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Contents

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BRIGADIER GENERAL GEORGE LeR. IRWIN, UNITED STATES ARMY

Commanded the 2nd Field Artillery Brigade, A.E.F., from February 1st to May, 1918; commanded the 57th Field Artillery Brigade from May to November, 1918, and from March to May, 1919; commanded the Saumur Artillery School from November, 1918, to March, 1919.

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Notes on the Training and Handling of Divisional Artillery in France

BY BRIGADIER GENERAL GEORGE LE R. IRWIN, U.S. ARMY

I ARRIVED in France in December, 1917, in command of the 41st Division, which, upon landing, was made a replacement unit. My first artillery assignment was at Souges, where the Artillery for the 1st Corps was being assembled for training. In January of 1918 I was ordered to command the 2nd Field Artillery Brigade of the 2nd Division. I reached Valdahon (Doubs) on February 1st, where I found that two of the regiments had commenced their training, and the third ready to start.

VALDAHON

Valdahon is ideally situated, and was well equipped for handling a single brigade. Officers and men were comfortably quartered, and there were good stable accommodations.

PRELIMINARY TRAINING

The range, rather limited in extent, was well adapted for firing, and permitted the carrying out of an interesting and varied program. Batteries fired daily, except Sundays, from 7 A.M. until noon; the afternoons being given over to theoretical instruction, orientation, instruction on the miniature range and in the sandbox, and work in the ordnance shops.

The French instructors were officers of experience, devoted to their profession, and eager to render every assistance to their allies. In like manner, our officers were anxious to learn,

and keen to fit themselves for the front. The progress made was eminently satisfactory.

OPEN WARFARE METHODS

It became apparent to me, as the instruction proceeded, that the long period of stationary or trench warfare had caused a very palpable disregard of the methods necessary in a war of movement. Fortunately, the majority of the officers of this brigade had received training in the United States in the provision of our Field Artillery Drill Regulations. Care was taken to impress on all that, sooner or later, open warfare was bound to occur, and that officers must be prepared to put into practice the principles laid down in our regulations. Some time later, when I was in Alsace in command of the 57th Field Artillery Brigade (made up of National Guard organizations), I made it a practice to cause all batteries to move to new positions in the open before delivering fire for operations ordered by the division. This training period proved of great value when, in August, this brigade supported the 32nd Division in the advance of 19 km. from the Ourcq to the Vesle.

STAFF INSTRUCTION

Staff officers of the brigade and regiments were given the opportunity to visit the headquarters of several French divisions and corps in the lines. Facilities to familiarize them with the methods employed in maintaining liaisons, lines of communication, ammunition supply, the obtaining of information, and the preparing of operation orders were freely accorded. The results obtained from these visits were very satisfactory.

EQUIPMENT

All of the regiments of the 2nd Brigade had been equipped prior to sailing. Upon arrival, it was found that most of the equipment could not be used, and it was turned in. The last few weeks of our stay at Valdahon was a hectic period of telephoning and telegraphing to complete the outfitting of the brigade. On leaving in March for the front, batteries were still

short many essentials. Matériel continued to be delivered as rapidly as it was received from the French.

ANIMALS

It was unfortunate that our draft animals did not arrive until just before the move. It is desirable that drivers and animals should receive their training at the same time as the gun and ammunition detachments. There was little or no opportunity for giving instruction in draft at the front.

TRANSPORTATION

Horses were at a premium in France. At no time during the war did the brigades with which I served have their full complements of draft animals, with the natural result that they were being continually overworked. Forage was nearly always insufficient in quantity, of poor quality, and frequently wet and damaged. Even then, had the personnel been competent, much might have been done to better the situation. It was unfortunate that officers who possessed a competent knowledge of firing came to us practically ignorant of stable management, draft and the care of the horse and harness. Our losses in action were heavy and usually unavoidable, but the fact remains that many casualties, deaths or evacuations were attributable to lack of management and improper care and handling. The remedy lies in the thorough instruction of officers and men. It was customary to detail one of the lieutenant-colonels to oversee the rear eschelons, and an honest endeavor was made to care for our animals. I find that I have become converted to mechanical transport, and I believe that tractors and tanks will gradually displace the horse in warfare.

AMMUNITION TRAIN

The ammunition train was with the division, and did not join the brigade until after our arrival near Verdun. In the 32nd Division the ammunition train had always been with the artillery brigade. The men of this train (the 107th) took genuine pride in this brigade and displayed great courage and devotion

in keeping up the supply of the guns. I am firmly convinced that the ammunition train should be assigned to and form an integral part of the Field Artillery brigade.

107TH AMMUNITION TRAIN

The 107th Ammunition Train was equipped in May, 1918, with 108 trucks. It traveled under its own power from St. Nazaire to Belfort in June, and remained in the lines with the brigade until November of the same year. At that time it had 104 of the original trucks in good running order; two trucks had been destroyed by shell fire and one salvaged.

AMMUNITION SUPPLY

While with the 57th Brigade, and during active periods, the custom was started of assigning two or more trucks of the train to each of the regiments. They were of assistance in moving ammunition from the regimental dumps to battery positions, and in carrying forward ammunition of batteries moving to the front. Regimental and battalion commanders were held responsible that no ammunition was left in emplacements vacated by their batteries, and also that empty cases and containers were properly disposed of.

The use of light railways, when available, for ammunition supply to forward dumps, and even to battery positions, was a great help, and a saving of horses and trucks.

TRENCH MORTAR BATTERY

The Trench Mortar Battery of the 2nd Brigade fared badly in the matter of equipment, which was not delivered until after it had been at the front for a considerable period.

The trench mortar batteries of both the 2nd and the 57th Field Artillery Brigades were equipped with an obsolete type of French mortar, for which little use could be found. In the 57th Brigade experiment were made with captured German minnenwerfer. Officers of the battery did good work as liaison and reconnaissance officers.

In my opinion, trench mortar artillery properly belongs to the Army and has no place in the Brigade organization.

GUNS AND HOWITZERS

In addition to the trench mortars the brigade was equipped with the famous French 75 gun and the 155 Schneider howitzer. Both gun and howitzer did excellent work, and stood up in a remarkable manner under the long and severe strain to which they were subjected.

MACHING GUNS

The machine guns with the anti-aircraft mounts proved useful, especially in protecting batteries on the march against attacks from raiding aeroplanes.

SMALL ARMS

I have never looked with favor on the infantry rifles in the hands of cannoneers. The recent issue of a limited number of Browning automatic rifles to artillery regiments is, however, a wise move, and, with the machine guns, will afford batteries in action a fair degree of protection.

AERIAL OBSERVERS

Valdahon was equipped to instruct Artillery officers as balloon and aeroplane observers, and details were sent to these schools from the several regiments for instruction. At the conclusion of the courses the officers found qualified went to the front to complete their training. Some time later the system was changed, and the furnishing of this class of observers was given over to the Air Service. I think this was a mistake. Good shooting requires good observation. Modern aeroplanes and lighter-than-air machines equipped with wireless telephones and telegraphs provide the artilleryman with the means of obtaining an accurate and rapid adjustment and fire for effects. Training both as an artilleryman and as an observer are essential to obtain the best results.

DETACHMENT OF OFFICERS

A number of officers were detached from the brigade just prior to its leaving for the front to serve as instructors for incoming organizations. It would have been better to have allowed these officers a short tour of duty at the fronts, if only because of the standing it would have given them in the eyes of the men under instruction. Later the organization of new units called for the detchment of many officers to return to the United States. The importance of selecting suitable officers was recognized, but their loss was severely felt, and the work of those remaining was correspondingly increased.

The personnel of both of the brigades I commanded in action was of very high quality, and deserving of the greatest praise for their constant devotion to duty, self-sacrifice and gallantry.

MOVEMENTS BY RAIL

The movement of the 2nd Brigade to the front was accomplished, under the direction of the French railway authorities, according to a carefully prepared schedule and with a minimum of friction. The French standard type of military train, and the convenient and commodious loading platforms, contributed largely to the smoothness with which large bodies of troops were shifted from sector to sector. As a rule, troops *en route* were well looked after and comfortable. There were at time congestions, delays and attendant discomforts, but these were the exceptions.

TRAINING AT THE FRONT

On arrival at the front, batteries were assigned to work with batteries of the French for a few days, after which authority and control was rapidly passed into American hands. This was a most interesting period, and the experience gained and the opportunities given for instruction were exceedingly valuable. Brigades which did not have the opportunity to see such service before taking part in one of the big offensives were badly handicapped.

It was noticeable that, both in Alsace and near Verdun, the

arrivals of the Americans in the line was quickly followed by a very marked increase in the activities of those sectors.

CAMOUFLAGE AND BATTERY POSITIONS

While in their training areas the brigades had received a limited amount of instruction in the principles of camouflage. Later officers of this branch were assigned to the brigades and were of great assistance to battery commanders. The men were interested in this work and showed an intelligent appreciation of the reasons for the precautions taken.*

CONCEALMENTS

It was necessary to occupy many old battery positions, and great care and ingenuity was shown in maintaining the look of abandoned emplacements. Such a position in the open was taken over by a howitzer battery of the 17th Field Artillery, which remained in position for weeks without discovery. There was considerable aerial activity at the time, and many enemy balloons in evidence, which seriously interfered with the fire of our batteries. Officers had been especially cautioned against opening fire when balloons or aeroplanes were known to be in observation. Hostile fire invariably followed any violation of these instructions.

SHELTER

Green troops, after being in the lines for a short time, are very liable to become careless and to take unnecessary risks. Battery officers must see that men do not expose themselves unnecessarily, and prevent the forming of groups during periods of shelling. Men soon learn by experience how and when to take shelter. The gas problem was very similar. Excessive casualties from gas were almost always the result of faulty discipline.

I had to impress on battery commanders the necessity of providing adequate shelter for gun crews, even in temporary

* They invariably resented the halting of any troops near their positions. On the other hand, very few troops showed any marked desire to linger in the vicinity of batteries in action.

positions. A little extra work with pick and shovel saved many lives.

LOCATION OF BATTERY POSITIONS

In selecting positions for artillery, consideration must be given to the terrain, width of the fronts to be covered, strength of the command, facilities for observation, for movement, for ammunition supply and especially the positions of our front and support lines. There were no hard-and-fast rules to be followed. Each situation had to be met and solved. In general the country operated over lent itself well to the selection and occupation of positions. On approaching the Vesle River, in support of the 32nd Division (August, 1918), there was considerable difficulty experienced in placing the artillery at my disposal. Good battery positions were hard to find, and batteries of a neighboring brigade had been forced into the sector of our advance. There was crowding of batteries near the Fond de Mezieres, which was further complicated by the advance of support troops to this vicinity. It was soon apparent, however, that the Germans had halted their retreat, and a redistribution of the artillery could be made and the congestion relieved.

During the continuance of stationary warfare it was customary to prepare many positions and to frequently shift batteries. After the German drive of March and April, 1918, steps were taken to provide a second line of resistance, and the artillery was divided to meet the situation. In some cases, batteries were divided, one platoon forward, and one on the rear lines—the second platoon firing only when the guns of the forward platoon were in action. More generally, the division was made in the battalion. The purpose was to prevent the artillery of a sector from being overwhelmed, as had happened.

In open warfare I usually placed the light field artillery regiments near the flanks of the zone of advance, and held the regiment of 155's near the centre. Regiments went into position with battalions in eschelon. I favored placing the artillery well to the front, both for the purpose of liaison and to avoid too frequent changes of position. Preceding an attack, emplacements

were constructed close to the front lines, to which designated batteries were moved. Precautions were taken to maintain concealment, and the fire of these batteries was limited to a few shots for registration, delivered under cover of the fire of other batteries. Just before the Meuse-Argonne offensive, the forward batteries did not register.

The 75 regiments were generally in advance of the 155's. There were exceptions, as on November 1st, when a battalion of the 121st Field Artillery, in position between Romagne and Dantheville, was the furthest advanced of all but one battery of the brigade. Many of the G. P. F. batteries were well to the front on this day.

CHANGES OF POSITION

Changes of position forward were made by advancing the rear battalions of regiments to previously reconnoitered positions. The remaining artillery was held in position until word was received that the movement was completed and batteries ready to open fire. Further advances were made in a like manner. Night was usually selected for changes of positions and reliefs, but during rapid advances it was often necessary to move by day. In this case a careful reconnaissance was made to select routes which insured protection against hostile observation. Wood roads were used when practicable and distances increased.

Our regulations prescribe that artillery moving to the front shall be given the right of way. When, as sometimes happened, a single road was the sole route of supply of an entire division, the artillery was obliged to make its way forward to the best of its ability. In such cases the congestion usually was very bad, and both artillery and ammunition trains were held up for long periods. During the first advance in the Meuse-Argonne there were long stretches of light railway in position, which, had they been promptly connected up. would have materially relieved the frightful road congestion towards Montfaucon. In this locality some of my ammunition trucks were on the road for over 24 hours, advancing about 8 km. The evacuation of the wounded to the rear was correspondingly delayed.

BRIGADE AND REGIMENTAL STAFFS

The first artillery brigades in France had no definite rules to follow in the organization of staffs and were forced to experiment and attempt to adapt to American needs the system in vogue in French brigades. When I joined the 57th Brigade I found a staff organized which I was able to try out while with the 32nd Division in Alsace. After several minor changes had been made, the following organization was adopted and retained. It follows very closely the organization of a brigade staff which was later laid down from G. H. Q.

ORGANIZATION OF A BRIGADE STAFF

1 Brigadier General	Commanding Brigade.
1 Lieutenant-Colonel or Major	Brigade Adjutant.
1 Captain	Munitions.
1 Captain	Communications.
1 Lieutenant	Intelligence.
1 Lieutenant	Operations.
1 Lieutenant	Assistant Adjutant.
1 Lieutenant	Brigade Detachment Commander.
1 Lieutenant	Asst. to Intelligence Officer.

Of the above officers, two were aides to the Brigade Commander. After the armistice several other officers were added to the staff and the following additional matters were handled: Recreations and athletics, training and instruction schedules, personnel adjutant, officer in charge of radio and message centre, and a liaison officer.

The brigade adjutant was in fact a chief of staff and operated as such. He was available to take over the work of an absent member of the staff. In this connection I invite attention to the importance of always having available in the regiments officers capable of filling staff positions. These officers can be trained by short tours of duty as assistants to staff officers at brigade headquarters.

Aides-de-camp should be given assignments and do their share of the work of the brigade staff.

Two French officers assigned to my staff were of great

value, acting as liaison officers to the headquarters of the French divisions and corps with which we operated and in reconnaissance and the collection of information. The French interpreter at my headquarters proved to be the best billeting officer and forager I have ever met.

The officer in charge of communications and the men under him should come from the Signal Corps. This command should stand in the same relation to the brigade as the division signal troops to the division.

Officers charged with the ammunition supply and artillery information must possess ability and initiative. They must constantly oversee and direct the work on these lines in the regiments and battalions. During the progress of an action, officers, unless held to strict accountability, were liable to neglect to render essential reports.

We obtained valuable information from our observation posts and were frequently able to locate many hostile batteries in advance of information from the corps. I considered it important to have an officer present at the questioning of prisoners to note matter of value to the artillery.

The preparation of orders, barrage tables and charts is a question of training. Officers soon become expert along these lines. There were occasional delays in the delivery of the divisional operation orders, allowing very little time for the preparation and distribution of orders. I was usually able to obtain sufficient advance information from the division staff to permit of the preparing of a working order which would require few changes before being issued. This is one of the advantages of close liaison between division and artillery brigade headquarters.

Means for manifolding orders, sketches and charts were necessary. A few brigades were equipped with small electric lighting plants which were very convenient.

LIAISON

In order to intelligently carry out its purpose of furnishing support to the infantry, artillery must maintain a network of

communications connecting the brigade headquarters with all organizations, P.C.'s and O.P.'s, and extending the lines to the division and infantry advanced troops. All practicable means of communication were employed—wireless, runners and couriers, flash-signaling, carrier-pigeons, but principally telephones. Because of frequent interruptions, it was general to provide more than one means of communication to any point. No work at the front was more arduous than that of the linesman, and no work was better performed.

Convinced that the best liaison was to be obtained by personal contact, the following methods were instituted in the brigade.

First: The artillery brigade headquarters was established with, or in close touch with, the division.

Second: A commander of the light field artillery was appointed with orders to maintain contact with the commander of the infantry advance, to advise and confer with him, and to carry out requests for artillery support, keeping brigade headquarters informed.

Third: A commander of the heavy field artillery was likewise appointed. His P.C. to be placed close to that of the brigade.

Fourth: Personal liaison or close touch was maintained between Field Artillery battalion commanders and the commanders of the infantry units supported.

Fifth: Artillery liaison officers with the front-line troops.

Sixth: A field officer was detailed with four or more officers and an equal number of non-commisioned officers to keep constantly in touch with the infantry front lines, and to keep brigade headquarters informed of actual conditions existing. This information was usually sent through the commander of the light field artillery. This detail was independent of the ordinary liaison details. In addition, I generally retained certain units for special missions, and designated the organizations to work with balloons and aeroplanes. The plan, as outlined, worked well, especially when the brigade was supporting its own division, where liaison was understood and appreciated. Service

together strengthened the bonds between infantry and artillery, and the liaison was correspondingly improved.

When the brigade was reinforced by other brigades and corps artillery, the system was expanded and was found elastic enough to meet the new conditions.

The French seldom moved their divisional headquarters during an engagement until the infantry had made a considerable advance. The move was then well to the front and usually carried out at night. The American method was quite different. Divisional headquarters were required to follow closely the advance, resulting in numerous small shifts and consequent interruption of the complicated system of communications. Theoretically, the American system may have had certain advantages, but practically it spelled confusion and loss of touch. Such changes meant always a large expenditure of wire at a time when wire was most precious. Communication with neighboring brigades was usually lost when one of the headquarters moved, and messages would have to be relayed through corps headquarters. Sufficient wire for our many needs was hard to get. It was gathered up whenever possible. We tried using German wires north of Château-Thierry, but found it quite unsatisfactory.

In Alsace it was a not uncommon occurrence to find our lines had been deliberately cut or grounded by German sympathizers. On the other fronts there was a good deal of unauthorized cutting into lines. There was too much careless talking over wires at times, which had to be severely checked.

FIRE EFFECT

The long period of stationary warfare, before the advent of the American Army, had led to the introduction of many refinements in the preparation of firing data. Map firing was extensively used. *The American artillery generally operated under conditions of open warfare to which the sound principles of our drill regulations were peculiarly applicable. In carrying out these principles particular stress was laid on the establishing of*

suitable observation posts and the observing of fire.* It was customary to push O.P.'s well to the front, not neglecting observation from the infantry front lines. When possible, the results of fire was sent to battery positions for the information of the men.

Map firing continued to be used extensively, especially at night, for harassing and destructive fire, and was extremely effective.

Some good work was done with the balloons assigned to our front. These were hampered by long periods of low visibility and frequent attacks by German airmen. The results obtained by the German artillery working with aeroplanes demonstrated the value of a trained air force.

There was noticeable confusion in the minds of those asking for artillery protection as to different kinds of fire. Barrages were often called for when a quite different fire was wanted. Requests for fire on localities were generally vague and sometimes meaningless. Coördinates, when given, had always to be carefully checked. There were too many calls for fire for unnecessarily long periods. To obviate these difficulties, I requested that more use should be made of artillery liaison officers in sending calls for fire.

Green troops, when first exposed to hostile fire, were prone to think that they were being fired upon by their own artillery. This was especially so in the Argonne, where the hostile artillery east of the Meuse delivered a very effective oblique fire from high-powered rifles on our front lines. Every one who has experienced the arrival of the so-called "whiz-bangs" knows how difficult it is to determine the direction from which the projectiles are coming. Liaison officers were particularly enjoined to clear up such situations, and, by showing that our artillery was not firing, or firing in a different direction, and pointing out the direction from which the fire was coming, to restore confidence. It may be said of our men that they soon learned to distinguish between different kinds of fire, and to appreciate the work of the artillery.

* Our italics—Editor.

The advance of the infantry in both major and minor attacks was, as a rule, protected by a rolling, or creeping barrage. The barrage, as first used by both the Allies and by the enemy, had numerous defects. It was generally too fast, had insufficient depth and did not provide for halts for the infantry to reform. On their part, the attacking troops failed to close up to the barrage, and gave time to the enemy to man lines and machine guns, checking the advance, while the barrage proceeded harmlessly on its way. As these faults were eliminated, the barrage became a very efficient protection and an important factor in conserving man-power. During the last phase of the war, shortage of ammunition prevented an extensive use of the barrage by the Germans.

A type of barrage I employed with success was as follows:

(*a*) A first-line barrage about 300 m. in advance of the jumping-off lines, fire of batteries to overlap; guns, 75's; ammunition, shell.

(*b*) A second-line barrage 200 m. in advance of the first line, and lifting with it; guns, 75's; ammunition, shrapnel and smoke.

Lifts of 100 m., time varied to meet conditions of the terrain—average about four minutes.

Rate of fire, 3 shots per gun per minute for 3 minutes, 2 shots per gun per minute for 2 minutes, and thereafter one shot per gun per minute.

(*c*) In advance of the main barrage, and lifting when the forward (second) lines approached to within 400 m. of the target, destructive fire on selected targets by heavy howitzers and guns (155 G. P. F.'s).

Halts of sufficient length to give ample time to reform the infantry were provided. During these halts a stationary barrage and smoke screen was laid down in advance of the infantry lines.

When the limit of fire of the 75's was reached, protection was continued by the fire of howitzers, long-range guns and 75's with long-range shells on designated targets.

When a considerable advance was contemplated the orders for a forward movement of the artillery were provided. In all cases, the barrage was coördinated with the fire of neighboring units. In large operations these adjustments were made by the corps or army.

Before an advance could be made, it was sometimes necessary for the artillery to open up paths through the enemy's wires. This presented no great difficultiy, and the French hand-books contained full instructions and data for such operations. Good observation was essential, and care was necessary to prevent repairs being made. I saw trench mortars used for breaking wire in Alsace and considered their work satisfactory.

The assigning of guns to accompany infantry units during an advance was introduced into the German Army pursuant to orders of General Ludendorf. A short time afterwards our General Staff adopted the same system. It could hardly be said to have proved an unqualified success. Infantry commanders hesitated to order a gun into position where its presence was likely to draw hostile fire. The 75 gun was ill-adapted for the purpose, and it was the opinion of the majority of artillerymen that much better results against machine-gun nests could be obtained from batteries in position having good infantry liaison than from guns pushed forward to the extreme front. At the time, I recommended the using of the Vickers-Maxim mountain gun for this work. Whippet tanks armed with a 37 or higher caliber gun would probably have given the best results.

It was further proposed to assign artillery batteries or battalions to be under the direct orders of infantry commanders. This presupposed an intimate knowledge of the handling of artillery by the infantry commanders, a condition which was to all intents non-existent. I saw this method tried once, at great sacrifice to the artillery unit involved, and with no corresponding advantage to the infantry.

A general attack was almost always preceded by a heavy bombardment of all calibers, and of varying duration. Personally, I favored a continuous pounding of the enemy, by day

and night, gradually increasing to an intensive fire of all available guns for about two hours before "H" hour. It is apparent, of course, that it was necessary to vary the method and to keep the enemy in the dark as to our intentions. During the Meuse-Argonne offensive the enemy's commands opposite to our front showed unmistakable evidences of nervousness, and with little effort could be led into a wasteful expenditure of ammunition in long and unnecessary barrages. At this time there was no let-up in the harassing of the hostile lines and rear areas. Definite programmes for fire by day and night were drawn up daily and carried out. Prisoners reported our fire to be most effective, and as having a very destructive effect on morale.

The following is quoted from a captured order of the 88th German Division, which was opposite our front:

October 30, 1918.

5. In the last days considerable losses have been occasioned by the enemy artillery fire. These are only to be prevented when the troops dig themselves in. Moving about in prominent places is without object, as the American artillery places all landmarks and woods under fire.

I expect that the commanders personally see to it that the troops dig in and build shelters. Wood may be obtained in the Pioneer Park at Montigny.

VON BECZWARZEWSKY.

COUNTER-BATTERY FIRE

Under French control much of the counter-battery work was done through the Chief of Divisional Artillery, by his own artillery, or by that of the corps and army placed at his disposal. After the formation of the American corps and armies, counter-battery work was entirely taken over by these commands.

It is my belief that this divisional artillery commander is in a better position to respond to calls for protection against hostile fire than corps or army headquarters. I was usually able to render such assistance with the means at my disposal when fire was from our own front. Against the fire of batteries located

outside the zone of advance of the divisions, aid was asked for from the corps.

I think that during active operations much of the corps artillery, especially heavy howitzers and G.P.F. guns, should be assigned to divisions, and in the same manner the handling of a considerable part of the army artillery should be given to the chiefs of corps artillery.

I am in favor of adding to the brigade a regiment of medium-caliber howitzers of adequate range, so that the organization would be: 2 regiments of 75 guns, 1 regiment of light field howitzers, and 1 regiment of 155 howitzers. To objections on the ground of unwieldiness. I can say that I found no particular difficulty in handling a brigade of 4 regiments. As I have said previously, the ammunition train should belong to the brigade, as should the mobile ordnance repair shop.

AMMUNITION

The American artillery was liberally supplied with ammunition, and the allowance to batteries was amply sufficient for all needs. Commanders were held accountable for any unusual expenditure, and firing not laid down in the daily programme was required to be promptly reported with the reasons therefor. Every endeavor was made to prevent wastage, and to make each shot count.

The quality of the ammunition furnished us was very good. Certain types of fuzes gave some trouble, and there were a few premature bursts in the 75 gun, but, as a rule, they worked well. The same was not true of the German ammunition, which, towards the latter part of 1918, was poor and produced a surprising number of "duds."

Shell was the principal kind of projectile used, but after September, 1918, shrapnel made its appearance, both mixed with shell in the barrage and against small parties and individuals concealed in fox holes. Machine guns in woods were difficult to dislodge. The 75 shell was not effective against these nests and shrapnel less so. I found that the 155 shell, with

long fuzes, bursting above ground, gave good results. Gas would have solved the problem, but infantry commanders were not all favorable to the use of gases on their immediate fronts. Had the war continued, undoubtedly a much more extensive use of gases of the mustard type would have been made, so that woods and strong points could have been thoroughly drenched, isolated and passed by the advancing infantry. Smoke-producing shells were likewise coming to be more used when the armistice put a stop to hostilities.

CONCLUSIONS

There was a steady and progressive improvement in the artillery after it reached the front, and a noticeable closer coöperation with the infantry. Artillery Headquarters was placing at the disposal of incoming organizations the experience gained by the brigades which had been in action, and improvements in organization, training and equipment were being introduced. That the artillery, from its small beginning, was able to accomplish what it did is extraordinary, and, in many respects, one of the most wonderful accomplishments of the many marvelous things done by the United States during the war.

I feel confident that the experience gained will not be wasted, and that our artillery of the future will hold its own with the best.

Observations Made During an Endurance Test for Saddle Horses

Run from Ft. Ethan Allen, Vt., to Camp Devens, Mass. From October 14th to 18th, 1919

BY COLONEL C. P. GEORGE (FIELD ARTILLERY) GENERAL STAFF

[EDITOR'S NOTE.—*A study of the conditions of this test leads one to the conclusion that more information relative to the type of horse desired by the Army for saddle purposes might have been obtained had each entry been required to carry the service pack which should have included all articles necessary for the proper care of the horse and rider during the test.*]

THE test was held under the auspices of the Chief of the Bureau of Animal Industry, Department of Agriculture and the Remount Board, U. S. Army. The War Department approved the entry of two officers from each of the following posts: Fort Ethan Allen, Vt., and Camp Devens, Mass., also the entries of any individual officers making application.

The test was promoted and financed by two sportsmen, Mr. W. R. Brown, of Berlin, Vt., and Mr. A. W. Harris, of Chicago, Ill., men actuated by a desire to stimulate interest in the breeding of cavalry mounts, and to determine the performance of different types and breeds of horses under the severe conditions of a forced march.

Following are the conditions as published prior to the test:

CONDITIONS, SUBJECT TO MODIFICATION BY JUDGES

Distance, approximately 300 miles; to be covered at the rate of 60 miles a day, as stabling accommodation can be obtained, for five consecutive days, rain or shine; each horse carrying 200

pounds, inclusive of rider and equipment. Equipment to be optional. An additional day's performance may be required by the judges in order to decide among contestants showing equal merit at the end of the fifth day. Should no horse show sufficient merit to justify an award, the judges may decline to award a prize, or they may award first, second, or third money only. All contestants to follow the same route, and all horses to stop at approximately the same place every night. Each horse to be ridden and cared for solely by his rider, except that a farrier and veterinarian will be in attendance for those who desire their services.

Rider to continue in the saddle while horse is in motion over the course.

Each rider to continue through with his horse, unless excused by the judges on account of illness or emergency. If excused, such rider may select his successor. Each horse will be provided with a number to be carried in plain sight on the rider's back.

Three feeds will be allowed each day at checking-in stations—before starting in the morning, at 30 miles, and upon arrival at night.

Stabling accommodations and feed will be provided in advance by the judges, for which a reasonable charge will be made.

