was deteriorating into that normally provided—but it is to the credit of the remaining elements that they were able to follow the advance and occupy positions from which they could fire effectively. The action of the G.P.F.'s in occupying advanced positions in spite of great difficulties, and in delivering effective long-range fire on the railroad from La Ferte to La Mouilly, is particularly noteworthy. One of these batteries boldly advanced on November 6th to a position 2.5 kilometers from Stenay, and from there executed a program of interdiction fire on the Montmedy-Sedan Railway.

On November 7th the 1st Division marched on Sedan, supported by the 1st F.A. Brigade. The 2nd and 58th F.A. Brigades kept up strong harrassing fire and counterbattery on the enemy lines across the Meuse. The 2nd F.A. Brigade also protected the right flank of the 1st Division.

The situation remained unchanged until November 10, 1918, when a plan was made to support the crossing of the Meuse by the 2nd Division in the vicinity of Mouzon, and by the 89th Division in the vicinity of Inor.

The operation being by divisions acting independently, each D.A.C. prepared a plan of support of his own Division in accordance with the divisional Plan. These plans were submitted to the Chief of Corps Artillery for coördination.

For several hours before H hr. all known enemy organizations were kept under continual harrassing fire. Interdiction

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fire was placed upon the crossings of the Chiers by the Corps Heavy Artillery. All possible effort was made to obtain information of enemy machine gun nests and enemy batteries in position to fire upon the crossings at Mouzon and Inor. As soon as located they were made targets for one 155 mm. howitzer. Non-persistent gas was used when practicable on all known enemy organizations and assembly points.

Barrage and successive concentrations were made to cover the infantry advance to its objectives. Corps Heavy Artillery was assigned counterbattery missions, using two guns for each enemy battery to be neutralized. Other guns not used for neutralization, fired on known enemy organizations until the Infantry advance required the lifting of the fire.

After the capture of the objectives, all Heavy Artillery, Division and Corps kept up counterbattery fire on all enemy batteries, under the direction of the Heavy Artillery Commander, 5th Corps. The long-range heavy artillery also placed interdiction fire on the crossings of the Chiers. Necessary protective barrages and counter-preparation were prepared by the D.A.C.'s to break up possible enemy counter-attacks from both front and flanks.

The artillery plan was coördinated with the machine gun plan of each Division, to the end that the machine guns should neutralize the maximum possible number of enemy organizations within the limit of their range, thus freeing the Artillery for use against more distant objectives. H hour for the operation was 9.30 P.M. November 10, 1918."

The following telephone message was received that evening:

"From 2nd F.A. Brigade 23h05—Infantry has crossed river and all going well."

Next morning we were notified that the armistice would go into effect at 11 A.M., and all firing was ordered ceased after that hour.

### II. *Notes on the Artillery Information Service of the Corps.*

The Artillery Information Service of the Corps played a very important and difficult rôle in the Argonne-Meuse Operations.

## THE EMPLOYMENT OF THE ARTILLERY

Its principal mission was to collect, examine, and distribute information regarding enemy batteries to all artillery units, Divisional, Corps, and Army, for these must all cooperate in the relentless struggle against the enemy artillery. The Chief of Artillery of the Corps is charged with the direction and coordination of this struggle. The principal sources of information are: Divisional Artillery A.I.S., G-2 of the Corps, the Air Service, neighboring Corps and Army A.I.S., and the Flash- and Sound-ranging Sections.

Generally speaking, the organization of the Information Service within the Divisional Artillery Brigade has not been developed to its best efficiency. It has many undeveloped possibilities, principally in offensive operations. Information of the enemy should come from the furthest advanced artillery liaison officer with the infantry; it should come from all artillery unit observers; it should come from the regimental intelligence officers. From all of these sources it should be passed back quickly to the Artillery Brigade Intelligence Officer, who should in turn keep the Corps A.I.S. informed. During the course of a rapid advance such as we executed on the 1st of November and succeeding days, we must rely upon the intelligence personnel with the brigades and their regiments to fill in the gap while the other sections are moving up and getting established.\*

Those Brigades which were fortunate enough to spend some time in a trench sector, under conditions of position warfare, were best developed as to intelligence organization, as they had the time and opportunity to learn under more favorable conditions the value and relationship of all the various means of obtaining information of the enemy. However, none of them has successfully solved the problem of making these means flexible, mobile, complete, during offensive action. The opportunity lies within the divisional artillery brigades to accomplish this

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\* It is not believed that it is necessary for the Corps A. I. S. to rely entirely upon the Divisional A. I. S. no matter how rapid the advance. Proper use of an Advance Report Center such as used in some other Corps, will permit the piecing together of the information from the several Divisional A. I. S.'s as readily as during stabilized warfare.—EDITOR.

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result.\* Its units are fighting units, moving continually forward. The intelligence system in each regiment should be equipped and organized to work in close coöperation with that of the other two—in locating targets of opportunity—and take up the work of the flash-ranging section until it has had time to move forward and get established.

Much valuable information was received from G-2 of the Corps on the location of enemy organizations and occupied areas. The Topographical Section of G-2, moreover, showed a splendid spirit of coöperation with the Artillery, and afforded us much valuable assistance by the printing of objective maps, of which the distribution was necessarily very large.

During the period from October 20th to November 1st, with the exception of about three days, weather conditions were very poor. The study of enemy organization was rendered very difficult, as owing to poor visibility, direct observation yielded very little useful information, and it was impossible for the Air Service to assist, either with plane or balloon. During the short period of clear weather, the Flash-ranging Section made some excellent determinations of batteries, which proved to be invaluable, as the enemy had kept changing his positions constantly, echeloning his artillery in depth and filling out his defensive organization in general. These three days of sunshine also enabled the Air Service to take photographs, by means of which we verified many batteries given by the F.R.S. and plotted them accurately on the Intelligence Map. The photographs revealed also many other important enemy organizations, such as routes of circulation, occupied areas, communications, machine gun pits, organized shell holes and incompletely organized lines of defense. Without the photographs our information would have been inadequate to say the least, as from a good set of pictures the A.I.S. gets most of its reliable data. The F.R.S. specializes on batteries and has rendered excellent service in this work,

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\* Perhaps brigades trained in quiet sectors were useful as regards Artillery. Information in this particular instance, but such training is not the best that can be given in preparation for ordinary open warfare. It is also believed that the Division operates on too narrow a front to obtain good Artillery Information. An example of this would be as follows: a gun of 11 kilometers range is frequently found firing on a division from an enemy sector two divisional fronts to the right or left.—EDITOR.

## THE EMPLOYMENT OF THE ARTILLERY

but without photographs even the battery map would be incomplete.

The chief difficulties experienced were due to the fact that the photographs came in at the last minute, so that time was limited and a minute and lengthy study of them was impossible. We had no previous photographs of the same areas taken recently enough for purpose of comparison, which always assists in developing an enemy organization. Even after the final map was issued, supplementary bulletins were prepared and distributed, giving additional enemy battery locations for the Corps Heavy Artillery for counterbattery, and for the Divisional Artillery, giving enemy organization in general. The balloons rendered practically no assistance whatever, due principally to adverse weather conditions.

The A.I.S. of the 5th Corps was in touch with the A.I.S. of the Corps on right and left. Often when a certain place was being shelled, and it was uncertain as to where it was coming from, by checking up with the A.I.S. of the right and left Corps, the source was found and fire delivered to neutralize and silence it.

General information of great interest was obtained from the Army A.I.S. bulletins. It must be remembered, however, that the Army in operations of this kind is rarely able to collect and publish information in time for it to be used for firing purposes.

One Flash-ranging Section and one Sound-ranging Section were assigned to the 5th Corps. These two sections, which were both French, belonged to the Army, but were put under the tactical control of the Corps A.I.S. Motor transportation should have been furnished with these sections by the Army, in order to permit them to accompany the advance. This was not done. Orders were given to the Corps to furnish trucks. The Corps in turn was very short itself and could only lend trucks to move these sections forward for two days at a time. This always caused delay and made it impossible for these sections to establish themselves and work with the maximum efficiency.

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Both the F.R.S. and the S.R.S., in spite of heavy casualties and difficulties of transportation and supply, rendered excellent service prior to the attack of November 1st. Owing to these same difficulties, these sections were unable properly to organize and function after the line was extended to the Meuse and before the Armistice was signed.

In this situation were revealed the weak points of our Artillery Information Service as it is now organized. Some provisions should be made to supplement our flash and sound ranging units with auxiliary equipment and personnel—with the artillery units. During the period immediately preceding an attack, the flash and sound-ranging sections usually render excellent service, but the advance is followed up under the existing conditions only on rare occasions by the prompt establishment of the flash-ranging section, and of the sound-ranging section, practically never.\*

### III. *Notes on the Ammunition Service of the Corps.*

At the beginning of the Argonne-Meuse Operations on September 26th, the main Army Depots from which the 5th Corps drew its supply of ammunition were located at Heippes, Lempire, Lemmes, Genimeurt, Courouvre and Amblaincourt, with Corps Dumps established at Auzeville for 75 mm., and one at Brocourt for 155 mm.

Two and a half days fire of ammunition had been delivered to the batteries previous to the beginning of the attack of September 26th, with the exception of one regiment of 75 mm., which moved into position after the artillery preparation had started. Notification that this regiment was attached to the Corps was not given to the Munitions Office until 3 P.M. of the 25th; however, an ammunition convoy had 250 rounds per gun

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\* From information recently received it would seem that the Artillery Information Section in the 5th Corps was short of trained personnel, other corps were better supplied; all lacked transportation, and to this lack, more than to insufficient training, was perhaps due the failure of the Flash Ranging Sections of the 5th Corps to keep up with the Infantry.

In the 1st Corps, for example, it is stated that the Flash Ranging Section under Captain Ross was never left behind. In both the Marne-Vesle and St. Mihiel offensives, the American Flash Ranging Sections were always in position to get valuable artillery information.

It requires several days to establish Sound Ranging Sections, so they can be of no particular value until a line has partially stabilized.—EDITOR.

## THE EMPLOYMENT OF THE ARTILLERY

waiting for the batteries at the positions which they occupied at about 4 A.M. of the 26th of September. The fact that the Artillery Units attached to the Corps were only partly equipped with ammunition trains was a big disadvantage in getting the initial supply of ammunition up to the guns. One of the Brigades had only 17 trucks available and another had none at all. The existence of trucks is just as essential as the existence of guns in operations of this kind.

The roads as a whole were good to start with, and very little congestion of traffic occurred before the attack. The enemy planes were very active and on numerous occasions machine-gunned the convoys, but the enemy shelling of roads was confined to the crossroads at Aubreville and near Brocourt. No damage was done by the shelling, and very little, if any, delay caused.

After the attack had progressed, however, to such a point that it was necessary for the Artillery to change position, the obstacle caused by the condition of the roads across "No Man's Land," and the traffic congestion around Avocourt and Esnes were very serious. Convoys were on the roads for 48 hours at a stretch, in order to make a round trip from the dumps to the battery positions.

The same traffic congestion existed thereafter throughout the entire operation. After the attack had progressed beyond Montfaucon and Charpentry, great inconvenience was caused by the long hauls which were made necessary through allotments of ammunition being given to the Corps at the old Army Depots of Lemmes, Heippes, Courouvre, etc., eighteen kilometers or more in rear of the battery positions. Corps dumps could not be established, due to the lack of transportation, and all the ammunition that it was possible to haul was needed immediately at the guns.

In preparation for the attack of November 1st, three and a half days of fire were put at the battery positions and regimental dumps, and a Corps Dump was established along the Epinonville plank road for 75 mm., 155 mm., S. Howitzer, 155 mm. St. C. Howitzer, and 105 mm. ammunition.



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Orders were issued for the 1st and 2nd F.A. Brigades to move forward, following closely after the Infantry, and to take up positions to the left of Landres-et-St. George. The 58th F.A. Brigade on the right was to move forward, following up the attack, and take up position on the Bantheville-Landres-et-St. Georges Road, near Bantheville.

The ammunition supply to the advancing brigades was taken care of by having two convoys, one for each Divisional Artillery, loaded each with a complete lot of 75 mm. ammunition at the Epinonville dump the night previous to the attack. These convoys were given the right of way on the roads and moved forward at the same time as the artillery. This plan proved to be very satisfactory and fortunately everything moved according to schedule.

Some of the difficulties encountered are summed up in the following remarks submitted by the Corps Munitions Officer:

"The proper study of the question of ammunition supply and personnel has been sadly neglected. In most opinions anybody can take care of ammunition supply, and that is the great reason for the utter confusion that resulted in some cases during our operations. Men from all branches of the service found themselves detailed on ammunition work, and they found on entering upon their duties an overwhelming amount of work and responsibility attached to the ammunition supply in these days of four- and five-hour artillery preparations and rolling barrages. For instance, in the attack of November 1st the operation orders required delivery to the guns and regimental dumps of the following amounts of ammunition:

<i>Caliber</i>	<i>Per Piece</i>	<i>Total</i>
75 mm .....	900	244,000
155 mm S. Howitzer .....	450	60,000
155 mm St. C. Howitzer .....	450	12,000
105 mm .....	450	12,000
155 L 77 .....	450	4,000
155 L.S. 17 .....	450	4,000
8" Howitzer .....	450	5,000
Total for all calibers .....		341,000 rounds

## THE EMPLOYMENT OF THE ARTILLERY

The above amounts, reduced to hauling and handling figures, represented 2744 truck loads of ammunition to be transported under cover of darkness from an average distance back of the lines of 18 kilometers. Of course, the foregoing preparation is slightly above the average, but the daily consumption of artillery ammunition is at all times a large item.

"In taking up the subject of the Ammunition Supply for the Argonne-Meuse Operations, I try to point out our faults in order that they may serve as an example of what to avoid in future. To quote from the summing up of the Chief of Artillery, 5th Corps, on these operations, 'The supply of ammunition was sufficient. At no time was the service of the pieces held up due to lack of ammunition.' But I wish to state that it was only by extraordinary efforts on the part of all concerned that the ammunition was delivered to the guns on time."

"The transportation and personnel allowed in the tables of Organization for the Ammunition Supply is entirely adequate, but at no time during the operations of the 5th Corps did we have within 50 per cent. of the figures allowed. The personnel which we did have was changed three times during the operations, which was a great disadvantage, as it meant days of lost time while the officers and men were becoming acquainted with the roads, battery positions, etc., in the sector. As practically all ammunition must be delivered at night, running without lights, over roads that are under enemy shell fire, and in most cases, far from being in repair, you can readily see why a thorough knowledge of the terrain is necessary."

"In justice to the officers and men of the Ammunition Trains of the Organizations in the 5th Corps, it is only fair to state that their devotion to duty was beyond all praise, and in several cases both trucks and men were on the road for 72 hours of continuous duty without rest."

W. E. SHEPHERD, JR.,

Lt. Col., F.A., U.S.A., Acting Chief of Artillery, Fifth Army Corps.

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**PLAN OF ATTACK.**

(Superseding Operations Order No. 4, and Appendices thereto)

*Artillery Headquarters, 5th Army Corps, U. S.*

Operations Order

No. 5

October 29th, 1918.

- I. INFORMATION OF ENEMY.
- II. CORPS PLAN.
- III. ORGANIZATION.
- IV. MISSIONS.
- V. PREPARATION OF ATTACK.
- VI. ACTION DURING ATTACK.
- VII. ACTION AFTER CAPTURE OF OBJECTIVES.
- VIII. MOVEMENTS.
- IX. COUNTER-BATTERY.
- X. LIAISON AND OBSERVATION.
- XI. MUNITIONS.
- XII. MESSAGES TO: (Location of P. C.).

HQ. 5TH ARMY CORPS, U. S.

Artillery

October 29th, 1918.

Operations Order

No. 5

MAPS

BUZANCY

DUN-SUR-MEUSE

1:20,000.

I. The general retreat of the enemy on the Western Front continues, and the 1st American Army will resume the advance.

II. On "D" day at "H" hour, the 5th Army Corps will advance on the line from the BOIS-DEBANTHEVILLE-LANDRES-ET-ST. GEORGES to the North and East and will attack the heights of BARRICOURT from the BOIS-DEBARRICOURT to FOSSE. (See Map.)

III. ORGANIZATION OF THE ARTILLERY. (See Table "A," over).

## THE EMPLOYMENT OF THE ARTILLERY

TABLE "A" III. ORGANIZATION OF THE ARTILLERY OF THE 5TH ARMY CORPS.

BRIGADIER General DWIGHT E. AULTMAN, Chief of Artillery.

Divisional Artillery	2nd D. A.-P. C. at 04.93 General Gatley, 67th F. A. Brigade				89th D. A.-P. C. EPINONVILLE, General Irwin, 57th F. A. Brigade			
	Regt.	Bns.	No. of batt'ys	Cal.	Regt.	Bns.	No. of batt'ys	Cal.
	6th	I & II	6	75	119th	I & II	6	75
	7th	I & II	6	75	120th	I	3	75
	149th	I & II	6	75	147th	I & II	5	75
	151st	I & II	6	75	203rd	I & II	6	75
	12th	I & II	6	75	122nd	I & II	6	75
	15th	I & II	6	75	124th	I & II	6	75
	5th	I, II & III	6	155 CS	11th	I, II & III	6	155 CS
	150th	I, II & III	6	155 CS	121st	I & II	4	155 CS
	17th	I, II & III	6	155 CS				
	59th	III	2	8" How.	59th	I & II	4	8" How.
	117th	T. M. Battery	1	6" 82 Div.	108th	T. M. Batt'y	1	6" Newt.
Corps artillery	Col. Mahieu, 301st Reg't Comd'g Left Grouping (Direct Liaison with Gen'l Gatley)				Col. Regnier, 330th Reg't Comd'g Right Grouping (Direct Liaison with Gen'l Irwin)			
Col. Hauser, Commanding P. C. at EPINONVILLE.	301st	I & III	5	155 CS	330th	I & II	6	155 S.Ch
	330th	III	3	155 S.Ch.	301st	II	3	155 CS
	454th	I	3	105	454th	II & III	5	105
	420th				Col. Salbat, 420th Reg't. I Bn.—3 Batteries—155 LS77. III Bn.—2 Batteries—155 LS 1917.			
Army artillery in liaison with 5th A.C., artillery.	General DAVIS, P.C., IVOIRY Com'g 31st Brigade Heavy Artillery, 55th, 56th and 57th Reg'ts, C.A.C. 16 Batteries,—155 G. P. F.							
Miscellaneous.	F. R. S. No. 57, West of EPINONVILLE.				Left Div. French Squadron 214. Command Squadron 99 } FOUCAUCO Adjustment Squadron 215 } URT. Rt. Div. American Squadron 104. Balloon 8, 1 Km. S. MONTFAUCON. Central at Ville-sur-COUSANCES.			
	S. R. S. No. 17, EPINONVILLE.							
	2nd Corps Artillery Park, Lt. Col. Rogers, Commanding, assigned to 5th Army Corps.							

### IV. Missions.

(a) *Divisional Artillery*.—The Divisional Artilleries will directly support the Infantry advance by preparatory bombardment, and by rolling barrage of 75's and standing barrage of 155-mm. Howitzers. (From "H" hour until the completion of the operation.) In addition they will cover the front by the fire of such flanking guns as can be emplaced by the Divisional Artillery Commanders to enfilade or bring an oblique fire on the

## THE FIELD ARTILLERY JOURNAL

hostile front. They will also perform such special missions in the accomplishment of the Infantry advance as may be assigned by the Division Commanders.

In firing barrage, one Battery of 75's in each Battalion will fire shrapnel.

Plans of the Divisional Artillery Commanders will be coordinated with each other by mutual agreement and with the Machine Gun plan in each Division, and submitted to the Chief of Corps Artillery for approval.

(b) *Corps Heavy Artillery*.—The Corps Heavy Artillery is charged with the counterbattery and with interdiction fire and harassing fire within the Corps normal zone.

All guns not required for the execution of these missions will be used to participate in the preliminary bombardments and assist in the advance of the Infantry on successive objectives.

When the Infantry attack approaches each objective, all guns of the Corps Artillery will lift therefrom and fire upon targets in the immediate front that they may impede the advance of the Infantry therefrom.

(c) *Army Artillery in Liaison with the Corps*.—Preliminary bombardment (Aisne Grouping), bombardment of distant objectives, and harassing and interdiction fire (by 31st Brigade, C.A.C.), as per Army Artillery orders.

### V. *Preparation of the Attack.*

*Action Prior to "D" Day*.—From the receipt of this order and until "D" day, all Artillery, Divisional and Corps, will maintain a continuous bombardment, harassing and interdiction fire on all enemy organizations within the Corps normal zone. Division Artillery Commanders will require shrapnel to be freely used by the 75's during this period. Non-persistent gas will be used on all woods, organized towns, and other points where enemy forces are located. Plans for use of gas by Divisions will be submitted to the Chief of Corps Artillery for scrutiny before being put into execution.

*Preliminary Bombardment*.—At "H" minus 2 hours, the

## THE EMPLOYMENT OF THE ARTILLERY

enemy's entire front line position will be subjected to an intense bombardment of all guns at the disposal of the Corps, except those required for counter-battery. The Army Artillery grouping in liaison with the Corps will be requested to participate in this bombardment.

The rate of fire will be the maximum hourly rate for all guns.

Enemy organizations to be bombarded are as follows: (See A.I.S. Map of Artillery Objectives, appended.)

(a) *Divisional Artillery*.—The 75's will bombard the enemy front line, enemy organizations—Landres-et-St. Georges-St. Georges—the southern edges of Bois-des-Hazois, including organizations eastward thereof, and the southern edge of the Woods on Cote 253. Particular attention will be given to organized shell holes and pits extending to about 200 meters in front of these woods.

Bombardment will be by both shell and shrapnel.

The 155's will place an intense bombardment on Landres-et-St. Georges-St. Georges and the enemy organizations in the woods and along the ridges to the north and northeast of these points. I.A.L. fuses will be used. Whenever possible, at least one 155 C.S. Howitzer will be assigned to the task of neutralizing or destroying known Machine Guns or nests.

The 8" Howitzers will bombard La Dhuy Farm, La Bergerie Farm, observation posts and organized works in the Boisdes-Hazios and Cote 253, Landres-et-St. Georges, and St. Georges. The 57th Brigade will assign one Battery for the shelling of Landres-et-St. Georges by 8" Howitzers during the preparation.

If time for adjustment is lacking, the fire of the 2nd F.A. Brigade will be superposed on that of the Brigades in position.

(b) *Corps Artillery*.—All guns of the Corps Artillery not utilized for counter-battery will execute intense bombardment of the organizations in the Bois-des-Hazios and to the east thereof, and on Cote 253, raking the woods by necessary variations of elevation and deflection.

(c) *Army Artillery in Liaison with Corps*.—The Army

## THE FIELD ARTILLERY JOURNAL

Artillery has been requested and ordered to participate in an intense bombardment on enemy organizations in the Bois-des-Hazios, east thereof, and on Cote 253, also an intense bombardment on the Bois l'Epasse.

### VI. *Action During the Attack.*

*Capture of 1st and 2nd Objectives.*—(a) *Divisional Artillery.*—At "H" minus 10 minutes, the Divisional Artillery supporting the 2nd Division, will lay down a standing barrage on the enemy's front line, the last three minutes thereof to be fired with smoke shell as hereafter prescribed.

From "H" minus 3 minutes to "H" a smoke barrage will be laid down on the enemy's front line by the Batteries of 75's, which are to fire H.E. in the rolling barrage, the remaining Batteries of 75's fire shrapnel during this time. Rate of fire 6 rounds per piece per minute. Batteries whose distance from the front line requires the use of reduced charges will fire H.E. shell in this barrage.

At "H" hour the Divisional Artilleries will establish a rolling barrage in front of the Infantry advance. Divisional Artillery plans will be in accordance with the Army scheme and will be coördinated by mutual agreement of adjacent Artilleries. Rate of advance—100 meters in 4 minutes over open ground, 100 meters in 6 minutes up steep slopes, and 100 meters in 8 minutes through woods.

Seventy-fives: 2 Batteries per Battalion will fire H.E. and the 3rd Battery will fire shrapnel superimposed over the H.E. Shrapnel range will exceed the range of the shell barrage by 200 meters. One-fourth of the guns firing shell will fire smoke shell (No. 3). Rate of fire 100 rounds per piece per hour. One hundred and fifty-fives will fire a series of standing barrages, lifting as the Infantry advances so as to fall at least 500 meters beyond the rolling barrage. Rate of fire 40 rounds per piece per hour. During halts the 155 mm. Howitzer will maintain heavy concentrations on all enemy organizations within 2 kilometers of the front line.

