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A BATTERY SEEN IS A BATTERY LOST

The stable detail had the plugs bedded down,
And were loafing around on the bales;
And curious like, like the rookies they were,
They begged the old sergeant for tales.
"Remember," he said, "in the artilleree,
That whether you're tractor or hoss'd,
You'll find it's the truth what me old colonel said:
That a battery seen—is lost.

"Twuz jest fur a second we showed on a crest,
When we tuck up position one day.
We'd galloped like hell so the boche wouldn't see.
Had they spotted us? Well, I should say!
Whizz-crash! They come rangin' with '150' cans;
One over and one short they toss'd.
The captun called limbers; we up-tail and run.
For a battery seen—is lost.

"All set in emplacements on east Verdoon front
In a sector what seldom got rough;
It was pretty we sat till th' boys all forgot
About overhead camyflage stuff.
With deep-hummin' motors th' airyplanes come,
'Cause we wasn't all leafy and moss'd.
And the boche dropped his burns and nigh blotted us out,
For a battery seen—is lost.

"Remember, you drivers an' don't git a grouch,
When you're having to make a detoor.
It may be some quicker straight over the crest,
And it's rougher around, but it's sure.
You, cannoneers, stick on the job at your posts,
So the enemy learns at his cost,
That you're quick on the lanyard and layed on him close,
And his battery seen—is lost."

—FAIRFAX DAVIS DOWNEY in *The Stars and Stripes*.

THE INFLUENCE OF RADIO COMMUNICATIONS ON CONDUCT OF FIRE

BY MAJOR J. G. BURR, FIELD ARTILLERY

First Prize Essay

THE proper technical handling of Field Artillery in service depends on three main elements: transportation to reach a given position; occupation of the position; and efficient use of the guns while in position. In order that the last may be effected there must be sure communications between the various elements of the position; that is, in the battery, between the O.P., P.C., and the gun position proper; in the higher units, between the various P.C.'s; and finally, in the services, between the Artillery and Infantry P.C.'s. Each of these is a problem in itself. This paper will be a discussion of the first only, or more explicitly, a discussion of communications in the battery and especially how this problem of communication has affected and will continue to affect the methods used in Conduct of Fire.

1. THE COMMUNICATION PROBLEM IN THE FIELD ARTILLERY BEFORE THE WAR

As a natural consequence of the introduction of the use of indirect fire in the Field Artillery came the separation of the observation post from the firing battery. This first separation started the communication problem, which gradually developed through voice (with the megaphone) and visual signalling to telephone communication. After the introduction of this last, developments were confined to improvement of the apparatus concerned in it. This development was forced by the gradual increase of the distances involved. The reason for this increase of distance may be disregarded in the discussion; but the fact itself, being self-evident, must be considered.

While our service, before our entry into the war, had progressed up and through the point of the adoption of telephone communication, the development of the matériel used in this proved inadequate for the needs of the service as indicated by conditions encountered abroad. For telephone communication the batteries were provided with buzzer telephones and light buzzer wire, which was carried and laid by means of hand-reels. One wire and a grounded circuit was the method of use. The telephones were

efficient over reasonably long distances, but the wire was light, easily broken, and very lightly insulated. In addition the method used in laying, *i.e.,* a small reel carrying only a quarter of a mile of wire, which was carried in the hand, was inadequate for an extended line. The result was that the distances between the elements of the position were restricted to a very considerable extent. It is true that this latter fact may be considered as the cause, and the light equipment the effect. However, no matter which way it is considered, the existence of the fact cannot be denied.

2. THE DEVELOPMENT OF COMMUNICATIONS DURING AND SINCE THE WAR

Before our entry into the war information from abroad indicated the necessity for the improvement of this equipment. The buzzer element and the ground return had to be abandoned because of the listening in devices. Heavier wire had to be used for several reasons; principally because of increased distance between the elements of the position and the heavy traffic in the fighting areas. This heavier wire and the increased amount necessary because of the all-metal circuit, in turn forced improved methods of carrying such as the breast reel, caisson reel, and reel cart. However, none of these improvements were introduced in our service until after our entry, with the result that during the fighting abroad French equipment was used almost entirely, with some exceptions, such as our own battailon reel cart. Since the war, our own equipment has been brought up to date, so that at present, the batteries are equipped with telephones, wire and carrying vehicles which are efficient in establishing communications quickly over distances up to 3000 yards and perhaps further. In addition the switchboard has been added, furnishing increased flexibility and speed in the establishment and operation of the system.

3. EFFECT OF THIS PROBLEM ON CONDUCT OF FIRE

As stated before, it is a question as to whether the tying of the O.P. to the neighborhood of the battery was due to the type of communication equipment or whether the latter was the result of the former. It would seem that when wire was first introduced the equipment was designed according to the demand for its use, but, that, as the advantages and necessity of being able to obtain O.P.'s at greater distances from the battery developed, the equipment failed to keep up, until the experiences in the war forced it to do so.

We have seen, moreover, that until the new equipment was furnished, it was the exceptional case where the O.P. was further than 400 yards from the battery. Usually it was much closer. Consequently

an officer firing his battery had axial observation, it might be said, at all times. That this was so can be easily determined by examining the methods used in conduct of fire in this period. All the varieties of lateral observation which are now in use were never mentioned, not even at the School of Fire. It is true that some officers had studied and considered it abstractly, but the service as a whole not only knew nothing about it, but had never even thought of it.

As the use of indirect laying increased, with it grew the appreciation of the necessity for and the advantages of more flexibility in the choice of observation posts. And with the improvement in wire communications came increased use of distant O.P.'s, both axial and lateral. At first the tendency was to keep observation axial, since conduct of fire from lateral points was unknown and had to be worked out. As this latter was mastered, though, came some of the flexibility so much desired.

It might be well to discuss here this matter of choice of observation posts. The ideal situation, of course, is a well-defiladed battery position with an observation post, within voice distance, from which all the sector can be seen. There would then be no communications problem and at the same time axial observation. This ideal is rarely reached. Usually in order to have both requirements, defilade and observation, the battery and O.P. will be separated. If an O.P. is desired near the battery, observation will be sacrificed to a greater or less degree; or if an excellent O.P. is selected, the battery will be placed near it and protection will be sacrificed. If sure communications could be secured over any distance up to five or six miles, we again would be able to reach the ideal as far as communications are concerned. The best battery position could be selected and at the same time the best O.P., there being no necessity to place one with relation to the other.

The improved wire communications developed during the war allow us to approach this ideal, but since wire is always liable to breaks and trouble of various sorts we are still a long way from it. And, principally due to wire troubles, the average battery commander is still inclined to keep his O.P. and battery as close together as possible, sacrificing, in most cases, a certain amount of observation in order to do this. Consequently, the normal case in conduct of fire is still axial observation and lateral is regarded as somewhat of a stepchild, to be used when you have to, but avoided on every possible occasion. This has retarded the development of the methods used in conduct of fire from lateral points. The extent of this retardation will be taken up further along in this paper, but the reader is requested to keep it in mind.

4. RADIO COMMUNICATION IN THE LAST WAR

With the last war came a new type of communication, wireless, or as commonly known, radio. It is unnecessary to go into all the ways in which radio was used. As we are only interested in the battery we will touch only on those which concerned that unit. The lowest unit in the Field Artillery which had this type of communication was the battalion and the battalion set was used for practically two purposes alone: meteorological messages and airplane adjustment. The latter was really a battery function, communication being through the battalion set. In rare cases communication with the infantry was obtained. In no case, with perhaps very rare exceptions, was fire adjusted by a ground observer using radio communication. The reasons for this are fairly obvious, such as the necessity of restricting the number of radio sets in a given area so as to prevent interference, and, principally, the unreliability of the light sets then in use. The radio phone was for practical purposes nonexistent.

5. DEVELOPMENT OF RADIO SINCE THE WAR

Since the war the development of radio has been one of the most remarkable phenomena of the age. The one phase of this development which, in turn, has been most remarkable, is the improvements in radio telephony, and this is the phase in which the field artilleryman is most interested. The advantages of radio telephony over wire telephony for artillery are so obvious that it is unnecessary to discuss them. Its disadvantages are quite as obvious, but, since it will be necessary to discuss them, they will be enumerated. The principal disadvantages are: possibility of interference and interception of one set by others, especially, of course, by enemy sets; limitation of the number of sets which can be used in a given area; weight of equipment at present necessary; unreliability of communication due to atmospheric interference and mechanical defects. Let us take up each of these in turn and show how these disadvantages are being overcome. First, however, it will be well to see what kind of a set the Field Artillery battery needs. If radio telephony is to replace the wire for conduct of fire purposes, there will be needed a set, light enough for two men to carry over difficult ground. It must be practically fool proof; reasonable proof against interference; and with a radius of from eight to ten miles. Considering these requirements in connection with the disadvantages mentioned above, we can get a clear idea of future possibilities.

The latest sets developed have a very decided directional effect; so much so that interference is only possible from other sets which are practically in line. This directional effect will also assist the

observer in locating his battery in case he has lost touch with it. With this feature is combined fineness of tuning which minimizes interference from all sets which are not on the same wave length. This tuning ability also increases the number of sets which can work in the same area without interference. The new 77-A set has largely solved the weight question, being light enough for two men to carry over fairly difficult ground. Unreliability due to various causes, however, still remains to be solved. The present sets are far from fool proof and are not satisfactory mechanically. Moreover, the radius of the 77-A set, our latest type, is less than one-half of that which would fulfill necessary requirements, being, when at its best, four to five miles.

Judging by the progress made in the last four years, there is every reason to believe that the mechanical defects will be overcome in the near future. One of the latest developments makes us even more confident that this will be so; namely, the development of the so-called "Power Tube." Exactly what effect this will have on the light telephone sets cannot be determined at present. It is a practical certainty, however, that its application will result in increased radius of action and reduced weight. Whether it will increase the reliability of action is as yet unknown.

Thus we see that prospects for the type of radio phone so much desired by the Field Artillery battery are so favorable that it will more than pay to consider what effect such a set will have in field artillery technic.

6. INFLUENCE OF RADIO IN CONDUCT OF FIRE

It is obvious that the first result will be the practical release of the O.P. from the battery. If we can obtain reasonably sure communication from any point within eight or ten miles of the battery, the battery commander will be free to pick the best place from which to see his sector, without the necessity of the present compromise due to communication. This must not be interpreted to mean that he will deliberately pick a distance point, if a near one is satisfactory, but that he will have the equipment which will enable him to do so when necessary. Anyone who has operated in rolling, wooded country will appreciate the number of times he will bless such equipment.

It is also fairly obvious that this freedom of choice will result in a large increase in the number of times the observer will have lateral observation. Right here will be a good place to consider the present status of conduct of fire with lateral observation. The methods in use at present are the direct descendants of the methods used by the French during the later stages of the war. In those

methods, adjustment by one gun at a time has been, and still is, the basis. There has been considerable simplification, both in methods of instruction and methods of fire, during the last three years, but, in the opinion of the writer, there has been a great lack of emphasis and a consequent lack of interest in the possibility of adjusting the *battery* with lateral observation, using the four guns simultaneously, as in axial observation. If it is advisable to adjust with the battery when axial observation obtains, it is just as advisable when using lateral, provided, only, that it is a physical possibility. Whether it is a physical possibility is not yet fully determined, perhaps; although, again, the writer has thoroughly convinced himself, by practical demonstrations, that it is.

Now, let us just consider what is going to happen in the next war if we have the new long-range guns and an efficient radio phone. The supporting artillery of the attack will be placed close up as it is now, but with the Infantry first wave will be groups of artillery observation parties scattered along its length; each equipped with a radio phone. As the attack progresses, part is held up by machine guns. The artillery observer works up to where he can see, sets up his phone, calls the battery which has been designated for that work, adjusts it and the attack proceeds. It sounds easy, but consider, now, the details of the observer's work. He is four hundred metres from the target, the battery is six thousand. He may be able to locate the target on the map, or he may not have a map. In moving forward, he is practically certain to get off the gun-target line. If he has no map, he may not even know where the G-T line runs, on his left or right. It is believed that no harder situation can be conceived. Have we many in the service at present who can handle it?

The situation described, under present conditions, would have to be handled either by the movement forward of batteries, by accompanying guns or by map firing. The last is obviously the worse because of its inaccuracy. The arguments against the accompanying gun are many, the principal ones being its vulnerability, and the loss of flexibility and control in the use of supporting artillery. The movement of batteries forward has many good points but one great defect, the fact that during the move the guns are out of action and this at the time when they would be needed most. The observer with the radio phone has none of the disadvantages of the above methods. His disadvantage lies in the difficulty of adjustment and this difficulty at present rests on a lack of knowledge as to the best methods to be used in the situation. It can be done. Much harder problems have been solved in the past; this one can be solved

also. But, we must start now to study and experiment on it so that our part will be done when the radio experts finish theirs.

It is a new problem in gunnery and there are probably others which will develop with the use of the radio. It cannot be considered an exceptional case, for it occurred any number of times during the last war and the artillery failed with it almost the same number. Indeed, it is the pressing question in Field Artillery at this time. We can provide excellent support at the start of any attack, but up to the present no efficient method has been provided which will enable the artilleryman to always assist in removing obstacles which have unexpectedly checked part of the advancing line.

As I have tried to bring out, we will have in the future, probably fairly soon, a means of communication which will enable us to put an observer right at the point of trouble and yet enable him to talk to his battery with ease and surety. But the methods which should be used in conduct of fire in such a situation are practically unknown or at least undeveloped and are certainly not being taught to Field Artillery Officers, at the present time. It is highly important that this matter be studied, developed, and taught, so that we may be ready to immediately utilize the improved equipment which may be expected fairly soon; perhaps sooner than now seems possible.

Date of Issue

THE FIELD ARTILLERY JOURNAL is issued on the last day of the publication period, the March-April number coming out on April 30th. This is pursuant to the custom established at the founding of our Association, and should not cause anxiety to new members who are accustomed to receive commercial periodicals at the beginning of their publication period or even before.

A FIELD ARTILLERY GROUP IN THE GENERAL ADVANCE*

BY COLONEL W. H. F. WEBER, C.M.G., D.S.O.

PART II

The War of Movement At Last!

CHAPTER I. OCTOBER 5/7

(See Map No. 2)

OCTOBER 5th found 2nd Brigade[1] on the move again after a pleasant little holiday; we were to go further north this time, via Bellenglise. The nature of the fighting was expected to, and did, more nearly approach open warfare. Before marching, the Brigade Commander summed up September lessons, such as were likely to be applicable to October, as follows:

Support of Infantry and Economy of Force.

(i) 4 guns in action and 2 in reserve (probably with forward wagon-line).
(ii) Not more than 1/3 of guns on move at same time.
(iii) Might be necessary to keep firing-battery wagons with guns in action.
(iv) IX. Corps Instructions contemplated possible exclusion of organized barrages in future.

Choice of Positions and Observation.

(v) Avoid banks or hedges marked on map or specially visible to the eye.
(vi) Avoid "Column of Route" during advance in battle.
(vii) Report *immediately* occupation of a new position.
(viii) Achieve efficiency without delay after occupation.
(ix) Probably have to shoot without help of the squared maps, with which we had been "spoilt" for years.

Reports and Reconnaissance.

(x) Every unit in Army responsible for touch with neighbors.

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* Reprint from *Journal of the Royal Artillery*, November, 1922.

[1] Adjutants had changed owing to an officer's promotion.

(xi) Patrols required for (*a*) Protection, (*b*) Information, (*c*) Reconnaissance of ground.
(xii) Pass back information gained, personally if possible.
(xiii) Drill of Operation Messages.
(xiv) Great demand for mounted men (out-riders) with a battery.

Communications.

(xv) Economize wire for special occasions.
(xvi) Lamp better than flags for visual.
(xvii) Wireless.

General.

(xviii) Constant testing of sights.
(xix) Treatment of ammunition in changeable autumn weather.
(xx) Be prepared to man captured guns.
(xxi) 6-inch T.M.'s will probably be affiliated to 2nd Brigade.
(xxii) Splitting up of Brigade Staff to be avoided *if possible*.
(xxiii) Brigade Commander usually with Infantry Brigade; if not, with one (named) battery.
(xxiv) Great Principle—Take care of sights and ammunition, and *Fight by Eye*.

On the evening of 5th, we found 46th Division in high fettle over their recent success. They say "everything comes to him who waits"; this Division had waited since February, 1915, for a sensational success.

In view of the prevailing ideas as to employment of 2nd Brigade, R.F.A., in the forthcoming attack, a large number of officers were engaged on 6th in reconnoitring[2] the country from the high ground S.W. of Ramicourt as centre. Information was still uncertain as to who held Sequehart and Montbrehain. The enemy held Mannequin Hill, N.E. of Sequehart. Doon Copse was the highest feature in our area and there appeared to be a fine position for artillery along the western slopes of the ridge Doon Copse—Mericourt, which could be modified to the ridge Doon Copse—Mannequin Hill. Once more, much would depend on the success of the French on our right about Sequehart. Two areas needed a watchful eye on the part of battery commanders, (i) high ground S.E. of Sequehart, (ii) that N.E. of Brancourt.

On the afternoon of 6th, it was notified that 2nd Brigade, R.F.A., would be "in readiness" at the commencement of the attack,

[2] Some excellent reports were rendered and the German line well established in our minds.

a detachment to move into action between Ramicourt and Doon Copse when the First Objective had been captured—remainder of Brigade to act according to circumstances.

Preliminary instructions issued at 11:25 hours on 7th notified the place of assembly (Position No. 7) of 2nd Brigade, R.F.A., as follows: "Brigade Commander and O.C. 42nd Battery with O.C. section 87th Howitzers (at a named locality) E. of Magny-la-Fosse; Batteries near Fosse Wood." Time of assembly depended upon a question of water supply, but midnight 7/8 at latest. Probable first position of Brigade would be in I 13, approximately 2000 x S.W. of Doon Copse with headquarters alongside 16th Infantry Brigade at Preselles. Advance to be in 3 echelons, *viz.:* (i) 4 guns and 4 wagons, (ii) 2 guns and 2 wagons, (iii) first-line wagons. Route of advance as reconnoitred yesterday, if possible by the valley S. of Preselles; special care in crossing the Lehaucourt Ridge. Liaison duties were forecasted. Firing battery wagons to dump at once after occupation of advanced positions, then to return and refill from D.A.C. Section about Fosse Wood; First-line wagons on arrival to remain on gun positions. Water would be a difficulty; petrol tins required. 24th Brigade, R.F.A., would be with 71st Infantry Brigade, assembling S. of Joncourt, moving between Ramicourt and Preselles, and taking up a position on our left (north).

The Operation Order issued later explained that 16th Infantry Brigade was to attack on the right, with its outer (right) flank covered by a special detachment of 18th Infantry Brigade provided with tanks. 16th Infantry Brigade attack to be exploited according to circumstances. 42nd Battery (with one section 87th Howitzers[3]) was to advance directly the First Objective was captured to a position about I 13 b 8/1, to act in immediate touch with the infantry on the spot, communicating with 2nd Brigade, R.F.A., by visual and orderly. The protective barrage, over whatever line was eventually occupied by the exploiting infantry, would be 42nd on right, 21st on left, 53rd and 87th superimposed. 1/K.S.L.I. would capture First Objective; 1/Buffs would advance through 1/K.S.L.I. (liaison 21st Battery); 2/York and Lancaster would attack Mericourt from N.W. (liaison 53rd Battery).

Note on Chapter 1.—The position down South was uncertain, the French having met with strong resistance W. of St. Quentin. The French were faced with a difficult task; their objectives were such that, even in case of their success, our (6th Division) frontage would be thrown back from left to right and 7500 x in extent; it might be 10,000 x; and the French to start an hour later than we did. The valley between us and them was to be the scene of operations

[3] At special request of O.C. 2nd Brigade, R.F.A.

of the special detachment 18th Infantry Brigade with its tanks. A detachment of 46th Division (left unrelieved at Sequehart) had to undertake a subsidiary attack[4] before our zero. On our left, 30th American Division (who had relieved the Australians) was ahead of 6th Division (who had relieved 46th Division) thereby complicating the barrage. The force of Field Artillery supporting 6th Division totalled *eleven* Brigades, of which only seven were to take part in the creeping barrage. 5th Cavalry Brigade was in attendance, and, as before, Life Guards' Machine Gun Battalion was attached to 6th Division.

The above note seems necessary, properly to understand the course of events. It is obvious therefrom that we were in for something different to the normal frontal attack of 1916/17 with its parallel lines, wired and entrenched, and its limited objectives.

CHAPTER II. OCTOBER 8/10

(See Map No. 2)

NOTE:—The writer finds it difficult to describe the exact course of events (from the point of view of the Right Group) during the next period, as almost all information came in personally and many orders were given verbally. He has, however, NOT drawn on his imagination.

At 08.15 hrs. on 8th, batteries sent forward their R.O.'s to I 13 area. At 08.30 hrs. 42nd Battery and attached section 87th Howitzers were ordered forward according to plan, and passed through at 08.42. At 09.40 we received news of the capture of Cerise Wood by the French, which turned out to be inaccurate, for a subaltern of 21st Battery, sent on reconnaissance at 13.00 hrs., brought the first news that things were going better on that flank. Three other officers went out at various times between 11.00 and 15.00 hrs., all bringing back useful reports to the Brigade Commander, which were of course passed to 16th Infantry Brigade. At length the special detachment 18th Infantry Brigade (1/West Yorks) secured Mannequin Wood, in spite of all three supporting whippet-tanks having been knocked out; the rest of 2nd Brigade, R.F.A., was launched at 16.15 hrs., and at 17.00 hrs. headquarters 16th Infantry Brigade, and 2nd Brigade, R.F.A., shifted to Preselles Farm (Position No. 8).

42nd Battery had had some sensational shooting during the day, but unfortunately the battery commander was severely wounded by a rifle bullet and the battlefield knew him no more.

[4] Unfortunately this subsidiary attack failed, twice over, but the great effort made enabled 6th Division troops to cut the defenders off and compel them to surrender.

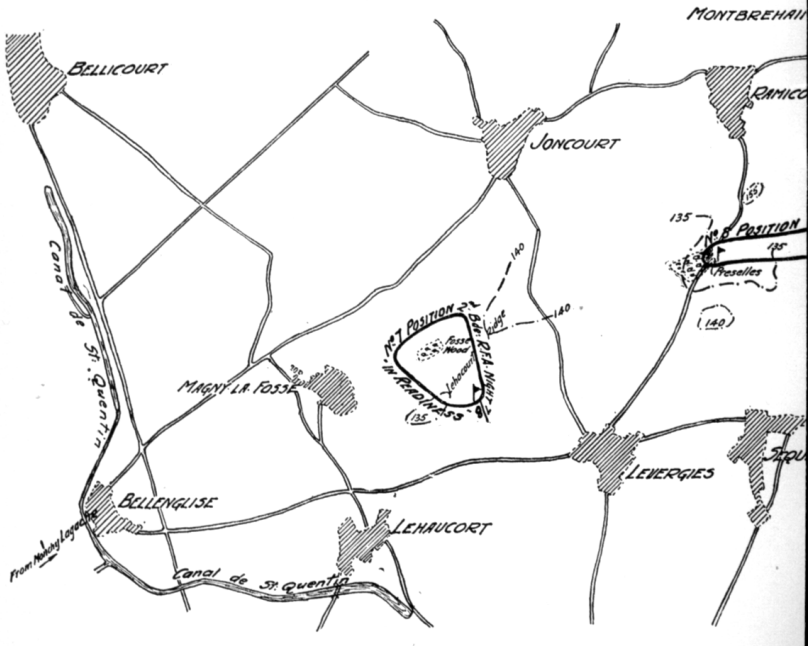
MAP No. 2. TO ILLUSTRATE PART

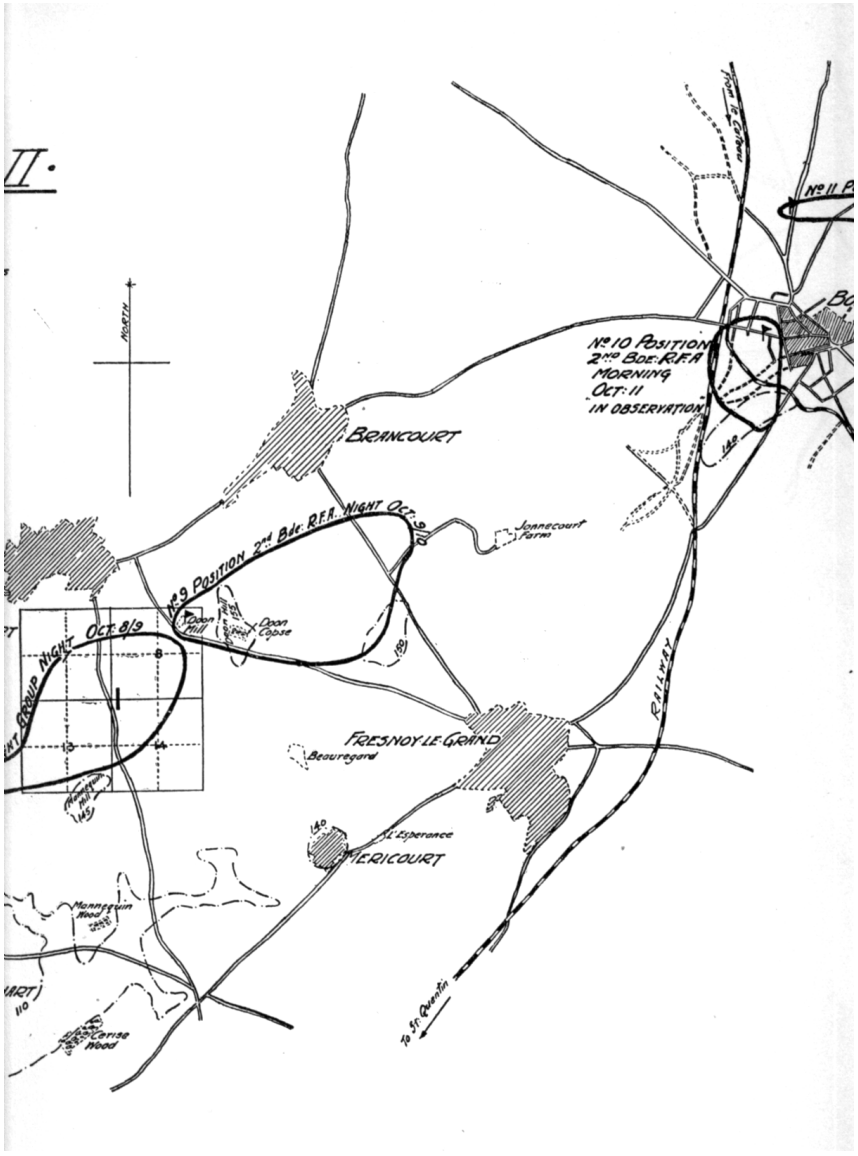
· CHAPTERS I/III ·

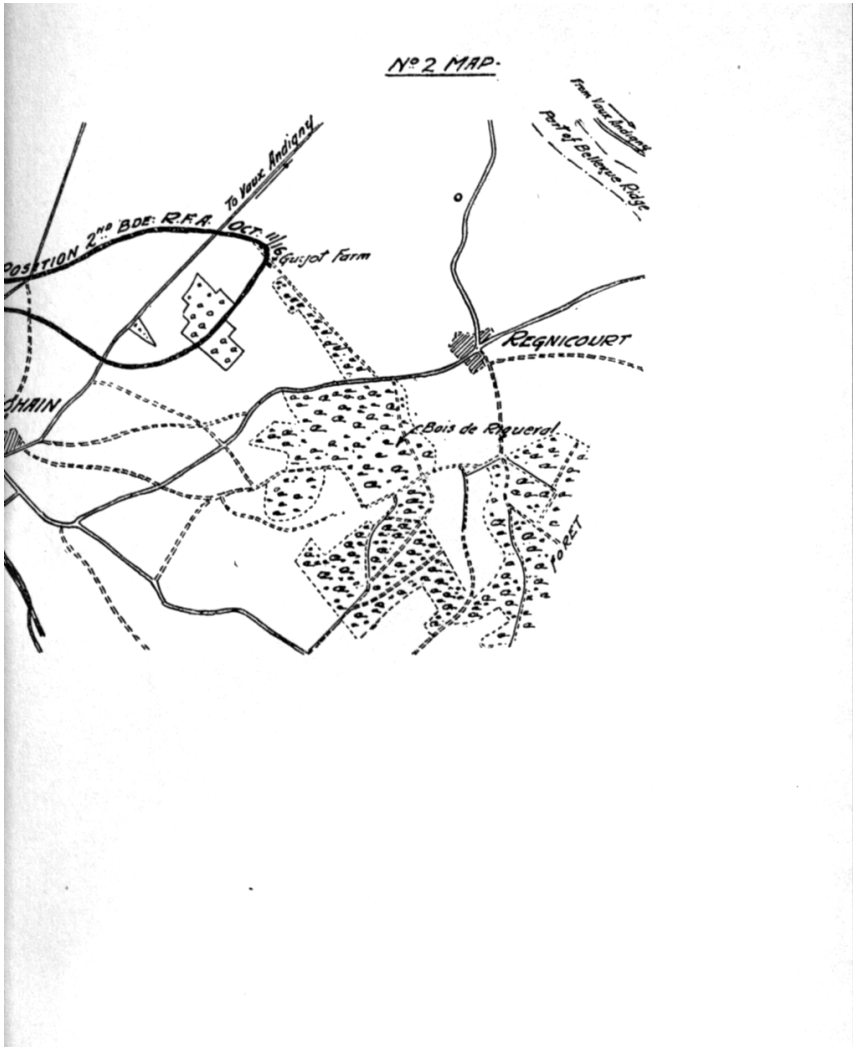
YARDS 1000 500 0 1000 2000 3000 4000 5000 Yds