Points: Condition, 50 per cent.; speed, 25 per cent.; feed consumed, 25 per cent. Condition to be determined by an examination of the horse at the close of the race, and a subsequent examination the following morning as follows:

(*a*) Appearance of horse as to brightness of eye, condition of coat, appetite, etc.

(*b*) Weight of the horse at the finish as compared with weight at the start.

(*c*) Energy at the walk, trot, canter, and gallop.

(*d*) Freedom from lameness, soreness, stiffness, injury, etc.

(*e*) Freedom from temperature, colic, lung trouble, etc.

Speed to be determined by the shortest time elapsed as the

sum of the time between the start and finish each day within the time limits set.

The total elapsed time on the road each day, from departure in the morning to arrival at night, inclusive of time for feeds, or for any other cause, not to be shorter than 10 hours nor longer than 15 hours. Time of departure in the morning, within certain hours, will be optional with each rider.

Credit for the smallest amount of feed consumed *en route* to be determined by weight of feed to each horse. Permitted foods to consist of hay, oats, corn, bran and salt, issued in such quantities as desired. An account to be kept of the number of pounds of feed consumed by each horse. No feed other than the above to be allowed, nor shall horses be fed elsewhere than at the checking-in stations. Plain water only to be given, and permitted whenever and wherever obtainable.

Prizes to be awarded as follows:

1st Prize	$1,000 in cash.
2nd Prize	500 in cash.
3rd Prize	250 in cash.

A cup will also be awarded to the owner of the winning horse, to be known as the United States Mounted Service Cup, and the name of the owner and his horse recorded thereon, together with the date, time and distance, said cup to be the property of the owner for one year, to be put up and contested for annually thereafter, until one owner has won it three times, when it will become his permanent property.

The judges to be Major Henry Leonard, of Washington, D. C.; Harry Worcester Smith, of North Grafton, Mass., and Major C. A. Benton, of New York.

A decision of a majority of the judges shall be final in all matters. Rejection of any horse during the race may be made on account of a condition developed in which it appears to the judges that it would be a cruelty for him to proceed.

Contest open to any stallion, mare, or gelding over four years of age, owned in the United States.

Entry fee to be $5 for each horse. Entry to be made out on blanks, which shall contain the name of each horse entered, his breed, age, color, sex, height and owner, with owner's address. Breeding of all horses to be classified as follows:

1. Pure-bred. Meaning a horse registered in any accepted stud book for that breed, or the breeding of which can be clearly traced to the satisfaction of the judges to registered stock of the same breed on both sides.

2. Grade. Meaning a horse of which either the sire or dam is a registered pure-blood of some established breed, or the breeding of which can be clearly traced to the satisfaction of the judges, to one-half or more registered pure-blood of some accepted breed, and the remaining blood of which is of other breeds or unknown.

3. Cross-bred. Meaning a horse of which both the sire and dam is a registered pure-blood of an established breed, but not of the same breed, or the breeding of said horse can be clearly traced to the satisfaction of the judges completely to registered pure-blood of but two established breeds.

An entry will constitute an agreement that the owner making it, his agent and his horse, shall be subject in all matters to the decision of the judges. Entry fee to be forfeited, and horse and rider disqualified, for failure to observe rules or make entry.

Entries to close two weeks before date set for race.

Owner to pay all expenses of horse and rider.

The fact that the test was not advertised at an earlier date, without doubt, resulted in the original entry list, which was quite large, being reduced to twenty. Fourteen finally started.

The judges, who arrived at Fort Ethan Allen the day before the start, received for consideration various suggestions and protests.

It was the general opinion of three of the four entries from the Army that the conditions relative to weight should be interpreted

to mean, inasmuch as the test was to simulate the severe conditions of a forced march—in other words, field conditions—that a minimum weight of two hundred pounds, inclusive of rider, would be carried, and that the equipment necessary for the care of the horse would be included in the equipment carried.

This view was not taken by the civilian entries and one Army entry, as nearly all these contestants made arrangements to convey by motor the paraphernalia with which to care for their horses, which included blankets, buckets, sponges, bandages, etc.

It was suggested to the judges that the conditions be interpreted to require an entry to carry as part of his pack the equipment with which to care for the horse, but they ruled that, under the conditions prescribed, each horse was to carry just two hundred pounds, but that no objection would be made to overweight.

Another question raised was whether or not a horse specially shod with pads, etc., to prevent concussion, would receive the same credit, other things being equal at the end of the test, as one shod with an ordinary shoe. The judges decided that if such a condition existed, the horse shod with ordinary shoes would receive more credit than the horse shod with pads.

It was also suggested that the weight given for food consumed be reduced to 15, and the difference added to speed. This was also overruled as not being authorized under the conditions pursuant to which contestants had prepared.

All horses were weighed, stripped, at 5 P.M. the day before the start. Riders with equipment were weighed immediately after the horses.

The next day, just before the start, the riders and equipment were again weighed, and each day thereafter the riders and equipment were weighed just prior to starting, and at the finish of the day's run.

The following table shows the horses starting, their breeding, weight, height, and weight of riders' equipment:

Horse	No.	Breeding	Rider	Owner	Wt.	Ht.	Rider's Weight	Wt. of Equip.
Abbess	1	Arab	Alfred Jose	H. S. Neilson	835	15	150	50
Primrose	3	Arab	B. M. Jenkins	H. S. Neilson	765	14–1	151.5	48½
Castor	4	Morgan	Capt. Paul Hurlburt, 3rd Cav.	Agri. Dept.	860	14–3½	162	38
Ponce de Leon	5	Half-bred	J. D. Lawson	Rider	927	16	137½	62½
Bob	7	Half-bred	C. P. George, Col. G. S.	Rider	1072½	15–3	138	62
Kingfisher..	9	Arab-grade $^{15}/_{16}$ Arab $^{1}/_{16}$ thoroughbred	Frank Tompkins, Col., Cav.	Rider	840	14–3	157½	42½
Prince	10	Morgan	A. S. Hunter	Norwich University	900	14–3	152½	47½
Ched	11	Morgan	Ed. Walter	Norwich University	865	14–3½	157	43
Donlyn	12	Morgan (Stud)	R. R. Allen, Capt. 3d Cav.	Agri. Dept.	897½	14–2¼	136½	63½
Rustem Bey	15	Arab (Cross bred)	R. H. Nickolsen	W. R. Brown	995	15–3	171	29
Kheyra	16	Arab	Lee King	W. R. Brown	875	15¼	151½	48½
Ramla	17	Arab	A. W. Harris	W. R. Brown	850	14–3	159¾	40¼
Halcyon	18	Arab-grade ⅞ Arab ½ thoroughbred	J. W. Ames	W. R. Brown	897½	15½	162	38
Crabbett	19	Arab	James Monahan	W. R. Brown	915	15–2	177½	22½

Following is a list of the officials:

Judges: Major Henry Leonard, U. S. Marine Corps; Mr. C. A. Benton and Mr. Harry Worcester Smith.

Clerk of the Course: Mr. David Gray.

Official Weigher: Mr. John G. Glidden.

General Assistant to Other Officials: Mr. Harold Berry.

Methods followed by the officials in judging; issue of food, etc.:

On the road and at the beginning and end of each half day's run, all horses were carefully observed by the judges, and if an animal showed any indication of weariness, he was examined by the official veterinarian, his pulse, respiration, and temperature were taken, and general condition noted, and if, in the opinion of the judges, he was not in condition to continue, he was disqualified.

The judges remained at the starting-point for at least an hour after all contestants had checked out, and then, traveling

by motor, observed the horses on the road, arriving at the next feeding station ahead of the leading contestant.

Every horse was examined by the judges and the veterinarian half an hour after the finish of each day's run, and his condition recorded; this included pulse, respiration, and temperature.

As a result of this careful supervision, at least two horses were disqualified in time to prevent permanent disability.

One judge remained on duty at the stables each night.

Feeding.—The food was in charge of the official weigher and feeder, who had an assistant. Grain and bran were issued for each meal in paper sacks by weight or measure, as requested. Hay was issued by weight in salt sacks for each meal. A careful record was made of the issue, the amount left after each meal being weighed, recorded, and re-issued at the next meal.

The following kinds of feed were available for issue: whole oats, ground oats, corn, bran, hay, salt. Riders were allowed to graze the horses while *en route,* if they so desired.

The Route.—The route was clearly marked by pasteboard arrows, about four inches by twelve inches, placed on telegraph poles, trees, etc., at all cross-roads; the direction being so indicated as to preclude any chance of taking the wrong road. Blue arrows were used for the morning route, white arrows for the afternoon route. Yellow rectangular disks were conspicuously placed for every five miles of each day's run.

In addition to the above, each contestant was furnished typewritten sheets showing distances to each town, village, crossroad, or landmark passed *en route*. These sheets were arranged separately for each day's run.

All contestants were started together from the Administration Building, Fort Ethan Allen, at 7.26 A.M., October 14th. The weather at the start was cool, the sky overclouded.

The first day's run was as follows:

Fort Ethan Allen across Winooski River, down South Shore, across to Waterbury for feeding (28.8 miles); back to

"RAMLA," THE WINNER.
Mare, pure-bred Arab. Owner, W. R. Brown. Rider, A. W. Harris.

"KINGFISHER," SECOND PLACE.

Gehling, cross-bred Arab ($\frac{15}{16}$ Arab. $\frac{1}{16}$ thoroughbred). Owned and ridden by Colonel Frank Thompkins, U. S. Cavalry.

"KHEYRA," THIRD PLACE.
Mare, pure-bred Arab. Owner, W. R. Brown, Rider, Lee King.

"HALCYON," FOURTH PLACE.

Mare, cross-bred Arab ($\frac{7}{8}$ Arab. $\frac{1}{8}$ thoroughbred). Owner, W. R. Brown. Rider, J. W. Ames.
This mare is the dam of Kingfisher and was five months in foal at the time of the race.

South Shore, turning S.W. at Duxbury Corner for Moretown, bearing N.E. through Moretown down Mad River Valley, and reaching south bank of Winooski River, nearly opposite Middlesex; through Montpelier Jct. to Northfield (60.3 miles) to front entrance of new stables, Norwich University.

Following are the times:

Horse	No.	Out	In	Out	In	Speed
		A.M.	A.M.	P.M.	P.M.	Hrs.
Abbess	1	7.26	12.40	1.33	8.40	13–14
Primrose	3	7.26	12.40	1.33	8.40	13–14
Castor	4	7.26	11.40	12.58	5.26	10
Ponce de Leon	5	7.26	1.21	2.00	11.13	15–47
Bob	7	7.26	11.38	1.03	5.26	10
Kingfisher	9	7.26	12.05	1.15	6.13	10–47
Prince	10	7.26	12.05	1.15	6.13	10–47
Ched	11	7.26	12.05	1.15	6.13	10–47
Donlyn	12	7.26	11.40	12.50	5.26	10
Rustem Bey	15	7.26	11.30	12.58	5.28	10–2
Kheyra	16	7.26	11.00	1.02	5.28	10–2
Ramla	17	7.26	11.30	1.04	5.28	10–2
Halcyon	18	7.26	11.30	1.00	5.28	10–2
Crabbett	19	7.26	12.00	1.18	6.34	11–8

The route during the morning period was generally up and down hill, with sufficient level stretches to allow increased gaits. The roads were dirt, and varied from good to excellent. One noticeable feature of the start was that although the riders started together, within less than half a mile they were grouped, those from the same stables and localities riding together. It was evident very early the first day that the entries from the same stable or locality were "teamed" with the intention of pacing each other. This procedure, without doubt, worked to a big advantage to those concerned, particularly so when they alternated taking the lead.

The roads during the afternoon ride were very good, and except for two stretches of deep gravel, were soft.

The route followed was a valley with a slight down-hill slope. I was the sixth out, at noon. Following my schedule, I passed the leaders about two forty-five. At four o'clock I stopped for water and a rest of fifteen minutes, as I was ahead

of my schedule; during ten minutes of this period my horse grazed. The leaders, Rustem Bey, Kheyra, Ramla, Halcyon, Castor and Donlyn passed me here. I again passed them at four forty-five, was joined by Castor and Donlyn, and arrived at the finish, the Norwich University Stables, at five twenty-six.

We were immediately assigned stalls, ordered to weigh in, issued feed, and left to our own devices. The following schedule in caring for my horse was carried out each evening: Unbridled; loosened cinch, leaving saddle on horse; removed pack from saddle; fed hay; made a straw wisp; removed saddle; blanketed horse; pounded horse's back with wisp for five minutes; weighed in with equipment, including blanket; reblanketed horse; hand-rubbed legs with a lotion containing equal parts alcohol and witch hazel, with 20 per cent. tannic acid; after rubbing a leg, tightly bandaged it from knee or hock to and including the pastern; groomed horse, "scrubbing" with the body-brush to stimulate the skin. (As my horse was practically cooled out when I arrived at the finish, with the exception of one evening, I watered, about one-half bucketful, one hour after arriving.) Removed tight bandages, substituting cotton batting lightly wrapped with bandages; packed feet with "white rock," a foot packing. Again watered horse; fed oats. Total time, about two hours and a half.

The first evening three horses were chilled, due either to coming in hot and cooling out too quickly, or being watered too soon.

One horse was diqualified the first day, No. 5, Ponce de Leon. His rider did not understand the printed instructions, and assumed that the noon stop did not count in the total time reckoned; as a result he was forty-seven minutes over the maximum time allowed (fifteen hours).

Second Day. Up at four-thirty, arrived at the stables at five; watered and fed oats, two pounds. Groomed. By five thirty every one was busy. We were allowed to depart between seven and seven-thirty; usually every one was out by seven-fifteen.

Noticed several horses walking stiff as they left the stable.

I was last out, and, as Bob was anxious to catch the others, had my troubles until I passed the first group.

The route was as follows:

Northfield to Montpelier, going from there up Worcester Branch of Winooski River, through Worcester, going N.E. to Hardwick for feeding (29.9 miles); from Hardwick through South Walden, W. Danville, Danville; turning at Danville for N. Danville, to St. Johnsbury, first gate of Fair Grounds (just 60 miles).

Weather, A.M., clear and cool. Road generally soft, but over rolling country. Passed through Montpelier, about one mile of paved streets. From Worcester to Hardwick quite hilly, generally down hill.

Caught leaders, Rustem Bey, Kheyra, Castor, at a farmhouse about eight miles from Hardwick, where we were given refreshments, consisting of fresh cider and apples. I remained there about fifteen minutes, grazing; others went on after five minutes. Passed Kheyra and Castor about four miles from Hardwick; walked in last mile.

Fed one pound of hay; removed equipment, blanketed; pounded back with wisp; sponged nostrils, eyes and dock; fed two pounds oats (followed this schedule every midday stop); ate lunch, saddled; out at 1:02. Rustem Bey, Kheyra, Donlyn and Castor were out ahead of me. Did not catch sight of any of the leaders during the balance of the afternoon. I followed my time schedule whenever practicable. The road was generally quite hilly, and the last fifteen miles were practically all down hill, which precluded fast going, except on short level stretches.

The leaders, paced by the two Morgans (Donlyn and Castor), arrived at the finish slightly ahead of the schedule. To use the expression of one of the others, "they went like hell at a trot, up and down hill." Seemingly that gait must have suited Rustem Bey and Kheyra, as they were bunched with the Morgans during the entire afternoon.

I arrived six minutes too soon, and had to walk my horse and graze until time to check in.

Following are the times:

Horse	No.	Out	In	Out	In	Speed
		A.M.	A.M.	P.M.	P.M.	Hrs.
Castor	4	7	11.55	12.59	5	10
Bob	7	7.13	11.54	1.02	5.13	10
Kingfisher	9	7.11	12.33	1.40	5.52	10–41
Prince	10	7.11	12.33	1.40	5.52	10–41
Ched	11	7.11	12.33	1.40	5.52	10–41
Donlyn	12	7	12.05	12.58	5	10
Rustem Bey	15	7.02	11.53	12.54	5.02	10
Kheyra	16	7.02	11.55	12.58	5.02	10
Ramla	17	7.06	12.33	1.48	5.50	10–44
Halcyon	18	7.06	12.33	1.10	5.50	10–44
Crabbett	19	7.05	12.05	1.05	5.46	10–41

Two entries were disqualified this date, Abbess, No. 1, and Primrose, No. 3. It was apparent at the start of the test that neither of these horses were in condition. Abbess was trained too fine, and Primrose was too fat. Abbess went lame; Primrose was led in. With the exception of these two, all the horses appeared to be in excellent condition.

Third Day. Route was as follows: St. Johnsbury down west bank of river through Wells River to Bradford for feeding (32.5 miles); continuing down west bank of Connecticut to within about two miles of White River Jct.; turning S.W. at this point through Hartford to Fair Ground entrance gate (62.8 miles).

My horse came out stiff, and although he "walked out of it" within a quarter of a mile, I knew it was the beginning of the end. This animal is 13 years old; was in Mexico for six months, and in France for seventeen months, and during these periods he underwent many hardships.

As a result of this hard service, "wind puffs" appeared on all four pastern joints about a year ago. To these I attribute his stiffness and subsequent withdrawal, as they without doubt are a sure indication of a weakening of the bursal sack, and the resulting deficiency of joint lubrication.

Weather, cool, sky overclouded.

Rain from about 9 A.M. until late at night.

Roads, A.M., generally hard; rolling country, many steep grades.

The going was but fair in comparison with the first and second days, and got worse as the rain continued.

I was last out, and saw none of the others until about five miles from Bradford, where I passed Kheyra and Halcyon; they passed me about two miles from Bradford. Took it easy during the morning because of the condition of my horse at the start, and was last to check in at noon.

Fed one pound of hay and one pound of oats; followed the usual routine in caring for my horse.

Remained at Bradford just forty minutes, and as a result was first to check out.

Rustem Bey, Castor and Donlyn caught me about three miles out. I tagged behind, and stayed with them the balance of the afternoon.

Ramla, Prince, and Ched caught us about eight miles from Bradford, and from there on into White River Junction it was quite a race.

Rustem Bey had lost two minutes the first day and his rider was waiting for a chance to give the others the slip, and make up the lost time. It was raining quite hard, and no one apparently expected to arrive at the finish within the minimum time. No one was "asleep," however, and instead of making up time, Rustem lost three minutes.

Having departed in the morning, sixteen minutes after the leaders, I loafed the last four miles.

The roads were slippery but generally soft. With exception of the last eight miles, the grades were gradual; the last eight miles were over steep inclines.

It is interesting to note the amount of overweight of the riders and equipment, due to the rain.

Donlyn plainly showed signs of fatigue at the finish. This was evidenced by the starry condition of his coat, his unsteady

gait, dullness of his eye, and the carriage of his head. Shortly after arrival he had a very had chill.

All the others seemed to be in excellent shape. Bob picked up during the day, and came in strong with no sign of stiffness or lameness.

Fourth Day. There was a general jockeying for position before the start. Finally Ramla made the break at 7:07, followed by the others at intervals, Kingfisher, Prince and Ched being the last out.

Horse	No.	Out	In	Out	In	Speed	Overweight Due to Rain
		A.M.	A.M.	P.M.	P.M.	Hrs.	
Castor	4	7.03	11.43	12.45	5.03	10	14 pounds.
Bob	7	7.13	11.54	1.02	5.13	10	No record.
Kingfisher	9	7.03	11.46	12.50	5.40	10–37	11 pounds.
Prince	10	7.03	11.45	12.53	5.13	10–10	10 pounds.
Ched	11	7.03	11.45	12.53	5.13	10–10	2 pounds.
Donlyn	12	7.03	11.45	12.46	5.03	10	7½ pounds.
Rustem Bey	15	7	11.42	12.43	5.03	10–3	11 pounds.
Kheyra	16	7	12.03	12.50	5.47	10–47	2 pounds.
Ramla	17	7	11.44	12.58	5.03	10–3	No record.
Crabbett	19	7	11.43	12.54	5.30	10–30	No record.
Halcyon	18	7	12.03	12.55	6.10	11–10	15 pounds.

Bob came out a little stiff, but showed an improvement over the previous day. Donlyn came out quite stiff, but walked out of it.

Weather, A.M., fair; at noon quite warm.

Roads, generally soft.

Terrain, rolling country, with a general down-hill slope.

As the going was very good, all contestants made excellent time during the forenoon, in spite of quite a rise in temperature.

The route was as follows: Leave White River Jct. for Lebanon, turning S.E. beyond through Enfield Centre, Springfield, Wilmot, to Potter Place for feeding (33.2 miles); thence through E. Concord, to State Encampment Grounds, coming in back gate, and making just 60 miles.

Passed Donlyn about seven miles from Potters Place; he plainly showed signs of fatigue, and upon arrival at Potters Place was disqualified by the judges. The failure of this animal

ON THE ROAD THE LAST DAY ABOUT TEN MILES FROM THE FINISH.
(Left to right) "Ramla," "Rustem Bey," "Castor." Note the general appearance of "Rustem Bey."

COLONEL C. P. GEORGE AND "BOB."
Gelding, thirteen years old.

"CASTOR," SIXTH PLACE.
Gelding, Morgan. Owner, Agricultural Department. Rider, Captain Paul Hurlburt, 3rd Cavalry.

"RUSTEM BEY."
Gelding, cross-bred Arab. (Sire, Arab; dam, standard-bred.) Owner, W. B. Brown. Rider, R. H. Nickolsen. This horse was in the best condition of any horse at the finish, with the exception of a slight lameness.

to finish may be attributed to two causes—improper conditioning and a heavy coat. Had he been clipped, he would probably have finished, irrespective of his surplus weight.

It is interesting to note the typical reactions of exhaustion, all of which were plainly evidenced in Donlyn's case. His coat was starry, eye dull, breathing hard, and he stood with his head hung low. The mucous membrane of his nostrils and eyes was inflamed. His temperature was 103.6, pulse 80, and respiration 60. His pulse was of very poor quality (almost as small as a silk thread).

The general condition of the horses at this time was interesting to note, as more than half the distance had been covered. Animals off their feed or improperly conditioned were showing the effect of the strain, easily noticeable by the condition of their coats. Others whose condition seemed only fair at the start were improving each day; the latter particularly true of Ramla and Kingfisher.

None of the contestants were taking chances of losing time this day. Rustem Bey and Kheyra remained but twenty-three minutes for the noon feed.

Weather, P.M., fair and warm.

Roads, generally soft.

Terrain, rolling country with a general slope down hill.

As the distance was indicated to be only twenty-seven miles from Potters Place to the Concord Fair Grounds, practically every one had figured, comparatively speaking, on taking it easy. Unfortunately, the route was about two miles longer than indicated, and, as a result, those who figured their time too close lost out. Bob's perfect time score was ruined this date; he came out at noon, after a rest of thirty-three minutes, quite stiff, and it was quite plain that the mileage was telling on his legs; his condition otherwise was excellent, his coat glossy, and appetite excellent; he walked out of the stiffness in less than a hundred yards, but each time a halt was made started off slightly stiff.

Following are the times:

Horse	No.	Out	In	Out	In	Speed
		A.M.	A.M.	P.M.	P.M.	Hrs.
Castor	4	7.11	12.14	12.49	5.11	10
Bob	7	7.16	12.20	1.00	5.25	10–9
Kingfisher	9	7.22	12.18	1.18	5.32	10–10
Prince	10	7.22	12.18	1.25	5.32	10–10
Ched	11	7.22	12.18	1.20	5.32	10–10
Donlyn	12	7.11	12.21	Out at noon.		
Rustem Bey	15	7.11	12.13	12.35	5.11	10
Kheyra	16	7.12	12.13	12.35	5.12	10
Ramla	17	7.07	12.13	12.55	5.07	10
Halcyon	18	7.13	12.13	12.36	5.13	10
Crabbett	19	7.08	12.13	12.45	5.08	10

I made two bad errors this date. After discovering the discrepancy between the route as marked and actual distance, I rode at an increased gait the last two miles, in order to arrive within the minimum time. This tired my horse more than necessary, and resulted in a bad fall, as we suddenly struck some deep sand, going at a gallop, and down we went.

The water at Concord was cold, and I made the mistake of giving Bob about half a bucketful an hour after he arrived, and, although he had cooled off, the water chilled him, and I had to borrow blankets to warm him up. The chill had no effect on his condition, however, as he ate eight pounds of ground oats and ten pounds of hay that night, and four pounds of oats the next morning. In an effort to combat the stiffness, I applied hot applications of witch hazel to his legs as soon as we arrived, then returned at 10:30 P.M. and hand-rubbed all four legs until the swellings around the pasterns were reduced, and, as a last resort, Sloan's liniment was applied, and the bandages left off. The morning of the 18th I started in at 5, and worked on his legs until 6:30. Added a quart of boiling water to a bucketful of cold water—this took the chill off—and he drank with no ill effects.

Half an hour before leaving again applied Sloan's liniment; the skin being tender, it caused him to dance around in the stall, and when it came time to start, he walked out like a colt. The relief was only temporary, however, as at the first halt, about

four miles out, he stiffened up after standing five minutes; examined his feet, found them cool and free from soreness; his tendons were free from soreness, but puffy around the pastern joints.

Every one was astir early for the final day, and by 7:05 the last man was out.

The route was as follows: From Encampment Grounds over Merrimac River, down west bank of Merrimac to West Manchester, taking south-westerly direction from this point through Bradford, Amherst to Milford for feeding (33.7 miles); from Milford to Ponemah, turning south through Hollis to within about one mile of Groton; thence through W. Groton and to scales at Remount Station, Camp Devens, giving 59.4 miles.

Weather, A.M., fog to first hour; fair and warm.

Roads, generally soft, passing through Manchester paved streets for 4 miles.

Terrain, rolling country, gentle slopes.

Although Bob walked out of the stiffness, I noticed, after about fifteen miles, a shortening of his stride at a trot and gallop. Thirty miles from the start (about four miles from Milford) during a halt, I discovered heat in his tendons, and, rather than risk a permanent injury, decided to scratch him.

As soon as he arrived at Milford (an hour later) he was examined by a veterinarian, and found to be in excellent condition, with the exception of his leg; his pulse, temperature and respiration were normal.

Ched was disqualified by the judges at Milford on account of lameness. I continued by motor to Camp Devens.

Weather, fair and warm.

Roads, fair; generally hard.

Terrain, rolling country, gentle slopes.

At 3 P.M. we passed Prince and Kingfisher, jogging along about fifteen miles from the finish; a short distance in front of them were Halcyon, Kheyra and Crabbett; about two miles

ahead of the latter three we passed Ramla, both rider and horse looked fresh; a half mile ahead was Rustem Bey, moving at a trot, and a mile ahead was Castor, also going at a trot. Castor plainly showed signs of tiring; and very shortly after dropped behind. He had a fall a short distance from the finish.

Following are the times:

Horse	No.	Out	In	Out	In	Speed	Condition on Arrival
		A.M.	A.M.	P.M.	P.M.	Hrs.	
Castor	4	7.02	12.25	1.14	6.20	11-18	Very tired.
Kingfisher	9	7.05	12.25	1.26	6.11	11-6	Showed effects of ride.
Prince	10	7.05	12.25	1.27	6.11	11-6	Showed effects of ride.
Rustem Bey	15	7.02	12.25	1.14	5.39	10-37	Slight lameness, right fore, otherwise excellent.
Kheyra	16	7.02	12.40	1.30	6.50	11-48	Looked tired, dull coat.
Ramla	17	7.02	12.26	1.25	5.39	10-37	Excellent.
Halcyon	18	7.02	12.40	1.30	6.51	11-49	Looked tired.
Crabbett	19	7.02	12.41	1.30	6.39	11-37	Looked tired.

As soon as the horses crossed the finish, the riders were weighed in and the horses led to the scales and weighed, stripped.

It is interesting to note the amount of weight lost.

Horse	No.	Weight at Start	Weight at Finish	Loss
Castor	4	860	805	55
Kingfisher	9	840	775	65
Prince	10	900	830	70
Rustem Bey	15	995	935	60
Kheyra	16	875	825	50
Ramla	17	850	790	60
Halcyon	18	897½	835	62½
Crabbett	19	915	875	40

I am certain that in most cases the loss of weight could not be taken as a standard on which to base the horses' condition at the finish. For instance, although Crabbett lost less than any horse that finished, his condition did not compare favorably with any of the others, with the possible exception of Castor and Kheyra.

The morning of the 19th all the contestants who finished were ordered to appear on the parade ground at Devens for a final test.

The judges very carefully noted the condition of each horse, the gaits, freedom from lameness or stiffness, injury, appearance, etc., all of which was considered in grading for condition. Rustem Bey and Prince were disqualified, in both cases due to a slight lameness in the right fore pastern.

It was most unfortunate that Rustem went lame, as this horse not only had the best time record, but he was by far in the best general condition at the finish.

As a result of the final examination, the places were awarded as follows:

Horse	No.	Breeding	Rider
Ramla	17	Arab (pure-bred)	Mr. A. W. Harris.
Kingfisher	9	Arab (cross-bred)	Colonel Frank Tompkins.
Kheyra	16	Arab (pure-bred)	Lee King.
Halcyon	18	Arab (cross-bred)	J. W. Ames.
Crabbett	19	Arab (pure-bred)	James Monahan.
Castor	4	Morgan	Captain Hurlburt.

