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Vol. I **JULY-SEPTEMBER, 1911** **No. 3**

FIELD SERVICE EXERCISES FOR A BATTALION OF LIGHT ARTILLERY

SECOND EDITION.

BY G. AUBRAT, MAJOR OF FIELD ARTILLERY.

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Contents.

PREFACE

In the field, artillery marches mostly with the infantry. Each march is followed by a halt, either in cantonment, cantonment-bivouac or bivouac. On the field of battle, artillery first maneuvers to occupy positions which may have been assigned to it; this is the period which it devotes to reconnaissance and maneuvering. Once in position it applies the method of fire demanded by circumstances. In the course of the combat it may have to change position. Then it maneuvers again to reach these positions; once having occupied these, it fires. At different phases of the combat it is called upon to replenish the personnel, matériel and ammunition. To prepare itself for war, artillery ought then to perform exercises in marching, camping, study of general artillery positions and emplacements for the firing battery, reconnaissance and occupation of the positions, service firing, change of position, and finally in supply of ammunition. These different exercises under the general name of "service in the field" take place in garrison, at the school of fire and at grand maneuvers.

In this study we will first explain some general ideas of field service exercises; we will then make out for each series of exercises a general program which will show the provisions of the regulations which refer to them. As an example, we will also give a detailed program for each type of exercise. These preliminaries having been taken, we will proceed with the principal aim of this study by giving reports of numerous exercises and conferences.

And now, we beg our readers to remember that all this has but one aim,—preparation for battle.

Officers have not prepared themselves for battle until they know instinctively how to act when they are face to face with the enemy. That is the end for which they should persistently strive throughout their whole career. Thus they should eagerly take advantage of every occasion which will give them an inkling of how they will fight in the next war, and try to profit by everything—conferences, exercises, maneuvers, essays, etc. This explains the welcome given to the study entitled *Field Service Exercises for the Battalion*, which we have extracted from articles published in the "Revue d'Artillerie," from April, 1899, to March, 1901. Since that time we have had the good fortune to take part in numerous exercises of all kinds performed under the direction of eminent chiefs who have shown us what would be the probable role of artillery in battle. From this information we have endeavored to deduce a method of directing the instruction of the artillery so that it may make the most of its marvelous weapon; and that is the reason we have again taken up the pen. Our aim in publishing this new study is to let our comrades profit once more from the experience which favorable circumstances have permitted us to acquire. (*December, 1906*.)

BATTALION FIELD SERVICE EXERCISES

I

General Considerations

AIM OF FIELD SERVICE EXERCISES

The aim of these exercises is to prepare for war, battalion commanders and the personnel under their orders. Hence these exercises should be conducted in such a way as to accomplish the following results:

Increase the tactical judgment of officers on the ground by furnishing them opportunities of making decisions and carrying them out;

Develop, on the ground, the initiative of all officers, non-commissioned officers and cannoneers, by making them able to quickly find solutions for the different problems which they may have to solve in the field;

Accustom the officers to formulate simple orders which are easily understood and clearly define what is to be done by all subordinates:

Prepare all the personnel for the role which they may have to fill in the field:

And lastly to inspire all with confidence in themselves and in their chiefs.

This last result is naturally obtained by joint instruction. The battalion commander in instructing his personnel must not fail to explain the reasons for his adopted solutions in the different cases considered, as he can certainly employ no better means of inspiring confidence in his subordinates and preparing them to obey, without hesitation, in the moment of need.

NECESSITY OF FIELD SERVICE EXERCISES

This necessity is self-evident. Thanks to the unlimited variety of ground and situations, these exercises permit the introduction of the unexpected, which is indispensable in the preparation of the personnel of the batteries for war. They cannot be too numerous. Is a position to be occupied? The battalion commander may need:

Scouts to reconnoiter the routes of approach, to secure the batteries against surprise, etc.

Agents of communication to connect with the battery commanders and the reserve commanders, etc.

This service will not be well done unless the battalion commander has acquired the *habit of formulating his orders* in such a clear, simple and concise manner that in case of need he could be understood by musicians and non-commissioned officers who have received no special instructions. This habit can be acquired by the battalion commander only by numerous exercises.

Is a position for a firing battery to be selected, the reserve to be located, firing data prepared, etc.? Are, in a word, all the measures to be taken which are necessary in a given case?

The battalion commander must decide on the best measures to be taken according to the terrain and situation, in the short interval of time which precedes the arrival of the battery commanders for their reconnaissance, then he must give the necessary orders.

Here again, expert knowledge of terrain and great skill in giving orders, two qualities which can be obtained only by numerous exercises, are of prime importance.

And if we consider that the battalion commander must be ready to act in the face of the enemy, that is to say, to be ready to take the best measures demanded by circumstances, in spite of the emotions due to being on the field of battle, we will easily admit that he must have more than theoretical knowledge, and that a habit or rather an instinct of adapting the maneuver to the terrain is necessary to him.

We could, with the same arguments, prove the necessity of these exercises for the battery commander and his subordinates.

The provisions contained in our different regulations show above all things the importance attached to these exercises. They impose upon us programs of instruction, having for their sole purpose the preparation of officers and men for their duties in time of war.

Exercises in the open should be multiplied as much as possible and the maneuvers in the barrack square reduced to the strictly indispensable ones. The adoption by all countries of the rapid-fire piece, the effects of which are crushing, is today an accomplished fact which obliges the artillery to possess more tactical skill now than in the past. In a future war a simple forgetfulness or lack of foresight, neglect for example to take concealment with reference to a portion of the horizon, to keep personnel and matériel below the sky-line, to observe the enemy's artillery take position in line at some point, might cause a battalion to be put out of action in a few minutes or at least its easy neutralization.

"It is indispensable that artillery execute as many exercises as possible on varied terrain, especially exercises with the personnel, including a great many reconnaissances of positions. By this means only can the officers of this arm acquire the habit of putting in practice rapidly and correctly one of the most delicate operations which is incumbent on them on the field of battle." (Circular of June 6, 1898.)

Finally, the necessity for field services exercises, all executed on varying terrain, under war conditions, results from the manner in which the regulations define the supreme aim of instruction. "Preparedness for war is the ultimate goal of all peace training."

METHOD OF INSTRUCTION

"Tant valent les cadres, tant valent les troupes,"
(What the cadres are worth, is the worth of the troops).

is an old military saying. This saying, true for the different arms, seems to be especially applicable to the artillery. On the battlefield the artillery maneuvers or is in position; in both cases the cannoneers perform their duties under the immediate observation of their officers. The men of a battery are not isolated, which is the opposite from what happens in a troop or company.

When artillery maneuvers, the gun squads have only to allow themselves to be carried on the chests and the drivers have only to follow their chiefs of section.

When artillery is in position for firing and is preparing for, or is firing, the men have only easy duties to perform.

In all these cases the role of the men is very simple while that of the officer is complex.

"The preparation of artillery troops for service firing depends greatly upon the instruction of the officers. The latter depends upon the personal work of the officer himself." (Instructions of January 17, 1906, on the preparation of field artillery for service firing.)

From these considerations it is evidently possible for the artillery to prepare itself, to a great extent, for its role in war by means of exercises executed by the officers and non-commissioned officers only.

But these exercises will be profitable only if the instructors refuse to be satisfied with approximations, and conduct them so as to make the personnel feel that if they should be called upon to execute the same maneuvers with matériel they could do so without hesitation.

Field service exercises should then be executed in most cases with the officers and non-commissioned officers. But these should always be followed by a certain number of exercises with matériel.

The latter have the following advantages:

1. They accelerate the instruction of the entire personnel and give them confidence by verifying the results obtained in the exercises without matériel.

2. They prevent the officers and non-commissioned officers from acquiring false ideas particularly in regard to the mobility of artillery and the rapidity of execution of orders.

3. They practise problems of fire which approximate very closely service conditions.

Use of Sighting Apparatus.—The conclusion of each maneuver is always the occupation of a position and fire on a given target, that is to say, the placing of each piece in a given place and its laying at the word of command. The maneuvers with the officers and non-commissioned officers are more profitable if use is made of some means of actually showing the results sought at each occupation of a position.

To do this it is of advantage to use an apparatus which can be easily carried by a mounted man, and which can show the location of each piece and its laying in direction. This sighting apparatus contains a line of sight similar to the real line of sight and is mounted on a tripod which maintains it at the height of the trunnions of the field piece. The sighting apparatus and the tripod are connected by

a double-jointed spindle which permits laying either on the target (individual aiming) or on a reference point (collective aiming). A simple ruler may be used to give the line of sight as the instructor uses this apparatus to indicate directions only. The tripod can be used as a support for the sight by having on it a socket similar to that on the matériel and by means of a ruler and a graduated circle all operations of sighting in direction can be made. The sight gives the direction of the target (individual aiming) or of the aiming point (collective aiming). The ruler always indicates the direction of the axis of the piece.

GENERAL PRINCIPLES

Each exercise is directed by an officer who, at the beginning of each session explains to all the personnel present the situation in which he assumes the batteries are placed and often the mission which is to be given them. The situation should be clearly given. Example: Exercise of reconnaissance and occupation of a position.

The personnel present represents the officers and non-commissioned officers of a battery and the scouts of a battalion.

The director gives all the information necessary to clearly define the situation, and makes known the mission which is to be imposed upon the batteries. If the information in regard to the mission is not given at the beginning of the exercise it should be made known from the enunciation of the orders given during the maneuver.

Here is an example of how a director of an exercise could give his instructions.

Situation: The battery is supposed to be marching at the head of the second battalion which is at the head of the main body of a division. The first battalion is supposed to be in the advance guard.

The enemy coming from *Sceaux* occupies *Villacoubly* (Plate 1, scale 1:80,000). The head of the second battalion has halted at 1:15 p. m. at the eastern exit of *Viroflay* on the road leading to *Chaville*.

Mission: At this moment the commander of the second battalion receives from the commanding officer of the artillery the following order which has been brought by an agent of communication: "Reinforce as rapidly as possible the 1st battalion; this battalion is near the *Chaville-Jouy* road, 1 km. west of *Velizy*." The battalion commander need not fear to maneuver many times over the same ground. The personnel will understand what use the artillery can make of the terrain by seeing how the method of occupying the same position may vary according to circumstances.

The personnel uses maps and figures only under the conditions they would be used in service:—maps on a scale of 1:80,000, maps on a scale of 1:320,000 and plans of public registry. (The latter for cantonment exercises.)

Since artillery must be trained to maneuver under all circumstances, these field service exercises should not be suspended on account of bad weather.

Claims for damages are avoided by a previous understanding with the owners of the terrain utilized for these exercises.

II

General Program of Exercises

This program has been made out in accordance with the provisions of the Field Artillery Drill Regulations. It comprises elementary exercises, exercises with officers and non-commissioned officers and exercises with matériel.

We give later a program of different series of exercises with officers, and non-commissioned officers, indicating the provisions of the regulations which refer to them. Elementary exercises are conducted in each battery at all periods without any other rule than to prepare, in available time, the personnel for the execution of the other exercises. They do not require a special program.

The exercises with officers and non-commissioned officers should be conducted in accordance with a program which has been decided upon in advance in order that all parts of the instruction shall be given the importance they deserve.

A program of these exercises indicating the provisions of the regulations which refer to them is given as an example. The exercises with matériel are only a repetition of those with officers and non-commissioned officers, executed with all the personnel of the batteries and the matériel. They require no program. The requirements of instruction and the difficulty of finding accessible terrain should alone limit their number.

1ST SERIES: CANTONMENT, CANTONMENT-BIVOUAC, AND BIVOUAC

Preparation for a battalion of three batteries on a war footing of:

A cantonment (nearly all the horses sheltered).

A cantonment-bivouac (half of the horses sheltered).

A bivouac.

Provisions of the Regulations

Field Artillery Drill Regulations: Part VI, Service of artillery in the field. Chapter III, Cantonment, Bivouacs.

Field Service Regulations; Parts VI, VIII and IX.

2D SERIES: SCOUTS

The exercises for scouts prescribed by the regulations relate to marking the route, reconnoitering, security of the artillery while in close formation, in action and on the march, observation of fire, observation of the battlefield and the discovery of objectives.

Provisions of the Regulations

Field Artillery Drill Regulations: Part V. Chapter III (Art. 1). Part VI. Chapter V. Practical instruction in the service of artillery on the battlefield.

Field Service Regulations: Part IV, Security.

3D SERIES: STUDY OF ARTILLERY POSITIONS AND EMPLACEMENTS FOR THE BATTERY

This study includes: In the first place the examination of the different emplacements which the battery may have to occupy on the same general position depending upon the object to be obtained, then the examination of the different general positions which may be occupied in succession by the artillery during a combat.

Provisions of the Regulations

Field Artillery Drill Regulations: Part V, Maneuver of the Battery Mounted. Part VI, Chapters IV and V.

Field Service Regulations: Part XIV, Combat. Chapters I, II, III and V.

4TH SERIES: RECONNAISSANCE AND OCCUPATION OF POSITIONS

The order of exercises indicated below can be followed as the exercises in reconnaissance and occupation of positions. They are first conducted on the drill ground, then on varied ground. The batteries are considered either as forming part of an advance guard, or as ordered to reinforce a line of artillery, or to support the infantry in an attack, or to occupy a captured position, or to aid a rear guard, etc., and in all the different cases they are supposed to act as counter-batteries or as infantry-batteries.

Provisions of the Regulations

Field Artillery Drill Regulations: Part VI. Chapters IV and V.

5TH SERIES: CHANGES OF POSITION AND AMMUNITION SUPPLY

The following course may be followed: Change of position to the front, then to the rear. Maneuver of the battalion reserve. Change of position to the front (rear) and supply from the reserve and the ammunition train.

Provisions of the Regulations

Field Artillery Drill Regulations: Part V. The battery mounted. Part VI. Chapters IV, V and VI.

Field Service Regulations. Part V, Marches, Part VII. Ammunition supply.

6TH SERIES: EXERCISES WITH MATÉRIEL

As we have said, the exercises with matériel are only a repetition with all the personnel and matériel of the exercises with the officers and non-commissioned officers. They are, consequently, only the application of the provisions of the regulations already studied in the preceding series.

III

Detailed Programs of Different Types of Exercises

1ST SERIES: CANTONMENT, CANTONMENT-BIVOUAC, AND BIVOUAC

1st Session.

ESTABLISHING A CANTONMENT.

In this session the director of the exercise proposes to show the lieutenants the method of procedure of an officer charged with the duty of establishing a cantonment for a battalion on war footing and of instructing the personnel of the detail in charge of making the arrangements therefor.

Scheme.—In this exercise the chosen locality is large enough so that all the men and horses are under shelter. The battalion is considered as operating at a distance from the enemy.

The detail for making arrangements moves under the protection of the advance guard, is only one hour in advance of the troops, and is supposed to arrive at about 10 a. m. at the cantonment.

The director of the exercise acts as the officer in charge of establishing the camp. He goes to the locality chosen with the 14 mounted

men who compose the detail for arranging camp for the battalion and the officers whom he is instructing. On arriving in this locality he immediately goes to the city hall where he leaves a non-commissioned officer. The latter is ordered to inform the mayor that he is to report at the city hall, after which he will prepare the cantonment lists. After this the officer in charge of establishing the cantonment will rapidly go over the locality and return to the city hall where he will proceed to make the necessary arrangements.

He calls the attention of the officers to the order in which his operations are conducted. On account of the short time allotted him, this order corresponds to that of the operations which troops would execute in establishing the cantonment. On arriving at the cantonment the artillery would park. The officer in charge of the arrangements must then first look for sites for the park of the battalion or for parks for the batteries. (1st operation.)

The park having been made, the men and horses of each battery are conducted to the cantonment; he then assigns portions to the different batteries. (2d operation.) In each battery the men and horses are conducted by platoon to the center of their cantonment; to do this the quartermasters of the batteries assign to the 4 platoons, as soon as possible, the zone which has been allotted them. While the quartermasters are doing this, the officer in charge continues the arrangements for the cantonment; he informs himself in regard to the quantity and quality of the water, to the existence of contagious diseases, etc. With the assistance of the 1st sergeant he obtains the information necessary for answering all the questions contained in the regulation information blank. He finishes this work a few minutes before the arrival of the batteries so as to be able to receive the reports of the quartermasters and to make the necessary modifications in his preliminary work. He then goes to meet the column. In the exercise of the 1st Session the operations are concluded at this time. In reality the establishment of the cantonment is perfected after the arrival of the batteries. In short, in this exercise the director should endeavor to show the officers and the detail for making the camping arrangements that the aim is to establish, at short notice, an organization of the cantonment such that the batteries can install themselves there as quickly as possible and be able to reassume the march formation by day or by night. In order to reach this result the *officer in charge should not decide on matters of detail before he establishes a general organization* which permits the troops to shelter themselves as soon as they arrive.

2d and 3d Sessions.

ESTABLISHING AND OCCUPYING A CANTONMENT-BIVOUAC.

In these two sessions a lieutenant acts as the officer in charge of the camping arrangements and proceeds under the conditions indicated by the director of the exercises as in the 1st Session. Candidates may discharge the duties assigned to the various non-commissioned officers.

Scheme.—For the 2d and 3d Sessions the locality chosen permits the sheltering of only about one-half or one quarter of the animals and the battalion is supposed to arrive at the cantonment-bivouac at 11 a. m. (2d Session) or at nightfall (3d Session).

4th Session.

ESTABLISHING A BIVOUAC.

Scheme.—Conditions similar to those of the 3rd Session.

2D SERIES: SCOUTS

For each of these exercises the enlisted detail is divided into two parts, the first acts as the scouts and the second represents the head of the column of batteries.

The battalion commander or a battery commander acts as director of the exercise and as battalion commander.

1st Session.

MARKING THE ROUTE.

An artillery battalion, marching with infantry, receives from the artillery commander an order to occupy a position. The battalion commander has the battalion clear the infantry, then orders the detail to mark his route behind him in such a way that the batteries can follow him, and starts out in reconnaissance guided by the agent of communication from the artillery commander.

2nd Session.

RECONNAISSANCE.

The commander of a battalion which is in a position of readiness, or in battery, orders his scouts to find the best route to be followed in order to reach a given position.

3d Session.

MARKING THE ROUTE, OBSERVATION OF THE FIELD OF BATTLE AND DISCOVERY OF OBJECTIVES.

A battalion of artillery with the advance guard of a division receives the order to occupy a position.

The detail repeats its action in the 1st Session.

Once in position, the battalion commander utilizes his scouts to observe the field of battle and to discover objectives.

4th Session.

RECONNAISSANCE, MARKING THE ROUTE AND OBSERVING THE FIRE.

A battalion receives an order to prepare for a change of position.

The battalion commander has the approaches to the new position reconnoitered by some of the scouts; then, having ordered the firing to cease and the batteries to follow him, he starts out himself in reconnaissance and has his route marked by the remaining scouts. Having arrived at the position, he uses the scouts to observe the effects of the fire.

5th Session.

RECONNAISSANCE, MARKING THE ROUTE AND SECURITY OF AN ARTILLERY BATTALION WHICH IS IN ACTION.

An artillery battalion which is part of an advance guard, receives an order to occupy a position which is covered by the cavalry. The latter has passed the position, but the infantry is, for the time being, still in rear.

The battalion commander uses his scouts to reconnoiter the best approaches to the position, to mark the route and to secure his batteries during the reconnaissance, the occupation of the position and the first firing, until the arrival of the infantry abreast of it.

6th Session.

RECONNAISSANCE, MARKING THE ROUTE AND SECURITY OF A BATTALION OF ARTILLERY WHILE APPROACHING A POSITION.

An artillery battalion, in order to reach a position which has been assigned to it, is obliged to use a road on a flank of the zone of terrain occupied by the infantry so that it must look out for a surprise during its march by a hostile detachment.

The battalion commander uses his scouts to reconnoiter the best approaches, to mark the route and to protect the batteries from surprise during their march.

3D SERIES: STUDY OF GENERAL ARTILLERY POSITIONS AND EMPLACEMENTS FOR THE BATTERY

1st Session.

Inspection of different positions on a crest which may be occupied by a firing battery (without maneuvering).

The director of the exercise takes the detail to a position on a well-defined crest and shows them there the various positions in succession which might be occupied by the artillery.

On the line of flash defilade (3 meters below the crest).

On the line of mounted defilade.

On the line of dismounted defilade.

On the line of sight defilade.

On the crest or in front of the crest, the batteries in plain view.

In advance of the crest, on the counter slope, the batteries more or less concealed by a cover or another crest, between the lines of sight and flash defilade. Then the director of the exercises makes different suppositions which accord with the tactical situation and the mission which has been assigned the batteries. Each supposition causes him to occupy along the general position a special emplacement which is preferable to all the others. He indicates it on the ground and gives the reasons which cause it to be chosen.

2d Session.

INSPECTION OF DIFFERENT POSITIONS WHICH COULD BE OCCUPIED IN SUCCESSION BY THE ARTILLERY DURING A COMBAT.

(Without maneuvering.)

The director of the exercises conducts the detail to the ground which he has chosen and inspects, in succession, the different positions which are capable of being occupied by the artillery in the course of an action. He makes a supposition for each case which he wishes to consider in making known, as in the preceding exercise, the tactical situation and the mission which has been assigned the batteries.

As far as possible he cites orders which might be received by a battalion commander.

Examples of positions to be taken up in succession:

1. Advance guard batteries during the preliminaries of a combat (counter batteries or infantry batteries).

2. Reinforcing batteries coming abreast of the advance guard batteries to aid them either by opposing the hostile artillery or by firing on the hostile infantry.

3. Batteries detailed to take part in the preparation of the attack on a point of support and having for a mission to make a breach, to neutralize hostile artillery or infantry, to ward off a counter attack, etc.

4. Batteries detailed to accompany the infantry and to occupy a captured position.

4TH SERIES: RECONNAISSANCE AND OCCUPATION OF POSITIONS

1st Session.

EXERCISES WITH DETAILS ON THE DRILL GROUND.

This exercise has for its object the preparation of the special details for the occupation of positions on varied ground while teaching them the mechanism, the employment of which they will find in later exercises. To give the instruction the director of the exercises directs the batteries to one of the roads leading to the drill ground. At the exit of the city he posts the mounted men of the detail so as to represent the positions of the firing batteries and the battalion reserve in the column and makes them go through all the phases presented by the occupation of a real position. The artillery forms part of an infantry column and is marching at a walk along a road; the battalion commander leaves in reconnaissance; the batteries clear the column and trot; the captains leave in reconnaissance, during which the batteries continue their march towards the position; the reconnaissance having been completed, the battalion comes into action and fires; later the limbers are brought up, in order to move to a new position, and so forth to the end of the session.

2d, 3d, and 4th Sessions.

RECONNAISSANCE AND OCCUPATION OF POSITIONS.

These exercises are the same as the preceding but are executed on varying terrain.

Scheme.—For the second session the batteries are supposed to be marching with the advance guard; the director of the exercise reconnoiters and causes the detail to occupy a position as concealed from the view of the enemy as the mission and the terrain will allow.

For the third session the batteries are supposed to form part of a battalion which has been detailed to reinforce a line of artillery.

For the fourth session the batteries are supposed to act either as counter-batteries, as infantry batteries, or to take part in an action which is desired to be decisive.

5TH SERIES: CHANGES OF POSITION AND AMMUNITION SUPPLY

1st, 2d and 3d Sessions.

CHANGES OF POSITION.

Scheme.—For the first session the batteries are supposed to accompany an advance guard: after having taken up a first position concealed from the enemy's view (preliminaries of the combat) they advance to fire more effectively on the hostile artillery. The battalion reserve is represented.

For the second session the batteries are supposed to form part of a body of artillery which has ceased firing on the hostile artillery in order to support an infantry attack which is desired to be decisive and to occupy the hostile position (completion, pursuit). The battalion reserve is represented.

For the third session the batteries are supposed to accompany a rear guard; after having occupied a first position they are obliged to move farther to the rear.

4th Session.

MANEUVERING OF THE BATTALION RESERVE.

The battalion commander or a battery commander acts as director of the exercise. Each of the three batteries as well as the wagon company is represented by an officer. The lower grades represent the battalion reserve and act as the agents of communication.

The following communications only are established:

(a) Director of the exercises and the battery commanders with—
   1. Each of the batteries;
   2. The battalion reserve;
   3. The wagon company.

(b) Commander of the battalion reserve with the wagon company.

5th and 6th Sessions.

CHANGES OF POSITION AND SUPPLY OF AMMUNITION.

The battalion commander or a battery commander acts as the director of the exercise. The three batteries are represented by their officers and non-commissioned officers. The wagon company, commanded by a lieutenant, is represented by personnel taken from the batteries.

6TH SERIES: EXERCISES WITH MATERIAL

No special program is to be established. The exigencies of the elementary instruction of the cannoneers and the difficulty of finding

accessible terrain alone limits the number of these exercises which should be interspersed with the exercises with the officers and non-commissioned officers. This method gives the two following advantages:—the maneuvering of the batteries at all seasons of the year, and the execution with all the personnel and matériel of the maneuvers practised a few days before with the officers and details only.

It must not be lost sight of that the aim of these exercises should be:—1, to assure the instruction of the cannoneers and to complete that of the officers and non-commissioned officers; 2, to teach the personnel of the batteries to maneuver with reduced strength varying in numbers of men and horses, i. e., simulating the losses which would result from hostile fire; 3, to counteract the false ideas which might arise from the maneuvers executed without matériel both in regard to the mobility of the matériel and the rapidity of the execution of orders; 4, to allow the study of problems of fire in its true setting, that is, in the open field.

IV

Reports of Exercises

1ST SERIES: CANTONMENT, CANTONMENT-BIVOUAC, AND BIVOUAC

I.—Cantonment.

Situation. The battalion, on war footing, is to go into cantonment alone in the village of *Guyancourt*. (See Plate 1, map on scale of 1:80,000.) The village of *Guyancourt* is to the southwest of *Versailles* at a distance of about 5 kilometers.

The detail for arranging the camp arrives in this locality only one hour before the batteries.

The enemy is at a distance and the cantonment is quite extensive.

Sequence of the operations. 1. On the road the officer in charge of establishing the camp seeks, by consulting his map, to form some idea of the locality where he is going (Fig. A).

2. (7:05). *Arrival in front of Guyancourt*. The officer in charge directs himself toward the belfry of the village and looks for the municipal headquarters. He leaves there a corporal with orders to find the mayor or his secretary and to have the public register and cantonment lists prepared if there are any. On his way from the entrance of the village to the municipal headquarters the officer in charge has been looking to the right and left.

The ground to the south of the *Versailles* road seems to him suitable for the park; but the village is flanked on this side by a wide

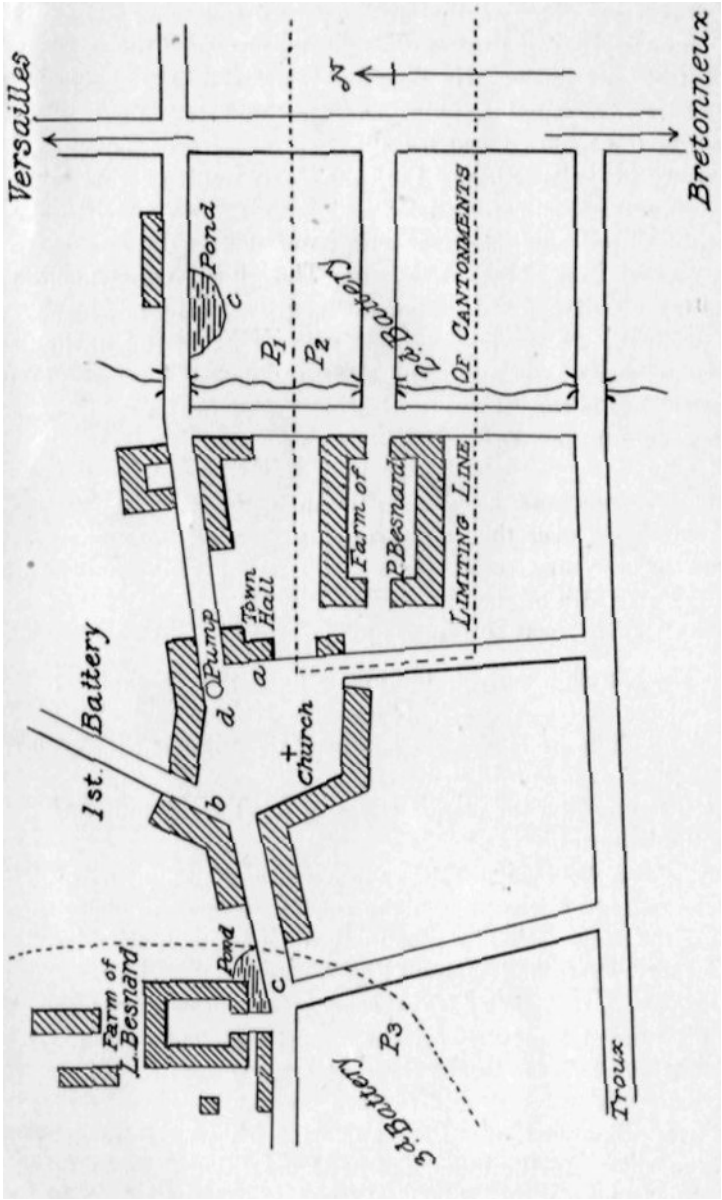


Fig.A. CANTONMENT OF A BATTALION AT GUYANCOURT.

ditch which can be crossed only on three bridges. It seems dangerous to him to group all the batteries in this place. A pond to the left and a small farm to the right attract his attention.

3. (7:10). While the mayor is being looked for, the officer in charge passes through the village. He looks for places for the parks, orients himself in the village and makes an approximate estimate of the resources it offers for the cantonment.

All the detail, except the corporal left at the municipal headquarters, follow the officer in charge and look around and orient themselves in order to be able later to understand quickly the distribution of the locality to the three batteries. The officer in charge thus reconnoiters in succession; a large farm to the west; not far from there a position for a park not quite so good as the first as to ground but easier of access; another large farm to the east, a certain number of small farms and barns.

He is certain he can shelter all the horses.

4. (7:25). The officer in charge returns to the municipal headquarters and dismounts, as also do the quartermaster and the corporals. He looks over the public register and the cantonment list, questions the secretary, recalls the roads he has followed and finally forms a general idea of the cantonment.

The farm to the west belongs to Mr. L. Besnard and can shelter 200 horses. The farm to the east belongs to Mr. P. Besnard and can shelter 200 horses. Three small farms, one to the east, two others to the west, all three on the main highway of the village can shelter 60 horses.

A certain number of barns and outhouses scattered through the village can shelter at least 60 horses.

The officer in charge gives the following orders to the quartermasters:

The 1st battery, including battalion headquarters, will establish its park at the east entrance of the village (P1); it will occupy the main highway of the village leaving to the two other batteries the two large farms.

The 2d battery will establish its park on the flank of that of the 1st battery (P2) and will occupy the farm of Mr. P. Besnard to the east of the village. It will go from its park to its cantonment and back by the road and bridge which unites the farm and the field.

The 3d battery will occupy the farm of Mr. L. Besnard to the west of the village and establish its park to the southwest of this farm (P3).

Assembly of the quartermasters at the village entrance at 7:55 a. m.

5. Departure of the quartermasters. Each quartermaster goes to his cantonment, goes over it on foot followed by a corporal and two men of his battery, makes the assignment to the 1st, 2d, 3d and 4th platoons and indicates this assignment by marks.

The officer in charge fills out the table of information which has been furnished him as far as the time permits and in the order of urgency.

In the present case he determines:

Guard house for the provost guard:	At the municipal headquarters.
Issue of supplies	Church square.
Watering places for animals	In the farms and ponds to the east and west of the village (these ponds having an oozy bottom it would be well to water from tubs, filling them by buckets).
Drinking water.....	A pump in front of the municipal headquarters furnishes sufficient drinking water.
Water for washing of clothes	Water from the ponds taken from the watering troughs placed in buckets.
Sick call.....	1st battery at the municipal headquarters; 2d and 3d batteries in their cantonments.
Inspection of animals.....	In the park of each battery.

He decides on the quarters for the battalion commander, and reserves lodgings for the officers and a place to set up the canteen in the houses which surround the church. He conforms in these matters to the orders which have been previously given him by the battalion commander.

6. (7:55) a. m. The quartermasters return to the place indicated for their assembly. They report that they can amply shelter the men and horses of their batteries. The officer in charge dictates to them the supplementary information in regard to the provost guard, place of issues, etc.

The corporals and cannoneers have remained in the cantonments of their batteries in order to improve them if possible. The corporal and two cannoneers give their special attention to the platoons to which they belong, viz: the 1st, 2d and 3d. They go to the park as soon as the batteries arrive in order to guide their platoon to the cantonment. The quartermaster himself guides the 4th platoon. In this manner, the 1st platoon as soon as it is parked is dismounted by order of its chief without waiting for the other platoons, unharnessed and goes to its cantonment following the corporal of the 1st platoon who has been with the camping detail. The 2d, 3d and 4th platoons

proceed consecutively in the same way as soon as they have parked.