SCALE 1/40000 ·

NOTE:-
Head Quaters of each position indicated thus:-




II.
NORTH
No 10 POSITION
2nd Bde: R.F.A
MORNING
OCT: 11
IN OBSERVATION
BRAINCOURT
No 9 POSITION 2nd Bde. R.F.A. NIGHT OCT. 9/10
Jonnecourt Farm
OCT. 8/9
Talon Hill
Doon Copse
FRESNOY LE GRAND
Beauregard
RAILWAY
L'Esperance
MERICOURT
Monnequin Wood
To St Quentin


No 2 MAP.
From Vaux Andigny
Part of Bellenglise Ridge
To Vaux Andigny
POSITION 2nd BDE: R.F.A. OCT. 11/6
Guyot Farm
RONICOURT
DHAIN
Bois de Riqueval
FOREST

6th Division had gained its final objectives by dark, including Mericourt; there had fallen into its hands over 30 officers and 1100 men; casualties had been moderate, coming chiefly from the right flank previous to the capture of Mannequin Wood (the decisive incident) and the French success; 71st Infantry Brigade and 5th Cavalry Brigade, on our left, had come under fire of German field-guns firing over open sights from about Jonnecourt Farm.

Followed an indescribably hard night! Communication to be established. Night-lines to be decided and notified (eventually Orme Copse—L'Esperance—then directly towards Brancourt); 2nd Brigade, R.F.A., to be reinforced to form a large Group; "remaining efficiency" (1) of the various units to be studied; and orders to be issued for an attack under a barrage at dawn. It was pitch dark and the accommodation at Preselles bad (after our shelling), but there was a dug-out.

The Right Group was at first increased only by 5th Army Brigade, R.F.A., but later by 23rd Army Brigade also. Somehow or other, orders were prepared and issued (verbally, for the most part); somehow or other, 16th Infantry Brigade handed over ground on its right to 46th Division and side-slipped to the left (N.); and somehow or other, we attacked at 05.30 hrs. on 9th under a respectable barrage. The attack, whose object was to complete capture of the "area of exploitation," met with considerable success.

At 06.10 hrs. on 9th, it was notified to all concerned that 16th Infantry Brigade was to reach and hold a road leading approximately from Jonnecourt Farm to Beauregard and to form a defensive flank facing Fresnoy-le-Grand; then, while maintaining the defensive flank, 6th Division was to gain the Fresnoy—Bohain railway line.

At 08.00 B.G.C. 16th Infantry Brigade unexpectedly[5] moved. The Group Commander, having lost his infantry brigadier, experienced delay in meeting unit representatives at the appointed place (Doon Copse), but eventually the Group disposed itself to meet existing circumstances, as shown on the map (Position No. 9); it might have to fire E. or S.[6] Touch was regained with headquarters 16th Infantry Brigade in the afternoon and we settled down together in Doon Mill. Some registration had been done by the artillery, but in view of the fact that our patrols and those of 46th Division on our right were "out," it was not possible to do the harassing fire ordered and arranged. It had been a hard but interesting day without any

[5] Without telling the artillery.

[6] When 46th Division had occupied Fresnoy, the southern line of fire was, of course, eliminated.

sensational events after the affair of the morning. The ground traversed was covered with dead, dispersed in open-warfare fashion, mostly German. Night-lines had been ordained running from N. outskirts of Fresnoy and along E. side of the railway, but the success of 46th Division, who occupied Fresnoy before night, altered things—and during the night 9/10 6th Division entered Bohain.

Very late on the evening 9th, an order arrived grouping the division into 3 mobile mixed brigades, 2nd Brigade, R.F.A., being affiliated with 16th Infantry Brigade. 5th and 23rd Army Brigades, R.F.A., had left the Right Group during the later hours of the afternoon. As 16th Infantry Brigade was relieved by 71st Infantry Brigade during the night and went out to rest, O.C. 2nd Brigade, R.F.A., determined to accompany them (in accordance, as he thought, with the spirit of the new grouping order) and took his batteries to Ramicourt early on 10th. This was apparently not intended and considered *"ultra vires";* we had to suffer for it by a very early start on 11th. In future, a Brigade, R.F.A., though affiliated to an infantry brigade in the second, or even third, line, was to remain in its forward position and watch developments. (2) Anyhow, Ramicourt was a fairly well-preserved village—much better than anything we had seen for a long, long time—and the pleasure of spending an afternoon and part of a night under such conditions compensated for a certain coolness towards us on the part of superior authority.

Here we can pause, after our first bout of something like open warfare.

Comments on Chapter II.

(1) The "table of remaining efficiency" at about 21.00 hrs. on 8th read as follows:

No.	Question.	5th Army Bde.	23rd Army Bde.	21st Battery.	42nd Battery.	53rd Battery	87th (How.) Battery.
1	Number of guns in action?	13	Not yet reported to Right Group.	6	6	6	6
2	Ammunition—(a) echelons	Full		Full	Full	Full	Full (except 1 Section)
	(b) dumped on position	Over 200		None yet	309	200	208
3	Observation?	Not yet selected		Local	Local	Local	Local
4	Has battery shot itself in?	Not yet		Yes	Yes	Yes	Yes
5	Casualties?	None		None	B. C. and 2 Gunners	None	1
6	Any shelling going on?	A little		Yes, on O.P.	Slight	A little	Quiet
7	Horses at?	——		——	——	——	——

(2) Possibly an opportunity was missed to give a third of the artillery some rest; but it must be remembered that each minor

operation was supported by the whole artillery, and that minor operations were occurring freely and at short notice. The point is, that the artillery needs its breathing spaces as much as the infantry.

CHAPTER III. OCTOBER 11/16

(See Maps Nos. 2 and 3)

2nd Brigade left Ramicourt at 03.45 hrs. on 11th and came into action "in observation" soon after 06.00 hrs., just S.W. of Bohain (Position No. 10). Brigade Headquarters established itself in the outskirts of the town,[7] which contained almost its normal inhabitants, so far as we could judge. Liaison was established with 71st Infantry Brigade, at the moment the "brigade in the Line," and the day was spent in reconnaissance for positions to suit action contemplated for 12th. At dusk batteries moved their guns on to the selected positions N.E. of Bohain (Position No. 11), but only a few men passed the night there. 18th Infantry Brigade relieved 71st Infantry Brigade in "the Line," 24th Brigade, R.F.A., taking up duty accordingly.

On the morning of 12th, Brigade Headquarters moved (early) to a small farm house about one mile N.E. of Bohain; routes of approach to the new positions were chosen, which would avoid passage through the town; the ammunition dump was completed to meet the latest instructions; batteries registered (on *targets other than their barrage objectives*); operation orders and barrage tables were issued.

The position was as follows: The Americans held Vaux Andigny on our left and were considerably ahead of 6th Division. 71st Infantry Brigade, in spite of tank support, had failed to reach the alignment on 11th. 46th Division was held up by Riqueval Wood on our right and were still further behind. The object of today's minor operation (by 6th and 46th Divisions) was to come into line with the Americans; the special objective 6th Division (18th Infantry Brigade) was a footing on Bellevue Ridge.

The attack took place at 16.30 hrs. in heavy rain. Except for some success on the extreme left, by 2/D.L.I., it failed all along the line. It was useful, for it disclosed a new enemy position, provided with a considerable amount of wire; it showed also that our maps were, for once, rather inaccurate. The opening of our barrage produced an unexpectedly heavy retaliation on the battery positions and caused a number of casualties, in which Brigade Headquarters

[7] Whence it was brusquely ejected after a couple of hours by "four two's."

shared.[8] It was evident that the enemy intended to stand along the Selle River.

The next days were spent in constant conferences and reconnaissance; in addition to the normal harassing, and so on, batteries had to cut wire on 13th, in view of a probable renewal of the attack on a large scale on 15th; but late in the evening (13th), a temporarily defensive attitude was ordained. Tactically, a special condition was present, comparable to that of 29th September; we were very close up to the front line, and the position on our right (S.) flank was uncertain and that flank refused.

A new commander[9] had arrived on 11th for 42nd Battery. Life was rendered more pleasant during this lull by the existence of a fine crop of vegetables considerately grown for us during the summer by the enemy.

On 14th, a new plan was explained to eight field artillery brigade commanders. The Bellevue Ridge was to be attacked in enfilade from N.W.—entailing a preliminary flank move, surely a sign that the war of position was over. 6th Division was to effect penetration from Vaux Andigny, 1st Division to exploit. The attack was to be made under a barrage of eight brigades R.F.A. and eighty machine guns, and to be supported by 172 60-prs. and heavy howitzers. 2nd Brigade, R.F.A., was to be the nucleus of the Right Group of four brigades, R.F.A. (2, 5, 161, 298). 6th Division Infantry had to commence their attack on a frontage of 1500 x which (in the course of an advance of less than 3000 x) extended to 5000 x; there were several enemy strong-points in this fan-shaped area.

The problem was not too simple, either, for the Field Artillery. The area allotted the Right Group (Position No. 12) was an exceptionally difficult one in which to emplace so many batteries; it was chiefly occupied by scrubby woodland, of most uneven terrain, called Bois de Busigny and for the most part on a forward slope. The opening lines of No. 1 Barrage were, in some instances, at a range

[8] The brigade commander had an old Irish hunter, of marked personality—like most Crackenthorpe stock. He had apparently been very lame for weeks past; vets had advised his destruction, but he was a favorite; the brigade orderly officer had maintained that the horse was "swinging it." On this occasion a shell burst in the brigade staff lines; the animal in question, *very* slightly wounded, broke loose and led the lot off on a trotting tour. Pausing to graze, he was easily caught with the aid of a feed-tin, but it took the whole afternoon to recapture the others. Our friend never went lame again from that day to this, when he still carries his mistress to hounds.

[9] Formerly staff-captain 6th Division Artillery, so no stranger. This officer acted as O.C. 2nd Brigade, R.F.A., during most of the remaining period covered by this narrative.

of under 2000 x (without registration) (1), the final lines at an almost prohibitively long distance. Two of the four brigades had to move, after capture of the First Objective, in order to cover the forming-up of 1st Division Infantry by No. 2 Barrage. The other two had to move later (on the capture of the Second Objective) to take part in No. 3 Barrage to cover the advance of 1st Division. This arrangement was modified; the moves were now to be by timetable, subject to orders from the Group Commander, and *trusting to their own patrols for security*. It was, of course, necessary yet once again to split up 2nd Brigade, R.F.A., staff;[10] for the Group Commander would have at least four brigades under him—in a battle of movement, too.

Within the Group, the barrage of 2nd and 5th (Army) Brigades were to be superimposed on one another; similarly 161st and 298th Brigades on the left (northern) half; each brigade to keep a battery ready to answer zone calls. The moves were to be by one battery per brigade first; remainders of brigades to follow on successful occupation of advanced position by the first battery; units behind to keep touch with those gone forward. Group Headquarters to be at Becquigny from 15.00 hrs. on 16th; communication after the start of the battle entirely by mounted orderlies. Wagons to dump on new positions, return to refill, and be replaced by First Line wagons which would refill in their turn. There were amendments to the arrangements (arriving up to the last moments) so frequent and so complicated, that in order to simplify this narrative further details as to the Group Task have been omitted, but the writer does not remember an occasion which necessitated more meticulous attention to the requirements of superior authority or more care on the part of battery commanders.

Another serious, and avoidable complication, was the decision at a late hour (on 16th) of our Infantry Brigadier to change his battle headquarters (2); the artillery communications had all been laid; nor did the brigadier in question inform his artillery of the change. The result thereof was felt throughout the whole two days fighting, and must have been serious had the attack failed, as it at one time threatened to do, or the enemy been active.

At the last, the Right Group was ordered to emplace a single section[11] to enfilade the enemy opposite 46th Division on our right (3). Its target was a length of enemy trench just W. of Regnicourt.

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[10] 2nd Brigade sub-group was remarkably well handled during period October 17/20.

[11] The task was duly performed but the position chosen turned out to be in a very hot spot. The section commander was most unfortunately killed, for he was a particularly able officer, and there were a number of other casualties.

Careful arrangements were necessary to ensure that the old front was covered during the emplacement of the Right Group for the new battle.

The night of 16/17 at Becquigny was saddened by the serious wounding near Group Headquarters of the B.G.C. 16th Infantry Brigade, who lost his arm. 2nd Brigade, R.F.A., was not working with him on this occasion, but had been in almost constant liaison with him since the autumn of 1917; he was always sympathetic in his dealings with the Gunners and we missed him very much.

Comments on Chapter III.

(1) At this period of the war, preliminary registration never took place as such; the practice of firing unregistered barrages had been initiated at Cambrai in November, 1917.

(2) Without wishing to insist too much, the change of plans here recorded was the most inconvenient instance in the writer's experience of the "headquarters" difficulty. The new Infantry Brigade Headquarters were 1½ miles from those originally fixed and rather inaccessible. The change was made so that the 6th Division Brigadier could be alongside the 1st Division Brigadiers, the importance of which is not for a moment underrated.

(3) This was the third occasion in the writer's experience on which he was asked to perform an enfilade task. Enfilade artillery fire reads better on paper than it works out in practice. On the whole it would seem to be best carried out by a detachment of the formation which requires it; the task is not easy (from a gunnery point of view often quite difficult), accidents can easily happen, and any consequent unpleasantness is best kept within one Formation. Secondly, it is more suitable to offensive than to defensive conditions, because an outlying detachment is difficult to control, and control is usually easier to maintain in the attack than on defense, unless the enemy is very active.

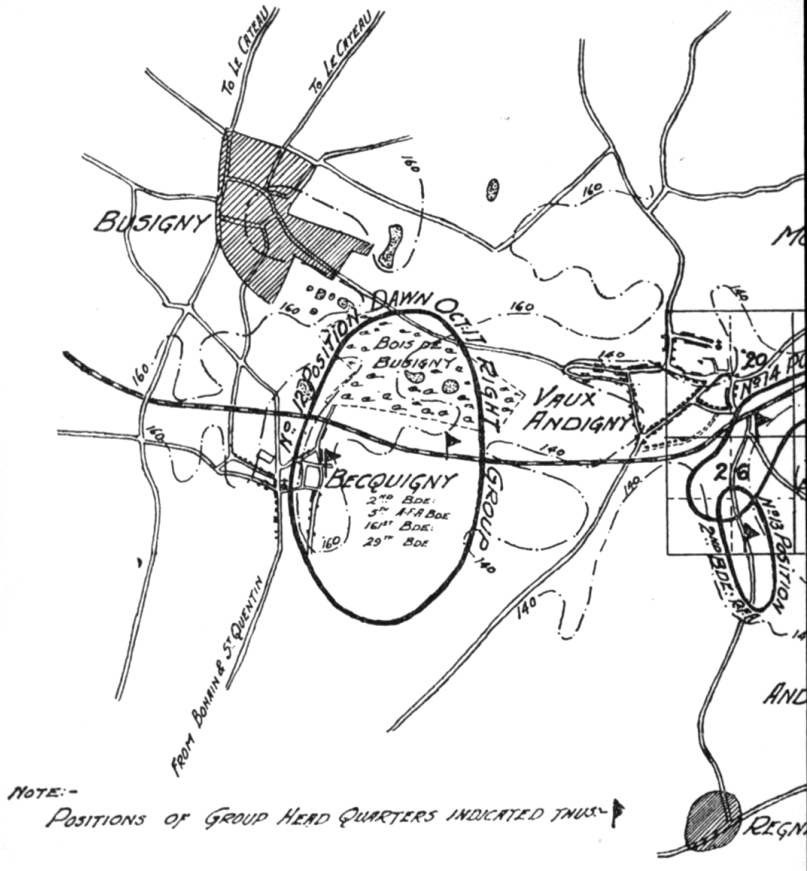
CHAPTER IV. OCTOBER 17/20

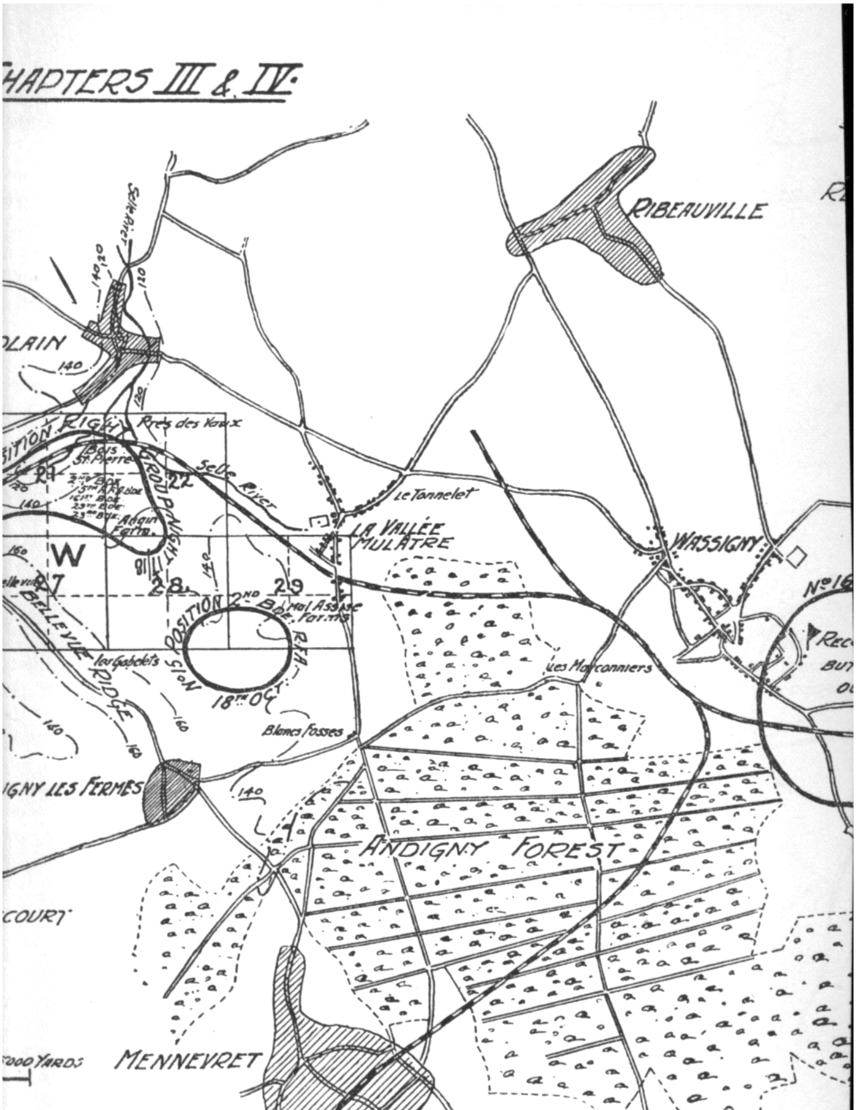
(See Map No. 3)

At 05.20 hrs. on 17th the attack was launched, in thick fog. At a time not recorded[12] in any papers at disposal, information was considered good enough to advance 21st Battery of 2nd Brigade, R.F.A., together with one battery 298th Brigade to the valley running due south from Vaux Andigny and lying at the foot of the

[12] The exact positions and moves on October 17 of the various units in this large group are found most difficult to follow in the available records. Map No. 3 shows only those which the writer can be certain of.

MAP No. 3 TO ILLUSTRATE PART II C.




HAPTERS III & IV.
RIBEAUVILLE
Selle River
OLAIN
Pres des Vaux
Bois St. Pierre
Selle River
Le Tonnelet
LA VALLÉE MULATRE
WASSIGNY
W
27
28
29
22
Anguin Farm
RIGHT GROUP
2ND BDE. R.F.A.
Hal Assise Farms
18TH OCT
les Gobelets
Les Marconniers
BELLEVILLE RIDGE
Blancs Fosses
IGNY LES FERMES
ANDIGNY FOREST
COURT
MENNEVRET
000 YARDS
140
160

T·DE·BEAULIEU
Canal de la
To LANDRECIES & MAUBEUGE
Sambre
La Louvette
OISY
Fme. de l'Arrouaise
OSITION 2nde BDE: RFA
NOITRED
NEVER
UPIED
NORTH

Bellevue Ridge (Position No. 13). At 08.20 the rest of these two brigades was ordered forward to join their advanced batteries. Group headquarters, which after the start of the barrage had been located on the railway embankment between Becquigny and Vaux Andigny, moved later to the above-mentioned valley. It was a rare and exhilarating sight to watch the long lines of guns trotting down the slope into action in the open. On arrival in the valley, the Group Commander was soon able, on a prearranged plan, to connect up by telephone with 6th Division Artillery—not a bad performance on the part of 2nd Brigade Signal Officer. (1)

Things had not gone perfectly with the infantry. The assembly of 18th Infantry Brigade just outside Vaux Andigny, and the passage of supports through the village, had been seriously interfered with by enemy gas shells. In spite of tapes laid out to show the initial lines of advance—which, it will be remembered, was fan-shaped—direction was lost. 16th Infantry Brigade (on the left) got its objective without delay, except on its extreme right; but 18th Infantry Brigade in the low ground (one of whose battalions actually advanced arm-in-arm, the better to ensure direction) became involved in the fog with 46th Division troops on their right. It was the advance of 1st Division which definitely secured the First Objective all along the line, while troops of 1st, 6th, and 46th Divisions met in Andigny-les-Rermes (in 46th Division area).

It may be asked whether it was really safe to advance the batteries under such conditions, but at this period of the war no one took counsel of his fears, and enough information was brought in personally by selected F.I.O's., or forwarded by liaison officers with the infantry, to satisfy the Group Commander that *advance was justifiable, if the batteries used patrols properly*. The F.I.O's. accurately located advanced positions of 16th Infantry Brigade, 46th Division, and the French; but immediately in front of us, the position was uncertain.

At 09.50 hrs. the Group Commander ordered forward the 5th Army and 161st Brigades, R.F.A., to the Bois St. Pierre-Pres Des Vaux valley on the other side of the Bellevue Ridge (Position No. 14), to fire No. 3 Barrage (due to last till 12.52 hrs.). At 10.37 hrs. 2nd and 298th commenced their No. 2 Barrage, after the completion of which (up to the limit of their range)[13] 23rd Army Brigade, R.F.A., which was by now in the valley W 26, came under the Right Group Commander. As two Heavy Artillery representatives were, about this time, offering their services and asking for information, which the Group Commander was able to give in considerable

[13] Eighteen-pounder batteries of 2nd Brigade moved forward after reaching their range-limit to Position No. 14.

detail, there were at this moment under his leadership between 120 and 130 guns—and it was a "moment of movement." Group Headquarters established itself in the southern outskirts of Vaux Andigny, at a spot where no projectiles were falling.

There was now a pause in the battle; 6th Division Infantry were being gradually eliminated; 1st Division had taken over command, but the C.R.A. 6th Division remained on duty. The time was occupied by Group Headquarters in gathering and sifting information from various sources, and by the batteries in improving their positions and in management of ammunition. This information, in unusual detail, showed 1st Division Infantry as held up on a line along the eastern edge of La Vallée Mulâtre and the western edge of Andigny Forest. The last report, particularly clear, was brought in personally by a captain, formerly adjutant 2nd Brigade, R.F.A., at about 16.00 hrs.