Following are the grades of the horses that finished:

No.	Name	Speed—hrs.	Speed—%	Feed Units	Feed—%	Condition	Final
17	Ramla	51-26½	23.6	38.805	19.3	50	92.9
9	Kingfisher	53-21	21.6	38.976	19.2	48	88.8
16	Kkeyra	52-37	22.4	30.729	25.0	25	72.4
18	Halcyon	53-45	21.3	66.494	0.0	60	71.3
19	Crabbett	53-56	21.1	44.030	15.7	30	66.8
4	Castor	51-18	23.7	57.198	6.4	30	60.1
10	Prince	52-54	22.1	68.905	5.3	Lame	None
15	Rustem Bey	50-42	24.3	62.961	2.4	Lame	None

SUMMARY

Feeding.—The food scores undoubtedly did much to place the horses in the final standing. In this connection the Arabs were easily ahead of the others, as they are normally very small feeders.

Following is a table showing the amount of food consumed each day:

B, indicates bran. O, indicates oats. B, indicates bay. S, indicates salt. Oats, bran, key in pounds and ounces; salt in ounces

Horse	No.	14				15				16				17				18				Total			
		O	B	H	S	O	B	H	S	O	B	H	S	O	B	H	S	O	B	H	S	O	B	H	S
Castor	4	8	–	2		11				10				11				10				11			
Bob	7	6½		½		10				9				1		½		9				10			
Kingfisher	9	6	–	1		9				7	–	13		10			1	4	–	6		10			
Prince	10	6	–	1		14				8	–	14		14			1	10	–	1		11			
Ched	11	6	–	1		14				8	–	14		13			1	9	–	1		10			
Donlyn	12	8	–	9		13				11	–	5	½	13			1½	12	–	14		13			
Rustem Bey	15	10		1		12				13	–	4	1	10			1½	13		1		10			
Kheyra	16	7	–	8	17/16	10				6	–	6	3/16	6						1		6½			
Ramla	17	8	–	9	2¾	11	–	14		7	–	15	1/16	12				2	–	6		10			
Halcyon	18	7	–	8		13	–	4		9	–	15		10				11	–	13		12			
Crabbett	19	8	–	3	¼	9				6	–	14						10	–	15	3/16	20			

Horse	No.	14				15				16				17				18				Total			
		O	B	H	S	O	B	H	S	O	B	H	S	O	B	H	S	O	B	H	S	O	B	H	S
Castor	4	8	–	2		11				10				11				10	½	11		10–6			10½	48½	½	54½	1
Bob	7	6½		½		10				9				1		½		9				10				4 Out at noon 18th.			
Kingfisher	9	6	–	1		9				7	–	13		10			1	4	–	6		10				6–4				31	42		1
Prince	10	6	–	1		14				8	–	14		14			1	10	–	1		11				10–12			13	9–6				45	45	67	1
Ched	11	6	–	1		14				8	–	14		13			1	9	–	1		10				8–10			11	Out at noon 18th.							
Donlyn	12	8	–	9		13				11	–	5	½	13			1½	12	–	14		13				Out at noon 17th.											
Rustem Bey	15	10		1		12				13	–	4	1	10			1½	13		1		10				10–6	½	12	½	8–4	¾	6		54	4	49	3
Kheyra	16	7	–	8	17/16	10				6	–	6	3/16	6						1		6½						2–8		5–8	¼	9–4		19	1	39	½
Ramla	17	8	–	9	2¾	11	–	14		7	–	15	1/16	12				2	–	6		10				4				6–3		10		29	¼	43	
Halcyon	18	7	–	8		13	–	4		9	–	15		10				11	–	13		12				12–6			17	10–6	1	10		51	1	72	
Crabbett	19	8	–	3	¼	9				6	–	14						10	–	15	3/16	20				10			1	3–3		9		39	7/16	39	1

In scoring for feed the judges did not give the various kinds of feed the same weight, but based the values on nutrient content.

Following is the method by which feed pecentages were worked out:

Nutrient contents of the various feeds per 100 pounds (data from Department of Agriculture):

Oats		Bran		Hay.	
11.4	Protein	15.4	Protein	4.6	Protein
4.8	Fat	4.0	Fat	1.1	Fat
59.4	Carbohydrates	53.9	Carbohydrates	31.3	Carbon
75.6		73.3		37.0	

It is interesting to note the food value of bran, as the general opinion of the layman has always been that bran has very little food value.

Points given for feed were arrived at in the following manner:

The horses eating the least was awarded the perfect score, and his food value of food consumed computed.

The horse eating the most was given a zero score, and food value computed. In computing the standing of other contestants, the procedure was as follows:

66.494 Feed value of zero score.
30.729 Feed value of perfect score.

35.765 Difference.

25 points allowed for feeding.
35.765 equivalent to a loss of 25 points.

$\frac{35.765}{25}$ = 1.4306 equals amount of food value equivalent to loss of one point.

Subtract the perfect score from any contestant's food value; divide the result by 1.4306; quotient will be number of points lost. Subtract this quotient from 25 for number of points allowed.

Although the table giving food consumed shows blank spaces for several meals, it does not necessarily mean that the horse was not eating, as contestants were allowed to feed the unconsumed food at the next meal.

Some animals were off their feed for several meals, but picked up during the latter part of the test. This was particularly true of Kheyra and Ramla; and although being off her feed a short time did not affect Ramla, whose condition seemed to improve the farther she went, it surely must have had some effect on Kheyra, as her coat at the finish was dull, and she looked drawn. Crabbet was another who undoubtedly lost in condition the latter part of the contest, probably due to being off his feed during part of the 17th and 18th.

My personal experience during this test simply confirmed the ideas I had gathered in the service. Feeding a horse more than he can eat at any one meal is poor judgment and a waste of feed. I believe that the oat feeds should be divided as follows:

One-fourth in the morning.

One-fourth at noon (less, depending on time available; not more than one pound for every half-hour rest).

One-half at night.

I varied this, depending on the amount of time spent at the mid-day feeding points. If I stayed an hour, I fed one pound of hay and two pounds of oats; if less than an hour, fed the same amount of hay and one pound of oats; then fed one additional pound of oats at the night stop.

In conditioning my horse for the test I started hard work about one month and a half before the test, feeding as much as the horse could eat and digest; this was slightly above the ration allowance. As a result, the animal at the time of the test was in perfect condition, weighing about fifty pounds more than when

the conditioning work started. This extra weight, due to judicious feeding and constant work, was muscle and not fat.

His work each day consisted of three hours at a walk up and down hill in the morning, then two hours in the afternoon at a walk, slow trot, trot, and gallop.

As long as he remained in the test, his condition, with the exception of his legs, was excellent. In fact, I believe I can state without risking contradiction, that his general condition at the time he was scratched was better than any horse participating in the test.

Knowing that the Arabs were normally small feeders, I had little hope of offering competition along that line, but did cut my horse's feed to 9 pounds of oats and 10 pounds of hay a day, taking advantage of every opportunity to graze. I am convinced I could have cut his feed at the start to 7 pounds of oats a day without affecting his strength.

On the fourth day, when his legs started to trouble him, I increased his feed; this, I believe, was unnecessary.

At one stop, the bedding, which was not charged against the horse's feed, was, in most part, meadow hay; that night I drew no hay.

Great care should be exercised in watering animals at night and before starting in the morning.

I believe that water which is not cold can be given in quantities at any time, but cold water should be given in very small quantities, and then only after a horse is thoroughly cooled out. I chilled my horse one morning by allowing him to drink a bucketful of cold water before starting.

On the road I watered whenever I came to a trough, allowing the horse to drink his fill; average six times each half day. Believe this did much to keep up his weight and condition.

Fed bran, with oats, as a mash, the first evening, but this caused my horse to "scour," so used no more bran. Believe that bran mixed with ground oats is an excellent feed if fed dry; as the bran, in addition to having a high protein value, has bulk

for a small amount of weight; the combination being easily digested, and furnishing little food "for the sparrows."

Gaits.—A large majority of the contestants took up increased gaits very shortly after starting each morning. The first morning ten of the fourteen took up the trot within less than half a mile from the starting-point.

An analysis of the ramifications of the blood supply of a horse's foot is a convincing argument for a slow gait at the start of the day's work. In other words, the machine should be slowly warmed up and given a chance to "get the kinks out" before going into high speed.

An examination of the values given for condition, speed, and feed convinced me that a large horse would have to maintain a perfect time score in order to compensate for the loss due to food consumed, so I felt it would be foolish to attempt competition with the Arab with respect to food.

Another influencing factor was to shorten the length of time the horse would have to carry the pack as much as possible consistent with his condition, the condition of roads, and the nature of the terrain.

With this idea in mind, I divided a total day's run of 60 miles into two periods of 4½ hours each, thereby allowing one hour for the noon rest.

A 4½-hour period was divided in mileage as follows:

1st hour	5 miles
2nd hour	8 miles
3rd hour	8 miles
4th hour	7 miles
Last half hour	2 miles

Carefully gaiting my horse, I obtained the following rates:

Walk	4½ miles per hour
Slow trot	6½ miles per hour
Trot	8½ miles per hour
Gallop (really a canter)	13½ miles per hour

The gaits, maintained as far as possible, depending on the condition of horse, roads, etc., were as follows:

First hour: Walk, 30 minutes; slow trot, 10 minutes; trot, 15 minutes; rest, 5 minutes, adjust equipment.

Second and third hours: Alternate gallop, 10 minutes; walk, 5 minutes; rest between 5 and 10 minutes every hour and a half.

Fourth hour: Walk, 5 minutes; gallop, 5 minutes; slow trot, 5 minutes.

Last half hour: Walk.

My experience during this test convinced me that the gallop for short periods is a natural gait and that by maintaining it for short period the horse does not use up his stamina, providing his condition is good, as it has the effect of limbering him up. An easy galloper can cover the same distance, varying this gait with the walk, in less time with less chance of loss of condition than by going the same distance at a trot.

Ramla, the winner of the test, galloped a great deal and came in at the finish strong and in perfect condition. The other horses did comparatively little galloping, and as a result had to cover most of the distance at a continuous trot.

My observation was that few of the contestants made halts while *en route* to rest their horses. Their reasons for not so doing I did not ascertain.

Equipment Carried.—As a test to determine the comparative weight-carrying ability of the horses, this one had little value, as but one horse, Bob, was packed with equipment approaching the regulation pack for the field. He carried approximately seventy pounds dead weight.

One contestant carried a pack weighing approximately twenty pounds, on his own back; most of the other simply carried slickers. There is no question of doubt in my mind that had all the horses been required to carry from sixty to seventy-five pounds dead weight, the ranks of the "also-rans" would have materially increased.

I noticed two contestants who, after the first day, lounged in their saddles a great deal; it was simply luck that their horses

did not get sore backs. I am sure had their horses been packed they could not have finished the test.

I made one very bad error which might have resulted seriously. Thinking it would facilitate the placing of my equipment on the horse, I had my saddle blanket stitched all the way around; this worked beautifully until the day it rained; that night the blanket was soaked, and by the next morning had not dried out; a small wrinkle appeared on one side which, during the next day, rubbed a small patch of hair off the horse's back. As it was impossible to remove the wrinkle, I just escaped having a horse with a sore back.

CONCLUSIONS

The test undoubtedly demonstrated the powers of endurance and the courage of the Arab. It further demonstrated that the Arab is normally a small feeder, and his superiority over the Morgan.

It did not demonstrate the ability of the Arab to carry a pack saddle at fast gaits, nor his superiority over the best saddle horses of other breeds; it did demonstrate his superiority over the Morgan. The four Morgans entered were undoubtedly the best of the type, and the same may be said of the Arabs. Of the two horses of other strains entered, both are old, and have seen their best days.

It is not belittling the Arab's performance to state that it is unfortunate that horses of the best types of other breeds were not entered. The much mooted question of comparative ability of the horses of different breeds can only be settled by competition; therefore, this test should bear fruit, and have the effect of bringing the best saddle horses in the country into competition next year. As the matter now stands, the Arab, by demonstration, has the undisputed possession of the crown. All horsemen who witnessed the test were very strongly impressed by the Arab's performance, and they were unanimous in their opinion that energetic steps should be taken to employ the Arab blood

in the remounts of the Army. An infusion of this blood will, without doubt, do much to increase the quality of horses suitable for the Army.

No sane breeder of Arabs advocates the adoption of the pure-bred Arab as the service mount. The most enthusiastic simply advocate an infusion of Arab blood in the saddle horses of the Army.

It is recommended that energetic steps be taken to obtain a few of the best Arab stallions and mares for use by the Remount Service.

As one of the contestants, I desire to express my admiration for the gentlemen who managed the contest, and the sportsmanlike manner in which it was conducted. Too much cannot be said of the diplomatic and efficient manner in which all questions were handled by the judges.

As a last word to future contestants: Condition yourselves, as well as your horse, as the physical and mental strain on the man is terrific.

Some Notes On Training of Emergency Officers

BY LT. COL. C. A. BAEHR, FORMERLY THIRD FIELD ARTILLERY

UPON the entrance of our country into the late war the problem of most interest to me was that of how we were going to rapidly develop the necessary officers for the new forces about to be formed. Previous to the war I had for two years been on college duty, part of the time at one of our highly rated "essentially military" colleges, part of the time at one of our large land grant colleges where military training exists because the institution must have it in order to enjoy certain benefits under the Morrill Act of 1862. From this I had formed a very definite idea of the superficial training given the student who, in the majority of cases, "took drill" only after exhausting every agency in the effort to evade it. In the summers of 1915 and 1916 I was on duty at the Plattsburg training camps, where for the first time I saw together a body of men not in the service who seemed to have an interest in military matters, and who were anxious to absorb all the instruction given. There is no question but that much good was done here by the bringing of representative men into direct contact with the army, its officers, and systems of training, and acquainting him at first hand with the military needs of the nation. But as far as actually training him for the duties of an officer was concerned—the best one could say was that he had been exposed to some of the rudiments. No facilities existed, and the time was too short to give instruction aimed at qualifying a man for any of the duties of an officer with an organization except a few simple drills. Such important matters as discipline, messing, care and accounting for property, could not be included in the course. The worst feature of the matter was that many reserve commissions were awarded in various grades on what appeared to be very sketchy qualifications at the conclusion of the camp, the idea being apparently that the commission

was somehow going to superhumanly confer these necessary qualities upon the recipient. I was at one time very severely criticized because I did not turn in enough nor high enough recommendations, on the ground that it should be done to send candidates away "feeling better" towards and make them "boosters" for the movement. As I have a profound respect for the qualifications necessary to an officer who can satisfactorily train and lead a unit in war, it seemed that even in time of peace it was an absurd, dangerously misleading practice to submit a list of names of men alleged to be qualified to lead young Americans to battle when I knew they were not so qualified, and was not at all certain that they ever would be. Knowing, then, when war came, something of the qualifications possessed by some of our reserve officers, having seen at one or two joint camps of regular and National Guard troops some of our other civilian-officer material, I was keenly interested in seeing how it was all going to work.

When the first series of training camps was under way, I was on duty at Fort Myer, and was in the latter days of that camp an assistant instructor in field artillery there. In the second Fort Myer camp I was regularly assigned as an instructor, and in charge of a training battery. There was a considerable and noticeable difference between the policy of training and the personnel of these two camps well worthy of mention. In the first camp a considerable proportion of the student personnel were young men fresh from college, brought into the camp from spirit of adventure, which gave to the whole course very much of the air of a college. There were advantages connected with this spirit in that it stimulated interest, through competition, which was a distinct help in the training; but there was lacking the more serious interest which the presence of older men would have brought. There was a tendency to regard the whole thing as a college course is, alas! often looked upon by the spirited young man—that is, as a sort of hurdle to be surmounted, a disagreeable handicap to be overcome, rather than as an opportunity, all too short, of learning in sketchy detail a profession

which has for its prime object the handling and leading of men in a game where their lives are the direct stake. The spirit of service seemed seriously often absent. The tendency of students in this camp was to take the attitude that anything which could "get by" the instructor was sufficient, the idea apparently being at times that when the days of trouble of the training camps were over there would be little or nothing more to do. In the second camp the experience of the instructor personnel gained in the first one came more prominently to the fore. There were present among the student personnel more men of mature years and greater judgment, and the result was a more serious attitude all along, a better coöperation in the training, and, I believe, on the average a better percentage of instruction was gained.

It is not my object here to comment at any length on the faults or weaknesses of the training-camp system. It was, as everybody knows, a makeshift forced upon us in the emergency, and was no doubt the best system whereby officers could be rapidly developed. That it had many weaknesses goes without saying, but what the result was in the service is a matter of vital interest. I was fortunate in having under my command an old battalion of field artillery, which, even after a large proportion of the enlisted personnel had been taken away to form other units, still retained enough old men and enough of the old spirit to rapidly leaven the new recruits with which it was speedily filled up. For officers I received a quota from each of the three training camps, and I was given an excellent opportunity to follow out the career of officers who had been trained under the extemporized system. It is from the conclusions gained in the training of this unit that I would record some observations on the results of the system.

My first observation was that too little emphasis had been placed on discipline. It was speedily impressed on me that the first thing that I had to do was to teach my new officers what discipline really means, especially what is the fundamental difference between the responsibility which lies upon the officer

in its enforcement and that which is placed upon the enlisted man. In almost every case I found at the start that the tendency of the new officer was to go to the extreme of allowing the discipline of his organization to rest wholly upon his older noncommissioned officers, without the intelligent supervision which is necessary to such a process. Perhaps I, myself, was a bit responsible for this, since I had in every case given my officers to understand the value and responsibility which I believed the non-commissioned officer should have in an organization, and also the fact that in the particular case of the organization which I commanded there were several of these old non-commissioned officers whose knowledge of many of the details of handling of a battery was vastly superior to that of the officers over them. I found it hard to impress upon many of these young officers just what was their status in an organization, and to build up in them a proper sense of responsibility. I found it necessary to check up the most minor details of the carrying out of orders—to repeatedly and constantly follow through, to see that the spirit of instructions was obeyed, and to take a great deal of personal disciplinary action throughout the whole battalion. Successive increments of new officers showed this to be the major fault.

I found early in the game that none of my officers had any real idea of what their relation was in regard to me and in regard to the disciplining of their men. It was a long process, the impressing upon them of the fact that when an order was published at battalion headquarters they had a direct responsibility in seeing that it was carried out, and that it was their duty to take some action in every case of violation coming to their notice. Too often I found that when the order entailed something which, in the minds of the enlisted men of the battalion, was irksome or unnecessary, my officers were displaying—covertly—the same attitude, and giving by that attitude the idea to their subordinates that they were themselves not in sympathy with the commanding officer. The idea of compliance with an order fully and promptly simply because it was an order was a new one and

grew slowly. I must, in justice, add that this idea did grow, however, and that coöperation once gained was never lost.

The next salient feature in the handling of these young men was the idea, rapidly gathered—a survival of the old college rivalry, I suppose—that there should be constant and bitter rivalries between batteries. It was a difficult thing to cause it to be understood that each unit was a part of a general whole, and that the efficiency and coöperation of all the units were vitally necessary—that it made but little difference if two organizations were good, if the third were poor, since all must work together. It was often necessary for the battalion commander to interfere personally to make an organization oversupplied with some essential turn over some of its excess to another which was lacking in it, because the commander of the first preferred to enjoy the fact that he was the more fortunate.

In the matter of training, too much emphasis had been laid on the technical side of field artillery—at least at the start—and too little on the organization and administration, the handling of the thousand and one little details which go to make up an efficient and contented organization. I found very early in the game that my officers knew a great deal too much on the average about the computing of firing data and the elements of the trajectory, and too little about how to have harness and guns cleaned, and how to take stables. I found myself as battalion commander compelled to supervise the most minute details of mess, supply, discipline and stables of three batteries because my officers had but the slightest knowledge of them. Many queer and absurd situations arose which might have been funny if they had not occurred in war time, for these new officers frequently had plenty of energy, which they often expended in the giving of most astounding orders. There were times when I was firmly convinced that I could make a better unit were I to be left alone with the three batteries in charge of their first sergeants. Frequent conferences, a daily criticism on the day's work, and the result of my various inspections, in which I spared the feelings of nobody, gradually remedied the situation, however. The

greater part of my officers began to learn what was wanted, and I began getting rid of the others; but, in the meantime, the organization had been made to suffer from the various experiments and mistakes of the new officers. Many reliable and worthy non-commissioned officers became disgusted, and deliberately sought reduction or transfer, while the worst element in each battery took advantage of the situation.

The haziest sort of ideas seemed to prevail as to what was required in the way of training in order that a battery might be an efficient unit. One officer would spend all of his time on formal parade-ground drill, and it would require a direct order to get him off the level ground; another would prefer to spend most of his time at an improvised blackboard repeating, more or less imperfectly, what he had just learned from the book; a third would divide his battery into a dozen fractions, place these under anybody who might be handy, irrespective of his abilities or information, send them out with no plan and few instructions to "kill" the drill period. It was a long time before I could trust a battery commander to work out even the most minor details of an instruction schedule, and for a part of the time I did very much of my instruction by battalion. As far as tactical ideas went, they were of the haziest. The training camp had, of course, concerned itself little with them, and it seemed that the average field artilleryman candidate had assumed that such things had concern only for the infantry, and religiously kept his ears and eyes closed lest he be contaminated by alien doctrine. Even strictly field artillery manœuvres had been thus treated, due in some cases to lack of equipment at the training centre, but in others apparently from failure on the part of the instructors to emphasize their importance. A general idea seemed to gradually have gained ground to the effect that some superior providence was going to drop the guns down in the firing position and supply the ammunition, and that all that was to be left for the field artillery officer to do was to compute his data and fire away. I must, in justice, admit that the theoretical side of field artillery is bound to appeal more to the college man than the

many bothersome details of the handling of the interior economy of a battery; but for that very reason a great deal more emphasis must be laid in the training of such men on these less agreeable features, so that they may be properly impressed with the fact that they must of necessity come first. Later, when the French methods of instruction first came into prominence, and officers began to arrive who had been given courses under that system, another struggle had to be undertaken to keep in the minds of the officers the fact that field artillery is designed to be mobile. In the absorption in the corrections of the moment and map-firing, the handling of artillery fire from positions in trench warfare designed to be built and occupied at leisure, with every detail carefully worked out and plotted beforehand, the fact seemed to be overlooked that, after all, the field gun was designed to be moved, to be put in position rapidly, and that when it was going to be wanted in such times it was going to be wanted in a hurry. Such details as orientation and plotting of positions were indeed very thoroughly taught and understood, but the vital matter of personal reconnaissance of routes and positions, and their selection and occupation, were almost invariably neglected. Above all, it seemed to be a cardinal feature in the training that, as far as the artilleryman was concerned, the infantry simply existed as a side issue. Some lectures and talks upon this—the most important thing of all to have impressed upon the minds of the young artilleryman—had indeed been given, but practically very little effort seemed to have been expended in the field artillery courses, both here and in France, to have practical demonstration of the enormous difficulty, and the supreme importance of the close liaison between the two arms. It often seemed to me in the handling of the small terrain exercises of the battalion that the idea gained by most of the officers in their training was that there was some reason for believing that the artilleryman should not run the risk of having his valuable life terminated by the enemy, and that the infantry had the sole prerogative of going up where danger was thick. There seemed sometimes too much emphasis on shelter, covered positions,

and routes—too much emphasis on camouflage and hiding, which led, I believe, to the idea that the gun never *could* be taken up where the enemy's projectiles were likely to be thick. And with this came the lack of appreciation of the importance which mobility plays in the field artilleryman's game. Gone seemed to be the old idea of the taking care of the horse which prevailed when stables and the handling of the horses was regarded as one of the greatest tasks of the mounted organization. The times when every officer not required for duty elsewhere was required to be at the stables when the horses were being cared for—that when an organization had completed its day's work the first duty of every man was to see that the horses received the proper amount of attention before seeking comfort for himself—seemed to have vanished overnight. I am frank to admit I believe that in the building of new organizations and the training of new officers it is a mistake to attempt any subdivision of the work of the battery into departments, as contemplated at present in our admirable drill regulations. Too often, when I confronted a battery commander with criticisms on his stable and the condition and handling of his horses, his guns, or his mess, I found him inclined to promptly pass them on to his lieutenant in charge of department "A," "B," or "C," and there to consider his part in the thing done. I found that it was often days when the battery commander considered his duty with regard to his stables, guns, or mess done when he had turned the holding of stables over to this officer, cleaning and inspection to that, even when he himself could easily have attended to those matters in person. And all too often that battery commander, as well as his lieutenant in charge, was alike ignorant of just what care was needed for their animals, guns, or mess, leaving the details in the hands of the stable sergeant, mess sergeant, or mechanic. It is not to be wondered at that frequently the result was a total lack of care of the animals, rations, and equipment, and a loss to the government, both in animals, mobility, and morale.

From the above I would deduce that in the future training of reserve officers all emphasis in a short course should be placed on the fundamentals of military training; that in a course which is designed to produce officers who must at once be of some use to an organization commander, the instruction be given which he is going to need first, and that this instruction be to develop first and foremost in his mind that the value of an officer to the country depends on his realization of the fact that he is an officer, and what responsibility that places upon him. Next he should be thoroughly instructed in the little essential details of the mechanism of an organization in his arm, so that when he joins such an organization the commander can depend upon him at once to take charge of a drill, inspect mess, quarters, or stables, supervise the taking care of property, etc., being certain, above all, that the new officer understands the relations which exist between himself and those above or below him, and the spirit in which orders must be carried out.

Field Artillery In American Colleges

BY PROFESSOR RAYMOND WALTERS, REGISTRAR OF LEHIGH UNIVERSITY.
(LATE CAPTAIN A. G. D., U. S. A., REGISTRAR F. A. C. O. T. S.)

[*Editor's Note.—Professor Walters served as the representative of the American Association of Collegiate Registrars in organizing the grading system at the Field Artillery Central Officers' Training School, under the direction of the Committee on Classification of Personnel. He was the appointed Registrar of the School, being commissioned as a Captain in the Adjutant General's Department. In connection with his duties. Captain Walters made important studies of the rating grades, which were published in "School and Society," the leading educational periodical. He contributed a sketch of the F. A. C. O. T. S. to the October–December, 1918, number of the* FIELD ARTILLERY JOURNAL, *and he wrote "The Story of the Field Artillery Central Officers' Training School," a volume brought out by the School Association. Professor Walters is the author of numerous magazine articles and of two books*.]

THE Caisson Song is being sung at twenty-two colleges of the country from New England to Oregon and from California to Alabama, not by undergraduates in evening clothes at glee club concerts, but by khaki-clad batteries of husky young fellows who hurry across the campus after academic classes for the R. O. T. C. drill of the gun squad. There are well over five thousand students who have enrolled to travel "over hill, over dale," and, according to reports received from the colleges, they are exhibiting earnestness and promise in learning the rudiments of the Field Artillery.

The purpose of the Reserve Officers Training Corps, as set forth by Secretary of War Baker in an address at Lehigh University, is "the securing of a corps of properly qualified reserve officers. . . . It is to the collegiate institutions of the nation that we must always turn to supply the material from

which the commissioned officer personnel for our immense citizen armies must be developed."

In a national emergency the situation becomes particularly critical in specialized branches of the service, such as the Field Artillery. The Chief of Field Artillery conceived and instituted the Central Officers' School to meet the crisis in 1918. Aside from the question whether the circumstances of another war will afford a similar opportunity for training, it is hazardous in the extreme to rely largely upon short-cut preparation. The results accomplished at the great war school at Camp Taylor were a revelation as to the possibilities of American manhood in intensive training. But every instructor and candidate of the Field Artillery Central Officers' Training School probably shares the judgment which many expressed that, for mastery in the Field Artillery, time to assimilate is an indispensable requirement. It is an element of strength, therefore, that the complete Field Artillery course of the R. O. T. C. is spread over four full college years, including two summer camps.

That youth is the best period, not only for strengthening physical fibre, but for learning technical content of military science, was attested at the F. A. C. O. T. S. Of 8737 graduates of the school, those from 18 to 26 years led in making the highest rating grades (combined Scott rating and technical grades), and they notably surpassed in technical subjects. The group of college undergraduates did well because they brought minds alert and accustomed to scholastic study, and because the subjects of the course were based to a considerable extent upon their recent college and preparatory school mathematics and physics.

The possibilities of R. O. T. C. training in the Field Artillery were demonstrated in the record of the Yale College students at Camp Taylor. The Yale battery, following the R. O. T. C. course at New Haven, and a short period at Camp Jackson, entered the F. A. C. O. T. S. as second lieutenants.

A study of the marks of the 8737 graduates shows that:

(1) Of twelve men making the highest rating grades (between

85 to 90) six—or one-half—were Yale second lieutenants. As there were 164 in the Yale battery, the Yale percentage in this topmost class was .04 of their own number, as compared with a percentage of .0007 for all other graduates.

(2) Of 119 men making rating grades in the next highest classification (80 to 85) eleven were Yale second lieutenants, a percentage of .07, as compared with .01 for all others. These figures may safely be said to demonstrate the advantages that accrued from the Yale R. O. T. C. training, and also the native ability of the young men attracted by Yale, and then by the Field Artillery.

GENERAL R. O. T. C. PROVISIONS

The Reserve Officers' Training Corps, as at present in operation in the colleges, is directed by the R. O. T. C. Branch, War Plans Division, through the R. O. T. C. Section, Adjutant General's Office. Organized under authority of the Act of Congress of June 3, 1916, the corps is now administered under Special Regulations No. 44, W. D., 1919. There are twelve geographical districts, each under a district inspector, stationed at district headquarters. In addition, an officer of each of the various corps has been designated to assist in Washington in the work of the units of his corps. An officer of the Training Section of the Office of the Chief of Field Artillery devotes his entire attention to the Field Artillery of the R. O. T. C.