7. The officer in charge of the camping arrangements reports to the battalion commander and the quartermasters wait on the *Versailles* road for the arrival of the column.

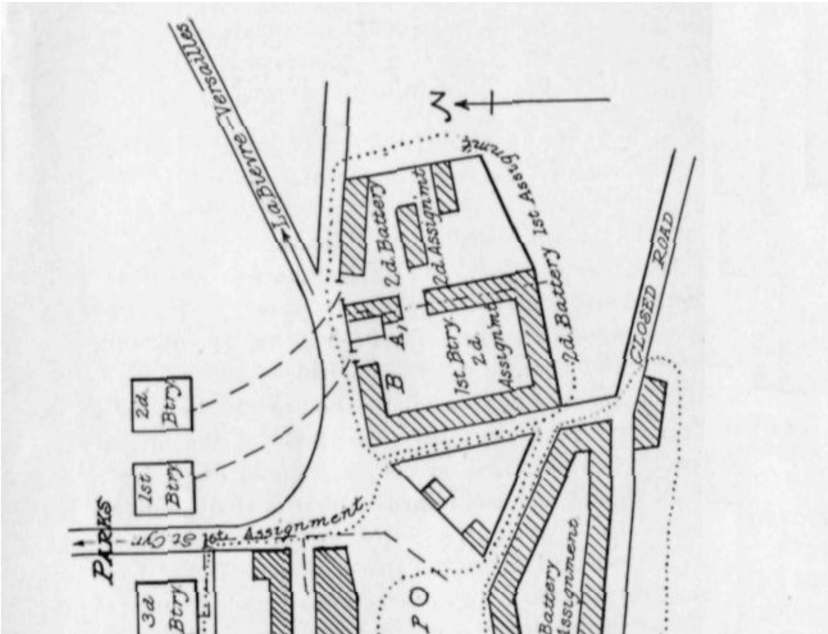
II.—Exercise of Cantonment-Bivouac.

Situation. A battalion of artillery and a battalion of infantry are to camp at *Bouviers* (village to the north of *Guyancourt*) (Plate 1, map 1:80,000 and Fig. B.) The detail for establishing camp passes *Versailles* at 9 a. m., and marches on *Bouviers* via the *Guyancourt* road. The battalion should arrive at *Bouviers* at about 11 a. m. Direction of the enemy, northwest.

Sequence of the operations. At 9:40 a. m. the detail passes *Guyancourt* and at 10 sharp it enters *Bouviers*. As soon as it arrives the officer in charge learns that all the houses on the west of the *Guyancourt-St. Cyr* road have been reserved for the infantry. A dense fog prevents this officer from judging the exact lay of the land on which the village is built. He learns that *Bouviers* is a hamlet, attached to *Guyancourt* and that it has no municipal headquarters. If the officer had known this earlier he would have been able while passing through *Guyancourt* to have made inquiries at the mayor's office as to the size of *Bouviers*, and procured its cadastral map and cantonment list.

1st Reconnaissance. The camping detail moves out at a trot on the *Guyancourt-St. Cyr* road which marks the limits of the artillery and the infantry cantonments (Fig. B). In order to see the approaches to the village, the officer in charge takes the first street to his right; but this is closed. To the south and east the village ends in an abrupt slope. The officer returns and reaches the square which he finds at the center of the village and on which he observes a cross. Keeping up a trot and followed by the detail he rides to a farm not far from the square and observes its large buildings. Finally he ends his reconnaissance by looking over the northern part of the village.

At 10:10 a. m. the officer in charge returns to the square with the cross without having found a place for the parks. Very much hindered by the fog, he does not know the cantonment very well but he decides to make an assignment which he will change if need be. He divides the side of the village east of the *St. Cyr* road into three parts by lines running east and west.


P Pump. Drinking Water.
A1 Watering Trough For 1st & 2d Batteries
A3 Watering Trough For 3d Battery
B Quarters For C.O.
C Location Of Canteen And Distribution Of Supplies.
D Quarters For Officers.
E Quarters For Medical Officer & Veterinarian
— — — Route To Be Followed From Park To Cantonment And The Reverse.
La Bièvre—Versailles
Parks
1st Btry
2d Btry
3d Btry
St Cyr
1st Assignment
3d Batty.
2d Battery
2d Assignmt
1st Btry. 2d Assignmt
2d Battery 1st Assig
1st Battery 1st Assignment
Closed Road
Guyancourt
Portion Reserved For Infantry

The 1st battery is assigned the southern part; the 2d battery the center part formed by the farm, and the 3d battery the northern part.

Orders are given the quartermaster sergeants to rapidly look over with their corporals the portions which have been assigned them and to find out during this reconnaissance the number of horses which can be sheltered. They should, at 10:30, return to the cross. The 1st sergeant is directed to secure lodging for the battalion commander, the surgeon and the veterinary, a location for the canteen and for the issues. He reconnoiters the watering places and those for washing clothes. He should be at the place of assembly at 10:30.

2d Reconnaissance. (See Fig. B', the sketch drawn by the officer in charge on the back of the "list of information and orders to be communicated to the troops before entering a cantonment.") These orders having been given, the officer trots to the farm, the importance of the buildings of which has attracted his attention. He immediately sees that these can shelter about 300 horses. Moreover, this farm has two court yards and is divided into two distinct parts.

The quartermaster of the 2d battery, whom he fortunately meets receives the order to prepare the buildings which surround the second court yard for his battery, and not those of the entire farm as he had first been instructed.

The officer in charge mentally assigns the buildings of the first courtyard to the first battery. On leaving the farm the officer observes a watering place and a position for the park.

(10:30). The officer returns to the assembly place near the cross. The quartermasters report:

1st battery can shelter all the men and 60 horses;

2d battery can shelter all the men and nearly all the horses (using only the second court of the farm);

3d battery can shelter all the men and 70 horses.

The sergeant major fails to come to the assembly point.

In view of this situation of affairs, the officer in charge of the camping arrangements assigns the 1st and 2d batteries to the farm and the 3d battery to the rest of the village. Thus the three organizations are about equally sheltered.

(10:35). The officer in charge orders the quartermaster of the 3d battery to reconnoiter with the corporal of the 1st battery the locations which the latter battery was first ordered to occupy. In this manner the work of the quartermaster is facilitated.

The quartermaster of the 1st battery should reconnoiter the first court of the farm which has just been assigned him. The sergeant major, arriving late, goes to complete his work. The hour of assembly is fixed for the same place at 10:50. While waiting for this hour, the officer reconnoiters the locations for the parks to the north of *Bouviers;* he observes a watering trough and a pump in the plaza.

(10:50). The camping detail is again united. Each quartermaster reports that his work is completed. All the men will be sheltered. Only a few horses will not be sheltered, but they can be protected from the wind by being tied to lines stretched along the walls. The officer indicates to the quartermasters the location of the parks of their batteries and gives them the information which he has received from the sergeant major and is recorded on an attached sheet. The officer attaches to this sheet a sketch of *Bouviers* and with the quartermasters goes to meet the column. The corporals and mounted cannoneers who accompanied the quartermasters are left in the locations assigned to their respective platoons with the order to report to the park on the arrival of their batteries. Each of them should conduct his platoon to its cantonment.

Remarks of the director of the exercise. These remarks are made to the officer in charge of establishing the camp in presence of the lieutenants of the battalion who are taking part in the exercise.

"Lacking the information sometimes furnished by the mayor or his secretary, the officer should have, during his first reconnaissance, halted at the farm and dismounted. In this manner he could have judged approximately of the number of horses that could be sheltered there and have immediately given the quartermasters the assignment which he had not been able to until later.

"The error of the officer in charge has reduced to a large extent the time left for the quartermasters to establish the cantonment of each battery.

"The officer in charge lacks the time to properly study out the approaches to the park and consequently the routes to be followed in going from the park to the cantonment, and *vice versa*, in order to avoid mixing up the batteries. Time is also lacking for him to complete his sketch of the locality.

"The positions of the parks are assigned by the battalion commander as soon as the batteries arrive. The officer in charge, in his hurry, has reconnoitered a position for the parks in general but has not fixed the position for the park of each battery nor the formation to be taken."

INFORMATION AND ORDERS TO BE COMMUNICATED TO TROOPS BEFORE ENTERING THE CANTONMENT.

Name of the locality occupied	*Bouviers*.
Lodging	The battalion commander—Large farm. Medical officers and veterinaries, at M. Dausse's to the right on entering.
Quarters ocupied by the batteries	2d battery — In the large farm. 3d battery in the available portions of Bouviers assigned to the artillery to the east of the Guyancourt—St. Cyr highway.
Duties	For the day. For the provost guard.
Calls	Indicate the hours.
Retreat	Fix the hour at which all the men chould be in their quarters.
Provost guard	Headquarters: Near the cross on the square. Sentinels to be detailed.
Issues	Bread, meat, forage and wood:—on the square near the cross.
Give the prices that may be charged for provisions in the cantonment.	
Watering places	Locations — 1st and 2d batteries at the farm. 3d battery trough in the square. Precautions to be taken. Draw the water in buckets and water from tubs. Hours for the different organizations.
Water	*Drinking*—Pump in the square where a sentinel must be at once posted. *For washing clothing*.—In rear the watering troughs.
Sick call	(Hour and place). Guard house.
Ambulance (if there is one)	(Location).
Inspection of horses	(Hour and place). Near the large farm.
Postal service	Location of boxes and time when mail is collected.
Officers' quarters	Mr. Buot's on the plaza.
Canteen	House next to Mr. Buot's.
Assembly for leaving	Hour.

Report of the quartermaster of the 2d battery (as an example). The eastern part of the farm, the second court, being assigned to the 2d battery, the quartermaster observes that the two large sheep-folds and two sheds can shelter, respectively, 80, 40, 20 and 20 horses.

The cantonment is immediately assigned as follows: First sheep-fold to the 1st and 2d platoons; second sheep-fold to the 3d platoon; the sheds to the 4th platoon. The officers are quartered in the main buildings. In the farm itself there is a watering trough suitable for two batteries. The kitchen is established in a laundry near the dwelling; drinking water is obtained at the pump. Quarters for the men are in the hay lofts above the sheep-folds. A gate permits

entering the second court of the farm without crossing the first court. This should be used to prevent mixing of the horses of the batteries. The carriages of each battery can reach the park by different roads.

The cantonment having been thus prepared, the quartermaster rejoins the officer in charge and reports that all the men and nearly all the horses can be sheltered and that there is at the farm sufficient water for the horses. Afterward he notes all the information and orders to be communicated to troops before entering the cantonment.

III.—Exercise of Cantonment-Bivouac.

Situation. A battalion of three light batteries stationed at *Versailles* receives the order to leave that city at 6 p. m. on April 15th and go into cantonment at *Hotel Dieu* at the crossing of the *Sceaux* and *Bievres* roads (Plate 1, map to scale 1-80,000).

Velizy and *Cour-Roland* are occupied by friendly troops.

Direction of the enemy: *Sceaux*.

Order given by the battalion commander at 4:30 p. m. to the officer in charge of arranging the camp: "Prepare cantonment for the battalion at *Hotel Dieu*; the battalion will arrive about 7 p. m."

(5 p. m.) *Sequence of the operations*. The camping detail of the battalion leaves *Versailles* at 5 p. m. and arrives at *Hotel Dieu* at 5:45 p. m. The inspection of the map shows that *Hotel Dieu* consists of only a farm and its outbuildings.

(5:55 p. m.) After reaching this place and having glanced over the farm, the officer's first care is to look for a place for the parks. He finds it on the side of the *Sceaux* road in a grain field (Fig. C). The park is separated from the cantonment of the men and the horses by a highway, which is to be avoided in general. However, in this case it is the best solution. The officer in charge points it out to the quartermasters and goes to reconnoiter the farm in detail. The inspection of this farm shows him that the men can be sheltered in the sheds, stables, lofts and barns (Fig. C'). He assigns the locality in the following manner: 1st battery, the granary and half the stable situated against the enclosure wall; 2d battery, the other half of the stable already occupied, granary and stable near those assigned the first battery. This was not the assignment first made. The 1st battery had all the upper part of the buildings (granaries); the second all the lower parts (stables); but on account of the difficulty of reaching the granaries, it seemed advisable to divide them between the two batteries in order to equalize the loss of time; 3d battery, the barn to the left on entering the court, shed opposite the

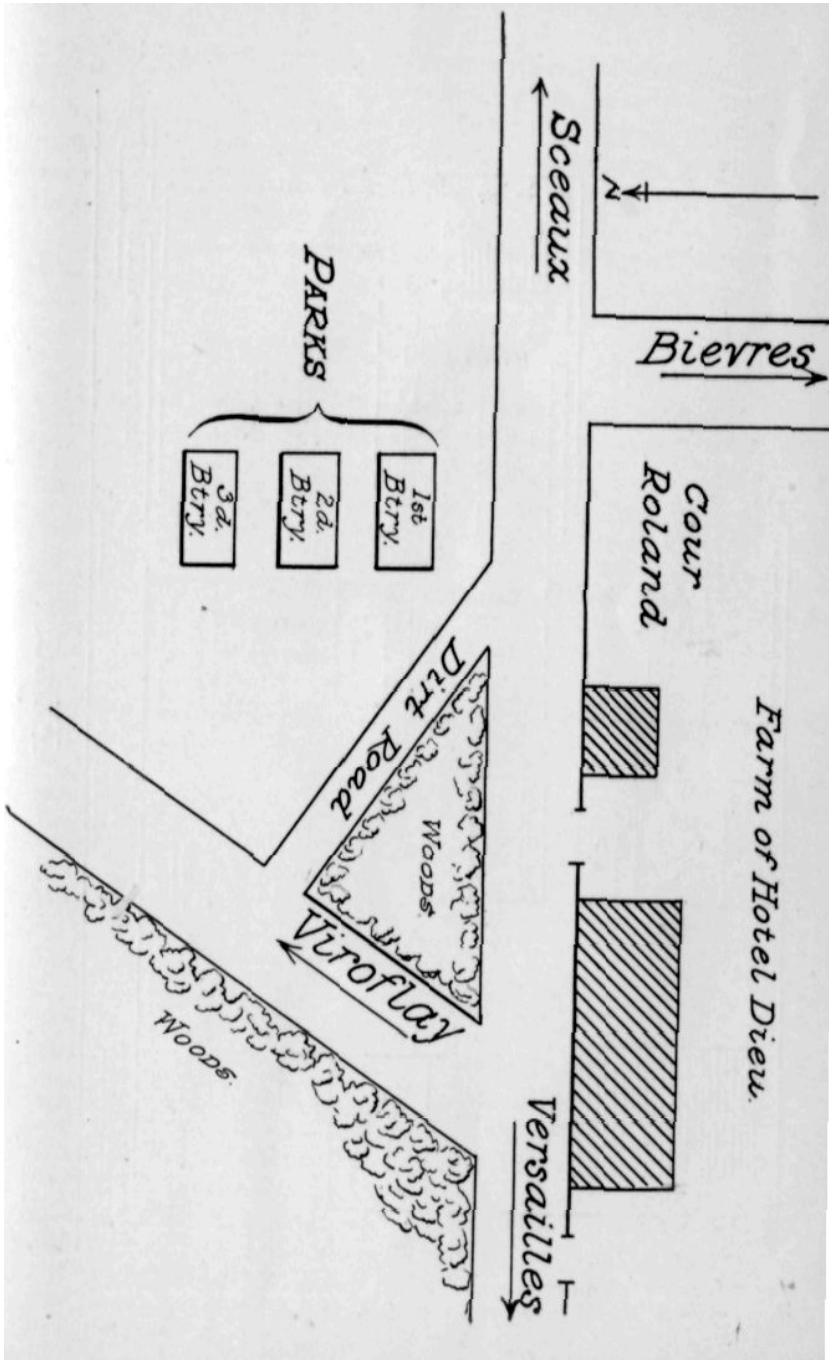

Farm of Hotel Dieu.
Cour Roland
Bievres
Sceaux
Versailles
PARKS
1st Btry.
2d. Btry.
3d. Btry.
Dirt Road
Woods
Viroflay
Woods

Fig.C.

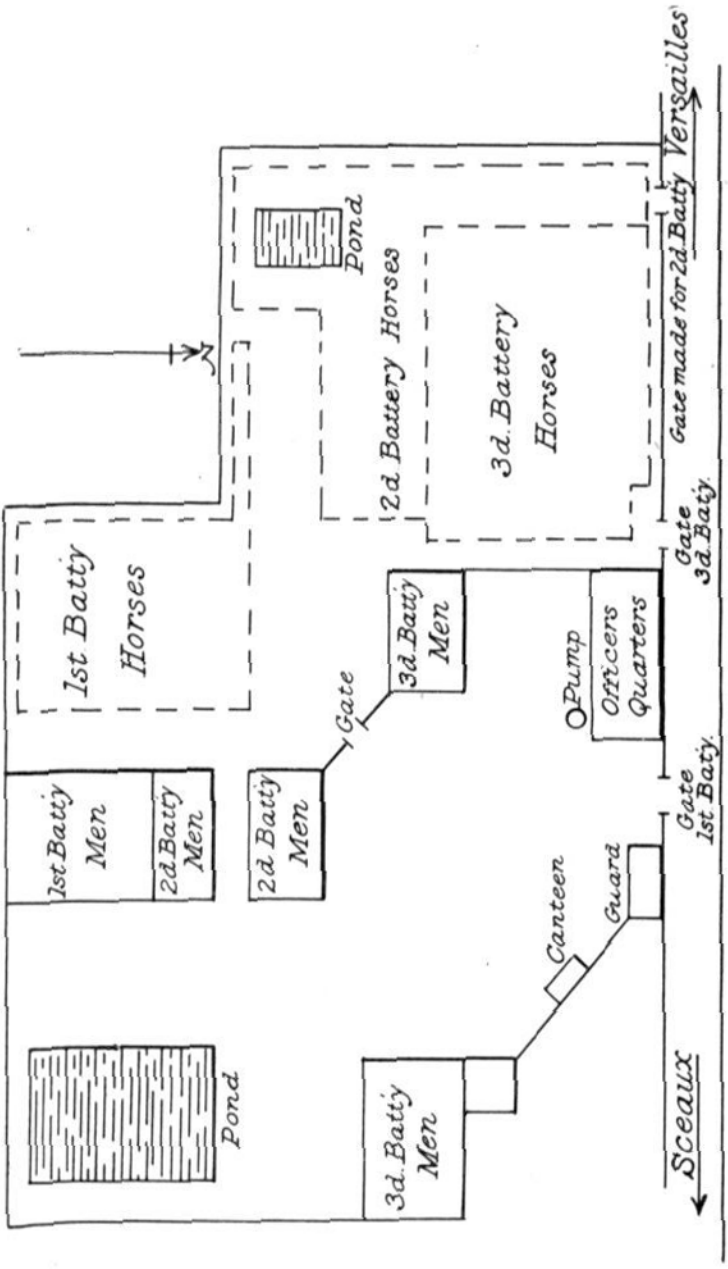

1st Batty Horses
2d. Battery Horses
3d. Battery Horses
Pond
Pond
Gate made for 2d Batty
Versailles
Gate 3d. Batty
3d. Batty Men
Gate
2d Batty Men
1st Batty Men
2d Batty Men
Pump
Officers Quarters
Gate 1st Batty.
Canteen
Guard
3d. Batty Men
Sceaux

Fig.C'.

barn. The enclosure which forms part of the farm can shelter the horses. They can be tied to lines stretched along the walls of the enclosure. The two existing gates will serve as exits for the 1st and 3d batteries. Part of the wall facing the road will be broken down in order to make an exit for the 2d battery. Each battery will thus have a separate exit and a special route for reaching its park. The ground and walls are divided equally between the batteries as shown in Fig C'.

The necessary water for the horses is furnished by a pond in the woods north of *Cour-Roland*, if the two pools situated, one in the court and the second in the enclosure, are insufficient. Drinking water is to be taken from a pump situated against the dwelling and supplied by a cistern of sufficient capacity—about 30 cu. m. The guard house is established in a lean-to to the left of the entrance gate. The officers are quartered in the dwelling, the battalion commander and his staff in the first floor and the battery officers on the floor above. All the men will be sheltered. The horses will be placed along the walls; they will thus be protected from the wind and are much better off than in the open field. The quartermasters receive the order to mark out the locations with cords and to assemble in the park at 6:55 p. m.

Report of the quartermaster of the 1st battery, as an example:

I. *Men*. To shelter the men the battery has available; a grain loft 20 m. long and 7 m. wide and, under this loft, a part of a stable about 15 m. long. The loft contains straw. The men of the 1st and 2d platoons will sleep in the stable in which straw will have been placed, those of the last platoons in the loft. The few men of each platoon who cannot be sheltered will be placed along and near the walls of the stable. A single window reached by a ladder is the only entrance to the granary. The quartermaster assisted by the corporal takes a hay rack from the stable and adds it to the ladder in order to facilitate the entrance to the granary.

II. *Horses*. 100 m. of wall and 30 m. of the wire fence are in the portion of the enclosure assigned to the battery. The three first platoons can each have 35 m. of wall or fence, the fourth platoon 20 m. of wall. The horses of each platoon will be tied to lines placed along the walls; those of the 4th platoon, which cannot find room along the wall, will be tied to lines stretched in rear.

Remarks of the director of the exercise. "The cantonment has been well established and the shelters have been used to their maximum capacity.

"The greater part of the men can sleep under shelter and the horses are tied to lines in the enclosure wall sheltered from the wind by the walls and woods.

"The lack of exits from the farm is an inconvenience. The officer in charge has taken care to remedy this by knocking down a portion of the wall to make a third exit. This portion of the wall having been knocked down each battery can leave the cantonment by a different exit and reach the park by one of the two roads leading to it. The enclosure is large enough to be used as an assembling point for each battery in case of alarm, and even in the middle of the night it is possible for the battalion to quickly take the road."

SECOND SERIES

Scouts

I. MARKING THE ROUTE

Situation. A battalion of artillery marching with infantry receives the order from the artillery commander to take up a position.

The battalion commander causes the batteries to clear the column, orders the scouts to mark his route in order that the batteries may follow and leaves on reconnaissance guided by the agents of communication from the artillery commander.

Execution. Purpose of the exercise. To teach the officers and special details to mark a route under the conditions of the situation.

Division of the exercise. The session has been divided into three parts in order to permit the director to point out the mistakes and to change the roles of the detail during the maneuver. (Three routes have been consecutively marked out. Plate 1, map scale 1:80,000).

1st. *Versailles—Hill* 183, north of the docks—*Buc—Les Loges*—Farm at the gate of *Loges*.

2d. Farm at the gate of *Loges—Les Lodges—Jouy-en-Josas—La Cour-Roland—Hotel-Dieu*.

3d. *Hotel-Dieu—Velizy—Hill* 83—*Viroflay—Porchefontaine—Barriére de l'Avenue de Paris*.

Measures in detail. At the beginning of each of the three parts of the session, the director of the exercise details an officer as the battalion commander, forms the squad of scouts behind this officer (at 10 m.), and represents with the remaining personnel the head of the first battery of the battalion. This having been done, he has the acting battalion commander give the following orders: To the senior battery commander: "Follow me; gait 8 to 10 km. an hour."

To the chief of scouts: "Mark my route."

These orders having been given the officer starts ahead at about 15 km. per hour on the route known only to himself and the director of the exercise.

The chief of scouts is then responsible for the direction followed by the batteries. He posts at each crossroad or side road a scout who is charged with showing the batteries which road to follow. The first scout left behind leaves as soon as he is seen and recognized by the commander of the column, goes ahead as rapidly as possible and joins the second scout whose place he takes. The second scout acts in the same way replacing the third and so on.

Remarks of the director of the exercise. At the end of the maneuver the director points out the mistakes in detail and makes the following general remarks:

"To sum up, marking the route is done in accordance with the following principles: The chief scout should follow the acting battalion commander at a distance of 10 meters in order not to lose sight of him and to always be at hand to hear his orders. The scouts should, for the same reasons, march immediately in rear of their chief. The chief scout should be sparing of his men, the acting battalion commander might need them for other duties than marking the route. However, he should not hesitate to place them at every place where it appears necessary to him in order to surely guide the column; but he requires that they return to him as quickly as possible.

"The method of successive replacement permits this result to be easily attained. Each scout having only short distances to cover followed by halts can go at very rapid gaits. If the chief scout is short of men he immediately reports it to the acting battalion commander; the latter must take the necessary measures in order that the chain on which the column depends is not broken.

"For this he can use two methods:

"*1st Method*. He slackens his gait, and asks by a preconcerted signal for more markers from the batteries; as for example the head gear held in the right hand, the arm in a horizontal position, then waved up and down. (Note: The head gear held vertically with the arm extended is retained as the signal to indicate 'Reconnaissance' which causes the battery commanders to report to the battalion commander). This is transmitted from scout to scout to the commander of the column.

"This method, however, greatly delays the battalion commander. Consequently it is inadmissible if this officer is urgently required by the artillery commander.

"In the latter case, the following method should be used:

"*2d Method*. The battalion commander gives to the last marker the order to have the column halt when it arrives at his position. He then continues to march with the chief scout. The latter afterwards returns to the place where the column has been halted in order to guide it to the position 'in readiness.'

"In order to be sure to be able to find the column again, the chief scout while following the battalion commander ought frequently to look behind him to impress upon his mind reference points which will aid him in retracing his route.

"To mark a long route with a limited number of scouts, it is necessary that the markers understand well that they must not content themselves with assuring the passage of the column by a point but also over a certain route.

"Consequently, at the indication of the chief scout (arm raised) given to the scout, who is to assure the passage of the column to the point where he is, the latter slackens his gait and follows for a short time the squad of scouts in order to see the direction taken; he then retraces his steps in order to take up the post indicated.

"He there waits for the following scout, or the head of the column if he is the first marker, and by a hand signal indicates the direction to be taken. He makes the signal at an opportune time in order that the one following (marker or commander of the column) may follow without hesitation."

II. RECONNAISSANCE

The director of the exercise conducts the details to the church square at *Ville d'Avray*, where he explains the purpose of the exercise in the following manner (Plate 1, map scale of 1:80,000):

"*General Situation*. A battalion of artillery is in alarm quarters; the battalion commander sends one of his staff officers on reconnaissance to obtain information in regard to the practicability of roads by which he can reach a given position.

"*Special Situation*. The battalion is in alarm quarters at *Ville d'Avray* where it has arrived at 11 a. m. I am going to consider in succession four of you as representing my staff officers, whom I will send on reconnaissance.

"I assume that this mission has been given you at 2 p. m., that you start an hour later, about 3 p. m., accompanied by a scout, and that you are given one hour to accomplish your mission. You should return at 4 at the latest and make your report at that hour.

Execution. Instructions of the battalion commander. The battalion commander designates officers in succession to whom he gives

the mission, indicating to them the actual time, about 6:45 a. m., and warns them that he will expect them at the point of departure at 7:45. He then explains to each officer the mission assigned him. The staff officers are supposed not to have a map with them, which is oftenest the case in the field. Each of them, as soon as he understands the route he is to reconnoiter, makes a sketch of it generally to a scale of 1:20,000 by consulting the battalion commander's map. This is the sketch which he completes during his reconnaissance. For instruction purposes, to gain time, each officer takes a sketch from his own map which he then gives to the director of the exercise.

Missions given. The following mission is given the first officer: "Reconnoiter the two following routes from *Ville d'Avray* to Hill 162 to the north of *la Saussaye*.

"*First Route*. The *Versailles* highway road passing between the two ponds of *Ville d'Avray* leading to Hill 162 by following a southwest direction.

"*Second Route*. The *Sevres* highway as far as the letter Y of *Avray*, road passing through the letter T of *Les Mortes* then to the crossroads situated south of *Mortes* and leading to Hill 162 by a full and a dotted line."

Missions of the same kind are given to three other officers.

Reports. At 8 o'clock the first officer has returned; he has been to Hill 162 by the first route and returned by the second. By the aid of the notes and the sketch that he has made on the road he makes a verbal report to the director of the exercise. We give here the first part of the report, that is the notes and the sketch (Fig. D) relating to the first route followed from *Ville d'Avray* to Hill 162.

General direction	Northeast, southwest.
Total distance of the road through the woods	About 1500 m.
Character of the road	National highway, then, after passing the two ponds, country road through the woods 6 m. wide. Numerous crossroads. Section column only can be used.
Practicability	The road is in bad condition.
Noticeable points	At 800 m. crossroad (*Petits Bois* road and the *Ville d'Avray—Viroflay* road) a sign post. *Viroflay* 1600 m., *Chaville* 1100 m. At 350 m. a Circle (road to *Jardy* and the roads from *Ville d'Avray* to *Viroflay* and to *Chaville*). Sign post: Farm of *Jardy* 2300 m., *Viroflay* 1150 m., *Chaville* 1200 m.
Surrounding terrain.....	The route is wooded and favorable to surprises.

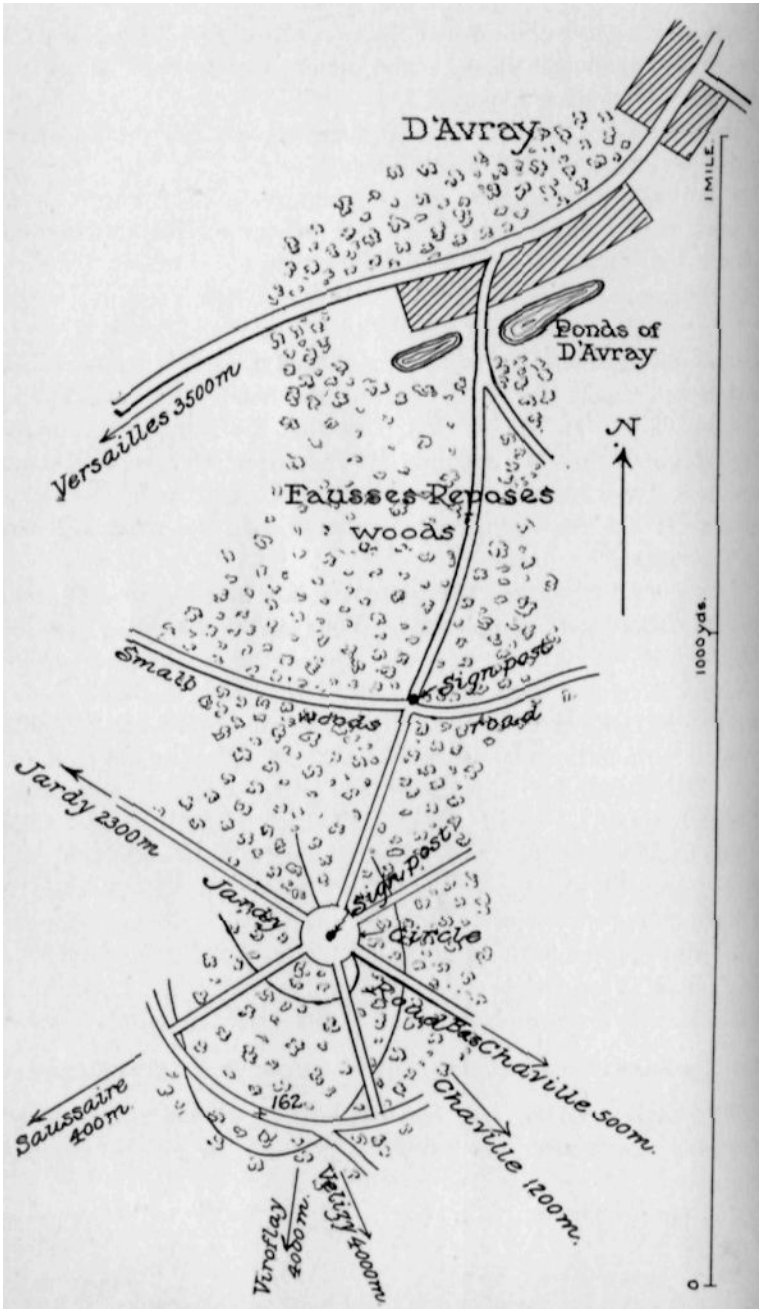


***Fig. D*. Route from D'Avray to Hill 162.**

Remarks of the Director of the exercise. After having heard the report and examined the notes and sketch of each officer, the director makes the following remarks:

In regard to the preceding route, the director of the exercise addresses the first officer in this way:

"You have carried out your mission very well. But I have to remark that your reconnaissance will not furnish the battalion commander all the necessary information on the condition of the road and the route to be followed.

"*First Observation*. Practicability of the road: between the two ponds and Hill 162 you have not followed a *road*, but a wood road, and besides, immediately on passing the ponds you have ascended a steep slope. It is most important that the battalion commander should know that his column will pass over very broken country which will demand the greatest effort on the part of his horses, and he should also know that after a heavy rain the road will barely be practicable for artillery.