There now occurred an incident, of interest as showing what may occur on such occasions; it was entirely *due to the separation of infantry and artillery headquarters*. At 16.25 hrs. a message, considerably mutilated, was received over the 'phone from the C.R.A. 6th Division, ordering the Group to fire a barrage to cover a renewed attack by 1st Division Infantry; the barrage was to start at 17.15 hrs. from a line about one thousand yards distant from that on which the Group Commander believed that infantry to be held up. The Group Commander, on receiving the (mutilated) message, sent for the (five) Sub-group Commanders, and went at once to the telephone; but at this critical moment it had gone "dis." He sent two officers in succession to 1st Division Infantry Brigadiers' headquarters; the first to ask whether the line of resistance as known to Group Headquarters; vide 16.00 hrs. report, suited 1st Division for the first line of the barrage; the second to ask simply when and where the barrage was to begin. Both officers were long delayed at the infantry headquarters, but returned with the following answers, (i) that 1st Division Infantry line had changed somewhat since that given in the 16.00 hrs. report and quoted by the Group Commander, (ii) that 1st Division Artillery was firing the barrage and that nothing was known of our Right Group coöperating. Information to be gathered by the Group Commander from his immediate neighborhood was conflicting beyond hope of usefulness. It was now past 17.00 hrs. and impossible to fire the barrage as ordered in the (mutilated) message; but a "long concentration" was put down on absolutely "safe" localities at 17.15 hrs., at which hour some kind of action could be heard to occur. At 17.24 hrs. arrived written orders confirming the (mutilated) message; and about the same time two F.I.O's. rendered reports showing the modification to the 1st Division Infantry line since the 16.00 hrs. report, thus confirming the answer sent from 1st

Division Infantry headquarters. This incident, itself of little practical importance, has been narrated at some length because it illustrates very well the situations which come to an artillery commander in moving warfare; above all he should be at Infantry Headquarters. One sees here the problem, such as it was, and the action taken; in the cool reflection of today, the proper solution was (i) to issue instructions for barrage in accordance with the (mutilated) telephone message, (ii) to order the barrage not to be actually fired without further confirmation from Group Headquarters, (iii) *then,* to leave someone else in temporary charge, ride at once to 1st Division Infantry Headquarters, and obtain their wishes personally? But "it is easy to be wise, etc." (2)

As a matter of fact, the line was little different at dark from that given in the 16.00 hrs. report. We knew that 46th Division were safely established about Andigny-les-Fermes and that the French were close up to Mennevret. The Right Group was reduced by the departure of 23rd Army Brigade before midnight to 2nd, 5th (Army), and 161st Brigades, R.F.A., and was to act as a stand-by to 1st Division Artillery. 6th Division Infantry were gone. It had been a vastly interesting day!

At 09.30 hrs. on 18th orders were received, still from 6th Division Artillery, for a barrage to commence at 11.30 hrs. This barrage was duly fired; the attack was everywhere successful; the French got Mennevret, the (British) 1st Division Wassigny, and the Americans Ribeauville. Immediately afterwards, 2nd Brigade, R.F.A., and part of 5th (Army) Brigade advanced to the neighborhood of La Vallée Mulâtre (Position No. 15).

On 19th, 6th Division Artillery Headquarters were eliminated and our Group came under 1st Division Artillery, who gave orders for the advance of 2nd and 5th (Army) Brigades, R.F.A., to positions whence to cover the crossing of the Oise Canal; 161st Brigade, R.F.A., was kept "in readiness." Group Headquarters was moving to Wassigny when a message was received from 6th Division Artillery that 2nd Brigade, R.F.A., was to pull out and rejoin 6th Division; this was not agreed to by 1st Division Artillery who were on the spot. The arrival of the message had caused Group Headquarters to remain in Vaux Andigny (where by now Headquarters 1st Division Artillery had established themselves); by a mischance, the (verbal) orders to 2nd and 5th (Army) Brigades, R.F.A., had miscarried (3); so no one moved though Position No. 16 had been reconnoitred. It was luckily of no importance that the orders had miscarried, for an immediate crossing of the Oise Canal was not contemplated; and early next morning 5th Army Brigade joined 1st Division Artillery, while, by 14.00 hrs. on 20th, 2nd Brigade,

R.F.A., was in IX Corps Reserve on its way to Becquigny. The battle line was at this moment, Oisy (French)—La Laurette—Reget (American).

Comments on Chapter IV.

(1) It would seem that if a unit advances in a battle of this nature, responsibility for touch between it and superior authority behind should be maintained from back to front. There was really insufficient personnel to lay and maintain communications within such a large Group after Group Headquarters had once advanced, though the utmost economy was observed. The mounted orderlies, too, were still unused to their new work.

(2) The conditions under which a soldier may disobey an order are (*a*) that he must believe himself to have such information as to enable him to appreciate the situation better than the issuer of the order can do; (*b*) that he cannot refer to the issuer at the moment, but that he must inform the latter at the earliest possible moment that the order has not been carried out; (*c*) that he must bear the responsibility for non-compliance. All these conditions were of course fulfilled in this instance; and it must be remembered that the original message was considerably mutilated. It has three times happened in the writer's experience that a battle-order has arrived which it seemed to the recipient should not be carried out; on the first occasion it was clearly impossible to do so owing to fresh conditions; on the second occasion the recipient was admitted by the issuer to have acted correctly; on this, third, occasion, the recipient was probably wrong—a solution to the problem has been already suggested.

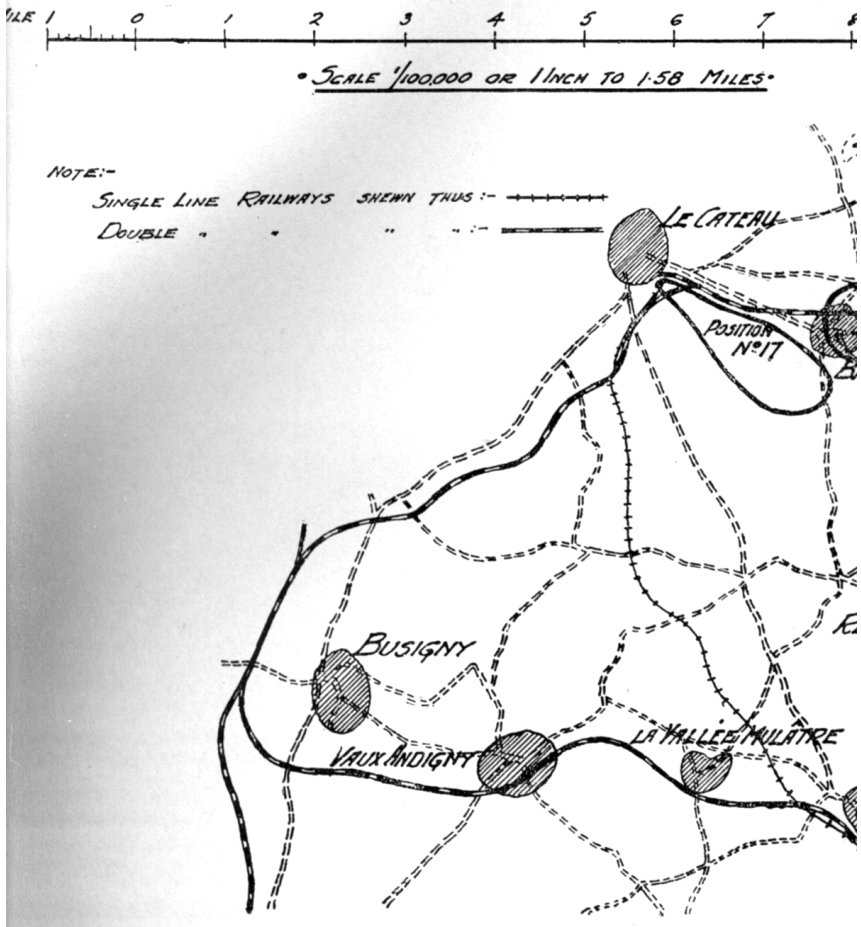
(3) There is surely no more fruitful source of trouble than verbal orders! It was perhaps the personality of two officers, hitherto unknown to one another, which brought about this miscarriage of orders; one must be thankful that the occasion was not more important. If the man who is carrying the verbal order has time to transmit it to paper (in his own interest), so has the issuer time to write the order. Indeed, with many personalities, it takes less time to write than to dictate an order, and their written orders are the best.

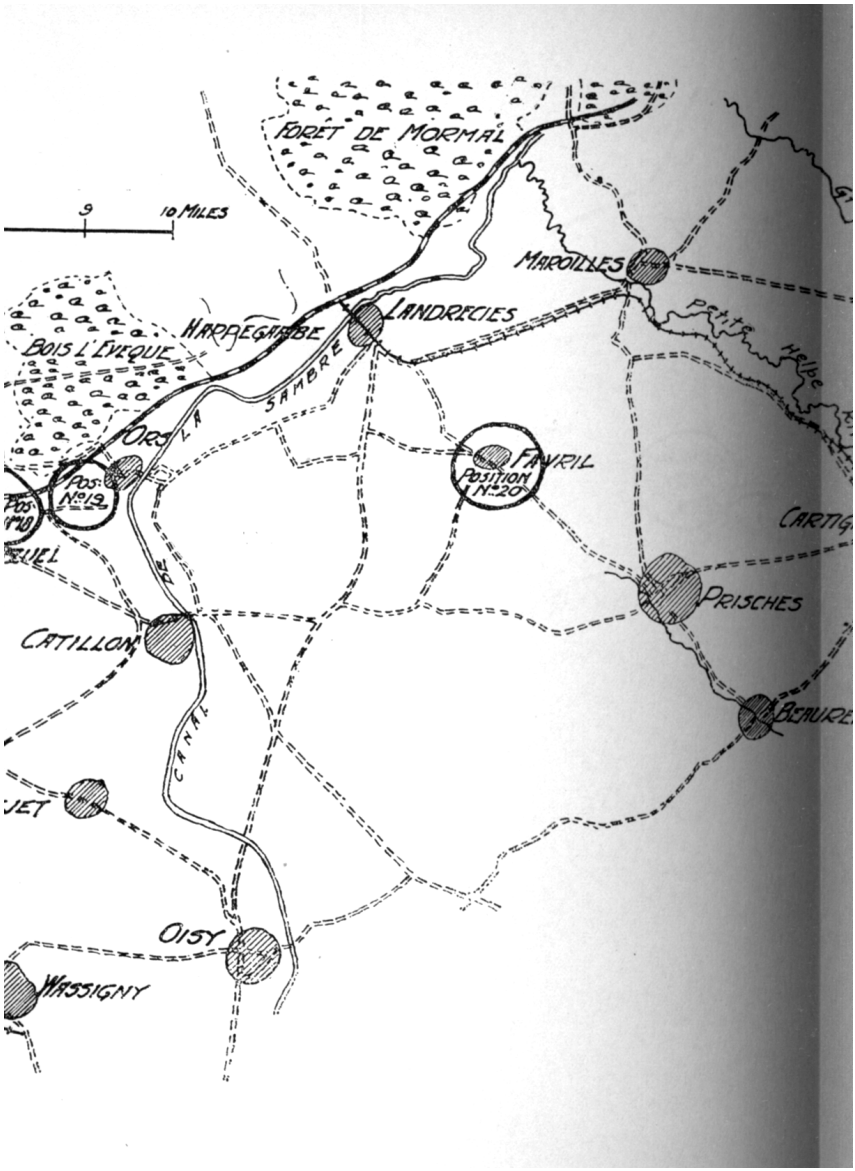
CHAPTER V. OCTOBER 21/ARMISTICE

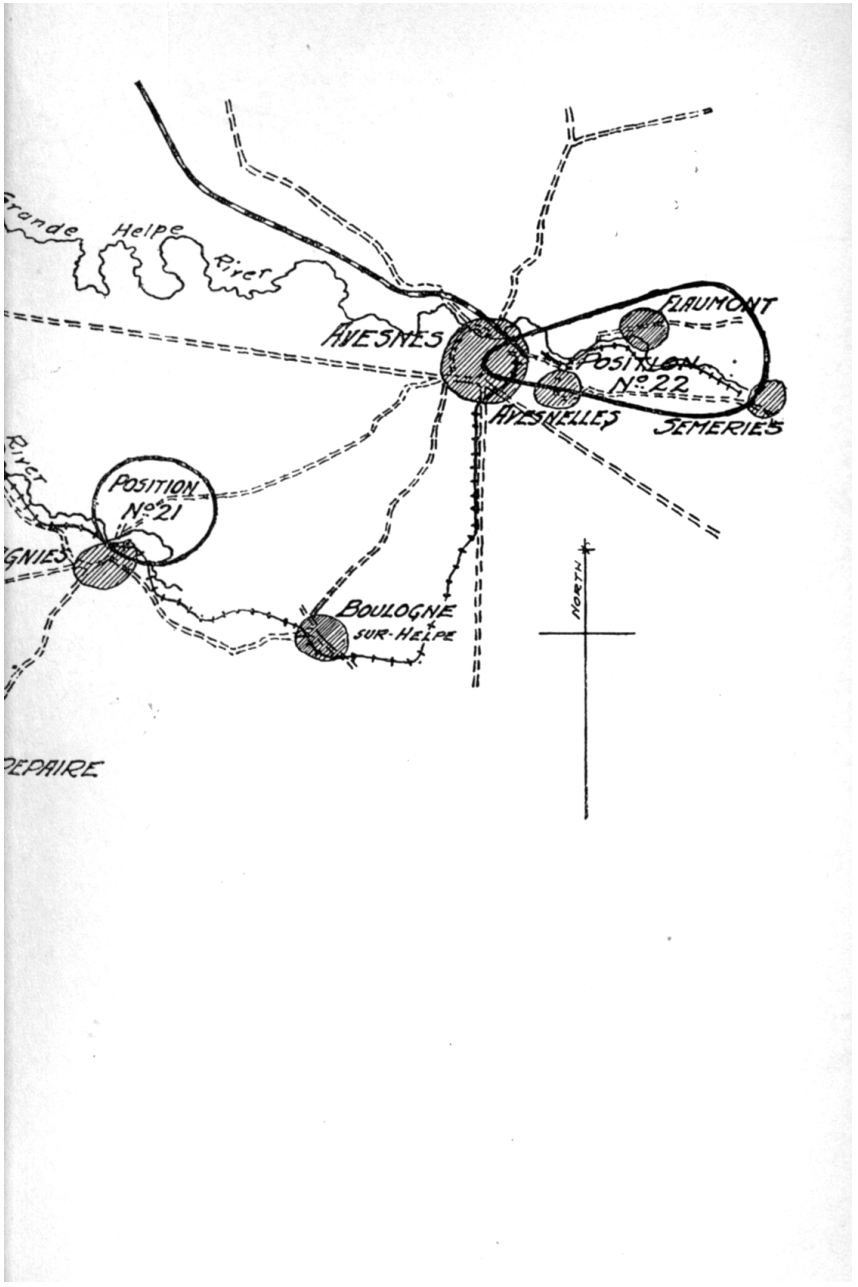
(See Map No. 4)

NOTE:—The following pages are based on a written record; the author of this article was called away on urgent private affairs and was therefore, unfortunately, not present during these, the last, actions of the war in which 2nd Brigade, R.F.A., participated.

• MAP No. 4 TO ILLUSTRATE PART II •




FORÊT DE MORMAL
9
10 MILES
MAROILLES
LANDRECIES
HARGNIES
BOIS L'EVEQUE
SAMBRE
ORS
LA
FAVRIL
POSITION No 20
POS. No 19
CARTIG
PRISCHES
CATILLON
CANAL
OISY
WASSIGNY


Grande Helpe River
AVESNES
FLAUMONT
POSITION No. 22
AVESNELLES
SEMERIES
River
POSITION No. 21
BOULOGNE SUR-HELPE
NORTH

The evening of Oct. 20th, found 2nd Brigade at rest in Becquigny, where we had a new and rather unexpected experience; for war had not passed through the country since autumn 1914, and some inhabitants resented its inconveniences—not so much the shells, of which they said philosophically "C'est la guerre," but rather that four years of warfare had taught all armies to get the greatest possible value out of any luxuries available—arm-chairs, for example.

On Oct. 22nd the Brigade Commander went on leave; on Oct. 23rd, 2nd Brigade, R.F.A., was called upon (unexpectedly) to relieve artillery 4th Australian Division. The positions were S. and W. of Bazuel, headquarters in Le Cateau (Position No. 17); batteries were at the call of 24th Brigade, R.F.A. A barrage was fired at 00.30 hrs. on Oct. 24th and the following night 2nd Brigade moved to positions N.E. of Bazuel (Position No. 18). On Oct. 30th, it participated in a successful minor operation W. of Landrecies. There was a lot of "harassing" on both sides during this period and batteries had rather a bad time.

On Oct. 31st, 2nd Brigade, R.F.A., became part of a Sub-group under O.C. 16th Brigade, R.H.A., the Group Commander being C.R.A. 4th Australian Division Artillery. On Nov. 2nd a minor operation was undertaken to secure a forming-up place (on the Happegarbe spur) for the general attack on Nov. 4th; a barrage was fired early in the morning and the attack succeeded, but at 09.00 hrs. a counter-attack developed; there was protective S.O.S. fire at frequent intervals during the morning, but by 15.30 hrs. the spur was lost.

Nov. 3rd produced an almost exact replica of the events of the previous day (1). The officer temporarily commanding 42nd Battery (its major was acting as Brigade Commander) was wounded. The shooting in connection with these two days' fighting had used up a deal of ammunition and it was a heavy task to collect the necessary dump (400 r.p.g.) by zero Nov. 4th.

During the last minutes before zero on 4th, 2nd Brigade, R.F.A., was taken out of the prearranged barrage to repeat its barrages[14] of Nov. 2nd and 3rd in support of 96th Infantry Brigade, who took the Happegarbe spur without trouble, *in their stride* (1). Things were not very easy on the left, where 14th Infantry Brigade found difficulty in crossing the Canal about Ors owing to enemy machine-guns, whose activity formed the principal feature of this battle. At 09.05 hrs. the main barrage had to be brought back to meet this condition. The opposition was eventually overcome by moving troops (already across the Canal) northwards along the eastern

[14] The fifteenth organized barrage since September 17th.

bank. At 13.45 hrs. "Stop Firing" was ordered and the Brigade Commander went forward to reconnoitre; there was still, however, trouble coming from enemy machine-guns passed by our troops in the advance, and it was 16.30 hrs. before the batteries of 2nd Brigade were advancing (to Position No. 19). At 19.00 hrs. 2nd Brigade was placed under 161st Brigade, R.F.A., which was already across the Canal at Ors, and there was a prospect of having to support exploitation on Nov. 5th. But the enemy retired, and some harassing of his line of retreat during the night were the last rounds of the war fired by 2nd Brigade, R.F.A.

On Nov. 5th, the Brigade crossed the Canal and came into "observation" about Favril (Position No. 20); it crossed the River Petite Helpe on Nov. 7th and was again "in observation" (Position No. 21). There was to have been a barrage on Nov. 8th, but the enemy had again retired.

On Nov. 9th, 2nd Brigade, R.F.A., was disposed E. of Avesnes (Position No. 22) with the enemy some 8–10 kilometres distant; the Brigade Commander returned from leave[15] in time to order the last advance on November 10th. There were no squared maps of the country in which we were now fighting, but we never came nearer to battle after Nov. 10th than "positions of readiness." The remarkable features of the period covered by Chapter V were (*a*) enemy use of delay-action mines (2), (*b*) the able handling of his machine-guns, and (*c*) the bad weather, one result of which was that, in the last battle-position occupied, 2nd Brigade, R.F.A., was split in two by an unfordable river; one had to go back into Avesnes. All things considered, casualties in this fortnight's advance had been fairly heavy—1 officer, 20 O.R., and 34 horses.

On Nov. 11th came the Armistice; at 10.59 hrs. the not-yet-completely-conquered, -in-defense-of-his-Fatherland-so-brave, -but-now-with-Republican-Ideas-imbued, German machine-gun-man, fired his last belt, took off his helmet, bowed, and walked away; the psychological effect on the soldiery of this sudden peace is tempting to discuss, but too ambitious for the author. Also it has nothing to do with field artillery tactics.

Comments on Chapter V.

(1) There are some positions in battle, as in Life, which one cannot occupy without going straight on; one must "either go on or go back." Such a one was the Happegarbe spur; another was Trones

[15] Methods of transit were many and various at such times; on this occasion they included, besides the usual lorry-jumping, a journey on the footboard of a pilot-engine testing a stretch of railway-line for mines, and a motor-car drive with the Army Commander at the wheel!

Wood on the Somme, which lay in an enemy re-entrant, and which was attacked and occupied half-a-dozen times between 7th and 13th July, 1916, by 30th and 18th Divisions in succession, before finally passing into our hands when the whole IV. Army line advanced on 14th.

(2) The effect of delay-action mines was more strategical than tactical, for it interfered principally with the supply system; one cannot feed huge armies by hand or by aeroplane during the advance. The railway-lines about Avesnes were freely adorned with these instruments of war; every road-culvert, if not already destroyed, was probably mined; even if it was already blown up, there might be another explosion impending. These mines kept going off for long after the fighting was over, which caused great delay during the advance to the Rhine; they would perhaps have prevented pursuit, if the fighting had continued; may they even have influenced the decision to grant an Armistice? It would be interesting to know the date on which the last mine exploded, and the date, too, on which the last was timed to go off had not enemy representatives arrived to disclose them.

* * * * * * *

PART III

SUMMARY

The Transformations of War

NOTE:—In the following pages, the writer has endeavored to confine himself to a few deductions from the events recorded in Parts I and II, and to interweave these lessons with the military tendencies of today; and this briefly. He has not forgotten the financial side of the question—the cost of changing armaments; but when a national crisis arrives, money gets freely spent to secure victory; nor has finality been reached in the development of the tank or the heavy gun.

A. THE INFLUENCE OF ARTILLERY UPON THE BATTLE AND THE FUNCTION OF FIELD ARTILLERY IN PARTICULAR

Throughout the 58 days' fighting recorded, the function of the Field Artillery was almost entirely protective, *i.e.*, the creeping barrage to cover the infantry during advance and the defensive S.O.S. barrage. There may at times have been some pushing forward of sections with the infantry for offensive tasks; there was harassing (and a little sniping) fire; generally speaking, the offensive

duties were still performed by the heavier armament, though of course the duty of exploitation did to a certain extent increase the importance of field artillery support. In war-time, the cry has always been, and probably will always be, for a further-shooting, harder-hitting, and more reliable weapon than the enemy has got; hence the fifteen-inch howitzer and the tank, hence the battleship, hence the Zeppelin and the Handley-Page. The answer to the demand is governed largely by what the nation can produce or purchase and by the nature of the theatre of operations. It has happened that armament has become so heavy as to render its possessor defenseless through immobility; *viz.*, the armored knights of the Middle Ages and the heavy fighting ships of the Armada; it was not quite the same thing in the case of the battleship, because of the invention of the torpedo; otherwise, too, with the surrender of the Zeppelin to the aeroplane.

On the Western Front was a maximum of productivity plus purchasing power and a minimum of natural obstacles, so that the influence of auxiliaries (artillery and tanks) dominated at times that of infantry power. Frontages of offensive were chosen by the Allies (from fairly early in the war), according to where the attacker could produce the greatest artillery power with the maximum surprise; the objectives were sometimes limited or arranged according to where the attacking artillery could support, or the defending artillery could not produce its full effect upon, the attacking infantry; the Germans endeavored to extend their objectives to the capture of the defending gun-line. At the end of the war, the appearance of the tank affected, decisively no doubt, the course of the war. On only one occasion in the latter part of the war on the Western Front did a combatant rely primarily on his infantry to achieve his object—*i.e.*, when the Germans practiced on us in the spring of 1918 the tactics already tried and approved at Riga; but then the Germans had no tanks.

The last thing the writer wants to suggest is that, even under the most favorable conditions, heavy armament (guns or armor), or new inventions, do anything but modify war—though, of course, as in the case of gas and tanks, their influence is temporarily enormous; success must depend on national character, training, and resources. He does not hold that the basis of any army will ever be other than well-trained infantry, even if "mopping-up" (netto-yage), and the act of occupation, become at times its chief functions.

Away from the Western Front, the story was rather a different one. There were no tanks and few heavy guns. In rough countries, whose roughness is due to terrain or the uncivilized nature of the inhabitants, offensive duties no doubt did, and probably again will,

fall to the lot of field artillery, which can generally be landed and used with *some* form of traction.

Warfare reached its highest (or lowest?) development on the Western Front *after an extended period of training and improvement*. There it would seem that the centre of the battlefield was a wall of fire, against or behind which the infantry moved, and which was created by the lighter guns, which we can group under the name "field artillery," but much of which was manned in our Army by the misnamed Royal Garrison Artillery. People say the "Creeper" was the outcome of stationary warfare; that it will not be feasible in a war of movement; that it will be replaced by "Concentrations," though this form of artillery fire needs as much control as does the organization of a creeping barrage. No doubt there will be a period of movement early in any future war—*though not necessarily at once,* for, is it not conceivable that the initial conditions following mobilization may necessitate a preliminary period of position warfare *on the land front?* one must remember also that a single night's work digging goes far to produce a battle of position. In the humble opinion of the writer, we shall do well to expect that infantry will demand some form of "wall of fire," both in attack and defense; but he admits that in a war of movement the supply of the necessary ammunition to provide this wall will be the difficulty, as it is also the principal argument for the maintenance of what we now call field artillery, because of the cheapness, ease of manufacture, and portability of the field artillery shell. Obviously, the heavier the armament, the less density will the wall of fire have, not only because of the increased difficulty in provision of ammunition on the battlefield, but also because of the increased physical exertion on the part of the gun detachments.

If one could easily move thirty-inch howitzers, their platforms, and their ammunition, and afford and carry an unlimited amount of both, would there be anything to prevent the entire armament of an army being thus composed? each weapon, for security hence for reliability, in its own steel fortress. But here we enter dreamland; nevertheless "If you can dream yet not make dreams your master . . . ."