The new regulations provide, in Secretary Baker's words, that "the Government will, to institutions forming training units of at least 100 members, furnish an officer to act as Professor of Military Science and Tactics, with such assistants as may be necessary, and all the requisite uniforms, arms and equipment. Students who attend the summer camps will, in addition, be provided with quarters and sustenance free of cost, and transportation from and to their homes." Congress has been asked for additional modifications, including more officers and noncommissioned officers. Pay is asked for students during summer

camps—a period when many students must earn money to carry them through the college year.

SALIENT POINTS OF FIELD ARTILLERY COURSE

The salient features of the course of instruction for Field Artillery units of the R. O. T. C. are as follows:

1. The course covers four years. Students electing it are expected to continue at least two years; if qualified, they are urged to complete the work.

2. A commission as Second Lieutenant, Field Artillery Reserve Corps, is issued upon satisfactory completion of the course, but, in general, is issued only when a student is also awarded his degree from the institution attended.

3. Certain academic subjects—those regularly embraced in a general college curriculum—are prerequisites for obtaining a commission.

4. A minimum number of fundamental military and Field Artillery subjects, collectively termed Military Science, are prescribed in continuous courses of preferably not less than three hours a week for each subject. These subjects are taught by Army Officers detailed for this purpose. Academic credit toward a degree is to be given for Military Science, each faculty assigning credit "under the same rules as apply to other courses of like nature in the institution."

5. Physical training is called for throughout the course, including American, British and French army methods of calisthenics, gymnastics, fencing, swimming and games.

6. Instruction in Field Artillery subjects, except mounted instruction, is essentially theoretical. When possible, some practical instruction is given during the academic year.

7. Practical, intensive training will be afforded in two summer camps of six weeks each, to be attended by students at the close of their freshman and junior years. One-half of the time will be devoted to fundamental military instruction, one-half to Field Artillery training.

8. The Commandant of the R. O. T. C. unit becomes Professor

of Military Science and Tactics in each institution. He coöperates with the faculty in having existing college subjects taught with reference to application in the Field Artillery, and he provides instruction in Field Artillery subjects.

OUTLINE OF FIELD ARTILLERY COURSE

The R. O. T. C. work in military science, theoretical and practical, is outlined as follows:

Freshman Year

1. Fundamentals of Military Science. 108 hours.
2. Physical training. Time allotted by college.

First Camp. Six Weeks.

During the first camp the students will be specialized as cannoneers of the firing battery, and as drivers for horse-drawn carriages. The course will include:

Fundamental military subjects.
Gun drill.
Matériel and equipment.
Commands and signals.
Occupation of positions. As cannoneers.
Marches and march discipline. As cannoneers.
Entraining and detraining matériel.
Equitation and horsemanship.
Driving and draft.
Advance to and occupation of positions. As drivers.
Camping, shelter and bivouac. As cannoneers and drivers.
Care of horses in the field.
Entraining and detraining animals.
Attendance at lectures, conferences and critiques.

Sophomore Year

1. Fundamental of military science. 72 hours.
2. Field Artillery matériel and motors. 36 hours.
3. Physical training or practical equitation and horsemanship. Time allotted by college.

Junior Year

1. Fundamentals of military science. 72 hours.
2. Field Artillery reconnaissance and gunnery. 36 hours.
3. Mounted instruction. 72 hours.
4. Physical training or mounted instruction. Time allotted by college.

Second Camp. Six Weeks

During the second camp the students will be specialized as officers and non-commissioned officers, drivers for motor-drawn carriages, and in the details of the firing battery. The course will include:

Fundamental military subjects.

Fire control instruments for Field Artillery.

Functioning of B. C. and Bn.* details, duties of their members and officers.

Military topography.

Field gunnery.

Firing instruction.

Commands and signals.

Artillery in the field.

Duties of lieutenants, Departments A, B and C.

Gas engines, trucks and tractors.

Attendance at lectures, conferences and critiques.

Senior Year

1. Fundamentals of military science, including the military history and policy of the United States. 72 hours.
2. Organization, employment and tactics of Field Artillery. 36 hours.
3. Mounted instruction. 72 hours.
4. Physical training or mounted instruction. Time allotted by college.

MATÉRIEL, EQUIPMENT, ETC.

A detachment of non-commissioned officers and enlisted men is assigned to each college to care for the equipment and

* Battery Commander and Battalion.

animals, and to assist in instruction. The following is a list of matériel, equipment and animals used as a basis for the supply of R. O. T. C. units:

1 Basic allowance of clothing and equipage.
Basic allowance of general organization equipment.
Complete equipment of one 3-inch battery (less 6th, 7th and 8th Sections), as prescribed in Ordnance Publication No. 1659.
1 Range-finding and fire-control equipment as prescribed for one battalion Light Field Artillery.
1 Gun and caisson with limbers, sights, fuze-setters and accessories of each of the following types:
75 mm. field gun, model 1897, French.
75 mm. field gun, model 1917, British.
75 mm. field gun, model 1916, American.
155 mm. howitzer.
4.7-inch gun.
1 155 G. P. F. gun.
1 Sectionalized fuzes and projectile sets.
4 Subcalibre and drill cartridge kits.
2 Heavy Browning machine guns.
2 Browning automatic rifles.
2 Tractors, 5-ton.
1 Tractor, 10-ton, for motorized units only.
1 Car, motor, reconnaissance.
1 Car, motor, 5-passenger.
2 Trucks, cargo.
2 Trucks, ammunition.
1 Truck, repair.
2 Motorcycles with side cars.
1 Signal equipment as prescribed for one battalion Light Field Artillery.
1 Engineer equipment as prescribed for one battalion Light Field Artillery.
90 Horses.

REPORTS FROM COLLEGES

Because of the limited number of officers available, and the expense of complete equipment, the number of Field Artillery units was restricted. In selecting universities, colleges and schools the factors of large enrollment, local adaptability, and broad geographical distribution were considered.

The following summaries of reports received (November, 1919) by the present writer from the twenty-two institutions having Field Artillery R. O. T. C. units are presented in order of size of student enrollment in the units. In noting the enrollment it should be remembered that in the land grant universities military training for certain periods is required; in most privately endowed colleges membership in the R. O. T. C. is voluntary.

PURDUE UNIVERSITY

Purdue University, Lafayette, Ind. Commandant, Lt.-Col. Robert G. Kirkwood. F. A. unit enrollment, 1374. Military training required. The Field Artillery unit is the only unit at Purdue, and therefore has the undivided attention of the students. They show keen interest in the work, especially in the course of motors. The diversified work of motorized Field Artillery appeals particularly to technical students. Of Purdue alumni in service during the war, more were commissioned in the Field Artillery than in any other arm. In other respects than numbers enrolled, the Purdue unit may therefore be accounted a Field Artillery center.

VIRGINIA MILITARY INSTITUTE

Virginia Military Institute, Lexington, Va. Commandant, Col. K. S. Perkins. F. A. unit enrollment, 547. Cavalry and Field Artillery R.O.T.C. units have recently been introduced. The institute has good stables and stable equipment. Some grading remains to be done on the drill plain, which will be first-class when completed. The cadets are responding to the Field Artillery requirements in accordance with the high tradition of the Virginia Military Institute.

OHIO STATE UNIVERSITY

Ohio State University, Columbus, Ohio. Commandant, Lt.-Col. Edwin P. Parker, Jr. F. A. unit enrollment, 446. The spirit manifested by the students is reported to be exceedingly good. The unit has

"plenty of ground and satisfactory housing for matériel. The climate is favorable for Field Artillery work." There are five students in the unit who were Field Artillery Officers in the war.

CORNELL UNIVERSITY

Cornell University, Ithaca, N. Y. Commandant, Lt.-Col. T. J. J. Christian. F. A. unit enrollment, 403. Military training required. The surroundings from the Artillery point of view are reported to be excellent. Interest in the Field Artillery among Cornell students is keen. The unit includes fourteen men who held Field Artillery commissions during the war. Their participation is a factor in establishing high standards.

OREGON AGRICULTURAL COLLEGE

Oregon Agricultural College, Corvallis, Oregon. Commandant, Col. W. F. Sharp. F. A. unit enrollment, 332. Of interest are figures of enrollment in other R.O.T.C. units in this college; Infantry, 535; Engineers, 162; Motor Transport Corps, 93. "There are a few men who take the work merely because it is a requisite for graduation at this institution; but, generally speaking, there is a large and genuine interest shown in the Field Artillery unit. This college is especially suited to Field Artillery work."

UNIVERSITY OF ILLINOIS

University of Illinois, Urbana, Ill. Commandant, Maj. William D. Alexander. F. A. unit enrollment, 245. About 50 per cent. of the members of the Field Artillery unit were in the Army service during the war. The work of the unit has aroused and held interest. The University of Illinois is building stables which will accommodate more than one hundred horses. Local conditions are highly suitable for Field Artillery.

UNIVERSITY OF NEBRASKA

University of Nebraska, Lincoln, Nebraska. Commandant, Col. William F. Morrison. F. A. unit enrollment, 210. The organization of the unit is a battalion of three batteries. "Up to the present time the schedule has included only through the Battery Dismounted, due to the lack of a gun shed and gun park, which are in process of construction." The attitude of the students toward Field Artillery work has been very favorable. "A large number could easily have been procured, but the size of the unit was limited in order to insure proper instruction with the small staff of instructors and the limited facilities."

UNIVERSITY OF OKLAHOMA

University of Oklahoma, Norman, Okla. Commandant, Lt.-Col. C. A. Baehr. F. A. unit enrollment, 187. Five hours of instruction a week are given in the basic course, and seven hours a week in the advanced course; credit of sixteen hours is allowed by the Faculty toward the B. A. degree. Two years of R.O.T.C. training have been made a requisite for all physically fit male students. There was some hostility at first, but interest in the work is increasing, and the spirit now manifested is good. The University has provided a large armory, stables and gun-shed. Extensive drill grounds are available.

AGRICULTURAL AND MECHANICAL COLLEGE OF TEXAS

Agricultural and Mechanical College of Texas, College Station, Texas. Commandant, Lt.-Col. Louis R. Dougherty. F. A. unit enrollment, 178. The unit is divided into two batteries of 89 officers and men. There is a keen competition between batteries, which promotes progress. The work has received hearty support from the President and the Faculty of the College. Student sentiment is most favorable. "Few institutions are better fitted for the training of F. A. units than is A. & M. of Texas."

UNIVERSITY OF MISSOURI

University of Missouri, Columbia, Missouri. Commandant, Lt.-Col. Lloyd E. Jones. F. A. unit enrollment, 165. "Every male student in the University of Missouri must take two years in the R.O.T.C.—which naturally gives us some students who are not fundamentally interested in things military. About fifty per cent. of the students enrolled are interested, many of them enthusiastic. The fifty per cent. which appear indifferent are men who will fall on our side with the gaining of their confidence and the development of the course as anticipated." The terrain about Columbia is highly suitable for Field Artillery practice.

UNIVERSITY OF WISCONSIN

University of Wisconsin, Madison, Wis. Commandant, Major Orlando Ward. F. A. unit enrollment, 163. Freshmen and Sophomores at Wisconsin are required to take three hours of military drill each week. Students with a certain amount of training are exempted. There are 157 sophomores in the basic course of the Field Artillery and six advanced course students. While "they are not overly fond of drill," the students display interest in the construction of the guns. The

advanced course men are extremely interested. Aside from the severity of the weather, Madison furnishes a suitable location for Field Artillery work.

CARNEGIE INSTITUTE OF TECHNOLOGY

Carnegie Institute of Technology, Pittsburgh, Pa. Commandant, Lt.-Col. Leon R. Cole. F. A. unit enrollment, 140. In addition to Field Artillery there are R.O.T.C. units in Signal Corps, Motor Transport and Corps of Engineers, the total enrollment reaching 450. "Everything seems to be on a firm basis. The spirit among the Field Artillery students is very good. They are men in engineering courses of the Institute, and are good Field Artillery material."

CULVER MILITARY ACADEMY

Culver Military Academy, Culver, Indiana. Commandant, Capt. John M. Fray. F. A. unit enrollment, 135. "Local conditions for Field Artillery are very good. The spirit in the unit is exceedingly fine. There is keen competition between sections. All of the driving and harness instruction has been taken by the students during their recreation periods, and instruction for the gunners' examination is similarly given. The Field Artillery battery looks forward to ranking in another year with the Culver Black Horse Troop."

PRINCETON UNIVERSITY

Princeton University, Princeton, N. J. Commandant, Major John E. McMahon, Jr. F. A. unit enrollment, 134. Located in the country, with plenty of open spaces and soft roads, Princeton furnishes an ideal location for a Field Artillery unit. "Horses are on hand at the University for riding classes, which are held every day except Saturday and Sunday. On these latter days students are allowed to go out for privilege rides, under the supervision of an instructor." President Hibben has given hearty support to the unit. The spirit of the students is good. Silver cups have been offered to the best gunners of the battery, and other cups to the crack gun squad. A revolver club has been formed.

YALE UNIVERSITY

Yale University, New Haven, Conn. Commandant, Col. R. E. D. Hoyle. F. A. unit enrollment, 129. Yale possesses what is doubtless the most complete Field Artillery facilities of any college in the country. Artillery Hall has offices, recitation rooms, and an indoor subcalibre range. Yale alumni in 1917 provided an armory, with riding hall, stables for a battery, blacksmith shop, store-room, garage, etc. The unit has complete equipment and matériel. These resources, the support

of the University and alumni, and the record established during the war by Yale men, combine to make Yale a Field Artillery stronghold. "There was slowness in enrolling at the outset last fall, due partly to reaction following the war, and partly to certain difficulties in working military science into the college course. A campaign brought in more than enough volunteers in ten days. Their progress and spirit are highly pleasing."

UNIVERSITY OF UTAH

University of Utah, Salt Lake City, Utah. Commandant, Col. M. C. Randol. F. A. unit enrollment, 128. The campus of the University of Utah adjoins Fort Douglass, a Regular Army Post. This, and the fact that Utah has made history and tradition with the old "Utah Battery" and "the 145th F. A.," produce a fine spirit in the R.O.T.C. unit here. The course is elective. Nearly all of its members are freshmen, from whom great things are expected if they continue as they have begun.

HARVARD UNIVERSITY

Harvard University, Cambridge, Mass. Commandant, Col. Robert C. F. Goetz. F. A. unit enrollment, 126. At the time the Harvard Field Artillery unit was organized, the reaction against military matters following demobilization was at its height. It was difficult to stir up interest. The students who volunteered for the unit are now enthusiastic about the work, and the department is much talked of in the student body. Harvard gives full credit for these courses toward the degree, and this is an inducement which will probably count heavily in the future. Harvard College is pretty well boxed in, and there is some difficulty in finding place for outdoor work. At present, by arrangement with the State authorities, a part of the Commonwealth Armory is used for housing matériel and horses.

UNIVERSITY OF CHICAGO

University of Chicago, Chicago, Ill. Commandant, Col. H. E. Marr. F. A. unit enrollment, 106. Interest in military matters on the part of the student body of the University is not marked, but the spirit of the students enrolled in the Field Artillery unit is quite satisfactory. The University authorities have remodelled Ellis Hall, which now furnishes a first-rate armory, with a sufficient number of store-rooms for matériel. Conditions for Field Artillery at Chicago are by no means ideal. It is simply a case of utilizing to the best advantage facilities that are available.

LELAND STANFORD UNIVERSITY

Leland Stanford University, Palo Alto, Cal. Commandant, Col. Leroy P. Collins. F. A. unit enrollment, 84. There is plenty of suitable terrain at Palo Alto. This and the complete equipment furnished by the War Department make the Field Artillery advantages at Leland Stanford most attractive. A listless spirit toward military preparedness seems prevalent on the Pacific Coast. But the spirit of the students in the Field Artillery unit is the opposite to listless. They are doing excellent work.

Detailed information is not yet at hand, but reports received in the Office of the Chief of Field Artillery indicate a similar healthy condition of the Field Artillery units at the Colorado Agricultural College, Fort Collins, Col., Commandant, Lt. Col. W. C. Harrison; Alabama Polytechnical Institute, Auburn, Ala., Commandant, Major Isaac Spaulding; Iowa State A. and M. College, Ames, Iowa, Commandant. Lt. Col. J. K. Boles.

CONCLUSION

The present revised regulations covering the R. O. T. C. in colleges and universities represent the judgment of the General Staff and the War Department Committee on Education and Special Training, which had, in Secretary Baker's words, "the great advantage of consultation with a number of presidents of our institutions of higher learning, including members of the Advisory Board of Presidents on the Summer Camps." It is, of course, too early to tell the exact measure of success of these regulations, or the modifications that time and experience may show to be necessary.

As far as the Field Artillery units are concerned, the reports just cited evidence a satisfactory beginning. They certainly support the declaration of Secretary Baker in his Lehigh address: "A college education which has left untouched the fitting of its subject for active service under his country's flag is and must be incomplete. In the R. O. T. C. the college finds this vital addition to its curriculum, and the student who pursues the training which it offers finds the opportunity for physical and mental development which completes his equipment for the battles of life."

With a Regiment of 75's in the Champagne-Marne Defensive

BY CAPTAIN P. G. BLACK, 76TH FIELD ARTILLERY.

I. OCCUPATION OF POSITION

THE last days of June, 1918, found the Third Field Artillery Brigade in bivouac at Guere. A short course of intensive instruction of less than one month had been completed, horses had been drawn, and the regiments were eagerly awaiting transportation to the front.

On the 28th of June I had preceded my regiment to the front, as regimental billeting officer. At this time the Third Division was in position along the south bank of the Marne, from Château-Thierry on the west to the Surmelin Creek on the east. Already the division had won everlasting glory when the 7th Machine-Gun Battalion had been thrown into Château-Thierry at the end of May, stopped the Boche, and driven him back across the river. Up to this time the infantry had been supported by French artillery, and we were looking forward to taking their places.

The regiment was to arrive in three sections, detrain at various points, and march to the front by easy stages. Each section, as it detrained, was to march from the railhead at Boissey le Chatel, a distance of from fifteen to twenty kilometres, where it would camp the first night. The next day it would march about ten kilometres and camp the second night at Sablonniers, a town about fifteen kilometres from Division Headquarters. On the third day it would reach the Grande Fôret, chosen for the regimental echelon, and go into position that night. Everything was ready, and, according to schedule, the first battery would be in position on the morning of July 7th and the last on the morning of July 9th.

I was detailed to meet the first section at Boissey le Chatel and assist in guiding them to the front. As had been arranged,

this section, consisting of 2nd Battalion Headquarters, D and E Batteries, arrived there on the night of July 4th and went into camp.

That night we had our first taste of hostilities when a number of Boche planes flew over the town on their way to Paris. the anti-aircraft guns commenced firing, and their shrapnel dropped around us in the streets of the village. Fortunately no one was hurt.

In the morning I guided this section to its next camp and returned to Boissey le Chatel to meet the second section. About four in the afternoon, F Battery arrived and prepared to make camp. Almost coincident with the arrival of F Battery came the Lieutenant-Colonel with orders to push on to the front with the utmost speed. The Boche were hourly expected to attack, and the entire regiment must make a forced march, covering the whole fifty kilometres to the front without a stop. This was indeed a difficult task, as our horses were green and had never had a chance to show what they could do.

F Battery was despatched on its way. I accompanied the Lieutenant-Colonel to Columbieres to speed up the last section, which was due to arrive there that evening. A and B Batteries were detrained and marched off under his guidance, while I remained to bring C Battery forward.

The work of detraining was speedily and smoothly accomplished, and we got under way about 6 P.M. on our long march to the front. We stopped at Boissey le Chatel for a hurried supper and then resumed our journey.

I shall never forget that night march. The road which stretched out ahead, between rows of poplar trees gleamed white in the moonlight. Before us the whole horizon was lit by the flash of guns, and everywhere along it rockets rose or star-shells burst, while now and then the deeper red of a Bengal flare could be seen above the hills. Always the distant rumble of the cannon grew louder as we approached the battle-line. We bumped along over the cobbled streets of silent villages. Not a light showed in the houses. No one stirred. The cannoneers, walking behind their pieces, were singing "Pack Up

Your Troubles in Your Old Kit Bag" as they marched. A feeling of intense excitement was in the air.

At 2 A.M. we reached the rest of the battalion. Here we watered and fed the horses, breakfasted, and caught an hour's sleep. At five we were off again. This time I went ahead of the batteries in a truck to show the officers of the Second Battalion their positions before dark. In the afternoon I came back to the Grande Fôret from the front. Here I found the entire regiment in camp. I had about two hours' sleep, some supper, and at dusk started off again to guide F Battery to its position.

To reach the front we had to pass through Essises, turn sharp to the left in that town, follow a country road to the Château-Thierry-Montmirail turnpike, follow this about a kilometre, and then turn off to the right on another country road which led to the battery position. We missed the turn at Essises in the dark and started on the wrong road. Fortunately we were recalled in time and put on the right track. This mishap got me pretty well rattled, and, to add to our enjoyment, news came that the Château-Thierry road was being shelled ahead of us. On we went, and it seemed an eternity of marching before we reached the turnpike. At times I feared we had lost our way and were marching into the German lines. Once, a huge French cannon de marine went off almost at my back, and the concussion nearly unhorsed me. We passed through a ruined village, its gaping walls rising like spectres in the darkness. The road seemed absolutely deserted, and the roar of the big guns and the rattle of machine-gun fire increased momentarily.

At last the cheery hail, "F Battery!" was heard ahead from the guide I had left at the point where we were to turn off and go into position.

F Battery was placed behind a small crest in an open wheat field on the edge of a road. We unlimbered, taking great care not to break down the wheat, and the cannoneers started to erect the camouflage. Here we met with an unforeseen difficulty—we had no poles, and none were to be found in the fields.

Nothing could be done but drape the nets over the guns and trust to God. It was just at this moment that the Battery Commander informed me that he had neglected to select a place for his *short* echelon.[1] I had hoped my work was over for the night, but I started off once more with the limbers to a wood I knew of not far away.

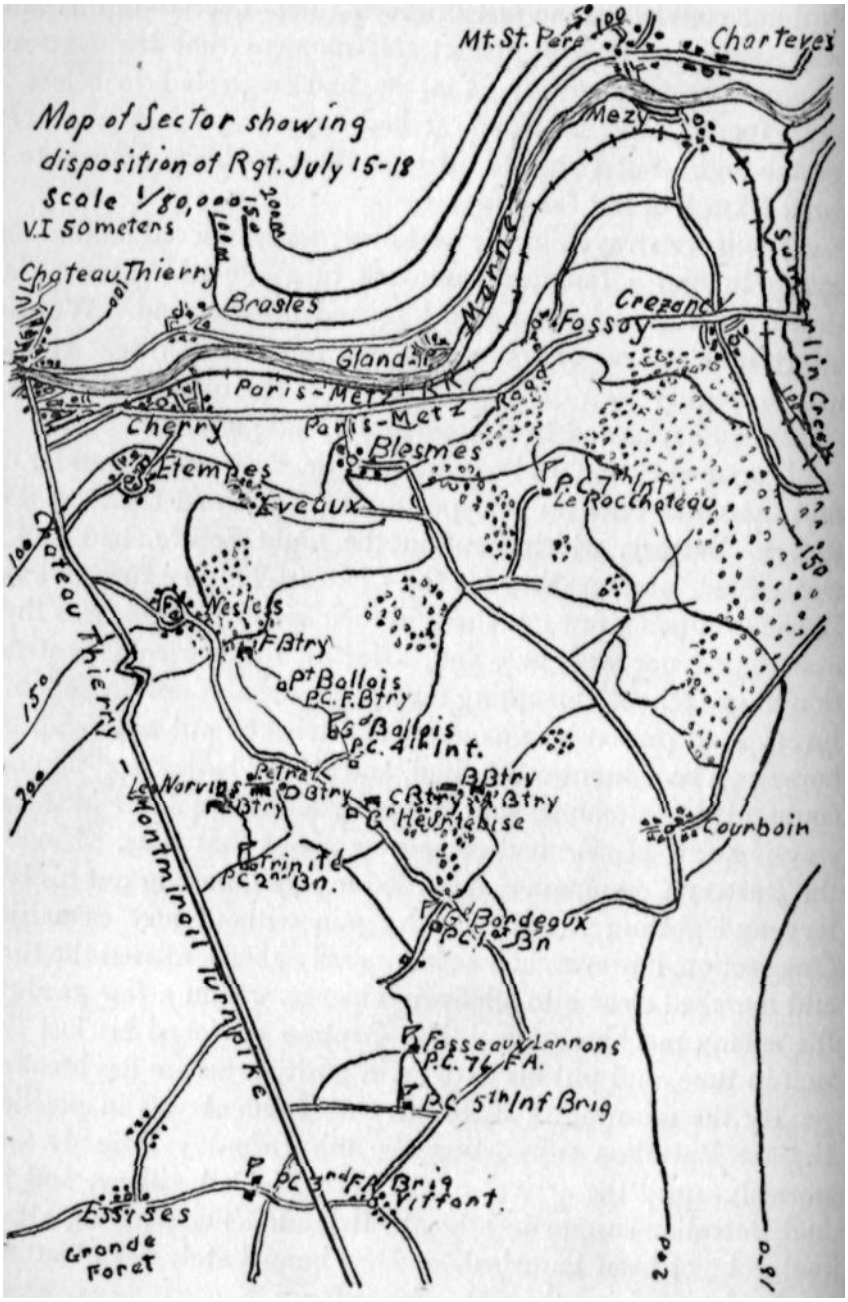
Again we strayed in the darkness; we wandered on and on, trying to find a familiar landmark to guide us. Dawn was almost upon us when at last I picked up the road. We got safely under cover of the woods just as the sun rose. It was with a mighty sigh of relief that I left the men to their own officers and returned to Regimental Headquarters.

It seemed that F Battery was not the only one to wander on that march to take up first positions. I learned the next day that E Battery, which went in the night before, had had a worse time. Just as they hit the Château-Thierry turnpike the Boche dropped a few gas shells in their vicinity. This was their first experience with gas, and, after all the gruesome instruction in gas school, something near to pandemonium broke loose. Every man put on his gas mask and tried to put masks on the horses. The column was halted, and got all balled up. No one could give commands, and things would have been in a bad way if a few H. E.[2] had come over about that time. Finally, the Battery Commander succeeded in straightening out his battery and getting it under way again without any casualties. One section, however, had sailed merrily ahead, missed the turn, and marched clear into Château-Thierry, within a few yards of the enemy machine guns. The Captain retrieved his lost section in time, and put his battery in position before daybreak.

By the morning of July 6th the regiment was in position, the 1st Battalion supporting the 6th Infantry Brigade temporarily, until the arrival of the 10th Field Artillery, and the 2nd Battalion supporting the 5th Brigade. The pending attack had not yet been launched, and we immediately set about the work of organizing the sector for defense.

[1] The short echelon is the echelon in which the limbers of the firing battery are kept. This is placed as near the battery as safety will allow.

[2] High explosive shell.


Map of Sector showing
disposition of Rgt. July 15-18
Scale 1/80,000
V.I 50 meters
Mt. St. Pere
Charteves
Mezy
Chateau Thierry
Brasles
Marne
Crezancy
Fossoy
Gland
Paris-Metz
Cherry
Blesmes
Etemes
Eveaux
P.C. 7th Inf
Le Rocchateau
Westeis
F Btry
Pt Bollois
P.C. F Btry
66d Bollois
P.C. 4th Int.
Le Nurvins
Courboin
Trinite
P.C. 2nd Bn.
Bordeaux
P.C. 1st Bn
Fosse aux Larrons
P.C. 76 F.A.
P.C. 5th Inf Brig
P.C. 3rd F.A. Brig
Vittont.
Essises
Grande Foret
Montmirail Turnpike

II. ORGANIZATION OF THE SECTOR

The Terrain.—The ground on the south bank of the Marne is nearly flat for a distance of from 500 to 1000 metres, whence it rises abruptly to a plateau at a height of about 100 metres above the level of the river. The forward slope of this plateau is heavily wooded and cut by ravines, while the plateau itself is covered with patches of woods and dotted with isolated farms. An excellent system of roads runs between these farms.

Battery Positions.—It was here that our batteries were placed, A and B Batteries concealed in the edge of a wood, C Battery behind a hedge near the Grande Heurtebise Farm, D Battery in an orchard near the Petret Farm, E Battery (its guns concealed under haystacks) in a field behind Les Norvins Farm, and F Battery in a woods on the forward slope of the plateau. The battery positions of the regiment were organized in depth, to give elasticity of fire in case the enemy gained a foothold in the sector, so that the range to the normal barrage of the most advanced battery (F) was about 4000 metres, while that of A Battery, the furthest to the rear, was about 5500 metres.

The P. C.[3] of the 1st Battalion was in Les Petits Bordeaux Farm, and that of the 2nd Battalion in La Trinité Farm. Both P. C.'s were centrally located with respect to the roads leading to their batteries. The regimental P. C. was at La Fosse aux Larrons Farm, near the Headquarters of the 5th Infantry Brigade.