## THE EMPLOYMENT OF THE ARTILLERY

Eight-inch Howitzers will be used to intensify the barrage, through the Bois-des-Hazois, Arbre-de-Remonville (east of Bayonville-et-Chennery), and in Le Fey Bois northeast of Remonville.

During the halt from "H" plus 2.30 to "H" plus 3, and until required to lift therefrom, the 8" Howitzers will bombard the organizations in northern part of square 00 and southern part of square 11, Chennery, Bayonville-et-Chennery, and Remonville.

I.A.L. fuses will be used in the barrage whenever practicable. The density of the barrage will be variable. Thin in front of the advances over open ground and very dense on enemy organizations and woods. In passing through woods, the barrage will be reinforced by an 8-inch Howitzer fire in depth—500 meters in advance of the 155's. During the pauses, the barrage will be generally kept thin, unless for special reasons the Divisional Artillery Commander considers it should be strong, or unless the Infantry should request increased density to withstand counter-attacks.

(b) *Corps Artillery*.—During the advance, the neutralization of enemy Batteries will continue according to the plan of the Corps Heavy Artillery Commander, who will assign the number of pieces he considers necessary to this mission. All other available pieces will bombard the organizations in the vicinity of Hill 253—Bois-des-Hazois and eastward thereof, until the approach of the Infantry attack requires the fire to be lifted, after which the more distant targets will be taken under fire, lifting as the attack approaches.

From "H" plus 2.30 hours, the Corps Artillery will bombard enemy organizations northeast of Imecourt, in the vicinity of Remonville, and the observatories in the Arbre-de-Remonville (38.20) and at 63.22. Fire will be lifted to the organizations of the Freya Stellung on the approach of the Infantry attack.

(c) *Army Artillery*.—In accordance with the plans laid down for the Army Artillery, the grouping in liaison with this Corps will bombard the organizations of the Freya Stellung



## THE FIELD ARTILLERY JOURNAL

(2nd Objective) until the approach of our Infantry attack obliges them to lift their fire to more distant targets.

All bombardments will be extended northward to the line marked 3d Objective, the organizations of which will be held under fire until the approach of the Infantry advance, after which the Artillery thus employed will return to its normal missions.

All Artillery Commanders are charged with the responsibility for lifting their fire from targets by the time the Infantry advance makes such fire dangerous. Barrage charts will be furnished them for the purpose of determining the time at which they should lift.

After the displacement forward of the accompanying Divisional Artilleries, they will be operated under the direction of Divisions in accordance with tactical situation. Barrage charts will be prepared for rolling barrages and tables computed for the second positions so that barrages may be fired immediately upon occupying these positions.

The Divisions will be supported as far as the advance to the parallel through Chenery by the Artillery Brigades remaining in position as well as by the accompanying Artilleries with ordinary H.E. shell and shrapnel; support by D (1917) shell will be accorded thereafter to the limit of their range.

*Capture of 3rd Objective.*—After the capture of the 2nd Objective, the Divisions operate independently for the capture of the 3rd Objective.

Barrage tables have been prepared for the advance from the 2nd to the 3rd Objective.

Divisional Artillery will operate under the direction of the Division Commanders, but will maintain liaison with the Chief of Artillery and with the Corps Heavy Artillery.

Corps Artillery will support the advance, in accordance with barrage tables, by counter-battery and bombardment.

Long range counter-battery will be requested from the Army Artillery grouping (P. C. Davis).

## THE EMPLOYMENT OF THE ARTILLERY

*Exploitation.*—Progress beyond the 3rd Objective will be by exploitation on the first day.

Divisional Artillery Commanders will keep thoroughly in touch with the advance and through their liaison groups will furnish all possible support during the exploitation.

### VII. *Action After Capture of Objectives.*

(a) *Divisional Artillery.*—Upon the termination of the operation, Divisional Artillery Commanders will, through their Liaison Officers, determine the position of the Infantry line, and will immediately prepare protective barrages and O.C.P. Location of the Infantry line will be immediately communicated to these Headquarters.

(b) *Corps Artillery.*—Counter-battery and interdiction for 2 kilometers in advance of the Infantry line. Liaison must be maintained with Divisional Artilleries.

(c) *Army Artillery.*—Long range and interdiction according to Army plan. Counter-battery upon request.

### VIII. *Movement Forward of the Artillery.*

In order to insure continuous fire during the progress of the attack, one Artillery Brigade in each Division will occupy previous to "D" day positions as far advanced as is compatible with conservation of the matériel and the replenishment of ammunition.

In order to comply with this principle, the 57th Brigade will occupy in the sector of the 89th Division, positions west of Romagne, and in the vicinity of the road running west from Romagne to the Bois-de-Gesnes, and the 67th Brigade will occupy in the sector of the 2nd Division, positions in the Ravin-de-Sommerance, and extending 1½ kilometers east and west of Sommerance. The 1st F.A. brigade will remain in its present positions.

These three Field Artillery Brigades will remain in their positions throughout the attack, and will cease firing when out of range. The 57th and 67th F.A. Brigades will stand relieved

## THE FIELD ARTILLERY JOURNAL

from duty in the 5th Corps sector at the end of the first day's operation.

At "H" plus 2 hours, one Field Artillery Brigade in each Division will move forward. These movements will be made by Echelon; that is to say, that in each Regiment one Battalion only will move; thereafter according to schedule:

### GENERAL SCHEDULE OF DISPLACEMENTS OF DIVISIONAL ARTILLERY TO FORWARD POSITIONS.

Hour	2nd F. A. Brigade		58th F. A. Brigade	
	Cal.	Unit	Cal.	Unit
"H" plus 2.	75	1 Bn.	75	1 Bn.
"H" plus 2.30.	75	1 Bn.	75	1 Bn.
"H" plus 3.	155	1 Bn.	155	1 Bn.
"H" plus 4.	75	1 Bn.	75	1 Bn.
"H" plus 4.30.	75	1 Bn.	75	1 Bn.
"H" plus 5.	155	1 Bn.	155	1 Bn.
"H" plus 6.	155	1 Bn.	155	1 Bn.
"H" plus 7.00.			75	1 Bn. 203rd Fr.*
"H" plus 7.30.			75	1 Bn. 203rd Fr.*

\* Provided roads are clear.

When the last units of the Divisional Artillery have commenced their forward movement, report will be made to the Chief of Artillery, who will cause the displacement of the Corps Heavy Artillery to begin under the direction of the Commanding Officer of the Corps Heavy Artillery.

In accordance with the above principles, the 58th Brigade will leave its positions northwest of Gesnes, and will proceed to new emplacements in the area between Le Gd. Carre Farm (67.90) and La Bergerie Farm (68.92), from which it will support the further advance of the 89th Division.

Similarly, the 2nd Brigade will leave its positions, and proceed via Sommerance to its new emplacements, in the vicinity of Cote 253, and extending three kilometers west of Landres-et-St. Georges, from which emplacements it will support the advance of the 2nd Division beyond the first objective. Batteries will be pushed as far forward as the tactical situation permits.

Subsequent movements of the Artillery directly supporting

## THE EMPLOYMENT OF THE ARTILLERY

the Divisions in line will be made under the direction of Divisional Artillery Commanders in accordance with the tactical situation, and after arrangements for use of roads with G-1 of the Army Corps.

Seventy-five Portoe's will change position forward to area of 57th F.A. Brigade following the displacement of the Artillery of the 58th F.A. Brigade to the vicinity of Remonville, moving via Romagne-Sous-Montfaucon-Bantheville Road.

### IX. *Counter-Battery.*

The Corps Heavy Artillery is charged with the mission of counter-battery, and the Commanding Officer thereof will submit a plan for counter-battery during the operation.

Enemy batteries will be neutralized with non-persistent gas if conditions for the use of such gas be favorable.

Requests for counter-battery by the Divisional Artilleries will be made directly to the Commander of the Corps Artillery grouping, with which they are in direct liaison. (See Table of Organization of the Command.)

If the latter cannot provide the necessary counter-battery, he will report the fact to the Commander of the Corps Heavy Artillery, who, if he cannot furnish the same with the means under his control, will call upon the 31st Brigade, Heavy Artillery, 1st Army, Brigadier-General Davis. All calls for action by the Army Artillery will be promptly reported to these Headquarters to the A.I.S.

### X. *Liaison and Observation.*

See Plan of Liaison, 5th Army Corps, October 23, 1918, and Appendices, giving Liaison and assignment of balloons and airplanes.

See Diagram of Telephonic Liaison appended.

(1) In addition to F.R.S. 57, all Artillery organizations will establish wherever practicable forward observing stations, one per Battalion if possible, for the observation and correction of fire.

## THE FIELD ARTILLERY JOURNAL

### XI. *Munitions.*

Divisional Artillery Commanders will call upon the Corps Munitions Officer for the amounts of ammunition estimated to be necessary for the fulfillment of the missions assigned to their units.

They will adjust the munitions now in possession of their units to fulfill these missions.

The 57th and 67th F.A. Brigades, which are to be relieved from duty in the 5th Corps Sector after having fulfilled the first day's missions, will arrange the ammunition supply so that no ammunition will remain in battery positions that are to be vacated.

The 2nd and 58th F.A. Brigades will place in their first positions only the necessary ammunition to fulfill the missions assigned to them prior to their displacement to the vicinity of Landres-et-St. Georges.

All Commanders are strictly enjoined not to leave munitions in vacated Battery positions.

On their movement forward, the 2nd and 58th Brigades will take with them full caissons and in addition thereto all available horsed vehicles full of ammunition. Arrangements will be made by the Commanding Generals of these Brigades to move forward by truck to the furthest possible point, at least one day of fire, to be placed in a sub-dump by the roadside, so as to insure an ample ammunition supply with the minimum of fatigue to the animals.

The estimated amounts of ammunition to complete the operation are:

<i>Calibers</i>	<i>Per Piece</i>	<i>Total</i>
75 m/m .....	900	244,000
155 m/m S. Howitzer .....	450	60,000
155 m/m St. C. Howitzer .....	450	12,000
105 m/m .....	450	12,000
155 m/m .....	450	12,000
155 m/m L/77 .....	450	4,000
155 m/m LS/17 .....	450	4,000
8" Howitzer .....	450	5,000

## THE EMPLOYMENT OF THE ARTILLERY

Of the above estimates for the 75's, the following amounts should be "D" shell (Model '17).

1st F. A. Brigade .....	9,600	rounds
67th F. A. Brigade .....	16,000	"
57th F. A. Brigade .....	20,000	"
203rd R. A. C. P. ....	12,000	"

### XII. *Messages to Corps Artillery*—CHEPPY.

By Command of Brigadier General AULTMAN:

W. E. SHEPHERD, JR.,  
Major, F. A., U. S. A.,  
Chief of Staff.

#### *Copies to:*

1st F. A. Brigade.  
2nd F. A. Brigade.  
57th F. A. Brigade.  
58th F. A. Brigade.  
67th F. A. Brigade.  
Corps Heavy Artillery.  
DAVIS Grouping.  
Army Artillery.  
G-3, 5th Army Corps.  
C. G., 5th Army Corps.  
1st Army Corps, Artillery.  
3rd Army Corps, Artillery.  
P. C. WHEELER.  
Munitions, 5th Army Corps.  
A. I. S., 5th Army Corps.  
General AULTMAN.  
File.

#### ANNEX I. *To Operations Order No. 5.*

MEMORANDUM FOR DIVISIONAL ARTILLERY COMMANDERS:

#### *Support of Infantry:*

##### *Liaison of F. A. Regiment to Infantry Battalion in Line:*

Attention is invited to the necessity for close liaison between the Divisional Artillery and the Infantry Units that it directly supports.

For this close support one Regiment of 75's will be assigned to work in conjunction with each Battalion of Infantry in the front line during the next operation.

The Regimental Commander will establish and maintain, through his Liaison Officer and Agents direct communication with the Infantry Battalion

## THE FIELD ARTILLERY JOURNAL

Commander. He will normally fulfill the missions that have been assigned him by higher authority, but will, at the same time, be prepared to furnish such direct and special assistance as may be called for by the Infantry Battalion Commander to further his advance.

### *Accompanying Guns:*

Batteries or single guns will be detailed, after consultation with the Division and Infantry Brigade Commanders, to accompany the advance of the Infantry, for the purpose of firing on Machine Gun nests and Anti-Tank guns.

The roads over which these guns are to advance, and the method of advance will be carefully studied by the immediate Commanders, in consultation with the Infantry Battalion Commanders.

If the conditions be such that they cannot be drawn by horses, request will be made for details from the Infantry to assist in drawing the guns to their position and supplying them with ammunition.

Such guns, brought forward to carefully concealed positions on or near the front line, may produce decisive effect by their close range fire upon enemy organizations that could otherwise delay and possibly definitely check the progress of the Infantry line.

By Command of Brigadier General AULTMAN:

W. E. SHEPHERD, JR.,  
Major, F. A., U. S. A.,  
Chief of Staff.

HEADQUARTERS FIFTH ARMY CORPS

Artillery

October 31, 1918.

### *Addendum to Operations Order No. 5:*

Neutralization of enemy batteries will be executed by Divisional Artilleries as follows:

From "H" hour until approach of infantry:

2nd D. A.	89th D. A.
A 30.04	F 51.99
A 33.03	A 56.07

Two pieces of 155 S. Howitzer will be assigned to each enemy battery, Rate of fire same as prescribed for bombardment during the advance.

By Command of Brigadier General AULTMAN:

W. E. SHEPHERD, JR.,  
Major, F. A., U. S. A.,  
Chief of Staff.

## THE EMPLOYMENT OF THE ARTILLERY

HQ. 5TH ARMY CORPS, U. S.

Artillery

31st October, 1918.

ANNEX II. *To Operations Order No. 5.*

MEMORANDUM FOR DIVISIONAL ARTILLERY COMMANDERS:

### *Roads and Road Discipline:*

In accordance with Operations Order No. 5, the Commanding Generals of the 2nd and 58th F. A. Brigades will designate the Battalions of their Brigades to move according to the schedule therewith.

The roads over which the advance is to be made will be held clear for twenty-four hours for the passage of Artillery, ammunition, ambulances, and engineer matériel.

The most rigid road discipline will be exacted.

1. All teams and vehicles *must* keep to the right of the road and *must* afford passage to vehicles moving in the opposite direction.

2. Mounted men will march in the column or on the right thereof, never on the left.

3. No column will halt on the road, but if it is obliged to do so it will pull off to the right, leaving space for vehicles to pass in both directions.

4. Obstacles in a road, such as shell holes, trenches, or wire, must not halt a column. A detachment of Engineers will be requested from the Divisional Engineers to precede the first units that advance, for the purpose of clearing the roads or preparing by-passes where an obstacle is too serious.

5. No obstacle must be permitted to prevent the forward movement of the Artillery.

All possible roads will be reconnoitered, so that, after arrival in terrain recently occupied by the enemy, one road is found to be blocked another way may be taken with the minimum loss of time. If no road is found to exist, the guns will be moved across country.

6. When the continued movement of Artillery and ambulances would produce a block of traffic, the Artillery will unhesitatingly and without delay leave the road and proceed across country until it can again move on the road.

7. A schedule showing roads to be followed, times of departure from present positions, and estimated times of arrival in the new position, will be furnished the organizations that will be required to move forward, but the advance will none the less be carefully reconnoitred before the units are definitely committed to the road.

8. A staff officer of the Divisional Artillery or an officer specially



## THE FIELD ARTILLERY JOURNAL

detailed for the purpose will accompany each Artillery column for the purpose of seeing that this order is carried out and will report on the conduct of the march to his Divisional Artillery Commander.

### *Supply*

9. All organizations that move forward will take with them two days' rations and two days' grain and such hay as can be carried in the Artillery Carriages.

### *Ammunition*

10. In addition to ammunition supply provided for in Operations Order No. 5, these Headquarters, the 60 cm. railway will place, on the night of "D" day, one day's ammunition for the two 155 C/S Howitzer Regiments that move forward, at a dump to be organized about two Kilometers East of LANDRES-ET-ST. GEORGES.

By Command of Brigadier General AULTMAN:

W. E. SHEPHERD, JR.,  
Major, F. A., U. S. A.

HEADQUARTERS VTH ARMY CORPS

Artillery

October 31st, 1918.

### SCHEDULE OF FORWARD MOVEMENTS OF ARTILLERY

To accompany Annex No. III, Operations Order No. 5, 5th Corps Artillery, Western Sector.

Western sector hour	2nd F. A. Brigade				
	Unit	Cal.	Route	Dist.	Arr. "H" plus
"H" plus 2	I Bn.	75	FLEVILLE-SOMMERANCE	8	4.00
"H" plus 2.30	I Bn.	75	Vicinity of LANDRES-et-St. GEORGES— COTE 253—to positions in indicated area* (see map)	8	4.30
"H" plus 3.00	I Bn.	155		7	5.00
"H" plus 4.00	I Bn.	75		8	6.00
"H" plus 4.30	I Bn.	75		8	6.30
"H" plus 5.00	I Bn.	155		7	7.00
"H" plus 6.00	I Bn.	155		8	8.30

## THE EMPLOYMENT OF THE ARTILLERY

### Corps Heavy Artillery

"H" plus 6.00	I Bn.	105	EXERMONT-FLEVILLE-SOMMERANCE to position between ST. GEORGES & LANDRES-et-ST. GEORGES	12	10.00
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### First F. A. Brigade—(Note)

"H" plus 11.00	I Bn.	75	FLEVILLE-SOMMERANCE—Vicinity of LANDRES-et-ST. GEORGES—To positions in vicinity of LANDREVILLE	11	15.00
"H" plus 11.30	I Bn.	75		11	15.30
"H" plus 12.00	I Bn.	155		11	16.00
"H" plus 13.00	I Bn.	75		11	18.00
"H" plus 13.30	I Bn.	75		11	18.30
"H" plus 14.00	I Bn.	155		11	19.00
"H" plus 15.00	I Bn.	155		11	20.00

Eastern sector

### 58th F. A. Brigade

"H" plus 2.00	I Bn.	75	BOIS-DE-ROMAGEN-LA DHUY Fme. east of Le-BERGERIE Fme. to positions*	7	4.00
"H" plus 2.00	I Bn.	75	GESNES-ROMANGE-BOIS-DE-ROMAGNE-La DHUY Fme.—N. E. of La BERGERIE Fme. to position*	12	5.30
"H" plus 2.30	I Bn.	75	BOIS-de-ROMAGNE-La DHUY Fme. to positions in indicated area*	8	5.00
"H" plus 4.00	I Bn.	75		8	6.30

### Corps Heavy Artillery

"H" plus 6.00	I Bn.	105	GESNES-ROMAGNE-BOIS-de-ROMAGNE-La DHUY Fme. to position	13	10.00
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### 58th F. A. Brigade

"H" plus 11.00	I Bn.	155	ROMAGNE-BANTHEVILLE-le-GRAND CARRE Fme. to position. (Motorized.)	12	15.00
"H" plus 11.30	I Bn.	155		12	15.30
"H" plus 12.00	I Bn.	155		..	16.00

NOTE.—Movements of 1st F. A. Brigade will depend upon the tactical situation and the solution of the problem of ammunition supply. Further orders will be given.

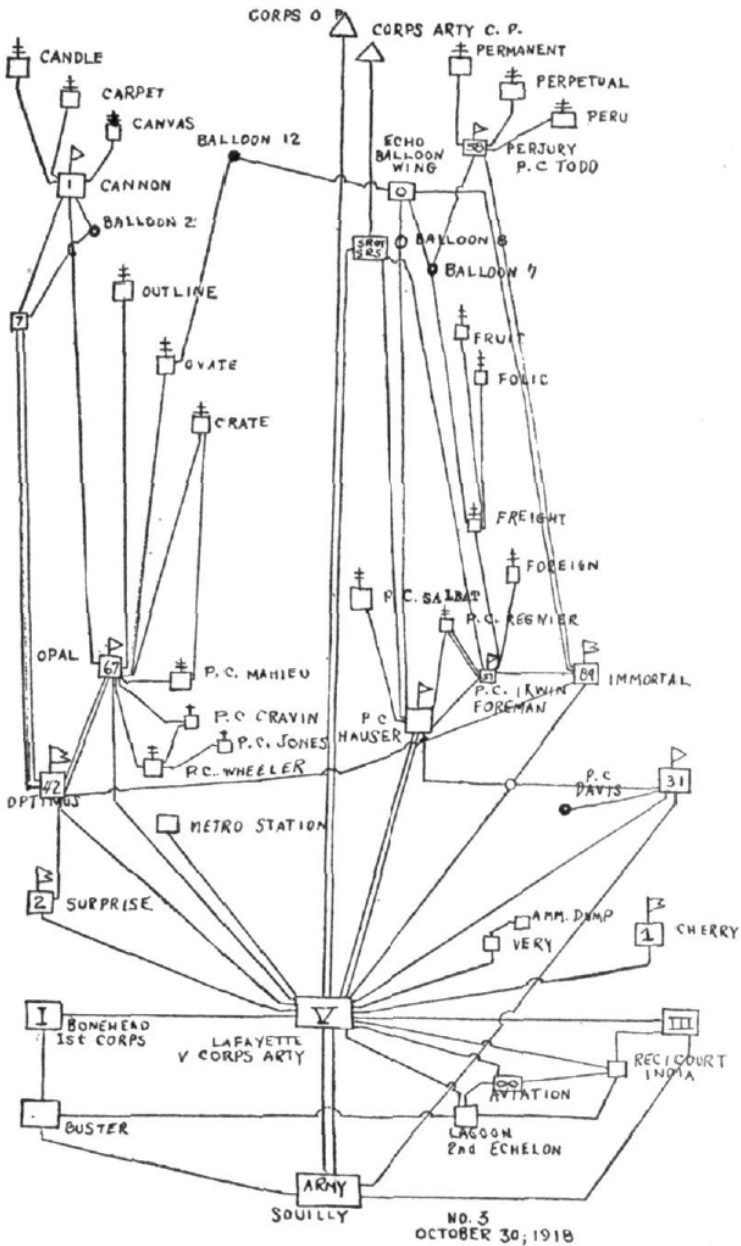
\* Batteries to be pushed as far forward as the tactical situation permits.

By Command of Brigadier General AULTMAN:

W. E. SHEPHERD, JR.,  
Major, F. A., U. S. A.,  
Chief of Staff.

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## 10. ARTILLERY TELEPHONE NET ARTILLERY HEADQUARTER'S V. ARMY CORPS



— LEGEND —












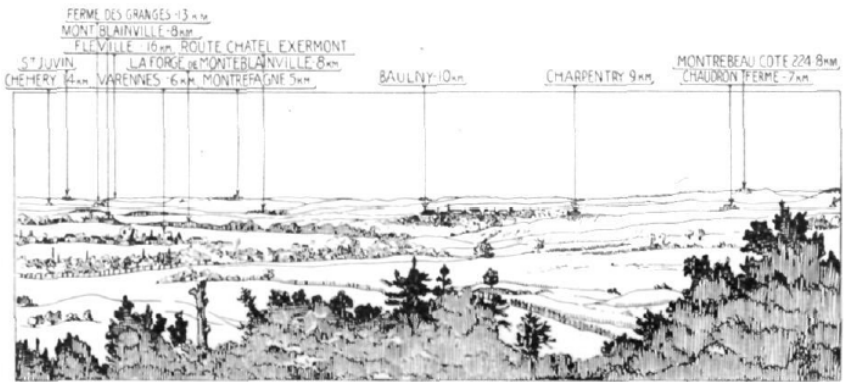
-  — 75 <sup>m</sup>/<sub>m</sub>
-  — 155 <sup>m</sup>/<sub>m</sub> Howitzer
-  — 105 <sup>m</sup>/<sub>m</sub>
-  — 155 LONG. S. 1917
-  — 155 LONG "77" (1877)
-  — 220, 7 KM. 100 M.
-  — 90-95
-  — 155 G.P.F.
-  — 120
-  — 220, 10 KM. 800 M.
-  — 8 m. How.

PLATE I.