A tank containing a field artillery gun is with us, the real object of the tank being reliability by securing the personnel and equipment from destruction. Surely this combination of gun, shield, and power of movement, may one day provide a possible solution of the problem of the "infantry gun"? the object of which is to provide attacking infantry with an artillery weapon for immediate assistance wherever they go. Note the old cry for a heavier weapon than the enemy's rifle or machine-gun! It is worth consideration whether some pack artillery of howitzer type should not be provided to form a reserve

to the close-supporting weapons, to remain "in readiness" at direct disposal of infantry commanders on the spot. Defensively thinking, infantry will need support against the attacker's tanks; that support is not likely to be supplied by field artillery as we know it, or knew it yesterday, but rather by armored anti-armor guns—*viz.*, another form of tank, possibly firing fore and aft. One should not, however, forget that a moving tank provides a poor platform for a gun, which puts it at the same disadvantage against a stationary weapon, which the ship-gun suffers as compared with the coast defense weapon.

The deduction would appear to be that 18-pr. (or 75 mm.) armed field artillery (organized in batteries) will give place to tanks[16] in front (attached to infantry formations) and to heavier, probably mechanically-drawn, and perhaps armored, weapons behind—their size being limited by (i) the feasibility of providing (in the field) enough ammunition to create the wall of fire, (ii) the question of movable platforms or possibility of their use on the natural surface of the ground.

B. MECHANICAL TRACTION AND HORSE DRAUGHT

There is no deed recorded in these pages which could not have been equally well performed by a reliable tractor—the terrain was, in fact, particularly easy to negotiate. Nor is there anything to show that substitution of mechanical traction for horse draught would have been an advantage. The writer cannot see that the arrival of the tractor will alter field artillery tactics. But of course this is not the last word to be spoken on the subject.

Can a tractor go where a team of six horses can? Bad weather, causing boggy ground or a greasy surface, obviously gives preference to horse draught; steep mountain tracks, such as we had on the High Veldt in the Transvaal, call for the tractor; experiment will decide this point.

Will the tractor be able to get away after unlimbering as quickly as a six-horse team? Was there any necessity for such quickness on (say) the Western Front? One thinks of a tournament display by a well-trained horse artillery battery—of "Saving the guns at Maiwand"; but under close-range fire of the modern machine-gun or the Q.F., both team and tractor would probably come to grief. It is possible that some of the dash in limbering-up and unlimbering came under the head of showing-off; the practical utility thereof, some people might say, was based on an attractive hypothesis. Demonstrations of quick and perfect drill are useful if superimposed

[16] Subject, of course, to the far-reaching proviso that a suitable type of tank is evolved.

on efficiency; there exists a danger of their becoming a substitute for it, and it is interesting to note that a common complaint today amongst German ex-officers (*of other arms*) is that their field artillery posed as cavalry rather than as gunners.

But there is one result of the change possible, which is far more interesting. The cry in peace-time is always for mobility, as it is in war-time for weight—at least it always has been throughout the writer's military life and studies. It is the old struggle of weight *vs*. mobility, comparable to that between the gun and armor in the Navies of the World. Now that we have the tractor, *we shall not be limited by the weight* which can be drawn by six horses (as much are convenient to manage at a trot); the supporters of mobility will be deprived of their chief argument. So far as the possibility to draw it is concerned, the field gun of the future may be a considerably heavier weapon, from which the conclusion seems again to present itself that the 18-pr. and its opposite numbers will disappear before the heaviest gun that can be emplaced and moved about at a slow pace on the battlefield.

Some of us must naturally regret this, but progress demands a certain sacrifice from tradition. In such a question sentiment carries no weight. For a time finance will say its powerful word, but another day of stress will surely come. Small wars must be considered, but will there be any conditions in which it is possible to use the horse-drawn field-gun and feed the horses, when it is impossible to use and supply an improved tractor?

C. CONTROL AND COMMUNICATIONS

Again to re-quote the precept given in a lecture on Artillery at Camberley—"guns must be controlled, but the principle of control is subordinate to that of coöperation." The practice is harder than the precept, unless you evade the problem by saying that control is a means to coöperation.

Against a brave, highly-trained, well-armed, enemy, advance is no easy matter; either you must conceal yourself or provide yourself with armor as impenetrable as will still permit of movement. The 18-pr. of 1918 was not suitable for such an advance; the tank of today possesses the elements of suitability. The object of decentralization (or decontrol) is more immediate coöperation, and there is, one would think, no reason why the latter should not be attainable by means of the tank.

It is otherwise with the "wall of fire" which forms the main obstacle to preservation of life in a modern pitched battle; this wall needs organization before, and some control during, its period of existence; so do "concentrations" on selected localities. On the

Western Front the battle-line was continuous, no portion independent of events to either flank—another reason for control. Leaving aside consideration of war against an untrained enemy, it was a favorite theme of the present writer (before the war) that a battle of encounter would begin, as regards artillery, with decentralization; but as the battle stabilized, decentralization would give place to control, which would not disappear until one side retreated; decentralization, of course, in the pursuit. But we had no battles of encounter or pursuits after the first few weeks; it was only at the very end that, on the Western Front, regimental commanders began to have responsibility other than as regards organization and administration; the artillery was always controlled.

How can a commander control on a modern battlefield without artificial communications? They are the very essence of management of artillery other than armored guns accompanying the infantry. No doubt the heavier artillery suffered at times from failure of communications, but it was generally outside the zone of *constant* breaks, and it was less often on the move. There is no more desperate case than that of a field artillery commander, whose group is close up to the line and dispersed over a wide area, when he is asked to bring fire to bear here and there in a moving battle; the infantry, long accustomed to trench-warfare conditions (the principle of which was for field artillery buried lines), hardly seemed to appreciate this; it is for that reason that the writer has laid so much stress on the early location of combined infantry and artillery battle headquarters. It will probably be admitted that heavy guns are usually disposed in an area where mounted orderlies can be maintained; even visual is often possible; neither of these means are generally available for the advanced artillery elements. The training manuals grant that infantry once launched is out of control, but really it is the same with field artillery, especially on the defense or during a not perfectly successful attack.

The solution would appear to lie in the direction of wireless, *especially for field artillery*, which is generally long enough in each position to make it worth while to put up a wireless installation. It is not suggested that this is an easy solution; a great deal of experience, technical improvement, and training, is required; but it seems to the writer that in this direction there is hope for solution of the problem. The problem should be more easily solved the further the guns are back from the zone of smoke and close-range fire; *i.e.*, if the function of close support devolves on tanks, and that of the wall of fire on field artillery armed with a heavier and longer-ranged weapon.

FIELD ARTILLERY GROUP IN THE GENERAL ADVANCE

D. DISPOSITION OF FIELD ARTILLERY ON THE OFFENSIVE

In Part III of the previous article ("F. A. Group in Retreat"), the writer recounted nine conditions governing good support by artillery; he begs leave to repeat them here:

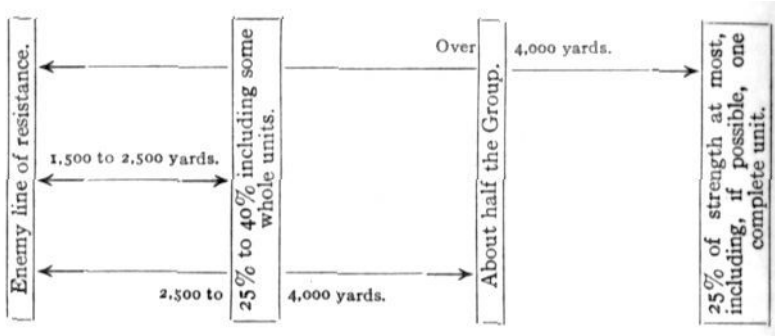
1. A good system of command. *N. B.* The splitting up of a Brigade staff to command a large Group militates against this first condition, unavoidable though it may be.
2. Good distribution. Suitability to the most probable course of the battle. Think also of the possibility of counter-attack. What is afoot to either flank of your area? Reconnoitre advanced and alternative positions.
3. Mobility. Concealed approach and easy exit.
4. Good observation. This includes arrangements against alarm by day or night. It is an essential, especially on the defensive (even if only temporary).
5. Good liaison—with superior authority as well as with units of the Group—with the infantry, ça va sans dire—with any heavy artillery units in the neighborhood.

   It includes the collection and sifting of information from all available sources. It is the duty of every unit in an army to keep touch with its neighbors.
6. Good communications.
7. Safety and comfort of personnel, including that of wagon-lines. Camouflage. Enemy gas. Rations.
8. Good gunnery. Sights tested daily. Care of ammunition.
9. Good equipment, well maintained. Good relations with representatives of the Mobile Workshops.

It is a platitude to observe that the general offensive may easily turn for a time into the local defensive. In the latter days of March, 1918, it did not seem to us that we were in position to do much counter-attacking, but counter-attacks do take place even when troops are hard pressed—the battle of Guise, for example, in 1914; it is just a question of reserves. One is not in a position to know whether the enemy is hard pressed, when he is fighting about a long-prepared defensive line of great strength; in Part I of this paper, it was a question of the approach to an as yet unpunctured fortress. A group commander must bear in mind the possibility of such a contingency, to meet which his batteries must be dispersed in depth—and this holds good whatever the nature of the guns composing the group armament. Positions suitable to the close support of an attack in the open do not perhaps suit when it is a case of attacking an enemy holding advanced posts in front of a main position. The old-fashioned *very close* support is indeed rarely possible under modern conditions; the flat trajectory of the field gun of today

renders it difficult; the mobile trench mortar was used with good effect in the great German offensive, a thing which we might have done well to imitate.

The writer suggests that about 25 per cent. of the Group should start the action close up, so that it can continue to have efficient range for a proportionably long time; and that (say) 25 per cent., starting at a longish range, should be kept ready to move at once. Diagrammatically put:



If there is a serious hold-up which shows signs of lasting through the night or longer, it would seem best to re-dispose the Group forthwith, so that it can fire an efficient S.O.S. defensive barrage, even if a few guns have to be withdrawn; the idea that the sight of artillery withdrawing (at leisure) will alarm the infantry is an insult to the latter; it comes down to us from a past century. (There are of course exceptional cases.)

Change of position in the advance is not altogether the same as change in position during the retirement. In the latter case, it is certain one will have to fight on the new position—probably at once; in the writer's opinion, as expressed in the former article, it is better to send back one section per battery to "warm" the new position—*i.e.*, to make such arrangements as will ensure that effective fire can be opened from it at the earliest possible moment. One can pursue the same method in the slow advance on a limited objective. But where there is a possibility that the enemy may break, it is easier to achieve efficiency quickly; moral is at its height; there may be no need for concealment at all—flash cover at any rate need not be so carefully studied; one wants the most efficient fire-unit on the new position as early as possible, and the most efficient fire-unit is the whole battery. The advance, therefore, seems better carried out by the whole batteries within each brigade.

Even in the only-half-open warfare of the last days of the war, the need of reconnoitring the country in front of them while still in action, of choosing new positions against time, and of "shooting

themselves in" quickly on arrival thereat, discovered weak points in the military ability of many a battery commander, who had reached his post in slower times. Many officers got quickly used to the new conditions; but a brigade commander with a real talent for the work was a jewel of great price. It can be taught; the map at home, then visiting the ground itself. The brigade commander alone (in most cases) can decide, by means of his intelligence service, the moment to advance, but he cannot do more than indicate the valley (or other area) where the new position is to be; the niceties of choice must be left to the battery commander, as well as local security. Indeed, the writer himself made a principle of never laying down the *exact* position for a battery, except very rarely when an officer was temporarily in command, of whose judgment he was uncertain; suggestion is quite a different matter.

It might not be out of place here to remark that in the advance the wagon-lines are often far behind; the supply of ammunition under such circumstances gives hard work, and the unit commanders get no opportunity to visit the unit "homes from home"; administration must not be forgotten.

E. OBSERVATION

It is true that the principal duty of field artillery in the latter part of the war was the Creeping Barrage, fired off the map. Nevertheless, good observation is an essential for support to the infantry. Terrain has a great deal to say; it was easier in Picardy or Artois than in Flanders; ground observation is, however, *always difficult to obtain in satisfactory measure*. On the whole, it is easier when the battle moves; there is less hostile fire, except at certain periods, when indeed all observation fails owing to the smoke of the battlefield; what hostile fire there is, is directed chiefly against infantry masses and main roads; when directed at likely O.P's., it is neither so well considered, nor so well registered. Again, our F.O.O. finds more obvious targets.

With all this, there remains the bugbear of communications; and that the battle has a way of becoming important at just that point which one cannot see.

One's thoughts fly to the air. The Heavy Artillery of course had the advantage over the R.F.A., with their Observation planes working for the counter-battery officer, and their "Sausage" balloons. It is not likely that field batteries will obtain the services of many planes; perhaps not a very great deal is to be expected of air observers as regards small-calibre shells. One of the best-known of Ole Lukoi's stories in "The Green Curve" is based on the doings of a kite attached to a Field Artillery Group Headquarters; it really seems as if more might have been attempted in this direction

during a war of new inventions; for use of the kite rids us at once of two great difficulties—one can see all the ground and one gets immediate and direct information of what the observer has seen. But, indeed, the writer has no personal experience of kite-work; or perhaps he would not have lived thus to trouble the reader.

F. SEPARATION OF HEAVY AND FIELD ARTILLERY

About 1896 the Regiment was split into "Horse and Field" and "Garrison," which event was (the writer believes) the occasion for the publication of Captain Cleeve's never-to-be-forgotten "Creed." Presumably, what was in the minds of the then Authorities, was Training. It was, and has been ever since, a subject of controversy. The writer can only quote his experience as a General Staff Officer not higher than in a Division and as a Field Artillery Commander; this limited experience has produced in his mind two arguments *for* amalgamation and none against it. These two arguments are, (i) inexperience by each branch of the other's limitations and capabilities, of its "conditions of efficiency," so to speak; and (ii) a certain rivalry, due—shall we say?—to competition for the good opinion of the Infantry (equally revered by both branches), but often misunderstood by the latter, especially when they find themselves obliged to deal with two separate artillery authorities. The two branches are really one, wherever it concerns weapons which can move with reasonable ease over the battlefield; in the writer's opinion, they are now more than ever likely to have the same sort of work. Whatever be the final decision of the Authorities of Today (or the Future?), one would think it should not be influenced by such a thing as temporary inconvenience in the adjustment of personnel. It is, however, much easier to generalize on such a point than to make a responsible decision, and the writer craves pardon for his generalization.

G. NEW DEVICES OF WAR AND THE STAGE OF DEVELOPMENT REACHED BY THEM IN AUTUMN, 1918

Briefly to summarize these developments as illustrated by the narrative in the foregoing pages.

In doing so we must remember that 6th Division was not engaged at decisive point; that is to say, it was not a spear-head; its importance lay rather in its proximity to our Allies.

We will take first the Creeping Barrage (the story of whose development would fill many pages), as being the one thing which maintained the importance of the British field artillery to the very end of the war. The Germans had rather neglected their field guns; they had been used for some time past for plastering our area

with mustard gas, but played a fairly important rôle (in sections) during the retirement; in the German army, during the last half of the war, field artillery seemed scarcely a first-class arm. The French field artillery maintained its influence, at any rate in part, by the national sentiment towards the soixante-quinze. We see in these pages (Sept. 19, 24, 30, Oct. 9 and 18, Nov. 4) that the "drill" of the Creeper was understood in our army; that a barrage could be fired with only the briefest instructions at short notice, provided the ammunition was available—provided also that the Infantry would give way as regards their line of departure. Registration was hardly ever thought of in these days; lack of range was what most hampered us—compare the ease of the task of the French "75" group on Sept. 30. There was a development at the end, however; the period of limited objectives was dying; there was now exploitation and, in the absence of heavier guns, exploitation demanded from the field artillery offensive action as well as the protective duty of the Creeper; in fact, movement increased the importance of field artillery in *all* armies. The writer believes that the Creeping Barrage has come to stay (in some form); what is really against it as a device of war is the amount of ammunition it uses.

The writer had little to do with the Heavy Artillery during this period—not nearly so much as during the German spring offensive or the summer's defensive about Ypres. A Heavy Artillery Brigade was now more or less an integral part (nominally "attached") of each Divisional Artillery; we knew it could move almost as easily as the field artillery; in other words, a portion of the Heavy Artillery had become heavy field artillery. It kept improving in what was perhaps its primary duty, counter-battery work, in which the field artillery (4.5 inch howitzers) lent an occasional hand—but the latter needed practice in this department, as well as longer range, and perhaps also more attention to platforms. The development of heavy artillery was surely one of the important things of the war? Heavy artillery seems to be a weapon of the future, whereas field artillery may be one of the past; why else did the peace treaty (Treaty of Versailles) abolish the German Heavy Artillery?

What was *our* experience of Tanks? We had participated in a tank attack on a grand scale at Cambrai in November, 1917, on which occasion it had seemed that the creeping barrage might almost have been dispensed with as regards man-killing projectiles; such an attack demands (*a*) surprise as regards concentration of the tanks, (*b*) smoke to screen the advance—a field artillery duty, (*c*) good counter-battery work to knock out what the enemy may use as anti-tank weapons. In the period covered by this narrative, tanks,

in small numbers only, had on two occasions (Sept. 18 and 24) supported attacks on the Quadrilateral, which became a tank cemetery, and was eventually captured by infantry unaided. Some whippets were told off to assist W. Yorks Regiment on Oct. 8, but were knocked out; the task was performed by infantry with the assistance of field artillery using some smoke. Tanks failed again to assist 71st Infantry Brigade on Oct. 11. When we came up against waterways (Sept. 29, Oct. 20, and Nov. 4) we had of course to do without their help, whatever the tank of the future may be capable of. The prospective use of tanks as close-supporting artillery will call for much technical development; and the problem of coöperation between these tanks and the infantry they are supporting, is not so simple as it looks. But improvements will come with time and training; it certainly seems to the writer that in this direction we may expect novelties; and if tanks are to provide the close-supporting artillery of the future, let us hope the Royal Regiment will get its just share in the development of this new arm.

Little has been said here about Gas and Smoke. We used mustard gas for the first time on Sept. 29, but one knows nothing of its success or otherwise, for it was against an area which we were not to occupy. Altogether, in our experience, the use of gas was generally limited to "harassing" in between our own, or in assistance to our neighbors, attacks. The writer remarked in his previous (The Group in Retirement) paper that a suitable opportunity for the use of gas was against the enemy's area of assembly, and we had a good example of this when the Germans used gas shells with effect against the assembly of 18th Infantry Brigade about Vaux Andigny on the night of Oct. 16/17. Captain Lefebure in his "Riddle of the Rhine" suggests its use as an anti-aircraft weapon. There was much talk of Smoke, but the ammunition was not always available. Everyone must have seen for himself how smoke blears the battlefield; at the moment when one is attacking, everything which makes for ease in obtaining and communicating information is demanded, even though such conditions may also help the enemy; it is notorious that the use of smoke interfered with the counter-battery service. One would deduce that the use of smoke should be confined to certain definite occasions. With both gas and smoke climatic conditions have the last say, and the use of either must often be left to the initiative of the responsible commander on the spot at the last moment.

Now for the Air—and here indeed is an occasion for the Dreamer! Who can tell what the future may bring? Let us confine ourselves to the period covered by this narrative. Enemy aircraft was, so far as we could judge, chiefly employed in bombing (*a*) depressions in our forward area—against personnel, (*b*) roads,

bridges, wagon-lines, and probable rest camps—principally against our supply system; and that chiefly at night, and very well carried out. Our aircraft was presumably engaged in photography, the counter-battery service, and bombing raids. The development of aeronautics has re-introduced the artillery duel, in which "God is on the side of the strongest Artillery"; the attacking artillery is presumably the strongest at the moment of attack; good air-work therefore assists the attacker and should continue to do so until someone invents a satisfactory anti-aircraft weapon, device, or method. If a good anti-aircraft gun is forthcoming, one may expect to see one in the equipment of, at least, every brigade of field artillery; pending that day we must pay all possible attention to camouflage and the protection of personnel. May not artillery have to play a part in the development of air-fighting also, as in that of tanks?

A few other points. Scientific calibration in a back area, combined with training and experience on the part of our personnel, enabled us to fire unregistered, which made us more than ever dependent on accurate maps, which in turn demanded from battery commanders accurate resection of their positions; note that squared large-scale maps began to fail us in the last days. The unregistered barrage allowed of surprise as regards the actual moment of attack and the actual target of the spear-head; serious wire could be dealt with by tanks—though, as late as Oct. 13, 1918, there was talk of cutting new-found wire with field guns. The enemy was on the move, and *at last being pressed all along the line;* he had no time to continue his scientific development of the defensive on a limited front against a limited-objective attack, as exemplified during the three and one-half months of the Battle of Flanders (or Passchendaele). Counter-battery work had reached a very high standard. Machine-guns had taken up barrage duties in assistance of the field artillery, as well as offensive duties in support of exploitation; but to the very end we had not yet solved the problem of how to deal with enemy machine-guns on defense. We had not conspicuously developed high-angle short-range fire for close. support, as could possibly have been provided by mobile trench-mortars.

H. TRAINING AND PERSONALITY OF JUNIOR OFFICERS, AS WELL AS NONCOMMISSIONED OFFICERS, OF THE R.F.A.

As the writer is probably at the end of a long, and by him treasured, connection with the Royal Regiment, he may perhaps be forgiven for uttering the following platitudes.

We have first to deal with professional soldiers. First-class war has taken, so to speak, a turn towards mechanics; whereas we needed a young officer or noncommissioned officer to ride well and be a

horse-master, we now require him to manage a car and to fly. The shooting of a battery and care of the section gun-park, as understood when the writer was a subaltern, is a very different thing from the intricate business of today, which requires expert knowledge of equipment (recuperators, etc.), communication-means (wireless), ballistics, and the management of explosives under varying climatic conditions—to mention only four branches of an officer's work. It was suggested in the *R. A. Journal* some time back that an artillery officer should be capable of acting as "traveller" for armament firms, should be able to show off equipment. More recently an officer wrote an article recommending that the captain should be responsible for the whole equipment of a battery and should not be permitted to reach that rank without passing a course in the "Shops," nor be promoted until he could properly perform his duties.[17] All this shows a tendency to specialized professionalism and to making a Gunner officer what other arms have long believed him to be—a "scientific" man. The writer's recent experience on the Continent was that in the French and German Armies, he is already that to some extent; the French president of the Inter-Allied Commission of Control expressed surprise that a regular artillery officer of considerable seniority had had no factory experience; a very leading German manufacturer of war material, on hearing that the writer was a regular artillery officer, remarked "Das 1st Schon Etwas" and proceeded forthwith into the realm of advanced science. It seems worth noting as a tendency with regard to the training of the future officer or noncommissioned officer. To go to simpler and quite old-time ideas much might be done (as regards the Regular R.F.A.) in (*a*) training officers in the tactical handling of a Group first on maps indoors, then visiting the ground, (*b*) better umpiring of Group and Battery *Tactics* at manœuvres, (*c*) training young noncommissioned officers and recruits by the use of single guns and percussion shells on selected spots close to barracks; these are the writer's—fads?

But practical experience steps in to show us that after a short, all too short, period of first-class war, we no longer have with us our complement of regulars. There is one constant change of personnel in process. Now some men's characters are obvious at short acquaintance, but in far more cases character appears like the dim outline of a mountain behind the morning's mist; only with acquaintance, as with sunlight, does the mist roll back and disclose some, at any rate, of the truth. It is generally admitted that the art of command

[17] During the last few years, the writer has been working with a number of ex-I.O.M.'s, some of whose criticisms of our care for our equipment (in the gun-line) were more illuminating than complimentary.

lies largely in putting the right man in the right place; the study of character is a chief duty of a senior regimental officer; there are other ways of dealing with an apparent "failure" than merely returning him to the base. This leads to the platitude that the commander must be constantly in touch with the personnel under him and must form an opinion for himself of each man—a most difficult thing for a man to do, if not imbued with a sense of the superiority of his own mentality, or who does not hold that seniority is the principal basis of authority; it *should* be so, but only is, when an officer has throughout his service set himself to acquire the knowledge which gives that authority. The writer wishes not to be sententious—it is this way: if the commanding officer does not seek out his new officers, it is very unlikely that they will jostle over one another to seek him. Whatever the conditions in battle or at rest, whatever its seeming disadvantages—such as personal fatigue when all your mental power is required in the headquarter office—such as apparent waste of time—*never neglect the daily visit* to each unit under your command.

(*Conclusion*.)

THE GERMAN AMMUNITION PROBLEM* IN 1914

BY C. H. MORGAN, MEMBER A. O. A.

NUMEROUS studies have been made in the last few years of the American ammunition problem. The most thorough study was that of the Munitions Board, which was appointed in 1919 to fix definitely the amounts of ammunition in the various calibres that should be held as a special war reserve to meet the needs of this country in case of war until new ammunition resulting from war contracts could reach the front. The Munitions Board made a very complete study of the problem and fixed a minimum amount of ammunition in each calibre that should be retained as a war reserve. In addition where a surplus stock of ammunition was on hand, they fixed an amount which should be held to meet current requirements during the probable life of the ammunition.

In general, previous studies of this question have been based on the experience of the American and of the Allied armies during the latter years of the World War. During this period the fighting was mainly from fixed positions and the rate of fire per gun was very high. In marked contrast to this high rate was the expenditure of ammunition during the year 1914. Accurate figures are now available as to the amount of ammunition on hand with the German Army at the outbreak of the war. These figures were recently obtained from a study of the confidential archives by Lieutenant Colonel Krueger, of the General Staff.

On January 6, 1912, General Von Moltke, Chief of the General Staff of the German Army, fixed the war reserve of the field artillery ammunition at 1200 rounds per gun, and wrote to the Ministry of War on that date as follows: "I can only welcome the intention of the War Ministry to continue the development of the ammunition reserve of the field artillery to such a point that for every single gun there will be a total of 1200 rounds available. The figure of 1200 rounds seems to me absolutely necessary in view of the small amount of ammunition which, as I now hear, and in spite of all our efforts, can be manufactured after the proclamation of mobilization, I must ask that that figure be reached as soon as possible."