Each battalion had established an O. P.,[4] from which its three batteries registered their fire. An officer and telephone men of the Battalion Staff were constantly on duty at each battalion O. P. to report any enemy activity observed in their sector. The 1st Battalion O. P. was placed in a rock-quarry, well forward in the sector covered by the 7th Infantry, while that of the 2nd Battalion was on the forward slope of the plateau overlooking the 4th Infantry sector.

[3] P.C. Post of Command, a headquarters in the field.
[4] O.P. Observation Post.

Before going on with the organization of the sector I will give a detailed description of one of the battery positions, as more or less typical of all the others in this period of semistabilized warfare. D Battery had its guns emplaced in an orchard. This orchard was surrounded by a high hedge and a row of trees. It was on the northern edge of this orchard, behind the hedge and under the shelter of the trees that the guns were placed. The gun-pits were about two feet deep and fitted with trail-pits deep enough to allow an elevation of thirty degrees. In each trail-pit was a trail-log, on which to traverse the piece. The gun-pits were about ten metres apart and large enough to accommodate the gun crew, which seldom exceeded three men—the gunner, number one and number two. On either side of the gun-pit were trenches which held the ammunition and gave shelter to the men fusing the shells. The four gun-pits were connected by a communication trench which ran in rear of them and gave access to the road. From the front the battery was screened by the hedge and trees, while for protection from aerial observation each gun had its own camouflage net, so stretched that the net of one gun connected with that of the next, and also covered the communication trench. About 100 metres to the right of the guns stood a group of three farm buildings. In one of these was the P. C. of the battery and the telephone dugout, while in the others the men lived when off duty. The details of the other battery positions differed somewhat from this, but the principal features were the same.

Communications.—As the sector was comparatively new, and had not been thoroughly organized, there was no system of telephone lines to tie to. Regimental Headquarters ran lines to the 5th Infantry Brigade Headquarters and to the battalions. Each battalion headquarters ran a line to the infantry regiment it was supporting, to the other battalion, and to its O. P. Each battery was responsible for the line to its battalion P. C. and to the next battery. Only single lines were laid, and these were all ground lines, or elevated on trees where it was possible. There was no time to duplicate the lines or to bury them.

The Echelon.—The regimental echelon at the Grande Fôret comprised all the heavy wagons, caissons and their horses, with the exception of those of the Supply Company which was located south of Viffort. The limbers of the firing batteries with their horses were concealed in clumps of woods near the battery positions.

Supplies.—Supplies for the firing batteries were brought up each night to the positions by the battery ration carts, and in the same way forage for the horses at the short echelon was brought forward. No cooking was allowed at the battery positions; all of the food was brought up in thermos cans. This gave the men two hot meals a day—supper, when the cans first arrived, and breakfast the next morning before the cans were taken back to the echelon.

Ammunition.—The regimental ammunition dump was located near Viffort. To this dump the ammunition train brought the ammunition from the division dump. From here the regimental ammunition officer conducted the trucks carrying ammunition for both battalions to some convenient rendezvous, where the train was split and turned over to the battalion ammunition officers. At this particular time we had no battalion dumps, and the trucks were taken directly to the battery positions.

Liaison.—A system of liaison with the infantry was established. A lieutenant from Regimental Headquarters was sent to the 5th Infantry Brigade Headquarters. A lieutenant from each Battalion Staff was at the Headquarters of the infantry regiment the battalion was supporting, while another was with the battalion of infantry in the line. Each of these officers had a number of runners with him, and the detail was permanent.

III. THE FIFTEENTH OF JULY

With the sector thus organized, the work of preparation for the attack was rapidly carried on. An elaborate system of barrages, normal and eventual, and of offensive counter-preparation,[5]

covering the entire front of the division, was established. This included a Britel Switch[6] at right angles to our normal fire, in case the enemy should gain a foothold in the Surmelin Valley. Under the regimental command were placed a French battalion of 75's, a French battery of 105's, and two French batteries of 155 howitzers. This multiplied the work at regimental headquarters, as it necessitated the translation for them of all orders. We were extremely fortunate in having a very superior French officer attached to the regiment as liaison officer, and it was due to his efforts, and to the hearty coöperation of the French officers in command of these units, that perfect harmony was kept up. These French organizations had been in the sector before our arrival, and we were careful, in registering, only to fire when one of their batteries was firing, so as not to betray our positions.

Between the 6th and the 14th of July the sector was ominously quiet. There was little or no shelling, except occasional high-burst ranging by the enemy. Nevertheless, tension was at a high pitch. Almost every night, as we were trying to snatch a little sleep, would come a call for O. C. P. The Colonel would rouse the entire staff, and, half asleep, we would sit around the little office at Headquarters awaiting the attack that did not come.

As the 14th grew nearer, calls for O. C. P. and barrage became more frequent. Between the 11th and 14th of July the regiment fired approximately 11,000 mustard-gas shells per night. Boche activity increased. Smoke cylinders[7] were reported between Brasles and Gland. The entire division was put on the "Alert."

The evening of July 14th was clear and cloudless. Scarcely a sound broke the stillness. About 11:30 the staff was awakened by the Colonel's orderly, and assembled in the office at

[5] Offensive Counter Preparation, abbreviation O.C.P. Fire placed upon the enemy's front line, assembly, and strong points, to break up his attack before it is launched.

[6] Britel Switch. A shift of fire to the flank which would place a defensive barrage behind our lines in case the enemy succeeded in penetrating at that point.

[7] A device for projecting smoke screens.

Headquarters. A call for general O. C. P. had just come in. Suddenly every gun in the sector broke loose. About 12 I went into the garden. All around me the flashes of guns pierced the darkness, and their noise was an uninterrupted roar. All at once I heard a curious sound, quite distinct from the commotion raised by our guns. It was a steady whir overhead, like a high wind whistling through the trees, yet there was no wind. With this sound I was later to become only too familiar. It was the noise of Boche shells passing over us in a continuous stream.

About 12.25 we were calling 2nd Battalion Headquarters on the phone. In the midst of the conversation the cry of gas came to us over the wire—then silence. By 12.30 all communications were cut. In vain we attempted to call brigade, division, battalions or batteries. Every line was cut. The great attack was on in earnest.

The regimental telephone officer immediately set out with his men to repair the lines. The regimental surgeon started off in his side-car for 2nd Battalion Headquarters. The rest of us, crowded together in the office, could only wait for news. Toward morning the radio officer picked up a message from the infantry, stating that the enemy were crossing the river before Fossoy.

About 4:30 the tension became unbearable, and I asked the Colonel if I might ride around to the battalions to find out how things were going. He consented; so I started off for 1st Battalion Headquarters with an orderly. Here I learned from the Major that all was well with him. None of his batteries had suffered heavily so far, and he was well along in the work of reëstablishing his broken communications.

I then started for 2nd Battalion Headquarters, intending to visit the battery of French 105's on my way. I had gone but a short distance when, suddenly, I smelled gas. On went our gas masks. Shells commenced to burst all about us. It is impossible to describe the sensations of that moment. Everything appeared confused and distorted. A white mist of gas enveloped me. On all sides the scream and crash of bursting

shells came so fast that it was useless to attempt to avoid them. My vision was cut down by my mask, and it was with difficulty that I was able to make out the road ahead. I pushed my horse into a gallop and, with my head down, I ploughed forward as if I were trying to buck the line in a football game. Every once in a while it would appear as if the ground would rise up, *en masse,* in a cloud of smoke and flying dirt. I passed the farm house where the French battery should have been, but, in my confusion, nothing seemed familiar, and I missed it. I kept on, and at last reached Battalion Headquarters.

Along the road in front of Trinité Farm ran a little ditch, and this ditch was full of doughboys, supporting troops of the 28th Division. Many of these were killed or wounded, but so intense was the enemy's barrage that no one could get to them. A lieutenant stood in the road where I dismounted, and I asked him if the Major was still in his P. C. He replied that the Headquarters was then evacuating Trinité Farm and taking to a trench. Leaving my horse with the orderly, I walked over to the farmhouse, where I found the staff busy taking the last of the wounded from the building. The farm had been badly shot up, as the holes in roof and walls and the clutter of *débris* testified. As we stood about the doorway, talking, a shell came steaming over like an express train, and struck in the courtyard. I shall never forget the agonized look of terror on one man's face as he threw himself to the ground. For five solid hours now this had been a continuous performance for these poor devils, and they were about all in.

Here I learned that the 2nd Battalion was in a bad way. A captain and the battalion surgeon had both been wounded. The surgeon, with a shell splinter in his leg, was still hard at work. Practically all of the telephone men and runners were killed, wounded, or missing. Five of the missing were found several days later in one of the upper rooms of the farm, blown to little bits. No communication with the batteries was possible, as every man who went out on the line was hit, and while the line was being mended in one place it would be broken in three

or four others. The losses at the batteries were not known, but every one was "Carrying On." Their fire had never slackened for one moment.

I left Battalion Headquarters and rode over to D Battery. Here I found that as yet the casualties had not been very high, although shells were dropping all around the battery. The executive and a number of the cannoneers had been wounded. The B. C.[8] had had a roving piece out when the "Show" started, and all attempts to serve this piece had failed, as it was impossible to carry ammunition to it. Most of the casualties had occurred in trying to serve this gun.

I went into the P. C., where I found the executive lying on a bed. The nauseating smell of gas was everywhere, but the men had long since given up trying to work in their masks, and now only put them on when an especially strong concentration occurred. While I was here, trouble commenced. A sergeant's head was blown off. Another man staggered in with his arm in shreds. Casualties then came in thick and fast. The road to Battalion Headquarters was a veritable deathtrap, and it was impossible to evacuate the wounded. As all communications were gone, and we could get no word of what was happening, there was nothing to do but keep on firing the O. C. P. This we knew would catch the Boche as they formed to cross the river.

I promised the B. C. that I would try to get him an ambulance, and started back to Battalion Headquarters. I lashed my horse into his best speed, in the hope that I could outrun the shells. Once a shell burst just off the road in front of me, and, as I galloped by, I saw a man leap up and commence to dance about the crater waving his arms and jumping up and down. What the trouble was I did not stop to enquire.

I finally reached the Major, and told him of D Battery's plight. He wanted ambulances the worst way himself, so I went back to Regimental Headquarters to get some for him. Here I found that communications to the rear and to the 1st Battalion had been re-established. No news of how the attack

[8] B.C.—Battery Commander.

was developing had come, but we were holding our own. I remained at Headquarters about an hour, waiting for the ambulances, and had some breakfast.

At last one ambulance arrived. I started out in it once more for the 2nd Battalion. When we reached the gas zone the driver put on his mask, and we wove our way between shellholes till we came to Trinité Farm. Here the driver refused to go further, saying that there would not be a chance of his reaching D Battery.

I found the Major with the remnant of his staff seated in a trench in the wheat field. He asked me to carry a message to the three batteries, as there was no one left on his staff who knew the way to F Battery. A lieutenant offered to accompany me. We walked over to E Battery, where we found the B. C. in the courtyard of the farm which had once been his P. C. He told us that his guns had not been touched, but that his P. C. was destroyed, and that his losses had been pretty heavy.

From Les Norvins Farm we started along the road to Le Pêtret and D Battery. Shells were coming over pretty fast. Once we hesitated about going forward, but went on. A shell exploded in the exact spot where we had stood.

We reached D Battery without mishap and then continued our journey to F Battery. This was the worst part of the trip, for our road lay over an open field, under observation of the enemy. The trip across this field was a succession of falling on our faces, crawling and running, till at last we reached the shelter of the woods. Here it seemed almost a miracle, as not a shell had fallen in the woods about F Battery. All who had ventured outside the wood had been hit, but F Battery itself was untouched. The B. C. was not at his battery position, but in his P. C. at Les Petit Ballois Farm. To reach this we had to cross another open field, and we heartily cursed him for being where he was. At last, however, we reached the farm in safety, and delivered our message. Here we found Captain —— lying in a ditch that had been dug under the house, with a piece of shell in his side. The ditch was as dark as pitch, with water

in the bottom of it. The Captain had been lying in this hole for eight hours, with no other medical attention than a first-aid dressing.

He had been at the Battalion O. P. when the barrage commenced. After all communications were cut and his O. P. destroyed, he had volunteered to carry a message from the 4th Infantry to their headquarters at the Grand Ballois Farm. With only his compass to guide him he had made his way through the woods in the dark, and had almost reached F Battery's P. C. when a shell got him. He managed to crawl the rest of the way, and from there had his message relayed to the Infantry Headquarters. The shelling had been too heavy to evacuate him, so he had to remain where he was until it abated.

From F Battery the lieutenant and I went to the 4th Infantry P. C. On the way we passed two doughboys with a pushcart. In the cart lay three bodies, two dead and one still living. From the 4th Infantry P. C. we had stretcher-bearers sent back for Captain ——.

By this time F Battery had a line to the 4th Infantry at the Grand Ballois, and C Battery at the Petit Heurtebise Farm had a line to the rear. We borrowed some signal corps men from the infantry and had them put in a line from the Grand Ballois to the Petit Heurtebise. The regimental telephone officer put in a line from C Battery to the trench which served as the 2nd Battalion P. C. Thus the Major was put into communication with the Regimental Headquarters, through C Battery, with the 4th Infantry P. C. and with F Battery. His other two batteries could be reached by runner.

After having accomplished this I returned to Regimental Headquarters. It was now about 4 P.M., and the enemy shelling had materially slackened. I was "all in," and I slept clear through till the next morning.

By the 16th the crisis had passed, and the last German drive for Paris had been stopped. True, the enemy had gained a foothold in the Surmelin Valley, but his advance was over. Counter-attacks had already been launched, and by the 19th

the enemy were again on the north side of the Marne, in full retreat.

The following extract from the account of a German officer in one of the divisions that attacked us shows the effect of our artillery fire upon the enemy troops when they attempted to cross the Marne on the night of July 14th and 15th. This is taken from an article printed in the November issue of the *Watch on the Rhine,* the official organ of the Third Division:

"Then, when they are almost ready to attack, artillery cuts loose. At first they think that their own has made a mistake, and is firing a few minutes too soon. But they are not long in learning that it is the American artillery, and that their enemy has beat them to it, and has surprised them instead."[9]

This is the picture of the Jaulgonne forest shortly after the fight had begun, as drawn by the writer of the article:

"The concentrated fire of the enemy artillery pours in. Not a spot escapes. Over here, the steady shelling of a heavy battery. In the depths of the forest the explosions are terrific, unnerving. Over there, a clearing is ripped and torn up every five minutes by a light battery, and almost immediately becomes a vast crater field. And the narrow lane at the right is covered with heavy shrapnel bursts."

The German officer describes their attacks, the many futile efforts before they succeed in getting pontoon bridges constructed across the river, the crossing of the stream, and then the supreme effort to break the line of the enemy on the south bank, resulting in fearful loss of life and utter failure to carry out their plans.

The writer depicts the beginning of the wane of German military supremacy as follows:

"The men run headlong, searching for cover. And then that howling, moaning shell—so hollow-sounding! Gas masks on! A minute ago we could scarcely see. Now we can see

[9] He is describing our O.C.P.

nothing. Clammy despair seized many men. They fell helpless. The wounded are shrieking. In a hoarse voice the company commander finally shouts an order:

"'Fall in! Has every man a rifle?'

"Now forward through the narrow lane into where steel is pouring, but it is the only path down to the river. Down a short distance stand the pioneers. Their leader is helpless. He has only a few men left, and the infantry lends a hand to carry the pontoons to the river. . . ."

"A new volley! Every one is running away! Several dead and a wrecked machine gun lie beside the pontoons. But there are other pontoons below! Let's get forward! Anywhere away from here! . . ."

"'The Americans slaughter everyone!' was the cry of terror of July, which for a long time had its effect on our men.

"At home they were laughing at the inadequate training of the enemy, at the American 'bluff.' and at other things. That we lost more than 60 per cent. dead and wounded of the men who went into battle on July 15 was due mostly to him."

IV. CONCLUSION

Before concluding this account of our initial movement to the front and occupation of position, and of the subsequent action in the Champagne-Marne defensive, I want to give a short critique showing some of our mistakes, and the lessons they taught.

The first of these was brought home to us when we moved into position. It is a lesson which all of us have been taught, but one upon which too much stress cannot be laid. This is the necessity for personal reconnaissance—"P. R." the Colonel used to call it—and it was drilled into us from the very beginning of our training. Yet even then we did not grasp its full signifiance. By P. R. I mean that an officer should not only take every opportunity to see for himself rather than trust to the reports of others, but that he should have the ability to locate himself quickly and accurately, at all times and in all

places, with or without a map. To be able to do this requires a thorough knowledge of map reading. Before starting out on a march or reconnaisance, an officer, by study of his map, should be able to memorize distinctive features of the terrain, such as culverts, prominent hills, church steeples, road crossings, etc., so that, carrying these details in his mind, he will recognize them when he sees them on the ground. Not only must he be able to do this in the daytime, by a quick reference to his map, but also at night without a map. A corollary to this definition of P. R. easily follows. This is the habit of making a mental note of every landmark which is passed. With a little practice, an officer can so familiarize himself with ground once covered that he can always retrace his steps. All of the wanderings which occurred on the night we went into position would have been avoided if this lesson had been thoroughly learned in our period of training.

The next mistake we made was in our choice of positions. The sector which we had to cover was a large one, and to do it effectively we had two alternatives open to us. Either we should separate the battalions in order to place them behind the infantry regiments they were to support, which would mean a weakening of our own regimental control, or we should keep the battalions close together to insure liaison with our regimental headquarters. The latter course was adopted, for two reasons. In the first place, our regimental P. C. was close to the 5th Infantry Brigade P. C., and, according to all previous instruction, we should have been able to keep in touch with the infantry through the latter. In the second place, this was our first experience at the front, and no one knew how the battalions would function in action.

What were the results of this decision? When the enemy barrage was laid down on the night of July 14th every line in the division was cut. We were able to repair the communications within the regiment by the afternoon of July 15th, but we were hopelessly out of touch with the 7th Infantry, the regiment which most needed our support, until late on the afternoon

of July 16th—that is, until the crisis had passed, and their greatest need for our help was over. Another result of this decision was the temporary loss of the 1st Battalion O. P. This had been placed well forward in the sector of the 7th Infantry. All during the most critical hours of the fight it remained useless, because it was so far away from the battalion that it was impossible to keep the long telephone line under repair during the enemy bombardment.

From this mistake the following principle was evolved: Always keep the battalions as near the infantry they are to support as possible. After the initial plans for attack or defense have been given, regimental control counts for little. The battalion is the tactical unit, and it must seek its targets and missions from the infantry in its front. No help can be expected from a headquarters in the rear.

The next place where we fell down under the stress of battle was in our system of liaison. Our liaison officers with the infantry were all lieutenants, good men individually, but inexperienced, and, because of their inexperience, lacking in self-confidence. In addition, this was the first time that our brigade had served with their infantry, and the infantry officers had no idea of the weapon which they had at their disposal in the divisional artillery.

When the enemy attack was launched, and the headquarters in rear could no longer direct our fire, our liaison officers were ignored. Because of their low rank and their lack of self-confidence, they, in turn, did not assert themselves. Consequently during the entire engagement, we remained in ignorance of the needs of the infantry, and could only keep on firing our O. C. P., which had been assigned to us beforehand.

The fault here lay not only with us, but with the infantry, and the lesson of close and efficient liaison was not entirely learned until after another month of hard fighting. The point I wish to bring out, however, is this: Liaison officers should be selected with the greatest care, and should be officers skilled in their own arm, energetic and resourceful, with sufficient rank

and personality to impress themselves upon the infantry officers with whom they are associated. These officers should be amply provided with runners and should make use of them to keep their commanding officer constantly in touch with the movements of the infantry. Whenever possible, they should have their own telephones. The detail should be permanent, but they should be frequently relieved by fresh men, for their work is the most arduous of any that falls to the artillery. Personally, I should like to see provision made in the tables of organization of light field artillery for four captains to be assigned to Headquarters Company for this work.

Perhaps the reader may have noticed in reading Part III of this article that most of our casualties occurred at the Battery and Battalion P. C.'s while few of the men actually serving the guns were hurt. This was due in a large measure to the fact that the men at the guns were all protected by trenches, while those at the P. C.'s were all in or around farmhouses, where no adequate shelter had been prepared. Of course, many of the casualties were runners and telephone linemen, and were unavoidable. The lesson we learned, however, is this: The minimum number of men possible should be kept with the firing battery, and all of these should be provided with shelter in the form of trenches, where they will be protected while not actually engaged in some duty.

The last notable defect in our system was in the ammunition supply. We had no battalion dumps from which ammunition could be carried by hand to the batteries. Consequently, when the enemy barrage became so intense that it was impossible to bring trucks or wagons up from the regimental dump, we had nothing to fall back on, and the ammunition shortage at the batteries became acute.

Extracts from the Report of the Chief of Field Artillery for the Fiscal Year 1919

[EDITOR'S NOTE.—*The following extracts from the report of the Chief of Field Artillery are published for the information of those of our readers who will not have an opportunity to see a copy of the full report as published by the War Department.*

The report of the Chief of Field Artillery, Major General W. J. Snow, for the fiscal year 1919, is more of a narrative of field artillery activities during the World War than a routine annual report.]

General Snow states:

As in 1918 the World War was still going on, only a short report, and this in general terms, was submitted. Now that the war is over, it is deemed advisable to submit a more lengthy and more detailed report covering the entire period of hostilities.

Insufficient time has elapsed since the cessation of hostilities to study and digest the lessons of the war; the present report is, therefore, more of a narrative of artillery activities made of record in order to prevent their being lost; but, even so, a study of this report will show where mistakes were made, and, consequently, the steps that should be taken to avoid their repetition in the next war.

The present report is concerned more with procedure and occurrences in the United States than in Europe. This is due to two facts: First, information as to the latter is as yet almost unavailable; second, separate reports covering the latter will undoubtedly be made later.

The report is summarized as follows:

CONDITIONS AT THE OUTBREAK OF WAR

In April, 1917, the Field Artillery of the United States consisted of 9 regiments of Regular Field Artillery, approximately 16 regiments of National Guard, and a reserve of 221 officers and 33 enlisted men.

THE REGULAR ARMY FIELD ARTILLERY

Under the provisions of the act of June 3, 1916, the Regular Army Field Artillery was increased from six to nine regiments. In order to form the three new regiments the four light battery regiments were divided to form the nuclei on which to build. The declaration of war found all the light regiments with 55 per cent. of their enlisted men with less than one year's service. The authorized peace strength being far below that of war strength, and the fact that these regiments were far below peace strength, gives one an idea of the condition of our Field Artillery at that time.

The trained Regular Field Artillery on April 6, 1917—that is, officers

and enlisted men with more than one year's service—was 275 officers, 5253 enlisted men.

These figures should be compared with the strength of the Field Artillery on November 11, 1918, which are as follows: 22,393 officers, 439,760 enlisted men.

Upon the outbreak of war the Regular Field Artillery was increased from 9 regiments to 21 regiments, calling for a still further distribution of the regular commissioned and enlisted personnel in the Field Artillery.

The disorganization resulting from such an expansion following that of June 3, 1916, can well be imagined. The entire enlisted personnel with one year's service was not sufficient to fill the noncommissioned grades in the 21 regiments. Moreover, about 400 of these noncommissioned officers were called on as instructors in the officers' training camps just being formed.

A still further tax was put on the Regular Field Artillery by the forming of 138 regiments of National Army Field Artillery, and to a much smaller extent by the forming of 51 regiments of National Guard Field Artillery.

The fact that Cavalry regiments could not be used in Europe to the same extent as the other arms of the service permitted the conversion of certain of the Cavalry units into Field Artillery. The Eighteenth to the Twenty-fifth Cavalry Regiments, inclusive, were converted into Field Artillery under authority of General Order 139, War Department, November 1, 1917. As late as August, 1917, no attempt had been made to brigade these 29 regiments of Regular Field Artillery. General Order 101, dated August 3, 1917, laid down the composition of an Infantry division, at the same time outlining the organization of an Artillery brigade.

Upon the publication of this order, organization of brigades was immediately undertaken, thus placing a still heavier tax on the regular Field Artillery in expanding to form the brigade headquarters detachments.

THE NATIONAL GUARD FIELD ARTILLERY

Seventeen divisions of the United States Army, numbered from 26 to 42, inclusive, were formed into National Guard units. They included 17 brigades of Field Artillery, numbered from 51 to 67, inclusive.

The national defense act of 1916 provided for 12 brigades of National Guard Field Artillery. These 12 brigades had been formed only in a small part. Hence it was found upon the declaration of war that an enormous expansion of the National Guard forces would be necessary. The trained National Guard Field Artillery on April 6, 1917, may be stated as 541 officers, 12,975 enlisted men.

The expansion called for 3247 officers, 79,917 enlisted men.

The organization of these brigades was at first undertaken in the divisions themselves by the conversion of Infantry and Cavalry organizations into Field Artillery. This proving ineffective, transfers were made of reserve officers and enlisted personnel from the National Army Field Artillery, and to a very small extent by the transfer of Regular Army personnel. The brigade commanders were in almost all instances Regular Army officers.

REPORT OF THE CHIEF OF FIELD ARTILLERY

THE NATIONAL ARMY FIELD ARTILLERY

Seventeen divisions known as National Army Field Artillery units were organized in August, 1917. The Field Artillery brigades in these divisions were numbered from 151 to 167, inclusive. The organization of these units called for approximately 3000 officers and 70,000 enlisted men. The brigade commanders and the senior field officers were detailed from the Regular Army. Officers from the Reserve Corps made up the remainder of the commissioned personnel.

The enlisted personnel was composed entirely of men brought into the service under the draft act. The development of these units in the face of the most discouraging handicaps was truly remarkable.

The efficiency developed by these units in so short a space of time can only be attributed to the wonderful esprit of the draft men and the young reserve officers acting under the efficient guidance of the Regular Army officers responsible for the training and development.

The handicaps under which these units labored were a lack of matériel with which to train, overcome partly by the improvisation of makeshift equipment, and the much more serious handicap of being called upon continuously to build up the National Guard units by the transfer of partially trained men. This latter resulted in a continuous disorganization of these National Army units, and continued as a serious menace to the training and the development of these brigades until the establishment of the office of the Chief of Field Artillery, when replacement depots were organized from which replacements were drawn both for organizations serving in the American Expeditionary Forces and units at home.

TRAINING

Conditions in the Field Artillery in January, 1918, may be characterized as chaotic.

The only solution of the problem was the immediate establishment of a centralized head with full responsibility for the organization and training of the Field Artillery.

On February 10, 1918, Maj. Gen. William J. Snow was detailed as Chief of Field Artillery.

Briefly stated, the following projects were undertaken and carried to a successful conclusion:

1. The establishment of the Field Artillery replacement depot at Camp Jackson, S. C., and later, the establishment of a similar depot at Camp Zachary Taylor, Ky.
2. The organization of the Field Artillery Central Officers' Training School at Camp Zachary Taylor, Ky.
3. The reorganization and enlargement of the School of Fire at Fort Sill, Okla.
4. The organization of brigade firing centers.
5. The establishment of a system of training and coördination, through

inspector-instructors, who both inspected and helped in the training of brigades.

6. The establishment of schools for the instruction of specialists, and for the training of motor mechanics and chauffeurs.
7. The redistribution of matériel along equitable and efficient lines.
8. The coördination of Artillery matériel production.

OFFICERS' SPECIALISTS

Schools were established to train officers in the following specialists' subjects: (1) Staff work; (2) aerial observation; (3) radio work; (4) motors and tractors; (5) telephones; (6) liaison; (7) orientation.

FIELD ARTILLERY CENTRAL OFFICERS' TRAINING SCHOOLS

No adequate provision had been made for the training of officers as replacements. Division schools had been established for this purpose, but they were grievously deficient in the following respects:

1. The movement of a division broke up a school.
2. The number of graduate students were inadequate.
3. The training was superficial, incoördinated, and inefficient.
4. There was a waste both of matériel and instructors, due to the great number of schools in operation.

The Central Officers' Training School was established at Camp Zachary Taylor, Ky., with Col. A. H. Carter as commandant.

Eight thousand seven hundred and thirty-five students were graduated from this school between the dates of August 16, 1918, and February 1, 1919.

Commendatory reports on the efficiency of this school were made not only by inspectors from the Inspector General Department, but by the officers of the foreign missions who had occasion to visit and inspect this institution. Graduates entering the School of Fire at Fort Sill were especially commended, showing conclusively that the Central Officers' Training School was being conducted along most efficient lines.

THE SCHOOL OF FIRE, FORT SILL, OKLA.

This school, organized before the war, conducted at that time a course for classes of about 30 officers. Shortly after the declaration of war Maj. Gen. William J. Snow, at that time a colonel of Field Artillery, was detailed as commandant of the school, and immediately undertook to develop the course along more comprehensive lines and to arrange for the enrollment of a much larger student body.

Upon the promotion of Colonel Snow to brigadier general of the National Army, Col. Adrian S. Fleming, Field Artillery, was detailed as commandant of the school, and under his most efficient and able direction the plans for reorganization were carried into effect. Some 6000 officers were trained at this school, and upon graduation were detailed on different Field Artillery activities, both at home and in the American Expeditionary Forces. And it can be said that without question this school contributed more to the success

of the Field Artillery operations in this war than any other Artillery activity.