"*Second Observation*. The route to follow in going from the ponds to Hill 162 is quite complicated. Your sketch should be free from all useless information: e. g. the distance from the circle to *Bas-Chaville, Chaville*, etc., and on the other hand, it should indicate clearly the best route to follow in such a manner that another officer, if need be, could surely conduct the column. You should have made a special sketch for each crossroad; your sketch is incomplete in the vicinity of the ponds. This error might result in the column, when caught in a bad road, being forced to make an about, which would not only cause a delay, but is also bad on the morale of the troops.

"*Third Observation*. Concealment: generally you would have to furnish information on the subject of concealment, but I have not asked it of you today since Hill 162 is in the midst of woods."

III. MARKING THE ROUTE. OBSERVATION OF THE BATTLEFIELD

The director of the exercises conducts the detail to the *Grille de Trianon* where, after forming them in circle, he gives them all the information concerning the session.

"*Program*. The exercise we are going to execute will comprise two parts.

"1st. An exercise in marking the route having for its purpose perfecting the scouts in their duties as markers. I will presently give you all the information necessary for the execution of this first part.

"2d. An exercise in observation of the battlefield having for its

purpose the preparation for their duties in observation which may be given the officers and non-commissioned officers attached for duty with the battalion commander. All the information necessary for the execution of this second part will be given later at a position occupied by a battery."

1st Part. Exercise in Marking the Route.

"*Situation*. The detail represents the head of the column of a battalion, the battalion commander, scouts, agents of communication, etc., then in rear the head of the first battery. Form in column in rear of me." The detail having formed in column on the road from the *Saint Antoine* gate to the *Allee Des Matelots*, the head of the column at the *Grille de Trianon*, the director of the exercise continues (Fig. E and Plate 1 scale 1:80,000). "At this moment Lieut. A arrives; he is the agent of communication from the artillery commander. Lieut. A, give me the order which you are supposed to bring me." Order from the artillery commander to the commander of the 1st battalion: "Reconnaissance. Have your batteries follow you as far as the entrance to *St. Cyr*, beyond which point they should not go. The artillery commander is on the dam of the *Bois Robert* pond to the south of *St. Cyr*." On receiving this order the battalion commander gives the following orders: To the senior captain. "Take command of the batteries. I leave in reconnaissance and will mark my route. Have the batteries follow me at a 8 km. per hour gait. The head of the column will halt at the entrance to *Saint Cyr*."

To the chief scout: "Mark my route."

In order to see how the route will be marked the director of the exercises remains with the head of the column. The chief scout marks the route taken by the agent of communication from the artillery commander. The latter makes the trip by himself, which in service, he would make with the battalion commander. At a signal from the director of the exercise the agent of communication starts out at a trot and follows the route given below:

Road through the park to the *Versailles–Saint Cyr* highway where it meets the *Allee des Matelots–Versailles–Saint Cyr* road and towards *Trappes* to a point two-thirds of the way up the ascent into *Saint Cyr;* thence by the left-hand road across two railroad tracks is the dike. From the end of the dike across country to the *Bouviers–Bois d'Arcis* road, thence to the *Troux* road, and by a dirt road leading to the crest, where the officer is supposed to find the artillery commander.

The chief scout with the squad of scouts follows the same route and marks it. The head of the column follows the route marked out. On arriving at the entrance to *Saint Cyr*, the officer acting as the agent of communication of the artillery commander, in accordance with special instructions from the director of the exercise, posts a scout whose mission it would be to give the commander of the column, on his arrival at *Saint Cyr*, the order: "Continue to follow the battalion commander with the batteries, same gait."

The head of the column reaches the position twenty minutes after the officer.

Remarks and instructions of the director of the exercise. The director of the exercise forms the detail in a circle around him in order to make his remarks on the subject of marking the route and to give his instructions for the second part of the session.

"*Remarks*. The marking has been well enough done, as the result sought, which is the arrival of the batteries at a given position, has been accomplished. But too many scouts were used in passing through *Saint Cyr;* one at the entrance, a second at the first crossroad, a third at the turn of the road leading to the dam and finally a fourth at the first road crossing after leaving *Saint Cyr*, and only 300 m. from the preceding scout.

"In place of four scouts, one only, or at most, two should have been sufficient for the route through *Saint Cyr*. On account of the distance the scouts were ahead of the batteries, the scout detailed for the entrance of the city could have easily gone to the exit and having noticed the direction taken by the battalion commander toward the dike could have returned to the entrance of the city before the arrival of the batteries. The chief scout must be sparing of his men. On arrival at the position to be occupied, the battalion commander will have need of scouts for other purposes—reconnaissance, observation, security, etc.

"I call your attention to the means employed by the battalion commander to transmit an order to the batteries by a marker posted at the entrance of the city of *Saint Cyr*. This marker allows all the other scouts to pass him, transmits the order which he has received and then takes the place of the first marker."

2d Part. Observation of the Battle-field.

"*Situation*. Our infantry firing line is in front of the depression between the *Saint Quentin* pond and *Troux*. It is engaged with an enemy which occupies *Montigny le Bretonneux* and the small woods

to the right and left of the village. The battalion is to go into action behind this crest. One battery is to take a position on the crest in order to fire on a body of infantry which is seen to the right and beyond *Montigny*. The two other batteries should take up a position in observation behind the crest in order to act as counterbatteries. It is assumed that the terrain in rear of the crest and to the left of *Montigny* is entirely out of view of an observer placed here; and hostile artillery might take position there and open fire on us, and especially on the battery on the crest, before we have suspected his presence. For this reason the observation of the field of battle is of great importance."

Orders given. In order to be informed in time of the entrance of the hostile artillery on the line, the battalion commander makes the following arrangements. He calls one of the staff officers to him and gives him the following order: "The terrain in front of us and to the left of *Montigny* is hidden from our view. Hostile artillery may take position there and not disclose its presence until the moment it opens fire. This is dangerous for the 1st battery which is to take position on this crest in order to fire on the hostile infantry. Take measures to see beyond this crest and warn me if the enemy's batteries are there already or are going to come into position there. Possibly, to the right in the trees, along this road (*Trappes* road) or in front of us about 500 m. in the edge of the woods (woods to the north of *Troux*) you may find a good observation point. Take three or four scouts with you to transmit rapidly your information."

Execution. The officer designated takes with him four scouts and sets out to find an observation point. The director of the exercise follows, having left a portion of the personnel under charge of an officer in the position to be taken by the battery. It is this officer's duty to record the information, which is sent to the battalion commander by the officer sent on the mission of observation. Let us now follow the latter officer. His route is marked on Figure E. He starts toward the *Trappes* road (first solution) but the deep railway cut stops his progress. As he sees that it would be impossible for a horse to reach the main road except by the grade crossing a little further to the rear, he gives up this solution and returns to the edge of the woods along the *Troux* road.

A tree attracts his notice; he thinks for a moment of using it for an observation station. But after hesitating a few moments he descends the slope, crosses the brook, dismounts at the first road crossing, climbs a straw stack and afterwards into a walnut tree. All

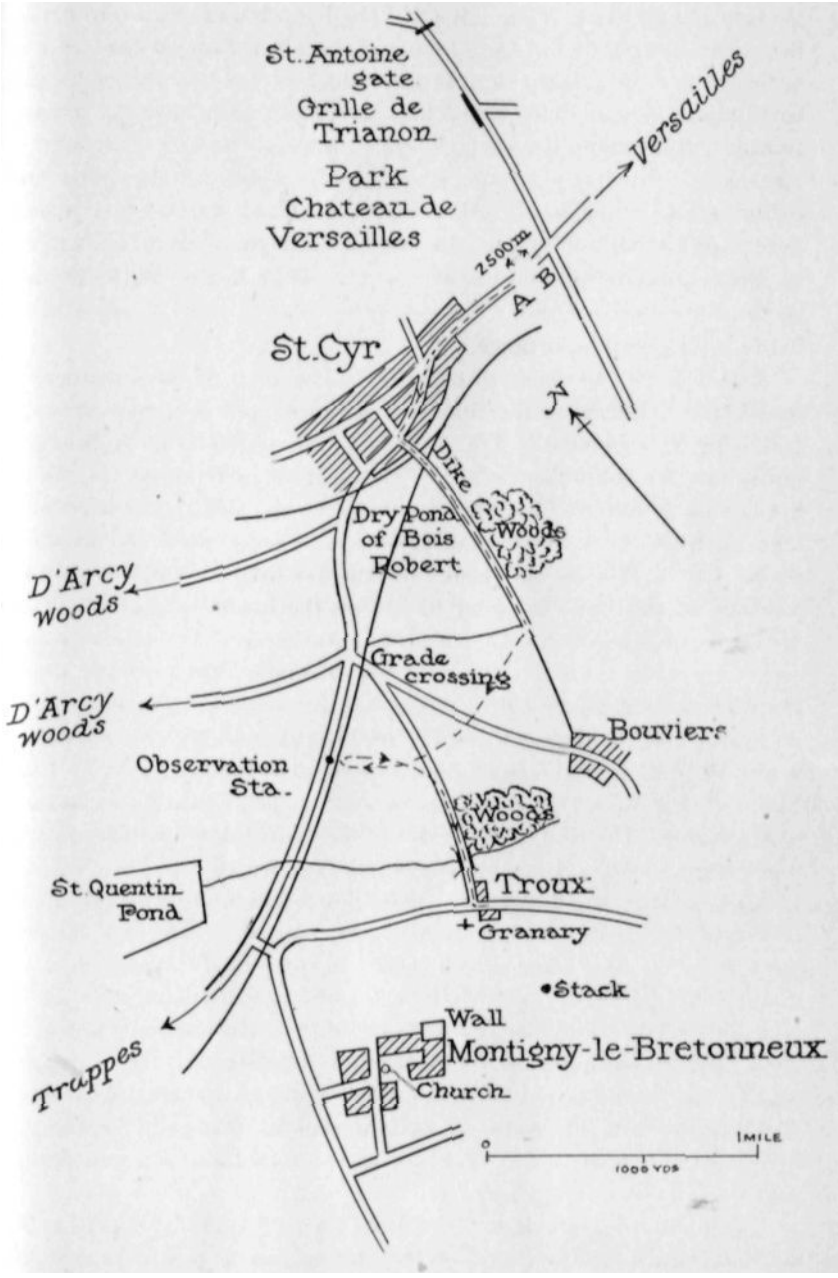


***Fig.E*. Exercise in the observation of the field of battle.**

these observation points are too low and the terrain in rear of the crest of *Montigny* is not seen better here than at the position of the battalion. At this moment a high building of the farm attracts his attention. It appears to him that an opening in a granary would make a good observation point.

He enters the farm, climbs to the granary with one of his non-commissioned officers and sees that he can clearly see from the window the terrain which he is to observe. He decides to remain in the granary and orders the non-commissioned officer with him to post a scout half way between the battalion and the farm near the bridge which he previously crossed.

The three other scouts are posted as follows:

The first in the granary with the officer;

The second remains available at the foot of the stairway in the court yard;

The third is the horse holder.

The director of the exercise allows the arrangements to be made, then, taking position near the officer, gives him in succession the following information, leaving between them a certain interval of time.

"I see a body of hostile infantry near the highway to the right and beyond the belfry of *Montigny*."

"This detachment leaves the road and moves behind the village."

"A group of mounted men arrives behind the crest to the left of *Montigny*."

"Judging from the movements of these mounted men, they are probably an artillery reconnaissance party."

(At this moment the officer, in writing, sends this information to the battalion commander:

"*An artillery reconnaissance party is to the left of Montigny*.")

"I see an artillery column to the right and rear of *Montigny*."

"A column (battalion of infantry) is moving towards *Montigny*."

"A body of infantry in mass (2 or 3 battalions) is to the left and rear of *Montigny*." (This new information is immediately transmitted in writing as before: *A battalion of infantry is moving toward Montigny, two others are assembled to the left rear of the village. A column of artillery is marching on the Trappes road*.)

"The column of artillery leaves the road and moves behind *Montigny*."

"Mounted men return to the position previously reconnoitered."

"Batteries are coming into line in rear of the mounted men. I count three batteries."

(The officer now sends the following information: "*Three batteries are very probably coming into action to the left of Montigny*.")

At the moment that this information is to be sent off, the battalion commander says to the officer: "Give in a more exact manner the probable position of the hostile artillery." The officer then adds to his note after "to the left of *Montigny*":—

"The probable position of the artillery center is marked by a small isolated hay stack to the left of Montigny."

At this moment the director concludes the exercise. He calls the attention of the personnel present to the long wall of the enclosure at the northern edge of the village to the right of the assumed emplacements for the artillery and returns to the position taken up by the battalion to give his remarks to the personnel on the subject of this second part of the exercise.

Remarks of the director of the exercise. "I have two remarks to present, the first relating to the choice of the observation station. and the second on the subject of the use made of the station chosen.

"*Choice of observation station*. The station chosen, the granary of the *Troux* farm, allows of perfect observation of the terrain in rear of the *Montigny* crest; but it has grave defects on account of its position relative to the two contending artilleries. It is far from the batteries (1000 m.), consequently the information sent to the battalion commander risks arriving too late, or even not at all. It is much too near the enemy, in a farm which would certainly be occupied by our infantry, would be difficult of access and where bullets would rain. It is from 300 to 400 m. to the left of the probable line of fire of the batteries; this would explain why the information in regard to the positions of the hostile batteries has now become useless.

"To judge of this, look at the crest to the left of *Montigny*. The aspect of the landscape is quite different. The hay stack is still visible, but it appears now very much to the left of the center of the hostile batteries. Finally, from another point of view, the station has a serious fault. A station established for observation of the battlefield is often used for direction of fire. It would necessarily be so in this case. The hostile batteries will probably not take position on the crest. They will probably take dismounted, mounted or even flash defilade.

"The granary of the *Troux* farm cannot be used for a station for observing the fire; it is too far from the batteries.

"The trees in the woods to the north of the farm are also too far away to furnish a station for both observation and direction of fire.

"I should say that it would be preferable to choose the highest and most accessible tree which borders the *Trappes* road. This tree is hardly more than 100 m. to the right of the battalion; it allows an elevation of about fifteen meters to be taken and makes an observation station which has a more extended view than the granary. It is true that it is separated from the batteries by the deep railway cut, but this cut is not an obstacle if we use dismounted men for communication.

"*Use made of the station chosen*. The information sent the battalion commander has been in a measure suitable and sufficiently exact except as regard the position of the hostile batteries. While the battalion commander has required Lieut. A to clearly indicate the positions, the latter has sent him useless information. We will see why.

"Could the lieutenant have done better? I consider that in general it is very difficult, not to say impossible, for an officer sent to observe the battlefield to answer questions similar to those given, especially if his station is far from the batteries. But on varied terrain each exercise is a particular case; well, in the present case it was possible to send the battalion commander exact information. You see in front of the belfry of *Montigny* the wall which I have previously pointed out to you. This wall placed as it is on the crest, constitutes a true unit of measure and a unit independent of distance. For if at 100 m. the interval between the center of a line of hostile artillery and the left corner of the wall is four times the length of the wall, it would be equally the same at 2,000 m., 3,000 m., etc.

"The following would absolutely inform the battalion commander: 'The interval between the center of the artillery and the left corner of the wall in front of *Montigny* is four times the length of the wall. I estimate the front of the artillery as twice the length of the wall.'

"*Conclusion*. Today's session has shown you the importance of similar exercises. With only the information sent by Lieut. A the battalion very strongly risks being surprised by hostile fire. On the contrary, an experienced officer would have chosen one the trees along the *Trappes* road for his observation station and transmitted sufficiently accurate information in time to enable the battalion to open fire at the moment the hostile batteries arrive; and if they

remain behind the crest he can from his station, by simple signals, aid in the adjustment of fire."

Having finished these remarks, the director of the exercise takes the entire personnel to the *Montigny* crest to verify his conclusions.

IV. MARKING THE ROUTE, SECURITY OF ARTILLERY POSITION

General Situation. A battalion marching with the advance guard receives an order to take up a position in front of the infantry. The battalion commander uses his scouts to mark his route and to assure the security of his batteries against surprise during reconnaissance, the occupation of the position and during the first firing until the arrival of the infantry abreast of it.

Purpose. The principal purpose of the exercise is to show the detail how the security of the batteries can be assured under the conditions of the preceding situation.

1st Part of the Exercise. Marking the Route.

The director of the exercise acts as battalion commander. He conducts the personnel to the crossing of the *Marly–Saint Cyr* and the *Porte de Bailly* roads. (Plate 1, map, scale 1:80,000 and Fig. F.) He there posts them as in the preceding exercise to represent the head of the column of a battalion and explains the situation.

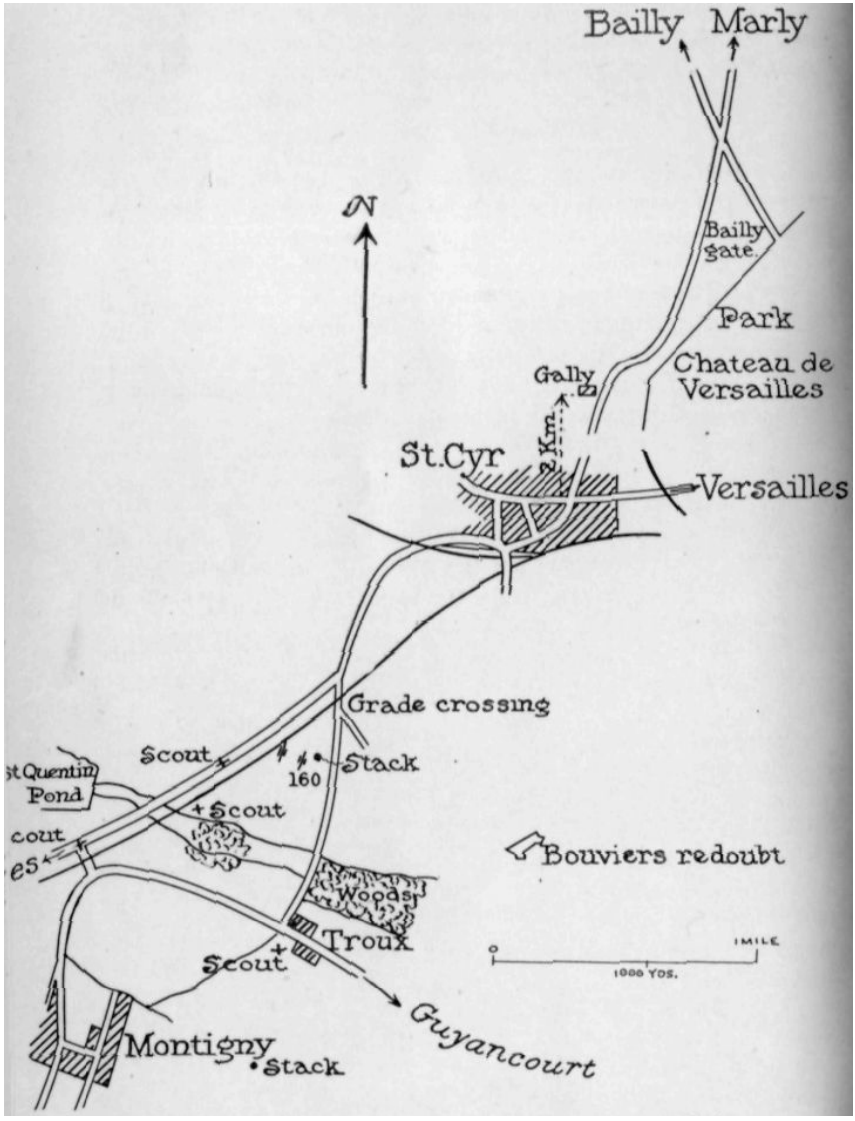
"*Situation*. The batteries marching with infantry form the advance guard of a division. The column marches from *Marly* toward *Saint Cyr* and *Montigny*. We will start out at a walk as if marching with infantry."

Maneuver. When the head of the 1st battery reaches the *Gally* farm an agent of communication brings the battalion commander from the artillery commander the order:

"Reconnaissance. Have your batteries follow you as closely as possible." The battalion commander then gives the orders: To the senior captain: "Take command of the batteries. Clear the column and follow me, gait 10 km. per hour." To the chief scout: "Mark my route."

Having given these orders, the acting battalion commander reports at a rapid gait to the artillery commander guided by an agent of communication of the latter. The scouts mark the route; they are followed at a distance by a squad of mounted men representing the head of the batteries. This squad marches at 10 km. per hour and is supposed to pass the infantry column.

The acting battalion commander takes the following route: *Gally–Saint Cyr–National Highway* towards *Trappes* as far as the grade



***F*. Exercise in security of artillery in position.**

crossing of the railway 1 km. southwest of *Saint Cyr*, then along the macadam road beside the railway to reach crest 160, where he is supposed to see the artillery commander.

2d Part of the Exercise. Security.

The battalion commander assumes that he has received from the artillery commander the following instructions which determine the situation for the second part of the exercise. "Position for the batteries behind this crest, dismounted defilade, right on the railroad. Concealed occupation of position in order to take a position in observation. Zone of fire: the outskirts of the village of *Montigny*, extending to the left as far as that hay stack. I have no exact information of the enemy. I know only that he occupied *Montigny* and that one of his columns is on the *Trappes* road. Some mounted men are in front of me. The security of the artillery must be assured while waiting the arrival of the infantry abreast of it, which cannot be for ten minutes."

Description of the terrain. The terrain immediately in front of the position to be occupied by the batteries is entirely concealed: it is formed by the bottom of a valley drained by the stream which is the outlet of the *Saint Quentin* pond. To the right the deep railway cut ends the position and the trees along the highway limit the view. To the left the view is also limited by a large farm (*Troux*) and a wood.

Execution. On his arrival at the position, the director of the exercise calls to him the officer who is to establish the service of security and gives him the orders: "The battalion is going into action behind this crest. I mark the center of the position. Establish as soon as possible the security of the batteries in such a manner as will prevent a surprise. I place the scouts at your disposal; you may use them as they join you." He then adds the following information: "In looking around to size up the situation, you find that the enemy is entirely invisible, but I warn you that *Montigny* is already occupied. On our side you see that a column of infantry is leaving *Saint Cyr*. The first infantry scouts are 500 m. behind you; they are arriving at the grade crossing. Some mounted men in front of us at *Quatre Paves* and at *Troux* are engaged with the enemy." In the execution of the foregoing order the officer makes the following arrangements:

He sends forward a scout on the road along the railway. The latter has orders to search the bottom of the valley and report

immediately if he sees any hostile troops dangerous to the batteries Since the deep railroad cut prevents his returning to the *Trappes* road he turns toward the grade crossing, shows it to two scouts and orders them to reach the highway. In compliance with these orders, one halts on line with the position to be occupied by the batteries, the other goes forward as far as possible on the road without losing sight of his comrade. When the officer has two other scouts available, he conducts them to the left. He leaves the first at the corner of the woods and the other near the *Troux* farm. The first is so placed as to see the batteries and the scout at the farm at the same time. The security being thus assured on the left, the officer verifies the positions taken by three other scouts in front and to the right of the battery position. He completes, if need be, his first orders and goes back to the position where he is to report on his mission to the battalion commander.

Remarks of the director of the exercise. The director of the exercise, as soon as he is joined by the remainder of the detail, explains the arrangements made by the officer (Lieut. A) who was ordered to establish the security of the batteries. He then goes to the scouts and proposes situations which would probably take place on the battlefield, in order to verify more or less the efficiency of the service of security which has been established. Figure F shows the positions of the scouts and allows the remainder of the maneuver to be easily followed.

The director of the exercise asks the scout stationed near the woods the following questions: "Suppose you should suddenly see marching on this road (*Troux* road) toward you a squad of 30 to 40 hostile cavalry, what would you do; whom would you report to if you did not immediately meet Lieut. A or the battalion commander?" This question showing that Lieut. A had failed to indicate the point where he intended to be in order to receive the information brought by the scouts, the following observations are made:

"It is rarely possible for an officer charged with establishing the service of security to indicate where he expects to remain. But this is how the lieutenant could have proceeded in the present case. Immediately on returning to the position, he should have looked for an observation station from which he would see the terrain in front and the scouts. This hay stack to the left could make an observation station conforming exactly to these conditions. We will go to the different scouts; you can verify that the hay stack is

seen by all of them. By occupying this observation station. Lieut. A could himself observe the enemy and cull the information sent by the scouts. Only in case of urgency, for example, when a body of cavalry gallops after a scout, in which case he reports to the first officer he sees, all information should come to the lieutenant. He must sift it and send to the battalion commander only that which is important for him to know. If the service of security is to be established for some time, the lieutenant informs the scouts of his observation station, and, for accelerating transmission, even agrees on certain signals with them."

To the farthest scout at *Troux*. "You see a hostile mounted patrol of two men leaving *Guyancourt* and marching toward you. Where are you going? Our infantry has arrived abreast of the position of the batteries. What are you going to do?" To Lieut. A on arriving near the scout sent to the front of the batteries: "The position of this scout should have been rectified. He has had to come this far in order to see the terrain in the dead angle, but after having assured himself that no enemy was hidden behind the ditch and the trees which border it, he should have chosen another position as near the batteries as possible from which he could quickly signal the arrival of the enemy. Besides, after occupying the hay stack, the lieutenant could have had this scout return as he has now become unnecessary. I call your attention to this recall of a scout which is only the application of a general rule.

"You have to establish the security of a battalion in a country scattered with cover, bunches of trees, ditches, farms. etc., which might conceal the enemy. You have these covers searched by your scouts, but if you could have found, near the batteries, an observation station from which you could see the surrounding terrain and the means of approach to these covers, you could have assured security by an observation station only and recalled all the personnel previously sent in reconnaissance."

To Lieut. A, with reference to the manner in which the service of protection was established on the *Trappes* road: "The scout placed at *Quatre Paves* between the dike of the *Saint Quentin* pond and the railway embankment is poorly situated to observe alone the surrounding terrain; I would have placed two scouts there. I would not, for that reason, have omitted the scout who is on the right of the batteries. Only instead of leaving the latter on the road, I would have placed him on the same side of the railroad cut as the batteries. Thus he could report instantly the information which had been transmitted to him verbally across the cut."

Finally the director of the exercise, on arriving at the hay stack, expresses himself thus: "In conclusion, in a case similar to that of today, the lieutenant charged with establishing the service of security, that is to say, of preventing the surprise of the reconnoitering personnel and then of the batteries, should apply the following principles:

"Search the dangerous points in the order of their importance. As soon as the indispensable measures have been taken, rectify the positions taken by the scouts. complete their instructions. look for an observation station, establish yourself there and recall the scouts which have become unnecessary."

"It goes without saying that the observation station is chosen in the first place to assure security, but it is also used for observing the battlefield and reporting the results of the fire. In reality in most cases the same station is best suited for these three objects. That is the case with the hay stack.

"If, at the present, we separate the exercise into that of reconnaissance, of security, of observation, etc., it is only that it may be better understood by you. Later will come more complete exercises in which you will be asked to make at the same time the arrangements necessary for security, for establishing the observation of the battlefield, reporting the effect of fire, directing the reconnaissance for a change of position, etc."

V. RECONNAISSANCE. MARKING THE ROUTE. SECURITY

General Situation. A battalion with the advance guard of a division is in battery. Foreseeing a change of position, the battalion commander has the means of communication around the position reconnoitered. The battalion receives the order to occupy the new position. The battalion commander leaves in reconnaissance, making use of his scouts to mark his route and after having arrived at the position to assure the security of his batteries against surprise.

1st Part of the Maneuver. Reconnaissance.

Situation. The battalion is part of a column marching from north to (the) south via *Chaville-Velizy-Bievres*. At 6:30 it is in position (Fig. G) east of *Hotel-Dieu* in the angle of the *Sceaux* and the *Bievres* roads. It has for its zone of observation the interval between the edge of the *L'Homme Mort* woods and the tower of *Gizzy*; the *Chateau de Monteclin* marks the center of the zone. Foreseeing a change of position of the battalion the major orders Lieut. A to

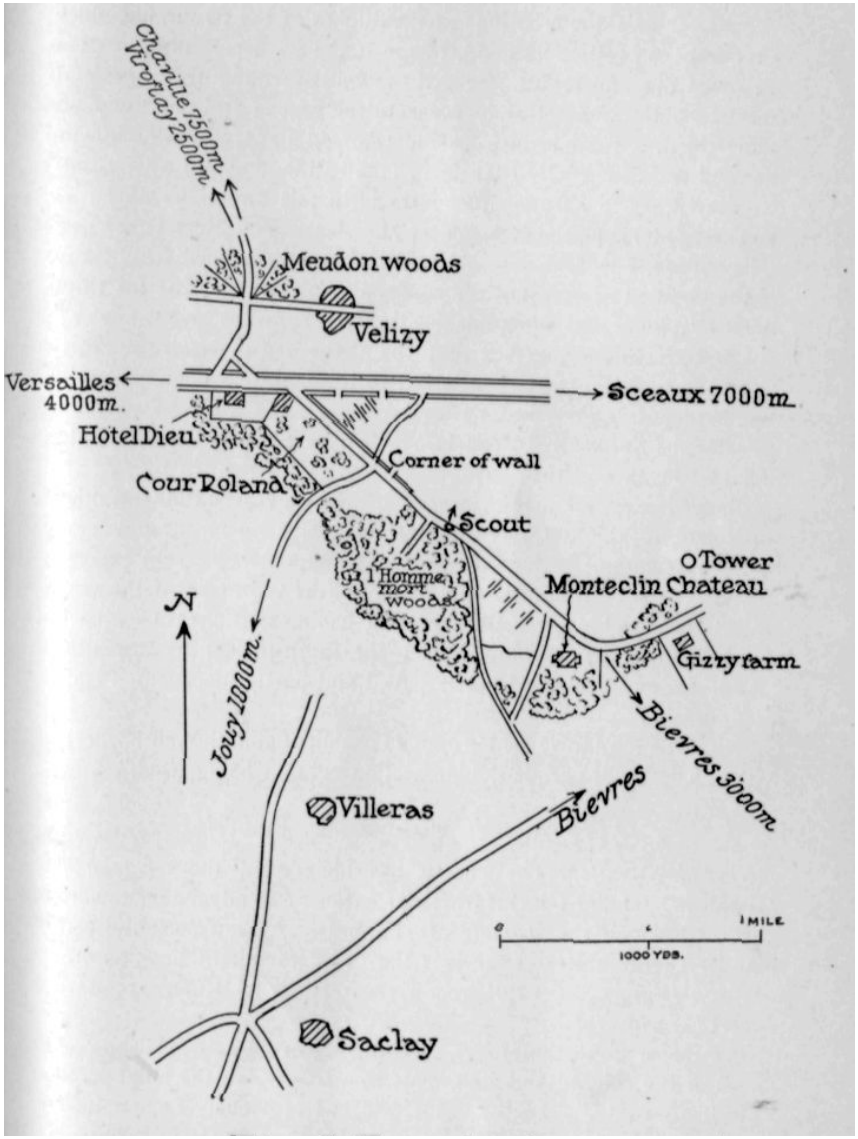


Fig.G. **Exercise in reconnaissance.**

reconnoiter first, the crossings of the ditches of the two roads which surround the position; second, to see if the road running from the corner of the wall (south angle of the wall surrounding the park of *Cour Roland*) is practicable for artillery and if it joins the *Jouy* road; third, a road leading to the *Chateau de Monteclin*; fourth, the road from the *Hotel Dieu* farm (the battalion commander points out the farm) to *Viroflay* (*Viroflay* is in this direction) as far as the passage through the *Meudon* wood.

Execution. Lieut. A himself reconnoiters the immediate vicinity of the position and orders the reconnaissance of each of the three roads by two scouts from each battery (a sergeant and a bugler). The last reconnoitering party returns at the end of twelve minutes. The following information is given to the battalion commander by the lieutenant.

"1st. The *Sceaux* road can be reached by two small bridges, the first at 200 m. and the second at 400 m. from the crossing of the two large highways. The *Bievres* road can be reached by two other small bridges; the first abreast of the wall of the *Cour Roland* park, the second 200 m. south of the first.

"2d. The road towards *Jouy*, which leaves the angle of the park wall, is practicable for artillery, but it has a steep slope which will require its descent at a slow walk for a length of 300 m.

"3d. An excellent road partly paved and partly macadamed leads to *Monteclin*.

"4th. The road towards *Viroflay* is excellent and, though bordered with ditches, will permit double section column being used."

2d Part of the Maneuver. Marking the Route.

Special Situation. The enemy has abandoned the *Chateau de Monteclin* and the *Gizzy* farm; our infantry is advancing towards *Bievres* through the *Homme Mort* woods. At 7 o'clock the commander of the batteries receives the order to take a position west of *Monteclin* in order to fire on the plateau of *Villeras* and the *Bievres–Saclay* road.