General Von Moltke did not neglect the needs of the heavy artillery. On October 11, 1911, the following memorandum was sent to the War Ministry: "I have always realized that the heavy artillery of the field army is in a better position than the field artillery, though

* Reprint from *Army Ordnance* for Jan.-Feb., 1923.

it is not as good as I had assumed . . . If we draw on the stocks of the siege artillery, including the supplies of the fortresses, there will certainly be no shortage of ammunition for the heavy artillery of the field army. But there will still be the question how, with the supply of ammunition available, we shall be able simultaneously to carry on sieges, the rapid conclusion of which must also be the object of speedy operations." It is apparent that in the early days of the war the German army did draw on the reserve ammunition supplies of the fortresses, especially those located on the western frontier, for we note that the ammunition expenditures for the heavy calibres in 1914 did not exceed the reserve stock on hand at the beginning of the war. A single exception is the 21-centimetre howitzer, which expended slightly more than the reserve stock, due probably to the large scale on which this weapon was employed in reducing the Belgian and French frontier fortresses.

On August 1, 1914, at the outbreak of war, the German army had the following supply of guns and ammunition available for use in the field:

	77-mm. gun	105-mm. L. how.	150-mm. H. how.	10-cm. gun	21-cm. H. how.
Guns	5,068	1,260	1,368	192	216
Total rounds	3,864,000	954,000	1,596,000	814,000	199,000
Rounds per gun	762	757	1,166	4,239	921

In addition to the above a total of 21 howitzers of the calibres 28 centimetre, 30 centimetre, and 42 centimetre were available for use in the field as well as 40 of the 13-centimetre guns. It is evident that the German army fell considerably short of acquiring the reserve of 1200 rounds per gun for the field artillery armament. The rounds per gun for calibres above the 105-millimetre light howitzer are somewhat misleading, as the number of guns shown are those that were actually available for use with the armies in the field. A considerable number of the larger guns were emplaced in permanent fortifications and so all of the ammunition for these calibres was not actually available for use in the field as is shown in the table.

The monthly deliveries of artillery ammunition of the principal types provided for by the Germans for 1914 were as follows:

Two hundred thousand rounds for the 77-millimetre gun.

Seventy thousand rounds for the 105-millimetre light howitzer.

Sixty thousand rounds for the 150-millimetre heavy howitzer.

One hundred and twenty-five thousand rounds for the 21-centimetre howitzer.

Under the terms of the contracts made for the manufacture of the above ammunition deliveries were to start in from four to

seven weeks, the full monthly deliveries to be reached by the sixteenth week after the first mobilization day.

The monthly expenditures by the Germans of field-gun ammunition from 1914 to 1918 were:

Year	Expenditure of Ammunition		Number of Guns	
	77-mm. guns	105-mm. how.	Field Arty.	Heavy Arty.
1914	1,075,000	144,000	6,780	2,632
			(August 1, 1914)	
1915	1,424,640	540,000		
1916	2,903,040	1,152,000	8,614	6,169
			(August 1, 1916)	
1917	3,575,040	1,620,000	10,930	6,525
			(August 1, 1917)	
1918	5,376,000	2,484,000		

The increase shown above is of course partly due to the increasing number of guns used. Attention is specially invited to the greater jump in the expenditure of the 105-millimetre howitzer as compared with the increase in the expenditure of ammunition for the 77-millimetre gun. This clearly shows the present need and importance of a light field howitzer of this approximate calibre.

A complete tabulation of the amount of ammunition for the principal types that was delivered to and expended by the German army each year during the World War is shown below. In 1914 the rate of fire for the 77-millimetre gun was approximately seven and one-half rounds per day. The French army reported a daily rate of fire in 1914 for the 75-millimetre gun of about eight rounds per day. This daily rate of fire rapidly increased as the warfare became stabilized until in active sectors in 1918 the rate of fire per gun became as high as sixty rounds each day.

	77 mm. Field Gun Ammunition Rounds		105-mm. Light Field Howitzer Ammunition Rounds	
Reserve on hand, August, 1914	3,864,000		954,000	
	Delivered Rounds	Expended Rounds	Delivered Rounds	Expended Rounds
1914	3,299,520	5,496,960	1,200,000	1,728,000
1915	22,061,040	17,109,120	8,247,000	6,519,000
1916	35,105,230	34,870,080	14,205,000	13,830,000
1917	47,429,760	43,270,800	21,501,000	19,665,000
1918	55,009,920	55,480,320	23,118,000	24,849,000

150-mm. Heavy Field Howitzer Ammunition Rounds 1,596,000		10-cm. Gun Ammunition Rounds 814,000		21-cm. Heavy Howitzer Ammunition Rounds 199,000	
Delivered Rounds	Expended Rounds	Delivered Rounds	Expended Rounds	Delivered Rounds	Expended Rounds
235,500	1,437,000	32,500	561,000	41,000	217,000
6,220,500	4,695,000	1,191,700	850,500	836,000	634,000
12,101,000	10,786,500	2,352,000	2,381,000	1,957,000	1,937,000
14,248,500	12,618,000	5,317,000	4,612,000	2,293,500	2,145,000
11,350,500	12,195,000	5,242,000	5,263,000	2,451,500	2,377,000

THE CHOICE OF A BATTERY POSITION

BY AYMAR EMBURY, II, E.O.R.C.

IN undertaking to tell artillery officers about their own work I want to explain that my work as divisional, corps and army camouflage officer afforded me opportunity to examine many more American and French positions than was the case with the average battery officer, and also as my duties during the several forward movements of our army restricted me very little, I was able to compare the German practice with our own.

These observations and comparisons led me to believe that our army paid too little attention to teaching the value of the several factors which lead to the choice of battery positions, and what I have seen of present instruction in artillery work seems to show that the importance of correct choice is still insufficiently stressed. I have therefore endeavored to set down in some sort of logical sequence what seems to me to be the course of reasoning which should be pursued in choosing a position.

1. WHO SHOULD CHOOSE THE POSITION?

In various artillery brigades the practice varied greatly. Artillery taking positions for the first time commonly had their exact coördinates assigned by brigade headquarters; sometimes even by G3 of the divisional staff. In other artillery brigades it was usual to find the positions exactly assigned from regimental headquarters within areas of operation delimited by the brigade. In other brigades the battery positions were chosen by the battalions or even by individual battery commanders within assigned subdivisions of the regimental areas.

Of the three methods, the third worked out infinitely the best in the field. In a war of movement it is physically impossible for the officer commanding a unit even as small as a regiment to properly reconnoitre for all his battery, and the practice of assigning exact positions from a map (even so good as the French 1:20,000) is to be deplored, because conditions on the terrain may be such that positions given on the map are highly undesirable; the indicated location may already be occupied by an infantry camp; it may be a point at which interdiction fire is constantly directed; the ground may be too soft for gun emplacements or so hard that the construction of shelter trenches is impossible; the position may even be in the hands of the enemy. (One colonel was reported to have been relieved from his command during the Meuse-Argonne offensive

for refusing to obey an order to take positions within the German lines.) Maps give information as to where to look for positions, but not as to exact positions.

Further, since in a war of movement the artillery is often assigned by regiments or battalions the mission of supporting certain infantry units, and as their movements will determine those of the artillery assigned to support them, the higher artillery commanders will either temporarily lose control of these units, or much time will be wasted in informing brigade headquarters of the situation and in receiving orders covering the proper movement. Such a condition is recognized by Field Service Regulations as follows: "When the transmission of orders involves a considerable period of time during which the situation may change, detailed instructions are avoided . . . they should lay stress upon the object to be obtained and leave open the means to be employed." Unfortunately the truth of this principle was far from universally recognized by the artillery brigade commanders of the A.E.F., and battalion commanders very frequently felt themselves obliged to act without authority to meet certain situations. The brigade commander simply cannot know what all his batteries should do or are doing in a war of movement.

On one occasion during the advance north of Chateau-Thierry the commanding general of the 51st Artillery Brigade personally gave me the coördinates of the supposed positions of each battery of the brigade; the nearest correct of these positions was 200 metres from its actual position, the furthest was 7 kilometres away. During that advance the artillery habitually moved by battalions, the battalion commander reporting his new positions to the regimental headquarters, rather than upon orders from higher authority to change position. The positions chosen were almost uniformly excellent because the men who had to fire from the positions chose them themselves with exact knowledge not only of their missions, but also of how much preparatory work their men were capable before fire was necessary.

In a war of position all positions might be reconnoitred by the commanding general or by his operations officer, but the wise officer should realize that the more opportunity he can give his subordinates to exercise their judgment the better they will be fitted to meet conditions when they must rely upon their own intelligence and accept responsibility for acts for which they have no higher authority. I believe, therefore, that under no condition should exact battery positions be designated by brigade headquarters, and that even the battery commanders should be given all possbile freedom to choose positions (within definite limits) which they consider will insure the

CAPTURED GERMAN PHOTOGRAPH SHOWING FRENCH BATTERY POSITIONS IN THE SECOND DIVISION AREA

safety or conduce to the comfort of their men. It is a rare man who will take the trouble to execute a scheme forced on him from above with the same verve and enthusiasm that he will one of his own, and since it is to the battery commander that his men look for safety, and for comfort, his prestige is increased by the increase in his power, and with his prestige the efficiency of his command.

2. THE POSITION ITSELF

The factors which affect the choice of a position can be roughly classified as follows:

I. Mission.
II. Safety:
    A. By defilade,
    B. By concealment,
    C. By immunity from gas,
    D. By distance from other objects likely to attract fire.
III. Comfort.
    A. Accessibility:
        1. Of motor power,
        2. Of kitchen,
        3. Of supplies;
    B. Ease of installation.
    C. Ease of protection.

Mission.—The primary reason for the selection of any position is that the mission can be accomplished. If the mission requires the battery to be located on the top of a bare hill within rifle range of the enemy, it must there be located at whatever expense to men and materiel; and in the following discussion it will always be assumed that the position recommended is one from which the mission can be accomplished.

Safety.—The precautions necessary to insure the safety of a battery will depend upon the character of the enemy, and to some extent upon the character of the action. If the enemy is without artillery any position beyond rifle range is safe. If his artillery is greatly outranged any position beyond his range is safe. If the enemy is without air observation, any position with proper defilade is safe (providing that it be not one on which interdiction fire is likely to fall). If the enemy's artillery is as good as ours, and his air service efficient, concealment becomes necessary. So important was concealment in the late war that special services were set up both by the allied and by the central powers to teach and enforce concealment.

I believe the practice of having an especial service of camouflage to be fundamentally faulty: each branch of the army should be

taught to conceal themselves just as they are taught to use gas masks; and artillery most of all, because of its enormous value both practically and as a moral support to infantry, and because it is by no means so mobile as infantry, should seek concealment as automatically as defilade. Very often when I have endeavored to persuade artillery out of a bad position into a good one, I have been met with the bald statement, "This position was chosen for *Military* reasons," as if the preservation of the lives and matériel of a battery was not a supremely military reason. During the war new organizations came to the front with the idea that camouflage was either a miraculous cloak which rendered a battery invisible, or that it was pure bunk. Neither thing is true, but the result was in either case the same, for the man who took a bad position and trusted to some rags tied to chicken wire to fool the Germans, and lost heavily, thereafter was as opposed to concealment as the man who perfunctorily obeyed the letter of the orders regarding camouflage, and found it useless.

The essence of concealment is not in the covering but in the location of the guns. We located the enemies' batteries' and they located ours by several different methods which to guard against needed some intelligence, a great deal of patience and an ability to outguess the other man. If battery officers are to prevent the enemy from discovering their positions, they should understand these methods as well as an intelligence officer. I commonly found that our artillery officers had little or no knowledge of why their batteries were or were not fired on, and in consequence were unable to take proper steps to keep themselves from being located.

Batteries are located by, first: reasoning out the probable places from which certain missions could be accomplished; second: by sound ranging; and third: by air observation, including air photography.

The first method is obviously one of elimination and will leave many possible positions in question. To cover them all with fire will usually be impractical and certainly foolish, if they can be reduced in number. This can be accomplished within certain limits by the sound-ranging devices, for which a degree of exactness was claimed beyond what seems to me to have been the case. I examined many hundreds of German positions and found them always in the neighborhood, but rarely in the exact spot located on our maps by sound ranging. Direct observation from the air is likewise inexact, because the human brain is a poor recording mechanism, and while a plane flying low may occasionally secure information which can not be otherwise obtained, air photography was in the late war, and probably will be in any future war, the only exact method of recording

information, or rather of such information as can be given by a photograph.

It is somewhat of a question as to whether in the next war photography will be better or worse than in the last; my own feeling is that anti-aircraft protection is in a more elementary stage than photography, and that by improved anti-aircraft machine guns and artillery, planes will be kept at least as high as they were during the late war. However, the amount of information given by air photographs was appalling to the officer of the camouflage section whose duty it was to prevent it.

Of the methods of concealment I wish to say little, for the article is not primarily upon that subject, but only to point out that in broken country a battery can be readily concealed, and in smooth pasture land or in growing crops it cannot be concealed. Most important of all, *uniform* spacing is to be avoided. (See photo.) Single gnns, even without overhead cover, are not readily recognized, but groups of four are so characteristically battery positions and there is such difficulty in concealing trails to them, and blast marks in front of them, that irregular spacing at wide intervals is almost necessary to concealment. Various objections are made to this; the answer is that our 155 C.S.'s, the 155 G.P.F.'s and other larger gun batteries were usually placed in pairs, and practically all the German battery positions showed a wide and irregular distribution of the pieces.

Immunity from gas, at least in part, may be obtained by placing positions where gas would not normally be thrown; while gas is often used for counter-battery work, its principal use has been and will probably continue to be on infantry encampments, dumps and other points where large numbers of men may be expected to be found, and if the battery position is sufficiently separated from such points, the battery will be liable only to gas specially directed at it. It is obvious that a position in the bottom of a valley is to be avoided because of the tendency of gas to drift into hollows, and even though a considerable amount of extra effort is needed to place the battery on the bench of a hill, the expenditure of effort is more than compensated for by the ability to work without masks.

Not only must a battery be located so as not to attract fire itself, but so that it will be outside any probable zone of fire on other objects. I could quote many instances where failure to recognize this fact has resulted in heavy casualties. The points particularly to be avoided are crossroads, billets and camps of other troops, dumps and other batteries; and not only should the battery itself be located, but its echelon and its way of supply should lie outside such dangerous zones. One of the batteries of the 340 F.A., after the St.

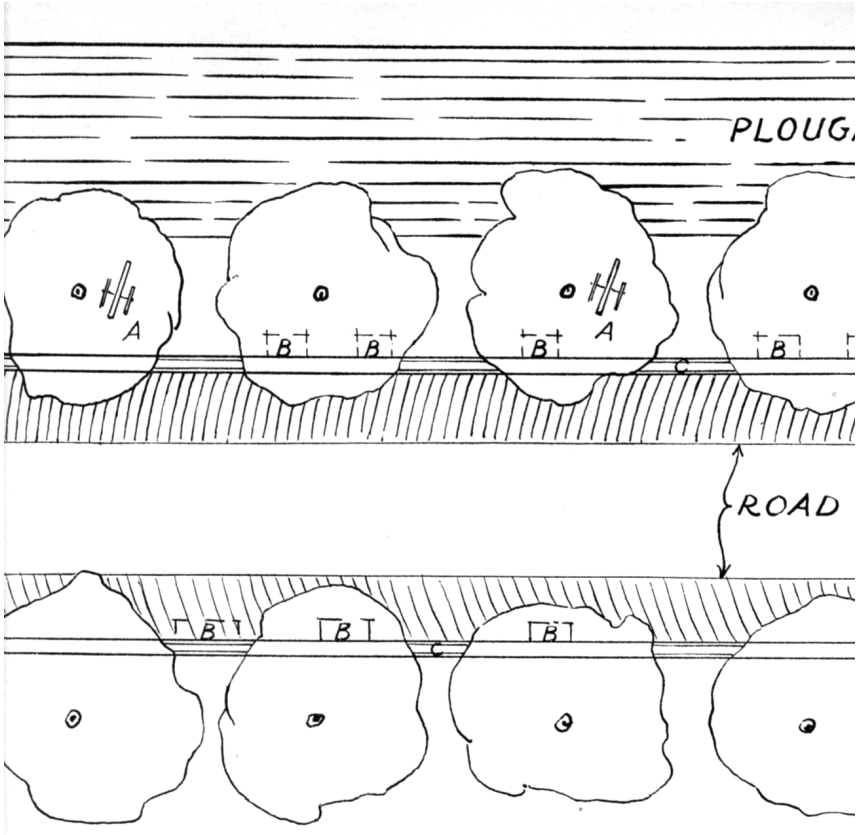
Mihiel attack, took a very daring position on the Beney-St.-Benoit road and did one of the best pieces of camouflage work I have ever seen. The battery was never located, but had several casualties because the No. 1 gun was close to a trail which led from the road into a piece of woods. One of the batteries of the 102nd F.A. had several men killed and wounded because their ammunition unloading point was within the zone of dispersion of fire directed on the Paris Farm crossroads. There is no reason to believe that either position was discovered, but they were in a crowded neighborhood and suffered for it. Artillery should be as exclusive as the Four Hundred.

Comfort.—The comfort of a command is very directly contributory to its efficiency, and while it is almost axiomatic that no avoidable labor should be required of troops in the field, it is an axiom which was little regarded in the late war. Artillery especially should be spared to the utmost extent, for no branch of the service is worked harder, more continuously, or under worse conditions than artillery; and especially in open warfare, where positions are often changed, and where interdiction fire on roads and neighboring areas, renders the whole terrain unsafe, positions which can be taken without extensive preparation, will be preferred to those requiring much labor for the installation of the guns and for constructing shelter trenches.

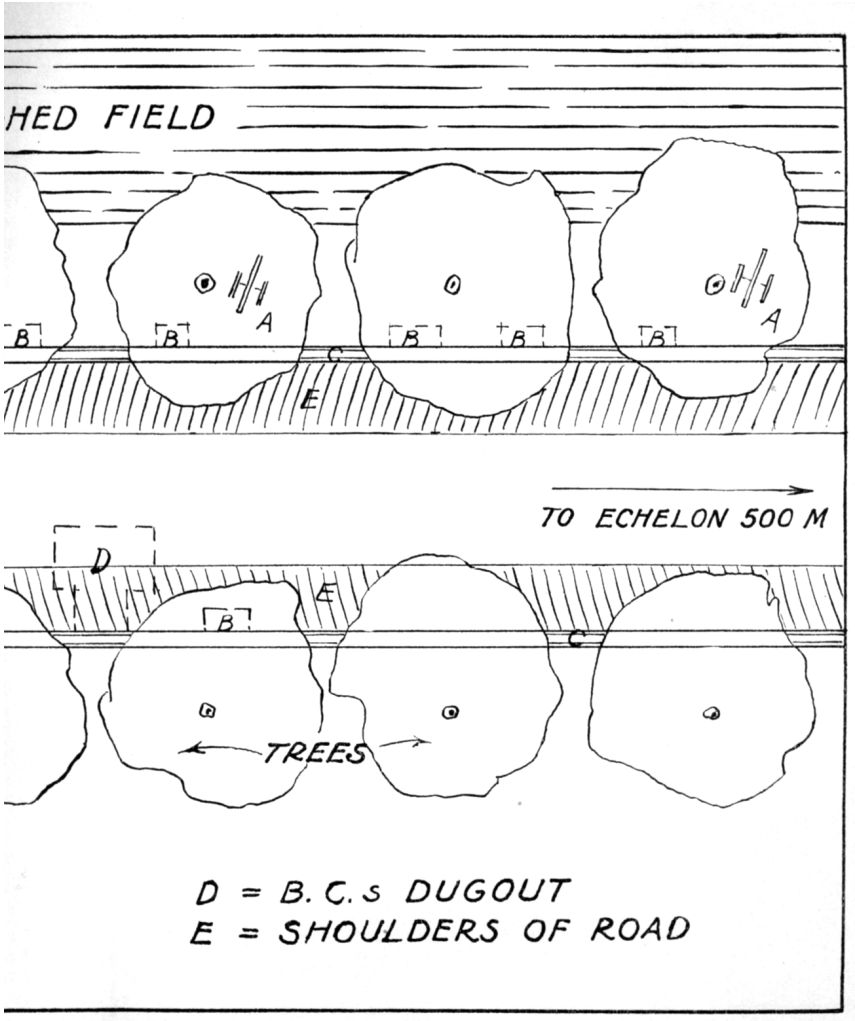
In selecting a battery position the responsible officer should never assume that it is temporary. This mistake was made over and over again during the late war when officers occupied all the best available positions without any precautions to keep them concealed, so that sooner or later it was necessary to evacuate them and remove the guns to other positions from which it was more difficult to accomplish the required mission, and where much more labor was required to make the position safe.

The natural position to take is the most accessible; which means that in open warfare the batteries will usually be located near roads, and often in the ditches or hedge rows beside roads. During the Chateau-Thierry fighting roadside positions were almost normal on the part of both the Germans and the Allies, and many of the positions taken by both sides were as excellent as could be imagined. One German position, which was occupied without discovery for some weeks, was as indicated in the diagram.

No gun platform or overhead cover was used. The ditch was so deep that most excellent protection for the gun crews, telephone, ammunition, etc., was obtained by digging niches in its side; the guns fired across a ploughed field, where no blast marks were observable; ammunition could be unloaded direct to the guns, and the ditch acted as a natural communication trench. I suppose that



A = GUN IN POSITION UNDER TREE
B = NICHES IN SIDE OF DITCH
C = DRAINAGE DITCHES


HED FIELD
A
A
B
B
B
B
B
C
E
TO ECHELON 500 M
D
E
B
C
TREES
D = B. C. s DUGOUT
E = SHOULDERS OF ROAD

twenty minutes was enough to install the battery and it could have remained until the end of the war without discovery.

Another most excellent position was taken by a captain of the 305th Artillery on a bench of a hill east of Chery-Chartrevve, in the ruins of a burnt French barracks. The building was so far destroyed that its use as a shelter for men was unlikely and the town of Chery-Chartrevve was close enough to attract the enemy's fire for destruction in its area, so that it was unlikely in itself to attract fire; it was about 30 metres from the road and the space all around it was so trodden and burned over that signs of occupancy did not appear, and its ruins were sufficient to conceal the guns, the ammunition and the personnel of the battery. In each of the above cases the kitchen and rear echelon were located from 500 to 700 metres to the rear of the position on the same road, perfectly accessible, and yet not in a position which was indicative of the neighborhood of a battery. Both these positions approached the ideal very closely, in all respects. Compare them with the foregoing table.

I. Mission: They were close enough to the front to accomplish their missions, and even probably future missions.

II. Safety:
- A. They had excellent defilade.
- B. They were perfectly concealed.
- C. They were difficult to gas.
- D. They were near no crossroads, woods likely to be infantry camps, dumps or other important features.

III. Comfort:
- A. 1. Their horses could reach the batteries in five minutes on a good road.
  2. The carrying distance from the kitchen did not exceed 1000 metres.
  3. Ammunition could be unloaded from the road.
- B. No digging was necessary to install the battery.
- C. Shelter and communication trenches were in one case ready, in the other difficult because of bad ground.

Now these positions had no artificial camouflage material at all, but were perfectly concealed positions, and while my point of view is naturally that of a camouflage officer, I want to emphasize this point, because camouflage takes time and labor to erect, is not always effectual, is not always obtainable, and uses transport which might better be applied to things for which brains cannot be substituted.

The biggest factor after all in choosing a battery position is brains; the ability to outguess the other fellow. I had a piece of luck when I first went to the front which worked as well as brains

and which will serve to illustrate this point. I induced several batteries to take positions in the edge of woods, where concealment was excellent and which were perfectly accessible, much against the opinions of the battery officers who had been told that positions in the edges of woods were dangerous. The batteries were never discovered or fired on; five months later captured German memoranda stated that American batteries were sometimes being located in the edge of woods *in disobedience to correct artillery practice* and the photographic section would again search for such positions. By that time I was advising artillery to keep out of the edges of woods because I found that the edges of woods were beginning to be fired upon.

In conclusion, I wish to repeat that the battery commander should constantly bear in mind not what the position is, but where the enemy will think it is; and he must balance his guess as to the enemy's conclusion against considerations of comfort of his men and ease of operation of his battery.

THE COMPARATIVE STUDY OF MILITARY ORGANIZATION*

BY COLONEL OLIVER L. SPAULDING, JR., F. A.

THE class is about to enter upon a comparative study of military organization. The field is broad, and might include all types of military organization, tactical and staff. The general idea is the same, however; and since time is not available to make complete studies of everything, a limited number of types of tactical organization only will here be taken up.

But what is this study, and why is it undertaken?

Kipling, whose writings contain many fragments of sound military doctrine, asks in one of his poems, "What can he know of England, who only England knows?" Similarly, we may ask what can he know of our present American tactical organization, who knows no other?

Anyone working in or with a particular organization tends to fall into a routine—to look upon the organization as being of importance in itself, rather than because it is a machine for accomplishing certain things—itself a more or less logical development of certain principles, working under certain conditions. Too often he tends to become the slave of his tools, rather than their master. He may find that his machine is not perfect, and may try to improve it; but if he has never seen any other machine for accomplishing the same purpose, he may never realize that he can get results better by applying some different principle, and may go on using an awkward machine and getting poor results.

A telephone switchboard is a highly complicated mechanism. Everyone knows what it looks like, and what it is for; but the new operator finds it puzzling, and handles it slowly and awkwardly. A little practice brings perfection, and the machine runs smoothly. But to design a new switchboard, or to study the operation of the old one, keep it in order and make improvements, the mere *operator* is incompetent. To do this requires, not so much dexterity in manipulating the board, as a scientific knowledge of it. What, precisely, is the problem to be solved? What is the history of the attempts to solve it? What different types of switchboard have been and are in use, and what are the merits and defects of each? This kind of knowledge, coupled with a broad knowledge of electrical theory, the telephone *engineer* must possess.

* Lecture delivered at the Army War College, Washington Barracks, D. C., November 11, 1922.

It is quite possible to exhibit to an intelligent military man a diagram of a tactical organization or staff system, explain its mechanism in detail, and teach him to operate it. But he will pick it up more readily, get a better grasp of it, and be in a better position to adjust and develop it, if he knows where it came from, how and why.

Again, if one knows only his own current organization, he will be embarrassed when he comes to fight an enemy organized differently. Even if he gets the enemy's table of organization, he can hardly understand it at once; he will not grasp the capabilities of the opposing system, and will not know what to expect. But if he has previously studied organizations in general, and knows the genesis and characteristics of the leading types, a new one will not seriously embarrass him.