The results of this training were noted and most favorably commented upon, both by officers of the senior grade in the American Army and by foreign officers who saw and appreciated the results of this training abroad.

FIELD ARTILLERY BRIGADE FIRING CENTERS

Shortly after assuming office the Chief of Field Artillery noted that the brigades were not being efficiently trained in divisional cantonments. This condition arose from lack of matériel, lack of sufficient and efficient instructors, and lack of training area. To meet this condition four brigade firing centers were immediately organized, being located at Camp Doniphan, Okla.; Camp Jackson, S. C.; Camp McClellan, Ala.; and Camp Knox, Ky.

Matériel and instruction were concentrated at these camps. Staff schools and schools for all specialists in the brigades were established. Officers returning from abroad, as well as officers from the foreign mission, were detailed as instructors.

It may be truly said that only those brigades which had passed through these firing centers were properly trained and organized upon their departure from this country for France.

Fourteen brigades were trained at these centers.

REPLACEMENT DEPOTS

To obviate the constant demand on the National Army Field Artillery to supply replacements for the troops in the American Expeditionary Forces and National Guard, the Chief of Field Artillery directed the organization of two replacement depots, one at Camp Jackson, S. C., and one at Camp Zachary Taylor, Ky. The original plan of organization contemplated the supply of replacements from depot brigades, but this scheme proved in a short time most ineffectual, with the aforementioned result, namely, that National Army units were constantly called upon to make up deficiencies.

These replacement depots trained both officers and enlisted men in their particular duties to the end that men could be supplied on demand who had been especially trained for their particular functions in the brigade.

These depots supplied 8220 officers, 35,369 enlisted replacements.

MATÉRIEL

Upon the outbreak of war the following matériel was on hand for training purposes and for actual combat:

2.95-inch mountain guns and howitzers	107
3-inch guns	574
3.8-inch guns and howitzers	40
4.7-inch guns	55
4.7-inch howitzers	112
6-inch howitzers	42

This shortage of matériel militated more than any other one thing against the proper training of our newly-organized Field Artillery units.

Matériel was improvised in all brigades to make up for this deficiency,

but this effort in no sense offset the terrible disadvantage under which these troops labored.

An unequal distribution of matériel worked a serious hardship on certain units in training which had no matériel or practically none. This condition of unequal distribution was immediately corrected by the Chief of Field Artillery, as was the question of immediate supply of matériel for which no arrangement or provision had been made.

One of the greatest problems which confronted the office of the Chief of Field Artillery was the coördination and following up of the production of matériel for troops serving in the American Expeditionary Forces, as well as those in training at home.

On April 1, 1919, production had reached the following figures:

75-mm. guns	1,281
3-inch guns	33
4.7-inch guns	395
155-mm. guns	334
155-mm. howitzers	521
8-inch howitzers	213
9.2-inch howitzers	1

INTRODUCTION

This report, in addition to furnishing a record of Field Artillery activities, presents a study for determining a Field Artillery policy by pointing out and emphasizing the errors made in organization and training during the early stages of the war and the corrective measures applied later.

The question of organization and training is divided into two parts—the first phase from the outbreak of the war to the establishment of the Office of Chief of Field Artillery; and the second phase subsequent to the establishment of such office. With reference to this division of time General Snow states:

This division is a most logical one, as the records and facts herein will show. The earnest and conscientious efforts of all the artillery personnel during the first phase are above criticisms, and though little or nothing was accomplished, it was obviously not through lack of effort. After the establishment of the Office of the Chief of Field Artillery, which brought about the coördination of all artillery activities under one head, we note, those enormous strides in development and training which are attested to so gloriously in the records of the Field Artillery of the American Expeditionary Forces during the operations in France.

Under the first phase, General Snow discusses the disorganization of the regular field artillery upon the outbreak of war, and states:

The disorganization resulting from such an expansion following that of 1916 can readily be imagined. Peace strength regiments which had been split in half in 1916, were again divided into three parts in June, 1917. It is obvious that the nucleus of trained field artillerymen contained in each regiment was almost negligible by the time the organization had been brought up to war strength with untrained recruits. The entire enlisted personnel contained in the original six regiments on June 30, 1916, was not sufficient to

supply even the noncommissioned officers required for the 21 regiments in existence in June, 1917. Moreover, approximately 400 of the best noncommissioned officers had been sent to officers' training camps and had received temporary commissions after the outbreak of the war. This number included practically all of those who had served above the grade of corporal in the original six regiments. In general the composition of the enlisted personnel of these 21 regiments of Regular Army Field Artillery, after being brought to war strength, was about as follows:

Noncommissioned officers in the higher grades, such as sergeants major, color sergeants, regimental supply sergeants, first sergeants, etc., were, for the most part, men who had been corporals in the original six regiments a year before. Many of the duty sergeants were men who had been privates in 1916. A considerable number of the corporals were recruits who had joined the first expansion and who had had six months or less training since the outbreak of the war. Practically all of the privates were raw recruits enlisted after the declaration of the war.

Later this situation was aggravated by the transfer of some 800 non-commissioned officers to the National Army Field Artillery for training purposes. It is obvious that these Regular Army regiments were such in name only. So far as their enlisted personnel was concerned they were very little different from the National Army forces raised by the draft a few months later.

Undoubtedly this was the proper use to make of the Regular Army—tear it to pieces and use the parts as leaven in organizing the larger army. But the public generally does not recognize that the Regular Army continued as such in name only, and that the successful creation of the much larger army and its rapid progress was only possible by the addition it received from the Regular Establishment.

It is interesting to note how the deficiencies of field artillery in the National Guard were made up by wholesale transfers of units from other arms.

The organization of each Field Artillery brigade was undertaken within the division of which it was to form a part. Practically all National Guard Cavalry units and a number of Infantry units were converted bodily into Field Artillery. Other units were broken up and their personnel distributed among various arms, the Field Artillery receiving a large number. Some idea of the extent to which the Field Artillery was recruited by this means may be obtained from the following list of units converted into Field Artillery, or broken up to supply recruits to the Field Artillery and other branches. Organization converted into Field Artillery were:

CAVALRY.	CAVALRY.
Troop M, First Squadron, Rhode Island.	First Squadron, Michigan.
First Pennsylvania (less headquarters, supply, and machine-gun troops).	First Wisconsin.
First Squadron, District of Columbia.	First Illinois.
Troops B and D, First Squadron, New Jersey.	Troop B, Missouri.
First Alabama (less machine-gun company).	First Texas (less Troops E and K and machine-gun and headquarters troops).
	First Ohio.

Troop B, First Squadron, Indiana.
First Utah (10 troops).
First Squadron, Oregon.

INFANTRY.

Headquarters and supply company.
Fifth Maryland.
Headquarters Company and Companies I and M, Fourth Virginia.
First Tennessee (less machine-gun company).
First Georgia (Companies A, B, C, D, F, G, and machine-gun company).
Sixth Illinois (less machine-gun company).
Third Minnesota (less machine-gun company).
Fourth Nebraska (less machine-gun company).
Third Indiana (less machine-gun company).
First and Second Battalions headquarters and supply companies, First Kentucky.
Fourth Indiana (less Companies L and M and machine-gun company).
Second Arkansas (less machine-gun company).
First Battalion headquarters and supply companies, Second Idaho.
First Battalion, Companies H and M, Fourth South Dakota.
First Battalion headquarters and supply companies, Third Wyoming.

MISSCELLANEOUS.

Company A, Virginia Signal Corps.

In addition, more or less heavy drafts furnished the National Guard Field Artillery from the following organizations:

New England Coast Artillery.
Twelfth New York Infantry.
Fourteenth New York Infantry.
First New York Infantry.
Seventy-first New York Infantry.
Seventy-fourth New York Infantry.
First North Carolina Infantry.
Second Tennessee Infantry.
First Florida Infantry.
Thirty-first Michigan Infantry.
Fourth Wisconsin Infantry.
Sixth Wisconsin Infantry.
Seventh Ohio Infantry.

Of the organization of the National Army, the report states:

ORGANIZATION AND TRAINING OF THE NATIONAL ARMY FIELD ARTILLERY

Seventeen divisions known as National Army units were organized in August, 1917. The Field Artillery brigades in these divisions were numbered from 151 to 167, inclusive.

The organization of these 17 divisions is of great interest as we find for the first time in the history of the United States the organization of entire units by the processes of the draft law. It is true replacements were obtained during the latter years of the Civil War through the operations of a draft act, but men reporting in compliance with the law at that time were placed in old organizations where the morale and esprit of the unit were established, and where seasoned troops were always available to train and instruct the new men. The placing of these draft men in newly organized brigades, in the present war, in a sense was an experiment, and, in fact, a necessity. New units had to be organized, and trained soldiers were not available to use as a nucleus in the organization. The building up of the morale in these units was of first importance. The spirit of the newly drafted men was an unknown quantity; there was no existing regimental esprit; the rigors of Army life were unknown to these new men; and it was possible that a low morale, a spirit of depression, might obtain.

To organize and train these new units three officers from the Regular Army were assigned to each new regiment, the colonel, one field officer, and one captain. In addition, there were selected from the noncommissioned personnel of the Regular Army four temporarily commissioned captains, who were to assist in administrative duties. The remainder of the commissioned personnel was drawn from the reserve officers' training camps and from enlisted men of the National Army divisions themselves.

The full responsibility for the training and organization of these new units fell on the Regular Army officers. The results obtained attest to the excellent manner in which they performed their duties. During the first days of the organization they performed all the duties of an officer in a regiment from that of second lieutenant to colonel, and in addition to training the enlisted personnel they found it necessary to conduct a course of training for the reserve officers, which usually took the form of night schools.

Too much credit can not be given to the reserve officers for the part they played in building up these units. These new officers entered upon their work with an energy, zeal, and enthusiasm that was soon communicated to the enlisted personnel. Their loyalty and coöperation were never in question.

The draft brought into the Army men from all walks of life. The rich and the poor, the educated and the unlearned, walked side by side inspired by a common thought—the defeat of the German Army. Men with exceptional qualifications and wide experience were found in every organization who soon rose to the grades of noncommissioned officers where, as leaders, they promoted the efficiency of the regiment and built up the morale of the troops.

One thing which contributed greatly to the rapid progress made by the National Army units was the thorough study made of the vocational training of the men reporting, to the end that they could be assigned to the branch of the service where their previous training would be of the most benefit. In the assignment of men the needs of the Field Artillery were not met, which resulted later in the establishment of specialists' schools to correct this deficiency. However, the distribution was equitable and the standard of enlisted personnel was higher than that of any army ever organized.

Scarcely had the organization of these National Army brigades begun before the drain on the enlisted personnel to furnish replacements commenced. As early as September, 1917, the National Army units were called upon to furnish personnel to fill up the vacancies in the National Guard, Regular Army, and units overseas. This condition continued unabated until the Field Artillery replacement depots began to operate in 1918, when it was materially relieved.

The lack of matériel for training purposes was almost as serious a handicap as the constant call for replacements. Entire brigades were furnished with from one to four guns for the training of the entire unit, with other necessary matériel distributed in like proportion. Wooden guns were improvised as were radio and telephone sets. Ingenuity was displayed in the construction of sights, scales, trench mortars, and fire-control equipment, but these improvizations in no way made up for the deficiencies in matériel which threatened at all times to limit the efficiency of these units.

The efficiency of these new units may be attributed to the guiding hand of the few Regular officers, to the magnificent spirit and earnestness of the newly commissioned officers from civil life, and to the interest, "pep," intelligence, and business-like seriousness of the drafted men. From the first much stress was laid in inculcating sound ideas of discipline, based largely upon military courtesies and customs of the service. All ranks took to it naturally, and it is safe to say no army was ever organized where the problem of discipline gave so little trouble.

Under the second phase it is stated that when the office of the Chief of Field Artillery was established:

A thorough and comprehensive study was immediately started concerning the training and equipment of the Field Artillery in the United States.

These studies may be listed under the following general heads:

1. Data concerning regimental commanders.
2. Data pertaining to strength and training of commissioned personnel.
3. Data concerning strength and training of noncommissioned officers and specialists.
4. Strength of commands.
5. Training of organizations.
6. Facilities for training and service practice.
7. Distribution of matériel.
8. Data pertaining to manufacture of matériel for training and service requirements.

The condition of the Field Artillery was found to be critical. Due to the constant call for replacements, a total shortage of 54,600 enlisted men was found to exist. Training was almost at a standstill. Equipment and material were negligible.

On April 9 a request was made to fill up the Field Artillery organizations from the new draft; this was the most urgent.

On March 27 a general plan for training was submitted, in the form of a memorandum, to the Chief of Staff, recommending in general the following:

1. The establishment of a Field Artillery replacement depot at Camp Jackson, S. C.
2. The establishment of a Field Artillery Central Officers' Training School.
3. Enlargement of the School of Fire at Fort Sill, Okla.
4. The organization of four brigade firing centers.
5. Authority to detail inspector-instructors to assist in the training of Field Artillery brigades. This to expedite and coördinate instructions.
6. Instructions of personnel assigned to motorized organizations at motor schools.
7. Establishment of additional "Specialists' schools" in the divisions.

This program was approved in its entirety, with the results hereinafter set forth.

In brief, the following were accomplished:

1. The reorganization and training of 21 Regular Army regiments, 51 National Guard regiments.

2. The organization and training of 8 Regular Army regiments, 81 National Army regiments.

3. The organization of the above-mentioned regiments into brigades with trench mortar batteries and ammunition trains.

4. The training of over 18,000 officers at the Field Artillery Central Officers' Training School.

5. The supply of more than 8000 officers, 2000 candidate officers and 73,000 enlisted men from replacement depots.

6. The training of 14 brigades at firing centers.

7. The development of the necessary specialists for Field Artillery.

8. The coördination of artillery training with artillery equipment production.

9. The establishment of close liaison with the Chief of Artillery, American Expeditionary Forces, to advise on matters of organization, training, and equipment.

The demands made on the Office of the Chief of Field Artillery to execute this program and to carry on the multiplicity of details which soon accumulated were enormous. For those on duty in the office the 24-hour day was all too short.

With reference to the 8th, Field Artillery Brigade, the Inspector says:

This brigade was the first to receive the new course of training originated with the establishment of the office of the Chief of Field Artillery. It had by far the best training of any brigade which was sent overseas.

General Starbird had seen every Field Artillery unit in training prior to its departure, Regular Army, National Guard, and National Army, and no more glowing tribute could be paid to the results of coördinated organization and training under one head.

When we speak of a brigade we are speaking of a unit which was larger than the entire force of Field Artillery in the United States prior to the war. With this point in mind one can conceive of the magnitude of the task which centered in the office in Washington. It should be kept in mind that at the same time, practically six brigades were receiving instruction similar to that receivey by the Eighth Brigade; that two replacement depots, as large as a brigade and more complex in detail were being operated; that a school at Fort Sill for officers from all Field Artillery regiments, as large as an average college, and meticulous as to its training was graduating officers weekly; in addition this office was directing and supervising the work of the Central Officers' Training School at Camp Zachary Taylor. This school was the largest school in the world, with as many matriculated students as Harvard, Yale, Princeton, and the University of California had in 1916 combined. At the same time those brigades on the priority list for sailing and those which were required to wait for space at the firing center were receiving special supervised instruction at their cantonments or camps. The following were likewise being given close attention and study: First, the coördination of training in America with training in France; second, a close liaison with

matériel production; and third, supervision of special training activities of various kinds.

It is essential to review briefly the methods adopted to undertake this training prior to the establishment of the office of the chief of Field Artillery. We find that the entire training of our reserve officers consisted of a two months' cursory course at the training camps, after which these officers reported to the different brigades to pick up such artillery information as their duties, or conditions in general, permitted.

Night schools were conducted in all the brigades, but lack of equipment and competent instructors soon showed that reliable and efficient officers would never be obtained under such an incoördinated and inefficient system.

No one had fully foreseen the demand for officers as replacements and to officer new organizations. It was understood that there would be such a demand, but no one had figured or attempted to figure what the nature of these demands would be. And it is no exaggeration to state that there would have been a serious deficiency in this respect had not the corrective measures recommended by the Chief of Field Artillery been promptly adopted. When the figures setting forth the probable needs in respect to commissioned officers was first submitted, those charged with the conduct of this matter believed that they were absurd. It was incomprehensible to them that figures as large as those submitted could possibly be correct. These figures applied only to the Field Artillery, but they showed that a proportional error in figuring the probable needs of other branches undoubtedly existed.

It was contemplated that divisional schools would furnish these requirements. These schools lacked competent instructors and matériel, were without coördination, and were being continuously broken up by the movement of divisions. These deficiencies were soon seen, and after the adoption of the recommendation of the Chief of Field Artillery, it was more fully appreciated that, as was pointed out in that recommendation, there was an enormous waste of instructors and matériel, that the instruction given was not sufficiently coördinated, or efficient in any respect, and what was more vitally important, that the division schools could not supply the demand.

At the same time an effort was made to train officer specialists, but the progress made along these lines amounted to practically nothing.

Upon the establishment of the office of the Chief of Field Artillery the general training of officers was undertaken in the Field Artillery Central Officers' Training School and the School of Fire. Specialists' training, including the instruction of aero observers, radio telephone, motor, ordnance, and gas experts, was carried on in several different specialist schools. Combined staff instruction was incorporated in the courses at the Field Artillery brigade firing centers.

As regards the enlisted personnel, the situation was even more critical. The depot brigades were designated to supply the demand for replacements in the American Expeditionary Forces. Under this arrangement untrained recruits without special training would have been sent abroad, and the demand would soon have far exceeded the possible supply.

Divisional schools were in some cases organized for the training of specialists, but, as a rule, these schools were simply for the training of specialists going abroad with the division. As a matter of fact they were not sufficiently comprehensive in their curricula, nor did they in any sense meet the demands for specialists.

Field Artillery brigades were as a usual thing organized as a part of the Infantry divisions to which they were assigned. When the new drafts were received, a hurried effort was made to select men according to their vocations, with the intention of assigning them to the branch of the service for which they would be best suited. In this assignment of specialists the needs of the Field Artillery were not understood, and as a result blacksmiths and teamsters were assigned to the Field Artillery in excessive numbers. Men experienced in radio and telephone work were sent to the Signal Corps, while draftsmen and surveyors were assigned to the Engineers almost exclusively. And so the Field Artillery lost the specialists which it so sorely needed.

A lack of vision and a lack of appreciation of the needs of the Field Artillery continued to exist until the establishment of the office of the Chief of Field Artillery.

It has been shown what steps had been taken in the divisions to train specialists, and in view of this it is interesting to note what were the actual needs of the Field Artillery as regards trained enlisted specialists.

Out of 389,355 enlisted men, 241,889, or approximately 62 per cent, required specialized vocational training. A list of these trades or specialties is set forth in the appendix.*

Due to the lack of appreciation of the needs of the Field Artillery in the assignment of the drafted men, the enormous task of training these specialists fell on the office of the Chief of Field Artillery. The means adopted were: First, training in the brigade and division camp schools; second, training in the replacement depots, where schools for all types of specialists were established, and in the firing centers, where schools were established to carry on such specialized training as bore directly on the coördination of brigade training. In addition, on July 23, 1918, the office of the Chief of Field Artillery furnished the committee on education and special training with an estimate of the required number of specialists needed to complete the Field Artillery program to July 1, 1919. The work done by this committee was of great value to the Field Artillery, and, undoubtedly, had the war continued the work of this committee would have had far-reaching effect.

There was practically no training of the brigades as a unit prior to the establishment of the office of the Chief of Field Artillery. This may be attributed partly to the lack of matériel and partly to the lack of sufficient space in which to train, but even where these deficiencies did not exist the training was not coördinated and the results were not satisfactory, as the reports of inspectors contained herein fully set forth.

Improvement in this regard was immediately noticed after the establishment

* Lack of space prevents our publishing this appendix in this number.—EDITOR.

of the brigade firing centers and the coördination of the training of those units which remained in their divisional camps.

As to the exchange of officers between this country and France:

On July 12, 1918, a cablegram was sent to the commanding general, A.E.F., requesting the return of 15 lieutenant colonols, 21 majors, 50 captains, 200 first lieutenants, and 300 second lieutenants. All these officers were furnished and assigned to units in the United States.

On October 11, 1918, the commanding general, A.E.F., recommended that the following plan be adopted: "Beginning at once a monthly quota of 700 second lieutenants of Field Artillery to be sent from the United States to France; upon arrival of each monthly quota in France, a monthly quota of experienced officers will be sent back to the United States as follows: Six lieutenant colonels, 14 majors, 50 captains, 200 first lieutenants, and 300 second lieutenants. All these officers to be promoted one grade upon arrival in the United States." In substance this plan was approved, and at the time of the signing of the armistice a draft of 700 lieutenants for replacements had been assembled at the Field Artillery Replacement Depot at Camp Jackson, S. C., awaiting orders for overseas service.

Too great stress can not be put upon the value of the services of the officers obtained in this way from the A.E.F.

NOTE.—This plan for the exchange of officers with the A.E.F. was adopted later by all arms of the service.

[NOTE.—*The Field Artillery Central Officers' Training School and the School of Fire, which are treated of in considerable length, are omitted here, as separate papers on both of these activities have already appeared in the* FIELD ARTILLERY JOURNAL.]

Of the Firing Center at Fort Sill (*and there were three other similar centers*) *the report states:*

In order to facilitate the instruction in reconnaissance and orientation, and also for the purpose of furnishing the necessary data to fire by the map, a triangulation system or "Canevas d' Ensemble," similar to the ones established at firing centers in France was compiled, covering the area to be used by the firing center in firing and manœuvering.

The geodetic points located by the Engineers and the school of fire were used as a basis. The coördinates as furnished by the school of fire, were verified by calculation. Points that were removed were relocated, and wherever the coördinates, as furnished by the school of fire, were not the same as our own the point was relocated in the field. A white quadruped with a central pole was erected over all the points west of the Rock Island Railroad, except those that had some plainly visible construction already erected. A characteristic signal was placed on each pole. Additional points about the reservation were located and their coördinates figured. Elevations were run to all these points, starting from the United States Geodetic Survey bench mark at the old post, Fort Sill.

The observation stations and targets placed on the range by the firing center were located and their coördinates calculated. Two declination stations

were established giving bearing to points from Lambert and True North in both degrees and mills.

The data thus obtained was brought together in a pamphlet entitled "The Triangulation System." In this pamphlet the order, number, coördinates, altitude, and sketch of the point are shown. This book is divided into five parts:

Part I. Geodetic Points.
Part II. Observation Stations.
Part III. Declination Stations.
Part IV. Transverse Stations.
Part V. Targets.

The area contained between Monument Hill and McKenzie Hill was assigned to the firing center as a firing range. A trench system was laid out extending from Signal Mountains to Monument Hill, and consisted of a system of trenches built up high enough to be seen from the various firing points, containing first and second line trenches and including communication trenches, listening posts, trench-mortar emplacements, barbed-wire entanglements, battery positions, and observation posts.

A number of tent frames and some shacks were utilized to establish a small village at the base of Signal Mountain, known as Gruber-court.

A railroad system was constructed from old target frames and extended from the woods north of Signal Mountain around the base of the mountain south to the village.

Calibration targets were established at various points on the range. Four large forward observation posts were established at various points within what would have been friendly lines. These posts were bomb proof against 155-mm. shells, and had a capacity for 15 men with excellent observation facilities.

A telephone system was established connecting all firing points. The system included both aerial and field cable lines with centrals installed at intervals on the range.

Positions for 22 batteries were located and used with their firing points running from Hyles Hill to McKenzie Hill. A trench system constructed by the Thirty-fifth Division east of Signal Mountain, approximately 2500 meters north of McKenzie Hill, was utilized for short-range firing and air shoots.

Practically all the material used in the construction of the trench system, telephone lines, etc., was obtained from the small amount of surplus supplies at Fort Sill, the school of fire, and Camp Doniphan. It might be said that during the entire course the ingenuity of all officers at the firing center was taxed to the utmost to obtain instructional material with which to carry on the necessary practical instruction of the brigade.

The instructional publications and pamphlets used for instruction and training at the firing center were almost entirely compiled at the firing center, and were based on the official publications obtained from the A.E.F. (school of the B.C., Artillery firing, etc.), supplemented by the practical experience of officers of the firing center. One of the most important additions was the preparation by the directors of Artillery instruction of range tables for the 3-inch, 4.7-inch, and 6-inch matériel arranged in accordance with the French

range tables in use for the 75-mm. guns and 155-mm. howitzer. These range tables made it possible for firing to be conducted on the Fort Sill range in the same manner as on the front, making possible momentary corrections, the calculation and solution of problems involving fire on slopes, choice of proper charge, and other problems met with in action abroad.

General remarks about Replacement Depots are:

REPLACEMENT DEPOTS

Prior to the establishment of the Office of the Chief of Field Artillery, there was no general plan for training Field Artillery replacements to meet the needs of organizations overseas. Depot brigades had been provided for the Infantry, at which the recruit received preliminary instruction before being sent overseas for final replacement training. Three replacement battalions of Field Artillery were organized in the summer of 1917 to furnish replacements for the Fifth, Sixth, and Seventh Regiments. Late in 1917 these battalions were sent to France, where their personnel was distributed among the regiments of the First Field Artillery Brigade.

Later replacements were furnished by drafts on the regiments in training in the United States. As previously stated, those calls seriously depleted the organizations and greatly interfered with their training and general efficiency. It was evident at an early date that some comprehensive replacement scheme for Field Artillery should be put into operation at the earliest possible moment. The Chief of Field Artillery included recommendations to this end in the memorandum to the Chief of Staff mentioned above. In this memorandum he emphasized the necessity for establishing a central replacement depot, his recommendation being as follows:

> The necessity for the establishment of this camp at the earliest practicable date arises from the fact that we now have no replacement drafts of Field Artillery in this country. Furthermore, the replacement divisions of the corps in France can not supply the same proportion of Artillery replacements to their combat divisions as Infantry replacements. Three out of six regiments of Field Artillery in the two replacement divisions in each corps will be used as corps and army Artillery. From the other three replacements must come the replacements of the corps Artillery, as well as the replacements of the Artillery of the four combat divisions. These three regiments may also have to reinforce the line and act independently of the Infantry of their respective divisions. It therefore follows that casualties in the Artillery now in France will have to be replaced by drawing more directly on the United States than in the case with Infantry replacements. Since there are no replacement troops of Field Artillery even corresponding to the depleted depot brigades of Infantry in the United States, the Artillery replacements will have to be taken from existing Artillery brigades until the Artillery replacement camp is able to turn out men sufficiently trained to be sent overseas. * * *
>
> These replacements will probably have to be taken from those National Guard brigades not included in the first three corps to be sent overseas (since only the National Guard brigades have an average of over four-fifths authorized strength). There are 9 of these brigades. These 9 brigades can furnish the estimated total replacements for the months of March, April, May, and June (7,200) at the rate of 800 per brigade; in addition they may be called upon to furnish 960 more men per brigade to fill brigades ordered overseas; any further withdrawals would most seriously cripple them. It therefore follows that the Artillery Replacement Camp must be organized as soon as possible so as to take over the burden of replacements after the month of June.

These recommendations having been approved, a Field Artillery replacement depot was established at Camp Jackson, S. C., under orders dated April 22, 1918. On June 25, 1918, a similar depot was organized in Camp Taylor, Ky., it having been found that the project at Camp Jackson would not be large enough to supply the demands made upon it.

These depots were primarily organized for the preliminary training of drafted men for Field Artillery, and to instruct especially selected recruits as artillery specialists as follows: Auto mechanics, chauffeurs, motorcyclists, truck drivers, tractor drivers, battery mechanics, machine gunners, horseshoers, stable sergeants, saddlers, cobblers, carpenters, painters, wagoners, buglers, clerks, bandsmen, topographical draftsmen, mess sergeants, bakers, cooks, tailors, radio men, and telephonists. The course of training was planned to cover six periods of 12 days each, though its exact length depended greatly upon the demand for replacements. The men who had been the longest under training at the depot were the first to be sent away.

Upon the arrival of the recruits at the depot, the classification committee assigned them according to their special qualifications, to a light or heavy training regiment, or to the specialists' brigade where especially qualified men were trained for special service in the artillery. Owing to the heavy calls for replacements, no draft was able to complete more than four 12-day training periods.

As finally organized, the capacity of the replacement depots was as follows: Camp Jackson, S. C., 36,000; Camp Taylor, Ky., 24,000.

The total replacements, officers and enlisted men, furnished by these depots for duty overseas were as follows: Camp Jackson, S. C., 4831 officers, 29,104 enlisted men; Camp Taylor, Ky., 24 officers, 3000 enlisted men; total 4855 officers; 32,104 enlisted men.

In addition to the above, the replacement depot at Camp Jackson furnished officers and enlisted men for various schools and for the formation of new organizations in the United States as follows: 2832 officers and 431 enlisted men. All demands upon the replacement depots for overseas drafts were promptly met.

The Field Artillery Replacement Depot, Camp Taylor, furnished 533 officers and 2834 enlisted men to new organizations in this country.

These depots are also discussed in detail.