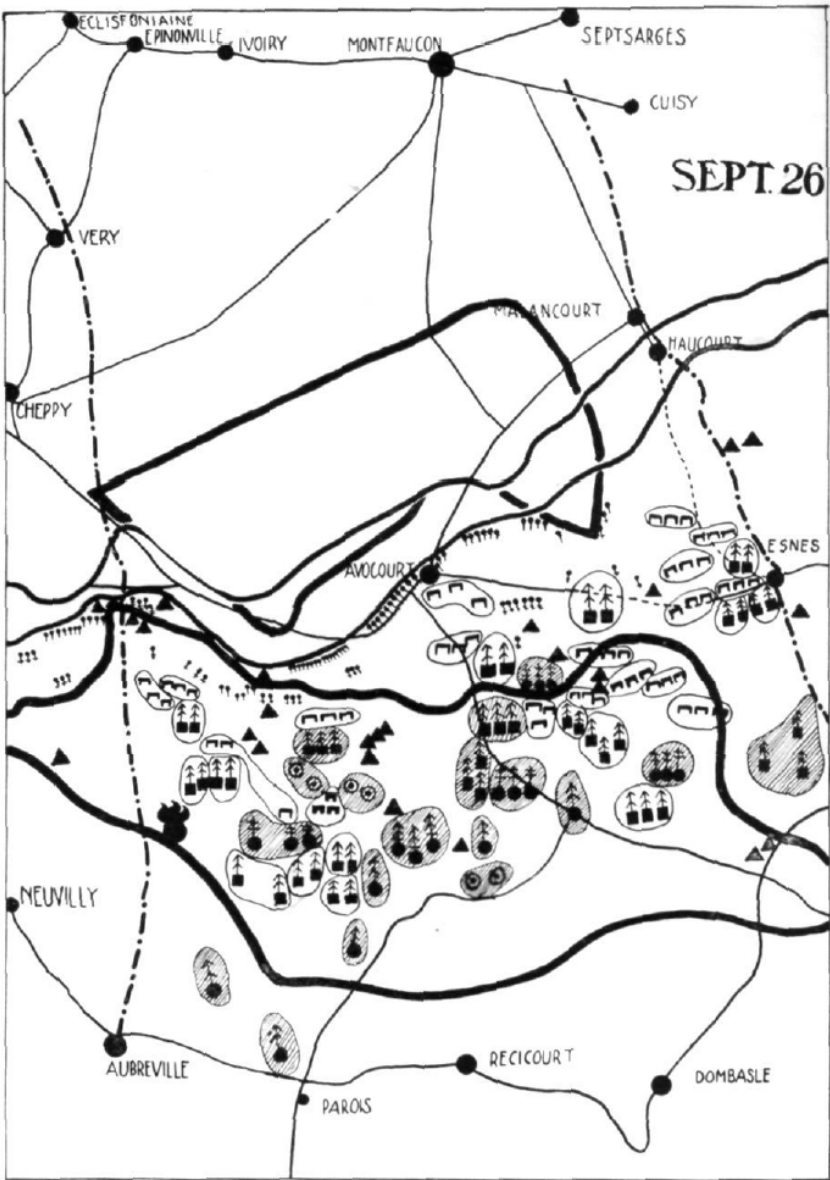


VIEW FROM OBSERVATORY N<sup>o</sup> 622

"COTES DE FORIMONT"

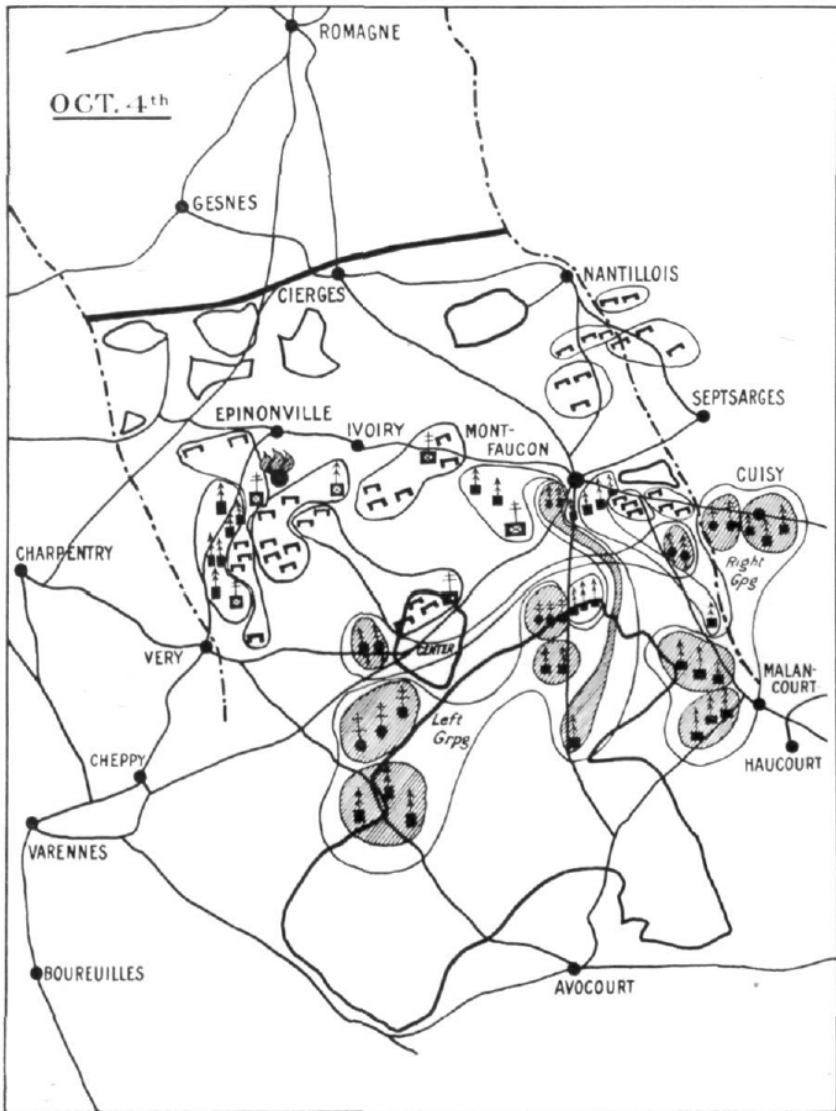
PANORAMIC SKETCH TAKEN FROM OBSERVATORY NO. 622 AND LOOKING NORTH OVER THE HILLS WHICH FLANK THE AIRE RIVER ON THE EAST. THE TERRAIN SHOWN IS ALONG THE WEST EDGE ONLY OF THE 5<sup>TH</sup> CORPS SECTOR. BUT IS CHARACTERISTIC OF THE ROLLING AND WOODED GROUND OVER WHICH ADVANCES WERE MADE

PLATE II.



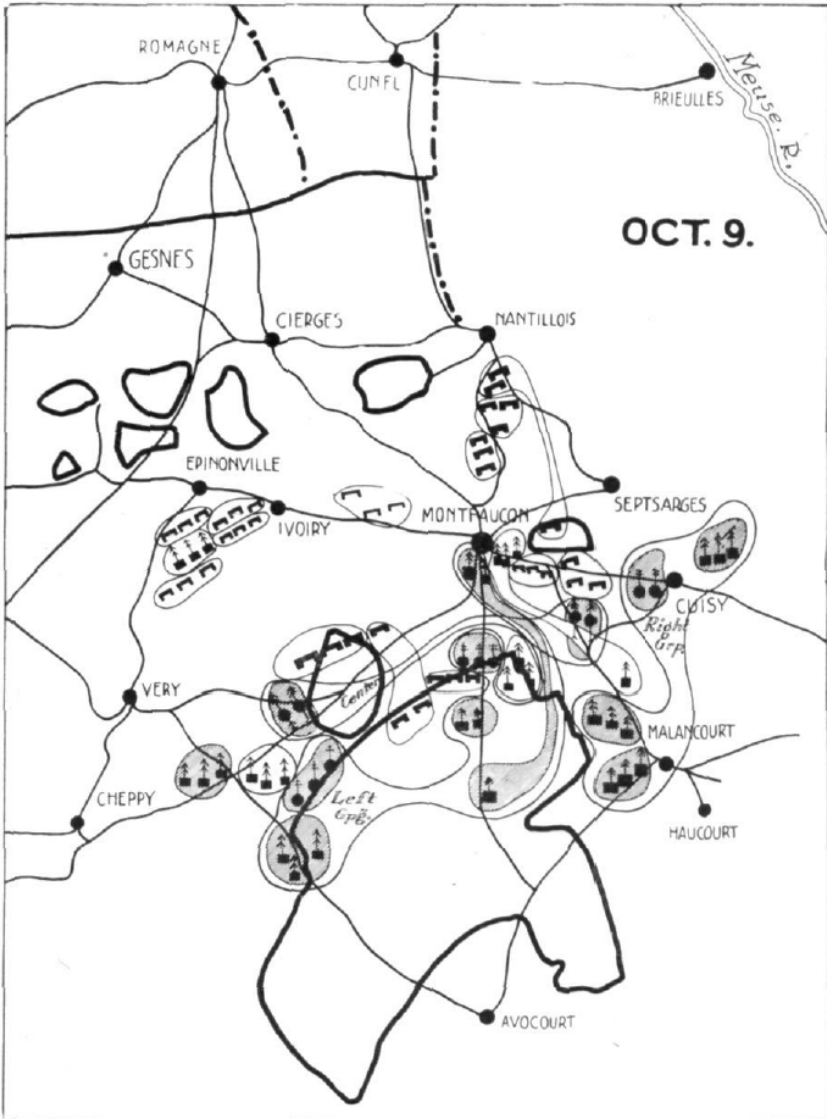
DEPLOYMENT OF THE ARTILLERY, SEPTEMBER 26TH, 1918. CALIBERS SHOWN BY CONVENTIONAL SIGNS. CORPS ARTILLERY UNITS SHADED

PLATE III.



DEPLOYMENT OF THE ARTILLERY, OCTOBER 4TH, 1918

PLATE IV



DEPLOYMENT OF THE ARTILLERY, OCTOBER 9TH, 1918



PLATE V.  
**5TH ARMY CORPS**  
 ORGANIZATION OF THE ARTILLERY  
 ATTACK OF Nov. 1, 1918

Divisional Artillery.....	2d Div. Arty.		89th Div. Arty.	
	Caliber	No. of Guns	Caliber	No. of Guns
	75	144	75	128
	155-C. S.	72	155-C. S.	40
	8" How. 6" Tr.	8 4	8" How. 6" Tr.	16 4
Corps Artillery.....	Col. Mahieu		Col. Regnier	
	Caliber	No. of Guns	Caliber	No. of Guns
	105	12	105	20
	155-C. S.	20	155-C. S.	12
	155-S Ch.	12	155-S Ch.	24
	Col. Salbat			
	Caliber	No. of Guns	Caliber	No. of Guns
155 L-77	12	155 L. S. '17	8	
Army Artillery.....	Davis Grouping			
	155 G. P. F.		72 Guns	
Total .....	608 Guns, All Calibers			

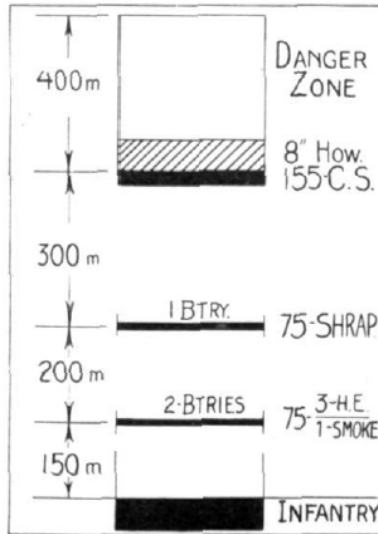
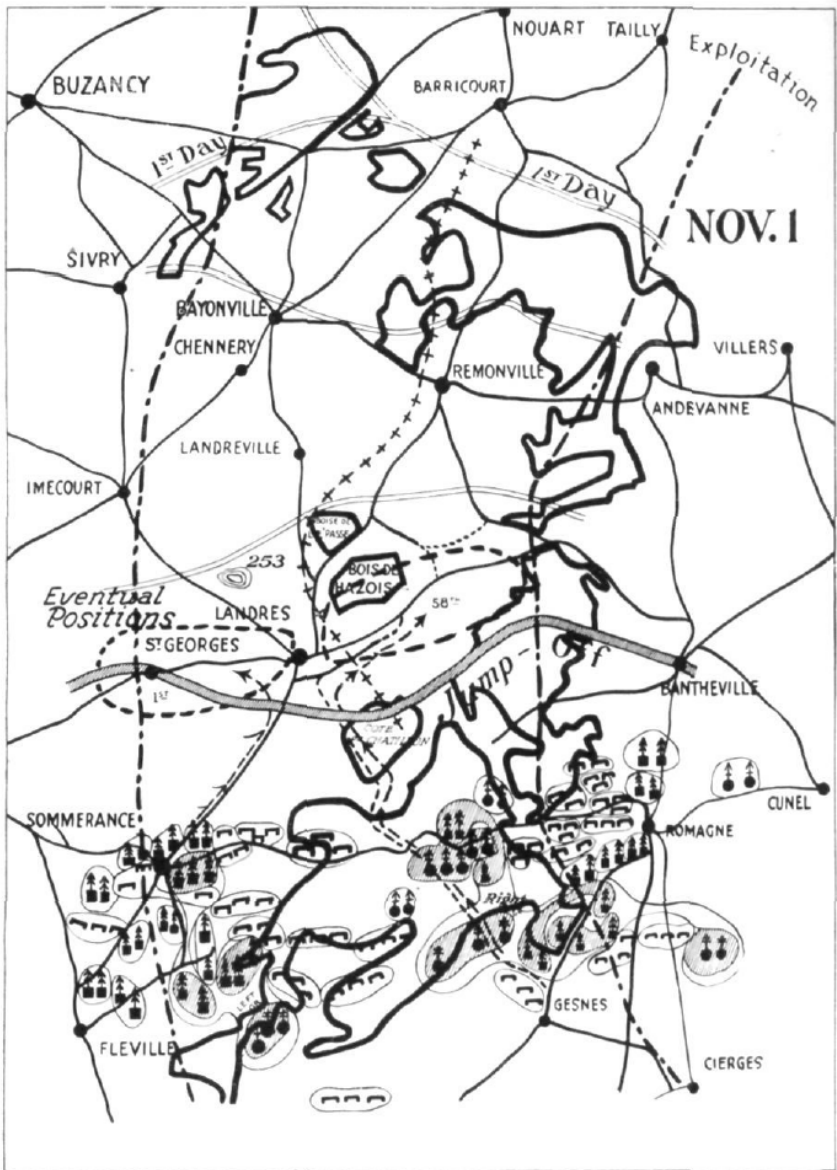


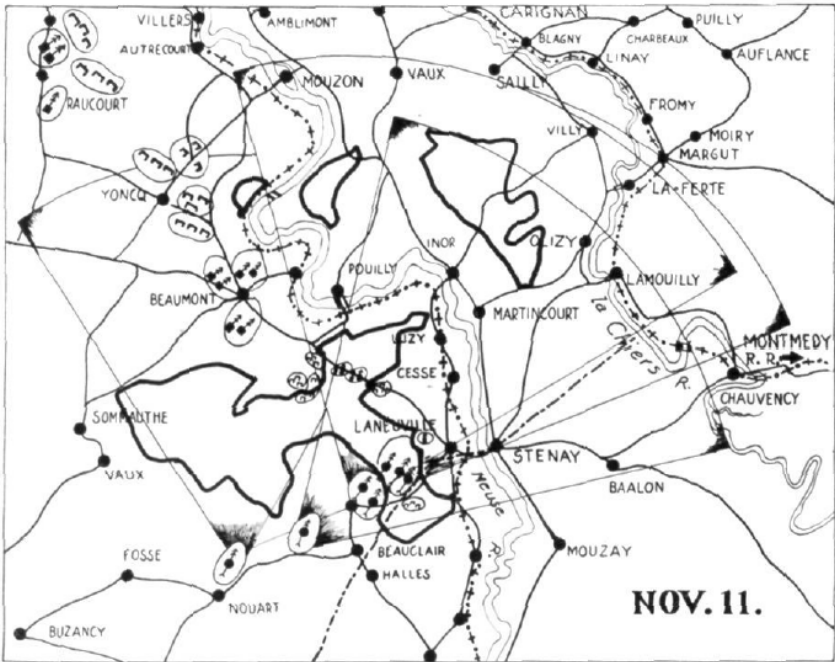
DIAGRAM SHOWING TOTAL STRENGTH OF THE ARTILLERY ON NOVEMBER 1st. 1918, AND METHOD OF USING THIS STRENGTH TO OBTAIN DEPTH IN BARRAGE AND COVERING FIRE

PLATE VI.



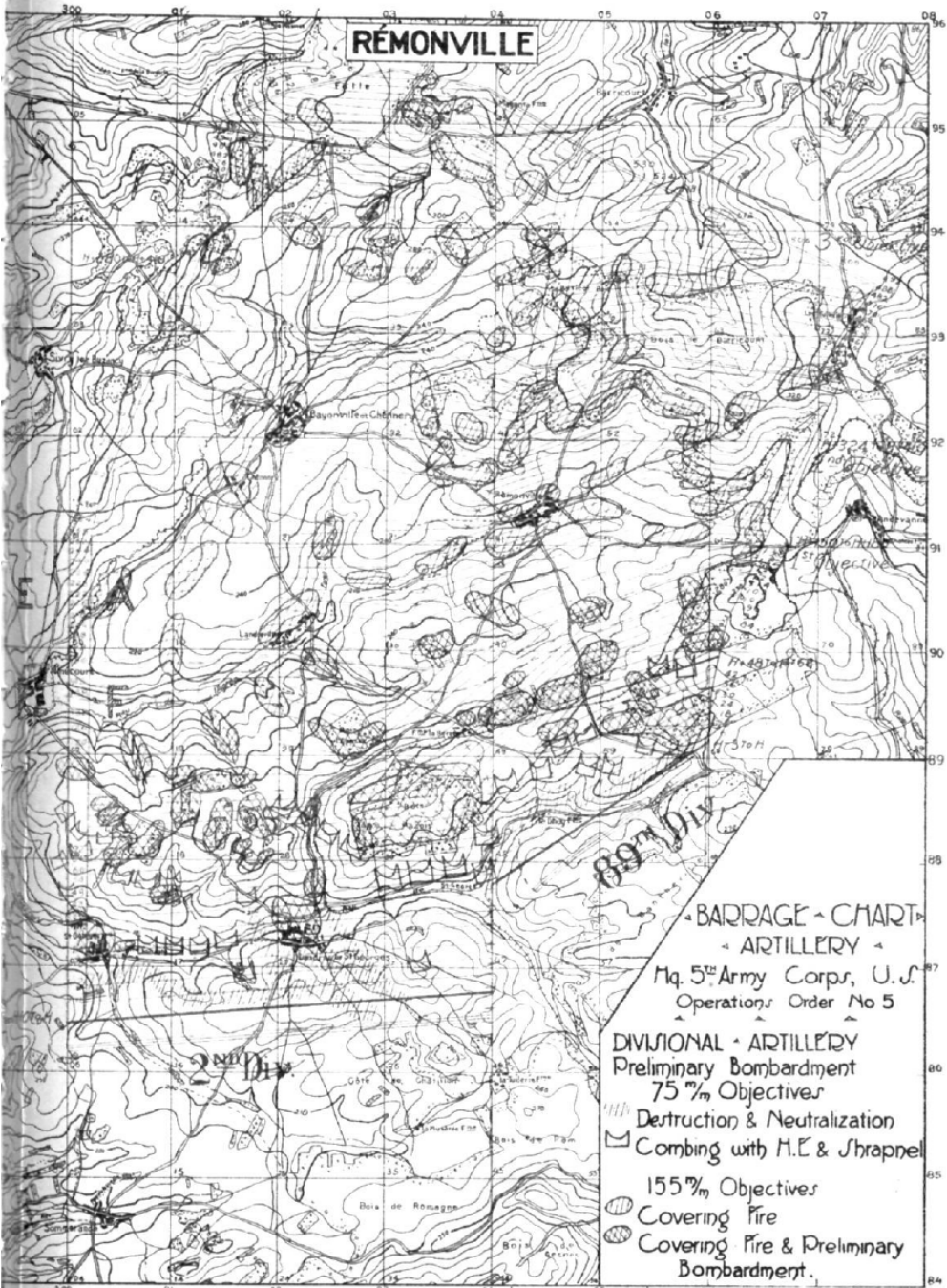
DEPLOYMENT OF THE ARTILLERY, NOVEMBER 1st, 1918

PLATE VII.



DEPLOYMENT OF THE ARTILLERY PREVIOUS TO THE ARMISTICE OF NOVEMBER 11<sup>TH</sup>, 1918.  
SHOWING FIELDS OF FIRE OF THE 155 MM. G. P. F'S

# RÉMONVILLE



89th Div

2nd Div

BARRAGE - CHART  
ARTILLERY

Mq. 5th Army Corps, U.S.  
Operations Order No 5

- DIVISIONAL ARTILLERY
- Preliminary Bombardment
- 75mm Objectives
- Destruction & Neutralization
- Combing with M.C. & Shrapnel
- 155mm Objectives
- Covering Fire
- Covering Fire & Preliminary Bombardment



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## "F. A.—Long Fuse Charge Zero."

BY LEWIS E. REIGNER (FIRST LIEUTENANT, FIELD ARTILLERY)

Scene, The Argonne, September, 1918, 4.45 A.M. American Battery of 155's in position.

TELEPHONE: Prepare for action.

No. 2 GUN: Ready for data.

SERGEANT: Everybody out!

TELEPHONE: Data coming.

EXECUTIVE: Battery ATTENTION! From Base Deflection RIGHT THREE FIVE—F.A. shell—LONG fuse—charge ZERO—BATTERY RIGHT—FOUR rounds—A M C—ELEVATION—TWO NINE DEGREES—THREE ZERO MINUTES—Report when ready to fire. (Two-minute pause.)

SECTION CHIEFS: No. 2 ready to fire, sir. No. 1 ready to fire, sir. No. 3 ready to fire, sir. No. 4 ready to fire, sir.

EXECUTIVE: Ready to fire.

TELEPHONE: Fire.

EXECUTIVE: FIRE!

To those of us who served with American batteries of field artillery in France and Belgium the 155 mm. Schneider Howitzer will remain enshrined, in our memories, of course, the object of as great veneration as was his shield to the Greek warrior and Sir Roland's "Durandal" to the champions of Charlemagne. In quarters and billet to-day let the "155" be mentioned and at once there arises an eager chorus to recount its three chief and abiding virtues, namely, its marvelous accuracy, its extreme mobility and its "camaraderie." I use the last term advisedly, and yet to one who has seen a gun crew strip off its underwear to wipe the breechblock, and that on a front where clean clothes were at a premium, there is in the above phrase no hint of meticulous anthropomorphism. (Not

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to be confused with the "Recuperator-cylinder-piston-rod-coupling-nut.")

Seriously, however, this attitude toward the guns, of companionship or intimacy, should not be underestimated, for American artillerymen literally fell in love with French matériel, and to their subsequent attachment to their arm can be attributed the unprecedented success which attended the campaigns in which soldiers of the United States manned the light and heavy engines of their Gallic allies.

The gun crew had confidence in its huge howitzer. The men saw on the target range evidences of its precision, its possibilities and its minimum error in distribution. They learned on the march, sometimes perforce, that they could pull 3715 kilograms of dead weight out of mud with their own hands. They demonstrated in the field, to their enthusiastic satisfaction, its range of 11,300 metres and its maximum destructive power. They slept under it, ate under it, and found shelter under it from rain, both aquæous and metallic. They walked beside it through sleepless nights and in its company "lived laborious days." They polished it, groomed it, prepared its food, and then, joy of all joys—they FIRED IT." "Why stuff cotton in your ears, bo? I wanta hear that Bang!" One remembers with delight a certain dusky "A. E. F." of Alabama who was rustling shell back of a battery position near St. Crois-de-Pierre, in the Argonne. Every time the guns roared he shouted: "Theyah you ah, Mistah Kaisah, count youah men!"

We were, in our unit, able to summarize, from innumerable actions, in twelve different positions, on three fronts, the Vesle, the Argonne and Audenaarde, under probably all conditions, the following results:

1. That it is possible to bring a battery through a campaign of three months without having any of the four guns go to the repair shop.
2. That it is possible to fire 1400 rounds per gun, with charges varying from number 4 to 00, without losing any appreciable time in minor repairs or damaging the bore in the slightest.

"F. A.—LONG FUSE CHARGE ZERO"

3. That muzzle bursts, prematures in the bore and all accidents of fire except faulty primers can be anticipated and avoided.

4. That the trail bundle and a specially prepared spade ditch are indispensable.

5. That the cannoneer who smooths and greases the shell is the most important man in the gun squad.

6. That, in our opinion, the I. A. L. fuse produces the best results.

7. That shrapnel with this calibre is impractical.

8. That grease is more important than powder.

9. That the quadrant was always used in action to the exclusion of the range dial.

10. That a chief mechanic who knows his job is worth his weight in gold.

These observations are not peculiar to any one organization, for the same or better conclusions have been drawn even within our own regiment and brigade. Such criticisms as may follow are not captious in any sense, for there is nothing to carp at in this gun. They serve only to bring out those faults which are most likely to occur in service.