This means that the first approach to the subject should be historical. Actually existing organizations are the ones to be studied; but we must not take it that they were created complete, as they stand, in a moment. If they are good organizations, calculated to endure, they are probably the result of an evolution. We should work up to the existing organization, not merely accept it and dissect it. We have records of organized armies, not mere legends of savage warfare, running back say forty centuries. These records are in considerable detail for say thirty. We have books on military history and technical treatises on military training over twenty centuries old, and the highly modern system of applicatory instruction dates from before the Christian era. We shall have no time in this course to go into all this; but it is well to realize that the art of war is a very ancient one, that its development has a certain continuity, and that anything that we do now is merely a further development. It is highly improbable that we shall, within the next few years, discover anything of real importance by plenary inspiration.

In studying an organization, as in any critical study, we must take nothing for granted. Every feature of it must be questioned, and called upon to explain its purpose, the means by which it accomplishes that purpose, its reason for accomplishing it in that manner and no other, and the degree of success it attains. If the system is good, it need not fear such investigation; if it is bad, the sooner it is found out the better.

When similarities are found between two systems, we must know why. Did the two originate independently, from needs felt in both places simultaneously? Was one imitated from the other? If so, was it pure imitation, to save thinking, or was the imitation the result of constructive thought? Where differences are noted, we

should also find out why. Are the two independent, or did one system have knowledge of the other, and deliberately reject or alter some point? And if any feature is found in any system, after finding out how it came to be there, we should know whether it remains because it is fitted to remain, or merely from force of habit.

The earliest weapons were undoubtedly the club and the stone—shock and fire. When fighting ceased to be purely individual, the simplest conceivable organization was that composed of a champion and his followers. Coming on a little further, the followers began to acquire the importance due to their numbers, and to develop an organization themselves. Without pretending to an exhaustive analysis, it may safely be said that these early organizations suffered from at least two great difficulties; they had not enough internal subdivision to permit free tactical manœuvre, and they could not combine fire and shock adequately. Some nations developed chiefly archers (or slingers and javelin men), others chiefly spearmen. The archers could annoy and injure a heavy mass of spearmen, but their weapons had such short range that they generally could not stop its charge, and they could not stand against it in the open field. The heavy phalanx, on the other hand, could win only by main strength and awkwardness. It had to close with the enemy, and it had to do it without the aid of fire power of its own. Such fire assistance as it had came from archers or similar troops attached.

A constant effort may be traced to correct these two faults. Since the time of Alexander considerable progress has been made, but the problem was not yet solved. Rome was now coming into prominence. She met the Greeks, and she met the Carthaginians. Sometimes she won, sometimes she lost. Her own native organization suffered from much the same defects as those of her enemies, but in different form and in different degree. Her soldiers and her military students studied and availed themselves of the military knowledge of their enemies, but they did not copy them. Instead, they inquired into the reasons for their own defeats, notably for the disastrous defeat at Cannae, and made the necessary changes to correct their faults, adopting something from abroad if they wished, but generally developing something of their own to meet the conditions. They gained rapidly both in manœuvring ability and in the combination of fire and shock; and finally, in the legion of the later republic, they at last developed a genuine balanced organization. The legion was made up of independent and interchangeable subordinate tactical units, capable of independent manœuvre; it was formed habitually in depth, with true support and reserve lines. In attack, it advanced slowly in lines of columns until within javelin range; then delivered its javelin volleys and instantly closed with the sword.

The support line closed gaps and reinforced the assault; the reserve line was available as a second support, or to cover flanks, occupy a captured position, or perform any other function of a reserve.

This organization, calculated as a field force, decayed when the Roman conquests had been pushed to their limit and when the troops became frontier guards. In the general decay of everything after Rome's power was broken, the military art also decayed. A new start was made, again taking its origin with a group composed of champion and followers. The development was not without its similarities to the previous one, and in fact serious-minded soldiers of the period eagerly sought and used the military textbooks of Greece and Rome, of the centuries just before and just after the beginning of our era.

No effort will be made in this course to trace the details of this second development for lack of time. Only a few random comments on it will be made, suggestive rather than systematic. Even these comments will not be critically accurate. They are a hasty sketch; the main outlines are correct, but much of the detail is conjectural, hence much of it may be wrong. If this picture suggests an interesting country, perhaps someone may be tempted sometimes to explore it; when he does so, and finds that some of the hills are broad plains, let him remember that a sketch from a mountain top is not an instrumental survey.

In the early Middle Ages, the business of fighting was attended to by the knights. Each knight had his band of followers, its size depending both upon his ability to support his men and upon his military reputation. When these grew to a considerable size, they acquired some degree of internal organization. The leader perhaps had other knights of less experience and reputation with him. He also had assistants of less than knightly rank, sometimes designated as sergeants.

When the company came to be looked upon as something in itself, not a mere following, the same general lines remained. The company was raised by some private gentleman at his own expense, perhaps on speculation, and placed at the disposal of the king. It was the private property of the organizer, who was its *head man, Hauptmann, captain*. In his absence, someone else was designated as his substitute, his *locum tenens,* his lieutenant. To attend to the details of handling the company, he had a general assistant, a sergeant, or perhaps several. If necessary, he had assistants of lower rank. Sometimes these were designated as *caporals* or *corporals,* meaning either chiefs of minor importance, or men charged with the affairs of the *corps*. Occasionally, as commanders of a *brigade,* or squad, especially of mounted troops, they had the title of *brigadier,*

which is even now used in France in that sense. Sometimes they were not recognized as having a distinct rank, but regarded merely as soldiers charged with special duties, and hence relieved from certain others; in this aspect, they were called *exempts*, or *gefreite*.

The distinguishing guidon of the company was carried by an officer, inferior to the lieutenant, but superior to the sergeant, called, from the name of the flag, *ensign* in the infantry and *cornet* in the cavalry.

The company was too small to operate alone. A group of companies charged with an independent mission was often called a *colonello*, or little column, and the name of the command gradually passed to the commander, who acquired the title of *colonel*. Any command was referred to as the *regiment*, or unit under the *regime*, of its commander, when considered in its administrative aspect; as a *battalion*, when considered as a fighting machine and a part of the line of battle. These names gradually became specific, and were taken to refer to particular commands.

On the continent of Europe the practice generally came to be, to appropriate the name regiment to the command of the colonel, and to consider the battalion as a subdivision of it, superior to the company. In England, the two names as a rule remained interchangeable, regiments consisting only of one battalion. Here, and in what follows, infantry is referred to unless otherwise specified.

The colonel was at first not a distinct officer, but was merely the senior captain. Without a company of his own, he would have had no status as an officer. His company, in his absence, was commanded by a lieutenant, who acquired the superior title of captain lieutenant. As assistants, the colonel, like the captain, had his lieutenant colonel and his sergeant major; major, be it noted, was an adjective, not a noun, and the sergeant major was a commissioned officer. Gradually, the title became abbreviated to major, and the title of sergeant major was ultimately conferred upon a superior grade of sergeant. In some cases also, the grade of corporal major existed; it still survives in Italy, and in the British household cavalry, as a noncommissioned grade.

The commander-in-chief of a field force held various titles, such as captain general, or colonel general, general being an adjective. He naturally had a lieutenant general, who, since cavalry was looked upon as the most important element, had command of that arm. The next officer was the sergeant major general, who commanded the infantry. On his staff he sometimes had a *corporal of the field*, a name suggestive of field marshal. The word *marshal*, in various forms, designates several noncommissioned grades in France, and

field marshal, with various qualifications, is used to designate various grades of general officers.

The titles, *lieutenant general* and *major general* gradually came to be accepted merely as those of two grades of general officer, without regard to arm. In most armies, there is now no lower grade of general officer; but in England the title of brigadier general, corresponding to corporal general, has continued in use. Properly, in the British Service, this is merely the title given to an officer of lower rank, temporarily exercising the command of a general officer, but is sometimes given as a substantive rank.

The regiment, like the company, was at first proprietary; the colonel drew a grant of money or money's worth from the king, and was responsible for the business of the regiment. It naturally followed that a commission in the regiment was property, with its definite market value, and could be bought and sold. With increasing restrictions and modifications, this system survived in the British service until late in the 19th Century. Logically, also, the general officer was merely a colonel performing special duties of a higher grade; all the British regulations as to pay and allowances were based upon this assumption.

As a result of all this evolution, then, two markedly distinct systems of tactical organization existed in the early 19th Century. On the Continent, the tactical unit was the battalion of about a thousand men; the administrative unit was the regiment of several battalions, usually two, three or four. In England, the tactical and administrative unit was the battalion, often referred to also as a regiment. Later on, the term regiment was officially defined in England as being that group of battalions assigned to a given recruiting district. A colonel was normally assigned to manage the affairs of the district, each battalion being a separate field unit under a lieutenant colonel. Colloquially, however, the battalion is not uncommonly called a regiment, even to this day.

The smallest group of regiments, curiously enough, acquired the name of brigade, the same as that sometimes given to the smallest group of troopers. On the Continent, the regiment was so large that it was finally accepted that two was the largest number permissible in a brigade; and this became the practice, in spite of the objection, often pointed out, that detaching one regiment broke up the entire brigade. In England, the brigade was a more flexible affair; it has normally been four battalions, but can without inconvenience be made of either more or less, according to circumstances. On the Continent, there seems always to have been the feeling that the brigade was heavy. Probably to lighten it, the four battalion regiments, formerly common, gradually disappeared, France using

the four-battalion organization from the Prussian War down beyond 1900, and Russia entering the recent war with it. Three battalions came to be the Continental standard.

Infantry gradually acquired the status of the principal arm. Cavalry receded from its predominant position, and artillery advanced from the status of a mere handicraft, to become auxiliary arms. When an army grew so large as to be difficult to handle, army divisions were created—little armies, groups of infantry brigades with contingents of the auxiliaries. Napoleon found and developed this system, more or less standardizing the division. Perhaps a division may reasonably be defined as a force of infantry, as large as may conveniently be handled by a single commander in combat, together with such auxiliary troops as are considered to be absolutely necessary to develop the force of the infantry in any combat. In practice, it has generally been roughly 10,000 infantry, but the variations have been wide. With the disappearance of close-order fighting, and the consequent increase in the difficulties of command, the logical evolution would seem to be toward a smaller division.

Napoleon found armies growing so large that even the divisional system was inadequate to insure control, and inserted a new formation, the army corps, between the division and the army. The corps became a permanent institution, but under Napoleon never was standardized; it varied greatly, according to the mission of the corps and Napoleon's estimate of the capacity of its commander. He deliberately avoided standardization, also, in order to complicate the task of the enemy's military intelligence officers. Perhaps it is not too inaccurate to say that his brigade was made up of about two regiments of three battalions each (or, at certain periods, his brigade was divided into two demibrigades of three battalions each); that his division averaged two or three brigades, with eight or ten guns; and that his corps had about three divisions, with a cavalry brigade and ten or twelve guns of corps artillery. Supply and administrative services were given very sparingly to divisions, but freely to corps.

Development in other Continental countries during this period followed something along the same lines. England continued to build upon her own separate plan, as outlined above. America began to attract attention now; and her military system was as a matter of course based upon the English, French and German influence coming in through the foreign officers who served in the Colonies, but not altering the fundamentals.

The elements to be considered in this course are all now in hand. We may proceed directly to treat, in a little more detail, certain

characteristic organizations of the latter half of the 19th Century, the immediate predecessors of those now existing.

In 1870, France had developed her organization on Napoleonic lines. Her corps were still variable, and consisted of from two to four infantry divisions, plus a cavalry division, and various attached troops. It was the basis of the administrative and supply system.

The infantry division had two brigades, the cavalry division two or three. To one of the brigades of each infantry division was attached an extra battalion of *chasseurs a pied* or light infantry. The divisional artillery was a battalion of three batteries, but one of these was armed with machine guns, which new weapon the French conceived to be artillery, and whose usefulness they destroyed by so treating it.

Prussia and the other German States had developed more freely and gone farther. The corps was standardized, and consisted of two divisions and the corps artillery. The division was about the same as a French division, but its artillery was stronger, having sometimes four instead of three batteries, all with normal artillery armament. The machine gun had not been adopted. The French corps cavalry division did not appear, but each division had a cavalry regiment. The corps artillery was very nearly standardized, and generally consisted of one horse artillery battalion, two batteries, and one field artillery battalion, three or four batteries. Supply and transportation were handled by the corps.

In 1914, when the recent war began, the two organizations had approached each other more closely, but there still remained notable differences. Some of these probably were immaterial, due chiefly to the accidents of development; others were more vital, and sprang from differences in military theories. This distinction is deserving of study. In both countries, the corps had grown steadily in importance, and was the great instrumentality upon which all mobilization and strategic plans depended.

The divisional organizations were very much alike. In each case there were the two brigades of infantry, each made up of two three-battalion regiments; one of the divisions in each corps had an extra battalion attached, *chasseurs* or *jäger*. In Germany, the divisional artillery constituted a brigade, two regiments of two three-battery battalions each; one of the battalions was armed with light howitzers. All batteries had six guns. In France it was weaker—only one regiment, of three three-battery battalions; the batteries were of four guns; there were no light howitzers.

In Germany the corps artillery consisted of only one battalion of heavy howitzers. In France it had four battalions of light guns,

but no heavy; heavy howitzers were at times attached, provisionally and grudgingly.

The cavalry was given to the divisions in Germany—one regiment of four squadrons. In France, it was assigned to the corps. In each case the corps had engineer, air service, and other units, as well as its administrative services and its trains. Such units were assigned very sparingly to the divisions.

Both countries, of course, organized their cavalry, not assigned to divisions or to corps, into brigades and higher formations. These will not be discussed here.

Japan depended chiefly upon French advisers in organizing her new armies, but later came to look more and more to Germany. She had evolved, by the time of the Russo-Japanese War, a divisional organization on the Continental type, suggesting both French and German influence, but identical with neither form. For reasons which deserve some study, she organized no army corps, but gave administrative and supply machinery more freely to the divisions, which thus lost their traditional character of a purely fighting force, and became little army corps. The Japanese Army, in the sense of a field force, occupied a position intermediate between the Continental *Corps* and *Army*.

This elimination of the corps, while it is not to be dismissed as a result of one cause only, brings back to mind the suggestion made above, of the heaviness of tactical units, brought about by the number of stages in the organization. Battalions had been cut to four companies, regiments to three battalions, brigades to two regiments, divisions to two brigades, corps to two divisions, and still they seemed awkward. The Japanese solved the problem by cutting out the corps stage. Von der Goltz, in his reorganization of the Turkish Army, cut out the division and made up his army corps out of brigades. During the recent war, both the French and Germans abandoned the brigade and made up their divisions out of regiments. Always there seemed to be the effort to get away from an awkward situation; but the Continental mind was so habituated to the former idea that even in advising the Americans they clung instinctively to it, and we got from the French an organization strongly resembling the one they had just abandoned. Just how far this was justifiable, apart from the question of habit, is a point to be investigated; but in the investigation the effect of habit must not be overlooked.

Meanwhile, the English had gone the even tenor of their way, entirely unconscious that such a difficulty existed. Whatever merits or defects we may find in their regiment battalion, it did away with this particular difficulty. The regiment battalion was both administrative and tactical; there was no intermediate step between it and

the brigade. They had no need to discuss large or small divisions, square or triangular organizations, for the system lent itself without friction to any of them. Their division normally has had three brigades, each of four battalions; the battalion being a little smaller than the Continental, this gave very nearly the traditional ten thousand infantry. The allotment of artillery to this division has varied considerably, growing gradually stronger. The policy has varied as to organization of army corps; the British mobilization schemes did not depend upon them, and their organization has been merely a question of convenience under existing conditions. The assignment of trains, etc., to the divisions, has necessarily varied also according to the policy as to corps.

The regiment battalion being so small, addition or deduction of one in a brigade did not upset the whole scheme of things, so the organization has proved flexible and easy to maintain under varying conditions. Similarly, the brigade is small enough so that three in a division is permissible, while two will still work if required. This flexibility has a distinct value in itself, independent of other considerations. The conditions of a particular campaign may call for modifications in organization; the Continental organization is so saturated, so to speak, so close to the ultimate limit of possibility at every stage, that alteration to any extent involves entire reorganization, as witness the violent changes made by France and Germany during the recent war. The same situation presented itself to the British forces, and they also changed their organization, but that change was easy and simple, and involved no change in the familiar methods of tactical handling.

It now becomes a matter for investigation, to determine whether this advantage is counter-balanced by disadvantages. This again will involve many considerations. Thus, the international position of the power in question is important. One nation may perhaps be able to foresee clearly that its future complications will be all in some one region, and of one character; a more or less rigid organization will be appropriate. Another nation, England, for example, may see possibilities of trouble in many places and in many forms; it must have flexibility. The idea may be carried as far as one likes; if the organization is made rigid, all attention will naturally be devoted to perfecting the technic of handling that one organization, and the doctrine of war will tend to reduce to a set of formulæ—the effect that may be good or bad, and the investigator must find out. On the other hand, if the organization is to be flexible, so also must be the method of handling it. Attention must be devoted to principles, and everyone concerned must be trained to apply these principles freely without set forms.

This survey of the foreign field, it will be seen, is most hasty and casual; each sentence, so to speak, requires expansion into a chapter to be of real use. But it serves its purpose, which is merely to suggest points of view for research. Let us now cast a glance at our organization.

And here again the caution must be given, that the hasty survey is based only upon the hastiest kind of study. To avoid the wearisome repetition of the question mark, the sentences will be cast in declarative form; but it should be distinctly understood that each affirmation is merely the statement of a question for debate. The negative of the proposition may be found to be true.

As suggested above, our organization was naturally based upon the English system of the late 18th Century. Foreign influences and our own special experience at once began to modify it, but it remained on the same basis. It degenerated more or less during the period from 1815 to 1845, when the army was concerned only with frontier garrison duty and detachment warfare with the Indians, but gained new vitality in the Mexican War. This war was still recent in 1861, and the Civil War armies on both sides were organized and commanded largely by generals whose first experience had been as lieutenants and captains in Mexico.

The Civil War organization is spoken of lightly by many soldiers of today, but perhaps we may find that some of the criticisms are due to a failure to understand the organization itself and the conditions under which it worked, and also to a change in the signification of the words used.

The basis of it was the British regiment battalion. The conception of higher formations was simply that a brigade should be a grouping of any desired or convenient number of these battalions, a division a similar grouping of brigades. Divisions, it was recognized, should have a certain allotment of artillery; and somewhere in the scheme cavalry was to be inserted, the particular place varying according to the amount of that arm available and the character of the operations contemplated. This conception, it would seem, is strictly, according to Napoleonic principles, expressed in terms of British units.

The first engagements of the Civil War were fought with a makeshift organization, growing out of the rapid assembly of half-organized regiments to meet immediate emergencies. During the summer of 1861, however, system was rapidly evolved. In principle, a brigade was taken to mean four regiment battalions, and a division three brigades. The divisional artillery was planned as four batteries, twenty-four guns. Cavalry was short, but it was considered desirable to give each division a cavalry regiment.

This was the extent of the work cut out as a first task. The next step was to be the organization of army corps, development of corps and army troops, etc. The whole scheme was very logical indeed; very clean-cut programs were laid out, not only for the tactical organization, but for staffs. The plan was distinctly British in principle, and closely resembles recent forms of British divisions.

The general scheme carried through the war. The modifications were considerable, but the principle did not change. Thus, regimental strengths ran down, and the number of regiments in a brigade was often increased to compensate for this. But in estimating this phenomenon, we must not forget that the word regiment meant what we now call a battalion—a thousand rifles more or less. Hence a regimental effective strength of a hundred or two is not shocking, but natural. We ourselves know of cases in France of the fresh American battalions fighting a battle with comparable strengths; the German accounts of the later operations of the war show battalion strengths of even less than a hundred.

This difference in nomenclature comes up everywhere. Thus, in the later periods of the Civil War, we find divisions turning over all their artillery to the army corps, and becoming purely infantry forces. This astonishes us, perhaps; but if we look at the question closely, we shall see that the division referred to counted a dozen or fifteen reduced battalions with an effective strength of say 5000, and that this had come to be looked upon as normal. In our present parlance, it was a brigade. Now in France, we saw that our large brigade often required artillery under its own command, for specific operations, but that habitually the artillery was in a single command under the division. If we note the signification of the words employed, the condition was exactly that of the latter part of the Civil War, when the corps had the artillery organically, and a division got it only exceptionally and for specific purposes.

Whether this condition was good or not is a matter for investigation. A similarity in the situation, apparent at least, is here pointed out, and consideration of it suggested.

This matter of nomenclature may seem to be of slight moment, but it has its serious aspect. If we are to get any inspiration from military history, we must understand the meaning of the words used. A change in the signification of a word is like a change in the value of money. In comparing wages, we must compare price, and estimate the change in the meaning of the word "dollar." An expert may not be deceived; but the ordinary man, even the intelligent and thinking man, is often confused. Now that is a situation that we can not alter—a condition that we must accept. But in military nomenclature we do not have to accept it. We are free to

adopt and define our own words. If we are going to use an old term, there is a distinct economy of intellectual effort in retaining the old sense, as nearly as may be; and this economy of intellectual effort may save us some misconceptions and false starts.

At the end of the Civil War, the same thing happened as at the end of the War of 1812. The army was disbanded, all except a few troops for frontier guard and Indian warfare. Everyone's ideas became restricted, military study languished, and nothing was done except to keep in operation the little machine that was left.

This condition continued, as during the earlier period of decadence, for about thirty years, say from 1866 to 1898. Then came the Spanish War, to be compared for present purposes to the old Mexican War. That is to say, it stirred up the problems of military organization again, and forced someone to give attention to them. This is the period to which belongs the famous and doubtless slanderous story, of the bureau chief who deplored his hard fate, saying that just as he had gotten his bureau to running smoothly—by which he probably meant without the need of thought—"along comes this war and breaks it all up again."

As in the Mexican War, an organization was put together which was based upon what we had at the moment. Looking abroad for help, it happened that our eyes fell this time upon the Continent instead of upon England. Noticing that Europe generally regarded a regiment as a group of battalions, and not recognizing the fact that we had always worked upon a different theory, we adopted the three-battalion plan. We did not realize that this was a change from one theory to another, profoundly altering all our habits of thought, but took it as a mere improvement in a single detail. We acquired an additional stage in our hierarchy, but kept to our former triangular tactics; we still said that three of these new larger regiments made a brigade, three brigades a division, and three divisions an army corps.

Within the few years after the war, the study of military theory became enormously extended. This paper organization was studied, and it was clear that there was something the matter with it. In divisional studies and war games, it appeared that almost invariably the division came to be used, not as a fighting unit, but as an army corps, missions being assigned to the brigades for independent execution. The functioning of the corps was very hard to formulate.

About this time came the Russo-Japanese War. Here we saw that the Japanese had given up the corps organization. This struck us as the solution of the difficulty which we were beginning to feel, so our regulations followed them. The division became our largest

formation, and continued to be used in map problems and war games very much like the Continental Army Corps.

After the Mexican War there had followed some fifteen years of peace. So also after the Spanish War, with its Philippine extensions, there followed some fifteen years of peace. Then, as before, there came a great war, closely comparable to the Civil War in relative importance and in military character.

The close resemblance of these two great wars is often overlooked; but even a brief study with this point in mind will bring it out. The earlier war was the prototype of the latter in many respects, notably in that it was fought, not by armies alone, not even by nations in arms, but by nations entire. War was the national vocation, all other interests avocations. So clearly is this resemblance now realized abroad that the French École de Guerre has recently dropped from its courses all lectures on the Franco-Prussian War, and substituted lectures on our Civil War. Germany had recognized it in part, even before the recent war, and some of the best critical studies of our Civil War are in German.

As before, our armies for this new great war were organized and fought by generals who had gained their first experience as captains and lieutenants in the smaller one fifteen years before. This time, since we were to fight on foreign soil and in close connection with foreign associates, we asked foreign advise on organization, and adopted what we found good in this advice, not in developing our traditional system, but as a substitute for it. The advice given us was in the best of good faith, and what we got as a result was supposed to be the best obtainable to meet actually existing conditions. But in looking back upon it, its striking similarity to the organization that our Continental associates had had before the war prompts the inquiry, just how much their ingrained habits of thought had to do with the advice they gave.

Nothing will be said here as to the operation of this organization in the war. Personal experience with it is widely spread throughout the existing army. But we are now starting on the process of destruction and reconstruction just as we did after the War of 1812 and after the Civil War. In this beginning, we all know that views diverged widely as to the proper steps to take in planning our new scheme, both tactical and staff. Several plans were proposed, differing greatly in principle and in practice. Certain tactical and staff machinery was set up, and all of it is still suffering modification from time to time.

To judge by the past, this transition stage will last some years more. In the former cases, we did not try to make any great modifications in our fundamental principles, but in each case it took about

five years to reach an approximate stabilization. This time we are trying to do much more in the development of a military system instead of a mere army; consequently it is normally to be expected that we shall see important and far-reaching changes for several years to come.

The purpose of this talk, and of the course that will follow, is to fix this point of view for those observing and assisting in the coming development—that it will not do for us to content ourselves with learning to operate the existing machine. The only safety lies in analyzing the subject, finding out what essential functions the machinery must perform, learning what different machinery has been used in the past to perform these functions, considering these in the light of our own military history, our own national characteristics, and our probable future complications, and then working out a system which shall be adaptable to all conditions reasonably to be foreseen, and at the same time workable even during the periods of change and readjustment.

There are two ways of making progress, evolution and revolution. The first is the true way; it never makes mistakes. When poor human beings are too blind to see the direction of evolution, or too impatient to wait for it, any action that they may take is revolutionary, and inevitably brings counter-revolutionary tendencies. The final result, if disaster does not intervene, is perhaps much the same that evolution would have brought about, except for the ill effects of the shocks; but the process, while spectacular, is really slower in the end, and the adjustment is less accurate.

It may at first sight seem that evolution is merely the lazy man's reliance—that the energetic organizer will work and invent, overturning old systems if need be, and that only the shirker will sit down and let nature take her course. But letting Nature take her course is not necessarily a passive process. Nature always works through some instrumentality. In the physical world, she has her own natural laws. In human affairs, she works through human agencies, humanly and not mechanically applied. Letting Nature take her course is assisting evolution, not merely watching it. This involves close study of evolutionary tendencies, knowledge of what is going on in the whole world, sympathetic understanding of our own and foreign systems, prayerful consideration of what foreign devices will combine well with our own traditions, skillful adaptations of these foreign devices to our own system—certainly a higher grade of spiritual activity than that involved in imitation, or in constructing a plan theoretically, without reference to past performance. At least, the possibilities are broad enough so that the man who attacks the problem on the evolutionary plan will find work enough to keep him busy.