The major gives the orders. To the senior captain: "Take command of the column and follow me at a trot." To the chief scout: "Mark my route." To the scout who has previously reconnoitered the road to *Monteclin:* "Guide me." He then starts in reconnaissance. Abreast of the north corner of the *Homme Mort* woods he leaves the road and takes the dirt road following the edge of the woods. The chief scout raises his arm. The bugler of the 3d battery

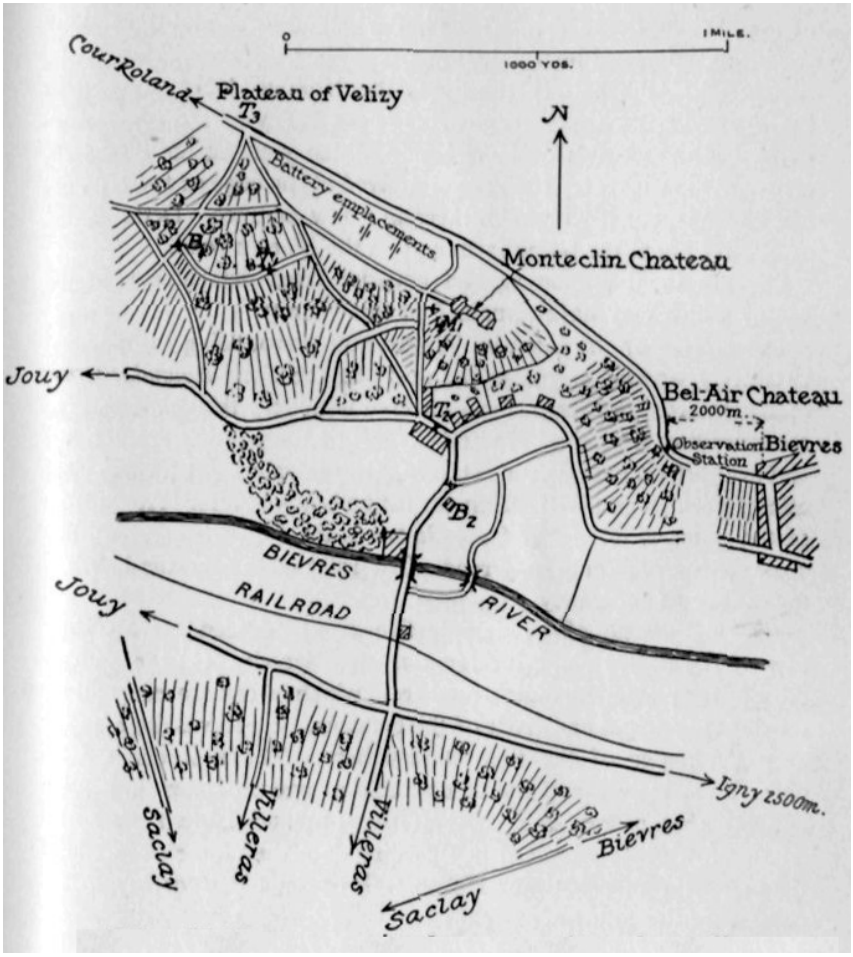


***Fig.H*. Exercise in the security of artillery.**

takes his place as marker. The major arrives at the new position. The bugler is himself sufficient to secure communication between the batteries and their commander.

3d Part of the Maneuver. Security.

Situation. The commander makes his reconnaissance and assigns positions for batteries in the triangle formed by the *Bievres* road, the edge of the *Homme Mort* woods and the wall of the *Monteclin* park (Fig H). He calls up Lieut. B, to whom he assigns the duties

of establishing the security of the batteries and gives him the following information and instructions:

"Here are the battery positions, the *Homme Mort* woods and the *Monteclin* park. In front of us is the valley of the *Bievre* and beyond it the plateau of *Villeras*, on which you see hostile troops retiring. Our infantry has not yet arrived at the edge of the *Homme Mort* woods, but it will reach there in a few minutes. Detachments of cavalry are at the *Gizzy* farm and on the *Bievres* road.

"Secure the battalion against surprise from detachments of the enemy which may have remained in this vicinity."

Description of the Terrain. The terrain surrounding the position is entirely wooded except to the north of the *Cour Roland–Bievres* road. In front are steep slopes covered with very thick woods. The roads leading from the right and the left of the position are winding and are just practicable for artillery. In the valley are several large estates with large parks which form numerous covers. At the foot of the slope on one side of the *Bievre* is the *Jouy–Bievre* road and on the other the *Jouy–Igny* road. The railroad is near the brook in the middle of the valley.

Execution. The officer taking five scouts descends with them toward the *Bievre* along the *Homme Mort* woods. On the military crest of the plateau he finds a road from which he can see easily all the terrain to the right and front of the batteries. He leaves the corporal and the bugler of the first battery here. The first chooses his observation station and the second acts as agent of communication between the corporal and the batteries (B' and T' in the figure). The security being assured in this direction, the officer proceeds to the left near the chateau. He posts his scouts in order from the chateau at the following points:

Terrace of the chateau, a sergeant (M'); at the crossroads on the *Jouy–Bievres* road, a bugler (T') and a corporal (B') farther to the front, in such a way as to see the two bridges of the *Bievre* and the part of the road towards *Bievres* which is hidden from the view of the sergeant M'.

This service having been established, the officer looks for his observation station. As he does not find one actually available, he returns to the battalion commander to whom he reports the rarangements he has made.

Remarks of the director of the exercise. The director of the exercises with a portion of the personnel goes over the terrain in front of the position in order to examine in detail the arrangements

which have been made by the officer in charge of establishing the service of security. As in the preceding sessions, he questions the scouts with a view of assuring himself that they are capable of carrying out the duties assigned them. When all the personnel are again united at the position of the batteries, the director thus makes a general criticism of the maneuver:

"Today's session includes three distinct exercises—Reconnaissance, Marking the Route, and Security. The reconnaissances have been well made. The result desired was obtained, since twelve minutes after the order was given the officer, the battalion commander had all the necessary information. However, I will point out some errors.

"There were four reconnaissances to be made. The lieutenant who was in charge of them should have reserved for himself the one which was, at the same time, the most dangerous and the most important. In other words, he should have reconnoitered the road leading to *Monteclin* instead of the small bridges crossing the ditches. A corporal or bugler would have been sufficient for the latter mission. Lieut. A has acted in this way in order not to be far from the position and to be able to consolidate the information required by the battalion commander. In my opinion, the reasons given for not personally conducting the reconnaissance toward *Monteclin* are not good. We must always act in these exercises as if we were in the field. If this habit had been well acquired Lieut. A would certainly have gone toward *Monteclin* since he had two reasons for it, one of which alone, the danger to be run, would have been sufficient to make him choose it.

"Another remark: Lieut. A, you have sent two scouts in each of three directions. Two were necessary for the reconnaissance towards *Monteclin* but one was sufficient for the two other directions.

"The enemy has just abandoned the chateau of *Monteclin*. The scouts sent in this direction are exposed to being fired on. One or perhaps both might be killed. By sending two scouts you have more chance of receiving information, but on the condition that they march at some distance from each other. The scouts which were sent toward *Monteclin* made the mistake of marching side by side.

"The marking the route was very easy and does not require remark.

"The service of security on account of the short distance between the two positions should have been established very rapidly. Lieut. A

should have arranged to have this service in operation at the moment the batteries arrived, which is a particularly dangerous time. He should not have tried to post all the scouts himself. He should have given some of them simple and concise orders, such as: 'First battery; corporal and bugler. Observe the terrain in front and to the right.' The other scouts, 'follow me.' The corporal and bugler of the first battery would have, on their own initiative, rapidly found a post which seemed to them most favorable for carrying out their mission. Lieut. B should himself post the scouts on the left. The posting of scouts on this side seems more difficult and at the same time more important.

"Then, after having gone over all the terrain, he could, on returning to the batteries, have rectified the posts of the scouts and looked for an observation station. No observation station was found by the lieutenant. There are none near the position of the batteries. The scouts having been posted, the officer had only to stay near the batteries ready to go forward to receive information from the scouts. No scout was placed on the *Bievres* road. That was a mistake. Perhaps the lieutenant ordered this because he was warned that a detachment of cavalry was on this road. This information should not have hindered him from assuring security on this side, as the cavalry might occupy this point only momentarily. The service of security should be limited to that which is strictly necessary without posting the scouts at too great distances. It should be very simple, and it is necessary to guard against transforming it into the duties of outposts which should not be taken up by the artillery non-commissioned officers. Nevertheless, it should be complete and independent of the positions occupied by the infantry and especially of the cavalry since these positions are apt to change from moment to moment."

The criticism of the first part of the exercise having been completed, the director of the exercise calls up Lieut. C and gives him the order and instructions given below: "As we are on particularly favorable terrain, I am going to ask you to assure the security of the battalion. It occupies the same position but the situation is different.

"*Situation:* The battalion occupies the same position as formerly, but this time no service of security has been established. The situation is as follows: Our first line of infantry is in the *Bievre* valley beyond the river along the macadam road; the infantry reserves are besides us. It is necessary to retreat. *Velizy* has been indicated

as the direction for the march to the rear. The battalion has for its mission the support of our rear guard; to do this it receives the order to remain in position as long as possible without, however, sacrificing itself as far as being obliged to abandon its matériel.

"*Order*. Assure the security of the battalion in such a way as to allow it to remain in action as long as possible."

Execution. Lieut. C takes six of the scouts with him and goes to the main road. He sends on this road, to the right in the direction of *Cour Roland* and to the left in the direction of *Bievres*, two scouts (a non-commissioned officer and a bugler) with the order to find an observation station and warn him or the battalion commander when anything threatens the batteries.

He then goes toward *Bievre* with the two other scouts and posts them at places previously occupied for observing the two bridges (T" and B" in the figure). He then returns to the position of the batteries where he is ready to receive information.

Remarks of the director of the exercise. The director of the exercises leads all the personnel to the *Bievres* road, stops near the scouts and makes the following remarks on the subject of the manner in which Lieut. C has conceived his mission:

"I do not approve of the solution adopted by Lieut. C. In the preceding case Lieut. B had to assure the security during reconnaissance, the occupation of the position, and during the first firing. For that, he searched the covers and rapidly threw out a sort of network of security around the batteries.

"That solution was suited to the concrete case, but the problem given Lieut. C demands an altogether different solution.

"In the first case Lieut. B must rapidly find a solution; in the second case of Lieut. C, there is no urgency since our infantry is still near the *Bievre*.

"In the first case the covers must be searched, which is out of the question in the second case, since our infantry occupies them.

"In the first case it is necessary to establish a very close network of security, since it was impossible to search all the covers and the enemy could have crept up near the batteries, which is not the condition of the second case.

"The problem consists only in finding the best means to employ in learning the movements of the enemy and determining the moment when the limbers will have to be brought up without delay. For this purpose it is, in general, sufficient to occupy one or several suitably chosen observation stations. The lieutenant takes the post

which he considers the most important and informs the battalion commander at the proper time of the movements of the enemy which might compromise the retreat of the batteries. By placing himself here, 800 m. from *Monteclin*, the lieutenant would be in the best position.

"You see, for a length of nearly 4 km. the railroad from *Jouy* to *Igny*, a large part of the course of the *Bievre* and the small *Jouy-Bievre* road, running along the foot of the slopes, and even certain parts of the roads, clearings and woods which surround the position of the batteries. You can, so to speak, count the enemy as they cross the *Jouy-Igny* road, the railroad, the *Bievre* and as they reach the foot of the slopes. Consequently you are able to give the battalion commander at the proper time the information which will allow him not to leave his position until the last moment. This is, for example, when a body of infantry, about one company strong, should begin to ascend the slopes of the *Monteclin* park.

"In conclusion, the solution consists in finding this observation station.

"How could Lieut. C have proceeded to arrive at this result?

"I have asked myself this question and this is how I would act. The order from this battalion commander is given at the position of the batteries. In this position I look for an observation station. The belvedere on the top of the Chateau of *Monteclin* attracts my attention. On approaching it I see that trees in front of it screen the bottom of the valley. I then think of making use of the Chateau *Bel Air* and while going there I have discovered this observation station."

VI. RECONNAISSANCE. MARKING THE ROUTE. SECURITY OF ARTILLERY ON THE MARCH AND IN. POSITION

General Situation. A battalion commander foreseeing a change of position has the roads which he may have to use reconnoitered. In order to reach the position assigned him, he is obliged to make use of a route situated on one flank of the zone of terrain occupied by the infantry in such a way that he fears being surprised by a hostile party during part of his advance march. He posts his scouts for reconnaissance, for marking the route and to secure the batteries from surprise during the march and while occupying the position.

Special Situation. The artillery commander sees friendly infantry occupy, in succession *Jouy, Petit Jouy* and *Les Loges* (*Fig*. I). His batteries are in position to the east of the *Colbert* bridge and have

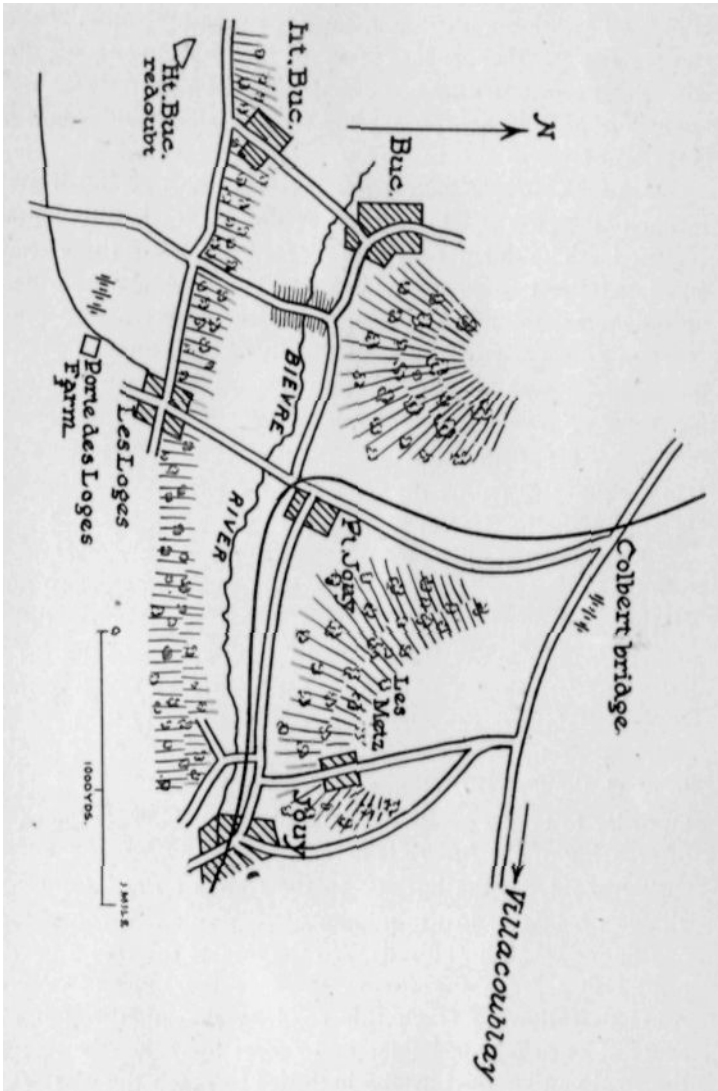


Fig. I. **Exercise for TERRAIN scouts.**

been firing on *Les Loges*. Foreseeing that he will receive the order to take position beyond the *Bievre*, he has the crossings of this stream reconnoitered. After the return of these reconnaissance parties he received the order to bring one of his battalions on line with the *Porte des Loges* farm. Giving to this battalion the order to follow at a trot, he, with the battalion commander, starts out in reconnaissance; the latter has the route marked. The director of

the exercises assumes that the battalion commander, at the moment he reaches the *Bievre*, sees at some distance to his left a detachment of friendly infantry and learns that to his right he can be protected only by cavalry patrols sent toward *Buc*. Also, the battalion commander, fearing a surprise on the right flank of his column while crossing the *Bievre* valley, uses his scouts to establish a service of security. These scouts will not rejoin until after the batteries have crossed. The farm of *Porte des Loges* is at the extreme right flank of the troops. On his arrival on the plateau, the battalion commander, finding his batteries a little in the air, establishes a service of security on the right flank.

Report of the Exercise.

On arrival at the position of the batteries to the east of the *Colbert* bridge the director of the exercises explains to the officers grouped around him the special situation of the battalion and immediately passes to the execution of the maneuver.

Reconnaissance. He calls up a lieutenant, a sergeant, two buglers and gives them these orders: "In front of us, where this road and the railroad meet are the village of *Petit Jouy* and the *Bievre* valley. (See the attached panoramic sketch, Fig. J.) The *Bievre* flows from our right towards our left perpendicularly to the road and the railroad. Our infantry at this moment crosses this river in order to reach the *Toussus* plateau which lies beyond. I expect to receive an order to take a position on the plateau. Knowledge of the points of crossing of the *Bievre* is necesary to me.

"Sergeant, on the horizon to the right of *Petit Jouy* you see the village of *Loges:* in the middle of this village a round-topped tree, one finger breadth (30 mils), to the left of the tree a portion of the road rising from the *Bievre* towards the village. Reconnoiter a route to follow to reach this road by passing through *Petit Jouy*. Start at once with a bugler and report to me as soon as possible if the road can be used by the batteries to reach the plateau.

"Lieutenant, follow this route." The battalion commander indicates to the lieutenant on the map and then on the terrain, by pointing out the direction of *Villacoublay*, the highway where the detail now is. Then he resumes reading the map with the lieutenant. "You turn to the right on arriving at this small road, 700 or 800 meters from here. The map shows that this small road divides into two branches, one follows the plateau then descends abruptly into the *Bievre* valley by *Les Metz*, the other reaches the valley and *Jouy* by

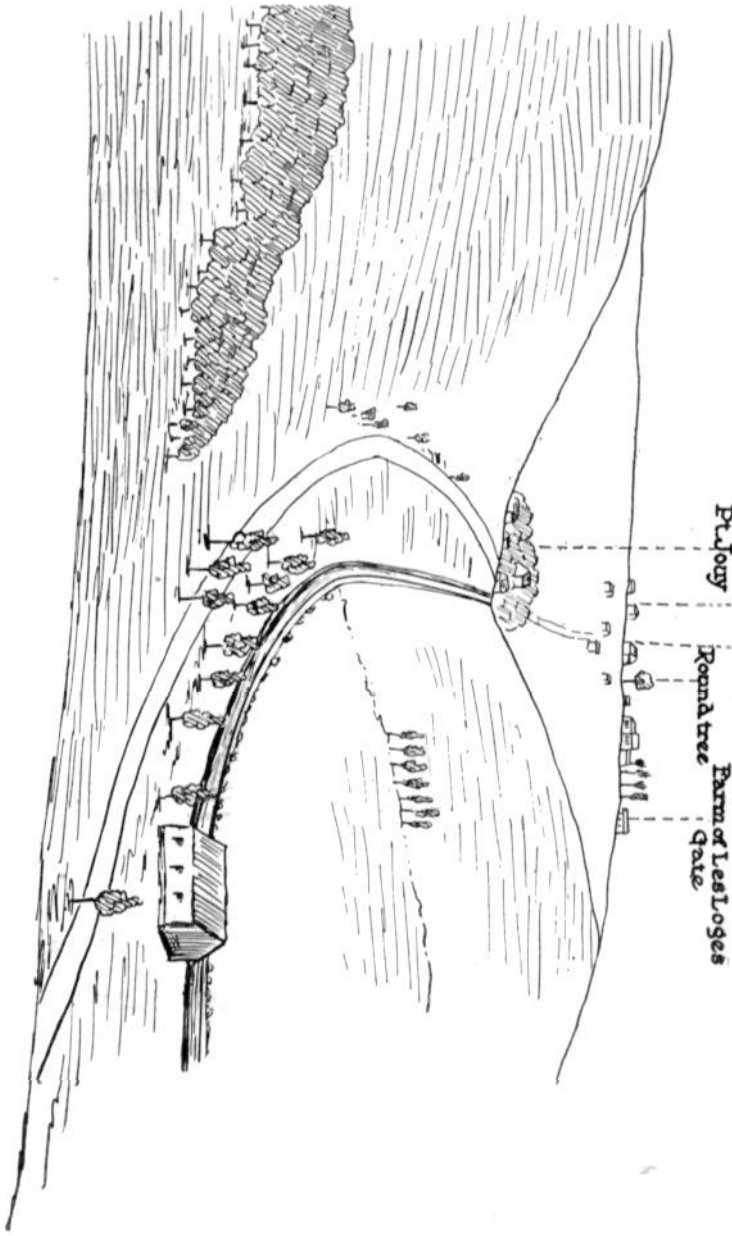


Fig. J. **Exercise in Reconnaissance.**

following the bottom of a ravine. Reconnoiter these two routes and the points of crossing the *Bievre*. Take a rough sketch of the terrain from my map which you can look over, and leave immediately with a

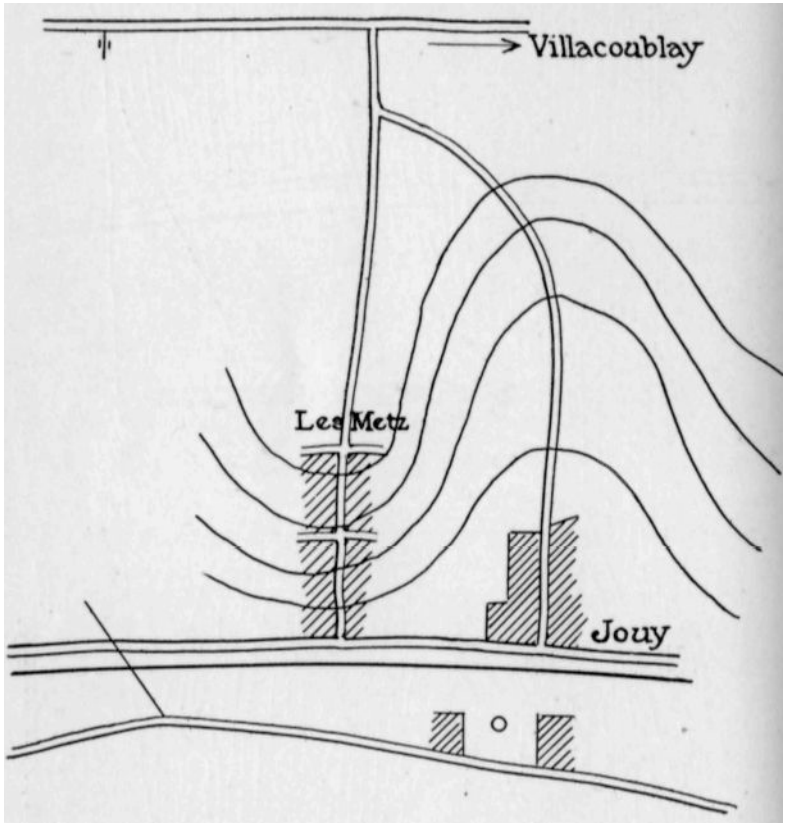


Fig. K. **Exercise in Reconnaissance.**

bugler." The lieutenant makes the attached sketch (K) which he will complete during his reconnaissance. Twenty minutes after the departure of the two reconnaissance parties the battalion commander possesses all desired information.

The sergeant has proceeded as follows. After passing the railroad by a culvert, then the *Bievre*, he has sent the bugler back to inform the battalion commander that the road is open as far as the first houses of *Loges*. He continues the reconnaissance of the road leading to the plateau and then returns to the batteries.

The lieutenant on arriving at the fork of the two roads leading to *Metz* and to *Jouy*, has sent his bugler on the *Jouy* road with orders to rejoin him at the banks of the *Bievre* and has himself reconnoitered the road passing through *Les Metz*. Then, once in the valley, he has completed his sketch by tracing the course of the stream and marking the points of passage (See Fig. L).

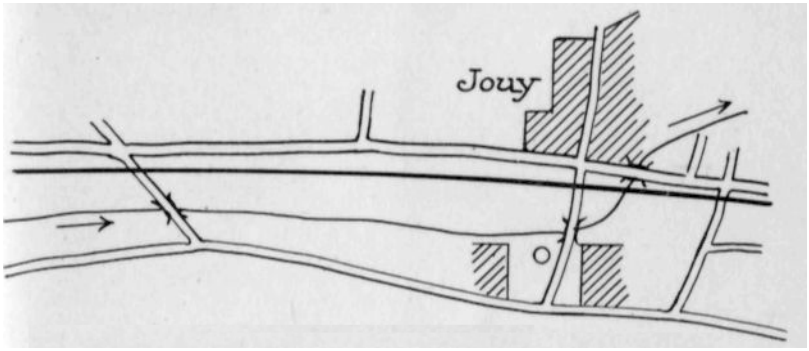


***Fig.L*. Completion of sketch K.**

Marking the route. The battalion commander assumes that he has received the order to reach the plateau by following the road through *Petit Jouy*. He has the sergeant who was previously sent in reconnaissance guide him, the scouts mark his route and the detail representing the head of the battalion column follow at a gait of 8 to 10 km. per hour. The marking presented no difficulties and was accomplished under the most favorable conditions.

Security. As soon as he has passed under the railroad bridge at *Petit Jouy* and arrived near *Bievre*, the battalion commander calls up Lieut. A. He gives him the necessary instructions for assuring the security of the batteries during their passage of the *Bievre* valley in the following form:

"*Situation*. We are here on the right of the division. I suppose that on my right are the several cavalry patrols which have been reported to me, but I am not sure of it. The enemy might surprise us while crossing this ravine. There is the road leading to *Loges* which the batteries will follow in reaching the plateau. You see on the right a parallel road surmounted by an aqueduct; that is the *Buc–Toussus le Noble* road. Lastly, this road goes from *Petit Jouy* to *Buc* and by it the aqueduct can be reached. Assure the security of the batteries during the passage of the valley. Take three scouts and rejoin me as soon as the batteries have reached the plateau."

Measures taken by Lt. A. to assure the security of the batteries while crossing the Bievre Valley.

Immediately after receiving the instructions of the battalion commander, Lieut. A reaches the aqueduct by following the small road to *Buc* (*Fig. M*). On arriving at the acqueduct he sees that the enemy cannot move except on the roads. The *Toussus* road is on an embankment 15 to 20 m. high in the middle of the valley. This must be passed. On the other hand, it is improbable that the enemy is hidden in the *Gonards* woods. The portion of the woods which he has just skirted is surrounded by a high enclosure wall. The lieutenant concludes from his reconnaissance that in order to assure the necessary security it will be sufficient to observe the road from *Buc* to *Toussus*. He assigns this mission to a sergeant whom he places at the crossing of the main road and the road from *Petit Jouy* to *Buc*, at the foot of the aqueduct.

The bugler is sent to the rear with orders to take a position from which he can see the sergeant and the route followed by the batteries at the same time. He will report to the lieutenant when the three batteries have completed the crossing. When this is done they will both join the lieutenant on the *Toussus* highway at the top of the grade. Having given these orders, the lieutenant followed by the remaining corporal, goes in the direction of *Toussus*. He posts the corporal in the angle of the roads leading to *Toussus* and to *Haut Buc*, and takes a position himself where he can see the corporal and the point of arrival of the reconnaissance party and then of the batteries on the plateau. A few moments after the arrival of the squad of mounted men representing the head of the column at the position of the battery, the lieutenant and the three scouts rejoin the battalion commander.

Arrangements made by Lt. A. to assure the security of the battalion while in position.

The position of the batteries (*Fig. M*) is to the southwest of the *Porte des Loges* farm and between this farm and the *Versailles-Buc-Toussus le Noble* road. The battalion commander assumes that at the moment the batteries arrive at the position the situation is as follows. The extreme right of the friendly infantry firing line is 500 to 600 m. in front of him in a depression formed by the terrain. This line is engaged with the enemy which occupies the covers surrounding the *Trou Salé* farm. Some detachments of friendly cavalry are seen to the right. In order to assure the protection of the right flank of the batteries, Lieut. A posts four scouts. He sends them

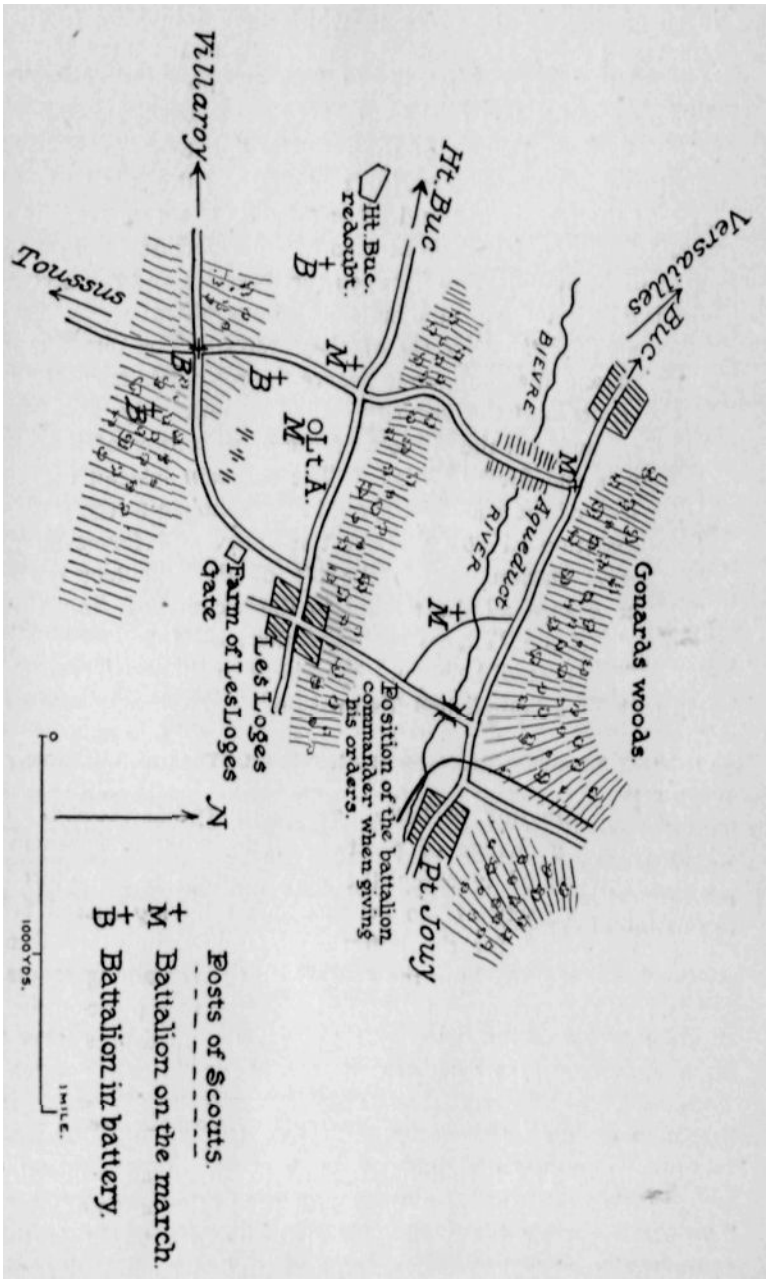


Fig. M. **Exercise in the service of security of artillery.**

in succession, in the order in which they join him, to the points indicated below. He sends the first scout to the intersection of the *Toussus* highway and the road running from the batteries to *Villaroy*; a second is sent to the extreme right towards the *Buc* redoubt; a third is posted south of the road leading to *Villaroy* beyond the small wood 200 or 300 m. in front of the batteries; he can see the zone of the terrain in the dead angle and cannot be seen by the first scout; finally, a fourth is sent to an intermediate position to act as agent of communication between the batteries and the second scout, who is a little far from the batteries, about 800 m.

Remarks of the Director of the Exercise. The director approves all the arrangements made to assure the reconnaissance, the marking of the route and the security. One remark only, as a matter of detail, is made on the subject of the organization of the service of security in the *Bievre valley*. "The sergeant instead of remaining at the foot of the aqueduct should have climbed to the top. That is at an elevation of 30 m. above the valley and forms an excellent observation station. From the top of the aqueduct the sergeant could have seen all the terrain in the vicinity of *Buc*, the top of the grade of the *Toussus* road and the road followed by the batteries. Thus posted, he would have been in the most favorable position to have accomplished his mission."

VII. RECONNAISSANCE. MARKING THE ROUTE. OBSERVATION OF FIRE

General Situation. A battalion of artillery has received orders to prepare for a change of position. The battalion commander has had the ways of reaching the new position reconnoitered by an officer and a party of scouts; then, after having ceased firing and given the order for the batteries to follow, he starts himself in reconnaissance, marking the route with the remaining scouts.

Before the arrival of his batteries on the new position, he has the objective reconnoitered and takes all the measures necessary to observe the effect of the fire.

1st Part of the Maneuver. Reconnaissance.

Situation. The battalion, attached to an advance guard, is supposed to be in action at 6:30 on Hill 162 to the north of *La Saussaie* (3 km. east of the *Versailles* chateau); its target is the north edge of the *Meudon* woods. The battalion commander, observing infantry advancing, foresees a change of position. He needs a road on which to take the batteries to the *Velizy* plateau. The information

given by the map is incomplete and on account of the condition of the roads running through the woods in this vicinity, a reconnaissance is necessary. The map (scale of 1:80,000) indicates to the reconnaissance officer no good road by which the plateau of *Velizy* can be reached by crossing the *Meudon* woods. There is actually an excellent road from Hill 83 to *Hotel-Dieu*. This road should be found by the officer sent on reconnaissance.