The credit for whatever merit may attach to the working of the guns belongs without doubt to the chiefs of section for their fidelity, and to the firing battery for its sporting instinct. They played the game, "in thunder, lightning and in rain." The cannoneers filed and rubbed and greased; the gunners laid, and the sergeants checked, not to avoid the "growl," but because their own lives, and, what was more, the lives of the doughboys in the trenches, depended upon their accuracy and constancy. But it is superfluous to refer to the accepted loyalty of the American artillery.

The care of the matériel has been our first and foremost concern throughout our service. Everyone is familiar with the spirit which animates every gun squad to excel every other, and it is no wonder then that the four big howitzers soon bore pet names none the less cherished because they are unprintable. It

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is nothing new to explain that the "firing battery" was "picked," and that in our case at least it was 99 and 44/100 per cent. Irish. Of course, one can lay no measure of meed to a senior chief of section who served in the old Sixth Cavalry and soldiered under Lawton to the extent of the Congressional Medal for gallantry in the Islands. Were we to mention the lowly "Number Seven," who wore his fingers raw scraping shell before Fismes, we would be but reciting the Iliad of a myriad other potential Achilles in O. D. Their creed, not of words, but of deeds, is tabled in that eternal utterance of pride, of confidence, of devotion: "OUR Guns."

At a meeting of the executives' school at Camp Meucon, France, before the regiment entrained for the front, the commanding officer read Major General Charles P. Summerall's comments upon the "155," which emphasized thorough cleaning of the shell and the use of the trail cushion. These two axioms were the Alpha and Omega of our efforts on the line. For the other factors which tend toward the successful upkeep of the howitzers, one has only to follow faithfully the provisions of the drill regulations and the notes in the handbook on "Caring for the Matériel."

It was found that during a barrage of some length that the best results were obtained with a maximum rate of fire of two rounds per gun per minute, especially with charges 1, 0 and 00. Again, it was considered advantageous to sponge the tube after every shot and to allow the breech to remain open until within a half minute of the time for the next round. We "rested" the guns alternately for ten to fifteen minutes in each hour, depending upon the rapidity of fire. During this time, if possible, the breechblock was dismounted or disassembled for the removal of the oily black residue. After every firing, without regard to time or weather conditions, the guns were cleaned thoroughly, including the breechblocks. The bores were then covered with a light coating of oil or grease and the muzzle was lubricated heavily for at least ten inches from the orifice, "to keep out the dampness."



## "F. A.—LONG FUSE CHARGE ZERO"

The recoil and recuperator systems were tested daily, after every march and before every firing, when it was not snaphooting. Little trouble was experienced with these cylinders. A spot of rust was the signal for a call to arms with crocus cloth, oil and elbow grease. "They found some rust on the short rammer of the third section gun to-day," says a gunner. "Holy smokes, I wonder if ours is dirty!" and every squad gets busy.

Greasing of the axles was a ceremony, and it is suggested here that the American oiling system and a grease gun would be of labor-saving importance on the French wheels. Grease itself was conserved like the rare whale fat which yielded priceless perfumes. No little boy bent on making a few pennies ever collected "rags" with more persistency than these same cannoneers, throwing away their souvenir German helmets to grab up a torn pair of pants, "to clean the guns with." Frequently, when circumstances warranted, the grease was removed from the bore to see if rust had formed UNDER THE protecting film. It was found that hot water was most practicable for cleaning the gun after a firing. Also the bores were invariably swabbed out while they were still hot from the gases, as this feature in itself aided materially in their restoration to pristine immaculateness.

Unless it was absolutely necessary, grease was not removed from the bore during rainy weather. In action a bucket of water was kept beside each gun for washing the breech and wetting the sponge. In some positions in the Argonne, where water had to be carried three hundred yards up an incline of 45 degrees, the enforcement of this rule called for some asperity upon the parts of the chiefs of section. Two good buckets are necessary for the welfare of each gun, just as two ample paulins per howitzer are of incalculable value in protecting the piece, the powder and the personnel.

The chief mechanic, although he was assisted by the four section mechanics, exercised a rigid personal care of each gun. He himself made the tests of the brake cylinders, and at every firing he checked the recoil mechanism after the second round

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and compared it with the table given in the handbook. Indeed, with this complicated and efficient machinery, few batteries experienced any difficulty at all, and the response of the recuperator to the monstrous impulse of the double-zero charge was a pleasure to behold. In this connection it might be said that the plunger of the locking lug should have a tapered end, so that it will enter if worn or burred. It is necessary to prevent binding in matching the hole in the plunger, so that delays are not experienced in going in or out of battery. If the plunger binds too much force is required to "start" the tube on the guide rails. An adjustable wedge slide would be of benefit between the cradle and gun slides to take up the "slack" resultant from the wear of fire and travel. This play displaces the tube from its normal axis; that is, the centres of the bore and of the cradle will no longer be in the same vertical plane, and, of course, there will be an error in the parallel lines of sight and of the axis of the bore.

When the gun is in the traveling position and the traversing lock is in place, the greater part of the weight of the carriage rests upon the rollers, which afford a very small bearing space. The result of this concentration upon a lineal base of 100 mm. for a length of time is the wearing of a "low spot" in the axle. Therefore, the rollers may be hindered in turning or they may refuse to revolve, and slide, to overcome which it is necessary to strain heavily the traversing screw and the traversing nut.

The coupling shutter must never be unlocked unless the tube is at the horizontal. Several narrow escapes from knocking off the lugs were reported. Once the cradle is off the slides, a derrick will be needed to get it back, to say nothing of the incidental damage. Releasing the trail spade from the traveling position is attended with dangers. Many men have had their shins scraped, and at Varennes, an old cannoneer, laboring under the excitement of going into action, lost a finger very neatly. A good jack should go with every battery wagon, if not with every gun. The geared type is believed to be quite as effective and certainly less cumbersome than the hydraulic lift of ten

## "F. A.—LONG FUSE CHARGE ZERO"

tons supplied the batteries of heavy guns. The latter is not dependable in freezing weather.

As regards the care of the bore and its protection from erosions and foreign particles, several precautions have been found to be of the highest importance. "Number one," day or night, should examine the bore after every shot to catch burning strings, residue of powder bags or any other obstructions. The sponge may be introduced. Chiefs of section and gunner corporals must make sure by glancing through the breech that the line of departure does not include crest, cover or camouflage. Shells should not have on their surface even the most minute particle of dirt or grit. This may cause a burst in the bore. Shells, particularly when they have been "policed," must be assorted according to relative weights and prepared with assiduous care. The rotating bands are filed smooth; sand is brushed from the bases, and the rotating bands and the swells of the ogives must be greased. While liberality in the matter of lubrication on the shell is not to be carried to extravagance, too much grease is safer than too little. Parsimony in lubrication sometimes results in the centrifugal departure of the rotating band at the moment the projectile leaves the gun, with a wierd, whistling shriek of metal, screeching away to the front.\* In one position a mechanic declared this noise was due to the loosening of the band on the long fuse, and he exhibited the still warm safety strip to prove his assertion.

At least a dozen shells per gun should be kept greased and ready for night and call firing. They should not be fused in advance. The long fuse (IAL) should not be screwed into the eye before the shell is on the loading tray, nor ought it to be stripped of the tape before the very last moment. Unless the rammers send the projectile home with a jolt, the shell may slide back and fall between the flasks of the trail. This has happened with the long fuse ready for action, and there have been breathless moments. The muzzle cover should always cover the nose

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\* This trouble is generally due to imperfections in the rotating band.

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while the matériel is under fire, for a fragment or particle entering the bore will be betrayed by the hole in the canvas.

The trail bundle was found to be necessary in all cases. On hard ground the trail was dropped to the lesser angle of opening, and a bundle of green branches in diameter equal to the depth of the spade was inserted under the float. The component sticks should never be larger than an inch in thickness, unless resiliency is sacrificed to slovenly or hasty construction of the buffer, so necessary to the proper absorption of the heavy recoil upon this comparatively light carriage, whose factor of safety is possibly inadequate.

The trail circle, of course, should be backed with wattling or brush work to facilitate the shifting of the trail in wide or sudden changes of deflection. It was found that no matter what precautions were taken, the trail ditch, especially in heavy barrage firing, was ploughed and rooted out of shape. Constant repair is needed in this particular, so that a gun is not reported "out of action" at a critical moment because the trail is buried in the ground. The French have a way of folding the trail in the traveling position and placing a six-inch bundle under the float, for use on hard surfaces. We did not employ this method.

In the moist soil of the Argonne and in Flanders we dug the trail circles three or four inches deeper than the spade at the greater angle of opening. The rear face of the ditch and the top were made of sandbags, well and regularly placed. At these places we were able to make all-night firings with zero and double-zero charges, without displacing the ditch wall and with perfect freedom of the trail, the spade having been let down to its widest grip.

Two-inch or heavier sawed lumber is necessary for platforms in soft soil. The planks are placed obliquely so that the two gun wheels do not rest on the same board at the same time. It is of prime importance that the gun position be prepared in advance with the greatest care and thoroughness before fire is opened. Ample provision of lumber and sandbags will prevent disastrous delays later.

## "F. A.—LONG FUSE CHARGE ZERO"

At Varennes we were able through fortuitous acquisition of track and hand cars to run a shell-supply tramway past the trails of all the guns, and in no other instance was the service of the piece attended with such dispatch or with so much pleasant labor. Carbide lanterns, or even candle lanterns, supplanted the lighting systems, whose batteries were always exhausted or whose wire was broken or too short to reach to the great distance that is desirable for an aiming post in the rear. A thumb-screw could be substituted for the spring catch on the collimator. The catch does not permit accurate adjustment quickly or without a jerk.

A system of wooden numbers of charges, which Number Three can feel in the dark, is of advantage in keeping in mind the number of the charge to be made up.

It is not to be assumed that the conclusions of this paper are final. A greater length of time in action might have changed any or all of these opinions. But as to the popularity of the 155 Howitzer with the batteries which have had the good fortune to serve it there is no doubt. One sergeant, just a few days ago, laid his hand affectionately on his gun and said, regretfully, if not altruistically: "I am almost sorry we shall never fire them again, in war."

# The Employment of Relief Maps

TRANSLATED FROM THE BULLETIN DE RENSEIGNEMENTS DE L'ARTILLERIE  
AUGUST, 1918 BY LT.-COL. J. A. CRANE, FIELD ARTILLERY, U. S. ARMY

THE tendency to use relief maps is properly becoming more general in the military service, but their difficulty of construction and inconvenience in handling and transport cannot be justified nor compensated for unless they permit the student to more rapidly and accurately solve his terrain problem than from the colored or shaded plan directeur.

From the fact that the relief map reproduces the third dimension, the one the student finds the hardest to grasp, it may be assumed that by the use of adequate instruments it will be as useful, if not more so, in accurately determining elevations than is the ruler, square, protractor and compass on the ordinary map.

The relief map, then, permits of the rapid solution of problems in visibility and profile, and the determination of certain firing problems.

The construction of every kind of relief map can be easily accomplished with the employment of a relatively small amount of matériel and personnel, by the Arnold process, which insures an exact, and, so to speak, mechanical reproduction of the corresponding plan directeur.

For the construction of a relief map the choice of a scale of elevation is particularly important. An exact impression of the terrain under consideration is not a necessity but what is needed is a working tool showing the third dimension, and it is evident that the precision of the results obtained in using it will increase proportionately to the scale of elevation chosen. This scale, then, ought to be as large as possible, taking into consideration the fact that in very rough country too great an exaggeration in relief involves difficulty in execution. This it is essential to avoid in order to facilitate work and preserve the map.

The accuracy of the plan directeur depends upon the skill of the draftsman who made it. If it contains errors the relief

## THE EMPLOYMENT OF RELIEF MAPS

map reproduces them, but it does not thereby lose all its value as a working tool. The most suitable scales of elevation are: 2500 for reliefs of 5000 and 5000 for those of 20,000.

### *Employment of a Light Ray for the Study of Relief Maps*

The principle of this method is the substitution of a very small light for the eye of the observer. If in the dark this light is placed on a point of the relief map, *i.e.*, the corresponding point on the terrain occupied by an observer, and the light ray projected upon a given sector of the map, immediately the visible areas are illuminated while the hidden ones remain in shadow. All questions of visibility and defilade can thus be determined. Similarly, if the light is placed at a distance and height corresponding to the scale of a relief map at the point of ascension of a balloon, the visible and hidden areas from the balloon are instantly obtained.

### *Arrangement of Lights*

The light usually employed is a three- to five-volt bulb (pocket light or projector bulb), so chosen because the filament ought to be as near as possible to the ground as represented on the relief map. With this form of bulb the light can be brought to within one millimeter of the ground. The bulb light mounted on an appropriate tripod is connected by a fine wire to dry batteries placed in a box and so arranged as to feed three or six lights. (See photograph No. 1.)

The light can also be projected upon the relief map through a lens, thus giving a bright point from which grazing rays radiating in all directions represent the visual rays tangent to the ground. Finally, for rapid exploration, it is convenient to use a form of portable lamp with a three- to five-volt bulb mounted in the end of a tubular cuff. With these different appliances it is essential to have a movable screen to shut out the superfluous rays annoying to the operator.

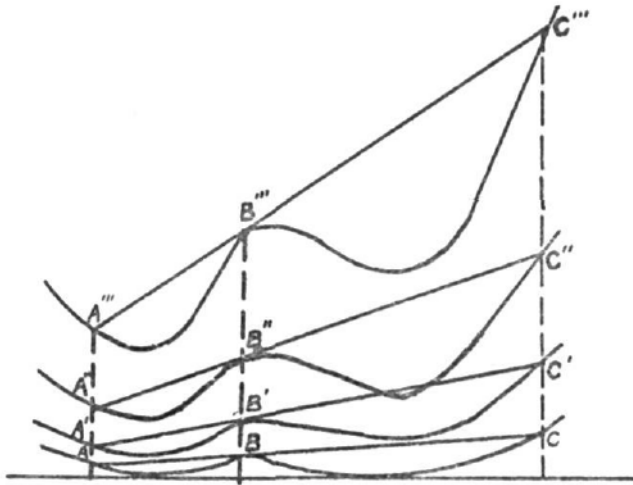
The special arrangement for balloons will be discussed further on.

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### *Degree of Precision and Method*

It should be noted in the beginning that the exaggeration of elevations makes no change in the problems.

A line of sight or ray of light which replaces it, originating at  $A$  tangent to  $B$  and striking at  $C$  in the terrain, if originated at  $A'$ ,  $A''$ , etc., remains tangent to  $B'B''$ , etc., and cuts  $C'$ ,  $C''$ , etc., no matter what the scale of elevation may be. The exaggeration



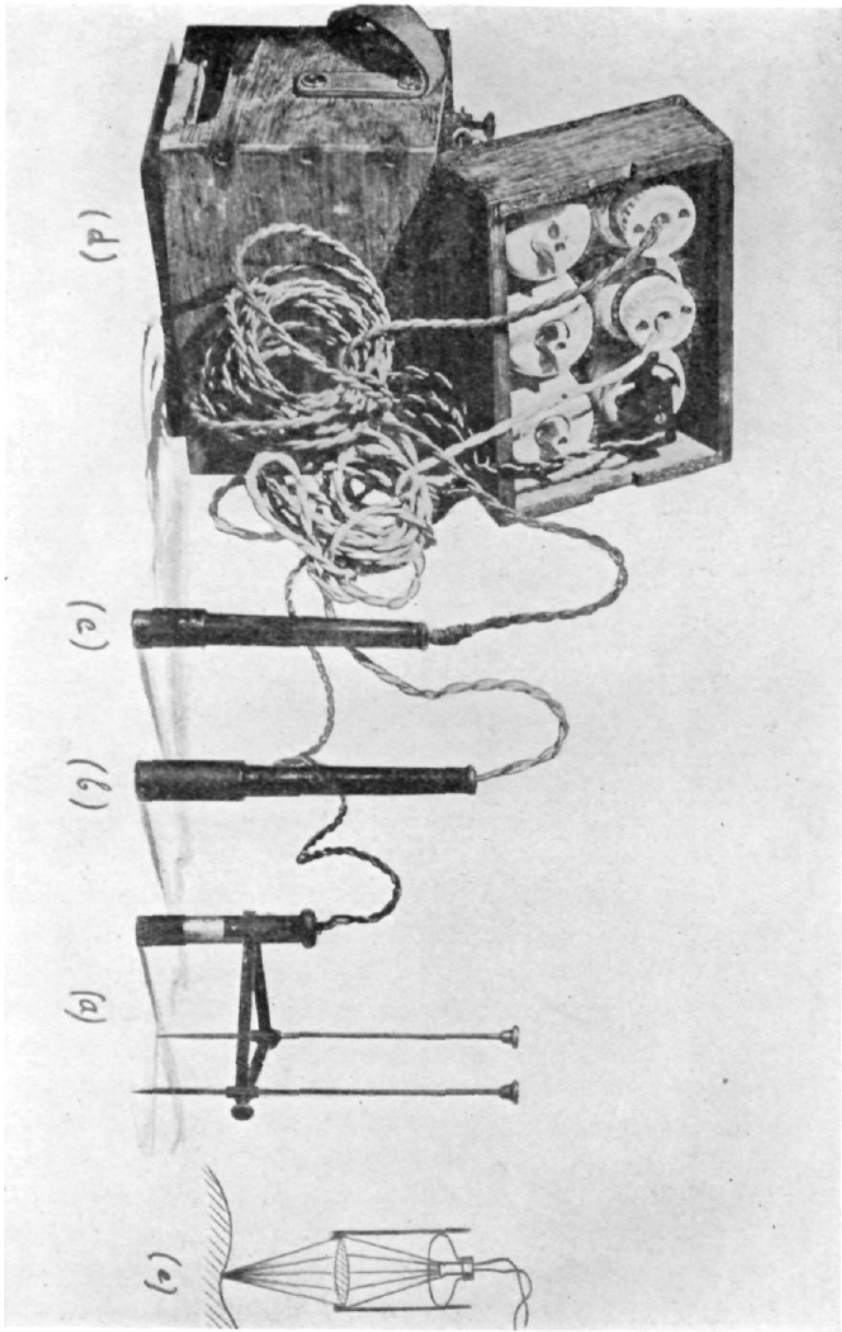
*Fig. 1.*

of relief makes the limits of shade, as at  $B$ , much more defined.

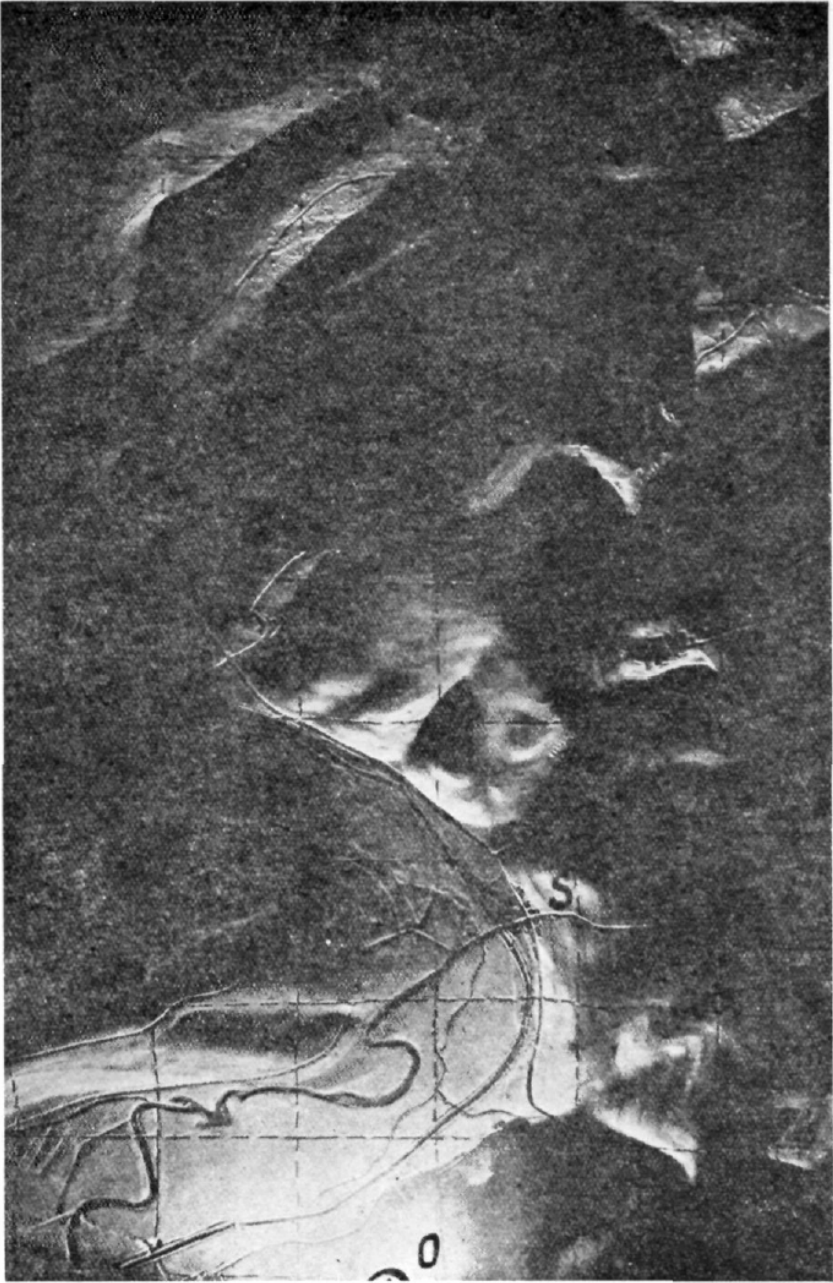
The process with the projector light is exact but with an ordinary bulb there is introduced a constant error due to the distance of the filament from the ground (about 5 meters with the 20,000 map, scale of elevation 5000). In this case it is easy to take into account the advantages of increasing the scale of elevation.

If we let  $d = AA'$ , the value of the error committed, for example, on a relief map scale 20,000, elevation scale 10,000 (Fig. 2). The point of light is at  $A'$  instead of being at  $A$ , and the light ray  $ABC$  is replaced by the ray  $A'B'C'$ . Suppose that one works now on a map the scale of which is 20,000, elevation





PHOTOGRAPH NO. 1.—APPARATUS FOR OBTAINING THE BRIGHT POINT (A) TRIPOD LAMP; (B) PORTABLE LAMP; (C) PROJECTOR LAMP; (D) BATTERY CASE, DRY CELLS AND CONNECTION PLUGS; (E) LENS

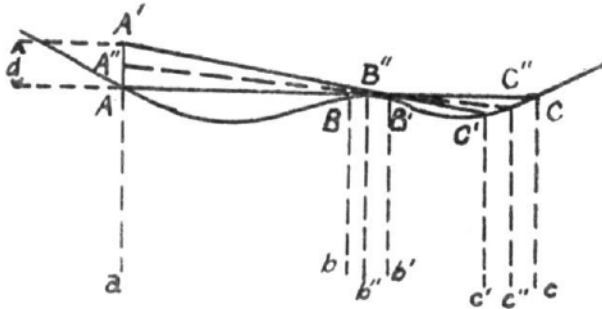


PHOTOGRAPH NO. 2.—ZONES OF TERRAIN SEEN FROM AN OBSERVATORY IN THE REGION OF TALOU HILL. (O. POSITION OF THE OBSERVATORY; S. VILLAGE OF SAMOGNEUX)

## THE EMPLOYMENT OF RELIEF MAPS

scale 5000. Everything is the same as before, except that we have reduced by half the error in the position of the filament. It is now  $A''$  and not  $A'$  which is the point of origin. The error committed in the position of the limits of shade are reduced by half.

If we now consider a more extended profile (Fig. 3) with a



*Fig.2.*

series of crests, it is evident that the precision increases with the distance of the covering crests and in a relation that is easy to determine if need be.

We can prove besides, that practically, except very near the light, the use of the portable lamp or any analogous system giving a grazing ray gives sensibly the same results.