DEMOCRACY AND WAR-MAKING POTENTIAL

BY CAPTAIN WARREN HILLS, O.R.C.

UNDER a real democracy the inclination of the state towards war is always slow. Its conceptions of honor do not involve the vindication of an ancient martial prestige upon which the strength and prosperity of the state are based, but involve primarily the assertion of rights which rest squarely upon the basis of universally admitted principles of justice. Its traditions are pacific, and it is the only form of government in which aggrandizement and the extension of power beyond its own limits are not tendencies inherent in its structure.

Not only are all domestic policies of importance settled by registering the will of the majority at the polls, but every important consideration of foreign policy also must be either determined by submission to the vote or submitted for discussion in the open forum where public opinion shall clearly express itself before responsible heads of government dare take positive action.

When, therefore, the relations of a democratic state with a foreign government begin to be disturbed, the issues are taken up for full discussion in the public press. The government itself withholds no information that is of fundamental importance, and individual citizens and organized groups of citizens find unrestricted opportunity for disclosure of fact and expression of sentiment. The case is tried, as it were, before the people; every argument, pro and con, is printed and pondered, and if, at last, the dispute proves insoluble and hostilities are determined upon, the great majority of the people are found standing solidly behind the government in its declaration or acceptance of war, for the declaration of war is, in fact, their own act.

Furthermore, this fact makes the democratic state whose military resources are adequate peculiarly redoubtable as an enemy, for the reason that the national morale remains very high, its citizenship through general discussion having acquired a common understanding of the principle at issue and having in each individual case reached the conviction that upon the merits of the issue the national cause is just. The combatant and non-combatant citizenship alike tend to remain united, even under adversity, and to resist the disintegration that reverses introduce where the hearts of the majority are not devoted to the cause. A democracy at war has its collective mind fixed upon victory and is probably capable of a more powerful and

sustained struggle than is any other form of government. Initial inferiority in coördination of its war-making mechanism is more than offset by its superior morale.

On the other hand, the democratic state is peculiarly defenseless against hostile influences so long as a state of peace prevails, and for the same reason that it is strong in war. An issue which if properly understood would be seen to be one menacing its security or interest may, if false or mistaken evidence is accepted, be treated as of minor importance. Into the forum, and before the court of public opinion all may come, not only the patriotic citizen who would interpret the issue as he sees it, but the agents of the foreign state with which a dispute has arisen.

Unfortunately in other forms of government than that of democracy the principle has never prevailed that a government shall practice the same high standard of morality in its dealings with foreign states that governs the conduct of private citizens among themselves under the municipal law of all civilized countries. There is no tribunal to whose moral sanctions sovereignty must bow. The sovereign power is bound by no moral law. In their zeal to serve and aggrandize the state, therefore, in other than democratic governments, statesmen may find the rule of expediency more advantageous than that of fixed principle. When, therefore, a minister finds the interests of his government running counter to those of a democratic state, he may not scruple to devise arguments which are disingenuous, not only for transmission through diplomatic channels to the democratic government, but for dissemination among its people; and to organize an elaborate propaganda of plausible and persuasive facts with which to convince democratic public opinion and whose true purpose is to weaken and destroy the position of the democratic government.

To this end the foreign government may use freely the multiform telegraph, and agents, known and unknown, present in person among the people, whose number may be legion and whose garb the most diverse. While the patriotic citizens are seeking only to reveal or discover the truth which is found so often at the bottom of a well, the foreign government and its agents may be engaged in equally persistent and even more fruitful efforts to distort the issue and muddy the waters of the spring of truth. The laws of logic are discarded, and the ingenuity and inventive genius of competent agents disdain the fetters of any conventions which might stand between them and the successful attainment of their ends. The right of free speech being untrammelled, all the power that may lie in the written and spoken word is theirs.

It is entirely possible, therefore, that through the coördinated efforts of agencies of propaganda the dissatisfaction, distrust and hostility even of the majority of the people, may be allayed and dissipated and a peaceful settlement to the satisfaction of the foreign state, if not to the interests of the democracy, be secured.

This is a weapon which is not available when neither of two opposing states is organized under the democratic form. In the nondemocratic state freedom of speech and of the press may have its advocates, but a study of their institutions reveals the fact that only the shadow of these privileges and not the substance is vouchsafed to private citizens. The daily and periodical press is sensitively responsive to the promptings of government upon all live issues, and means are always available to government for restraining the exuberance of the independent writer or editor. In a crisis, therefore, in foreign relations government has it in its power to direct the course of public opinion, and to determine the convictions of the people. It faces the hazard of the loss of public support only when an ill-judged policy of its own leads to obvious disaster which cannot be concealed or repaired.

Under the nondemocratic structure of government not only is the growth of domestic intransigence easily suppressed at its inception, but the control of political suggestion from without which might have an influence upon public opinion is placed firmly in the hands of the government by ancient and effective provisions of law and custom. News dispatches from abroad by telegraph and cable pass through government agencies which have power at all times to control or suppress their dissemination.

What the foreigner within their gates may say is not a matter of indifference to them: he is there by suffrance and not by right, and if his utterances are at variance with government views upon a foreign question his voice is silenced and his departure facilitated. That a paid agent of a foreign sovereignty should enter the country to arouse public opinion in support of a foreign cause would not be tolerated.

When, therefore, an issue arises to disturb the peace between a democratic state and a nondemocratic state, the democratic state is at a distinct disadvantage. Its existing government cannot make a scientific study of the merits of the case and come untrammelled to a conclusion upon a definite policy. It must permit all the evidence to go to the people and await the crystallization of their judgment, whereupon it must undertake to put that judgment into execution.

The nondemocratic government, on the other hand, through a controlled press and innumerable other agencies, determines the character and quality of the evidence to be put before the people,

suggests its mode of reasoning, and controls *ab initio* the trend of public opinion. It proceeds to fix its policy almost without regard to initiative from nonofficial domestic quarters. The support of public opinion is expected to follow, and does follow, as a matter of course.

Proceeding then from the beginning with the assurance of domestic support, the nondemocratic government finds in its hands an instrument of enormous value in the propaganda which it may freely use among the domestic population of its democratic adversary, and from the ravages of which its own people are effectually protected. Untrammelled by those scruples which confine the utterances of the private citizen within the bounds of veracity, the ingenuity and invention of the government and its agents, operating within the frontiers of the democracy, may be limited only by the purpose of discovering, inventing and fabricating arguments in support of the foreign cause which will find lodgment in the mind of the democratic citizen and sway his judgment. Thus the power of popular opinion, which does not embarrass the nondemocratic government at home, may be made the means abroad of disintegrating or paralyzing the opposition of a democratic adversary. By going boldly within the gates of the democratic state it may so influence public policy there that incipient government purposes which it conceives to be inimical to its own interests, may be neutralized from within and even the menace of war itself be laid. It may confidently prosecute an active campaign of propaganda knowing that the principle of freedom of speech and of the press is a cardinal one in the democratic philosophy and that the public will not brook government action which seems to be an arrogation of the right of suppression.

No doubt there is a point at which the democratic government would feel it to be its duty to intervene for the suppression of propaganda, but this point would be reached only when the utterances of a foreigner were obviously subversive of the purposes of government. A foreign propaganda, therefore, disguising itself under many forms, may be successful in prolonging a state of governmental indecision growing out of a divided public opinion by spreading false arguments of security, and retarding the crystallization of public judgment by fanning the flames of factional controversy. If eventually war is not averted the nondemocratic state, due in large part to its skillful campaign of propaganda, will enjoy the advantages of an initial offensive against an unready enemy.

How impossible it is, upon the outbreak of hostilities on a major scale, to make up the time lost in months of indecision, is strikingly illustrated in an article in the January number of the *Military Engineer* on the "Development of Field Artillery," by Major General

William J. Snow, U.S.A., Chief of Field Artillery. After alluding to the fact that before the war there was a generally prevalent idea that with our unrivalled manufacturing resources and our unlimited supply of steel we could readily supply our own needs in an emergency, the author shows the fallacy of this belief by setting forth statistics of the time actually required for quantity production of various types of ordnance: under contracts for 75-mm. cannon let on August 29, 1917, one year elapsed before the first delivery and one-and-a-half years before capacity deliveries were attained; for 155-mm. cannon one year and one month were required for capacity deliveries; for 240-mm. howitzers one year and seven months, and for 8-inch howitzers eight months. The armistice was signed and the war over before most of the guns ordered under these contracts could be made available.

A democratic government, when it finds itself involved in foreign controversy, cannot undertake special preparations for defense unless and until the point is reached where a majority public opinion approves and supports its policy. It would seem, therefore, that the war-making potential of the democratic state is much lower in times of peace, and particularly at the moment of controversy which might lead to war, than is that of the nondemocratic state, and that it will always be a cardinal principle of the latter to lower the morale of its democratic adversary by intensive propaganda addressed to its public opinion whenever a controversy arises which has in it the germ of war.

THOUGHTS ON ARTILLERY TACTICS IN FUTURE WARS*

BY COLONEL BARON VON WEITERSHAUSEN

IT seems rash to express opinions on this subject, now that any practical activity along these lines is forbidden to us. One can only put forward suggestions, formulated from personal experience and from study of domestic and foreign military literature.

At the end of the World War, our artillery tactics were equal to the best of the time. How will this be in the future? The development of artillery is hampered by the difficulty of correctly estimating it in peace-time manœuvres and war games; and there is a tendency to underestimate its importance. Artillery tactics assumes a mass of technical knowledge, which can not be quickly acquired, and a thorough technical study running parallel with practice. Artillery tactics is shooting, and good shooting calls for much study and thought. It demands, too, intelligent and appropriate fire direction; and the greater the number of batteries of various types and calibres, the harder this is. The World War created the artillery commander, and assigned to him the duty of handling all the batteries working with a division. Only the very heaviest calibres remained the monopoly of the higher commands.

Two new weapons were introduced in the World War, which will influence the artillery tactics of the future; these are the bombardment squadrons and the tanks. The bombing squadrons may very possibly take the place of heavy artillery, particularly in long-range demolition and harassing fire. The improvement in aircraft, and their increasing ability to carry heavy loads, will make them highly formidable weapons. The question must be considered, whether the construction of extra heavy guns will pay, and whether bombing planes will not be able to do the work better. If this should be the case, their handling becomes of vital interest in determining artillery plans, so that fire may be properly distributed. On the other hand, increased importance of aircraft will necessitate stronger antiaircraft artillery. Every division may require its own guns for this purpose, under a special command, for their work has nothing to do with that of the other artillery.

I can well imagine, then, that in future the artillery will be armed with small and medium calibres only, and will be concerned solely with the infantry combat. I incline the more to this view, since gas

* Translated from *Militär-Wochenblatt*, Oct. 1, 1922, by Colonel Oliver L. Spaulding, Jr.

constantly increases in importance, in spite of all efforts to the contrary. Small and medium calibres suffice for this use, for with rapid fire they can promptly establish concentrations of any desired density. Small calibres are here taken to mean anything up to 10 cm., and medium up to 18 cm.

The firing unit should have only three guns, the better to accommodate itself to the ground. Two guns are not enough, for then any interruption to the fire of a gun at once diminishes the power of the unit by a half. For the sake of economy, it might be well to make the battery six guns, with two platoons, each equipped for independent fire.

Such a platoon should have twenty or thirty men allotted for special details, with all communication and other equipment necessary. Each higher unit should have similar details, varying in strength according to requirements. This is absolutely essential if good work is to be expected from the artillery; the point can not be too much emphasized. The artillery commander in the division must have all the necessary auxiliaries of fire direction—flash- and sound-ranging detachments, topographical and map details, weather service, airplane and balloon detachments. The ammunition, it would seem, should be chiefly shell, with sensitive fuzes, half of it gas. Only about a fifth should be shrapnel, for ranging on ground which is not favorable for percussion bursts. The combat trains should have a few armored caterpillar tractors, for ammunition supply under heavy fire.

The tanks can become the true accompanying artillery; each infantry regiment might have its own tanks, both with artillery and machine guns. This will insure proper support to the infantry, at the moment when it has advanced beyond the range of its artillery, and only parts of the latter have been able to get forward. So also in counter-attacks from a defensive position. Here, too, the tank artillery must go forward with the infantry, to fight machine-gun nests, etc. This it can only do if it is a part of the infantry. The infantry regimental commander must consider himself to be the commander of a mixed force, including his tanks, mine-throwers, etc., as well as his battalions.

Of the four great groups, then, that I have briefly mentioned, the artillery and the bombing planes must work together under the artillery commander. The anti-aircraft artillery should be independent, and the tank artillery should belong to the infantry.

The guiding principle of artillery tactics in future should be, to clear the way for the infantry. The infantry, then, should make all its dispositions in close coöperation with the artillery. Nevertheless, I believe the next war will show the same characteristics that we saw

in the fighting on the Loire in 1870–1871, and even more in the later periods of the World War—that a fresh, enthusiastic infantry will at first leave its artillery behind in its dashing attacks, but later, after suffering heavy losses, it can be gotten forward only under cover of a powerful artillery fire, and will check its advance when it approaches the limit of the zone where this is possible.

Artillery of the Seventy-Sixth Division

THE March meeting of the 302nd Field Artillery followed the usual lines—instruction in firing data, conduct of fire, and gun drills.

Colonel Barker urged upon all officers the importance of preparing themselves during the period between now and the Divisional Camp, so as to be able to acquit themselves creditably at the camp. The present indications are that approximately fifty per cent. of the officers desire to attend the camp this year.

An arrangement has been effected with Lieutenant-Colonel Everitte S. Chaffee, commanding the 103rd Field Artillery, whereby the officers who cannot attend the camp will be able to fire with the 103rd at Charlestown Beach. So that every officer of the 302nd is assured of some field training during 1923.

The twelfth monthly meeting of the officers of the 385th Infantry was held on Wednesday evening, March 28th, at the Benefit Street Arsenal. Major James H. Johnston, 301st Engineers, discussed his experiences as a Captain in the 6th Marines during the World War, describing in detail the operation of the Rhine River Patrol, which he commanded after the American occupation of the Coblenz Bridgehead.

Major Scammell, commanding the 3rd Battalion, challenged the other battalions to mortal combat *via* the War Game route, action to be staged at the next regimental meeting. Major Wolf, commanding the 2nd Battalion, promptly accepted and an exciting battle is looked forward to on April 25th.

Colonel Buxton gave an interesting account of an operation of the 326th Infantry (82nd Division) in effecting a River Crossing, where the construction of a temporary bridge out of such material as could be found in the immediate vicinity, and in a very brief space of time, was the problem put up to the Division Engineers. The fact that they used the gun slings from their rifles for lashings indicated the resourcefulness required in this important auxiliary arm of the service. The outstanding lesson of the incident, however, was the importance of thorough reconnaissance. Reconnaissances to discover a ford across the stream failed to locate any. The construction of the bridge was put under way. The noise incident thereto gave the Germans timely information as to the crossing. The result—a battalion of Infantry shot to pieces.

THE INFANTRY BATTERY AND ITS DEVELOPMENT

BY 1ST LIEUTENANT MAHLMANN

(FROM "ARTILLERISTISCHE MONATSHEFTE," JANUARY, 1922)*

INFANTRY batteries have developed from the need of a direct support for the infantry in the form of accompanying artillery, that is to say, infantry guns have become a weapon of the infantry, in the same manner as machine guns and trench mortars. If we review the last two centuries of the history of war, we find that a proper solution of the problem of fusing a part of the artillery with the infantry has long been sought.

Frederick the Great writes on the organization of the field artillery: "It is a rule in our army to equip each front line battalion with two six-pounders and with one two-pound howitzer. The support has two three-pounders only. A battery of ten twelve-pounders will be assigned to each brigade. The biggest guns will be placed on the flanks of the two lines. In addition, each army will have one battery of forty ten-pound howitzers."

As is seen, guns as a weapon of the infantry did not yet exist. The assignment and subordination of certain elements of light artillery to the battalion commanders was, however, laid down by the above-mentioned regulation. The King states in other points of his military works that the artillery, fighting within the battalion had proven a success.

We find no such direct method of coöperation in the Napoleonic regulations. The division, as the sole authority, then had command over both artillery and infantry. Notwithstanding this fact, artillery elements also fought in the ranks of the infantry, so that immediate and effective support was available, inasmuch as the artillery firing in the ranks of the foot troops was directly interested in combating objectives which appeared suddenly. Scharnhorsts's regulations of 1812 adopted the formation of the French divisions for the Prussian "mixed brigades." The front line guns which the great King had laid down as a rule were not adopted. Only half of one battery was provided for each of the flanks of the second line, and one horse battery for the brigade cavalry.

Even the brigade batteries were abolished later. The artillery was reorganized, resulting in a more marked separation of the branches, through the formation of divisional and corps artillery.

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* Translation furnished by courtesy of Major J. W. Downer, Field Artillery, U. S. Army.

Consequently, the infantry no longer comprehended the participation of the artillery in battle. The recognition of the necessity of coöperation with the artillery was lost in the consciousness of being the leader of the battle. This state of affairs met with heavy requital in the wars of 1864, 1868, and, in particular, the battles of August, 1870.

Thereafter both the German and French Armies again turned their attention to the coöperation of arms, especially when the experiences gained in the Russo-Japanese War could be applied. The escort artillery of Frederick the Great was again reverted to, though but hesitatingly in our country. Paragraph 331 of our Infantry Training Regulations of 1906 stated: "Escorting the attack with single batteries up to short distances increases the moral strength of the Infantry and may obviate reverses." Paragraph 471, Field Artillery Training Regulations of 1907, reads similarly. It is further stated in paragraph 444, Infantry Training Regulations of 1906: "The activities of the Infantry and the Artillery will not be separated either in time or in space, but will be closely merged." These were naturally but very roughly sketched outlines. Vast scope was left to commanders. The relations of command and subordination, in particular, as well as the activity of the escort artillery, in each instance, had to be established by orders. Thus, the accompanying artillery failed in acting effectively during an offensive manœuvre on the artillery range at Jueterbog in the spring of 1913 because it received orders from both the artillery and the infantry commander, first from the one, then from the other. The necessity of a fundamental settlement of these questions had thus been recognized even before the war, but nothing had been done.

Things were different in France, where the missions of the accompanying artillery had been more exactly defined. The artillery commander, designated the number of escort batteries to be attached to the infantry, subject to situation, mission and strength. The following missions of the escort artillery were established by regulations:†

1. To follow the infantry in echelon and in rushes and unhesitatingly to take up positions as close as possible to the enemy's infantry.

2. Not to occupy itself with the hostile artillery should it attempt to go into action, the mission of combating it being left chiefly to the batteries of the second line.

3. To break all resistance to the infantry's advance as rapidly as possible; to adhere to this principle by avoiding scattering.

† These sentences, contained in the regulations of 1903, were not introduced into the regulations of 1910 and 1913.

4. To prefer flanking positions, in order to be able to fire continuously up to the last moment, thus lending the attack the dash which is indispensable to success and in order to meet counterattacks with immediate fire.

5. To proceed rapidly to the enemy's position as soon as the assailant has gained a footing there, in order to drive back the defender and parry counter-attacks.

These are principles which we did not draw up, precisely, until the war-training regulations were compiled.

The war of movement in the summer of 1914 showed sufficiently clearly that the troops were not yet familiar with coöperation between infantry and artillery. Thus, in a battle report made in October, 1914, I mentioned the good liaison between infantry and artillery as something new. This liaison had consisted in a telephonic connection between the infantry battalion commander and the artillery. An attempt was made in position warfare to avoid, by innovations, the unpleasant experiences of the summer. In addition to the absurdity of digging in defensive guns in the front-line trenches, barrage fire was adopted as a makeshift. It was at first believed that the liaison between the two arms in defense had been improved in this manner. The rigid defensive guns disappeared relatively late. By the end of the war an improvement on the barrage had not been found.

Modern defense forced the assailant to create weapons superior to those of the defender. The first thing to be done was to make the best use possible of the arms available. This led to the equipment of the infantry with trench mortars. Certain defects inherent in this weapon, to which I shall refer later, required escort artillery in addition to the light mortars. This artillery, however, was not made a permanent part of the infantry, as were the mortars, but was formed by detaching elements of the divisional artillery as required. Quick help was necessary at that time. The course taken was therefore retained, especially as the formation of special infantry gun batteries had been planned and had probably been carried out in part by the end of the war. (See Ludendorff, "My War Memoirs.") The lack of a gun suitable for the missions of escort artillery was regrettable. The guns used for that purpose were too heavy and offered too large a target.

Among the attempts made after the war for the purpose of solving the question of infantry batteries, two are particularly noteworthy. On the one hand, there is the organization effected by General Maercker in his "Landesjaegerkorps," on which he writes in his book, "From the Imperial Army to the Reichswehr": "An action of masses of artillery and cavalry being an impossibility in the small unit which I was able to organize, I did not need to consider

that at all and could take energetic measures to bring about coöperation. Instead of special arms, I formed mixed detachments, which were composed of one infantry battalion of three companies, one battery of three platoons and one troop of three sections. By assigning one platoon of heavy machine guns and one trench mortar to each company, I made them capable of taking part in many a phase of street fighting. . . . It was seen clearly that the mutual understanding between the arms and their coöperation were furthered by their close joint activity under a common chief. It had, indeed, proved to be a disadvantage that young battery and troop commanders lacked permanent direction by experts. In comparison to the advantages of the system, however, this deficiency was but of little importance. It was removed by such special measures as appointment of inspectors of arms and instructional staffs."

If this method of uniting all arms, which proved admirable for domestic struggles, could naturally not be applied to the new army, yet some solution in which Maercker's experiences could be utilized had to be found. Until the present, however, we have not surpassed what we achieved up to 1918.

France has recently organized trench mortars and guns into escort platoons for infantry battalions. The future will show whether this change of organization constitutes a progress. In any case, it has the advantage over us that the divisional artillery does not need to be weakened by the detachment of batteries.

With us mortar and accompanying artillery still supplement one another. Their missions are laid down exactly in paragraphs 174 and 175 of the new Small Arms Firing Manual and in paragraph 283, Field and Garrison Regulations. What the guns lack in penetrative force and ability to fire from behind steep covers is made up by the light mortars. Again, the latter have not the great dispersion of the guns, which makes it impossible for them to fire on targets close to their own lines, without endangering these. Guns, even when unlimbered and drawn by their crews, offer a too vulnerable target. Guns of small calibre, however, which do not have this disadvantage, cannot be employed because of their insufficient effect. Herein, too, mortars are superior to guns. Notwithstanding this fact, they cannot entirely replace escort artillery, for light mortars do not have sufficient range in flat trajectory fire, the minimum range required of any infantry gun being 2000 metres. Finally, the method of bringing up ammunition is as little suited to the battlefield as is that of the artillery.

The problem of infantry batteries is thus less a question of organization than of construction. A weapon is needed which will render both guns and mortars superfluous. Briefly, the following is required of this "infantry gun."

1. Mobility, in order to be able to accompany the infantry everywhere;
2. Range, up to 2000 metres;
3. Accuracy of fire and quick registration;
4. Flat trajectory and high-angle fire from the carriage;
5. Small target;
6. Light weight;
7. Easy supply of ammunition in battle.

The difficulty of constructing a weapon which will at once meet all these requirements cannot be ignored. They could be combined in a gun of small calibre, provided sufficient effect be guaranteed. On the other hand, guns of larger calibre cannot easily meet the demand for a smaller target, mobility, and easy supply of ammunition. The pivot of the problem is thus the question whether it will be possible to combine the two opposed essential requirements, *i.e.*, effect and mobility. Effect and mobility, in particular, are likewise demanded from another weapon, *viz.*, the tank. Whether and to what extent the tank is in a position to replace the "infantry gun" cannot be investigated until science, on the basis of the war experiences, has constructed something practicable, free from all the defects of the war tanks. The Versailles Peace Treaty does not permit us to make any practical experiments along these lines.

INSTRUCTION AND TRAINING

BY "AMERICAN LAKE"

SOME of the difficulties of carrying on instruction and effective training in the regular army are shown in the following analysis of a recent report upon one of our regular regiments of Field Artillery:

Total enlisted strength, present and absent		435
Division and Camp special duty	97	
Other special duty	159	
Noncommissioned officers for duty with organizations	46	
Wagoners in Service Battery	20	
Recruits	20	
Headquarters Battery regimental detail	8	
Sick, absent, and confinement	34	384
Total privates for drill, guard, etc.		51

Fifty-one privates for duty in a regiment whose total authorized enlisted strength is one thousand!

The reader says, "Too many men on special duty." Possibly so; but this regiment is in a cantonment built for more than a division. The work of upkeep is enormous and continuous. Instead of a division, the garrison now consists of but a couple of thousand men.

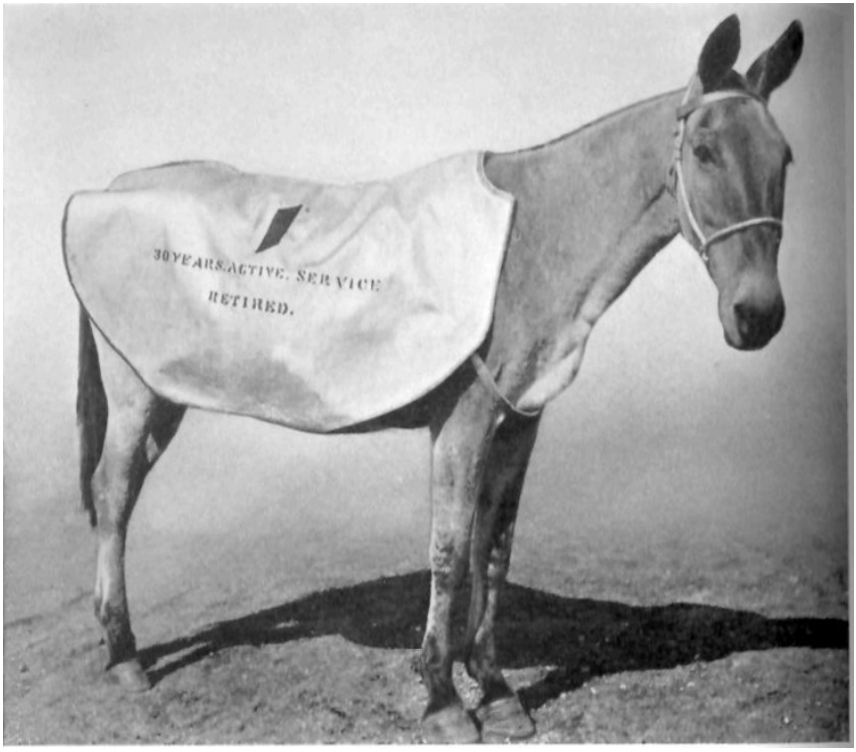
"Move out of the cantonment and give it up," you say. Yes, but in this particular case, the land, costing two million dollars, was given to the Government, on condition that troops be permanently kept there. If the troops were all removed, the United States would forfeit this magnificent reservation of fifty thousand acres. It is true that the Government never agreed to keep any specified number of troops there; but if the garrison were reduced to the point where it consisted of a mere care-taking detachment, it would be a violation of the spirit, if not the letter, of agreement under which the United States came into possession of the reservation.