Maneuver. The battalion commander calls one of the staff officers to him and assigns him the mission of finding a road by which the batteries can reach the *Velizy* plateau. He shows him the probable direction the battalion will take and gives him the following information which follows from an examination of the terrain and reading his map. "Take this road; after having followed it about 300 or 400 m., you will find a road crossing it at right angles which you will follow. In succession you will meet a metalled road, a highway, another metalled road and finally a crossroad in the vicinity of which is the *Chaville* church, the belfry of which you see in the direction of that small tree. Look for a practicable road crossing the *Meudon* woods and leading to *Velizy*. I place a corporal and a bugler at your disposal. Report to me as soon as you have found the road." The officer followed by the two scouts starts out at a rapid trot. He passes the reference points indicated above and arrives at the *Chaville* church. He leaves the bugler at the first crossroad after passing the church and goes on about 400 or 500 m. to Hill 83. There he orients himself and quickly perceives the desired road. The reading on the sign post placed at the meeting of this road and the one going from *Chaville* to *Viroflay* assures him that he is not wrong. Consequently, he immediately sends the corporal to the battalion commander with the following information: "There is an excellent road leading from *Chaville* toward *Viroflay*." On passing the bugler the corporal gives him the order to rejoin the officer. The first information having been sent, the officer continues his reconnaissance as far as the edge of the woods where he turns back. He returns to the battalion commander to confirm his first report and to thus relieve him of all doubt.

2d Part of the Maneuver. Marking the Route.

Situation. While this reconnaissance is being made, the battalion commander assumes that, as he foresaw, he has received an order to take position near *Velizy*. Friendly infantry has reached the *Velizy* plateau and occupies the south edge of the *Meudon* woods.

Maneuver. The battalion commander gives the order for the batteries to follow at a trot wherever possible and starts in reconnaissance instructing the chief of scouts to mark his route. He is guided by the agent of communication sent from the artillery commander and the corporal previously sent in reconnaissance. While on the way he meets the officer, who gives him all the necessary information as to the practicability of the route. Followed by the scouts, he rapidly reaches the *Velizy* plateau.

3d Part.—Reconnaissance of the Objective; Observation of Fire.

The battalion commander assumes that as soon as he arrives on the plateau he receives from an aide of the artillery commander, general instructions in regard to the position to be occupied. This position (Fig. N) is southwest of *Velizy*, between this village and the *Versailles–Sceaux* highway and behind a small crest perpendicular to the road. The major goes there by following a dirt road along the wall, which completely conceals him from the enemy.

The battalion commander then assumes that when he reaches the position which has been shown him by the aide, he finds there the artillery commander and that the latter officer gives him the following order: "Hostile infantry occupies that large farm (*Villacoublay*) and prevents our infantry from leaving the *Meudon* woods. With one of your batteries breach the walls of the enclosure of the farm and render it untenable by setting the buildings on fire. With the other battery try to neutralize the enemy's artillery which is in position south of *Villacoublay*." Finally, the battalion commander assumes that in carrying out the instructions of the artillery commander, he takes the measures indicated below. He decides that one of the batteries, that on the right, will act as counter-battery with reference to the hostile artillery installed behind the crest in rear and to the left of *Villacoublay* and that the other battery will be charged with breaching the wall which surrounds the farm and afterwards will set the buildings on fire. The commander of the battery on the right will take mounted defilade with reference to the artillery it is to neutralize. The commander of the battery on the left will find a position for his battery which is just concealed from the hostile artillery, and from which the projectiles will pass above the crest and reach the walls and buildings of *Villacoublay*. All that follows is principally in regard to the measures taken to allow the left battery to accomplish its mission.

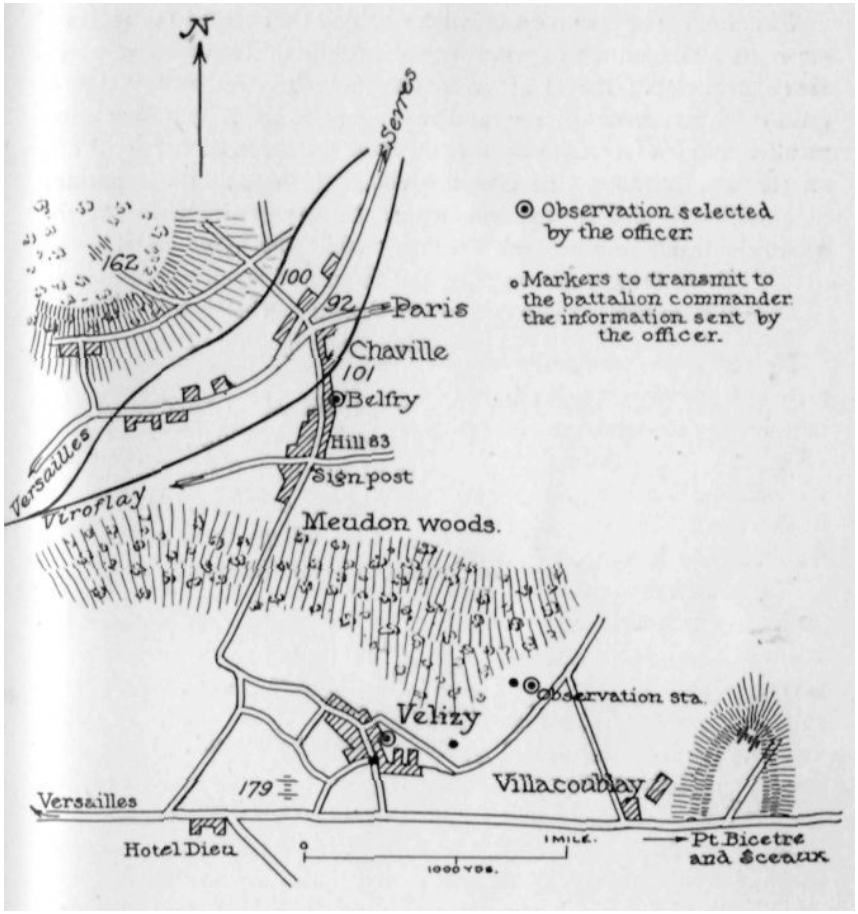


***Fig.N*. Exercise in Reconnaissance and observation of fire.**

Before the arrival of the pieces, the battalion commander has time to reconnoiter the objective of the left battery and to take the necessary measures to observe the efficiency of its fire.

In the exercise to which the present report applies, the head of the column does not arrive on the position until twenty minutes after the battalion commander.

Maneuver. The battalion commander calls to him the officer detailed to reconnoiter the objective and observe the fire. He gives him the following instructions:

"*Situation*. The enemy has artillery behind that crest to the left of the road. His infantry is intrenched behind the walls and houses of *Villacoublay. Villacoublay* is the large farm which you can distinguish to the left of the road just over the crest, by a long roof, a thick clump of trees, and, a little more to the left, the top of a tower. Our infantry occupies the village (*Velizy*) and the south edge of the wood (*Meudon* woods). A battery of the battalion will try to neutralize the enemy's artillery; while the other battery, the left one, is to breach the walls of the farm and render it untenable by setting it on fire." (The dotted line drawn on the sketch (Fig. P) indicates the portions of *Villacoublay* seen by the battalion commander at the time he gives his order.)

"Inform me in an exact manner of the arrangement of the walls and houses of the village in order to facilitate the task of the left battery and assure the effect of its fire. Take one or two scouts with you and get me the information as soon as possible."

The officer passes through *Velizy*. This village does not furnish him an observation station; he decides to enter the woods (*Fig*. O).

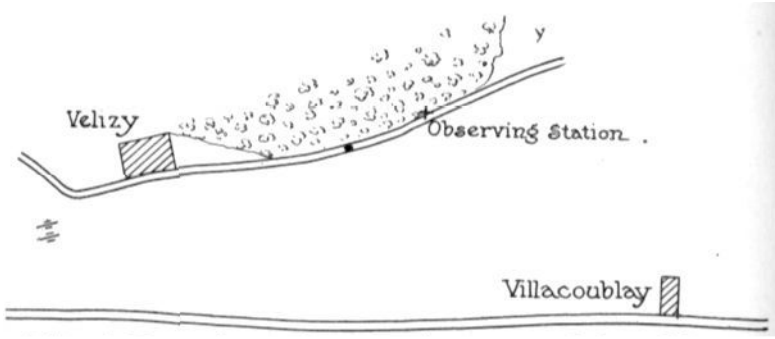


***Fig.O*. Exercise in Reconnaissance of the objective.**

Then, keeping behind the friendly infantry firing line, he skirts the interior edge of the wood until he arrives at a salient at a distance of about 1 km. from *Villacoublay*. There he makes use of a tree for an observation station and sees the farm perfectly. He carefully examines it and immediately returns to the battalion commander. He points out to him the position which he has been forced to take in order to plainly see the farm. Then, roughly, he draws on a sheet of paper a panorama and a plan. He adds to this drawing all the information of a nature which would facilitate the preparation of fire and insure its distribution. The drawing of the officer is reproduced

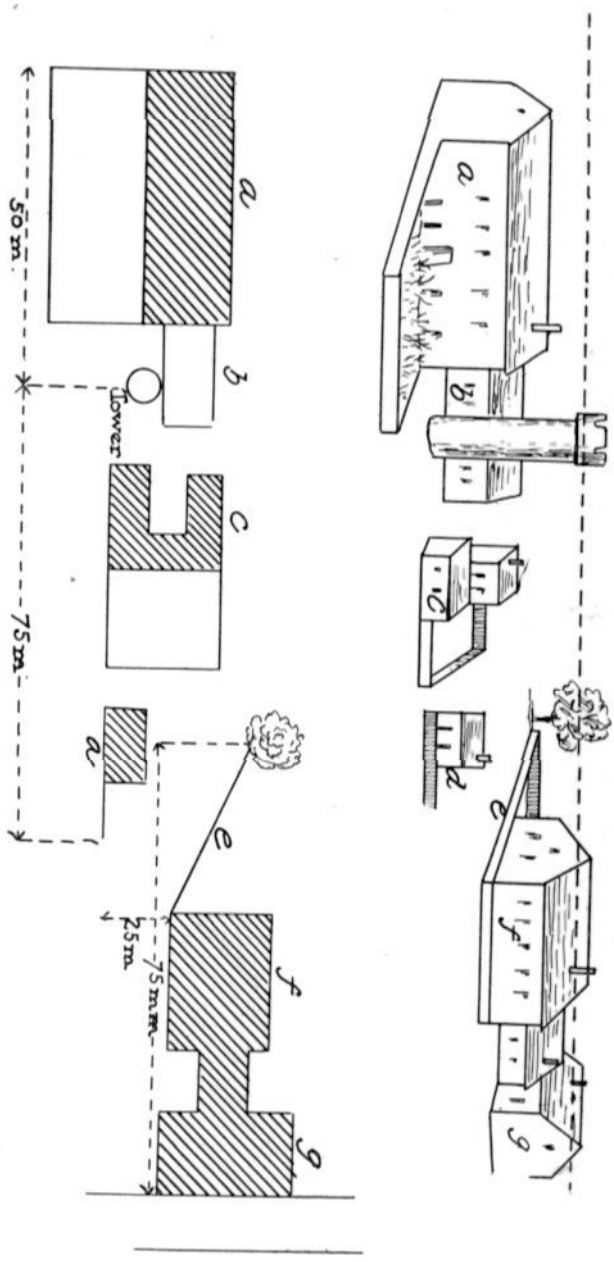


Fig.P. **Reconnaissance of the objective.**

herewith (*Fig*. P). The several numbers giving the approximate length and width of the buildings and courtyards are indispensable for the battery commander for the distribution and adjustment of the fire in range. Immediately on the opening of fire, the officer returns to his observation station and sends, in succession, to the battalion commander by means of the scouts the following information:

"Projectiles are falling in the orchard next to the farm 'a'." "The buildings are still intact." "A breach is made in the enclosure wall." "Projectiles are falling on the building 'b' and are setting it on fire." "The left wing of the building 'c' is partly demolished." "Our infantry now occupies the building a, b and c." "The batteries in position to the right of *Villacoublay* have just brought up their limbers; they are withdrawing on the main road."

4th Part of the Maneuver. Reconnaissance and Marking the Route.

Villacoublay being considered as abandoned by the enemy and occupied by our infantry, the officer receives the order to reconnoiter and mark out a route leading to the main road. He advances along the road skirting the wood and which appears to run into the road leading to *Villacoublay*. (It is to be understood that use is not made of the map.) He finds a very wide path, reconnoiters it quickly and seeing that it is practicable for artillery even at a trot, he leaves a marker at the road forks. The battalion commander rejoins the scouts and reaches the main road. The enemy is supposed to retire on *Petit Bicetre*. He continues to advance, first on the road, then on a path practicable for carriages and finally he reconnoiters a position for the battery beyond the ravine between *Villacoublay* and *Petit Bicetre*.

At this time the exercise is concluded.

Criticism of the Exercise.

When all the detail is reunited near him, the director criticises the exercise in this manner: "I will examine in succession each part of the maneuver.

"1st Part. Reconnaissance of a road from Hill 152 to the *Velizy* plateau.

"In obedience to the idea of dispelling the uncertainty of the battalion commander, as soon as possible the officer sent in reconnaissance returned having advanced only about one hundred meters beyond the edge of the *Meudon* woods. He should have pushed his reconnaissance farther. The road through the woods forms a defile; it might have been barricaded or the roadbed cut up. Therefore, it

should have been reconnoitered before allowing the battalion to enter it. The officer should have had no fear for his communication with the batteries; that was assured as far as the sign post by the corporal left near the *Chaville* church and it could be afterward maintained by the bugler.

"2d Part. Marking the Route.

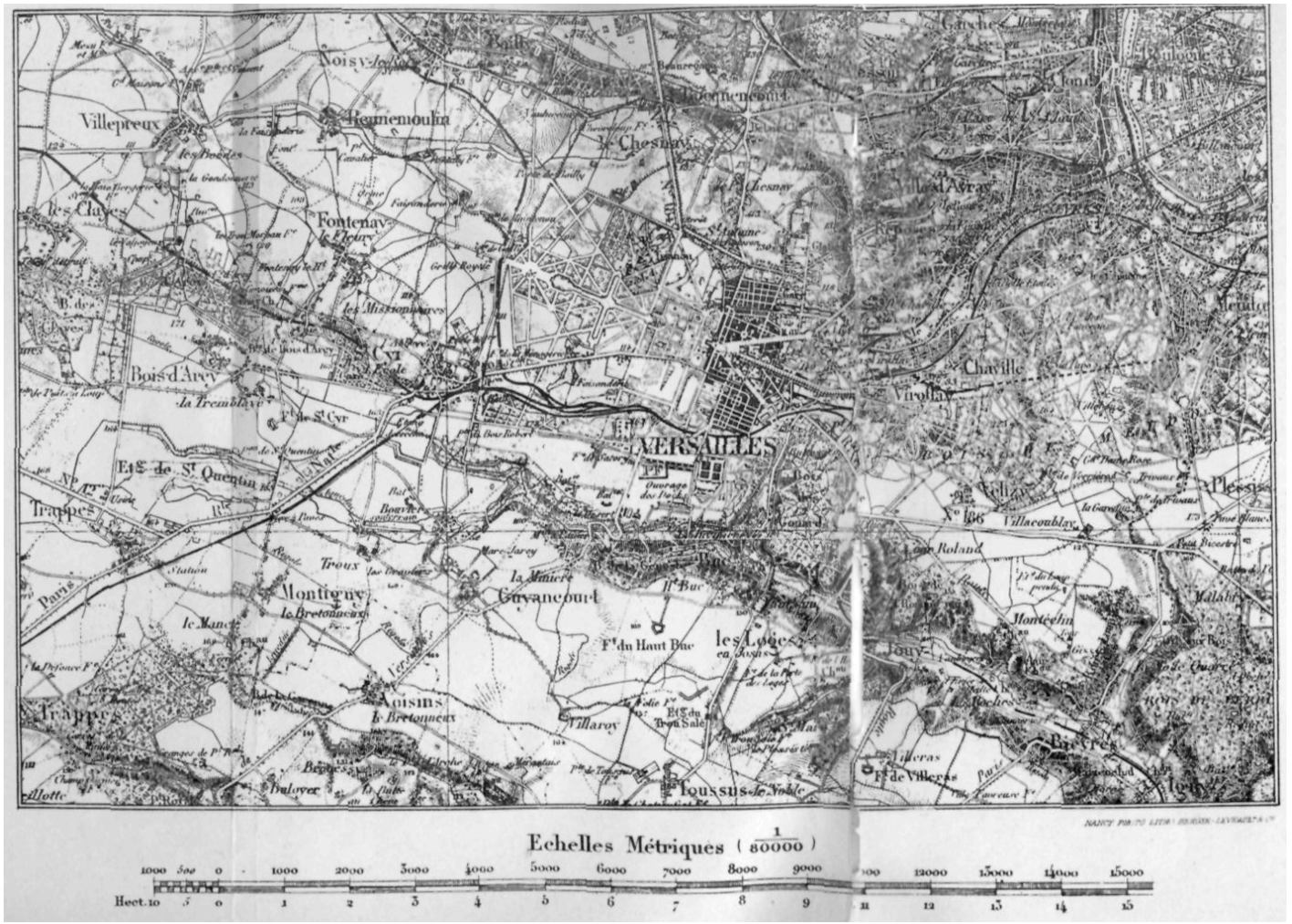
"The marking was well done and allowed the battalion commander to reach the position 20 minutes ahead of the batteries.

"3rd Part—Reconnaissance of the Objective; Observation of Fire.

"In general, two methods may be employed by an officer charged with making the reconnaissance of an objective or of observing the effect of the fire:

"*First Method*. Proceed rapidly at a gallop, risking being shot at, to the vicinity of the objective; observe for an instant and rapidly bring back the required information. This method is applicable when a glance is sufficient.

"*Second Method*. Choose as near the batteries as possible an observation station giving an extended view: high point of the terrain, tree, house, haystack, etc. Observation can be made with field glasses. According to the distance from the observation station to the batteries, post one, two or three markers to quickly transmit all useful information. If need be, carry important information yourself, or such as would be difficult to put in writing. This is the general rule. Let us see what application has been made of it today. I do not approve of the solution adopted by Lieut. A. The observation station which he has chosen is only 1,000 m. from the objective. To come on horseback several times to the edge of a woods in the midst of skirmishers even though one remains there only for the time necessary to fix in his mind the appearance of the target, is too risky an operation to be considered as practicable. Evidently this solution is preferable to the one given in a previous exercise, where an officer went forward to the skirmish line, took notes and made a sketch. In the present concrete case he should have chosen the following solution. Take a position as near the batteries as possible, for example, in the large oak at the exit of *Velizy*. Stationed in this tree, the officer could easily send all the necessary sketches and written information. The information which has been sent me shows me that the lieutenant had the very correct idea of not confining himself to his special mission, but of sending


Villepreux
Beauchamp
Chesnay
Fontenay le Fleury
Les Clayes
Bois d'Arcy
la Tremblaye
Fme de St Cyr
Ets de St Quentin
Trappes
Versailles
Montigny le Bretonneux
Guyancourt
Troux
la Minière
Paris
Fme du Haut Buc
les Loges en Josas
Jouy
Villaroy
Ets du Trou Salé
Toussus le Noble
Buc
Bièvres
Viroflay
Chaville
Vélizy
Villacoublay
Echelles Métriques (1/80000)
Hect. 10 5 0 1 2 3 4 5 6 7 8 9 11 12 13 14 15

all data which might be useful to the battalion commander. For this reason, having been specially charged with the observation of the battlefield, he has sent the following note:

"The batteries in position to the right of *Villacoublay* are limbering and are withdrawing on the main road." In regard to the fourth part. I have no remarks to make. In conclusion, you should retain the following ideas from the exercise of today. In the reconnaissance of roads, always go as far as possible and always beyond defiles and points which troops will be forced to pass, that is to say, as far as the ground where the artillery can maneuver if necessary, even off the roads. To reconnoiter an objective or to observe the efficiency of fire, use a method approximating one of the two which have been indicated to you: rapid reconnaissance made at a gallop, or the use of an observing station. In all cases avoid the improbable; do not make sketches and move around mounted in the midst of the skirmishers.

"Finally, this session has confirmed what I told you at a preceding session on the subject of dividing the exercises into that of marking the route, of reconnaissance, of security, etc. This division was made only to facilitate the instruction. In reality, all these exercises are connected with each other. Thus, an officer sent to reconnoiter the objective and to observe the fire makes the observation of the battlefield; he should be able to send the battalion commander information relating to security. In the fourth part of the maneuver, after the firing, he has received the order to reconnoiter a road and to mark the route."

[TO BE CONTINUED.]

HINTS FOR THE INSTRUCTION OF MILITIA BATTERIES.

BY MAJOR WILLIAM J. SNOW.

Introduction.

Part of the training of the personnel of a militia field battery can be done in an armory, and part can only be done out of doors.

It is fully realized that armories now in use differ greatly in the facilities they afford, and that some armories afford very few facilities. Nevertheless, if a determination to learn exists, various expedients will suggest themselves to the ambitious battery commander, not only for work in his armory, but also for outdoor application; and the result will be a surprising amount of progress. With the object of assisting such men, the following "hints" have been written.

One feature quite generally overlooked in instruction, is that the officers and some of the men (the specialists) must learn things that need not necessarily be known by all the personnel of the organization, and that some of this special knowledge can be learned fully as well, if not better, without the presence of guns, horses, etc., than with them. Nearly all batteries are located in large cities, from which surface transportation lines radiate, and for a five-cent fare, a person can get from the armory to open country, where, in some parts of field artillery knowledge, he can practice and instruct just as well as he can in a large encampment. For many kinds of instruction, it is merely necessary for small parties of from two to a dozen men to go out on the trolley, or other line, taking with them such of the battery instruments as can be carried by hand.

One of the objects in view in writing these "hints" is to show some of the things that can be practiced by the method stated.

It must be understood that this entire paper consists merely of "hints," and is in no sense a manual of instruction. Still less does it pretend to cover all branches of field artillery duties; it merely attempts to cover some of the present deficiencies of militia field artillery knowledge, by showing some of the things that can be done in an armory or its general vicinity.

General Instruction.

The characteristic of field artillery is the concentration of power in a limited space. The front of a battery in action is only about 100 yards; the battery is controlled by one man, the captain; it is capable of delivering its fire anywhere within a sector of some thousands of yards radius; each shrapnel contains 262 balls and there may be several of the shrapnel in the air at the same time from the same gun—and all delivered by a single command of the captain. It is evident, therefore, that the captain, or officer commanding the battery, must be a *master* of his business to handle such a unit properly. The battery has very aptly been likened to a firing machine, in which the captain plays four lines of fire from his battery at will; this sheaf, composed of the four lines of fire, he moves to the right or left to strike a new target, up or down vertically for new ranges, or he may sweep from right to left, or combine this with the change in range and cover an area both in width and depth; or he may play one or more lines upon one target, and the balance upon another, etc. In short, there is the greatest possible flexibility to what he may do. The sheaf is sometimes likened to the fingers of the hand, each finger representing a gun. He may have all fingers pointing parallel or all may be "bunched" pointing to the same spot, or all may be spread out, pointing to a large sector; in any of these positions he may move his wrist up or down or to the right or left; thus theoretically, he can distribute projectiles on the field almost as if placed by hand. But it is perfectly evident that no untrained or partially trained man can handle such a machine efficiently; hence the necessity for the *officer* thoroughly training himself in conducting the battery fire; also it is evident that the battery itself is such a machine only when the *enlisted* personnel know their part of the work, for the gun will not operate itself and no matter what its rapidity and accuracy may be inherently, actually they are no better than the skill of the personnel make them. Hence the necessity for thorough and accurate training in the personnel. The case of the battery is stated in the above manner, so as to call the attention of everybody to the absolute necessity of a high degree of training if efficiency in field artillery is to be secured. It must always be borne in mind that no matter how efficient a weapon may be mechanically, it is in practice, no more efficient than the operator.

There are but two actions in battle—shock and fire. Of these two, shock action has not increased, for a man or horse is no heavier

than formerly and they move no faster; but while, for centuries, shock action has thus obtained no increase, fire action has steadily developed, and particularly in the last quarter of a century. And artillery represents the highest or most perfect development of fire action. It is, therefore, again seen how necessary it is that the efficiency of the gun be not sacrificed by only partially trained personnel.

In order that the firing machine, which is the whole battery, may work smoothly, it is essential that each man do his particular part accurately; the work to be done is subdivided so that each man has only one or two things to do; but in order to secure rapidity of fire, each man must do his particular part rapidly as well as accurately. That is the whole essence of battery instruction, constant practice, so as to secure familiarity and skill in order that when a firing command is given, each man quickly and accurately, almost mechanically, does his share. If he must stop and think of what he has to do, if he has to study the scale on the instrument he sets before he can set off the designated reading, if he is not *accurate* and *quick*, the machine breaks down.

It must not be overlooked that while subdivision of the work of loading, laying and firing thus simplifies it for each individual, it has the disadvantage of making each man dependent upon every other one. Nowhere else except in the field artillery does this state of affairs exist. Suppose in a company of infantry, one private fails to do his part, does not load and fire, all the other men do, and only one rifle out of the hundred in the company is lost; but suppose in the artillery that the man setting the fuze setter does not know how to set it, then the whole gun detachment, or 25 per cent of the battery is idle, until the trouble is corrected.

This idea of the absolute necessity of high efficiency in the training of the enlisted personnel should be constantly kept in mind. An occasional drill of a few men will never make a battery that is worth while. Persistent repetition, insistence on accuracy in setting instruments and laying the gun, gradually increasing the speed until rapidity is secured, are the essentials in instruction of gunners and cannoneers. It is, therefore, recommended that in the Field Artillery Drill Regulations, Part III, Chapters I, II and III (Firing Instruction—Object and Sequence, the Cannoneer and the Gun Squad) be continually practised. If the facilities of the armory permit, Chapter IV (The Firing Battery) should be taught with equal thoroughness.

Fire for Adjustment and for Effect.

Artillery fire is divided, generally, into two classes: (1) Fire for Adjustment, and (2) Fire for Effect.

Fire for adjustment is the fire by the observation of which the Battery Commander determines the proper data that must be set off on the sights, quadrants and fuze setters in order to cause the projectiles fired by the battery to strike the target. It is probable that, with the approximate methods used to get the data, the first deflection, range and corrector announced by the captain will be incorrect. By observing the errors in the fire with this data and by constantly changing the data in accordance with the observed errors, settings are finally found which will cause the fire to produce the greatest effect upon the target. The fire is then said to be adjusted.

In using shrapnel, which is the principal projectile for the 3-inch gun, adjustment of the fire in three respects is necessary:

1. In direction.
2. In range.
3. In height of burst.

For the first, the panorama sight is used; for the second, the panorama sight is used in direct laying, and the quadrant in indirect laying; for the third, the fuze setter is used. The enlisted men who manipulate these three instruments must, therefore, thoroughly understand them, and in addition, in order to secure rapidity of fire, these men must possess skill in the use of the instruments.

Fire for effect is the fire delivered after the fire is adjusted in order to produce effect upon the target.

There is this point which must be borne in mind in considering the question of fire: there is great difference between artillery fire and infantry fire. Infantry fire produces such slight visible effect upon the target that it is impossible to tell just when it is producing the maximum effect and it may be impossible to tell, when small units are firing, whether any effect is being produced. In field artillery fire the effect of a single projectile, if it strikes the target, is usually visible to the observer, especially as the visible point of burst of the projectile shows him just where to look for the effect, and he is able to tell whether his shots are producing as great an effect on the target as they should produce under the circumstances.

As infantry does not fire an explosive bullet it is often impossible to see where the shots strike the ground, and to tell by observation whether the shots are short of the target or over the target. In field

artillery, on the other hand, the bursts of the explosive projectiles are clearly visible to the officer observing the fire, whether the shots strike far short or far over or to the right or left of the target. So that the observer need never be long in doubt whether his range is too short or too great and whether his deflection is correct.

As the accuracy of infantry fire depends, not only on the correct data being set off on the sights, but also on the steadiness and the accuracy with which the individual men hold and fire their rifles, it is never possible to tell whether the observed results of the firing are due to the sight settings or the erratic shooting of the individuals. Field artillery has not this difficulty. The gun sits steadily on its carriage and is not affected by the nervousness of the individuals serving it, and unless all the men serving one piece make the same error, which is highly improbable, it can easily be detected which men are not setting their instruments and using them correctly. And if the fire of more than one gun in the battery be observed, erratic results are more easily checked and corrected.

For these reasons infantry has no fire for adjustment, but relies on getting the approximate range and securing results by the flatness of the trajectory of its rifle and the consequent great width of the danger zone. A great number of rounds must be fired by infantry to secure any appreciable effect. Field artillery, however, as we have seen, can adjust its fire accurately, and when this has been correctly done, can open fire for effect promptly with the assurance that its shots are striking the target and producing the greatest possible effect on it.

Panorama Sight.

The present gun is a remarkably accurate weapon; it is also capable of great rapidity of fire, and to take advantage of this rapidity of fire, the sight is not placed on the recoiling gun, but is stationary so that the gunner need not remove his eye from the sight during the firing. But the greater the rapidity of fire, the greater the waste of ammunition, if the gun is not laid on the target; and in general, it will not be so laid, if the gunner does not set the sight correctly. Bear in mind that, as stated, in direct laying both range and direction depend upon the setting of the sight. The gunner must, therefore, be able to set both scales accurately and quickly and then also quickly to get the cross-wires on the target or aiming point. It is not sufficient for him merely to understand the sight, he must practice until he acquires *skill* in the use of the panorama sight, for this is the one

he habitually uses, the peep sight being only for emergency, when the panorama is not available. To secure this skill, he should be frequently practised in that part of the Field Artillery Drill Regulations appearing in paragraphs 143 to 155, both inclusive, and paragraphs 353 to 364, both inclusive.

The Range Quadrant.

The mechanical construction of this instrument and its care are explained in the Handbook for 3-Inch Field Artillery Material where the panorama sight also is similarly treated. But our present concern is with the *use* of the quadrant, and the method for this is stated in the Field Artillery Drill Regulations. The quadrant is absolutely essential for indirect laying, and its use always involves centering two bubbles in their tubes. Assuming the instrument to be in adjustment, its whole efficiency depends upon a correct setting of its two scales (range and angle of site) and upon centering the bubbles; neither correct setting nor centering of bubbles is of any utility, without the other also; and in the absolute necessity for centering the bubbles in their tubes, the quadrant differs from the other pointing appliances of the battery. All cannoneers should therefore be given much practice as No. 1, drilling them in paragraphs 158 to 167, inclusive, Field Artillery Drill Regulations. The armory affords sufficient facility for great skill to be acquired in the use of the quadrant.

Fuze Setting.

Not infrequently there is irregularity in the bursting of the shrapnel, when presumably they have all been set for the same range and corrector. The claim is then made of "poor fuzes," but as a matter of fact the trouble is generally in carelessly setting the fuze. Absolute uniformity of burning is, of course, impossible; but the Government, realizing the necessity of securing the greatest possible uniformity, conducted extensive tests to determine the actual error, and this having been found to be two-tenths of a second, the fuze was reconstructed with the result that the present fuze has a much less error, and is considered by the field artillery to be satisfactory. If the United States thus spent a great deal of money to get rid of small errors in the fuzes, the least the field artillery can do is to set them accurately. The fuze setting machine will do this, if the man turning the projectile in the fuze setter is careful. Men should be practiced in this, which can be done in the armory, and their settings checked up.

To do this, set off any range and corrector on the fuze setter, and then set the fuze by turning the projectile clock-wise in the setter: remove the projectile and read, *as closely as possible*, the seconds and fifths and parts of fifths at which the fuze is set; set it back at safety by hand; reset by means of the fuze setter, and compare with previous reading; the two readings should, of course, be identical, but with untrained men, they are rarely so. Have the men practice until they can do the work accurately and quickly. This entire matter looks as though too trivial to mention; but the whole efficiency of the battery depends upon bursting the shrapnel at the proper point, and much erratic shooting has resulted from merely failing to set the fuze properly.

The corrector scale of the fuze setter is graduated in mils and affords a method of making slight changes in the point of burst of the shrapnel in time fire. If the corrector setting is increased the point of burst is drawn back along the trajectory and, as the trajectory falls sharply near the target, the projectile will burst higher in the air. An increase in the corrector setting of one mil will cause the projectile to burst one mil higher in the air. Similarly, a diminution in the corrector setting of one mil will cause the projectile to burst one mil lower or one mil nearer the ground.

One of the great advantages in having this height of burst adjustable is that in fire for adjustment we may cause the shrapnel to burst in the plane which contains the target and the eye of the observer, so that the burst appears directly between the observer and the target or the target appears directly between the observer and the burst according to whether the range used was too small or too great. This enables us to adjust the range with considerable certainty. In passing to fire for effect we have only to raise the corrector setting to give us bursts three mils in the air and we have secured the height of burst which will produce the greatest effect on the target.