As to matériel:

While the facts as to shortage are as stated herein, I do not wish to leave the impression that the Ordnance Department was negligent in providing. It takes months to make a gun and carriage. The facilities for accomplishing this on a quantity-production scale, such as was needed in this war, did not exist in this country. Plants for this purpose had to be created from the ground up—the buildings had to be erected, the machinery for installation had to be manufactured, the skilled personnel had to be gathered together, the factory organization created, etc. It is a monument to American genius that we did as well as we did. Nevertheless, the fact still remains that there

was this tremendous shortage, and it rendered doubly hard the task of training the Field Artillery.

Summing up the matériel situation, it should be stated that the Field Artillery suffered far greater than any other arm of the service the lack of equipment absolutely essential in the training of its units. Increasing as it did from one of the smallest to the second largest arm and in greater proportion than any other branch, and being a service moreover in which certain matériel difficult to obtain was most necessary in preparing for war, the task was Herculean, and its accomplishment little short of miraculous. The shortage of Field Artillery matériel throughout the entire period of hostilities was distressing, and presented the most difficult barrier to the final success of our service. How well this difficulty was overcome and the results accomplished in France are worthy testimonials to the perseverance of cheerful and faithful officers who permitted nothing, no matter how discouraging and apparently hopeless, to interfere with the final attainment of victory.

On this subject of matériel, Major General Ernest Hinds, Chief of Artiltery, A.E.F., whose report is incorporated in that of the Chief of Field Artillery, says:

One of the great lessons that our people should learn from this war is that it requires much time to manufacture guns. On November 11, 1918, with the exception of twenty-four 8-inch howitzers manufactured upon plans which had been used by the Midvale Steel Co. in the construction of howitzers for the British Government, there was not in the firing line a single field or heavy artillery gun manufactured for us in the United States after our entrance into the war—a period of 19 months. Had it not been for the matériel furnished us by the French and the British, it is believed that the war would have been lost.

General Hinds' report is an excellent record of organisation and training in their broadest sense in the A.E.F. His recommendations, in which General Snow concurs, are:

(*a*) It is indispensable that an adequate reserve of material and equipment, particularly of ordnance, for our needs upon the outbreak of war be accumulated and maintained in time of peace. Had we not been able to obtain ordnance from the French and the British we would have been a negligible factor in the war until the end of 1918. When the armistice went into effect, 19 months after we entered the struggle, with the exception of twenty-four 8-inch howitzers made from British plans by the Midvale Steel Co.,, we had in line not one single piece of divisional, corps, or army artillery manufactured in America after our entry into the war.

(*b*) We should establish military instruction at all of our principal educational institutions, so that we may, from the graduates of these schools, build up a reserve corps of officers. The one thoroughly satisfactory source of supply of junior officers was the body of young men recently graduated from our colleges and universities.

(*c*) We should train in much greater numbers our regular officers for General Staff duty. This was one of the most troublesome questions that we had to consider in the A. E. F. Due to the tremendous expansion of our Army, the lack of trained officers for duty with troops, and the consequent imperative necessity for the retention as long as possible for such trained officers as we had with the fighting units at the front, the organizations of the staffs of our larger units—the corps and armies—was postponed much longer than was desirable. It is believed that earlier formation of these staffs is of the greatest, in fact, of almost vital importance.

(*d*) There should be a greater amount of time devoted to the combined training of our Infantry and Field Artillery, with interchange of officers of these two arms for a few months' period of training.

(*e*) The liaison between the Artillery and the Air Service must be improved. Our officers must be brought to a realization of the necessity for aerial observation for the Artillery.

(*f*) Artillery officers must be trained in time of peace in Artillery staff duties—for brigade, corps, and Army Artillery staff work.

(*g*) The Artillery information service should be retained in time of peace as a part of our Field Artillery organization. One Artillery information service company or, better, one for each Corps) should be organized and stationed at the Field Artillery School of Fire—this company to consist of three sections: An Artillery information service section, a flash ranging section, and a sound ranging section, composed of artillery personnel. This Artillery information service company should establish a short course of instruction, by which a nucleus of trained personnel would be provided for the Artillery information service when needed.

(*h*) The technical knowledge and training of our Field Artillery officers must be greatly increased, not only in matters of theory, but in practice; and with such special bearing on the various phases of motor transport and the application of both pure and applied mathematics to the technical employment of Field Artillery—this without prejudice to the well-known and long tried principles governing the employment of the arm in what we have heretofore known as open warfare.

To insure the technical proficiency of our Field Artillery officers in handling the fire of artillery units, a large ammunition allowance for target practice is indispensable.

(*i*) The development of the motorization of artillery of all calibers, including that of caterpillar mounts, should be pursued energetically. It can not be claimed at the moment that we have reached the point where horse-drawn light guns can be discarded, but it is believed at the present rate of progress that that point soon will be reached. We should keep in the forefront of progress by continual study and experiment.

(*k*) A study should at once be made of the question of Army Artillery organization, while our experiences in the American Expeditionary Forces are fresh in mind. It is believed that our Artillery officers of experience are practically unanimous in the opinion that there should be a general reserve of all artillery not assigned to divisions and corps.

(*l*) Some plan—drastic, if necessary—must be found and applied which will result in the limitation of unfit officers now in the service, in the prevention of such in the future, as far as humanly and politically possible, and in the timely promotion and reward of those who have proved, and who may in the future prove their worth. It is believed that our officers throughout the service are now so thoroughly convinced of the necessity for such action that it would be easy to carry out carefully digested regulations for examination for promotion with a view to eliminating unfit officers. If legislation could be secured whereby it would be possible to retire officers who are found by examination boards to be not fit for further promotion, on a percentage of pay basis (say $2\frac{1}{2}$ per cent. of pay for each year of service for six years), it would afford an ideal solution.

Promotion by selection in time of war is not only justified, but it is probably the only practicable plan; in time of peace, however, for regimental grades, there is danger of much injustice resulting from one cause or another. On the other hand, a properly devised system of elimination will rarely do injustice to the individual or result in injury to the best interests of the service. In any general application of a system of promotion by selection good officers would undoubtedly be passed over, because they are not as well known as others, or have not as attractive personalities as others, etc., and yet they may in reality be—in many cases will be—abler officers than those selected. It is very difficult in time of peace to prescribe methods whereby the best officer may be determined. It is easy to select those whose services are not satisfactory. A good officer once passed over in time of peace is injured; if passed over two or three times he is ruined, and the Government has not only lost a valuable asset, but has acquired liability—a disgruntled officer who is continually thinking of the injustice done him and airing his grievances to those about him, the tendency of which is to breed discontent and dissatisfaction among his brother officers; but on the other hand, in any large group of officers there is always a small number who stand out

conspicuously as superior to the general average. These men should be promoted. Moreover, promotion by selection in some manner and in some form is in use in most of the armies of the world. It is believed that promotion by selection of a limited percentage and elimination of all unfit would, in the long run, produce the best results in the service.

The recommendations of the Hero Board, in some of whose recommendations both the Chief of Field Artillery and the Chief of Artillery, A.E.F., concur, and in others dissent, are:

(*a*) That the proposed consolidation of the Field Artillery and the Coast Artillery Corps should not be made.

(*b*) That the battery combat trains be organized into ammunition batteries and battalions.

(*c*) That the battalion detail, now a part of the headquarters company, be made a distinct unit of the battalion.

(*d*) That the commissioned personnel of the battalion staff be increased.

(*e*) The board believes that a two-battalion organization for the heavy regiment would be advantageous.

(*f*) That the trench mortar batteries should not form part of the Field Artillery brigade but should be assigned to the General Artillery Reserve. (In order to expedite the development of Trench Artillery matériel, particularly of light mobile and of heavy motorized types, a further thorough study of this question should be undertaken and pushed to a conclusion now while our knowledge and experience are fresh in the minds of Trench Artillery officers. If a Trench Artillery center should be established at once in the United States it is believed that rapid progress would be made. A considerable improvement in the present types has already been made at the A. E. F. Trench Artillery center.)

(*g*) That the Artillery ammunition train and a mobile ordnance repair shop be made parts of each divisional Field Artillery brigade and kept always directly under the brigade commander, the Infantry ammunition train and that part of the repair shop pertaining to the Infantry being handled separately.

(*h*) That a battalion of mountain Artillery guns be added to the divisional Artillery brigades to make provision for accompanying guns.

(*i*) That the divisional Artillery be provided with a howitzer of smaller caliber than the 155-mm. howitzer.

(*k*) That the Corps Artillery arament consist of 155 mm. howitbers, 4.7-inch guns and 155 mm. guns.

(*l*) That the 75-mm. gun carriage be modified to permit of high angle fire.

(*m*) That artillery not pertaining to divisions or corps should be organized into a general Artillery Reserve—that there should be no *organic* Army Artillery.

(*n*) That the Army Artillery Staff should be a small tactical staff.

(*o*) That many modifications should be made in ordnance, quartermaster, signal, and motor transportation equipment.

(*p*) That the communications personnel and equipment therefore be increased.

(*q*) That study and experiment should be energetically continued looking toward the early motorization of every piece of artillery that can be successfully adapted to motor traction.

(*r*) That aerial observation must be made more satisfactory. That an observation squadron be permanently assigned as a part of each combat division; that the aerial observers used therewith be officers of artillery trained as observers and members of the unit for which they are adjusting; and that these officers be required to live with their units and leave them only for the purpose of making the required adjustments.

(*s*) That the personnel of the Flash Ranging Service and Sound Ranging Service should be artillerymen, and that those services should be parts of the artillery organization.

(*t*) That the strength of our liaison detachments be considerably increased.

(*u*) That in addition to divisional manœuvers there should be established a course of instruction for general, field, and staff officers of both Infantry and Artillery for practical training in artillery operations.

REPORT OF THE CHIEF OF FIELD ARTILLERY

Throughout the report, an attempt is made to give credit to individuals by name, where they have done important work; and finally the report states:

It will be noted that throughout this entire report conditions, procedures, and results in the United States only and not in the A. E. F. have been discussed. Undoubtedly a discussion of these same features abroad would be more interesting. But with the exception of the report of the Chief of Artillery, A. E. F., which is incorporated herein, but little information is yet available in this country. The records of the A. E. F. are in transit, but it will be years before they can be gone over and prepared for publication. And even when so treated, the matter will be largely historical of tremendous interest to the participants in the World War, but requiring a careful analysis before useful deductions can be made. On the other hand, the basis of any fighting American troops in any part of the world necessarily lies in the United States. The production of raw matériel, the creation of an army, the training of its personnel, and all the other steps necessary to put a force in the field, while much more prosaic than fighting, and appealing much less to the imagination, yet form the foundation of the entire military machine and this work is necessarily done in the United States.

To the officers who served in the Field Artillery all credit is due for their splendid spirit of service, for the enthusiasm and esprit which they have displayed in performing the various tasks assigned to them and for their unwavering loyalty at all times.

Military necessity demanded that many of these officers remain in the United States during the entire period of their service. They must not feel, due to this fact, their services have been in any respect less creditable, their work in vain, or their time wasted. The work of organizing and training at home was of as great importance as the more spectacular work at the front.

It is important for the future of the Field Artillery that the inspiring work accomplished by our arm in this war be preserved. To those who have shared in our trials during the organization and training and in our satisfaction as we noted the successes of our arm, we look for support and sympathy in the shaping of the future of the Field Artillery. For this reason and for the reason of that deeper feeling of comradeship which service alone matures, it is hoped that those who are discharged from the service will feel that they have not severed their connection with the Field Artillery.

The interest and best wishes of the Field Artillery goes with all who have served with it, and made it what it is.

APPENDIX.—REPORT OF CHIEF OF F. A.

ORGANIZATION OF THE OFFICE OF THE CHIEF OF FIELD ARTILLERY.

[Jan. 1, 1919.]

CHIEF OF FIELD ARTILLERY.

Maj. Gen. WILLIAM J. SNOW.

ASSISTANT TO CHIEF OF FIELD ARTILLERY,
Brig. Gen. E. H. DEARMOND.

OPERATIONS BRANCH.

ADMINISTRATIVE BRANCH.
Col. Lee.
Lieut. Kauffman.

Routine and Records.

CAMPS AND RANGES.
Col. King
Capt. Cross
Ranges, construction and supply.

MATERIEL.
Brig. Gen. DeArmond.
Col. Sturgill: Artillery design and equipment.
Col. Greenwald: Guns, carriages, ammunition, and fire control equipment.

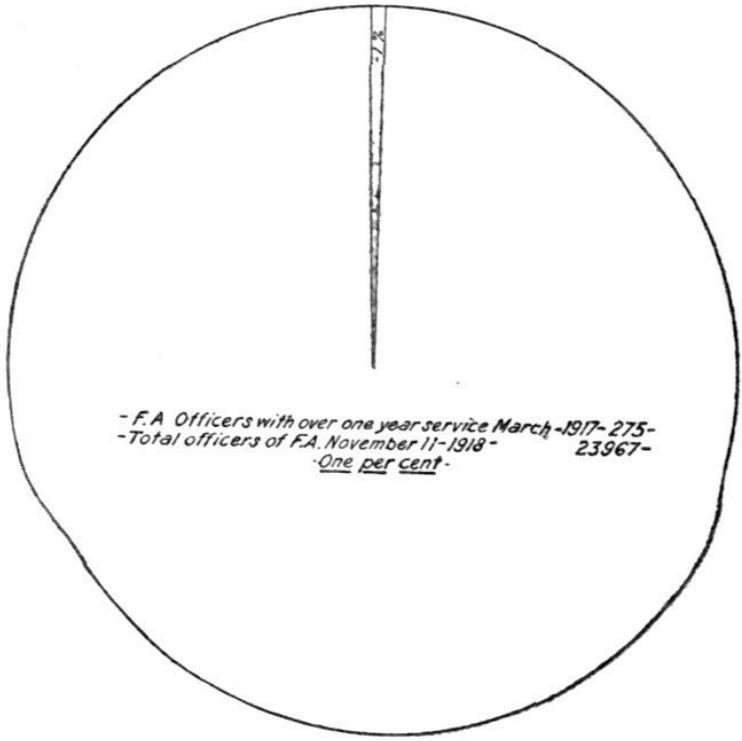
ORGANIZATION AND TRAINING.
Brig. Gen. Danford.
Col. Potter: R. O. T. C. (colleges).
Col. Sloan: Artillery schools.
Lieut. Col. Anderson: Training within brigades.
Lieut. Col. Gardner
Maj. Crane
Col. Orton
Artillery information statistics. Special studies.

MOBILIZATION.
Col. Collins.
Lieut. Col. Wallace.
Reports and inspection of demobilized units. Recommendations on commissioned personnel.

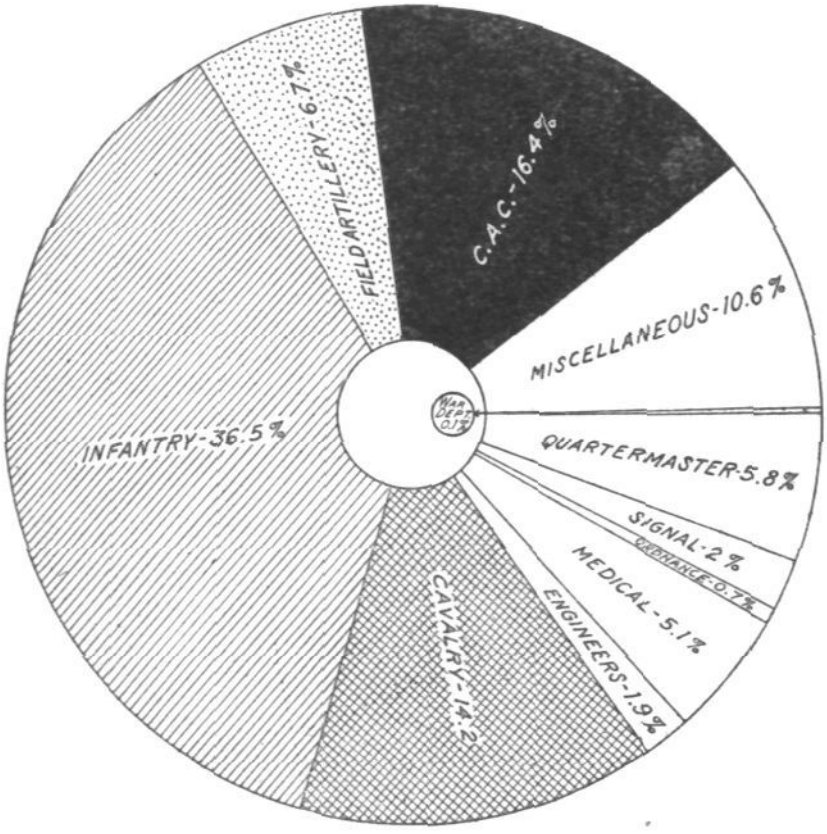
PERSONNEL.
Lieut. Col. Jones.
Capt. Reveley.
Personnel records.

ROUTINE.
Clerks, records files, reports, etc.

Percentage of Officers with Over One Year of Service, March, 1917, to Total of Officers of Field Artillery, November 11, 1918.



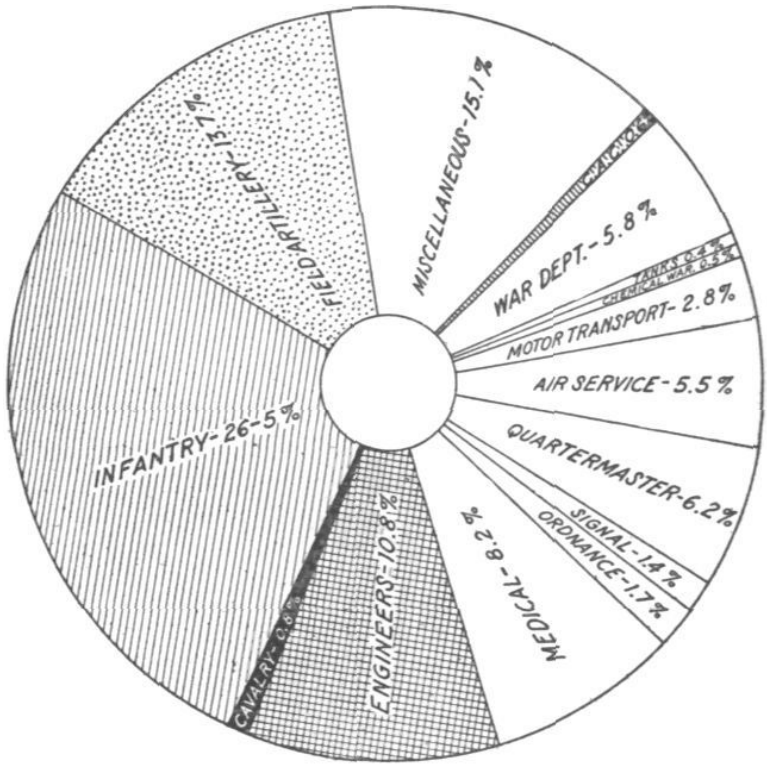
Proportion of Arms of Service March, 31, 1917.



REGULAR ARMY MARCH 31, 1917.

Arm.	*Strength.*	*Per cent.*	*Arm.*	*Strength.*	*Per cent.*
Field Artillery	8,645	36.5	Coast Artillery Corps	20,937	16.4
Infantry	46,598	6.7	Quartermaster	7,515	5.8
Cavalry	18,220	14.2	War Department	105	0.1
Engineers	2,418	1.9	Miscellaneous	11,977	10.6
Medical	6,520	5.1			
Ordnance	837	0.7	Total	127,771	100.0
Signal Corps	3,000	2.0			

Proportion of Arms of Service November 11, 1918.



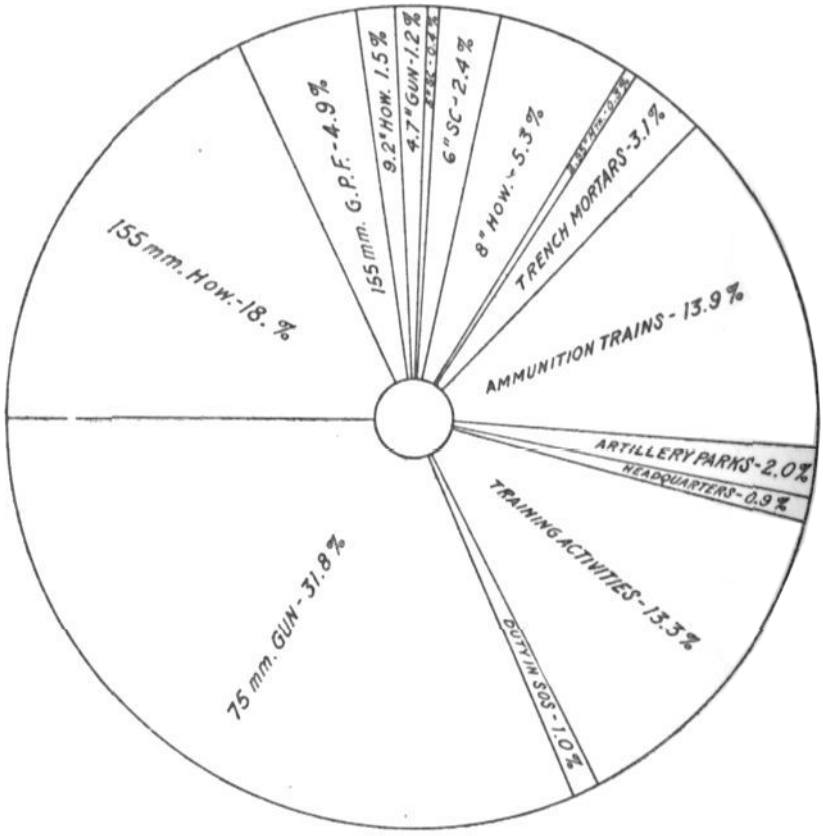
ALL FORCES IN SERVICE OF UNITED STATES NOVEMBER 11, 1918.

Arm.	*Strength.*	*Per cent.*	*Arm.*	*Strength.*	*Per cent.*
Field Artillery[1]	502,515	13.7	War Department	212,000	5.8
Infantry	974,000	26.5	Air Service	202,000	5.5
Cavalry	29,000	0.8	Munition Train	103,000	2.8
Engineers	394,000	10.8	Chemical War	18,000	0.5
Medical	300,000	8.2	Tanks	13,000	0.4
Ordnance	64,000	1.7	Miscellaneous	550,000	15.1
Signal Corps	52,000	1.4			
Coast Artillery Corps[1]	23,485	0.6	Total	3,665,000	100.0
Quartermaster	228,000	6.2			

[1] All Coast Artillery Corps serving in Field Artillery included in Field Artillery.

Composition of Field Artillery November 11, 1918, (exclusive of Replacement and Training Activities).

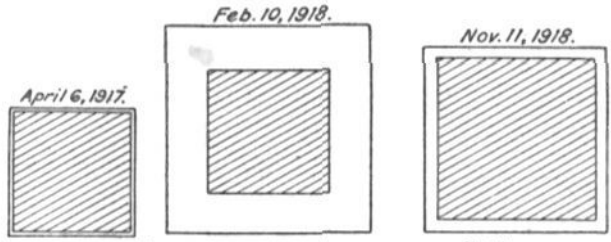
Composition of Field Artillery November 11, 1918. Showing Percentage of Personnel Organized to Serve Each Caliber Piece Used by the Field Artillery of France.



Piece.	*Strength.*	*Per cent.*	*Piece.*	*Strength.*	*Per cent.*
75 mm. Gun	152,743	31.8	9.2″ Howitzer	7,320	1.5
155 mm. Howitzer	86,694	18.0	4.7″ Gun	5,771	1.2
Ammunition Trains	66,815	13.9	SOS Duty	5,041	1.0
Training	63,883	13.3	Headquarters	4,220	0.9
8″ Howitzer	25,254	5.3	5″ SC	1,791	0.4
155 mm. GPF	22,501	4.9	2.95″ Mtn	1,335	0.3
Trench Mortar	14,825	3.1			
6″ SC	11,606	2.4	Total	480,319	
Artillery Parks	9,612	2.0			

Training activities include Replacements, Officers Candidates, Student Officers, and School Personnel.

For Training Purposes Required Gun Strength in United States.



Shaded portion shows guns available

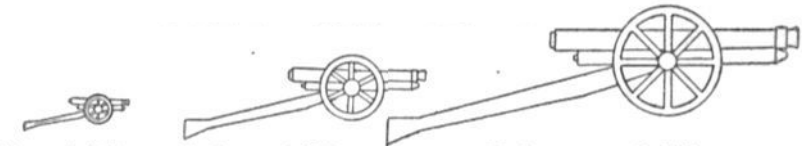
NOTE.—Because of the fact that many of the original brigades in training had gone overseas, needs for training in November were not as heavy as earlier in the year. While requirements were not quite met at this period, production was heavy and increasing and there were undoubtedly enough guns in factories awaiting tests, etc., to have fully supplied the needs within a very short time.

DISTRIBUTION OF GUNS - JANUARY, 1918.

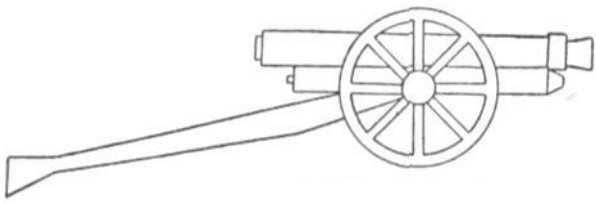
STRENGTH IN GUNS

REGIMENTS IN TRAINING

AMERICAN ARTILLERY PRODUCTION



MARCH 1, 1918 ***TO AUGUST 1, 1918*** ***TO DECEMBER 1, 1918***



TO MAY 1, 1919

The 75 mm. gun, model 1897, was the approved model for active service in France. Model 1916 and model 1917 were used for training purposes both in the United States and in France.

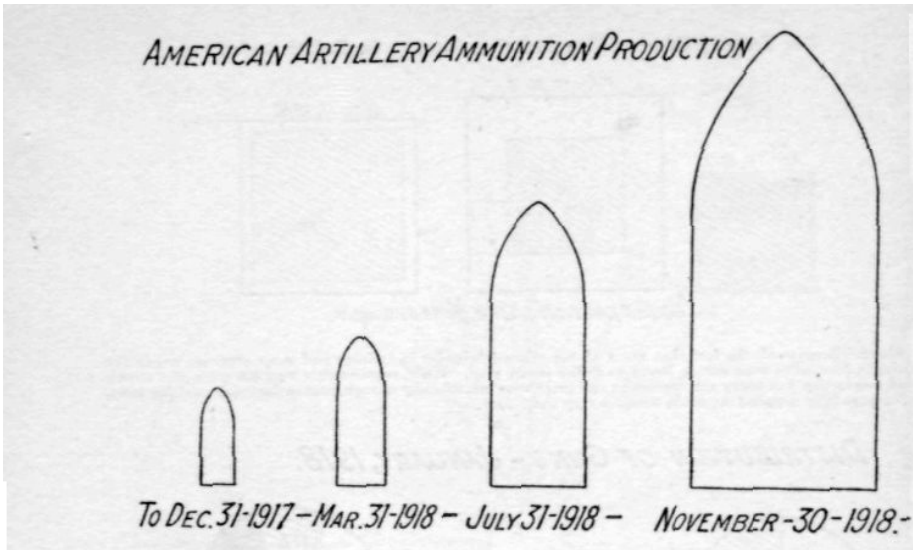


CHART I.

Showing the organization of the Office, Chief of Artillery, A.E.F. on November 11, 1918, the date of the signing of the Armistice.

Commander in Chief
American Expeditionary Forces

Chief of Artillery, A.E.F. Major General Ernest Hinds, U.S.A.
Asst. to Chief of Artillery, A.E.F.-Brig. General W. I. Westervelt, U.S.A.

Secretary-Lieut. Col. E. K. Smith, C.A.C.

Heavy Artillery Section
Col. W. E. Shedd, C.A.C.
Lt. Col. E. W. Putney, C.A.C.

Material Section
Lt. Col. W. P. Boatright, C.A.C
Lt. Col. W. C. Koenig, C.A.C.
Major A. Norton, C.A.C.
Major D. Armstrong, C.A.C
Capt. R. A. Jackson, F.A

Field Artillery Section
Col. D. C. Cubbison, F.A
Lt. Col G. H. Franke, F.A.

Information and Research Section
Lt. Col. J. H. Cunningham, C.A.C.
Capt. Stanley-Brown, F.A.
Lt. C. F. Choate, 3rd. Cav
Lt. C. P. Taft, F.A

Personnel and Training
Lt. Col. J. Mather
Maj. J. Izard
C.A.C.

Trench Arty
Col. F. E. Williford, C.A.C.
Capt. R. M. Adoo, C.A.C.

Engineering
Lt. Col. C. H. Birdseye, C.A.C.

Training
Lt. Col. R. C. Garrett, C.A.C

Personnel
Maj. R. W. Beasley, F.A.
Capt. J. D. Mac. Gavin, F.A.