It being thus apparent that the Government should retain the reservation, and that effective training is practically impossible with the present strength of the garrison, why not increase the garrison, by the addition of other organizations? The answer is, that the additional organizations to increase the garrison can be obtained only by decreasing some other garrison. To decrease other garrisons, would probably mean upsetting the War Department's entire corps area scheme of having in each corps area a reinforced brigade.

While the writer does not pretend to know any more about War Department policies and plans, than have frequently been stated in the public press, yet he is of the opinion that we have now reached the crux of the matter we are discussing: the basic trouble is too small an army to carry out the nine corps area idea.

The Amended National Defense Act, of June 4, 1920, was the basis of the nine corps area idea. It provided that, "for purposes of administration, training, and tactical control, the continental area of the United States shall be divided on a basis of military population into Corps Areas." For the part the regular army was to play in this plan, a strength of about two hundred and eighty thousand men was provided. Taking into consideration the various requirements of the Act, and the *strength thus provided* for the regular army, the number of corps areas was fixed at nine. This was a sound plan and was well worked out. There is no doubt but what the entire Defense Act would have worked out according to the ideas of the framers, and the nine corps areas determined upon under the Act would have been effective, had the strength of two hundred and eighty thousand been raised and maintained. But what happened? The ink was scarcely dry on the Act, when Congress, by successive decrements, began to take back with one hand what it had given with the other, until we ended up with an authorized army strength of one hundred and twenty-five thousand—about forty-four per cent. of the strength originally provided to carry out the Act. It is submitted that in nothing in this world—animate or inanimate—can forty-four per cent. fulfill the requirements of one-hundred per cent. And yet, that is just what the regular army is trying to do today.

What is the remedy? There are only two, and both involve action by that most uncertain of all arbiters—Congress. One is to get Congress to increase the regular army to the number originally contemplated when the Defense Act was passed—two hundred and eighty thousand. But, judging from the temper of that body during recent sessions, we might as well ask for the moon. There is no more probability of getting one than the other. The second remedy is to frankly and fully tell Congress the facts, and get them to restate the duties of the regular army, placing them within the scope of what it is humanly possible for an army of one hundred and twenty-five thousand to accomplish. It is understood that this latter is the procedure recommended by General Harbord, recently Deputy Chief of Staff. But Congress moves slowly; and so, in the meantime, what about fifty-one privates for duty in a mounted regiment with all its horses, guns and equipment to be looked after?



For when there's something doing,
They always send for me,
To start a Row with a Tow-Row-Row
From a Mountain Battery.

TIP

Name: TIP. Mule, Pack. Purchase Price: $124.00. Sex: Gelding. Age: 6 years at date of purchase, July 5, 1905. Weight: 770 pounds. Height: 14 hands. Color: Buck.

Joined the 17th Battery, Field Artillery, at Vancouver Barracks, Washington, July 5, 1905. Served with that outfit when it became Battery A, 2nd Field Artillery. Transferred at Fort D. A. Russell, Wyoming, on December 12, 1909, to Battery A, 4th Field Artillery. Transferred at Camp Stanley, Texas, in the fall of 1921, to the Service Battery, 4th Field Artillery. Took part I in the Cuban Army of Occupation, the 1000 mile test march in Colorado in 1912, in the Vera Cruz Expedition, and in the Punitive Expedition.

CURRENT FIELD ARTILLERY NOTES

Mule Show of the 4th Field Artillery

(From the *San Antonio Express*)

CAN mules put on a respectable show?

The first annual mule show of the Fourth Field Artillery, held recently at the Stadium, Fort Sam Houston, proved conclusively that when it comes to staging a series of contests mules are able to give their equine rivals several yards the better of it and still come out even at the end. The mule is not so showy as the horse, but is more brainy. He is not so swift, but he is easier gaited, not so handsome, yet requires less attention and feeding. Those who were present came away from the Stadium convinced that there is something between the comedy ears of the jackass besides meat and that those who have attributed the height of assinity to mules lack "horse sense."

Headed by the regimental band in the opening event, every entrant marched with great show of pride around the ring.

"Just like a rocking horse," describes the gaits shown in the saddle mule class, and this event showed better than anything else why it is that veteran packmasters who have leagues to cover in a day choose to ride mules. Pola Negri, Battery E's entry, was awarded first prize, with Wally Read, Headquarters Detachment and Combat Train, Second Battalion, second. Norma Talmadge, belonging to the same organization, was third. Theda Bara vamped her way into fourth place.

In workaday guise, laden with a heavy pack, numerous animals competed for the "pack mule" prize. Bunker Hill, belonging to Battery F, was first with George Washington of Battery D, second. It was close at that, and if George had been able to tell a wee bit of a lie by bettering his work and spoofing the judges, he would have landed first honors. However, like the illustrious original bearer of the name, he was strictly honest and preferred second place to prevarication.

A mule is to a burro as a horse is to a Shetland pony, but seldom does a burro get up the energy to do aught but walk sedately about. This makes the burro an ideal mount for children. Five entries were shown in the mule or burro for children under thirteen years old. The sedate animal ridden by Master Hayman was first prize winner, while the second prize went to little Miss Thirkold, and Master Buddy Swift took third money with his mount, "Man of War."

It was in the slow race that the mules really shone. If there's anything a mule had rather do than anything else, it is to go slowly. The slower the mounts went, the more nearly they approximated the ideal race condition, and when one contestant finally halted and moved nothing but his ears, he looked like a prize winner. As often happens these days "Bootlegger" won, while his ware, in the form of "P'izen," came second.

It was in distinct contrast to the slow race when a stake-driving contest was held and with the teams lashed into a gallop, the drivers put the transport wagons entered in the event between the rows of uprights standing little more than "wagon-wide," knocking down surprisingly few. Private Bardwell, Battery D, came first. Private Etter, Service Battery, second. Private Proctor, Battery E, third.

"Whoever saw a mule jump?" was the general comment when the hurdles were put in place and it was seen that the jug heads were expected to go over eight jumps, each two and a half feet high. Some of the mules confirmed the general belief that a mule would not jump. They sidled up to the hurdles, backed up, kicked at the bars and did other things no jumping animal should. However, "Question," with Staff Sergeant Rosell up, showed the best form in the jumps and won first place. "Pete," Private Osterbuhr up, second; "Chow," Private Pitner, third; "Action Front," Corporal Nicholson up, was fourth. Some of the animals that did not figure in the prize money in this event were Big Chief, Chief of Staff, Red Tape, Gum Shoe, War Plans, General Police, Bunk Fatigue, Action Rear and K. P.

Battery D won the show on points with 17; Battery E, 14, second, and Service Battery, eight points, third. Battery D won three cups, and Battery E two cups for events, while Battery D won the regimental cup to be held by it until another show is staged.

Artillery of the 88th (Clover Leaf) Division

The March issue of the Bulletin of the 88th Division, Headquarters at Minneapolis, devotes eight pages to instructive matter for its Field Artillery officers. The text is "Tactical Employment of Field Artillery" and aims to prepare the field artillerymen for the summer camps.

Reserve Officers' Association of Raleigh

The organization of a reserve officers' association in Raleigh, N. C., to promote fraternal relations between the officers and the former officers of the Army and Navy, active and retired or in

reserve, has been perfected and is headed by Brigadier General Albert L. Cox. Meetings will be held on the second Tuesday in each month. Special programs will be prepared for such occasions.

First Battalion, 103rd Field Artillery (R.I.N.G.)

VITAI LAMPADA

There's a breathless hush in the close tonight—
  Ten to make and the match to win—
A bumping pitch and a blinding light.
  An hour to play and the last man in.
And it's not for the sake of a ribboned coat,
  Or the selfish hope of a season's fame,
But his Captain's hand on his shoulder smote—
  "Play up! play up! and play the game!"

The sand of the desert is sodden red—
  Red with the wreck of a square that broke:—
The Gatling's jammed and the Colonel dead,
  And the regiment blind with dust and smoke.
The river of death has brimmed his banks,
  And England's far, and Honour a name,
But the voice of a schoolboy rallies the ranks:
  "Play up! play up! and play the game!"

This is the word that year by year,
  While in her place the School is set,
Every one of her sons must hear,
  And none that hears it dare forget.
This they all with a joyful mind
  Bear through life like a torch in flame,
And falling fling to the host behind—
  "Play up! play up! and play the game!"

HENRY NEWBOLD

From the above the First Battalion, 103rd Field Artillery, at Providence, R. I., have selected their motto "Play the game." They have recently issued an eight-page brochure entitled "With the Horses and Guns." It is an attractive prospectus setting forth, not only the equipment, training, work and play of the organization, but also something of the history of the Rhode Island Batteries in the Civil War and the World War.

Prize Essay Winners

The prizes have been awarded to the winners in the recent essay contest. First prize was awarded to Major J. G. Burr at Fort Sill. His essay appears in this issue. Second place was awarded to Major W. E. Burr at the University of Illinois. His subject was

"Divisional Artillery Missions." This essay will appear in an early issue.

Strength Data Regular Army

COMMISSIONED PERSONNEL, REGULAR ARMY, FEBRUARY 28, 1823

Arm or Corps	Authorized Strength (a)	Actual Strength (b)	Per Cent. Actual to Authorized Strength
General Officers	68	66	97.1
Infantry	3429	3666	106.9
Cavalry	874	1033	118.2
Field Artillery	1382	1176	85.1
Coast Artillery Corps	995	942	94.7
Corps of Engineers	493	464	94.1
Air Service	1508	848	56.2
Signal Corps	243	152	62.5
Quartermaster Corps	803	858	106.8
Ordnance Department	268	270	100.8
Finance Department	119	125	105.8
Adjutant General's Department	98	88	89.8
Judge Advocate General's Department	99	97	98.7
Chemical Warfare Service	78	66	84.6

ENLISTED STRENGTH, REGULAR ARMY, FEBRUARY 28, 1923

Arm or Corps	Authorized Strength (a)	Actual Strength (b)	Per Cent. Actual to Authorized Strength
Infantry	46,423	42,196	90.9
Cavalry	9,871	9,347	94.7
Field Artillery	17,173	14,464	84.2
Coast Artillery Corps	12,026	12,150	101.0
Corps of Engineers	5,020	4,569	91.0
Air Service	8,500	8,530	100.4
Signal Corps	2,184	2,255	103.3
Quartermaster Corps	8,000	8,208	102.6
Ordnance Department	2,307	2,315	100.3
Finance Department	393	436	110.9
Chemical Warfare Service	445	370	83.1
Medical Department	6,850	6,461	94.3
D.E.M.L.	5,758	5,304	92.1
Unallotted	50	0	00.0
Total	125,000	116,605	93.3

(*a*) Philippine Scouts *not* included.

General Rohne

[EDITOR'S NOTE: In the issue for last August, the publishers of the *Artilleristische Monatshefte* paid a well-deserved tribute to

General Rohne, their distinguished editor, on the occasion of his eightieth birthday.

To learn is the right and the cherished privilege of the military student and we should not and do not hesitate to learn from all sources. General Rohne is and was our teacher—quite involuntarily perhaps, for in his writings he probably never stopped to think that we might be reading his articles on artillery. His age precluded him from active participation in the recent war; and, while we still learn from him, his most important lessons came to us before the war.

Hence a translation (somewhat belated) of the article in question may be not without interest to our readers.]

TRANSLATION FROM "ARTILLERISTISCHE MONATSHEFTE"

On September 5th, Lieutenant General Rohne celebrates his eightieth birthday, sound in body, and vigorous in mind. The publishers, his associates in this magazine for the last fifteen years, take pleasure in extending congratulations to him, in their own names and in those of his many readers and admirers.

General Rohne long ago made it his aim to establish field artillery firing upon a scientific basis, to free it from rigid rules, and to make it possible for conductors of fire to apply their scientific knowledge with perfect freedom to the circumstances of the particular case. This aim is emphasized in all his writings, and shown how it might be attained. Many opponents came forward, but he was always able to hold his own with them. Since logical shooting is possible only if one understands what happens when the piece is fired, and the effect of projectiles, he published studies on these points. And since the best of shooting is useless if not in accordance with the existing tactical situation, he treated the action of artillery in combination with the other arms, and taught that it must always act for the benefit of the infantry. As teacher in the Artillery School of Fire, he was able to give effect to his views on firing; as a member of the Artillery Test Commission he exerted his influence upon the development of artillery matériel.

His writings on infantry fire broke new ground.

After his retirement he gave much attention to ballistic problems, and was able to stimulate much discussion by experts on these questions, in which he himself ranked as an authority. About the same time he began to study very deeply the development and the use of heavy field artillery.

He had an unusual knowledge of the tactics, equipment and firing methods of the French field artillery, and had treated them in a special work, as well as in numerous magazine articles. It was no

fault of his, if we met many unpleasant surprises in dealing with it.

As a tireless champion of improvement in firing methods and the use of artillery with the other arms, as a contributor to artillery science in general, he deserves the thanks of all disciples of St. Barbara.

Ordnance

(Extracts from the Annual Report of the Chief of Ordnance for 1922)

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Pack Matériel.—The pilot 75-mm. pack howitzer matériel, with range of 6500 yards, completed last year, has been tested by the Ordnance Department and the Field Artillery, and some modifications planned. Development abroad of more powerful matériel has led to a study of matériel capable of a velocity of 1250 foot seconds, and a range of 9000 yards.

Divisional Artillery.—Two models of 75-mm. gun and 105-mm. howitzer matériel have been under test. Both give a gun range of 15,000 yards and a howitzer range of 12,000 yards. One model has a split trail permitting maximum elevation of 80 degrees and traverse of 30 degrees, with weight, in firing position, of 3660 pounds. In order to reduce this weight, a gun carriage, giving elevation and traverse of 45 degrees, is now being considered. The other model, with box trail, and a weight, in firing position, of 2733 pounds, has required some redesign, but is quite promising, due to its simplicity and light weight.

No decision as to a type is expected until the completion of further studies and possibly a pilot of lighter weight split trail carriage. At this time it appears that identical carriages for gun and howitzer are impracticable.

Corps Artillery.—The 4.7-inch gun and 155-mm. howitzer matériel of Westervelt Board characteristics has been completed, but, due to weakness of the top carriage, will require further study. This carriage provides for a traverse of 60 degrees and 65 degrees elevation. The gun range is 20,000 yards; the howitzer range, 16,000 yards. The weight, in the firing position, of 13,000 pounds, is more than was desired, but was necessary to give the required range for the howitzer. A lighter carriage, giving 45 degrees elevation, is now being built for the gun. A wagon is provided to transport either gun or howitzer independently of its carriage.

Army Artillery.—Wheeled matériel for a 155-mm. gun, with a range of 25,000 yards, and an 8-inch howitzer, with a range of 18,000 yards, has been completed and is now under test. The carriage permits of 65 degrees elevation and 60 degrees traverse, and

weighs, in the firing position, approximately 24,000 pounds. A transport wagon for the gun or howitzer is provided.

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Divisional Motor Carriage.—Pilots of both the track-laying and the combined wheel and track-laying types have been under test throughout the year. When these carriages were designed it was considered that a speed of from 25 to 30 miles an hour should be secured. The power requirements for such speed necessitated large engines, which, in turn, demanded heavier construction throughout, resulting in greater weight of vehicle than is considered desirable. Tests indicate that there is no necessity for such extreme speed; also that high speed with the present design of caterpillar vehicles is impracticable, as it entails almost prohibitive maintenance.

The waterproofing of the power plant by means of covers over the spark plugs, magneto, etc., has been found impracticable. The addition of these parts interferes with adjustment and repair of the engine and after running several hundred miles on hard roads it was invariably found that the waterproofing had become ineffective.

As a result of tests, it is considered that divisional motor carriages, of light weight and moderate speed, are thoroughly practicable and that they can be made dependable, with motors readily accessible for adjustment and repair.

Corps Motor Carriage.—The design of a corps motor carriage mounting, interchangeably, either the 4.7-inch gun or the 155-mm. howitzer, has been completed and manufacture of a pilot inaugurated. Every effort has been made to eliminate weight. The estimated weight of the completely assembled unit is 20,000 pounds, which compares favorably with the corresponding wheeled carriage weighing 14,500 pounds, and a 15,000-pound tractor. The characteristic feature of this design are a fully sprung body, equalized and jointed truck frames to facilitate rough cross-country manœuvring, and the employment of rubber in the track and track-supporting rollers and on the drive sprockets and front idlers, in order to absorb shock and eliminate vibration. The maximum speed is 18 miles an hour.

Army Motor Carriage.—A battery of 155-mm. G. P. F. motor carriages of the combined wheel and track-laying type has been given a service test by a brigade of Coast Artillery at Camp Jackson. As a result of the test, and to correct several defects which developed, one of the carriages was rebuilt and is now under test at the Aberdeen Proving Ground.

Two new pilot motor carriages, of the track-laying type, which will mount, interchangeably, the new 8-inch howitzer and 155-mm. gun, have been completed and are being assembled for test. The

engine, with the 6 cylinders in line, is inclined at 45 degrees to give lower over-all height. Six speeds forward and two reverse are operated through a control box and steering post. Speeds varying from 1 mile per hour, over difficult roads, to 14 miles per hour on good roads, are obtainable. Elevation of 65, and traverse of 10 degrees of the gun on the carriage are provided, and movement of the entire carriage readily permits a field of fire of 360 degrees. The height of the axis of the gun is only 65 inches, eliminating the necessity for a loading platform.

Tractors.—With the exception of rebuilding the two pilot models of 2½-ton tractors (Divisional, Model of 1920), the activities of the Ordnance Department in the development of special military tractors have been confined almost entirely to the continuation of the construction and test of those pilots of divisional, corps, and army types, the design of which was initiated after the World War. The selection of improved types of artillery tractors is not, however, being confined to the development of vehicles of special construction intended primarily for military use, as the Ordnance Department is keenly alive to the advantages which would be gained by adopting a commercial type which is produced in quantity in time of peace. With this end in view the industrial field is being canvassed to determine which types give most promise of meeting military requirements in tractors.

Trailers.—As in the case of tractors, the work of the Department during the year on the development of trailers has been confined almost entirely to the test of pilot vehicles, the design and construction of which were undertaken shortly after the Armistice. Necessity for the development of track-laying trailers arises from the motorization of artillery in which, for the transportation of ammunition, the present wheeled limbers and caissons are unsuitable; running gears of the track-laying type are therefore being incorporated in all designs of Ordnance trailers. For the transportation of divisional artillery ammunition, there have been designed and constructed three types of trailers weighing approximately 1½ tons, with carrying capacity equal to their weight. For the transportation of ammunition for corps artillery two pilot models of trailers of 3-ton capacity have been constructed. A smaller trailer, of ¾-ton capacity, designed primarily for infantry use, has been constructed and tested.

Propelling Charges.—A new method for reworking smokeless powder has been designed and developed and is now under test. If successful, this method will eliminate the more expensive grinding operation. A new method of air-drying smokeless powder has been designed and is now in the stage of development. Satisfactory progress

has been made during the year in the development of smokeless, flashless, nonhygroscopic powder; this work was carried on simultaneously at the Picatinny Arsenal and by the E. I. du Pont de Nemours Company, but along different lines. Experimental lots were produced and tested. Test in a 75-mm. gun gave satisfactory ballistics, scarcely perceptible flash, but somewhat greater smoke than the standard service powder. Development work is proceeding and further tests will be made.

The work of balancing propelling charges for seacoast ammunition has been continued during the year. In view of the satisfactory results obtained by this method, all old powders are carefully blended before being made up into charges. Charges made up under the aliquot part plan for the 155-mm. matériel were issued to the Field Artillery for test; similarly made up charges for 12-inch mortar were issued to the Coast Artillery. Reports of these tests have not yet been received.

Primers.—A new 100-grain primer has been designed, developed and tested with satisfactory results. This primer has a decided advantage over the 49-grain primer for use with flashless powder in the 75-mm. gun, as well as with ordinary smokeless powder.

A new explosive for bursting charge for armor-piercing projectiles is being investigated. Results thus far obtained indicate it to be stronger and less sensitive than Explosive "D."

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Fuzes and Detonators.—Work on point-detonating fuzes, to meet modern field artillery requirements, has continued during the year. Fuzes of the super-quick and short-delay types have been designed, developed and tested. Results of tests show that further development work is required.

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Mobile Artillery Projectiles.—The production of common steel projectiles during the year has been limited to new types for test and experimental purposes. Changes have been made in the shape of the 75-mm. and 105-mm. projectiles, and tests conducted gave satisfactory results with the former; results with the latter, however, at maximum elevation, were not altogether satisfactory.

EDITORIALS

Thanks for Lieutenant-Colonel Cassels

The Field Artillery Association, through its JOURNAL, desires to express its appreciation for the excellent service rendered by Lieutenant-Colonel Arthur F. Cassels, U. S. Army, Retired, during the time he edited the JOURNAL.

Colonel Cassels was Editor from the beginning of 1918, to the end of 1922, and therefore carried on this work during the difficult period at the close of the war.

The Association regrets that the condition of Colonel Cassels' eyes prevents his continuing as Editor and our best wishes will follow him wherever he goes.

Constructive Criticisms

Among the letters received in response to our request for suggestions and criticisms, the following seems specially worthy of bringing to the attention of our readers:

"February 21, 1923.

Editor,
FIELD ARTILLERY JOURNAL,
17th and H Sts., N.W.,
Washington, D. C.

DEAR SIR:

I have been a constant and careful reader of THE FIELD ARTILLERY JOURNAL for the past three or four years and am very much interested in the JOURNAL itself, which concerns the Field Artillery service of the Army of the United States. I am writing this letter with the idea of offering, however, for what it may be worth, what I think a constructive criticism.

In my opinion THE FIELD ARTILLERY JOURNAL should be a publication of the Field Artillery service which appeals, as far as possible, to the Field Artillery officers of the Regular Army, National Guard and Reserve Corps. As the World War recedes further and further into the background the technical and mathematical procedure of Field Artillery becomes more and more hazy in the minds of the officers not now connected with the active service. I think that some articles appearing in THE FIELD ARTILLERY JOURNAL shoot completely over the heads of the

majority of the officers in the National Guard and Reserve Corps. I think that they are entirely too technical in the handling of the subject and many of the translations used from the French, German and Italian sources are too technical to be understood by an officer not in the regular service. For this reason I think that each issue of THE FIELD ARTILLERY JOURNAL, as far as possible, should contain articles which not only would be more understandable but would certainly be more entertaining and possibly more instructive if they were written from the viewpoint of the officer whose technical knowledge is not on as high a plane as it was in the World War.

Would it not be possible to secure articles from officers of the regular service and from former officers of Field Artillery of the World War written more or less in the narrative form concerning incidents of the Field Artillery service, methods of instruction, methods of training, care of horses and guns, amusing instances they might have witnessed or, in fact, anything along this line. Would it not also be possible to secure from the regular officers who are now on duty in different parts of the country, detailed as executive officers for the Reserve Corps Units in their vicinity, articles pertaining to the organization of the Reserve Corps Units and progress that these Units are making in the way of organization and instruction.

It seems to me that these officers are in a position to get articles in connection with the National Guard and Reserve Corps Field Artillery that would be of great interest to all readers of THE FIELD ARTILLERY JOURNAL. The fact that the Reserve Corps Field Artillery Regiments are now being organized and that they are holding regular meetings and pursuing a regular source of instruction should, it seems to me, meet with some recognition in THE FIELD ARTILLERY JOURNAL and that such news articles would be of real value to all readers as well as being an incentive to other Reserve Corps Units which might not, at this time, be quite so far advanced.

This criticism is offered entirely from a friendly viewpoint and because I am greatly interested in the Field Artillery service and its efficient publication, THE FIELD ARTILLERY JOURNAL.

Yours very truly,

A CONSTANT READER."

The above appeals to us as a constructive criticism. Whether the U. S. Field Artillery Association adopts entire the policy suggested in this letter, or any other letters, for its JOURNAL, is not the point. The Association will be guided by suggestions from many sources. We want more opinions.

Our Constitution sets forth our purpose to be the promotion of the efficiency of the Field Artillery by maintaining its best traditions; the publishing of a JOURNAL for disseminating professional knowledge and furnishing information as to the field artillery's progress, development and best use in campaign; to cultivate, with the other arms, a common understanding of the powers and limitations of each; to foster a feeling of interdependence among the different arms and of hearty coöperation by all; and to promote understanding between the regular and militia forces by a closer bond; all of which objects are worthy and contribute to the good of our country.

That Constitution was written in 1910 when there were but 225 Field Artillery Officers in the regular army, a comparatively small national guard and no reserve or R.O.T.C. The Field Artillery today numbers a reserve of 7866 officers, a national guard of 1653 officers, a regular establishment of 1204 officers and 20 R.O.T.C. units. But its development is only now taking form. Matériel, organization, and tactics are the subject of more study than ever before. The fields of endeavor of our branch are today more numerous, diversified and extensive than any other arm. If our Association can now disseminate the best information, keep our members informed of the current progress of our arm in all its phases of activity and in some little measure help to maintain our best traditions, it has much work to do. We want constructive criticisms and suggestions.

Another Editor Leaves

We are sorry to announce that due to his promotion and consequent eligibility for foreign service, Lieutenant-Colonel Hollyday is forced to leave the U. S. Field Artillery Association as Secretary-Treasurer-Editor. His tour of duty, though short, has been well done, and we wish to express our appreciation.

Modern War and Machines

The second and concluding instalment of Modern War and Machines is not in this issue, due to a delay in translation. It will appear in an early issue.