If we wish to refine the problem, for example, in verifying a very questionable case of visibility, taking into account the error due to the height of the filament, we can deduce this



*Fig.3.*

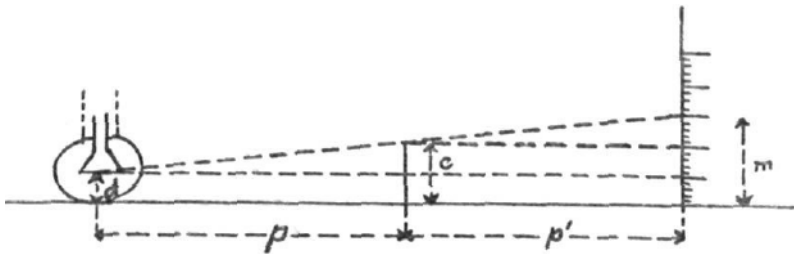
height  $d$  by interposing a screen (Fig. 4) as  $e$  between the light and a graduated scale. We have  $\frac{e-d}{p} = \frac{m}{p'}$  and as  $p = p'$  we have  $d = 2 e - m$ .

*Masks*

Masks existing on the intervening terrain evidently diminish visibility and increase defilade, but it is easy to take account of this by estimation just as in treating the same problem by means of profiles drawn from the plan directeur.

*Map of Areas Visible and Hidden from a Point in the Terrain*

The tripod light being placed on the relief map at the desired point we can (on the map that has been painted with oil) trace



*Fig.4.*

with water colors the limits of the visible areas, or tint uniformly either the visible areas or the hidden ones, depending on the relative size of one or the other.

The time necessary for the work varies from some minutes to one hour as a maximum, depending on the extent of the views and the character of the terrain. The transport of these limits to the plan directeur by aid of the squares, or of a planimeter, is also very quickly done. The whole operation for the average view from an artillery observatory can be completed in 30 to 40 minutes.

In certain cases, it will be advantageous to take a photograph directly of the lighted relief map (exposure of about 30 minutes). The photograph shows the shadows particularly well. (See photograph No. 2.)

## THE EMPLOYMENT OF RELIEF MAPS

### *Map of Simultaneous Visibility from Many Points*

This is obtained in the same way as above, either by placing a lamp at each point and lighting them simultaneously, or better, by lighting them at each point successively and tinting the area seen, in such a way as to paint each area only once. The photograph process applies as well in this case and gives the defilade for a series of observatories.

### *Search for Observatories and Preparation of Reconnaissance*

The portable lamp gives immediately:

Placed at an observatory, the view from that point.

Placed at an objective, the areas from which it can be observed and where we ought to seek the most suitable situation for observatories.

We can then in a few minutes determine: a limited area where an observatory ought to be placed to have the best view of all objectives.

The only points in the friendly lines giving certain difficult views.

The direction in which it is necessary to move to avoid a dangerous emplacement and retain the required view.

The eventual optical liaison for the observatory.

The obtaining of these results on the ground required two or three hours, sometimes two or three days.

Distant views are practically independent of the position of the observatory in a radius of 100 to 200 meters around the point selected.

In 30 or 40 minutes, we establish the map of visible and hidden areas, and the actual view will often be better than shown; the observatory generally profiting by hillocks or mounds not shown on the plan directeur or relief maps.

This map graduated with the same systems as the aiming circle allows us, with the help of the contour lines, to make a general sketch of the panorama, which is also graduated in a like manner.

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In possession of these documents the reconnaissance is completely oriented. Once on the ground it is possible:

To read the panorama at first sight.

To identify promptly many points of registration.

To avoid gross errors of interpretation.

Besides the observatory is quickly and accurately located on the ground; a precious advantage to the average observer when pressed for time and exposed to view.

### *Preparation of Fire*

At the observatory the map of visible and hidden areas is lightly retouched in accordance with existing masks. The panoramic sketch is improved and verified.

At the battery a duplicate graduated map is at the disposal of the Battery Commander.

So, based on these maps, the preparation is such:

That the execution of orders at the observatory is simple and the observation there is easy.

That a precise understanding is established between the Battery Commander and the observer from the beginning, assuring equally well the conduct of the slow adjustment or the instantaneous fire on the front lines upon signal from our infantry.

### *Advance of Observatories*

The portable lamp permits the rapid search for, and study of, auxiliary targets in their relation to observatories or other chosen points:

### *Auxiliary Targets*

This method saves a great deal of time and avoids serious disturbances of observation, by giving in advance very certain information that it is only necessary to confirm by reconnaissance.

It is particularly useful before an attack in orienting the artillery observation to be established in the terrain still in the

## THE EMPLOYMENT OF RELIEF MAPS

hands of the enemy. The observers can advance without hesitation, having already in their hands the necessary documents for a rapid entry into action, their optical liaison assured and their telephone lines started for a point almost exactly selected.

### *Observatories of Command and Special Observatories*

All that precedes applies equally well to observatories of Command.

By the use of the portable lamp, one can study and choose emplacements for special observatories, camouflaged trees, observation towers, etc.

### *Enemy Observatories*

We can obtain in a short time the visible and hidden areas from all the known enemy observatories, and deduce therefrom their relative value, with a view to their destruction or blinding.

A methodical exploration of the enemy zones of observation can be rapidly and accurately made, and besides the observatories already known, certain points will be located where the advantages of visibility, either by direct or enfilade view, will lead us to expect the presence of observatories and seek for them on aerial photographs.

### *Note-Book of Visibilities*

It is desirable to determine what parts within our lines can be seen by the enemy's observatories. This information is most useful in making the trace of various works and in the choice of emplacements.

It is well to be able to know at once, on arrival in a sector, the positions entirely defiladed and those not defiladed, and which observatories are the dangerous ones.

We place on the relief map all the known enemy observatories, the emplacements being marked by little white vertical pins, bearing the number of the observatory, according to a list giving the coördinates and a brief description of them.

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In rear of our front line to a depth of 8 or 10 kilometers, we explore each square kilometer, putting the light in the center of each 200 meter square.

At each of these stations we note, the observatories lighted and inversely those which have a view of the point considered, distinguishing those from which the visibility is certain and those from which it is doubtful, taking into account the possible masks.

We obtain thus a book of leaves modelled as in Fig. 5. On arriving at a position, an observer finds himself immediately oriented as to possible visibility; it only remains to discuss the relative value of these observatories with reference to the position chosen, taking into account their distance, probable zone of operation, etc.

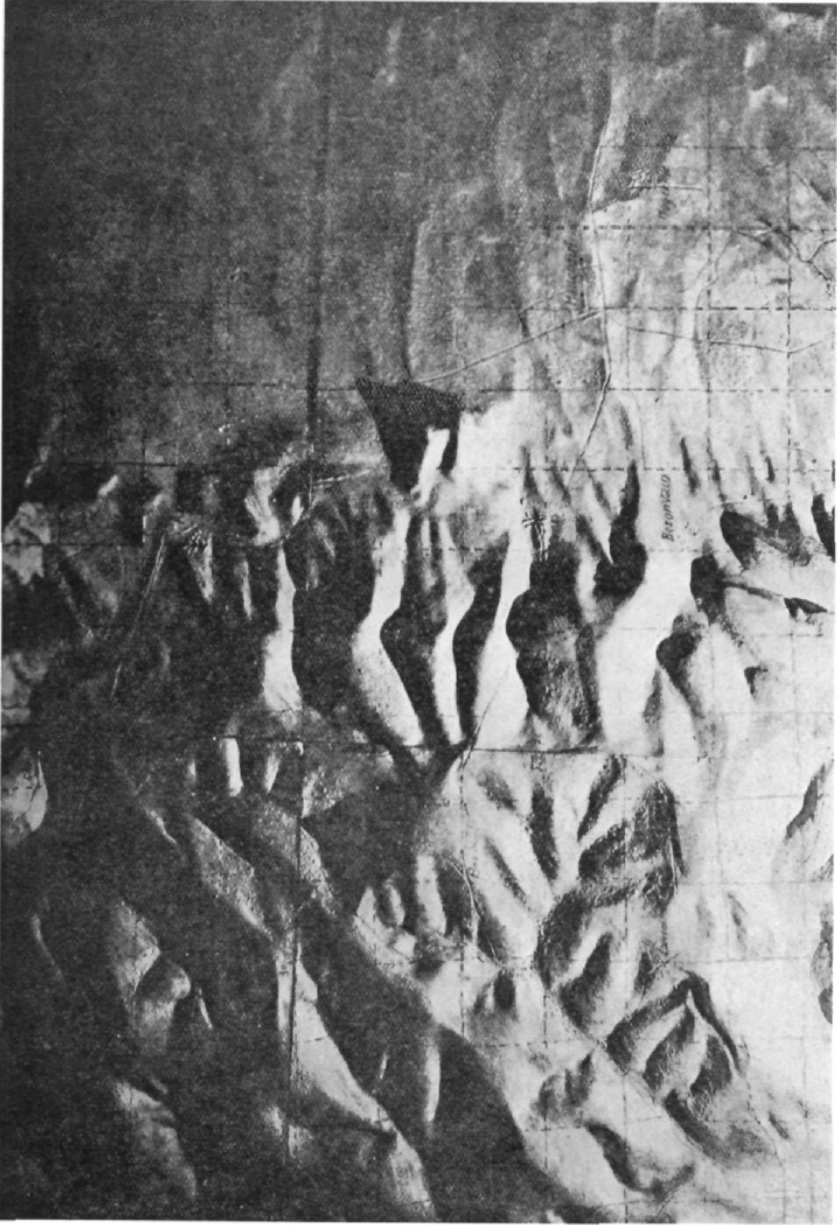
0	0	0	205, 207, 7, 8, 11, 14, 15, 18, 20, 22, D.	205, 207, 6, 7, 8, 11, 14, 15, D.
205, 207, 6, 7, 8.	0	205, 6, 7, 8, 11, 14, 15, 18, 20, 22D, 33, 35, 39, 206.	205, 207, 6, 7, 11, 14, 15, D.	205, 207, 6, 7.
205, 207, 6, 7, 8.	0	205, 207, 6, 7, 8, C, 14, 15, D, 29, A, G, 33, 35, 36, 39, 206, 18, 20, E, 202.	205, 207, 6, 7, 8, 11, 14, 15.	207, 6.
0	0	205, 207, 6, 7, 8, C, D, 14, 15.	205, 207, 6, 7, 8, C, 14, 15, A.	207, 6.
0	205, 207, 202, 6, 7, 8, A, C, D, 14, 15, 18, 19, 20, 21, E, F, G, 33, 35, 39, 206.	205, 207, 206, 6, 7, 8, A, C, D, 14, 15, 20, E, 202, F, G, 33, 35, 39.	2d ←	207, 6, F, G, 206.

FIG. 5.

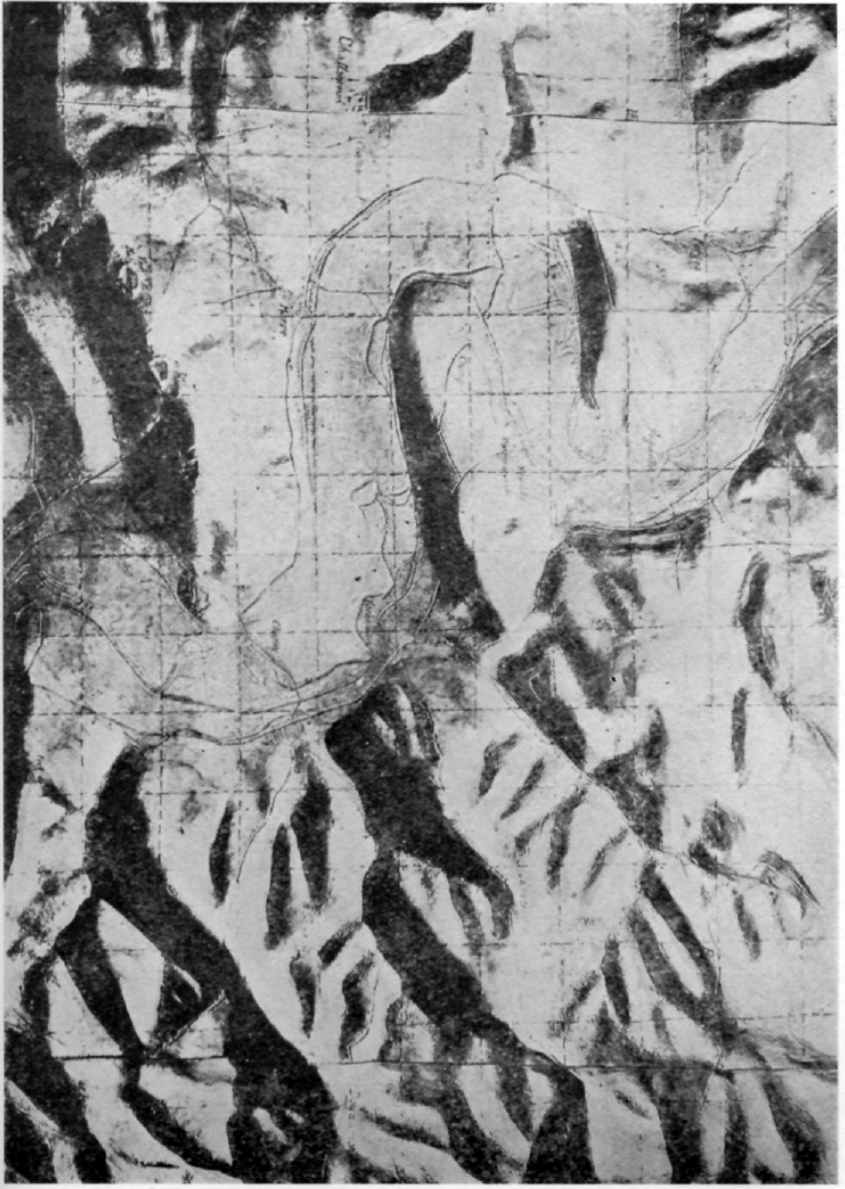
### *Optical Liaison*

The possible optical liaisons are immediately obtained by determining the areas where it is necessary to place the stations. This problem can be determined accurately enough to permit





PHOTOGRAPH NO. 3.—HORIZON VISIBLE FROM A BALLOON (ALTITUDE, 1200 METERS)



PHOTOGRAPH NO. 4.—HORIZON SEEN FROM AN ENEMY BALLOON. (VERDUN SECTOR, BALLOON AVOIDS THE VAUX-HUCHEE HAVINE. ALTITUDE, 1200 METERS)

## THE EMPLOYMENT OF RELIEF MAPS

sending to the selected points the necessary personnel and matériel for the establishment of the proposed system.

### *The Use of the Light Ray for Balloon Observation*

All that has been said above concerning observation from the ground applies to observation from a balloon. It is only necessary to place the light at a height corresponding to the scale of the map. The process of reconnaissance and preparation of plans of visible and hidden areas remains the same, so that we only give a summary of the various documents and kinds of information that can be obtained in a relatively short time.

(A) For a balloon with fixed emplacement:

Map scale 20,000, of areas visible and hidden at altitudes of 800, 1000 and 1200 meters.

Photographs of the same area to a convenient scale 80,000 or 50,000 for altitudes differing by 100 or 200 meters between 600 to 1800 meters. The photos can be struck off in sufficient numbers to be furnished to groups which register by the balloon, or to headquarters and units for which it observes.

For each balloon which is to advance in the course of an attack, we can establish in advance all the maps and photographs concerning one or more positions.

If any enemy balloon is located by intersection from two of our terrestrial stations, we can obtain its views, of the terrain over which an attack is to be made or of our works, our defilades, etc. We can then determine the more or less great necessity of destroying it. (See Photo No. 4.)

(B) If we consider all our balloons or those of the enemy distributed over the front of the attack, a very simple arrangement of the lights at the proper altitude all lighted at once, or successively, we can determine the mission of each, choose those suitable for distant adjustment and establish maps of areas defiladed from balloon observation. (See Photo No. 5.)

We can conceive, besides, how easy it becomes to choose and quickly determine the best emplacement to give a balloon for

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a fixed mission, to establish or modify the allotment of balloons on a front in the most efficient manner, that is logically according to the terrain seen, and not solely according to the sectors of the large units.

### *Studies for General Orders*

In what has preceded we have indicated the way to solve a series of elementary problems, whose rapid and certain solution has facilitated the work of those executing them.

But this process, which brings out in a striking way the properties of the terrain, leads to results which ought to give a very sure basis for the instructions and orders from the higher command.

### *Attack of Limited Objectives on a Stabilized Front*

In order to continually drive back the enemy it is necessary to take away from him his observatories, dominate him with ours and stop on a position having unobstructed views of the immediate foreground and also as distant ones as possible.

In some cases on the relief map, one can determine the line of objectives to be obtained fulfilling, as far as possible, the above conditions.

This done, a few hours suffice to establish for the chosen front of attack:

1. From the principal zones of observation of the enemy, our defilades before the attack and our gains of defilade once the objectives are obtained. (Photo No. 6.)
2. Our views of the enemy, and with our new zones of observation when captured, our gains of visibility.

The examination of these maps furnishes in advance the balance sheet of the operation.

If there are left, insufficient defilades, very cut up, and distant from the front, the terrain captured will be difficult to organize. It will be a difficult sector.

If, on the contrary, the defilades are compact, close to the



PHOTOGRAPH NO. 5.—DEFILADE AS SHOWN FROM A NUMBER OF ENEMY BALLOON POSITIONS



PHOTOGRAPH NO. 6.—GAINS OF DEPLADE REALIZED BY AN ATTACK WHITE A LIMITED OBJECTIVE. THE DE-  
PLADES ARE MARKED IN LIGHT COLOR, THE GAINS OF DEPLADE ARE IN DARK COLOR.

## THE EMPLOYMENT OF RELIEF MAPS

front, and if our views of the enemy are notably improved and border on a visual encirclement of certain parts of his terrain, the operation will be fruitful.

The first situation can only be temporary, it will become necessary to push further on in order to avoid losses; in the second case, we can become stabilized or mark time for a while without too great risks.

In considering the line of objectives and the nearer views, attention ought to be drawn to those points where the defilades of the enemy are nearest and most important.

When these defiladed areas are of easy access from the rear, it is presumed that they can serve for launching counter-attacks and correspond to weak points in our line; we avoid placing the limits of divisional sectors there, and also strengthen their garrisons.

The map defilades, with the indication of our gains of observation, allow us to make provision for telephone liaison, for defiladed routes, the routes of 60 cm. railroads, routes of advance to artillery positions, etc.

The study of the map, giving the views of the enemy in the light of gains resulting from the proposed attack, will give important information on the situation as to the conditions of occupation and communication which the enemy will have on his new front.

Besides, having selected our principal observation points, that is to say, all the points it is necessary to occupy to have the maximum terrestrial observation of the enemy, we can prepare the general artillery plan, especially that for distant work.

Finally we can direct very precisely the reconnaissance to be made on the terrain to test and refine all the information furnished by the above studies.

In possession of the information thus furnished in advance, the Command can determine more rapidly and more easily the application to the proposed operation of the military means at its disposal, or that which it ought to ask for.

The maps so established render tangible the principal

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properties of the terrain from an offensive or defensive point of view, they are sufficient to determine all the initial dispositions.

### *War of Movement*

If we possess a relief map, scale 20,000, to a sufficient depth either side of the actual front, we can obtain the most important information necessary to orient the operation in either an advance or retreat, the establishment of an advance support line, or the organization of a new position in the rear.

In any of these cases, the solution of the problems of liaison is of the first importance, and it is necessary besides for the establishment of the axes of liaison of the C.A. and D.I., to reconstitute with the least delay, the general systems of observation and adjustment, in order to permit the most effective entry into action of the artillery as soon as possible.

As soon as the front is definitely located, we determine the position of our principal observatories (Command and Artillery) and their views of the enemy; then the most favorable location for balloons and the corresponding defiladed areas. We can then allot the terrestrial and aërial observation missions, locate the telephone centrals and lay out the branch lines without delay.

Moreover, in determining the principal zones of observation of the enemy, we obtain the areas invisible to him to use in the advance of our troops and artillery.

The optical liaison of the general system, those established to tie in the zones of progression with the successive optical centrals, can easily be roughly determined.

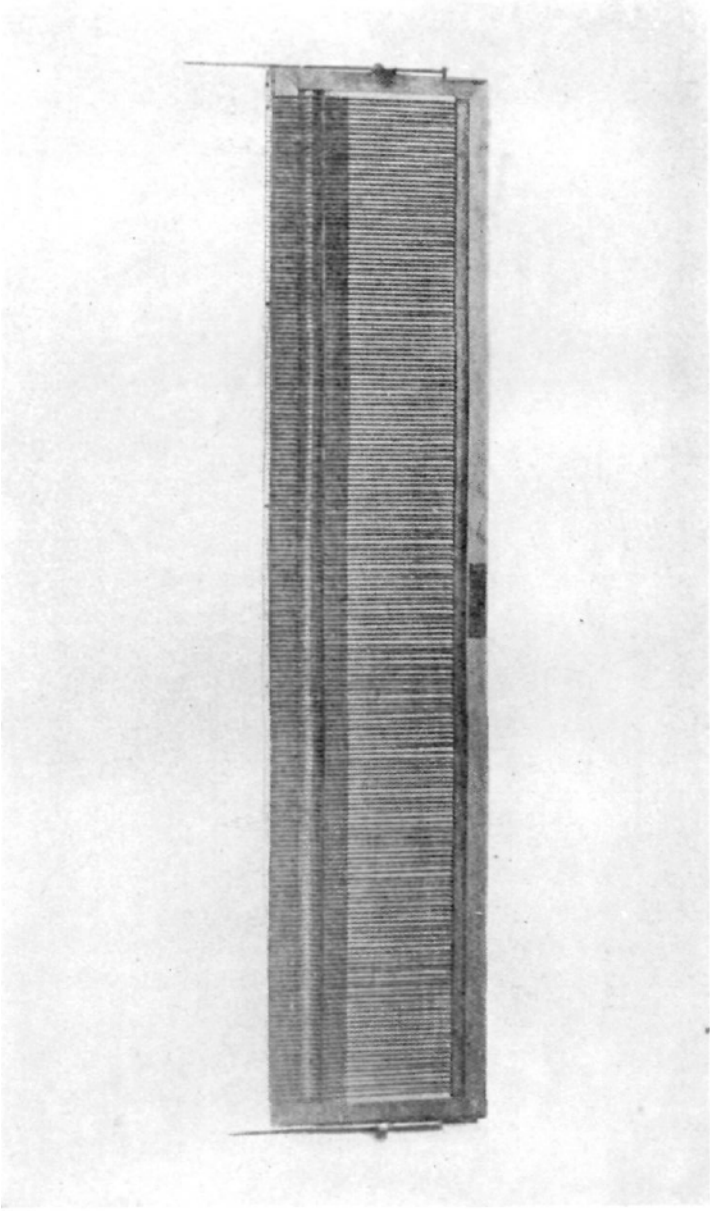
It should be noted that all the information furnished by this process can be utilized immediately, without transfer to the map, which takes a little more time.