Commands for Firing.

There are two methods of laying—direct and indirect. For definition of each, see paragraphs 234 and 235, Field Artillery Drill Regulations.

In order to fire the battery, commands must be given covering the following information:

1. Designating the object at which the gunner will point his sight.
2. Designating the method of laying.

3. Designating the method of fire.

4. Designating the deflection.

5. Designating the deflection differences when using indirect laying.

6. Designating the angle of site, when using indirect laying.

7. Designating the kind of projectile, as shell, or in the case of shrapnel, the corrector to be used.

8. Designating the range.

(See paragraphs 277, 278, 279, Field Artillery Drill Regulations.)

This information must be stated in the above sequence, in order that each man may note the particular part that relates to him, and that those men who set instruments may all be working at the same time.

The necessity of the above requirements is as follows:

As to 1. In both direct and in indirect laying, the gunner must necessarily know at what object to direct his sight.

As to 2. If direct laying is to be used, No. 1 does not need to know any of the data, as he merely fires the gun; but if indirect laying is to be used, he must set his quadrant.

The information relative to both 1 and 2 is succinctly given in the commands "*Target*, so and so" for direct laying, and "*Aiming point*, so and so," for indirect laying.

As to 3. Manifestly, the order in which the guns will fire ("By battery from the right or left"), and the number of rounds ("Volley fire," etc.), must be known.

As to 4. The gunner must know what setting of his sight to use in order that the line of fire may be directed on the target. This is given in the command "Deflection, so and so;" with direct laying this deflection is the same for all the guns, but with indirect laying, it applies to the right or directing gun only.

As to 5. In indirect laying each piece has usually a different deflection setting from all the others, but these deflections increase or decrease uniformly throughout the battery and hence in order that the gunners of the 2d, 3d and 4th pieces may know what change to make in the deflection announced for the directing gun, the command "Increase by so and so" or "Diminish by so and so" is given. (Note that the proper commands are "Increase" or "Diminish," and *not* "Decrease;" this latter word is avoided as it might be confused with "Increase.")

As to 6. In indirect laying, the vertical distance of the target above or below the gun must be compensated for (see Angle of Site, later

in this paper), and in order that No. 1 may set off the proper amount on his quadrant while the other men are setting their instruments, thus avoiding delay, the command is now given "Angle of Site, so and so."

As to 7. Up to this point, there has been no indication as to whether the battery will fire shell or shrapnel; if the former is to be used the command "Shell" is given. If shrapnel is to be used, its height of burst must be regulated by setting the fuze; hence in this case the command "Percussion shrapnel" is given if it is desired to burst the projectile on impact, or "Corrector, so and so," if it is desired to burst the projectile in the air, in which case No. 3 sets off the designated setting on his fuze setter scale.

As to 8. Finally, the range must, of course, be stated, so that the gunners, No. 1 and No. 3, may set it off on their instruments. The command "Range, so and so," also means that all data have been given, and it replaces an additional command to load—there now being no such command.

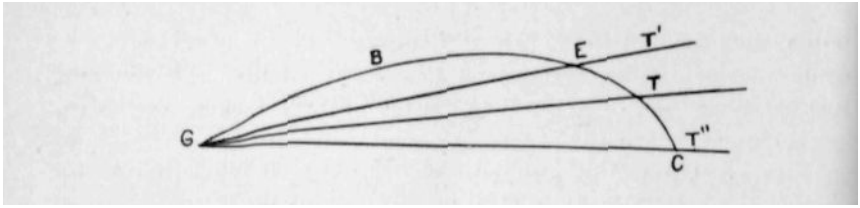
Officers must be familiar with the above information that must be communicated to the men, and must always give it in the above *sequence*, for the reason that the liability of *forgetting* or overlooking part of it is thereby diminished, and the above order permits all men to be working *simultaneously*.

Angle of Site.

The angle of site, as obtained with the Battery Commander's telescope at the observation station, is usually sufficiently correct to use at the guns without making any changes in it. Occasionally an estimated correction has to be made; and upon rare occasions, it has to be computed. But the two former methods will cover 95 per cent of the cases arising. The entire matter is covered in paragraphs 332 to 337 in the Field Artillery Drill Regulations.

The importance of obtaining an almost correct angle of site is sometimes overlooked. This angle must always be utilized in indirect laying, as it compensates for the elevation or depression of the target relative to the level of the gun, and errors in this angle give misleading deductions as to the range.

To illustrate, assume that in the figure G and T represent the gun and target, respectively, *both on the same level*, and that GBTC represents the path of the projectile that strikes the target using indirect laying. Now assume that *without* changing the angle of site, we fire upon T' or T", one above the level of the gun and one beneath



it, and each distant *actually* the same from G as T is. The firing data would be the same in all three cases (for the only change that really should be made in the data is in the angle of site); the firing data being the same in all three cases, the projectile would pass over the same path in the air, and hence it would strike *short* (at E) in the case of the target T' and over (at C) in the case of the target T". Whereupon we would make an erroneous deduction as to the range. If, in actual firing, we (not knowing that there is an error in our angle of site) naturally assume the incorrect range obtained to be the correct one, and then passing to a different target at *approximately* the same range, but at a different level, attempt to obtain its range, using as a basis the one we have just fired with, we may be greatly surprised to find that our shots strike far off the target, and thus we accumulate more trouble. Too much importance cannot, therefore, be attached to the angle of site.

Telephone and Signal Communication.

Read paragraphs 684, 686 and 689, Field Artillery Drill Regulations.

The duties of this detail (consisting of 1 corporal and 4 privates) are laid down in the above paragraphs, and the method of transmitting firing data is stated in paragraph 145.

The operaor at the observation station end sends the message or data exactly as given by the captain, and the operator at the battery end of the line repeats it back as he gets it, thus insuring a correct transmission—for if the operator at the observing station does not get back the exact words and figures sent, he repeats the correct ones. The officer in command at the guns gets the message as the operator there repeats it back to the observation station, and if necessary he changes the method of enunciating figures. Thus the captain at the observation station would say to the operator there "Deflection four, one, three, seven," the operator there would repeat this exactly into the 'phone, the operator at the other end would repeat it back (speaking rather louder in order that he may be heard by the officer near him in charge of the battery), and this officer

would give the command, "Deflection forty-one, thirty-seven." Operators must confine themselves strictly to sending and receiving messages, and not be allowed to engage in conversation; the officer at the gun end must keep constantly near the 'phone, so as to ensure prompt execution of orders received. Practice in establishing telephonic communication can be begun in and around the armory, and then continued out in the open country—the detail taking with them merely the telephonic appliances. There should be no difficulty in getting good telephone men in militia batteries, and it is then merely necessary to train them in promptly and efficiently establishing and maintaining communication, locating and correcting faults, etc.

Although normally, commands and firing data are either communicated directly by word of mouth or over the 'phone, on account of other methods being too slow, yet exceptionally flag and heliograph communication are used; for this reason, the signal detail should be instructed in sending and receiving messages by flag. This can also be begun in and around the armory and continued out in the open country. Later, the work of the signal detail can be combined in the open country with the use of the battery commander's telescope. An efficient signal detail is very necessary to the proper handling of a firing battery.

Scouts and Agents of Communication.

The duties of these men are stated in the Field Artillery Drill Regulations—Part V: The Service of Information and Communication, paragraphs 667 to 683, inclusive. These paragraphs should be read and reread. But the *method* of training in order that the scouts and agents may fulfil these duties is not stated. An illustration of their employment is given later in this paper (see Occupation of Position).

As both scouts and agents work away from the immediate presence of the guns and carriages, the instruction of these men particularly adapts itself to conditions in and around an armory. The basis of all their instruction is ability to read maps. Instruction in this subject must, therefore, precede everything else. In this, any good text book will answer, it being merely necessary that the men under instruction be taught to understand a map, to orient it, to locate themselves on it, to determine directions, to determine visibility of one point from another, to determine actual distance from measured ones on the map, to recognize form lines, and conventional signs. Practically all of this work can be taught

in an armory. The men will be taught the use of field glasses and then practiced out in the open country. Here they can also have their powers of observation developed and learn to make reports by describing what they see in the terrain through their glasses, the instructor checking them up by following with his own glass. For example, the man under instruction would describe the scene as follows:

> In my immediate front, at about 2000 yards, a railroad, single track running east and west; just beyond the railroad a church with white steeple; one hundred and forty mils to the right of the steeple a country road, bordered by hedges and crossing beneath the track, etc.

Measurements in mils should be made by the hand, calibrated as shown later in this paper (see Measurements of Angles—Hasty Methods).

It is important that these men become not only keen observers, but succinct reporters of what they have seen, so that upon their return from any mission given them they can quickly and intelligently report. If practicable, these men should be practiced in the duties of "ground scouts"—conducting a command across country where there are no roads, getting and transmitting the necessary information as to route so promptly that the (imaginary) artillery following may pass all obstacles without being delayed.

The men will be taught to "mark the route"; this can be done in the city or town where the armory is situated. The scouts are numbered and the officer conducting the service of route markers starts out, followed by the scouts, Having arrived at any street corner or fork of roads where a marker is required, the officer posts No. 1, and proceeds, followed by the remaining scouts. No. 1 observes the direction taken by the party. No. 2, 3, etc., are posted in succession where required. When the column (an individual man will answer for the purpose) reaches No. 1 he shows to the officer conducting the column the direction to follow and taking an increased gait over that of the column moves on to No. 2's station, of whom he inquires the route to No. 3, whence he proceeds to No. 4, and so on. Having arrived at the post of the highest numbered scout, No. 1 is posted again, or not, as circumstances require. Likewise No. 2 having directed the column on to the post of No. 3 takes the increased gait and follows No. 1, to be posted beyond No. 1, if necessary. This operation goes on as long as desired. Great economy in the use of these scouts may be

obtained by messages left with a scout, such as to stay on a particular road until directed off it, etc. The men should also be practiced in this duty at night, when objects present a different appearance than in the daylight.

The men should be instructed in the duties of "position reconnaissance," in order that they may assist the reconnaissance officer. This work also is begun indoors and completed outdoors. The men must be instructed as to the character of different positions—unmasked, masked; sight, dismounted, mounted and flash defilade; positions for immediate action, in observation, or in readiness (see Field Artillery Drill Regulations, paragraphs 313 to 317, inclusive). They must know the organization of a battery (see Field Artillery Drill Regulations, paragraphs 544 to 548, inclusive), subdivision of a battery for action (see Field Artillery Drill Regulations, paragraphs 624 to 626), and the disposition made of the limbers (see Field Artillery Drill Regulations, paragraphs 631 to 633, inclusive), reserve and train, amount of space necessary for each of these elements, etc. The indoor instruction thus consists in using maps for practice, and the outdoor in using the actual ground. In the latter, a position and strength are assumed for the enemy, and our scouts working in pairs, select artillery positions in a limited portion of the terrain, reporting upon the number of guns that can be gotten in the amount of defilade secured, cover for limbers and reserve, concealed route of approach, etc.

The men are also practiced in the service of security—covering the advance to a position, or a change of position, against attacks by small bodies of the enemy, or positions to be taken up by the men to give timely warning of danger, when the artillery is in action, etc.

They should also be taught the duties of observation of the battlefield. This will involve knowledge of the method of infantry and cavalry attacks as shown in the Drill Regulations of these arms, ability to observe keenly and report their observations succinctly and definitely.

The men will also be taught observation of fire. For this purpose they must be familiar with the subject as treated in the Field Artillery Drill Regulations (paragraphs 359 to 386), and with the rules of fire (paragraphs 387 to 413, inclusive). In the observation of fire only a theoretical knowledge can be gained, without attendance at actual firing practice.

(TO BE CONTINUED.)

THE DUTIES OF THE RECONNAISSANCE OFFICER OF A BATTALION OF FIELD ARTILLERY.

The intercommunication between troops in battle, or "*liaison*," to use the brief and expressive French word, has now for two years occupied the first place in French constructive military literature. Nor has the matter been left to mere discussion. Numerous experiments have been undertaken at instruction camps and during maneuvers, and more than one practical system has been evolved.

The *liaison* most difficult to establish and the one to which the greatest thought has been given is that which should exist between the infantry and the artillery charged with aiding that infantry in any task. On this subject most diverse opinions have been expressed, but this diversity bears only upon the means to be used to accomplish the end. There are partisans of "*liaison* from the top," "*liaison* from the bottom," "moral *liaison*" and "material *liaison*," but all, without any exception whatever, are agreed upon the absolute necessity of establishing some *liaison* as definitely as possible.

Within the artillery itself the system of intercommunication between its own units and its own commanders has been brought to a working basis and the object of this paper will be to show it in its practical details as understood in the French service.

In all modern armies the commander of a battalion of artillery has now been given an officer whose business it is to aid him in battle. This officer in our service is called the adjutant and reconnaissance officer. He aids in reconnoitering a position, assuring its safety, examining the approaches, establishing the elements of fire, and keeping up communication with other troops whose efforts are directed towards the same end. A great deal has been written concerning the duties of this officer and considerable has been prescribed, with more or less definiteness, in the drill books. Our own artillery drill regulations wisely devote only a short amount of space to these duties. We have never had practical work on a sufficient scale and covering sufficient time to evolve a really useful and practical method of operation for the reconnaissance officer. Until this has been done, it seems far wiser that we should trust to the experiences of others who have made these experiments with large numbers of troops of all arms during several years in succession. For this reason it has seemed well worth while to translate *in extenso* an article which appeared in the "Journal des Sciences

militaires" of Dec. 1, 1910, on the role of the artillery reconnaissance officer. The article is written by Lieut. Marchand, a senior lieutenant of well-known ability who has been adjutant and reconnaissance officer for several years and who writes of the work in a thoroughly practical manner, and with a clearness and precision of military style which in no way detracts from the pleasure of reading his paper. The article is as follows.

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Before beginning the study of the particular functions of the artillery reconnaissance officer, it may not perhaps be misplaced to recall briefly the successive operations which are necessary in the reconnaissance of a position on which a group of batteries is to be placed. This rapid examination will enable us to establish, before beginning the discussion, certain important elements of the problem, viz: the role and the responsibilities of each of the officers who have the duty of getting the best results from the rapidity and power of our modern field artillery.

On the battlefield the artillery must co-ordinate the efforts of its own fractions and must work hand in hand with troops of other arms told off for the same mission. But the orders necessary to attain this co-ordination of effort are the sole function of the commanding general. It is he, then, who is responsible for the employment of the artillery. By reason of this responsibility, he alone must determine the initial positions to be occupied by the artillery.

The officer commanding the artillery, being responsible for all measures of execution, accompanies the general commanding the troops in the general reconnaissance during which the initial positions of the artillery are determined. He then makes his personal reconnaissance, i. e., knowing the work he has to do, he studies the position; or rather the zone which has been designated for him, and decides on the distribution which he will make of his battalions and the role he will assign to each one.

The major commanding a battalion receives from the commanding officer of the artillery instructions as to his mission and the position assigned to his batteries, and in his turn makes his personal reconnaissance. He studies how best to utilize the ground in order to do the work assigned him. He settles in his mind the initial role he is going to give to each of his batteries, involving thereby the location of each. To aid him in his task, he can, to quote the regulations, "utilize an officer taken from one of the batteries and to whom are added some of the scouts." This officer is called the reconnaissance officer.

We see then that:

1. The initial positions to be occupied by the artillery are fixed by the commander of the troops;

2. The position to be occupied by a battalion is designated by the artillery commander;

3. The place of each battery is selected by the battalion commander.

This rapid examination having permitted us to define the functions of each commander, we will now commence our study of the role of the reconnaissance officer. In recent years, this role has become of greater and greater importance, and although it has been much discussed, we cannot yet say that even to-day it is clearly defined. Opinions on the subject are considerably divided.

Several years ago the general opinion was that the reconnaissance officer should march with the advance guard. He was expected to do a great deal of work beyond his competence and generally quite useless. The following extract of a memorandum which I have before me is one example out of many:

It has been said that the mission of a reconnaissance officer is:

1. To obtain information concerning the enemy.

2. To reconnoiter the general features of the ground in front and on the flanks of the line of march.

3. To rapidly reconnoiter the positions which our artillery might have to occupy as well as the itineraries and lines of approach.

4. When contact is made with the enemy, to reconnoiter these positions more in detail, in order to permit the batteries to be established there without loss of time.

5. To seek out the positions which the enemy himself is likely to occupy.

With certain variations the same exaggeration in prescribing the duties of the reconnaissance officer was noticeable everywhere, and he was made an omnipresent sort of being, able to do everybody's work. What was demanded of him above all and what is still frequently now exacted is that he should find artillery positions. We will see farther on that the reconnaissance officer cannot be logically charged with this mission. It is beyond his attributions, and, moreover, the elements indispensable for properly performing this duty are nearly always wanting to him.

It is not the business of the reconnaissance officer, in our opinion, to seek out positions for the artillery. He can and he should devote himself solely to the detailed study of a position already found, and,

in its larger aspect, reconnoitred; otherwise he infringes upon the attributions of the battalion commander, of the artillery commander, and even those of the general commanding the troops. It is not the duty of a reconnaissance officer to take the place of his chief, it is his duty to aid him.

Moreover, our regulations are very clear on this subject. Article 654 says: "This officer, called the reconnaissance officer, moves rapidly to the position as soon as the officer to whom he is attached has given him the necessary indications." We see then that the reconnaissance officer is not called upon to follow out his own ideas, but that he must place himself in a wholly concrete situation. Acting on this principle, some majors keep their reconnaissance officers near them and never let go of them until they themselves have been given their work. Is this system quite the best? I do not think so. Between these two extreme solutions we ought to seek a medium, one which furnishes the most results with the least effort, for here also the principle of economy of forces must be respected. If the cavalryman, after a day's march, must keep his horse in condition to make a charge, likewise the reconnaissance officer, at the end of a day's fighting, must have his horse, the only one he has, still ready to gallop and jump an obstacle.

Having been a reconnaissance officer during several years, I have tried to find out by what means I could be of the most use to my commanding officer. In these efforts I was greatly aided and encouraged by my battalion commander who was kind enough to leave me quite free during the autumn maneuvers to make experiments with the object of determining, first, the place of the reconnaissance officer, and second, the work which logically should be demanded of him. These experiments were not undertaken through preference of any particular method, but being entirely practical, each one was pursued exactly as though I were seeking to demonstrate its superiority. The final result was expected to lead to a decided preference of one over the others.

First Day.—Provided with a map I took post early in the morning with the advance guard point.

Galloping to the right and left, I tried to locate the best positions for my battalion. However, I found myself considerably embarrassed, for after all, what is a position for a battery? It is a point where it should be placed in order to best fulfill a certain mission. Now, the principal element of the problem was absolutely wanting to me. What was the mission which my battalion would be called

upon to fulfill? I knew absolutely nothing whatever concerning it, and my major was probably no better informed. Moreover, I began to feel that my work would be extremely difficult in time of war. Riding with the advance guard point, the enemy's troopers often came up with the utmost disregard of my feelings to disturb my indicating operations. I was frequently the target for shots which might quite needlessly have deprived my major of his reconnaissance officer. However, we were at maneuvers only, and I proceeded with unflinching courage. After much galloping, I began to have a very fine collection of battery positions, without, it is true, knowing how to communicate my discoveries to my battalion commander, when I heard cannon shots considerably in my rear. These were nothing more nor less than my battalion, which had come into action under orders which I very naturally knew nothing about. I had been entirely uselsss to my chief, and if on joining him at a gallop I was able to tell him that I had seen the flash of the enemy's guns, I had the poor satisfaction of hearing him reply that it was at precisely these guns he was firing.

This experience was repeated several times during the day with the same success.

The conclusion is inevitable and accords with what has been stated above: the reconnaissance officer should not be pushed too far to the front, for then his mission is not clearly defined and he escapes from the chief whom he is supposed to aid. He ought not to be asked to reconnoitre positions; this is not within his competence. His more modest role is to contribute to the detailed study of a position already selected by higher authority. If this higher authority needs help in reconnoitering the ground, it should employ a special personnel, and in no case should the reconnaissance officer of a battalion be distracted from his own particular duties.

Second Day.—Still having my map, I staid beside my battalion commander. In the course of the march I rendered him some insignificant services, but for these I was in no way indispensable. Finally an order arrives. I start off and am soon on the position. But my battalion commander is vigorous, he has an excellent horse, and I am hardly there before he arrives himself. The reconnaissance officer has made no reconnaissance and has to confess that he knows precious little of the terrain, nothing of the tactical situation, and that he has not yet examined the approaches for reaching the position.

Once more my role as reconnaissance officer has come to nothing, but at least I am on the spot ready to receive my chief's orders. A little progress has been made, but something better has got to be found.

Third and Fourth Days.—The first day I had gone too far to the front; the second, I staid too far to the rear. Where ought I to go?

To fulfil my role two things seemed necessary: be oriented as well as possible as to the terrain and the tactical situation; arrive on the position sufficiently ahead of my chief to do some useful work before his arrival. It seemed to me then that under these conditions my place ought to be at the spot where all the information arrives and whence come all orders, that is to say, near the officer commanding the artillery, who himself marches with the commander of the troops.

Confident in this idea, I decided to push my temerity even to the supposition that I was in an enemy's country and had no map. I therefore left mine with my baggage and started to find the officer commanding the artillery. I joined him and the commanding officer of the troops with the reserve of the advance guard.

The first thing to strike me here was the rapidity with which I got in touch with the situation and the general's intentions. Often when information came in or an order was sent out there would be a pause and time for conversation. I learn that such a village is called "A," such a hamlet "B," that the wood "C" is on our right, that "D" is held by the enemy's infantry, that a strong column has been seen marching from "E" to "F." In short, I become oriented without any trouble, and the absence of a map bothers me very little. I content myself with observing the country, noting the landmarks.

However, the situation now develops. The battalion of artillery of the advance guard goes into action. I know its mission and its location. The sum of my knowledge, both as to the terrain and the situation is by just this much augmented.

Finally the artillery of the main body is wanted. I go with the officer commanding the artillery when he makes his reconnaissance. Having examined the position where he intends to place my battalion, he sends his officer of communication to bring up my battalion commander. This time I am in a perfectly concrete situation. I am no longer working in the air, and I have time before me. I reconnoitre the methods of access to the position and of egress to the front and flanks, and post my scouts to watch the ground. I

perceive our own infantry not far off and send a sergeant to ask its commanding officer for information concerning the troops in the neighborhood and to ask if he cannot furnish a support for the battalion, which I fear may find itself somewhat in the air.

When my battalion commander arrives, I do not present him with a neat sketch (I will speak of this farther on), but at least I can give him some information more or less precise as to the ground in front, the methods of approach, and the location of friendly troops; I know that such a village is held by the enemy, such a wood by our own troops, etc., etc. I can moreover inform him that the immediate security of the battalion is assured by the scouts which I have posted, and that an infantry support is about to arrive. Certainly my role has been more modest than some have desired; nevertheless, my battalion commander assured me that the information I had furnished him was altogether sufficient. I was moreover now at his disposal to complete it in any way he might direct and to perform any duty with which he might entrust me.

The battalion having been placed in battery, I proceeded to examine the best means for leaving the position to the front, flanks or rear. All the information that the major needed was now obtained or completed. If I should stay with him, while my presence would not be entirely uselsss, for there is always something to do, it seemed to me that I would be wasting time which could be better employed perhaps elsewhere. The battalion would certainly not remain indefinitely in the same position. It had been firing already for some time and it looked as though some change in the situation ought soon to take place. If the battalion was sent forward to take up another position, its intervention should be all the more rapid, since the combat had progressed. Minutes were becoming precious.

Under these conditions, was it not of the first importance that I should learn at the earliest moment where the battalion would take up its new position? I could thus without the least loss of time prepare my major's reconnaissance and thus avoid any delay in entering into action. But to have this information at once, was it not clearly indicated that I would have to go and find it, that is, return to the officer commanding the artillery? This is what I did. Everything turned out as it is easy to foresee. While the whole battalion was not sent for, before long a battery was demanded, and when its captain arrived upon the position designated for him, he found me there. I oriented him, and when he informed me that he had all the information he needed, I left him to resume my place with the commander

of the artillery, there to await the despatch of further orders. This maneuver, repeated several times during the day, always gave the same good results. Thanks to the place which I occupied, my battalion commander could always find me when he wanted me, and I could furnish him with particularly complete information, since I had had at my disposal the greatest possible amount of time in which to gather it.

This being only a first trial, and the difficulties augmented by the fact that I had no map, the method employed seemed to present a distinct advantage.

The next day I proposed to apply the system to the special case of a battalion assigned to the advance guard, this being the mission of my battalion that day.

Now whether a battalion be with the advance guard or with the main body, its entrance into action comprises three distinct phases:

1. Reconnaissance by the commander of the troops; in this case he is the commander of the advance guard.

2. Reconnaissance by the commander of the artillery; this is the commander of the battalion.

3. Reconnaissance by the battalion commander; this may be the senior captain or not, in this particular case; the question is disputed, but it need not bother us here.

Since we have here the same channel as in the last case, why should the role of the reconnaissance officer be different? Seeing no reason, on the morning of the fourth day I started off with my battalion commander, who is the commander of the artillery of the advance guard.

As soon as the battalion received orders to go into battery, the major proceeded to reconnoitre a position whence his batteries could fulfill the mission assigned them; I, personally, proceeded to work under exactly the same conditions as the previous day. As soon as the artillery of the main body had come into action, the battalion of the advance guard once more comes under the orders of the commander of the divisional artillery, and therefore my functions call me to his side, as on the previous day.

The role of my battalion during the first part of this last day led me to conclude that the method employed was the general one. Whatever the force of artillery assigned to a command, whether advance guard, flank guard or main body, there is always a commander of the artillery, and it is with him that the reconnaissance officer should march.

However, two days of maneuvers, in the course of which I had, perhaps, been particularly favored by events, could not be deemed sufficient to establish a definite rule. It seemed well to verify these results under another set of circumstances, and, if possible, by other officers. This is what I tried to do during the work in campaign and the firing schools of the year following. One of my comrades was good enough to take up the question, and at the end of the year there was nothing in his experience which made it necessary to modify the conclusions drawn from my own work.

During the autumn maneuvers of 1910, the divisional artillery consisted of three battalions. This new organization furnished me the occasion to add one more advantage to the method of employing the reconnaissance officer described above. This was the concrete case:

The division was about to debouch from a small village, beyond which extended a long hill where there was every reason to suppose the enemy had established batteries. The advance guard was engaged; the colonel commanding the divisional artillery was at the edge of the village with the general commanding the division. The reconnaissance officers were present. The general was afraid lest a numerous artillery should open fire upon his troops debouching from the village, and he wished to be in a position to immediately reply to this fire if opened. He therefore requested his artillery commander to immediately establish two battalions "in observation" and one "in readiness" behind a position to be eventually occupied.

The commanders of the battalions with the main body were called up at once to make a reconnaissance, but they of course could not arrive immediately. The commander of the artillery would therefore have to await their successive arrival before giving his orders. However, minutes are precious, and the reconnaissance of three battalions' positions is a fairly long operation. The presence of the reconnaissance officers makes it possible to considerably cut down the lost time.

The commander of the artillery leaves at the position he has decided upon for the first battalion the reconnaissance officer of that unit and gives to him the instructions which will be needed by the major on his arrival. He makes of this lieutenant the depositary of his thoughts and proceeds to reconnoitre the positions for the other battalion. On arriving on the position assigned to his battalion, each major is informed by his reconnaissance officer as to the mission given his command, and all other information which in the meantime

he has been able to gather. The battalion can therefore be placed in position without any delay.

After reconnoitring the position of the last battalion and waiting there for its major, the commander of the artillery goes in succession to each of the other battalions and assures himself that the indications which he has given to the reconnaissance officer were comprehended and that his orders have been properly executed. The reconnaissance officer has thus, without ever quitting his functions as an organ of the battalion, been of material assistance to the commander of the artillery, enabling him to reconnoitre in the least possible time the emplacements for three battalions.

I have just stated that the reconnaissance officer is essentially a battalion organ. This point cannot be too much insisted upon, for it would be a serious error to suppose that when he is with the commander of the artillery, this officer would make use of him as an assistant. Indeed, it is absolutely indispensable that when a battalion commander is ordered up to an artillery position he should feel sure of finding his reconnaissance officer there. If this were not so, if the reconnaissance officer were sent off by the commander of the artillery to transmit orders or make reconnaissance, the resulting inconveniences are almost sure to be greater than the advantages. The commander of the artillery already has or should have his own assistants to aid him in his work.

During all these maneuvers I constantly worked without a map, and if I must admit that I was frequently embarrassed, it is nevertheless true that in the majority of cases I managed to get along perfectly well. As a matter of fact, working without a map presents certain advantages: when the eyes are not constantly searching out words on a piece of paper, the terrain itself is more thoroughly studied, and all its landmarks better fixed in the mind. What difference does it make that such a hill bears such a name as long as we know that it is there the batteries are to be established? And then, even if the map were a thousand times more useful than it is, we have got to learn to get along without it. In war, officers who will have one are few in number, and our ancestors seemed able to win battles without this assistance. However, there is no reason why a man should not examine whenever he can the maps of those officers who happen to be provided with them.

To resume our main subject, I think that experiments made over the most varied ground and under all sorts of circumstances show with considerable certainty, first, that the reconnaissance officer's

place during the march which precedes an engagement is with the officer commanding the artillery; second, that, having rendered all the service to the battalion commander that this officer has a right to expect of him, the reconnaissance officer should return to the commander of the artillery, in order to be ready to prepare without any delay the occupation of a new position.

Without being led away by theories, which are often more seductive than practicable, it now seems well to examine what the work is which should be expected of the reconnaissance officer in the study of position. Par. 654 of the Regulations states: "He studies the best ways of access to a position for the units which are to be deployed."

This, naturally, is the first thing to do. The thing of capital importance is that the batteries should reach their place of operation. The reconnaissance officer must therefore study out if possible a concealed march of approach and ultimately a place of assembly. He can also often pick out, with the eye, at least, the place for the limbers.

Farther on, the regulations say: "He then measures the angular distances to land-marks of the terrain, with a view to determining the elements for opening fire."

We here come upon a very delicate question, that of the sketch. We constantly hear it said that as soon as he arrives upon a position, the reconnaissance officer takes out his pencil and makes a neat sketch. But here, it seems to me, we suppose one of two things: either that the reconnaissance officer is qualified to select the major's post of observation, or that the famous laws of convergence no longer exist. A sketch ought to be made from the exact place where it is to be used. The panorama is considerably modified for a very small change of position. This is a fact which there is no getting around. On the other hand, if one takes the trouble to examine the various panoramas which present themselves during work in the field, it will be noticed that one does not always look out upon well defined slopes and hills. The landscape is often confused, the country close, and the principal lines difficult to locate. Clearcut landmarks are frequently entirely absent. Each person sees with his own eyes, and no two painters ever reproduced the same landscape in the same way. The following experiment on this subject is rather interesting.

An officer who is an excellent draughtsman makes a sketch and hands it to a comrade. Eight times out of ten the latter will ask for explanations, sometimes quite long ones, before he can comprehend

the drawing given him. Evidently this may be a fruitful source of error. Moreover, we cannot expect every reconnaissance officer to be a Sargent or a Whistler. Many an officer of the greatest ability draws like a foot. Then, again, the reconnaissance officer who makes a beautiful sketch on a bright warm day, during the September maneuvers, may not show the same skill and exactness on a cold, windy, rainy day, with the enemy shooting at him. Of course we will be told that a drawing is not wanted, but a conventional sketch. This, in my opinion, makes things even worse. A sketch in which a wood is represented by a rectangle, a tower by a vertical line, a bridge by anything you choose, is all very well for the person who made it, but will remain quite incomprehensible for anyone else. Moreover, is a sketch so necessary to the battalion commander? Has not he before his eyes something better than all the drawings in the world; the landscape itself? Whatever system he may use, whether base line, ruler or field glass, he will get along more quickly, and frequently more accurately by looking at the terrain than by looking at his sketch. It is a commonplace to say that in war only simple things can succeed. Let us be simple, then, work as much as possible on the ground itself and as little as possible with papers.

I do not in any way mean to say by this that sketches are useless; very far from it. The very making of them is, in the first place, of real value, for it teaches us to look at the ground, and it develops the faculties of observation. From this point of view, and as an education to the eye, sketching should be practised by all officers and even by non-commissioned officers. Again, a sketch is often indispensable in circumstances when great rapidity or precision are required. This is not the usual case with the battalion commander who, on account of the convergence, can only approximately designate the location of targets. Battery commanders, above all, can make serious use of a sketch, for example when collecting firing data for different points of the terrain and for firing at fleeting targets.

It would seem that in general a sketch is not indispensable or even very useful to the battalion commander. In any case, it ought to be in principle executed by the person who is going to use it; it may then be as simple and rudimentary as possible. If, however, the reconnaissance officer is charged with it, he can only make it after the major has indicated where his post is to be. It is therefore quite out of the question to make a sketch before the arrival of this officer.