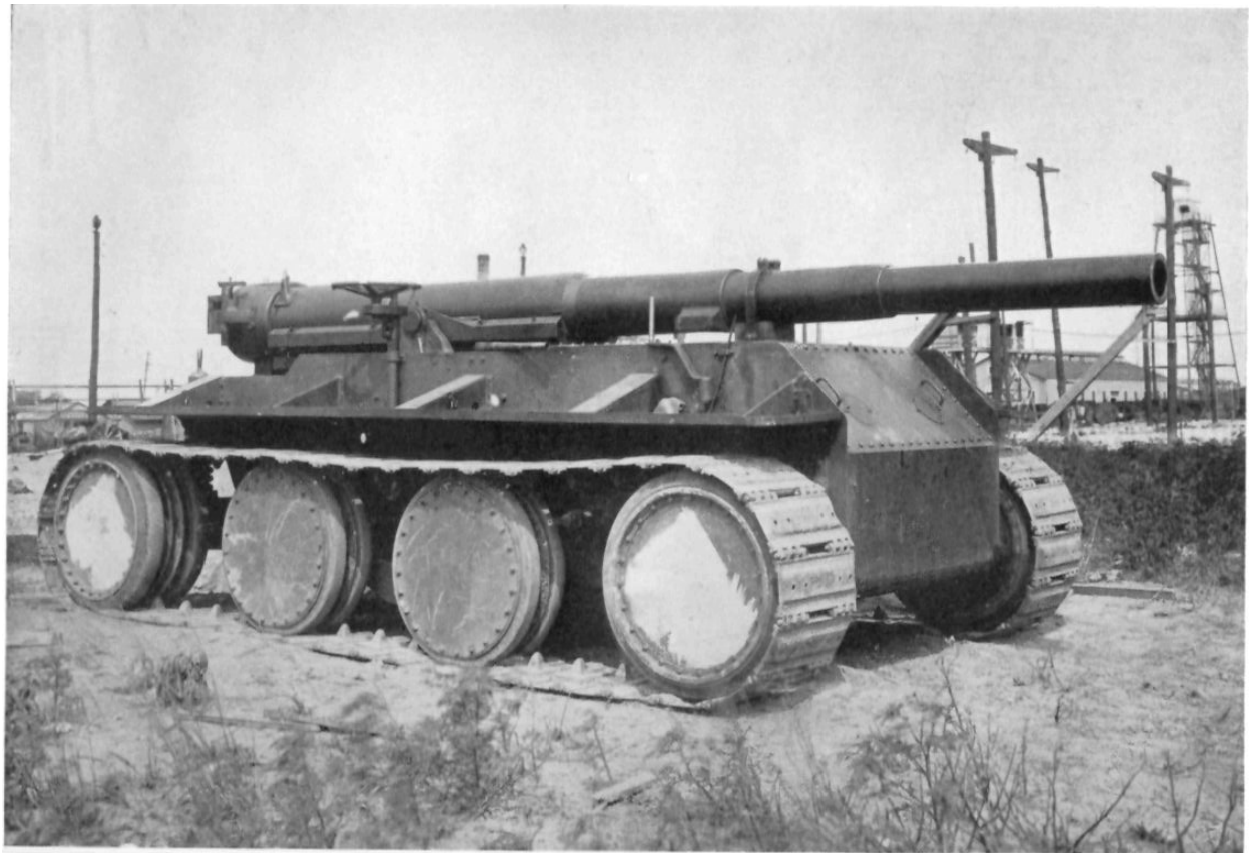
Training
Col. W. S. Sturgill, F.A
Lt. Col. J. W. Rumbough, F.A.

Liaison Officers

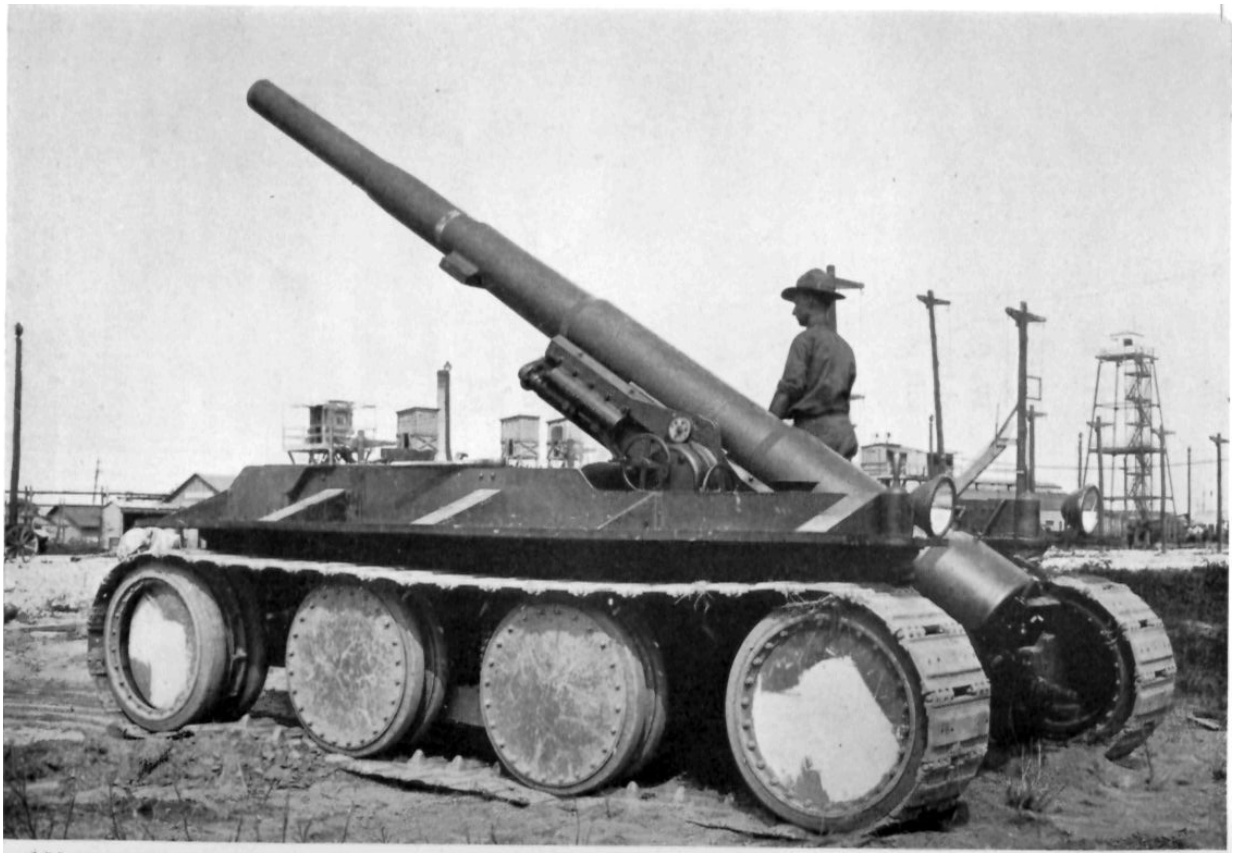
Col. A. F. Brewster, F.A.
G-4 SOS Tours

Col. E. M. Blake, C.A.C
G.Q.G.-R.G.A.
Sourdun

C of A 1&R



155 MM. G.P.F. ON CHRISTIE SELF-PROPELLED MOUNT, GUN IN TRAVELLING POSITION, CATERPILLAR TRACK ON WHEELS



155 MM. G.P.F. ON CHRISTIE SELF-PROPELLED MOUNT, GUN IN FIRING POSITION, MAXIMUM ELEVATION 35°

CURRENT FIELD ARTILLERY NOTES

The Christie Self-Propelled Mount

NOTES FROM ORDNANCE COMMITTEE, ORDNANCE DEPARTMENT

THIS mount, designed by Mr. W. Christie, of the Front Drive Motor Co., is an eight-wheeled tractor, so designed that a caterpillar track may be used in soft ground, and mounts a 155-mm. Filloux gun.

The gun, cradle, upper and lower carriages are mounted on the frame of the vehicle, and allow an elevation from 0º to 35º, and a total traverse at 0º of 20º. The height of the trunnions is 63 inches above the ground, allowing an elevation of 30º before the breech strikes the ground in recoil. The traverse at maximum elevation is 10º total.

The main frame of the vehicle is a box of Bessemer sheet steel, with a well extending to the rear, in which the gun is mounted, and elevates and recoils. Projections from the sides of the frame form supports for accessories and the tracks when not on the wheels. There are eight double-tired wheels, taking 36″ × 6″ solid-rubber tires. The four centre wheels are adjustable in the vertical plane, and are idlers designed to take varying amounts of weight from the end wheels.

The caterpillar track consists of 44 shoes, 22 inches wide, which fit over the wheels, giving a bearing length of about 16 feet. In the centre of each shoe there is a lug which meshes in a socket in the driving wheel, and there are grooves in the idlers which keep the tracks centred on the wheels. When not on the wheels, a portion of the track is bolted to the under side of the projecting platforms, and the remainder of the track is carried on the plaforms. The method of carrying the track is not convenient, and studies are being made with a view to improvement.

The engine is placed in the muzzle end of the vehicle and is a 6-cylinder, 120-H. P. Christie ball-bearing motor, 5½″ bore × 7″ stroke. The tractor is two-wheel drive, two-wheel steer, the muzzle wheels being the drivers. The clutches are hardened

steel of the multiple disc type. Transmission is of the selective sliding gear type, with four speeds ahead and four speeds reverse. This allows the machine to be run in either direction with equal facility, the normal direction of travel, with tracks on, being breech first. The maximum speed on wheels is about 20 miles per hour; with tracks on, about 8 miles per hour. Total width, 122 inches; length between centres of front and rear wheels is 155 inches; weight, 44,000 pounds.

In the run from Hoboken, N. J., to Washington, D. C., a distance of 276 miles, the running time was 51 hours, 16 minutes, an average speed of 5¾ miles per hour, and 1.37 miles per gallon of gasoline. On a 100-mile maximum speed test, an average of 13.23 miles per hour was maintained, averaging 1.3 miles per gallon of gasoline, and .055 gallons of oil per mile. A speed of 21 m. p. h. over a measured mile was attained.

On a 100-mile test at a speed of between three and four miles per hour, an average of 1.39 miles per gallon was obtained, and .06 gallon of oil per mile.

The mount has negotiated slopes exceeding 100 per cent., *i.e.,* 45º, and very difficult terrain. Firing with the tracks on was satisfactory, there being very little movement. Firing without tracks was not satisfactory, as the brake wheels skidded and allowed the mount to move to the rear under the force of recoil.

The results of this experimental design are very promising. The speed and flexibility of the mount are an advantage over the pure caterpillar type, and, with further improvements to increase the flexibility, gives promise of being the self-propelled mount of the future.

Aerial Conduct of Field Artillery Fire

BY LT. COL. D. W. HAND, FIELD ARTILLERY, U. S. ARMY

FOR years, the Battery Commander, in adjusting the fire of his battery, has been seeking height; various expedients, such as ladders and masts at the battery position, were improvised in order to gain the benefit of a few feet; ridges and hilltops were eagerly sought in establishing the O. P. The enormous advantage of increased command of the terrain was fully realized by all conductors of fire. Problems, which were most difficult for an observer near the same horizontal plane with the battery, became very simple from a point only a few yards higher; and when lateral observation was involved an O. P. on a hilltop changed the entire nature of the problem, due to the increased command and the ease with which the gun-target line could be visualized, and the almost absolute certainty of observations for range.

In the past we were content if a height of four hundred or five hundred feet could be occupied by the observer, but now we have heights of four or five thousand feet easily available by using aircraft as our O. P.'s. The ease and certainty of correct observations are increased to an extent which almost precludes the chance of error in sensings, and the conduct of fire becomes to a well-trained field artilleryman merely a matter of how fast the means of communication will permit his "next command" to reach the battery. No sensings should be sent down, no reference to maps made, while conducting a problem. What is needed is exactly the same as in terrestrial observation—accuracy in sensings, speed, decision, technic and strict adherence to proper commands in conducting fire.

Communication by means of the radio-telephone permits of commands reaching the battery as quickly as from a ground station, and if this instrument fails the buzzer must be resorted to, just as it has in the past; therefore, the observer must be skilled in the use of the buzzer.

The aerial battery commander must be trained in the conduct and control of fire, in the tactical formations used by all field-artillery units, to be able to identify guns of various calibres; when required to select targets in his sector, to accurately locate positions on the map, and to make reports to the artillery commander from the standpoint of a field artilleryman; and at all times be prepared, as a field artilleryman, to carry out his mission and to fight his battery, using artillery language.

The question now arises: From what source should the aerial battery commanders (A. B. C.) be procured in order to satisfy the conditions required above? The answer is, without doubt: From officers of field artillery, who must be thoroughly proficient in conduct of fire, and from officers of the air service, who should be required to take a modified course at the School of Field Artillery Fire, Fort Sill, Oklahoma.

The A. B. C. must not only be proficient as a field artilleryman, but also in certain requirements of the air service observers, *i.e.,* that he has sufficient training in piloting airplanes to be able to leave the ground and to make a landing with safety, a knowledge of machine guns and aerial gunnery, in order to protect his ship, a thorough knowledge of wireless telegraphy and telephony and the instruments pertaining thereto, aerial sketching, map reading, photography, meteorology, and aerial liaison, and, in addition thereto, should be qualified in balloon piloting to a sufficient extent to insure a safe landing in a free balloon.

In order to become proficient in the above subject, a field artillery officer, after having signified his desire to become an A. B. C., and passed the required physical examination, should be sent to take a course at the Balloon School, Arcadia, California, and then to March Field, California. Such instruction as pertains to the air service will be given the officer, and, in addition thereto, instruction in terrain board, smoke bomb practice, etc., by an officer of field artillery detailed to the school

staff. Having completed his flying training, the officer will proceed to Post Field, Fort Sill, Oklahoma, for conduct of fire for service target practice, both from balloon and airplane.

The officers of the air service who are detailed to attend the School of Fire for Field Artillery, where all instruction in field artillery subjects deemed necessary for an A. B. C. will be given, will, upon completion of course and pronounced proficient, be sent to Post Field, Fort Sill, Oklahoma, for their service target practice.

Early during the late war experienced field artillerymen realized that the methods used in adjusting fire from the air were cumbersome, slow and far from satisfactory; it was too late to make improvement and impossible to do so on account of lack of competent instructors; the "spotting method" was all we had to learn from our allies, and it is believed that they also had to abide by it, due to a lack of trained artillerymen capable of acting as aerial observers.

Many will inquire: What will we do for observers in another big war when the observers trained in peace will be needed in the artillery with advanced ranks? The answer is that some will undoubtedly be welcomed in the air service in higher grades, others will be available as observers, and, what is of the greatest importance to the field artillery, we will have a large corps of instructors ready to give the best and latest instruction in all that pertains to conduct of fire from the air; in addition, the air service will have a large number of trained A. B. C.'s.

A feature of the training as outlined above which must not be overlooked is the close coöperation between the Field Artillery and Air Service. It will tend to enhance to a degree the value of both services when members of each intermingle in their training, and get an insight into the full capabilities of the other.

The detail of Field Artillery officers who desire to take this training should not be limited by rank, as the air knowledge will be of inestimable value to any artilleryman; and no matter what

rank he might hold in time of war, he should be able to conduct fire if opportunity presented itself while he was in the air. Any officer would be thankful for his ability to take to the air in time of war, if only to look over his sector, be it one assigned to a battery or a brigade.

Let us, as field artillerymen, step forward and upward to a far more favorable O. P. than many of us have ever known, and, looking over the past situation, develop for the future a system of aerial conduct of fire thoroughly up-to-date, coöperating in every way with the air service, and seeking their coöperation.

The United States Field Artillery Association

Annual Meeting

THE regular annual meeting of the Association was held in Washington at 4.30 P.M., December 31, 1919, at the Army and Navy Club. The President and Vice-President being absent from the city and therefore unable to attend, the meeting was called to order by the Secretary, and Brigadier-General Marlborough Churchill, U. S. Army, was elected chairman of the meeting.

The Secretary presented written proxies of members and announced that these with the members present in person constituted a quorum for the transaction of business.

The minutes of the last annual meeting were approved.

The Treasurer presented his financial statements, and a committee composed of Colonel T. D. Sloan and Lieutenant-Colonel John B. Anderson, appointed to audit the accounts, reported that the accounts had been audited and found to be correct. The report of the committee was, on motion, accepted and approved.

The Secretary-Editor submitted his annual report, as follows:

On the recommendation of the officers of the Association and by direction of the Executive Council, the frequency of issue of THE FIELD ARTILLERY JOURNAL was increased, beginning July 1, 1919, to six per annum, and THE JOURNAL is now published bi-monthly instead of quarterly. This change has caused a considerable increase in the fixed expenses of the Association, but the results thus far appear to justify the change. The contents of the magazine are now more timely and therefore more useful and interesting than before the change was made,

and the change seems to have given satisfaction generally to the members of the Association.

During the fiscal year ended November 30, 1919, there was a slight increase in the income of the Association over that of the preceding year, the total receipts, exclusive of the amount on hand at the beginning of the year, being $24,721.73, which, after adding bills due the Association but not yet paid when the books were closed for the year, $368.80, made the total business amount to $25,090.53, an increase of $188.36 over the income for the preceding year. This slight increase in income, however, was more than offset by increased expenditures, the expenses of the Association amounting in all to $27,669.01, or $2,578.48 more than the income. This is attributable in part to the general increase in the cost of manufactured articles, labor, and material, and to the fact that the change from quarterly issue to bi-monthly issue added the cost of one extra edition of THE FIELD ARTILLERY JOURNAL to the expenses of the Association without increasing the income; but for the most part it is explained by the statement that the great increase in the number of members during the preceding year occurred mostly late in the year, and while the resulting income was credited in the accounts of that year, the resulting greatly increased cost of operation had to be borne during the year just closed. Below is a statement of the sources of the income and the purposes of the expenditures of the year:

RECEIPTS.

Balance on hand December 1, 1918,	$1,688.03		
Certificates of deposit	18,000.00	$19,688.03	
Advertisements		12,365.01	
Sales of copies of The Journal		72.71	
Sales of pamphlets published		212.75	
Canceled check		1.00	
Interest on deposits		894.36	
Subscriptions to The Field Artillery Journal		11,142.22	
Miscellaneous receipts		33.68	$44,409.76

EXPENDITURES.

Publishing The Field Artillery Journal	$17,777.18
Miscellaneous printing	193.92
Postage	434.39
Personal services	1,255.00
Office supplies and stationery	692.85
Refunds	24.50
Bad checks (all redeemed)	10.80
Commissions on advertising business	6,957.06
Miscellaneous expenses	236.70

Return postage	$14.30	
Binding	69.31	
Subscriptions to other periodicals	3.00	
		$27,669.01
Balance on hand November 30, 1919		$16,740.75
Bills receivable		368.80
Total assets		$17,109.55

During the year the number of members of the Association and subscribers to THE FIELD ARTILLERY JOURNAL decreased. During the preceding two years the war and the general interest in military matters caused a phenomenal growth in the members and subscribers, which could not be maintained in times of peace or while the army is being returned to a peace basis; but some of the decrease was because of the very serious difficulties encountered in getting THE JOURNAL delivered through the mails to members and subscribers stationed abroad or returning from abroad, many of whom failed to inform us of change of stations or new address. The number of members and subscribers is still large enough, however, to warrant the expectation of prosperity for THE FIELD ARTILLERY JOURNAL during the coming year.

Again during the year the management has been encouraged by many kind words of appreciation of THE FIELD ARTILLERY JOURNAL, received from members and subscribers, grateful acknowledgment of which is here made.

The chair announced that there were four vacancies on the Executive Council. The Secretary stated the views of the Executive Council with respect to its peace-time organization in which the opinion was expressed by the Council that as its members were elected during the emergency due to the war they should not be re-elected. A motion was made and adopted to declare those nominated by the Executive Council to be elected, and thereupon the chair announced the election of Brigadier-General Fox Conner, U. S. Army, Colonel George E. Leach, National Guard of Minnesota, Colonel D. C. Weld, National Guard of New York, and Lieutenant-Colonel A. A. Starbird, U. S. Army, as members of the Executive Council of the Association.

A motion was adopted tendering the thanks of the Association

to Lieutenant-Colonel A. F. Cassels, Secretary-Editor and Treasurer, and to Mr. C. S. West, Clerk to the Association, for the work done by them for the Association and THE FIELD ARTILLERY JOURNAL during the year.

The Secretary made an oral statement of the condition of the affairs of the Association, of the work done during the year, and of plans for the future, and several plans announced by members present for extending the scope and influence of THE FIELD ARTILLERY JOURNAL, and for the benefit of the field artillery in general were discussed, after which the meeting adjourned.

EDITORIAL

A NUMBER of inquiries have been received as to the policy of the FIELD ARTILLERY JOURNAL in so far as it relates to the training methods of Field Artillery as affected by the lessons of the World War.

Insufficient time has elapsed for a thorough study of these lessons, and until such study has been made it is believed that the best reply to these inquiries is the publication of the following memorandum:

WAR DEPARTMENT
Office of the Chief of Staff,
Chief of Field Artillery,
Washington.

December 19, 1919.

Training Memorandum No. 6.

1. As a result of various causes, considerable confusion exists in the minds of many Field Artillery officers as to the methods of Field Artillery firing and tactics which should be followed. The impression prevails to some extent that the principles laid down in Field Artillery Regulations are obsolete and should be superseded by the so-called "trench warfare" methods, including *map firing without observation*. We have recently fought a war. Some matters, formerly in the realms of speculation only, have now been subjected to the crucial test of experience. There can be no better test. It is, therefore, claimed by some Field Artillery officers that these very experiences now point to a revolution in our Field Artillery tactics and firing methods. Such statements are believed by this office, however, to be largely the conclusions arrived at by each man's individual experience, and are not the result of a profound study. They cannot possibly be the latter, for insufficient time has elapsed to make such a study. No two wars are alike—innovations and developments are inevitable in every war. Some of these changes are characteristic of the particular war considered, with its attendant special circumstances, and are totally inapplicable to a war of a different character. It is, therefore, wise not to be too hasty in drawing conclusions: they must be the result of exhaustive study. But, in the absence of such a study clearly pointing out lessons, there is one thing that is a safe

guide for training, and that is this: No artilleryman can foresee the circumstances under which he will have to deliver fire. These circumstances vary from those under which he cannot observe his fire to those under which observation is perfect; from circumstances under which he has all the time he needs to prepare his fire to those under which he has no time at all; from circumstances under which the utmost accuracy is required to those under which it is merely necessary to cover an area; from circumstances under which he can use every instrument of accuracy he desires to aid him to those under which he has no instruments at all. But the fact must never be lost sight of in the cases just cited that observed fire can be adjusted; unobserved never can. The latter, therefore, is relatively unreliable. Under all the circumstances, it is apparent that the basis of instruction should be that which enables an artilleryman to meet the greatest number of possible cases with observed fire. If an officer is familiar with such a method he is better prepared for the field than if he knows only a few special methods, applicable to only a limited number of cases. The one method best fulfilling the conditions just set forth is that laid down in our 1916 Drill Regulations. The more these regulations are studied, the greater their flexibility appears. Nothing that has occurred in this war has controverted the principles underlying these regulations. On the contrary, many of the refinements recently used are but special adaptations of the regulations to specific cases. The wide range of firing cases covered by these regulations is such as to train the officer in versatility. He gets a broad foundation. And it is a fact that those few officers in our regular field artillery who were masters of the old "P-T" methods, had no difficulty and lost no time in mastering the elaborate stabilized warfare methods. Such warfare is a special kind; victories are won only by movement. That means open warfare. In the last analysis it is axiomatic that the field artilleryman's gun is his best range finder.

2. The foundation of all Field Artillery training then lies in open warfare. Trench warfare is merely an application of the principles of open warfare to a peculiar case. The principles laid down in Volume III, Field Artillery Drill Regulations, constitute the groundwork upon which the special methods necessitated by the conditions of trench warfare are built. Principles are sound; their applications may or may not be.

3. In view of the above facts, all Commanding Officers of Field Artillery organizations and activities will take the proper measures to insure that the principles of Field Artillery Tactics and Fire prescribed by Field Artillery Drill Regulations are adhered to, and that their commands are instructed accordingly. All instruction will be primarily in

open warfare tactics; the refinements of trench warfare will not be taught until the principles of open warfare have been thoroughly mastered.

WM J. SNOW,
Major General, U. S. A.,
Chief of Field Artillery.

It is not to be inferred from the above memorandum that our readers may not give expression to their ideas through the pages of the Journal.

Healthy discussion of professional subjects is good for all, and we welcome signed expressions of honest convictions. For such purpose is our department of "Discussions" maintained. The subject of "Map Firing," so called, will be discussed more in detail in our next issue.

At the annual meeting of the Field Artillery Association, notice of the proceedings of which appears elsewhere in this number, certain proposed amendments to the constitution of the association were received. These amendments have for their purpose the admission to active membership of the members of the Field Artillery Section of the Officers' Reserve Corps to associate membership, in addition to those already eligible for such, all persons who, between the dates of April 6, 1917, and November 11, 1918, served in any capacity in the Field Artillery of the United States Army, the Field Artillery of the Regular Army, the Field Artillery of the National Guard in the federal service, and the Field Artillery of the National Army; to make eligible for the position of Secretary-Editor any associate member who is a commissioned officer of the Regular Army, and to make eligible for Treasurer any active or associate member who shall be an officer stationed or residing in Washington.

Roll of Honor

PRO PATRIA

GRAY.—Died of gunshot wound, in France, November 17, 1919, First Lieutenant Roland M. Gray, Field Artillery.

Index to Current 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.

APFFEL.—L'artilleric allemande en Juillet, 1917, 59 p. UF565 G3 Ap64.

ARTILLERY.—European War. War of 1917. Artillery on firing line Nov. 11, 1918. On Nov. 11, 1918, there was 921 regiments of artillery fully equipped either at the front or resting after action. (*Journal of the U. S. Artillery,* Aug., 1919, p. 221.)

BRIEF HISTORY OF THE FIFTH ARTILLERY, 1st division American Expeditionary Forces, 1917–1918. Nancy-Paris-Strasbourg, Berger-Levrault [ca. 1918]. 40p. D609 U58 5th B85.

CAMOUFLAGE.—Camouflage in the A. E. F. Maj. Evarts Tracy, Engineers. (*Infantry Journal*, Sept., 1919, p. 215.)

COST OF WAR.—European War. European war expenditure for all nations (table) and expenditures for Army bureaus etc., U. S. (*Congressional Record,* Aug. 26, 1919, p. 4616.)

FRANCE.—Ecole-spéciale de St.-Cyr. Documents militaires allemands dela campagne, 1914–1918. Textes étudiés aux cours d'allemand. St. Cyr, 1918. U26 G3 F85.

FRANCE.—Ministère de la guerre. Instruction on the offensive action of large units in battle. Nancy, Berger-Levrault, 1918. 193 p. U167 F82 1917–e.

FRANCE.—Ministère de la guerre. Tables de tir du canon de 75, Mle 1897, approuvées le 25 Août 1917. Annexe II. Paris, Imprimerie nationale, 1918. 38 p. UF857 F84 1917.

HEARD, RALPH T., ed.—A history of the sixth regiment field artillery, first division, United States Army. Coblenz, printed by Görres-Druckerei G.m.b.H. [1919.] 200 p. D609 U58 6th H43.

HUSSEY, R. F.—United States' first ammunition train, Coblenz. Görres-Druckerei, [1919] 83 p. D609 U893 H97.

ILLUMINATING DEVICES.—European War. Illuminating in war. Illuminating devices in the great war. I. An account of aerial lighting devices and their development from 1914 to the armistice. By Capt. H. M. Brayton, Ord. R. C. (*Scientific American Supplement,* Aug. 23, 1919, p. 114.) II. An account of aerial lighting devices and their development from 1914 to the armistice. By Capt. H. M. Brayton, Ord. R. C. (*Scientific American Supplement,* No. 2279, Sept. 6, 1919, p. 146.)

LOSSES.—European War. Canada and United States official losses. (*The Military Gazette,* Aug. 26, 1919, p. 5.)

MAP MAKING.—U. S.: Mapping by airplane methods, application to U. S. conditions. The airplane in surveying and mapping. By Col. E. Lester Jones. (*Journal of the U. S. Artillery,* Aug., 1919, p. 226.)

OFFICERS.—U. S.: Appointment. Generals and Lieut.-Generals, U. S. A., appointment and reasons. (*Congressional Record,* Aug. 28, 1919, p. 4747.)

ORDNANCE.—Civil War. Ordnance and gunnery in. By Brig. Gen. Henry L. Abbot, retired. (*Journal of the U. S. Artillery,* Aug., 1919, p. 216.)

ORDNANCE.—U. S.: Shortage in war of 1917. Maj.-Gen. Crozier upon. A merit system in the Army. (*The North American Review,* p. 329.)

PROMOTION.—Selection promotion by methods of foreign armies. W. P. D. study on. Staff study of promotions in armies. (*Army and Navy Journal,* Aug. 16, 1919, p. 1734.)

PROMOTION.—Selection promotion by U. S. A., Gen. March on selection. (*Army and Navy Journal,* Aug. 23, 1919, p. 1735.)

PROPERTY, Destruction of.—France.: Damage to farm land. European war destroyed 3.8 per cent of area under cultivation; other data. (*Commerce Reports,* Aug. 27, 1919, p. 1062.)

SCHOOLS.—A. E. F.: A. P. O. 714. The university of the A. E. F. By Maj. E. Alexander Powell. (*Scribner's,* April, 1919, p. 413.)

SCHOOLS.—U. S.: The need of an infantry school. (*Arms and the Man,* Aug. 30, 1919, p. 447.)

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