## II

### *Use of Relief Maps by Means of the Profilograph*

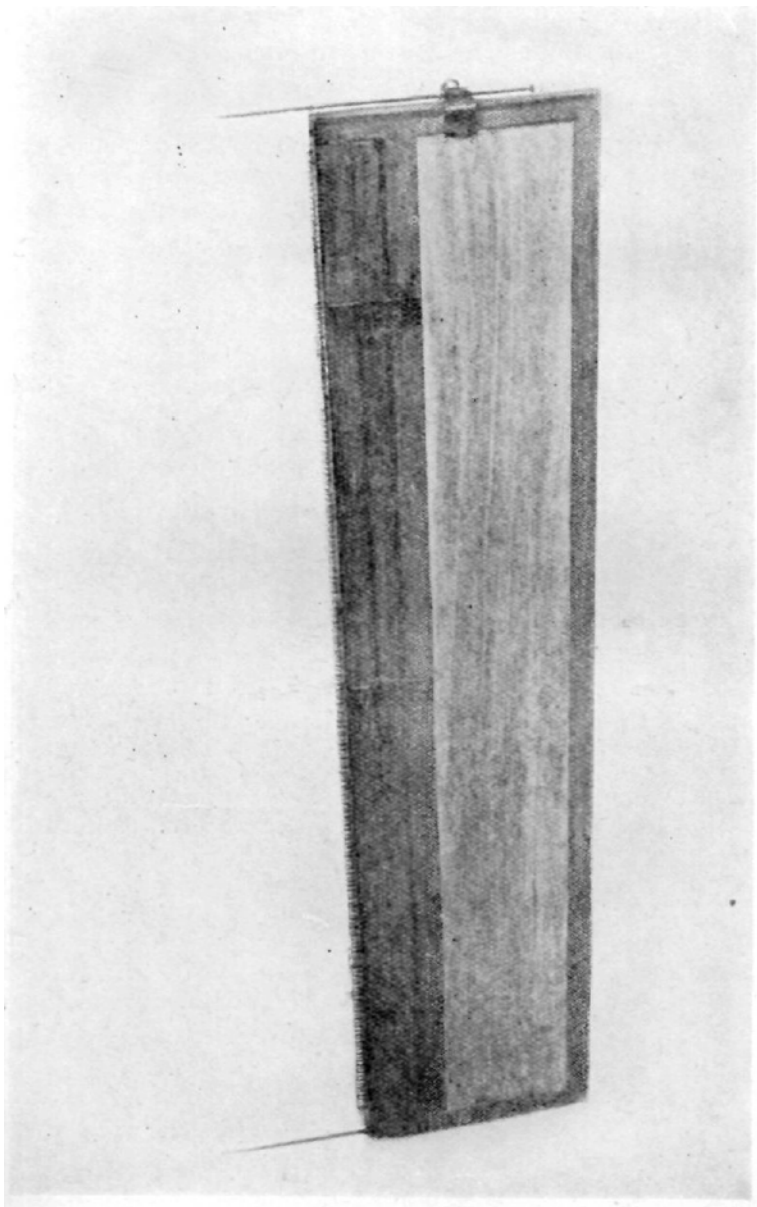
For certain problems of fire, in particular for the indirect fire of machine guns and for the verification of special questions





PHOTOGRAPH NO. 7.—PROFILLOGRAPH, FRONT FACE

PHOTOGRAPH NO. 8.—PROFILOGRAPH, REAR FACE

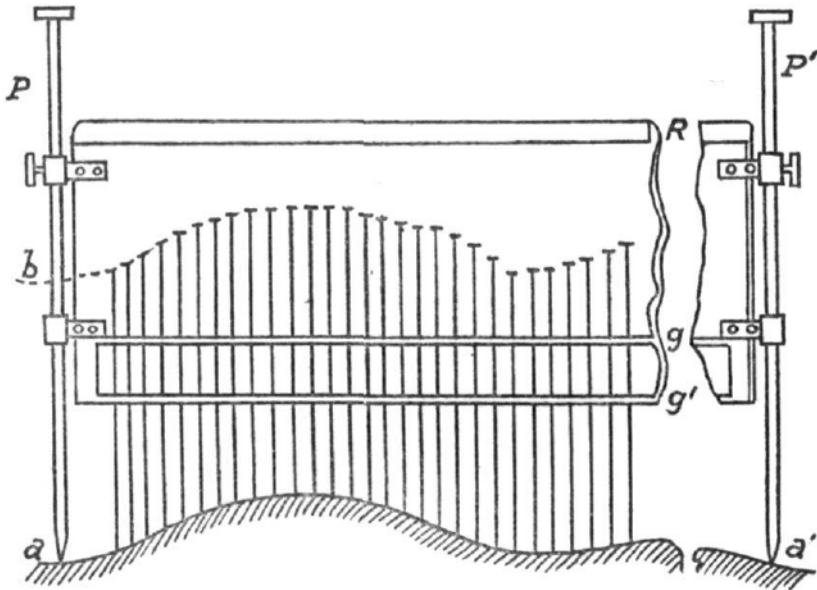


## THE EMPLOYMENT OF RELIEF MAPS

of visibility, it is advantageous to be able to obtain rapidly profiles of the ground.

The ordinary graphic process to obtain profiles from a plane or contoured map is quite long, especially if there are a number to be done.

The employment of a special apparatus called a



*Fig. 6.*

profilograph, enables us to obtain them rapidly, doing away with much slow and tedious work.

The profilograph is composed essentially (Fig. 6, Photos. Nos. 7 and 8) of a series of stiff, close-set steel needles of the same length, sliding through two guides  $g$  and  $g'$  fixed on a planchette of a length suitable to the length of the profiles desired and an arrangement to fasten the needles or let them fall freely all together. The planchette is supported by two posts one of which ( $P$ ) has a mark so placed that the distance  $ab$  is equal to the length of the needles. The post  $P$  is placed at

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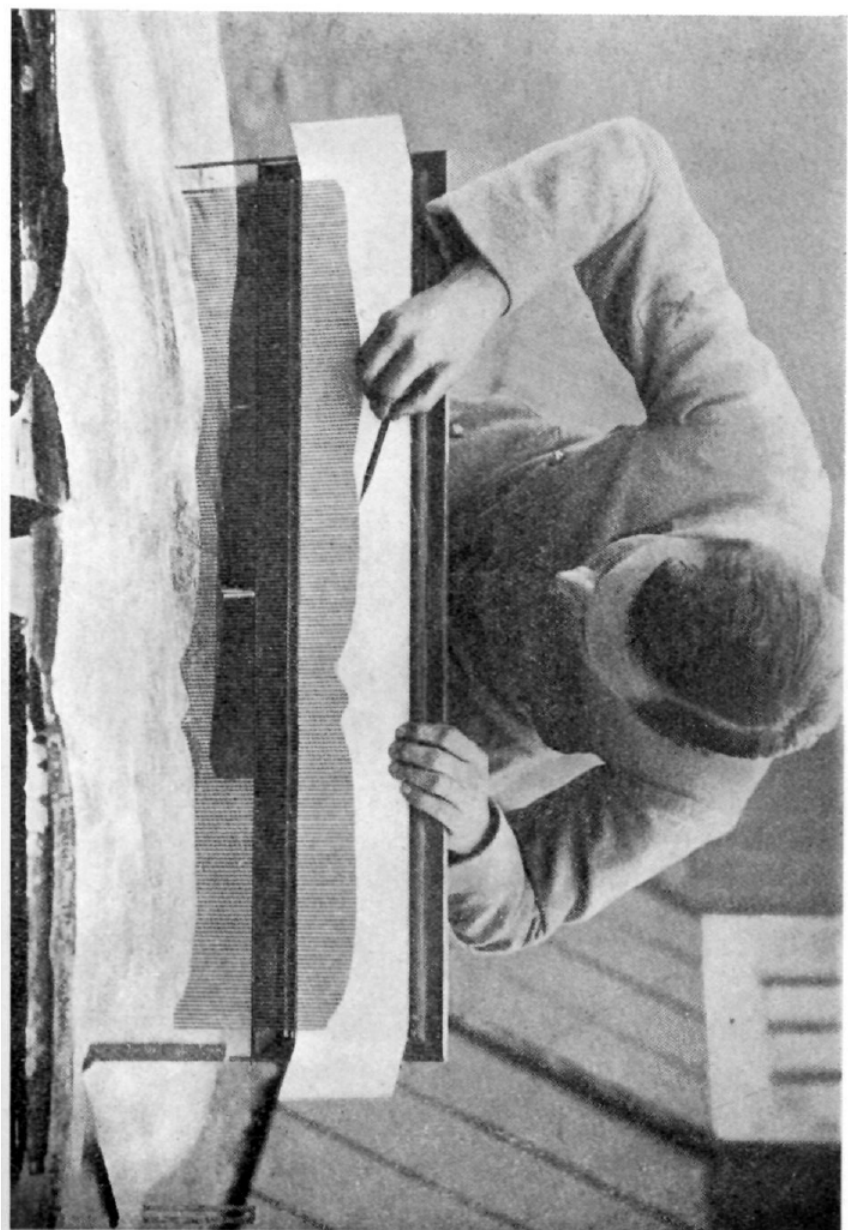
the origin of the profile on the relief map, and the post  $P'$  in the direction of the profile.

The upper edge of the planchette is made horizontal by means of a level; the needles are now released, they fall vertically on the relief map and their heads reproduce the profile of the ground on a sheet of paper placed behind them and against the planchette, between the guide  $g$  and the frame  $R$ . One traces the profile following the heads of the needles with a pencil. (See Photo, No. 9.)

Replace the sheet of paper, bring the needles back to their original position, by turning the planchette upside down, fasten them there and the machine is ready for a new operation. An expert operator can make 25 or 30 profiles in an hour.

To summarize: Relief maps can render very great service, using them as indicated above. It is necessary in each case to take into account the more or less exactness of the plan directeur from which the relief map has been made.

The exactness of the results obtained depends, as in everything, on the care and skill of the operators, but the rapidity with which they are obtained gives them their greatest value in the increasing necessity of study of the properties of the terrain of an attack. The time passed in the minute preparation of an operation is, indeed, an important factor in its success.



PHOTOGRAPH NO. 9.—CONSTRUCTING A PROFILE WITH THE AID OF THE PHOTOGRAPH

## **A Proposed Scheme of Officers' Schools for Field Artillery\***

PRESENT regulations provide that the Training Section of the General Staff will be charged with the supervision, coördination and control of military education. It is our belief that the strictly technical instruction of officers of the several arms should be under the supervision and control of the chief of each arm. One of the most important duties of bureau chiefs is the training and instruction of the officers and enlisted men of their branches.

As a result of our experience in the war, military education has become more technical and scientific, and in matters pertaining to strictly technical instruction in any one branch it is considered necessary that the methods of instruction and details of the courses given in the service schools should be, to as great an extent as possible, in the hands of officers thoroughly familiar with all the technical details of the arm. The Training Section of the General Staff being made up of selected officers from all arms of the service, cannot be as well qualified to prescribe the strictly technical training and instruction in any arm as the chief of that arm. The proper function of the Training Section of the General Staff is the general coördination of instruction and training in the military educational system, and the supervision and control of instruction in the general service schools where all branches of the service are brought together for combined instruction as in the School of the Line, the Army Staff School and the War College.

It may be argued that certain important branches of our combatant forces have no chiefs, and that necessarily the instruction in these arms must be handled by the Training Section of the General Staff. A proper system of military

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\* Prepared in the Training Section of the Office of the Chief of Field Artillery.

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education depends to a great measure on having a responsible chief for each arm of the service.

The old school system, or lack of system, was a gradual development from what was in its beginning only a reading course. It was not coördinated; it was purposeless; it had no ultimate goal; it encouraged generalization more than specialization; and only a comparatively few officers, selected more by chance than in any other way, could attend the schools. In the reorganization of the army there is no more important matter to be considered than that of the schools which are to influence and guide the instruction and training of our several arms. Our requirements in military education are:

First. To insure that every officer is given a thorough and fundamental basic military education, so that he may perform satisfactorily the duties of a second lieutenant. This may best be accomplished by *a basic school*.

Second. To insure proper direction in the instruction and training of the different arms, and the correct instruction of officers in the tactical handling of their particular arm. This may be accomplished by *a technical school for each arm*.

Third. To insure the correct instruction of officers in the tactical handling of combined arms, to preach a true tactical doctrine, and to insure the dissemination of data covering the latest developments in military science. This may be accomplished by *a school of the line* in which officers of all services come together for combined instruction.

Fourth. To develop and create an efficient general staff which will include the best brains of the army. This may be accomplished by selecting officers who, in competition with their comrades, have demonstrated their excellence, and who are then sent to *a general staff college*.

We desire, for the instruction of officers and matters that pertain strictly to Field Artillery, the elimination of the old form of garrison school, and the establishment of two special schools, namely, a Basic School and a Technical School, each

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with a course of one year in length. An advanced course in the Technical School should also be provided for captains and junior field officers. Whether these two schools should be under a single management in one camp or post, or at different locations, depends upon the number of officers to be instructed and, consequently, upon the size of the army.

The Basic School will have for its object the fundamental Field Artillery training of all officers just commissioned, whether from West Point, college R. O. T. C.'s, civil life, the ranks, or elsewhere. This school will soon develop into perhaps the most important and valuable one in the series, for the following reasons:

An officer who enters the army even from West Point is not graduated from that institution a good lieutenant of cavalry, of infantry, or of field artillery. His education has been more academic than technical or professional, and he needs more specialized study and practical work in the fundamentals of his arm before he becomes an efficient lieutenant. That he can get these fundamentals in a basic school far better than with his organization or in the garrison school there can be no doubt. In the former he is under highly specialized instructors who are conducting a course that is thoroughly coördinated, developed and up-to-date; in the latter he is receiving his instruction from a captain who may be good, or who may be decidedly mediocre.

In the garrison school the work of the school is more or less a side issue and is carried on at the expense of neglecting to a greater or lesser degree the training of the enlisted personnel. Based on previous experience with the garrison school, it is our opinion that the officer who handles the work of the garrison school efficiently, either as a student or instructor, is neglecting his more important duty of troop training, and, conversely, the officer who efficiently does his full duty by his enlisted men has no time to devote to the old form of garrison school. The garrison school which has for its object the requiring of an officer each day to attend a critique under the regimental or



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battalion commander, or both, in the work of the day just finished, and to study and prepare himself for the drill which the following day is to be given to the men (under a progressive and systematic program of troop training) is the real "garrison school" that we need and would welcome.

First impressions are lasting. The young officer upon entering the service is greatly influenced by his first captain. If the latter be an excellent officer, the young lieutenant is fortunate, indeed; if mediocre or of the kind that tells the youngster that the first sergeant is a good man for him to serve under, and then turns him adrift, he is decidedly unfortunate. In the immediate future our captains will be officers of limited experience. Shall we handicap our whole service for years to come by making them the teachers of our new officers?

A lieutenant just entering the Field Artillery is under the drill regulations assigned to a department. If to Department A, he is the battery executive, is in charge of all battery matériel, care, maintenance, etc.; and is responsible for the technical training of the cannoneer and gun squads. If to Department B, he is in charge of the horses and stables or trucks, tractors and motor equipment, and is responsible for the training of the drivers in equitation and draft. If to Department C, he is in charge of the training of the battery detail. Even if graduated from West Point, he is neither ready nor fitted for any of these duties. Thus far in our experience, with the shortage of officers, a large number of courts-martial, numerous odd details such as prison officer, exchange officer, etc., and a garrison school which covers none of the subjects which he needs so much, and uses day by day, he drifts along and gradually picks up by experience an imperfect knowledge of the duties which he should know and know thoroughly to be of value to his organization. A basic school will correct this very serious situation, and the young officer will get his first service with a battery under the direction of the best and most skillful instructors that the arm can furnish. There his instruction will be such as to stimulate greatly his interest in his profession

## OFFICERS' SCHOOLS FOR FIELD ARTILLERY

and in his arm. He will learn the spirit of the service and of his branch, and will become impregnated with the doctrine of industry. Or, he will demonstrate his inefficiency and incompetency, and as a provisional officer can be eliminated.

In effect the young man who graduates from West Point or from the college R. O. T. C., and then for another year attends a basic school, is spending five years on his education. This seems like a good deal, and this fact may be brought up as an argument against the plan. However, this very thing is precisely what is being advocated and adopted by the leading educators of our country, who assert that two years for collegiate, with an additional three years for technical, study, the two being carefully harmonized and coördinated, is the minimum time necessary for the education and training of the professional man of to-day. This plan, therefore, is merely carrying out what is recognized as being the best educational thought of the day.

One of the principal advantages of a school system such as outlined in this paper would be to develop a corps of trained instructors. Our best talent placed in a real system of army schools will coördinate, harmonize, develop and control our profession as nothing else could possibly do. These schools will soon become centres of information, investigation and research in the subjects included in their various courses. They will disseminate throughout the service a uniform doctrine for the handling of small units, and the best methods for the instruction of such units. They will promote mutual understanding and a better coördination of the work of the several arms. For this purpose it is important that a proportion of the officers of each arm should take courses provided in the schools for other arms. An exchange of this sort between the Infantry and Artillery is particularly expedient.

The principal argument against the basic school and in favor of the garrison schools seems to be the detached service evil—that is, it would keep officers away from their organization. This, however, will be true only in case of the instructors,

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as the students will not as yet have joined their batteries, companies or troops. In their case it will merely postpone the date of joining of each class one year. Before the war this was done in the Coast Artillery Corps without detriment to that service. To properly conduct this system of service schools it will, of course, be necessary to detach officers as instructors from their organizations. The only argument with which this can be met is that it is imperative for us to have a sufficient "overhead"—a sufficient number of officers to keep organizations at full strength—and so insure a sufficient number of officers for this and similar details. No additional officers were provided for the old garrison school. To properly perform the work required and outlined for the garrison school, it would be necessary to utilize the services of an infinitely greater number of officers than would be required for a basic school. Under the old system these officers are expected to perform simultaneously their duty with troops and as instructors. It is not believed that troop training can be efficiently carried on unless officers give their full time to this work, and, conversely, it is not believed that a new garrison school would be of any more value than the old, if the instructors gave it but a part of their time and a divided attention only. Congress should be asked to provide additional officers for this and other detached service. In the reorganization of service schools let us develop, if possible, the very best and most thorough scheme that we can. If this scheme requires additional officers, let us insist upon the necessity of having these officers. If Congress fails to grant the necessary overhead, it would then perhaps become necessary to further revise the plans.

The school system in any arm should include all the essentials of that arm, and should be completed within eight years after a young officer enters the service. Thus, for the Field Artillery the proposed basic school and the regular and advanced courses in the technical school will include all the essentials of Field Artillery. An officer in the first eight years of his service will spend five and one-half years with troops,

## OFFICERS' SCHOOLS FOR FIELD ARTILLERY

and two and one-half years in schools, or his program will approximate the following: Basic School, one year; Battery, three years; Technical School, regular course, one year; Battery, two and one-half years; Technical School, advanced course, six months (as a minimum). It would be well if the young officer were held strictly to such a program, and not be permitted to go off on other kinds of detached service. One of the greatest evils of our service has been that of detaching a promising young lieutenant from his arm and putting him on some duty, important enough, but where it is made impossible for him to learn or become expert in his real profession. The young officer must be given the opportunity and compelled to learn his business, and learn it thoroughly early in his career. He should know just what is ahead of him, and should be able to see a goal ahead.

After the eight years suggested above as covering his real training in his special arm, the officer may be sent to duty with troops, on various details (college, militia, etc.), or, if especially selected, to schools for the combined arms, such as the School of the Line, the Staff College, or the War College. Or he may be specialized as an instructor in his own arm. His military education, however, will have been given him while he was young and at the time when his ability to learn is greatest. An officer's work in the basic and in the technical school of his own arm, and his work as a battery officer, should form the basis of selection for detail to the School of the Line. Under this system this detail would be a reward for his superior work in the schools of his arm, and his demonstrated efficiency and habits of industry. Every officer will have an opportunity to make himself favorably known, and to demonstrate his work to his immediate superiors during his first eight years of service. In order to be eligible for the School of the Line he should be thoroughly trained in the theoretical and practical work of his own arm; possess excellent soldierly qualifications; have a seriousness of purpose and industry and aptitude; have a

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pleasing personality and a good reputation; possess good health, physique, etc.; and have a good disciplinary record.

The system of schools outlined above—certain—progressive—the best man advancing furthest—would have a stimulating effect on our whole service, because it would be a system where merit would be discovered and would be rewarded. All officers would be encouraged to put forth their best efforts because they would see and realize that efficiency meant advancement, and was therefore worth while.

With respect to the specialists' schools for officers, non-commissioned officers and enlisted men, it is possible for certain classes to receive their education in general army schools. Among these may be mentioned officers for instructors in equitation, signal work, motors and tractors, supply, etc., and such enlisted specialists as radio operators, motor mechanics, stable sergeants, horseshoers, saddlers, mess sergeants, and cooks. In respect to the enlisted specialists it might be possible to give a great deal of this class of instruction at divisional schools. Whether at divisional schools or at certain central specialists' schools depends principally upon the number to be instructed. In other words, if the number to be instructed within the division is not large, and the facilities for conducting the school within the division are not available, it would be better to send these men to a central school having the necessary plant and facilities. In this way the overhead would be cut down. As a general principle a central school will be more efficient and economical because, being established as a school of instruction, the course there will be more thorough and efficient, and probably can be completed in a shorter time. Officer specialists of classes, whose work is similar in all arms of the service, should be instructed in central specialists' schools, as there would not be a sufficient number of such officers in each division to make the establishment of a divisional school worth while. The instruction of these officers in a central school will greatly cut down overhead and the cost of the plant and matériel sufficient for their proper training. Specialists in work pertaining particularly

## OFFICERS' SCHOOLS FOR FIELD ARTILLERY

to one arm of the service only should be instructed and trained within their arm. This can be done in special classes in the basic and technical schools mentioned above.

Courses of instruction in special service schools of all classes should be as prescribed by the chief of the arm or bureau concerned. As a general principle it is considered a great mistake for the War Department to prescribe rigid courses of instruction which limit the initiative of the officers directly responsible for the work in any school. One of the most important lessons learned in the training and instruction of officers and enlisted men during the war was that the best results could only be accomplished by relying upon the ability and initiative of the officers detailed in charge of the various educational activities. It has been our experience that a very general statement of the requirements and of the courses of instruction and training was all that was necessary if an efficient officer is placed at the head of a school or training centre, and that it is better to let the man on the ground develop his own schedule and plan of operation. For the proper coördination and supervision of training and instruction it is, of course, necessary that schedules and courses so developed be carefully studied, checked and approved in the office of the chief of the arm or bureau concerned.

The supervision, coördination and control of the general service schools should be in the hands of a special committee of the Training Section of the General Staff. Again, however, this committee should not fix too rigid or too detailed a schedule for any school. An order stating the organization of the school, the duties of the various staff officers and instructors, the general scope of instruction, and the length of time to be devoted to each subject, should be sufficient. The commandant of each school should be required to submit, several months prior to the beginning of the school year, a general schedule of instruction for the year, which, when approved, would be issued as regulations for the year.

The real tactical school for all officers should be the School

## THE FIELD ARTILLERY JOURNAL

of the Line. Here we should bring together officers who have thoroughly learned all of the details of their own branch of the service. If all arms of the service adopted a basic school and a technical school, then the School of the Line could carry its instruction to a much higher degree than heretofore, because it will be possible to omit a great number of elementary subjects such as law, languages, topography, etc., which will have been thoroughly covered in the lower schools. In this way the School of the Line can become a real tactical school, devoting all of its time to studies involving the combined tactics of *all* arms. This again would extend the scope of the staff college so that the latter would become an institution to thoroughly prepare and train officers who have shown that they possess the necessary qualifications for staff duty. The School of the Line has always been satisfactory to officers of infantry, because it was, in fact, more of an infantry tactical school than a school of the line. By widening its scope it would really become a school for combined tactics, and would be of greater value to the service.

The General Staff School should be a training school for prospective general staff officers, and should be modeled after schools of the same type in France and Germany. It should absorb the War College, because there is no reason for having a staff school for junior officers and another for senior officers. A commanding general and his staff should both be imbued with the same tactical doctrine and conception of staff duty, should think along the same lines, and possess the same staff ability, their duties different only in degree of responsibility. As previously stated, an officer should be detailed to a general service school only after he has demonstrated his worth and efficiency in the basic and technical schools of his arm, and after he has had service with troops for a considerable period. An officer designated for the School of the Line should be chosen by competition from among those eligible, and this designation should be made as the result of the finding of a regimental board of officers approved by the regimental commander. If

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an officer fails to win a designation in any one year, he should be allowed to compete in a subsequent year for the detail, but not more than one or two re-trials should be allowed. If each tactical division is allotted eight officers for the School of the Line, we would have a class for twenty divisions of 160, plus 40 from the special corps, making a total of 200 officers. Of this number probably five per cent. will fail to complete the course for various reasons, leaving about 190. Of those who complete the course a certain proportion should be selected by class standing to enter the General Staff School. After satisfactorily completing the course in the General Staff School, a certain percentage should be attached to the General Staff for a short course of observation and study, at the end of which period they should be sent to serve with troops other than the arm from which they originally came. Upon completing this service with troops, selected officers should be detailed on the general staff, and others returned to duty with their own arm where they would be available at any time for general staff duty.



## DISCUSSIONS

AUTHORS ARE ALONE RESPONSIBLE FOR FACTS AND OPINIONS EXPRESSED IN THEIR PAPERS.

### Editor's Note.

*(In our issue for January-March, 1918, there appeared the following: "During the past, articles regarding service matters have appeared in the JOURNAL from time to time. To the writer these articles have probably seemed to be all that could be desired; however, others might not always agree. It is therefore thought desirable to inaugurate a section in the JOURNAL for the purpose of discussing such matters. It is not desired to open up a place for 'knockers' to spread themselves, but to enable the man with an idea, backed by what seems to him sound reasons, to put his idea before the Field Artillery for consideration. It is understood, of course, that all articles under this section will be signed.")*

### **The Field Artillery—Progress or Retrograde**

MAJOR ROGER D. SWAIM, 102nd FIELD ARTILLERY

*Shall the lessons taught by the Great War be forgotten and our Field Artillery return to its pre-war methods? It is believed that the majority of the younger officers who were "over there" view with alarm the tendency to return to the old methods as shown in recent orders requiring instructions in the rapid calculation of fire by the parallel method and in articles in the October-December, 1918, number of the FIELD ARTILLERY JOURNAL.*

IT is not intended to belittle the importance of "open warfare" which must always be sought to win battles. But it is believed that open warfare will hereafter be based on so-called trench warfare methods and that instruction should proceed

## DISCUSSIONS

from those methods to open warfare and not in the old open warfare methods with trench warfare methods as of secondary importance.