After the reconnaissance officer has finished reconnoitring the

best means of approaching the position, what should he next do? Undoubtedly he should occupy himself with the immediate security of the battalion. If there are friendly troops in close proximity, he has only to ask support of them. If the battalion is isolated, scouts must be posted where they can best watch the ground.

Certain, now, that no hostile squadron can make an unexpected visit to the battalion while it is going into battery, the reconnaissance officer can then study the tactical situation a little more closely. What troops are near by? What is their mission? Where is the enemy? He has been told that the battalion was to support the attack on such and such a point. Where is the officer who is conducting this attack? Communication with him must be established, his intentions or instructions learned. A scout is sent off for this purpose. In short, the reconnaissance officer does everything possible to prepare for any emergency likely to arise, and gathers all the information he can, thus enabling his battalion commander, as the fight progresses, to act without hesitation or error.

All this done, if there is still time left on his hands, he can occupy himself with the preparation of fire. He can study the defilades possible, in view of the work the battery has to do, look for the most favorable battery positions, etc. All of this roughly, of course, for the exact and complete reconnaissance of a battery position is the affair of the captain alone. Having furnished all this information to the major, and after the guns have been put in battery, the reconnaissance officer should at once study the best methods of leaving the position when the battalion is called upon to take up a new one. The moment he has decided upon the most practicable routes, he should have them closely examined by one or two scouts, who should then be left with the battalion commander to guide him when the occasion presents itself. Finally, having assured himself that the major no longer has need of his services, we have already seen that he has something much better to do than to remain and play the aide de camp to that officer. He should go and find the commander of the artillery, inform him of the situation in his battalion, what it has done and what it can do; in short, tell him all those things which will be useful in his next decision.

To recapitulate, the reconnaissance officer can be expected to do the following things:

1. During a march near the enemy, keep himself informed of the tactical situation, study the ground, learn all he can.

2. Do not forget that he must be on the position where the guns are to be established when his battalion commander arrives there.

3. When a position has been selected for his battalion, examine the best means of reaching it. If necessary, find a position where the battalion can assemble, and if possible, a good place for the limbers.

4. Assure the security of the battalion by posting scouts or by means of neighboring troops. Arrange for the surveillance of the battlefield.

5. Place himself in communication with friendly troops and get information as to their situation and mission; if possible, locate the enemy's position.

6. If there is time, prepare firing data.

7. When the battalion commander arrives, give him all the information to be had, topographical, tactical and technical.

8. Seek the best means of quitting the position in any direction whatever.

9. On returning to the commander of the artillery, inform him exactly as to the situation obtaining in the battalion.

With the aid of scouts and agents of communication several of these operations may be carried on simultaneously.

It does not seem too bold to say that this arrangement of the duties of a reconnaissance officer will produce the most useful and practical results. This statement is based on numerous experiments, during which the persons making them made a sincere effort to operate under the conditions which would obtain in war. I am far from thinking, of course, that this method is the only good one, and no method, not even the best, is good unless well carried out.

Battle has no fixed rules; its situations are so varied that it would be ridiculous to try to provide for every case that might arise. In the case we are now studying, let us take the example of a battalion which has received orders to make a turning movement, during which its security may be in danger. Its reconnaissance officer would certainly not go directly to the position to be occupied, for in this case the march of approach is of capital importance. The first problem to be solved is that of reaching in safety the position selected. The duty, then, of this officer, as soon as he learns what the orders are, would be to return to his battalion and aid in guarding it against surprise or attack during the critical period, unless, of course, the general has provided some special protection.

To terminate this modest study, I wish to say a word as to marking the route. Can the reconnaissance officer do this work? In my

opinion, no. To merit his title ("officier orienteur"), he ought to precede his battalion, and to charge him with marking the route would of necessity require him to remain too long in the rear to orient himself in time to be of use. Who, then, must guide the batteries?

In studying the normal procedure for the entrance into action of a battalion of artillery, we have seen that the place from which the order goes to bring up the batteries is usually the place to which they ought to be brought. The agent of communication between the commander of the artillery and the battalion commander, an officer, will therefore nearly always have to travel in a direction opposite to that which the batteries take. Moreover, it is perfectly understood that the duties of an agent of communication require him not only to carry an order, but to stay and witness its execution or at least the beginning of its execution; he therefore should not return to the commander of the artillery until he has seen the batteries in position. In the usual case it will be his business to guide the reconnaissance parties from the battalion (i. e., the major, captains, etc) to the position chosen and where the commander of the artillery is awaiting them. Under these conditions, the agent of communication would appear to be the person designated to mark the route.

After numerous trials, the following system was found to work best. As soon as the order is given (by the commander of the artillery), the reconnaissance officer, whose duty it is to examine the immediate approaches to the position, indicates a point on the ground where the agent of communication should conduct the battalion. Frequently he can even accompany the agent to the spot itself. The two officers now separate. The reconnaissance officer reconnoitres from this spot up to the position to be occupied by the guns. He is accompanied by the scout whose business it will be to guide the batteries in this last part of their march.

The agent of communication proceeds to find the batteries. It will often be to his interest to take, while going, the very road which the batteries will take in coming. He can, therefore, even at a gallop note the points at which it will be necessary to leave a marker when returning with the batteries. When he joins them, he knows, therefore, that five markers, for example, will be needed to mark the route. Having transmitted his orders to the major, he adds: I need five scouts or agents.

These five men are given him, and with them he marks the route which the batteries are to follow in coming up. If the itinerary to

be followed has not been reconnoitred by the agent of communication on his way to the batteries (an effort should be made to do this, it is not a waste of time, it is of the highest importance) he asks for the number of scouts which he thinks necessary. With these he goes forward as rapidly as possible, preceding the major and the captains, and marking the route.

It may be objected that since the scouts are supposed to be with the reconnaissance officer, enough men will not be left to mark the route. This leads us to speak of the assignment of scouts. A battalion has nine of them and the reconnaissance officer has no need of all these. It is inconvenient to have too many men galloping behind you, and some of the scouts can always be usefully left with the batteries. Moreover, it has already been seen that a number of these men always remain with the batteries when they are in position, either in surveillance over the field of battle, guarding the approaches, or ready to guide the batteries, when they start to make a change of position.

The reconnaissance officer can very well get along with two sergeants and one corporal, to whom is added one trumpeter to serve as horse holder. This leaves with the major to mark the route, one sergeant, two corporals, and two trumpeters. This is already a very good number, and if they are not sufficient the regulations provide that to mark the route scouts can be aided or replaced by non-commissioned officers taken for the moment from the batteries.

Therefore, if our scouts are too few to assure marking the route, we can take a few chiefs of section or caisson; but I beg to reassure battery commanders that these non-commissioned officers would always be the first markers established, and that each would take his place in the column as his battery passes. In this way the batteries are deprived of these men for only a very short time, and they come into action with their personnel complete.

This method of operating has been frequently tried out, and it always gave good results. Combined with the method above outlined for using the reconnaissance officer, it reduces to a minimum the fatigue imposed upon the horses of the scouts, while obtaining from these men the maximum results.

While on this subject I venture to suggest that the reconnaissance officer ought to have two horses. However good may be the one mount with which he is now provided, considering the amount of work which he has to do, this horse is sure to be tired out at the end of a few days hard service. If the reconnaissance officer is obliged

to take a battery horse while his own is resting, he will have much difficulty in performing his work.

In submitting this modest essay to the reader I have no pretension of presenting it as the sole solution of the problem. Its whole merit, if it has any, resides in its being the fruit of a long experience in the function of reconnaissance officer, during which I have always tried to do only what was in accordance with the realities of war, and make use of simple means only, the sole ones which ever succeed in campaign.

FIELD METHODS OF ADJUSTING FIRE-CONTROL INSTRUMENTS.

BY MAJ. W. S. MCNAIR, 6TH FIELD ARTILLERY.

The following methods are offered as suggestions for adjusting sights, telescopes, and quadrants in the field, where time is important, where the means described in the handbook are not at hand. and where a fair degree of accuracy is sufficient.

To Adjust a B. C. Telescope.

Means of adjusting the levels on the alidade of the telescope exist in the instrument itself, and are therefore always at hand.

For the adjustment of the angle of site micrometer the following expedients may be resorted to:

1st. When there is but one instrument:

Assume that there is an error in the angle of site reading.

Set up the telescope; see that the levels are in adjustment; direct the telescope upon the top of a stake at a convenient distance, not less than 100 yards; this stake should be of such height that the telescope can be set up near it later on with the objective at the same height as the top of the stake.

Read the angle of site; this reading will be 300 + S + E, in which S is the angle of slope of the line and E is the error in adjustment.

Set a second stake near the telescope with its top at the height of the objective of the telescope. Now move the telescope to the first stake and set it up with its objective at the height of the top of the stake. Read the angle of site to the top of the second stake, which was left at the first station. This angle will be 300 — S + E.

Now, if one reading is subtracted from the other

$$\begin{array}{r} 300 + S + E \\ 300 - S + E \\ \hline 0 + 2S + 0 = 2S \end{array}$$

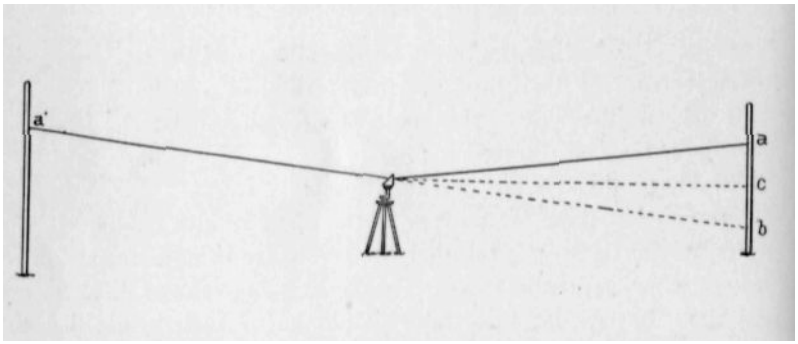
hence ½ the difference of the two readings is S and it becomes known that the reading in the second position should be 300 — S.

The slope of the line is up or down from the second position, according to whether the second reading is more or less than the first.

The rule then is to make the telescope in its second position read 300 + (or —) ½ the numerical difference of the two readings, when pointed at the top of the stake in the first position.

It should be noted that, if the objective is not at the same height as the top of either stake by one inch and the stakes are 100 yards apart the resulting error will be about one-third of a mil.

2nd. To adjust one telescope without setting it up in more than one position: An assistant is required.



Set up the telescope. Set a stake at about 100 yards. Set a second stake at about the same distance on the opposite side of the telescope and in line with the telescope and first stake.

Set the angle of site scale at any convenient reading near 300 and have the assistant mark on the stakes the points where the cross wire cuts them (*a* and *a′*).

Sight from a′ on the center of the objective and have the assistant mark *b* where this line cuts the other stake. Then the point *c* half way between *a* and *b* is on the same level as the objective. Make the angle of site read 300 while pointed at *c*.

If the point *b* is not correctly located by seven inches an error of one mil will result.

3rd. To adjust several telescopes:

Adjust one telescope carefully; then measure with it the angle of site to some distant prominent point. Set up each of the other telescopes near the position of the one first adjusted and make it have the proper angle of site reading when pointed at the distant point previously measured.

To Adjust the Sights.

The object of this adjustment is to make the line of sight parallel to the axis of the piece when the sight reads zero range and zero deflection. If the zero line of sight and axis of the bore pass through a common point in the target at the same time these two lines will be practically parallel.

To make the adjustment, select a well defined point 2,000 yards or more distant. Get two hairs from a horse's tail and secure them in the grooves on the face of the piece. Remove the firing pin and by sighting through the firing pin hole adjust the intersection of the cross hairs on the point by elevating or depressing and traversing the piece; without moving the piece, put the cross wires of the panoramic sight on the same point by revolving the sight and raising or lowering the sight shank in its socket; with the cross wires and cross hairs thus laid on the same point bring the readings of the deflection scale of the panoramic sight and of the range strip on the sight shank both to zero by the methods provided for their adjustment; verify the laying. It is not necessary to level the wheels for this adjustment.

To Adjust a Range Quadrant.

If but one gun with its quadrant is available then one of the methods heretofore described for adjusting the B. C. telescope may be used.

Generally two or more guns are together, in which case the following method will be more convenient. Unlimber two guns at about the same level; select a distant point, and, the sights being in adjustment, lay both pieces on it by means of the panoramic sights with zero range.

Set both quadrants for the same angle of site, then bringing the bubbles to the center by turning the range discs. If the range readings do not agree adjust the range disc of one of the quadrants till it agrees with the other. Whatever error exists in the adjustment of one quadrant will then be equal to that in the other.

Move one of the guns about 100 yards away from the other and turn the two guns till they point toward each other. With the sights still set at zero range, point each panoramic sight at the other and measure the angle of site at each piece. Half the difference in these two readings will be the slope of the line from one sight to the other. Set off 300 ± that half difference on the micrometer

scale, applying the plus correction to the quadrant which measures the greater angle of site; center the bubble again and then bring the zero of the range disc to the index by the means of adjustment provided.

Having adjusted one quadrant, all of the others may be adjusted by comparison with it when the guns are laid on the same distant point.

If the sights are not known to be in adjustment the guns may be laid by means of cross hairs and firing pin holes.

If a properly adjusted B. C. telescope is available the true angle of site of a distant point may be determined by its use and all quadrants may then be adjusted by comparison with the telescope.

The gun should be laid on the point by means of the bore sights or correctly adjusted panoramic sight set at zero range. If the quadrant is in adjustment the bubble will be centered when the angle of site reading is that found by the B. C. telescope and the range reading is zero. If the bubble is found not to be centered it should be centered by changing the range reading, then the range disc adjusted so as to read zero without disturbing the bubble.

FIRE AGAINST INFANTRY.

BY MAJOR E. BUAT, FRENCH FIELD ARTILLERY

Translated for the Field Artillery Journal from the "Journal des Sciences Militaires," July 15th, 1911.

[Major Buat is a French artillery officer of exceptional ability and varied experience. At the maneuvers of 1910, he was General Percin's right-hand man in organizing a new and complete system of umpiring, and, in an impromptu lecture given on the terrain to the foreign officers, he produced upon all a brilliant impression. He has served much on the General Staff, was a staff officer of the able General Bonnal, and has written a book on artillery methods.

The chief interest of the present paper to the American artilleryman is that it illustrates so clearly the great flexibility of the French system of handling fire.

Under this system the captain selects a registration point near the target. and lays his guns upon it by any convenient method. For example, he may lay the right gun on the registration mark, if it is near the target, and cause the other guns to be established parallel to it. The sheaf having been thus formed by the first lieutenant by any means the captain may prefer. each gunner selects his own aiming point and marks its deflection on the gun shield with chalk. The captain now refers every shot to his own registration mark, and can quickly change the direction of any gun by commanding, for example, "No. 2 left 50." No. 2 gunner increases his deflection 50 mils and relays upon his own aiming point. Or the captain may command "No. 2 left one turn"; the gunner traverses to the left by one turn of his hand-wheel. The captain need never consider the numerical value of the deflection of his guns; he does not need to know what it is, or even what aiming points they are using.

Other examples of simple commands for directing any gun or guns upon a new target are:—"No. 2, range 100 more" ("Deuxième plus loin cent"); "No. 3 left 2 turns, 3 rounds, range 200 less" ("Troisième à gauche deux tours, par trois, plus loin deux cents"); "No. 4 left 10 turns, 6 rounds, sweeping double, range the same" ("Quatrieme à gauche dix tours, par six, fauchez double, même distance.")

The battery commander thus may direct any gun upon any target with ease and rapidity, and this is absolutely necessary when he has to fire upon small groups of infantry advancing over irregular ground. Each group, if small, must be attacked by a single gun, or else the expenditure of ammunition is out of proportion to the object sought; and each group must be attacked quickly, or it escapes the fire of the artillery, and is left free to deal with our infantry.

This subject is covered in an interesting way in Major Buat's article, and the concrete illustrations give a clear idea of how this procedure may be practiced on the ground by the battery commander. In reading, it is necessary to remember that the French gun is "anchored" in position by means of wheel shoes, and that it has to be "cast loose" before shifting the trail.]

I.—Infantry in Groups.

Appearance of the Groups.—When a body of infantry, advancing against another at a distance of some thousands of meters, has to pass over ground which may be exposed to artillery fire, it takes its precautions accordingly. Usually it assumes a formation in small groups—say from a platoon down to half a dozen men. These

groups, often several hundred meters apart, move at a run, advancing a short distance and then lying down.

The artilleryman observing these groups will notice that they generally come into sight at particular points indicated by the nature of the terrain—woods, hedges, sunken roads, hills, etc.—and further, that such of these bits of cover as form the longest salients toward him seem the most popular. Infantry, like electricity, has a tendency to escape from points.

Our artilleryman will also note that the current of groups, flowing from any particular bit of cover, directs itself upon another. Between the two bits of cover each group advances by short rushes; behind it are other groups, some in motion, some stationary.

If we now add that all these streams of groups take their origin at varying distances from the observer—for the patches of cover are scattered irregularly over the ground—we shall have a fairly good idea of the target presented to the battery.

Amount of Artillery to be Used.—It is evident that all the batteries in an army corps would not go far if we should try to assign one to look after every stream of groups, or even every two or three streams. Out of all the batteries thus brought into action, only a few guns at a time would be usefully employed. The rest would be firing upon unoccupied ground, or not firing at all.

All this leads us to try to economize both guns and ammunition, and to use a few guns working actively instead of a large number firing slowly and intermittently.

One gun should be enough to fire upon a target of a squad or two. The captain will thus be encouraged to fire, for the importance of the target will correspond to the amount of force employed. If he waited for a chance to use four guns effectively he might never get it; or, if he did, it might not be until late in the game, when the two infantries were in close contact. Until then the hostile infantry, by its extended formation, might have altogether avoided loss.

We should, then, require the maximum effect from each gun used; in other words, we should utilize to the full the traverse of our gun on the carriage. This traverse being 100 mils, a single battery could, theoretically, observe a sector 400 mils wide—1200 meters at a range of 3000, 1000 at 2500, 800 at 2000. In practice, when the guns are anchored in position, this traverse is reduced, on one side or the other, by several turns of the hand wheel, so that the available traverse is only say 80 mils per gun, or 320 per

battery—say 300 in round numbers. But even this gives a 900 meter sector at 3000 meters range, or 600 at 2000.

Under the assumed conditions, the pieces may be anchored in position, and still any target appearing in the sector covered by the battery may be attacked at once, without shifting the trail. This is important, when we remember the transitory nature of the targets.

Preparation of Fire.—It is not necessary here to consider the battery position. The amount of defilade will be determined by higher authority, since the maximum permissible dead space will be indicated to the captain.

The sector of observation being 300 mils, the directing gun may simply be laid 30 mils to the left of its right edge, and the others

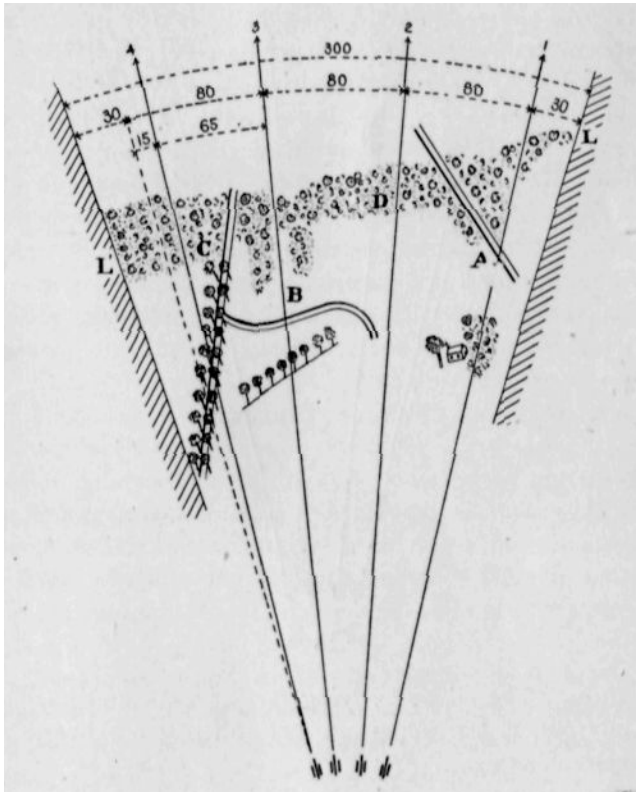


Fig 1

with a distribution difference of 80. But the important points in the sector, that is, the places where hostile groups may be expected to appear, will probably not be uniformly distributed.

For example, in Fig. 1, the critical points along the edge of the woods LL', within the sector assigned to the battery P, are the point where the road A leaves the woods, the salients B, and the road C, with its ditches and lines of trees. A piece should be directed upon each of

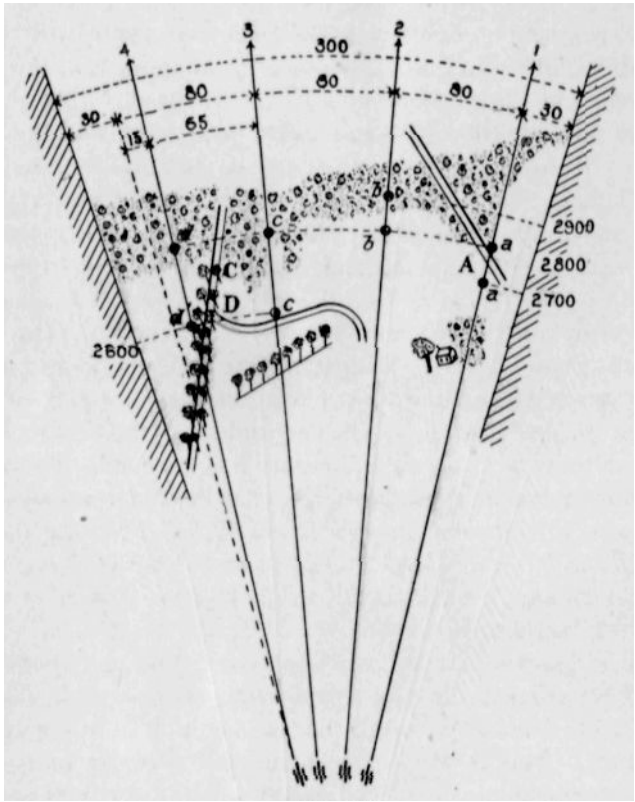


Fig.2.

these. The space D, lying farther back and having open ground in front, is less important, but still is good cover, and can not be neglected entirely.

Uniform distribution would place the first three guns about right, but would throw the fourth too far to the left on the road C; this gun, then, should be brought in to the right, after the pieces are anchored in position, by the command "No. 4, 15 right; register."

The captain will then be ready to open fire promptly upon any group that appears in his sector.

Fire for Adjustment.—The edge of the woods is kept under close observation, and when hostile groups begin to come out in any numbers it is time to adjust the fire. Or, if friendly artillery has already been firing in the vicinity, as, for instance, upon hostile artillery in position farther back, the adjustment may be made even before the groups begin to appear.

It is apparently no easy matter to make this adjustment, for the targets of the different guns will appear at different ranges. But in practice the solution is simple.

A first salvo, fired with range 2800, gives the bursts *a, b, c, d* (Fig. 2). Referring these to the edge of the woods, *a* and *b* are seen to be short, one almost among the trees and the other very close; *c* and *d* are over, in the woods. A second salvo, with new ranges—No. 1, 2700; No. 2, 2900; Nos. 3 and 4, 2600—gives the corrector, and also a bracket on the edge of the woods. The short limit is taken for each piece—2700, 2800, 2600, 2600. This places the whole group of bursts along the edge of the woods. If, later on, the captain wished to fire for effect with any one gun, he might find these ranges hard to remember, unless he had them written down, and even then he might have no time to consult his memoranda before firing at a fleeting target; but the regulations make it unnecessary for him so to tax his memory, by providing the commands "Range the same," or "Range so much more, or less."

The adjustment, then, is complete; the battery is ready to fire for effect at any moment.

Fire for Effect.—The sector to be covered by each piece being accurately registered, fire for effect requires, first, that the piece which is to fire be laid accurately in the direction of any group that shows itself. This is done by turning the traversing hand wheel; and the amount of traverse will usually be very slight, if each gun has been registered on the most likely point in its sector. For example: A group comes out of the woods by the road C (Fig. 2), and moves toward D, taking advantage of the cover afforded by the road ditches. The point where it appears is 20 mils to the right of the axis of No. 4 gun. The captain commands, "No. 4, 10 turns to the right." The direction being thus assured, and the range being already set, the only thing left to be determined is the kind of fire.

Distribution may be desired either in breadth or in depth; one

is not likely to go far wrong, in any event, by distributing in depth, for generally where one group shows itself there are others following.

A line of skirmishers, at wide intervals, appears in the sector of No. 2 piece; its front is about 10 mils. The captain directs the gun on the right end of the line, and commands, "No. 2, volley fire two rounds sweeping; range the same."

A small column is seen in the sector of No. 1 gun; the captain commands, "No. 1, volley fire two rounds; range the same."

Several groups, one after another, appear in the sector of No. 3; the direction of their advance is oblique, from the observer's left to right. The captain commands, "No. 3, volley fire two rounds, range the same"; and immediately afterward, "To the right *n* turns; volley fire two rounds; range 100 more."

After each firing, the piece is brought back to its registration point, unless the captain, finding it accurately laid on a place particularly sought by groups of the enemy's infantry, gives this as a new registration point.

Firing at such targets is particularly good practice for battery commanders. They offer ever-changing situations, requiring rapid estimation of angular distances and quick decision as to the kind of fire to be used. Thus they are particularly well adapted to develop coolness, judgment and tactical instinct, to familiarize one with the powers of his matériel, and give him confidence and certainty in handling it.

In general, the time will come, sooner or later, when groups will appear in such numbers that the captain can no longer control the fire of all the pieces that are called upon to fire at once. If the battery is in a direct fire position, it might be split up into two two-gun, or even four one-gun batteries, under the chiefs of platoon or section; but, although the conduct of the fire of these smaller batteries would be simpler, it would still be undesirable to place it in the hands of a reserve officer or a sergeant. And if, as would ordinarily be the case, the position is masked, this solution becomes impossible, since, not to mention other difficulties, there would hardly be observing stations enough.

We may then adopt another plan—that is, to form a veritable screen of fire in front of the line of cover. If the hostile groups attempt to pierce this screen at any point, the proper gun takes up rapid fire; the rest keep up a slow, continuous fire, distributed over the whole front.

Suppose, for example, a number of groups have congregated about

the farm F (Fig. 3), at the end E of the sunken road crossing the open space V, behind the hedge H, and at the road fork C. The short limits of the bracket are known, for the guns have been following these same groups from the time they first showed themselves. The captain

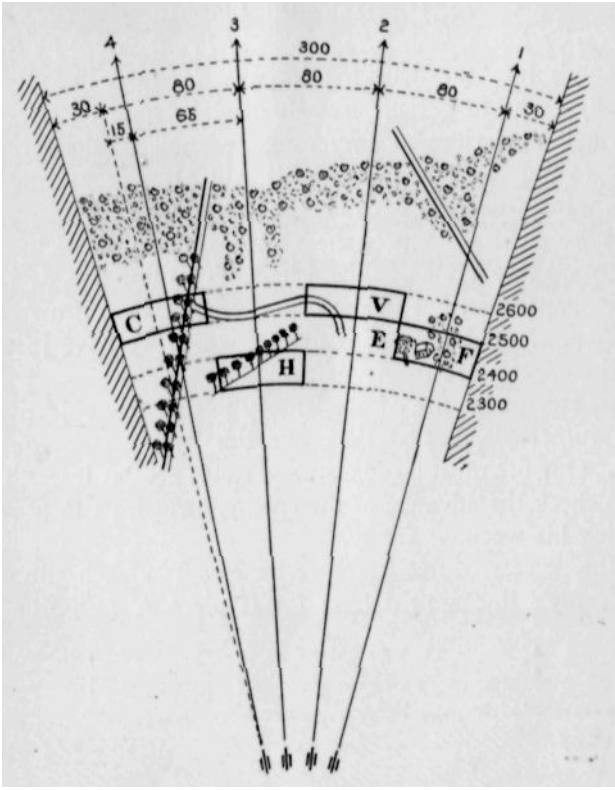


Fig 3

commands, "Each gun, front 20 turns right and 20 turns left; *n* shots per minute." If a sudden rush is made from the farm F and the adjacent woods, he commands, "No. 1, volley fire six rounds, sweeping double." If a similar rush is made at the same time from the hedge H, his command will be "Nos. 1 and 3" instead of simply "No. 1." In any case, the greatest number of projectiles should be directed upon the covered areas, for there will certainly be infantry concealed there.

If there is no specially noticeable line of covered positions, the screen may be established with the same range for all guns. And it is not essential that this range be short of the most advanced

groups; their advance will be delayed if they find that they can not be supported from the rear.

The chances are that, in the face of this fire, the separate groups will hesitate and delay, gradually drift together, and finally become skirmish lines. If by any chance they succeed in getting through, a new screen will be formed at shorter range, and the same process repeated.

II.—Skirmish Lines.

Progressive Formation. Reduction of Front Swept by Battery.—The enemy's infantry, working its way forward in little groups, continually seeks to get up enough men, in spite of our artillery, to form a line of rifles at easy range, capable of delivering a fire superior to ours. If it succeeds, it will attempt to continue the advance, a hand-to-hand fight being its ultimate object.

Hence we shall see a progressive transformation of the original line of groups into a line of skirmishers. This line will, at first, have numerous gaps in it, but in the course of time will grow more and more coherent. The barrier of fire, of which we have just spoken, will tend to accelerate the transformation.

We must adapt the fire of our battery to this new objective, which is more vulnerable, but at the same time more dangerous to our infantry. Our fire must be denser, and cause greater losses, the more surely to check the advance of the enemy, or at least to prevent him from using his weapons freely.

Now the density of fire in the sector swept by each gun increases as the enemy's line approaches; for if piece A (Fig. 4) at 2800

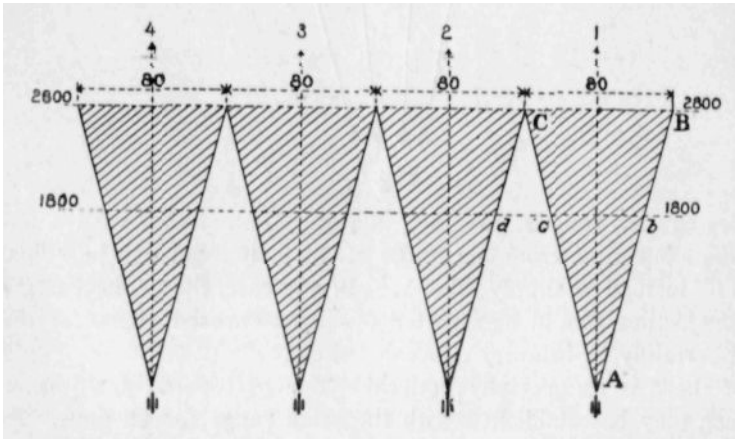


Fig. 4

meters distributed six projectiles over the front BC, 220 meters, it will, using the same method of fire, distribute the same number at 1800 meters over the front *bc*, 140 meters. But on the other hand, the sectors assigned to each gun having been so laid off as neither to overlap nor leave gaps at 2800 meters, there will, at shorter ranges, be gaps *cd*, which increase as the range lessens. In other words, our barrier of fire is becoming less coherent, while the target is becoming more so.

The guns might, of course, be cast loose, and, by shifting the trails, directed individually upon the gaps; but this would take a great deal of time, just at the moment when the enemy was trying to advance; and besides, no captain could control, and no battery execute, such continual changes of target.

We conclude, then, that the battery must not try to cover so broad a front; and that the reduction should be greater than that necessary at the moment, so as to allow for future reduction in range. Assume, for instance, that the battery in Fig. 5 is 1000 meters in rear of its own

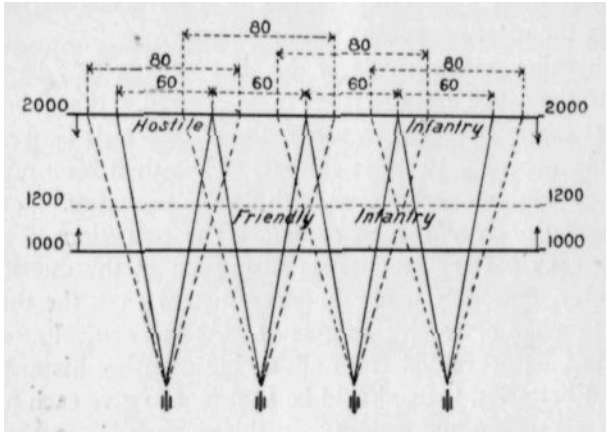


Fig. 5

infantry, which is engaged with hostile infantry at 1000 meters range. If we want to be able to sweep the entire front with the guns at range 1200, using the whole available traverse of 80 mils, we must make the sectors overlap at 2000 meters, and the distribution difference must not exceed 60 mils.