During the war until late in September, 1918, artillery officers arrived in France having had little or no instruction in the 75-mm. gun or the 155-mm. howitzer, in firing high explosive shell, in corrections for weather conditions or in map firing. Instead they had been instructed in the 3-inch and 4.7, in shrapnel fire and in the P-T methods. So far as known, the 3-inch gun never appeared on the front, the 4.7 was not a success, shrapnel was almost never used and no one ever used P-T or the parallel method. A frequent question asked was, "Why didn't they teach us the real thing at home?"\* There were 75's and 155's and instructors at home. But there was there the same refusal to believe in the new methods that will now cause return to the old methods, when the officers who had the actual experience at the guns have gone back to civilian life.

In the so-called trench warfare guns are laid by the map. They are located by orientation methods. The direction of fire and range are taken from the map and the guns are laid by use of the French aiming circle or compass goniometer. The same method of laying is equally applicable to open warfare. It requires only a *reliable map* and a reliable instrument. If we have not the maps we should make them. Wars will be fought

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\* It is of interest to note in connection with this "frequent question" the following:

HEADQUARTERS 107TH FIELD ARTILLERY  
A. E. F. VAIGES, FRANCE. APO. 762.

7 March, 1919.

Editor, Field Artillery Journal, Washington, D. C., U. S. A.

DEAR SIR:

After reading the issue of October-December, 1918, I wish to congratulate you on the stand that is being made regarding the Coast Artillery. Your article with reference to the failure of a number of officers to appreciate trench warfare as a mere phase of battle pinched my toes a little bit, but I am very glad to say the point brought out in the article is the best statement of the case that I have seen. Unfortunately, I was one of those misguided youths who thought Sill was not keeping up to date, and I now realize that had we conducted the schools in France more along the line of the Sill course, we would have had greater success on the front.—*From a Field Artillery Officer who has had considerable experience abroad as well as at home before the war.*—EDITOR.

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in either civilized or uncivilized countries. If in civilized, maps *should* already be in existence. If in the desert our services should be prepared to make the necessary maps as we advance.

Laying by map is the only answer to the often-asked question of how one is to lay when distant aiming point, target observations and view of the gun position from the observation station cannot be had. Such a condition will be the usual case. It was the method used in the open warfare at Chateau Thierry and in the closing days of the war. Too often there was not sufficient attempt to secure observation of fire and wasteful unobserved zone fire on areas was employed, but that the fire was *successful* proves that the method is sound. To say that because we have no maps we should learn to fire without maps is the wrong way to tackle the problem. We should make every effort to secure maps and teach map firing. Then and as a secondary matter firing without maps should be taught.

Shrapnel may be effective in certain special cases, but shell was used almost exclusively. Shell is the proper ammunition for the barrage which must generally be fired at night when adjustment of height of burst is impossible and, though the barrage is one of the principal trench warfare fires, in the open warfare of this war the artillery always prepared its barrage for the protection of the Infantry line the moment it rested and it will always do so. It will always be called on to execute unobserved night harassing and interdiction fires, prepared and fired from the map without observation.

The 75-mm. and 155-mm. fought through the war. The 75-mm. was called on to fire "D" shell at extreme ranges and for such it might be well to adopt a 75-mm. long like the German 77 long. But these guns should not be discarded or modified without serious consideration. It is implied that rapidity of action is impossible when trench warfare methods are employed. This is denied. A skilled officer will learn to locate himself on his map with extraordinary quickness. His adjustment will be much more rapid owing to the greater accuracy of his first shots.

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It is said that open warfare requires an officer to make quick decisions, while trench warfare involves plenty of time. On the contrary no open warfare could require greater rapidity of decision and calculation than the unobserved map firing for effect which battery commanders were called upon to execute during this war. Five minutes to wake up gun crews in the middle of the night, prepare ammunition and calculate firing data was not an unusual experience. And such fires were successful. Instead of retarding fire the use of trench methods gives greater rapidity.

The propositions laid down in this article are based on a course at the School of Fire at Fort Sill in 1912, and again in 1917; service with the National Guard, four months' training at Camp Coetquidan, France, one month at the front in the Chemin-des-Dames Sector in February, 1918, four months as firing instructor at Camp de Souge, two months as head of the School at Camp de Meucon and one month at the Meuse front at the close of the war. But the subject has been discussed with many officers who had experience throughout the war and represents their views also. It is hoped that it will result in beneficial discussion. Unless the civilian officers maintain their interest in these matters the subject will of necessity be directed by officers who did not have practical experience or live with the guns as they did.

To sum up, observation of fire should not be neglected. The principles of observation as laid down in our own drill regulations are sound. But the principles of laying, adjustment and fire proved by the war and laid down in "Artillery Firing" and in more detail in the "School of the Battery Commander" as translated by the Saumur Artillery School should be adopted. Rapidity of fire should be sought along these lines and as a secondary matter for use in special case of emergency without map or instruments our old open warfare methods may be taught.

## **Are We Justified in Discarding "Pre-War" Methods of Training?**

BY LIEUT. COLONEL JOHN B. ANDERSON, FIELD ARTILLERY, U.S.A.

MANY of the officers who are advocating position warfare methods as the foundation of the future training of our army, with open warfare methods as of secondary importance, apparently have not followed closely the criticisms of our army in the present war, nor have they appreciated our deficiencies and mistakes as pointed out by prominent officers of the Allied and enemy armies. Enemy criticisms are as valuable as our own, for they see us and our mistakes from a different angle.

In the early days of the present war, the campaigns were in the open. After the opposing armies had temporarily exhausted themselves, their ammunition, and their supplies, they sought rest by occupying strong positions, yet, at the same time, retaining contact with the enemy. The troops naturally constructed shelter, and within a few months a permanent intrenched line was established.

From this time on, battles consisted of the attempts of large masses of troops, on one side or the other, to break through this strongly intrenched and fortified line into the open, for the high command knew that that alone would decide the contest.

With troops facing each other for months at a time, with little activity except local attacks and raids, methods which would insure more accurate results in fire were certain to be developed and tested, but through it all the underlying principles, and methods still remained, to be used when the final "break-through" came. And to these methods were added those refinements and improvements which could be retained without loss of fire superiority and speed.

Had either the Allies or the enemy had a sufficient supply of ammunition and available reserves at this particular period—fall of 1914, after the Battle of the Marne—the war would undoubtedly have been ended by January 1, 1915, for the weaker would have been forced into battle after battle until he was exhausted and beaten.

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In 1914 and in 1918, and on every occasion in which the Allies or the enemy succeeded in crossing the trench system the methods of artillery fire used in position warfare had to be abandoned. Rapid and numerous changes of position were required, and observed fire with the old methods of computing firing data had to be relied upon. If maps were available, they were an assistance, but elaborate orientation methods took too much time, and were neglected and discarded by the officer who had had training and knew how to calculate firing data by the old methods and who knew how to properly observe his fire and handle his sheaf.

The great difficulties in delivering timely and effective fire, reported in so many cases, were not due to the fact that our pre-war methods were erroneous and obsolete, but because our new officers, were unable to apply them intelligently and with facility, due to their necessarily short period of training.

When we first entered the war, the apparent object of all officers was to discard what they knew and snatch a smattering of "trench warfare" methods, with the unfortunate result that our new officers knew but one thing—"dugout shooting." These officers went to the front in a quiet or semi-active sector, took it for granted that their data was correct if computed from a shrunken map and blazed away. When these officers were informed that they must observe their fire, they could see no reason for doing so, and thought that anyone giving so absurd an order was as obsolete as they thought the "pre-war" methods of fire were. In one division it was necessary to publish an order to make these officers observe their fire and make the necessary corrections in range and deflection.

This same division, at a later period, was to take part in an offensive with French divisions. It was hoped that the offensive would result in a "break-through." Eight days were available for manœuvres before the attack, and were supervised by French staff officers. In one regiment of the field artillery brigade, about five officers knew how to compute firing data by old methods, and it was necessary to instruct the remainder

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during these eight days for the entire operation was based on open warfare principles: rapid changes of position, calculation of firing data by the basic methods and observed fire. It was not the young officers' fault, but was due to the overzealousness of all in forgetting the open warfare methods which are the basic principles of all warfare.

Criticisms and warnings were numerous soon after American divisions became actively engaged in operations against the enemy, and extracts given below from reports of staff observers and captured documents, prove how sound our School of Fire instruction has been in the years before the war, and show what pitfalls we made for ourselves by adopting position warfare methods entirely and completely to the exclusion of basic principles. "Trench warfare" methods are auxiliary and improved methods to be used when a battery is in position for long periods, and the battery commander has the time to make careful corrections and computations and keep careful records, but in the open the battery commander must return to rapid calculation of data, observed fire, and rapid and numerous changes of position, not one of which will probably be occupied for a longer period than two or three hours.

General Pershing surprised the army, and was probably criticised by many officers of all grades for his policy with respect to the training of our new army in the present war, when he allotted two-thirds of the time available to open warfare training and one-third to trench warfare methods. But the soundness of this policy has been proven by the results obtained.

The following are extracts from the reports of artillery officers, which were published as a memorandum by Headquarters, Army Artillery, First Army, A. E. F.:

"Before the war the French spoke of an average fighting range of the 75 gun as 2200 meters, and we, of ordinary ranges of our 3-inch gun as 2400 yards. I think we would do well to go back to this conception, to cast off the effects of our study of trench warfare, to realize that henceforth the war is to be one of movement even though that movement be

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sluggish, and to develop our young officers along the lines so long taught and on the principles clearly presented in the field artillery drill regulations of 1916. We have permitted ourselves to be obsessed by the idea of stabilized warfare and are not trying to apply its highly technical and scientific methods to a situation which requires the work of an artist. Brigade commanders with considerable staffs are remaining in dugouts and giving directions from the map based on scarce and late information received over imperfect lines. Subordinates are painfully scaling distances from the map and applying corrections by mathematical computations. Much better results, many more dead Germans, killed horses and destroyed vehicles would be found if a genuine, energetic effort were made by all concerned to get direct observation and personal knowledge.

"One infantry brigade commander had the situation quite well sized up, I thought. He said that our artillery was fine in carrying out an operation which could all be planned and laid out beforehand, but that when it was required to act in situations which had not been foreseen and planned beforehand it fell down. The difficulties that we are encountering to-day are due simply to the fact that when the infantry encounters, unexpectedly, resistance which requires artillery fire such fire cannot be obtained promptly and accurately. To meet this condition artillery observers and above all artillery commanders must be forward where they can see, and command as a result of seeing. Forward observation is not, however, in itself enough. The guns must be so placed, with respect to observation, that long lines of communication between observers and batteries will not be necessary. This means to bring the guns forward. The only limitation on this is to secure sufficient protection for the guns to prevent annihilation.

"An officer who was with the \* \* \* Division during those same operations was particularly enthusiastic about the work of Colonel \* \* \* 's regiment of 75's. He stated that these guns were constantly up to about 1000 or 1500 meters and that the infantry could call for fire and get it in five minutes or so. This is a condition which I myself have never found in my quite numerous visits to the front during the open operations. Needless to say, the infantry were delighted in this case and made splendid progress. I hear that \* \* \* \* expressed themselves quite forcibly very recently against this idea of moving artillery way up front, stating that it only got shot up and out of hand. My only answer to such ideas is that their artillery is not trained to fight in open warfare (and this type requires more skill than firing a barrage), and that their artillery gets out of hand because they are themselves too far back to keep it in hand."



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The following are extracts from observations made during the first month of the operations in Picardy (March-April, 1918):

"The interest of these observations, taken from the reports of divisions that took part in the battles, lies in the resumption of open warfare during this period. They show:—

- (1) The combat methods employed most recently by our adversaries.
- (2) The great value still inherent in our field service regulations, our regulations for manœuvre, and in particular our infantry drill regulations.

"During the period of open warfare, the Germans had *little artillery*, and *this almost exclusively field artillery*. This artillery prepared the attack by a short and violent fire on the objectives. When the attack was launched, the artillery lengthened its fire on what the enemy supposed to be our second position, or on the presumed emplacement of the reserves. At times, during the attack on a village, it proceeds to block the means of exit.

*"In open warfare, it is impossible to carry out the fixed defensive barrage, and the accompanying creeping barrage; no schedule of liaison between infantry and artillery can be established in advance. The artilleryman must see for himself and often act instantly and on his own initiative.*

"On the defensive, *choose and organize, if need be, artillery observation posts*, well connected with the batteries and directly overlooking the ground where assault troops may gather; provide these observation posts with every means of observation and liaison.

"The enemy artillery has carried out *little systematic destructive or neutralizing fire on the batteries*. On the other hand, it frequently showed that it did not possess the necessary flexibility to attack transient objectives.

"As soon as the front becomes stable, *the harassing fire or the interdiction fire, increases violently*, especially on the villages, the cross-roads, the bridges, the rear position, the possible bases of departure.

"On the defensive the artillery must attempt to disperse every enemy line which is in the act of forming in proximity to our front, concentrate its fire on the enemy points of advance and paths of access to break down systematically every hidden cover or approach within the limits of possibility allowed by the supply of ammunition."

The following is an extract from comments on German documents captured during the last days of the war:

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"The employment of a rigid artillery barrage in the defense. The enemy's instructions state clearly that a rigid scheme of artillery defense by means of barrage fire must be discarded. It has no effect, the fire is very seldom accurate, it is too thin, is usually opened too late, expends a large amount of ammunition, and is a considerable danger to the infantry in mobile warfare. Great stress is also laid upon the necessity for keeping mobile as much as possible of the divisional artillery and of withdrawing artillery in the event of the imminence of an attack on a large scale.

"The adoption of these artillery tactics by the enemy will make counter-battery work more difficult during an attack. It will be necessary, therefore, to employ special measures to deal with the enemy's artillery: *e.g.*:

1. An increased use of gas for the purpose of neutralizing areas.
2. The employment of additional airplanes to direct counter-battery work.
3. The rapid advance of a portion of the artillery in order to enable it to get within range of the enemy's artillery.
4. The pushing forward of observers for the heavy artillery in order to obtain direct observation."

The following are extracts from a Memorandum from Headquarters, Army Artillery, First Army, dated October 27, 1918, headed "Common Artillery Mistakes":

"Barrages are too often fired from the map.

"Allowance for safety prevents the barrages being placed close enough to protect the line. Serious efforts should be made to adjust barrages by observation beforehand.

"Firing has been very largely by map.

"Such fire cannot have the maximum effect. Observation of fire must be constantly sought.

"Barrages have been used for destructive fire at a tremendous waste of ammunition.

"Observation of fire on definite objectives which may impede the infantry advance would obviate the necessity for this.

"Shrapnel has been too little used.

"Adjustment of height of burst is impossible without observation. Adjustment at normal height of burst is difficult under any circumstances. The inexperienced officer will accomplish effective fire with shrapnel most easily by obtaining bursts half on impact and half in air. The dispersion of shrapnel bullets is particularly effective in the open and in light brush against personnel not definitely located.

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"The use of artillery scouts for protection and observation has been neglected.

"Sufficient reconnaissance to determine a practicable scheme of advance has often not been made.

"The availability, condition, location and length of routes should be thoroughly known and carefully weighed, in order to reconcile two conflicting requirements:

First, the necessity of moving forward in order to bring desired objectives within range.

Second, the necessity of being emplaced in order to fire—that is, of not starting a displacement which cannot be carried through in the proper time.

"The forward displacement of artillery has not been prompt.

"The initial positions of batteries have not been far enough forward.

"Combat trains have not been provided with ammunition in preparation for an advance.

"During movement one cannot depend upon ammunition dumps. Ammunition must go forward with the guns and the supply must be kept up according to the methods of open warfare."

The following are extracts from Document 1348, A. E. F., September 5, 1918, entitled "Notes on the Tactical Employment of Field Artillery":

"Fire is habitually by direct observation from near the battery positions on specific objectives. The range finder should be at hand and used when accurate map ranges are not available, and for moving objectives. Free use must be made of scouts for securing information and for protection against surprise. Visual communications are important. Positions should be forward, well reconnoitred, but occupied with rapidity and boldness.

"Accompanying guns attack hostile machine guns, tanks, and strong points.

"Fire is direct in the case of clearly visible or moving objectives; otherwise indirect with flash defilade and observation at the piece. The range should be from 500 to 1500 metres. Ranges are ordinarily estimated. A wide bracket of (say) from four hundred metres is quickly obtained and searched. Ineffective ranges are eliminated during fire for effect.

"The pieces are ordinarily moved horsed, unlimbered under cover, and run forward by hand. Caissons are brought as near the piece as conditions

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permit. Accompanying guns find their protection principally in the small target presented, in concealment by natural features, and in their mobility. Two or more caissons should be assigned for the ammunition supply of each piece.

"Assignment of a Mission.—Up to the time of the assignment of a mission, the battery commander remains with, or in close liaison with, the infantry commander to whom attached. When assigned a mission the battery commander hastens to join the infantry commander whose unit he is to support. After obtaining the necessary information as to the operation contemplated, he makes a rapid reconnaissance of position and meets the battery on arrival in the vicinity or sends an agent to conduct it to the position. The position selected should be at as short a range as is possible, consistent with proper concealment and ammunition supply."

Extracts from "Notes on Recent Operations," by Brigadier General Leslie J. McNair, General Staff, G. H. Q., A. E. F.:

"They (infantry batteries) could have fired or not in the trench attack, depending upon circumstances. If they fired the objectives should have been the first captured. Reconnaissance should be made and firing cease as soon as it is possible to cross the trench system. Such batteries should move as complete fighting units with caissons and combat trains.

"Thereafter the movement of artillery should be continuous and independent of the ammunition dumps or position warfare. Ammunition supply should be as provided for in regulations.

"After the trench system has been crossed and artillery advanced, the difficulty of moving forward ammunition made it by all means necessary to cease the extravagant methods of map firing and utilize direct observation. The terrain afforded excellent observation posts and battery positions. Observed fire was used rarely—if at all. It must be inferred either that artillery commanders do not appreciate the immense advantage of adjusted fire, and the waste and loss of effectiveness in searching areas, or that they lack confidence in the ability of their battery commanders in the rapid preparation and conduct of observed fire. It is conservatively estimated that of the ammunition fired during the first two days of this operation, 50 per cent. was wasted.

"Aside from the difficulty of moving the artillery forward, the positions selected after the advance were in some cases too retired, considering the offensive nature of the operations. For example, in one division, at the end of the second day, the light artillery was all practically in

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line, about five kilometres in rear of the front line. The 155 howitzers were not yet in position. Instances have been reported where general instructions have been issued that the artillery should not be advanced closer than a certain distance from the front line. Such instructions induce timidity, are not sound in offensive preparations, and will be revoked at once. Guns if captured during counter-attacks will well pay for themselves in losses saved our infantry and inflicted on the enemy."

Extract from a translation of a German document, September, 1918:

"The schematic barrage fire employed up till now which was not directed on any specific objective, and which was placed in case of an imminent enemy attack as a screen of fire in front of certain lines occupied by our infantry, is suppressed by an order of the Chief of the General Staff of the Field Army, dated August —, 1918.

"The protection of the infantry in the presence of an enemy attack by artillery fire will in the future be carried out only as annihilating fire, which will be directed (in the event of an enemy attack impending or actually in progress) either against the enemy himself when he is observed, or against the presumed positions in which the enemy is making his preparations for attack or over which he will pass during the course of the attack.

"The signal barrage fire will not be used."

There are numberless reports and notes from artillery officers of the American Expeditionary Force, all of whom agree that the fundamentals known and used before the war are correct. The tendency during the closing weeks of the war was to return to these methods, and above all, give our officers a working knowledge of these principles, so that, when the trench system was crossed, we could take full advantage of our opportunities and deliver telling blows to the enemy forces.

We have learned much in this war, and that which is of value must be retained. But it must not be forgotten that the basic principles have been proven sound and cannot be discarded. They must be the foundation of our training, with position-warfare refinements and methods as an important, but subordinate, addition to "pre-war" methods.

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### **Notes on Personnel in Open Warfare**

BY EDWARD LONGSTRETH, 2D LT. 11TH F. A.

*(These notes are made as the result of observing conditions with a regiment of 155-mm. Howitzers in open warfare, and although some of these observations are of a general nature, those pertaining to transportation more particularly concern that caliber.)*

MOTORIZED field artillery now being in its infancy there are several plans, and much that can be said, on the motorizing of an efficient regiment of field artillery. One very comprehensive plan I have seen, provides for a section composed of tractor, gun and two trailers, one for ammunition and one for the personnel necessary to serve the piece. This abolishes the cumbersome and inadequate caisson and provides transportation for the personnel.

In active operations with the 155-mm. Howitzer, or larger calibers, over any appreciable period of time, there must be transportation for the men if there is to be high efficiency. Although the distance covered on the march may not be long, it is accompanied by every disadvantage conceivable. Such moves are made usually at night, along muddy roads, congested with traffic; the men walk with the sections, stopping and starting convulsively, standing for long delays or trudging along in the ditches, and so, though the distance may be but five miles, the time on the march is frequently over four or five hours. At the end of such a march emplacements must be dug, camouflage erected and, most tiring of all work, the heavy ammunition must be carried to the guns. And after that these gun crews must be ready to fire when and as long as called upon, a fire that demands steady accurate laying and constant serving of ammunition. At the end of a week the men show signs of exhaustion and sickness; deficiency becomes increasingly inevitable.

Another cause of sickness was of the same species; improper transportation. In our particular case we were not provided with motor rolling kitchens and it was thought just as practical to use field ranges that would be carried on trucks. But the

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trucks were the ubiquitous and abominable "Quad," and so kitchen outfits were more often in the ditches than with the men.

An excess of cold "corn willie" and hard-tack did the rest. Even with rolling kitchens constant "corn willie" will hurt artillery efficiency, for after three days of such a plain and constant diet the men sicken and diarrhoea becomes almost universal. Some concentrated and dried preparation, such as the Germans used that could be easily made up into hot soup, would be a great help in keeping up the health of men during a vigorous offensive. Such a preparation could be conveniently carried by the men and easily cooked over small fires.

Individual or section cooking is frequently necessary, for under the most difficult conditions of an offensive men must go for many hours, possibly for a couple of days without hot food unless they can warm up some "corn willie" and water in their mess-kits. But our mess-kits were not well suited for cooking and too often men found themselves with mess-kits that rapidly burnt out or actually melted in the fire.

Generally, packs could be put on the guns during a move, but they had to be carried a great deal and there was a tendency to do away with all unessential articles; tent poles and pins seemed to be classified as such. Shelter halves were handy enough for one purpose or another, but poles and pins proved a nuisance in actual practice. Men preferred to sleep under their guns or rig up shelters dug into the ground for warmth and security. What props they needed they could cut with a knife and leave behind or put on the last fire. So pins and poles disappeared.

Shortly after the armistice, but while for us war conditions still existed, I was assigned regimental personnel adjutant. There seems to be a widespread belief that the personnel office in operations belongs to the headquarters company and in the plan of transportation I have above referred to, the personnel office is allotted a trailer with the headquarters company train. But as a matter of fact in actual operations the personnel office is with the brigade headquarters and never with the headquarters

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company. It should therefore have independent transportation. In our case a White Reconnaissance car was used and with fair success. Yet this type of car is designed for a specific purpose. However, a very suitable car for a regimental personnel office could be designed with some modification of the Reconnaissance car, combining the general principle of the mobile repair trucks. The rear seat of the Reconnaissance car could be done away with and the entire rear half built up from the middle seat with compartments to hold two typewriters in cases, two field desks and two file chests; this at least, and if possible all the equipment allowed by the tables of organization. The rear doors could be designed for a drop-down desk.

With a well-organized and mobile personnel office near the brigade acting as a sort of Echelon Rgt. P.C., and a good courier service to the Rgt. P.C. there could be excellent liaison between different headquarters and casualty reports expedited.

The plan of having all the pay-rolls in a division made up in the division personnel office, a plan that has been adopted in some divisions I have been told, is excellent for those divisions that are so fortunate as to be intact, but could not be generally advantageous in open warfare due to the rapidly changing assignments of field artillery to different infantry divisions which would cause infinite delay and confusion in artillery payrolls and losses of pay-card files. So, whereas the plan may prove good divisional policy, to make it a general policy would install a system that would not be sufficiently elastic for the ever-changing relations and conditions of open warfare.



## EDITORIAL

### Vocational Training

THE necessity for vocational training in the army was recognized before the war by the insertion of a paragraph in the National Defense Act authorizing expenditures for this purpose in army camps. The full significance of the paragraph was not realized, however, until the country was faced with the necessity of raising a modern army. As this work progressed it became increasingly evident that there were not enough skilled technicians to man the organizations required for the military establishment and the supporting manufacturing industries. The available supply of skilled mechanics was exhausted in about six months and vocational training on a large scale had to be inaugurated to meet the requirements of the situation.

It is impossible to state how many technicians were trained for army service during the war. Each corps carried on an extensive program to this end, as the Field Artillery at Camps Jackson and Taylor, the Coast Artillery at Fortress Monroe, the Engineer Corps at Camp Humphreys, the Quartermaster Corps at Camp Johnson, the Air Service at St. Paul and at the various flying fields. In addition, the Committee on Education and Special Training was organized for this express purpose and established over 150 training centers at civilian educational institutions. As a result of all this work, the conclusion has been universally reached that vocational training must be maintained as a permanent part of all modern military training.

It being granted that vocational training will hereafter be a permanent part of the training in the regular army, the question arises whether that training shall be limited absolutely to that required to satisfy the technical needs of the army, or whether it shall be expanded so that each enlisted man may proceed as far as he is able during his period of enlistment, in

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order that he may be better prepared for service in civilian life after his discharge. If the purpose of the training is limited to meeting the army needs, it will not be necessary for every man to take that training during his entire period of enlistment. He can be brought to the degree of skill required in one year more or less and can then serve the remaining years performing the functions for which he has been trained.

If, on the other hand, he is to be given the opportunity of progressing as far as possible so that each develops his maximum skill, the training may profitably be used as an inducement to enlistment. Under these conditions a soldier would expect to continue his training for a portion of his time throughout the entire enlistment period. This would require larger facilities and a wider range of work. For if the training is to prove a real inducement to an energetic young man to enlist, it must bring him to at least as satisfactory a position industrially as he would attain under existing conditions in industrial life.

The decision of this first question is closely connected with the problem of the proportion of time that can be spared from the strictly military work for study. The estimates as to how much time can be devoted to vocational work vary from one-sixth to one-half of the total working time. If only one-sixth of the time can be spared from military work the training would not seriously appeal as an inducement to enlistment. If one-half is devoted to the non-military work it would probably interfere with the regular duties. The determination of this question must be made before any definite schedules can be constructed.

In the matter of providing equipment and facilities for vocational training, the first fundamental question is whether the general facilities of the camp can be used as the basis of the training. Shall the soldiers make repairs and do new construction work, build new roads, run the laundry and the bakery as parts of their training? If all the technical equipment that is part of the regularly used outfit can be treated as a basis for training, great saving in original cost will be made. On the

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other hand, serious complications may arise with civilian skilled labor if the relations are not established upon a rational basis.

All vocational work requires an accompaniment of academic work in English, mathematics, history, economics and the like. Shall this regular school work be organized after the pattern of the public school system in separate courses in each of these subjects, or shall it be organized in close coördination with the manual work? For example, shall arithmetic be taught by itself apart from shop work, or shall arithmetical exercises be given in all of the shop work in such a way as to develop the required arithmetical skill. In like manner, shall the English work be the same for every one, or shall the men working in different lines have the reading and composition work that is related to their manual activities?

A final general question that must be met is whether the vocational and educational training shall be compulsory or voluntary. Shall every man be required to take some vocational training, or shall he be permitted to take only academic work or no school work at all?

After these larger questions have been settled, the first step in making a definite schedule is the definition of the different types of vocational skill that it is proposed to develop and the determination of the number of men of each type that will be training. The first step has already been taken by the army. The several corps have defined the duties of each type of technician in each of their organizations. These definitions are very numerous and taken together furnish a bewildering specification which would be very difficult to meet with a vocational training program because of minor differences in the definitions of similar types of skill. For instance, the definitions of a mechanic as furnished by the engineers, the coast artillery and the air service, while resembling one another closely, still have differences that must be recognized in a training program.

If the program is to be adapted to training for civilian occupations as well, the differences between the army specifications and those of civilian life must also be taken into account.

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To reduce all these specifications to a relatively simple course that would produce the desired results for all cases, it is a serious problem and requires careful study.

A further immediate problem is that of the distribution of the men over the various types of courses. Shall the number of men in a given type be proportional to the number required by the army, or shall each man be permitted to elect the type of work which he prefers? If the men are to be distributed in proportion to the army needs, it will be necessary to decide which of the current organization charts is standard. It will also be necessary to decide whether the vocational training shall furnish just enough men to meet the requirements of the organization chart, or whether it shall be set up to furnish twice as many men as are actually needed.

After the types of training have been defined and the numbers allotted to each have been determined, it will be necessary to construct a program that will take care of all cases. This will require some sort of a grouping of the different occupations and their arrangement in a progressive series of unit courses in each group. For example, there could be a group in metal work which would include instruction in blacksmithing, welding, sheet metal work, heat treatment of metals. In a like manner a group of courses on automobiles might include driving, general repairs, gas engines, ignition, storage batteries, etcetera.

These and many other questions present themselves immediately in attempting to prepare a program for vocational training in the army. Since this is a problem which must be met and solved promptly, this journal presents the topic as one for discussion and invites its readers to contribute suggestions on any topic related to this subject.

### Thoughts On Reorganization.—Our Problems?

THE present war has brought out so many developments involving the employment of new forces and agencies, new methods and means of combat, all of which affect the organization, not only of our military, but also of our national forces,

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that a general regrouping, redistribution and reorganization of our military forces on land and sea and in the air are necessary in order that we may have efficient organization based upon proper employment of these forces in case of war. In studying this subject, it will be necessary to set aside, more or less, our preconceived ideas based upon conditions or practices of the past. The means and methods of war have developed so rapidly in the past fifteen years, that many of the experiences gained prior to 1904 have only an historical value.

Before we proceed to any organization of our military forces, we should carefully consider the functions of the different combatant services—land, air and naval, and should critically study the manner in which they have functioned and coöperated, or have failed to do so, during the present war. If these things are clearly understood, then it will be possible to lay down general limits within which separate services and arms shall be organized.

There is, for instance, a very limited comprehension of the functions of our navy and of the naval necessities of which our coast defenses are designed to meet. Both the Army and the Navy have plans for mining operations, but these bear no relation to one another. The Army knows little of the possibilities and limitations of submarine operations. Both the Army and the Navy have developed air services independently of one another and it is very doubtful whether these independent air services have plans for joint operations or have provided for an interchange of information on the many matters affecting the development and the employment of aircraft. The Army prepares its plans with the idea that the defense of our coast line should be made at the water's edge, whereas the Navy is convinced that the defense of our coast should be made as far from our coast line as naval operations will permit and that the present war has shown that this defense can be made at a great distance from our coast line.

Within the Army itself we find a conflict of ideas and different conceptions concerning the function of various auxiliary

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arms. The machine gun expert believes that the use of machine guns has become so highly specialized that a separate machine gun corps should be created. The tank expert refuses to see in his arm a hybrid service and insists that its full powers can be developed only by making it dominant and independent. The field artilleryman believes that artillery aerial observers should be field artillerymen, and that the field artillery officer of to-day must be able to conduct the fire of his battery from any O. P., whether in the air or on the ground. The Air Service, on the other hand, at one time believed that the duty of an artillery observer is limited to making record of the fall of shots. That this observer must also be competent to recognize immediately artillery opportunities for fire, judge the effect of that fire, and be able to control the fire of many units of different types and calibers, very much as an organist controls the tones of his pipes by the clever manipulation of his instrument stops, has been forgotten in the hurried training and organization developed during the war.

The Motor Transport Service believes the relation between operation and maintenance of motor transport is so close, that all motor transportation should be pooled into a single group, upon which combat units will make requisition for service, very much as an individual who wishes to catch the 10 o'clock train for New York puts in a timely call for a taxi to take him to the station. How well this scheme would fit in with field artillery requirements we are not at this time prepared to say. The subject is one that requires careful consideration.

And so we might go on *ad infinitum*. But these things must be settled, not in the future, but to-day; not by supermen, but by men with practical minds and a perception which will enable them to solve these problems in a broad-minded manner. If we take any period of history in which great events have taken place, we will find that the spoken and written ideas as to a proper solution were as many and as different as were the mental and moral calibers of the authors of those ideas. But like the first glorious burst of the sun's brilliance which follows the glow

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of dawn, a few big ideas do crystallize in the minds of a few strong and capable though at first obscure men, who by their brilliance at first only captivate, but finally convince us and thus point the way to a new idea which we find agreeable to accept and to follow.

Let us not sit supinely by and stagnate in the belief that everything that is or was is all right. It is most decidedly not! We are all witnessing the dawn of a new era, industrial, intellectual and moral, and the influence of it will be felt in the military as in every other profession. Our problems are many and difficult. They can be solved only by clear perception, hard work and much study. To this gospel every field artilleryman must dedicate his life, otherwise he will find himself dragged by the heels (or perhaps the scruff of the neck) *behind* the chariot of progress.

### The Journal as a By-monthly

THE question of publishing the JOURNAL as a bi-monthly, instead of a quarterly, magazine as heretofore, has, for sometime past been discussed by a number of the members of our association who have had its best interests at heart.

It was felt that the length of time between issues, *i.e.*, three months, was too great; that information and ideas of timely interest should be presented to our readers before the rapidly flowing current of events carried them out of date.

The elapsed time between the receipt of manuscript of timely interest and its publication, depends in great measure upon the date of that receipt with respect to the quarter; sometimes this delay may exceed four months, which is manifestly too long.

As a result of such discussion, and after mature consideration, the Executive Council has decided to issue the magazine six times a year instead of four: in consequence the JOURNAL hereafter will appear on or about the last day of August, October, December, February, April and June, etc.

It is to be noted in this connection, however, that our purpose can only be successfully accomplished by the hearty *literary* support of our membership.

# Roll of Honor

## PRO PATRIÁ

DAVIS.—Now reported buried, date and cause of death to be determined, First Lieutenant Thomas H. Davis, 12th Field Artillery.

SPAETH.—Died, October 11, 1918, at Camp Taylor, Kentucky, Lieutenant Walter H. Spaeth Field Artillery.

WEILER.—Died at his home in Toledo, Ohio, December 26, 1918, Second Lieutenant George A. Weiler, Field Artillery.

CALDWELL.—Died of broncho-pneumonia, February 24, 1919, in France, Second Lieutenant Marvin A. Caldwell, 343rd Field Artillery.

KREAMER.—Died of influenza and pneumonia, February 26, 1919, in France, Second Lieutenant Wilbur C. Kreamer, 307th Field Artillery.

ROBB.—Died of pneumonia, February 27, 1919, at Camp Hospital, Camp Knox, Kentucky, Second Lieutenant Joseph P. Robb, Field Artillery.

HAWLEY.—Died of cerebrospinal meningitis, March 1919, in France, First Lieutenant Mones J. Hawley, 11th Field Artillery.

OWEN.—Died of lobar pneumonia, March 14, 1919, at Base Hospital, Camp Taylor, Kentucky, Second Lieutenant William M. Owen, Field Artillery.

PULIS.—Died of broncho-pneumonia, March 14, 1919, on board U. S. S. America, Colonel Charles Clarence Pulis, 104th Field Artillery.

GROFF.—Died, cause to be determined, March 22, 1919, at Baltimore, Maryland, Captain Clyde F. Groff, Field Artillery.

LARDIN.—Died of acute nephritis, May 6, 1919, at Letterman General Hospital, San Francisco, California, Captain Lewis E. Lardin, 46th Field Artillery.

HOFFMAN.—Died of hemorrhage of liver, May 23, 1919, at Hospital, Fort Bliss, Texas, Second Lieutenant Douglas T. Hoffman, Field Artillery.



# Current Index to Field Artillery Literature

Compiled from monthly list of military information carded from books, periodicals and other sources furnished by the War College Division, General Staff.

- AERIAL WARFARE.—European War. British official returns of casualties from air and sea raids on Great Britain. (*The Times Weekly Edition*, Jan. 17, 1919, p. 63.)
- AEROPLANES, Armament.—Air War. Battleplane armament, from the automatic Pistol to the early airmen to the multi-gun fighting airplane of today. (*Scientific American*, January 25, 1919, p. 74.)
- AEROPLANES.—U. S.: "The instability of American airplanes. Sources of the defects that have killed many pilots revealed by the experiments that reduce aerodynamics to the elementals. (*Scientific American*, Feb. 8, 1919, p. 118.)
- AEROPLANES.—"The Visibility of Airplanes." (*The Journal of the Franklin Institute*, March, 1919, p. 289.)
- AEROPLANES.—"Present Status of American Airplanes and Seaplane Construction." (*Aviation*, March 1, 1919, p. 137.)
- AEROPLANES A. E. F.—Aeroplanes produced and shipped from U. S., April 6, 1917 to Nov. 11, 1918. U. S. squadrons at front by months. Number of. Number of planes to a squadron. (*Congressional Record*, Jan. 11. 1919. p. 1380.)
- AIRSHIPS.—"Admiral Sims urges rigid airships." Importance of and German accomplishment with airships. (*Army and Navy Journal*, March 1, 1919, p. 931.)
- ARTILLERY.—"Increase of Mobile Artillery Equipment Since the Civil War." (*The Official U. S. Bulletin*, March 19, 1919, p. 2.)
- ARTILLERY.—Great Britain: British home defense. Dangers run by shortage of artillery. (*United Service Gazette*, Feb. 27, 1919, p. 105.)
- ARTILLERY.—U. S.: "The Artillery Council of 1887," Historical account and relations with Ordnance Corps. (*Journal of the United States Artillery*, Sept.-Dec. 1918, p. 223.)
- ARTILLERY EQUIPMENT.—Germany: German artillery equipment, methods, etc. (See *The Field Artillery Journal*, Oct.-Dec., 1918.)
- CALDWELL, WM. H.—Field artillery officer's notes. (New York, E. P. Dutton & Co., 1918,—77 pp.—)
- CAMOUFLAGE.—The principles of camouflage as practiced on land. (*Scientific American*, Jan. 25, 1919, p. 76.)
- CHEMICAL WARFARE.—"Novel Views on the Future of the Gas Warfare Expressed by Brig. General A. A. Fries." Humanity and effectiveness of chemical warfare. (*Chemical and Metallurgical Engineering*, Feb. 15, 1919, p. 153.)
- ENGINES, Liberty.—Liberty engine. Development and details. By Gen. Geo. O. Squier. (*American Machinist*, January 16, 1919, p. 130.)
- EQUIPMENT. Aircraft.—Instruments on war planes. Illustrated. (*La Science et la Vie*, July, 1918, p. 47.)
- EUROPEAN WAR.—Germany: "By Force of Arms, Soldiers, Not Hunger, Defeated Germany." Reasons underlying Germany's request for armistice. (*The Saturday Evening Post*, March 29, 1919, p. 3.)
- EUROPEAN WAR.—Genesis of European War. Lord Haldane's Diary of negotiations between Germany and England, 1912. (*The American Journal of International Law*, Oct., 1918, p. 834.)
- EUROPEAN WAR.—Defeat of German army on the French front, 1918. Review of operations by Col. Feyler. (*Revue Militaire Suisse*, Feb., 1919, p. 72.)
- FIELD ARTILLERY TRAINING.—U. S.: The Field Artillery Central Officers' training school. (*The Field Artillery Journal*, Oct.-Dec., 1918, p. 4.)
- FIRE CONTROL.—"Radio Apparatus for Artillery Fire Control." Methods of fire control from aircraft. (*Electrical World*, March 1, 1919, p. 408.)
- FOCH, FERDINAND.—The principles of war. (New York, The H. K. Fly Co., 1918.—372 pp.—)
- GAS, MANUFACTURE OF.—U. S.: Official statement of American gas used in shells made by British and French and fired against the enemy. (*Official U. S. Bulletin*, March 7, 1919, p. 1.)

## INDEX TO FIELD ARTILLERY LITERATURE

- GAS WARFARE.—Employment of cyanogene and its derivatives in war. (*Le Genie Civil* Feb. 1, 1919, p. 89.)
- HEAVY ARTILLERY.—Great Britain: Weight of heavy artillery, and ammunition; rates of travel. (*The Journal of the Royal Artillery*, Nov., 1918, p. 269.)
- HEAVY ARTILLERY, A. E. F.—Heavy artillery, U. S. N. 14 in. guns on railway mounts. Construction, etc., with illustrations. (*American Machinist*, January 23, 1919, p. 141.)
- HEAVY GUNS.—Germany: Brief description of the foundation of the "Big Berthas" operated by the Germans during the European War. (*Congressional Record*, Feb. 11, 1919, p. 3333.)
- HEAVY GUNS.—A 121-mile gun. Ordnance officers of the U. S. Army demonstrate futility of super range guns. (*Scientific American*, March 29, 1919, p. 312.)
- HODGSON, EDWARD S.—Tri-lingual artillery dictionary. (London, Griffin & Co., 1918.)
- HORSES.—U. S.: Census showing number of horses, mules and other farm animals on farms. (*Manufacturers' Record*, Feb. 13, 1919, p. 62.)
- INVENTIONS SECTION.—U. S.: "Inventions Section of the Army." (*The Journal of the Society of Automotive Engineers*, March, 1919, p. 193.)
- LINES OF COMMUNICATION.—Radio communication. Military employment of. (*Electrical World*, March 15, 1919, p. 521.)
- MAPS.—European War.—German War Maps and Surveys." (*The Geographical Journal*, January, 1919, p. 30.)
- MORETTI, ONORIO.—Notes on Training Field Artillery details. (New Haven, Yale Univ. Press, 1918.—287 pp., illus.)
- MOTOR TRANSPORT CORPS, U. S.: Organization and accomplishment of the Engineering Transport Corps. (*The Journal of the Society of Automotive Engineers*, Jan., 1919, p. 5.)
- MOTOR TRUCKS, European War.—Motor transportation, Ordnance, U. S. Artillery repair truck. Artillery supply truck. (*The Journal of the Society of Automotive Engineers*, March, 1919, p. 181.)
- MOTOR TRUCKS, U. S.: "The story of the United States standard truck." (*The Journal of the Society of Automotive Engineers*, April, 1919, p. 308.)
- MOTOR TRUCKS, U. S.: Artillery supply trucks, Ordnance Department, U. S. A.
- MUNITIONS OF WAR, A. E. F.—Production of munitions in the U. S. from April 6, 1917, to Nov. 11, 1918. Official statement. (*Congressional Record*, Jan. 11, 1919, p. 1379.)
- NAVAL GUNS, European War, U. S.: "The long range naval guns." Illustration showing one mounted on wheels for service in European War. (*The National Marine*, Jan., 1919, p. 49.)
- ORDNANCE, U. S.: Table showing ordnance shipped or delivered to American Expeditionary Forces, British and French sources. Official statement. (*Congressional Record*, Jan. 11, 1919, p. 1379.)
- ORDNANCE, U. S.: "America's great effort in ordnance. Supplying our two million men in France with artillery, machine guns and rifles. (*Scientific American*, April 5, 1919, p. 338.)
- ORDNANCE DEPARTMENT.—"American ordnance problems discussed by General Williams. Need of coördination with industry. (*American Army Gazette*, March 22, 1919, p. 1079.)
- ORDNANCE DEPT.—Handbook of the 155 mm, gun matériel, model of 1918 (Filloux)—(Wash., Govt. Print. Off., 1918.)
- ORDNANCE DEPT.—Information regarding mobile repair shops.—Ord. Dept. Engineering Bureau, mimeographed, 1918.
- ORDNANCE DEPT.—Cost of manufacture of guns, etc.—(Wash. Govt. Print. Off., 1918—128p.
- ORDNANCE DEPT.—Spherographic system of anti-aircraft fire control.—Engineering div., Ordnance dept.—1819.—plates.
- PHOTOGRAPHY, Aerial.—Art of interpreting aerial photographs. Illustrations. (*Sea Power*, Jan., 1919, p. 60.)
- PROMOTION, Officers.—Promotion in foreign armies. Methods in foreign armies. (*Infantry Journal*, March, 1919, p. 750.)
- RAILROADS IN WAR, France: Military control and employment of French railroads during European War. (*Revue des Deux Mondes*, March 14, 1919, p. 414.)

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- RAILWAY ARTILLERY, U. S.: Artillery Railway Reserve. Organization Nov. 11, 1918, and engagements of in European War. (*Journal of the U. S. Artillery*, Jan-Feb., 1919, p. 130.)
- RAILWAY GUNS AND BATTERIES.—Heavy artillery on railway mounts Construction and types of mounts. (*American Machinist*, Feb. 20, 1919, p. 329.)
- RAILWAY GUNS AND BATTERIES.—European War: History and Development of artillery on railway mounts in European War. (*Engineering*, Feb. 7, 1919, p. 173.)
- RAILWAY GUNS AND BATTERIES, A. E. F.—Guns on railroad mounts. (*The U. S. N.* 14 in. railway batteries in A. E. F., 1918. With illustrations. (*American Machinist*, January 23, p. 141.)
- RAILWAY GUNS AND BATTERIES, U. S.: Organization of the railway artillery reserve on Nov. 11, 1918, and list of engagements during the European War. (*Journal of the U. S. Artillery*, Jan.-Feb., 1919, p. 130.)
- RANGES, Artillery, U. S.: The construction and operation of miniature ranges. (*Field Artillery Journal*, Oct.-Dec., 1918, p. 560.)
- REPAIRS, European War.—Artillery repair truck and equipment repair trucks. (*The Journal of the Society of Automotive Engineers*, March, 1919, p. 181.)
- ROADS.—Characteristics of war-time highway work in Great Britain and United States. War conditions have been injurious to roads. (*Engineering News Record*, Jan. 9, 1919, p. 102.)
- ROADS, France: Conditions of military roads in Western part of France in 1917. (*Manual for the Motor Supply train*, U. S. Army.)
- SIEGE GUNS, European War.—Long range guns of very large caliber in European War. (*Revue Militaire Suisse*, Nov., 1918, p. 445.)
- SIEGE GUNS.—"A 121-mile gun." Ordnance officers of the U. S. Army demonstrate futility of super range guns. (*Scientific American*, March 29, 1919, p. 314.)
- SMOKE.—Use of smoke in land warfare and tactics of. (*United Service Gazette*,—March 13, 1919, p. 127.)
- TANK CORPS, U. S.: Organizations of the Army Tank Corps summarized by the director in charge in report to Secretary of War. (*The Official U. S. Bulletin*, March 28, 1919, p. 10.)
- TANKS, European War.—Fighting value of tanks is realized. Land battleships will play an important rôle in future wars. U. S. and England to improve existing models. (*The American Army Gazette*, April 12, 1919, p. 1172.)
- TANKS, U. S.: Description and illustration of two-man tanks. (*Motor Age*, Jan. 9, 1919, p. 22.)
- TELEPHONES.—Development of the radio telephone and its adaptation to the airplane. (*The Official U. S. Bulletin*, March 31, 1919, p. 9.)
- TILSON, JOHN Q.—Arms, ammunition, airplanes and gas masks.—(Wash., Govt. Off., 1918.—212 pp. UC263.3, 1917.)
- TRAINING, U. S.: "What kind of military training?" How can we continue to get the benefits of universal training for the young men of America by utilizing the cantonments and equipment already at hand. (*The World's Work*, March, 1919, p. 547.)
- TRAINING, U. S.: "General McCain's Solution of Universal Training." (*The American Army Gazette*, Feb. 22, 1919, p. 936.)
- TRAINING, U. S.: Argument for universal military training in U. S. Argument for by Mr. Kahn. (*The American Army Gazette*, Jan. 18, 1919, p. 768.)
- TRAINING, U. S.: Mr. Kahn in favor of universal military. (*Congressional Record*, Feb. 13, 1919, p. 3426.)
- TRAINING U. S. Officers. Central Officers Training Schools, U. S., for candidates for commissions in infantry, field artillery and machine gun units. (Filed Env. Case, Schools, U. S., Officers, 1919.)
- TRANSPORTATION, Guns.—U. S. Navy 7-in. caterpillar mounts. Illustrated. (*Scientific American*, March 22, 1919, p. 287.)
- U. S. Army, Expeditionary Force, France, 1917.—Training Bulletin for Field Artillery Brigades.—A. E. F., G. H. Q., 1918.—9pp.
- U. S. Div. of military aeronautics.—Study and exploitation of aerial photographs.—(Wash., Govt. Print. Off., 1918.—175 pp., plates.)
- 443, Wisse, Sebastien L.—Emploi de l'artillerie dans l'attaque dun 24 octobre.—(G. C. T. A., IV.—1917.—31 pp.)