Each battery, then, being compelled to reduce its front of attack, we see the technical necessity for increasing the number of batteries as the range lessens. If this is done, the pieces may be left anchored.

Fire for effect.—The enemy's skirmish line will not be straight; even on the limited front swept by a single battery, there will be salients and re-entrants. There will be various reasons for this; the cover will be irregularly placed; certain portions of the line, having momentarily better protection, will make more rapid progress than the rest. But for whatever reason, the line will generally be oblique to the front of the battery.

These considerations lead to distribution of the fire in depth. It will commence with a range calculated for the most distant elements, and, after one or more changes of 100 meters, end at a range known to be short of the most advanced. Many projectiles will, it is true, fall beyond the line; but they will rarely be ineffective, for the skirmish line will probably be followed, at a short distance, by supports. Besides, the smoke from each group of bursts will form a background which will make parties at shorter range more clearly visible; and, the fire being stopped as soon as the bursts are clearly short, the expenditure of ammunition is minimized. The shortest range is the most important, for the most advanced parties of the enemy are the most dangerous to our infantry.

In each volley, either single or double sweeping may be used, according to the range and the front to be covered. It will be remembered that single sweeping traverses the piece 5 mils between shots, and double sweeping 10 mils; so that, at less than 2000 meters, the cones of dispersion overlap even with double sweeping.

Supporting or repelling an assault.—The reduction of the front swept by each battery reaches its maximum at the moment when our infantry, now only a few hundred meters from the the enemy, is about to make or receive an assault. At this critical moment the enemy must be prevented from advancing or using his arms. The number of batteries, then, should be sufficient to give each of them a front not exceeding 200 meters. In this narrow space, the salients and re-entrants, or the obliquity of the line, will be inconsiderable, and the volleys may be at a single range, or two ranges at most; they will be short and violent, with or without sweeping according to circumstances. The question of ammunition expenditure becomes secondary.

When the infantries have come so close together that it is dangerous to continue time fire, percussion fire may be used for a few rounds more. Time fire is then taken up again at a longer range, to reach the enemy's reserves. If they are visible, they will be an easy target, for the ground over which they must advance is already

registered by the preceding fire; if not, the fire will be directed chiefly upon the covered areas.

III.—Special Cases.

Repelling a counter attack.—When infantry is advancing to the attack, the zone of possible counter attacks is, so to speak, marked out on the ground; the tactical instinct of the artilleryman whose duty it is to guard against them should show him the line of cover or the hill crest where the enemy will probably appear.

He knows that if a counter attack is made he will see a strong skirmish line suddenly appear from cover, deliver a short intense fire, and then rush rapidly upon the flank of our attack, making a few short halts to fire.

The approximate direction of the danger is known, and it is certain that there will be no time to lose if the enemy is to be stopped. Preparations for quickly opening an effective fire are therefore made, by registering a certain number of points in the suspected sector; the battery is kept in observation, its guns directed upon the center of the sector.

Since the strength of the counter attack can not be known beforehand, it will be well to form the sheaf with a large distribution difference,—25 or 30 mils, perhaps, but of course the exact figures will depend upon circumstances. As soon as the enemy appears the necessary change in direction will be made, the guns anchored if there is time, and fire for effect opened at once.

The method of fire must naturally be adapted to the target. Now we know that the skirmish line will not be unsupported; other troops will be not far behind, and this suggests distribution in depth. We know also that its outer flank will be covered by still other troops echelonned behind it, exactly as in our own attacking force, and this suggests covering a broad front. We shall, then, have to cover a zone both broad and deep, with rapid time fire; zone fire sweeping seems to be indicated.

The density of this fire will not be great, but the important thing here is, not the destruction of the target, but its temporary immobilization, to give our infantry time to deliver its attack, or the troops echelonned in rear of our flank to come up.

Supporting a counter attack.—The procedure will be the same as before, except that, as the counter attack is essentially a surprise, no fire for registration can be permitted. At the moment when the

counter attack is launched, the battery must quickly get a long bracket, or perhaps merely determine a range short of the exposed flank of the attack; then pass at once to rapid time fire, broadly and deeply distributed.

Surprise of infantry in column or assembly formation.—A bracket of 400 or even 800 meters is obtained; zone fire follows, with or without sweeping, according to the size of the target.

Fire on a registered zone.—The effect of fire is of course zero if the data are incorrect; hence the necessity of adjustment. But there is more than one way to adjust. Methodical adjustment by salvos, in the usual way, is the least suitable against such targets as we may expect in modern warfare, for the gradual closing in of the salvos warns the enemy of his danger. Both infantry and artillery can almost instantly reduce their vulnerability,—the former by lying down behind any available cover, or even behind their knapsacks; the latter by using the shields. We may then doubt whether it is advisable, in case of shrapnel fire, to pass at once to fire for effect after adjustment, or whether it would not be better to wait until the target becomes more vulnerable,—the infantry by moving again, the artillery by resuming its fire.

In any case, there can be no question of the advantage of knowing beforehand the firing data for certain points in the terrain. A single verifying salvo will then be all that is necessary before passing to fire for effect, and the surprise will be almost complete. It may even be made absolutely so by firing the verifying salvo at a range known to be erroneous, thus giving no warning whatever.

It is very likely that registration will be more and more resorted to in the future. If we can succeed in getting an accurate range-finder and clinometer, which is not likely to get out of adjustment, registration will reduce merely to reading a few angles of site and ranges.

After fire is opened, registration goes on continuously and automatically. Even a salvo which is useless for the immediate purpose may, if carefully observed and noted, help in some future adjustment.

A battery observing a registered zone is like a hunter, lying in concealment and watching for game. As soon as anything is seen indicating the presence of an enemy near a registered point, the sheaf is directed upon the target and fire for effect opened without delay. The first volley is fired at a range believed to be long with reference to the elements of the target first seen; this verifies the

direction. The fire is continued by successive volleys, until a range is reached that is clearly short. According to the nature and size of the target, the whole battery may be used, or only one or two guns; sweeping is generally advisable.

Infantry entrenched is almost invulnerable to shrapnel fire; shell must be used. The bracket should, if possible, be narrowed to 50 meters, and both limits and the mean used in fire for effect. After each series of volleys at these three ranges, the direction is changed slightly and the series repeated.

For example:—each piece is assigned its part of the trench, and adjustment made with shell. A bracket of 2000—2100 is found on a certain part of the trench, and the gun firing at this part laid on its right extremity. The captain commands successively, "2100, 2050, 2000," makes two turns to the left and repeats, and so on to the other end of the sector. For 50 meters of target the ammunition expended will be about twenty-five rounds, including adjustment; the effect should be considerable.

Fire into dead angles.—If there is any ground which it seems at first sight impossible to reach with artillery fire from a masked position, it is that which lies below a trajectory which just clears the mask. Much of it may, however, be searched by skillful changes in angle of site, corrector and range.

First, by raising the corrector, we may draw in the points of burst. The effect will be less than with a normal height, but in this case the range is generally short and the trajectory flat; the height of burst in meters, not in mils, will vary within narrow limits, and the bursts will still be effective.

When we reach corrector 40, the limit of the scale, we are not yet at the end of our resources. We may raise the angle of site, compensate for this change by cutting down the range (10 mils angle of site corresponds to 300 meters range), and lower the corrector again.

For example:—the minimum range is 1800 and the proper corrector 20. The captain gradually raises his corrector to 40. Then, if the target is still short of the beaten zone, he raises his angle of site 10 mils, lowers his corrector by the same amount, and repeats his series with range 1500. By continuing this process he may bring his bursts clear back to the mask itself.

A PRACTICAL TEST OF 15-HAND HORSES FOR FIELD ARTILLERY.

Last July the French Minister of War directed that a selected battery of artillery make a severe two weeks test, under campaign conditions, of the value of the short stocky Breton horse for artillery purposes.

A board was appointed composed of nine artillery and cavalry officers, one veterinary and one civilian (manager of a state stud). All of these were practical horsemen of generally recognized competence. The full report of this board, with many photographs of the horses, is published in the "Revue d'Artillerie" for January, 1911. It contains many useful points of general application in the matter of the type of horse for field artillery, and the nature of the tests and method of procedure seem useful to record for future reference, in case a similar experiment is ever undertaken by us. The results of the tests themselves could not, of course, be accepted by us without further experiment, on account of the difference in roads, etc., in this country.

In reading the report, it is necessary, to avoid getting an erroneous impression, to keep in mind the type of horses used. The animals, while small, were very solid and "chunky."

For the purpose of the test 45 Breton horses and 15 Ardennes horses had been purchased in the summer. These were nearly all six years old or over. Arrived at the battery the majority were attacked by worms, but being cured they were subjected to a three weeks training before the test.

All of these 60 horses were between 14 hands 2¼ inches and 15 hands ¾ inches. To form a comparison, 60 horses between 6 and 12 years old and between 15 hands ½ inch and 15 hands 3¾ inches were selected from a regiment of artillery and put in the experimental battery alongside the small horses. The small horses were put together in teams and the large horses in other teams. During the two weeks test the same teams hauled the same carriages.

Most of the small Breton animals were mares; 14 of them had had colts. Before purchase they had been used for farm work. All of these horses were weighed two days after reaching the remount depot and again just before starting on the test, some two or three months later. The larger horses, those measuring 15 hands ¾

inches, weighed almost exactly the same on both occasions; the smaller ones, under 15 hands, gained an average of 22 lbs.

Of the 60 old artillery horses, most were in good hard condition. Nearly all had returned from the hard work of the grand maneuvers shortly before, since which time they had had moderate work.

The tests were intended to imitate the work of a hard campaign. They comprised two periods; six days marching on roads followed by one day's rest, then four days of march and maneuvering followed by one day's rest, then four days more of the same. There were two night marches and two bivouacs.

The battery was considered as forming part of a column of all arms. The gaits were kept strictly to the regulation pace, i.e., a little over 2¾ miles an hour for the walk and 5 miles an hour for the trot.

The following was the programme of the entire test:—

1st Period.

1st day	March of 15½ miles.
2nd day	March of 15½ miles.
3rd day	March of 18½ miles.

Bivouac that night.

4th day	March of 18½ miles.
5th day	March of 21¾ miles.
6th day	March of 21¾ miles, leaving that night.

All these marches must be at regulation gaits, not ever exceeding 5 miles an hour.

7th day	Rest.

2nd Period.

8th, 9th, 10th and 11th days, marches and maneuvers during which the battery is supposed to be part of a fighting force, taking up positions, changing to new ones, firing, retreating, etc., etc. For example, the battery has to move forward at a trot past infantry to come into action. It must trot 5½ miles, broken by half a mile at a walk. The battery after a day's fighting must march to a bivouac about 4 miles distant, with caissons drawn by four horses only.

The battery marched completely loaded and equipped for war.

The weather was for the most part bad, with much rain night and day. The nights were generally cold. The roads were hilly and the ground over which the battery moved to take up positions was wet and heavy. While the battery remained in position, say one hour at a time, the horses were exposed to very cold winds. Except on one day, the noon feed was not preceded by watering.

During the second period, a continued trot of 5 miles was taken up each day, followed by one or two miles at a walk on rough roads. The changes of position were made, requiring marches of from 2 to 3 miles over heavy ground where pulling was difficult.

Before starting on the march, the Board measured and weighed each horse. The results are shown in the appended "Annexe V. and VI." This table shows each horses's sex, age, height, color, price, and weight on purchase, on leaving for the march, on returning, and the loss in weight. It also shows the following dimensions: width of breast (between the points of the shoulder), circumference of surcingle, circumference of the cannon bone, length, distance from lowest point of girth to the ground. The general condition at the beginning and end of the march is also given, and any injuries.

Conclusions of the Board.

With regard to the 60 taller horses taken from the regiments, those of medium height stood the work best. Some of the tallest, those about 16 hands, showing too much daylight and too long, with not much mettle, did not do very well. It was noticed that the taller the horse, the more flesh he lost and the more harness galls he had. The result of these experiments confirmed the conclusions arrived at by the Board of 1909 in what concerns the question of weight, height, mettle and build. (The report of this Board was published in the "Revue d'Artillerie," April and May, 1910).

The small horses bought for these experiments answered in general to the requirements of artillery horses in the matter of mass, mettle, energy and strength. All the members of the Board were struck with their willingness and persistence against the breast strap; every horse was doing his share of the work all the time. This results from several causes:—

1. From the considerable *mass* of these horses, enabling them to pull by putting their weight against the breast strap and saving their muscular effort.

2. From their small height, which gave a line of traction almost ideal.

3. From the equal size of all the six horses in a team.

4. From the farm work which these horses had had before their purchase.

The weather during all the time was very bad, but these horses, in spite of their rather recent sickness, stood all the inclemencies without any diminution of effectiveness. Their strength in starting the heavy carriages in bad ground was frequently demonstrated.

They stood long periods at a trot over hilly roads without blowing.

The Board believes that these experiments confirm *the most important factors* to be considered in selecting the artillery horse, which factors were communicated last year. These are: 1st, Mass; 2d, Mettle; 3d, Height; 4th, Build.

1st, *Mass*.—We think it well to repeat that "any draft horse bought for batteries in *time of peace* should be adapted to the work of near wheeler; such a horse must start and pull about 900 lbs., and carry on his back 230 lbs.; hold back, with his mate, at a trot, 5200 lbs., and resist the lateral movements of the wheelers and leaders at turns." (The Board evidently had in mind the fact that French artillery in time of peace keeps on hand only about one-fifth the number of horses required for war. Hence, when a battery on a peace footing is expanded to a war footing, the old horses would be placed as near wheelers. The experiments with small horses were conducted largely to determine their fitness for artillery on mobilization.)

These facts point to the *absolute necessity of a sufficient mass*, and the recent experiments enforce previous observation on this subject. However great his energy, however good his blood, a too light horse is quite useless for artillery. On the contrary, if a horse is *too heavy*, he is also too lymphatic; a long trot uses him up, and the regulation ration will not keep him in condition. The experiments of 1909 showed that the artillery horse, fully developed and in thorough hard condition, should weigh very near to 1100 lbs. This weight was decided as correct for horses relatively tall—those representing the build till now usually bought for artillery. For the average of these horses this weight represented a certain *compactness*. We have named "coefficient of compactness" the ratio between the weight in kilograms and the number of centimeters above one meter in the horse's height.

The coefficient of compactness of the artillery horse, it was decided in 1909, should be about 8½. For small horses, such as the Board

has been experimenting with, this coefficient 8½ would correspond to a weight too small.

Certain small horses, weighing only 880 to 920 lbs., stood the tests admirably, but the battery commander was careful not to use them as wheelers. He used there only compact, strongly coupled and powerful animals.

This Board believes that the coefficient of compactness for the artillery horse should vary, with his height, from 8½ to 9½ as a maximum.

Starting with 8½ for heights of 16 hands and 16 hands 1 inch, this coefficient should increase as the height diminishes and approach 9½ for small horses. This would mean that a 15-hand horse fully developed, in hard condition, would weigh from 1000 to 1050 lbs. For a 15-hand horse, the reduction in weight is justified by the better utilization of the horse's mass and effort against the breast strap resulting from the traces being almost exactly horizontal.

2d, *Mettle*.—The Board adheres to the opinion expressed last year, viz: that mobility being one of the essential qualities of artillery, the artillery horse must be able to trot 5 or 6 miles at a stretch, under emergency. Hence the necessity of a certain quality or mettle in these horses. The experiments showed that the coarsebred, lymphatic horses, especially those of considerable weight, suffered very seriously at the trot.

3d, *Height*.—The need of mass allied to a certain amount of mettle prevents the acceptance of too small a height.

On the one hand, there were a considerable number of the 15-hand horses which were too light to be used as near horses; on the other hand, all the horses that were very heavy for their height were lacking in mettle. Hence, the Board believes that prudence should be exercised in the lowering of the height.

In time of peace, horses less than 14 hands 2¼ inches should not be put in field batteries.

The minimum normal height in time of peace should be lowered and fixed at 14 hands 3¾ inches.

Horses 15 hands high can be put in service, but they must be exceptional animals, of perfect conformation, fulfilling the conditions of mass and mettle required of a good near wheeler.

It is again pointed out that these weights and measurements apply only to the mature horse, fully developed, and in hardened condition. A young, undeveloped horse of good build can be bought

under these dimensions if the purchasing officer believes he will develop with age into a satisfactory horse.

The experiments proved that horses under 15 hands 1 inch are entirely suitable for the artillery, and that on mobilization animals of this height can be taken for any place in the teams. In the emergency of war, horses over 14 hands 1½ inches can be usefully employed in the artillery.

4th, *Conformation*.—The artillery horse should be well made, of strong back, near the ground, of solid frame with good legs, well directed.

Last year the Board stated that the artillery horse should stand about as high as his length. It is manifest that the small horse, while he looks about the same proportion as the big horse, is usually not so tall in proportion to his length. The legs are shorter, the body remains sensibly the same. Therefore, the less tall a horse is, the longer he may be for his height; still, care should be taken that his length is not much greater than his height. Finally, the draft horse should stand well apart in front, with a properly wide breast. This conclusion is justified by an examination of the tables annexed.

Resumé.

Among horses standing between 14 hands 2¼ inches and 15 hands ¾ inch there will be found many good draft horses capable of rendering excellent service in a field battery. The artillery horse for *time of peace*, a horse which must be fit for a near wheeler and also capable of being used in the riding instruction of artillery soldiers, should present, in his full development, in hard condition, the following characteristics:—

1. Height maximum, 16 hands; height minimum, 14 hands 3½ inches.

The Board believes that it would be even more prudent to establish the normal minimum at 14 hands 3¾ inches, leaving it possible to accept unusually well made horses that are ½ inch under this minimum.

2. The mass must be sufficient, and it ought to correspond to a coefficient of compactness varying, with the height, from 8½ to 9½.

3. The conformation must be regular, with plenty of width.

4. The horse should be compact, near the ground, have good mettle, but not be nervous.

EDITORIAL.

The attention of the readers of THE JOURNAL is called to the translation which begins in this number, of Colonel Aubrat's "Field Service Exercises for Battalions of Light Artillery."

Parts of this work originally appeared as articles in the Revue d'Artillerie. They were subsequently gathered together and correlated, matter was added, and the work was published in book form. Its great value at once attracted wide attention, and the book has since run through several editions. It has been translated into several foreign languages, but not heretofore into English.

Upon its first appearance its value was recognized by those American officers who read French, and several of them undertook the task of its translation into English. It was seen to be a work which should be in the hands of all officers of field artillery; but it could be published only at great expense, and because of the limited number of field artillery officers in our army the demand would be small, and therefore the price at which such a book would have to be sold would be prohibitive.

This difficulty in securing for the officers of our army an English edition of the work was removed by the inauguration of THE FIELD ARTILLERY JOURNAL. The management of the magazine took up the question of the publication of a translation, and has secured from Colonel Aubrat and his publishers the right to publish the book in THE JOURNAL. Among other conditions, however, it is stipulated that the translation shall not be published as a separate book. This, therefore, is the only English translation that can be obtained. The French edition can, of course, be secured in book form from the publishers, Berger-Levrault & Co., Paris.

This work is probably the best treatise that has ever been written on the practical handling of the modern rapid-fire gun, which, it will be remembered, is a comparatively new weapon, the use of which is radically different from that of all field artillery weapons heretofore used. Its careful study is recommended to everyone who would acquire knowledge of the handling of modern field artillery.

Certain parts, as, for example, those dealing with cantonments, may seem to have little immediate value to the American reader; it was, however, thought best to publish the book complete. It is of interest to see how our neighbors solve a military problem, even if we ourselves do not expect to have it to solve in the immediate future.

CURRENT LITERATURE.

All the books and periodicals referred to below are on file in the War College library. Officers desiring to consult them should address The Secretary, War College Division, General Staff, Washington.

CONTENTS OF PERIODICALS.

JOURNAL OF THE ROYAL ARTILLERY. (Royal Artillery Institution, Woolwich, England; Monthly; 2 s. 6 d. per copy).

May, 1911.

Artillery Fighting at the Battle of Gettysburg.—Lt. H. W. Wynter, R. H. A.

A very interesting paper. The events leading up to the battle, and the battle itself, are reviewed very summarily, with particular emphasis upon the part played by the artillery. Alexander's "Memoirs," Henderson's "Science of War" and the "Battles and Leaders" series are chiefly relied on.

The latter half of the paper consists of a discussion of the lessons of the battle to an artilleryman. These are treated under four heads:—(1) Artillery commands, organization, and staff duties; (2) Combined tactics of guns and infantry: (3) Artillery in attack and defense; (4) Ammunition supply.

Gunners as Filibusters.—Maj. Gen. J. B. Richardson.

An account of an incident in Hayti, in 1859, when British troops were landed to protect foreign residents; told by a participant.

Possibilities and Limitations of Aerial Bombardment.—Col. F. G. Stone, p.s.c., R. A., Member Aeronautical Society.

A lecture delivered February 14th, 1911, at the Naval War College, Devonport. Contains a discussion of the limitations placed upon such bombardment, by international agreement and by expediency, and an estimate of the results that might be accomplished by various methods.

Training of the Battery Staff.—Lt. C. N. F. Broad, R. F. A.

Plan for training scouts, agents, range takers and signal details. Of little use to us on account of the differences between the English and American systems.

Umpiring at Maneuvers.—Capt. H. Rowan Robinson, R. G. A.

Calls attention to the difficulty of estimating the effect of artillery fire at maneuvers; suggests method of indicating target.

Attack of Dirigibles, Aeroplanes, etc.—Translation from Mitteilungen über Gegenstände des Artillerie- und Geniewesens, No. 1, 1911.

Fortifications of Flushing, and Neutrality of Belgium.—Translation from Revue de l'Armee Belge, Dec., 1910.

June, 1911.

The Battle of Fuentes de Onoro.—Prof. Chas. W. C. Oman.

A lecture delivered at the Royal Artillery Institution, Jan. 5, 1911.

Gurko's Advanced Guard.—Capt. H. Rowan Robinson, R. G. A.

Description and discussion of Gurko's operations at Tirnova, Shipka and Yeni Zagra, 1877.

War Training of the Field Artillery Brigade.—Col. D. G. Prinsep, R. A.
A general scheme for instruction, with suggestions for modifications in organization and administration. Based on English system, but contains some hints worth reading in America.

A Drill Gun for Territorial Field Batteries.—Lt. Col. G. R. F. Talbot, R. F. A. (T.).
Photographs and description of a dummy gun used for instruction in an English Territorial brigade. Principally interesting as showing the situation of some of the Territorials as regards equipment and oppportunities for instruction.

Remarks on Field Artillery Fire.—Translation from Russian Artillery Journal, Dec., 1910.

Cyclist Battalions in Italy.—Translation from Russki Invalid, No. 76.

July, 1911.

Pack Artillery; its Organization and Employment.—Capt. H. Rowan Robinson, R. G. A.
Duncan Gold Medal Essay, 1911. A very good Mountain Artillery paper. Deals with use of pack guns in various kinds of country, urging their use not only in mountains, but anywhere, as a normal component of the artillery of an army. Discusses packing on ponies, mules and camels; use in connection with field guns; organization and equipment; ammunition supply; etc. Suggests introduction of pack batteries into Territorial force, and substitution of certain proportions of these guns for field guns in all divisional organizations.

Our XIIIth Century Gunpowder.—Lt. Col. H. W. L. Hime, late R. A.
A curious fragment, recently discovered, from Roger Bacon's Opus Tertium (A. D. 1266-8), concerning an explosive "powder composed of saltpetre, charcoal and sulphur."

A Working Model Range.—Capt. C. C. Phillips, R. F. A.
Illustrated description of a very complete installation for indoor firing instruction, used by a Territorial brigade. Apparatus too complicated for general use, although cost given as only 61. 16 s.

Loss of Rotational Velocity of Shrapnel Shell.—Capt. H. W. Hill, R. F. A.
Account of experiments and calculations based thereon. Concludes that loss of rotational velocity is greater than has ordinarily been supposed,—a matter of importance in the design of certain mechanical time fuzes.

Training and Employment of a Brigade Staff R. A.—Capt. S. W. H. Rawlins, R. F. A.
Article on similar plan to the one dealing with battery staff (May number—see *supra*), but for the brigade (battalion), and on a more elaborate scale.

Letters on Artillery.—Translation from Voenni Sbornik, Feb., 1911.

China's New Army.—Translation from Russki Invalid, No. 61.

August, 1911.

Pack Artillery; its Organization and Equipment.—Capt. C. F. Phipps, R. G. A.
Duncan Silver Medal Essay, 1911. Very similar to the Gold Medal Essay (July number—see *supra*), and equally interesting.

Artillery Training.—"Outsider."
An imaginary conversation with a foreign visitor to an English artillery practice camp; very readable, and contains some hints applicable to our own as well as the English practice methods.

The Scarcity of Horses in the British Empire.—Lt. A. Q. Archdale, R. F. A.
Statement of conditions, with review of plans for securing supply adopted on the Continent and in England.

A Packsaddle Observation Ladder.—Lt. C. N. F. Broad, R. F. A.
Description of a pack ladder, weighing 160 lbs., giving 20 feet command, and capable of being set up or repacked in 1½ minutes.

German Field Artillery Firing Regulations.—Translation from Jahrbücher für die deutsche Armee und Marine, May, 1911.

German Artillery Tactics.—Translation from Vierteljahrshefte für Truppenführung und Heereskunde, No. 2, 1911.

Organization and Tactics of the French Field Artillery.—Translation from the same.

REVUE D'ARTILLERIE, (Librairie Berger-Levrault, Rue des Beaux Arts 5, Paris; 22 francs per annum.)

May, 1911.

An Independent Line of Sight in 1891.—Capt. L. Olivier.
Description of the earliest matériel containing this feature.

Device for Determining Minimum Elevation, in Firing Over a Mask.—Capt. Luya.
Description, with photograph, of a device similar to a quadrant, designed to be attached to a battery or battalion observation wagon, for mechanical solution of this problem.

The Prussian Board of Artillery Experiment.—Capt. de Staël.
Résumé of the history and organization of this Board, which has recently celebrated the centennial of its formation.

Signalling Without Signallers.—Lt. Faure.
Description of a system of signalling with the arms, flags, etc. The author suggests that the system is simple enough to be taught to every soldier, thus doing away with special signal details.

June, 1911.

Rapid-fire Mount Without Recoil Brake or Recuperator.—Maj. di Stefano, in Rivista di Artigleria e Genio, translated by Capt. L. Olivier.
Detailed project, with drawings, for an entirely new type of rapidfire mount. The gun is to recoil in its cradle, its motion of translation being gradually transformed, by a system of helicoidal guides, into a motion of rotation on its own axis. The energy of recoil having been nearly absorbed in this motion, another series of guides is to transform the rotation back into translation, and bring the piece back to its firing position.

Field Guns With Increased Field of Fire.—Lt. Col. Deport.
Illustrated description of new and ingenious devices, permitting a greatly increased range of elevation and traverse on the carriage.

The New German Pay Scale.—Capt. de Staël-Holstein.
Summary of the law of 1909, fixing pay and allowances of German officers.

July 1911.

Notes on Breaking and Perforation Tests.—Capt. A. Mimey.
Theoretical discussion of tests of strength and resistance of materials, especially as applied to perforation of armor plate.

Adjustment of Fire by Observation From a Flank.—Lt. Lhoste.

Description of a special slide rule for the use of the observer.

ARTILLERISTISCHE MONATSHEFTE.—(A. Bath, Mohrenstrasse 19, Berlin; monthly; 27 marks per annum.)

May, 1911.

Notes on Ballistics.—Col. P. Haupt.

Mathematical discussion of ballistic formulæ. A reply to criticisms contained in an article published in the October number, 1909.

The New French Foot-Artillery Firing Regulations.

An analysis of the regulations of 1910. The French foot-artillery is organized and equipped for fortress warfare, not for the field army, and its guns are mostly of the older types. Hence, while these regulations show certain similarities in general principles to those of the field artillery, the details are for the most part entirely different.

Revision of the Russian Firing Regulations.

New firing regulations for field and mountain artillery have just been approved, and are about to be issued. Extracts from them appeared in the Russian Artillery Journal for November, 1910; from these this summary is made. Some of the most notable points are as follows:

As a result of war experience, shell as well as shrapnel fire is provided for. The 8-gun battery is retained, but provision is made for handling the two half-batteries separately if desired. Very definite rules are given as to the duties of the senior officer at the guns when the battery commander's station is at a distance. Fire for effect is habitually taken up after getting a bracket of five mils on the sight,—that is, 200-250 yards; bracketting is made compulsory. Rules are given for firing against balloons, etc., and for night firing.

Combination Projectiles.—Lt. Johannes Engel.

A comparison of various German types.

Training of Remounts in the French Field Artillery.—Capt. von Blittersdorf

Résumé of the methods provided in the regulations of 1910. Remounts are assigned to regiments at the age of 4 years. After six months' daily handling, preliminary training under saddle begins, with occasional work in harness. At 5 years more careful training in the riding hall, with heavier draft work, is taken up. This usually continues a year before the horses are finally taken up for full duty with the batteries. Occasionally they are taken up at 5½ years, but are not permitted to be used at maneuvers until they are 6.

The Question of the Size of Batteries in Holland.—By a Dutch Artillery Officer.

History of experiments with 6, 4 and 3-gun batteries. The present provisional organization is a 6-gun battery, divided when desired into two 3-gun "fire units."

The New Dutch-Indian 75 mm. Field Gun.

Description, with photograph, of a new Krupp gun now being issued to the Dutch colonial troops. The breech mechanism is semi-automatic; the trail is jointed, and is folded before limbering, thus shortening the carriage 80 cm. The weight behind the teams is about 1600 kg.; weight of projectile 6.5 kg.; muzzle velocity 500 m.

The Comet Mast.

Description of a new and ingenious observation mast for field artillery. It consists of several tubes, telescoping one within another; special clamps are provided at the ends of the tube sections, which automatically

lock the mast when extended and hold it rigid; a steel band inside the mast, with suitable gearing, is used for extension and lowering. Masts of this type are made of all heights and for all purposes; as observation masts they are built from 8 to 12 meters high, weighing from 100 to 120 kg. They can be run up in 30 seconds, and are rigid enough to carry two persons.

June, 1911.

Notes on Ballistics.—Col. Haupt.

Continuation of paper begun in the May number (see *supra*).

Field Artillery versus Infantry, at Close Range.

Discussion of French and German methods of "fire at will" and close defense of a battery, with description of experiments and suggestions for training.

The New Field Artillery Firing Regulations.—Gen. Rohne.

Review of the German regulations of 1911. The changes are not radical, and introduce nothing new to the American reader; in general, the reviewer approves the changes.

French Experiments With Artillery Draft Horses.

Review of the French experiments with small horses; a description of these appears elsewhere in this number of the FIELD ARTILLERY JOURNAL.

Remarks on General von Lignits's "Modern Tactics."—Gen. Rohne.

Review and criticism of those parts of the book that deal with artillery.

Artillery Requirements in Riding Instruction.

Notes on differences between artillery and cavalry requirements.

Mountain Fortifications in a New Light.—Capt. von Majneri-Kempen.

Suggestions for types of works, guns, and equipment. Howitzers in turrets are favored.

Telescopic Sights for Machine Guns.—Egon Neumann.

Argument in favor of the adoption of such sights, with photograph and description of a type constructed by Zeiss.

July, 1911.

The Handling of Artillery in Action.—Gen. Rohne.

Comparison of French and German conceptions of the action of artillery, with discussion of fire effect and tables showing results of experiments.

Calculation of the Elements of the Trajectory.—Col. von Kobbe.

New methods of computation, based on the paper of Col. Haupt in the May number, 1910.

Gun-Mountings With Recoil on the Carriage.

Notes on the history of mounts of this type, with an attempt to determine and give credit to the inventors of particular systems and devices.

Checking and Adjusting Range-Finders.

Explanation, with diagrams, of various field methods for adjusting different types of instruments.

Sea-Coast Howitzers and Mortars.—Capt. Berger.

Discussion of the purposes of these guns, desirable types, ammunition supply, etc.

Ranging With Time Fuzes.—Gen Rohne.

This method of ranging has only recently been definitely adopted in the German regulations, and there seems still to be much discussion as to its value. This is a contribution to the discussion, on the affirmative side.

Rearmament of the Italian Field Artillery.—Capt. von Graevenitz.

Review of the present situation. Rearmament with a Krupp 75 mm. gun has been in progress since 1906, but a large number of batteries still have old rigid carriages. The idea of reconstructing these has just been given up, and the substitution of the new type authorized by the Chamber of Deputies.

BOOKS.

Buat, Edmond:—"L'ARTILLERIE DE CAMPAGNE,"—Paris, F. Alcan, 1911.

Rohne, H.—"NEUE STUDIE UBER DEN SCHRAPNELLSCHUSS."—Berlin, A. Bath, 1911.

Bethell, H. A.—"MODERN ARTILLERY IN THE FIELD."—London, Macmillan & Co., 1911.

Marchand.—"NOTE SUR LE ROLE DE L'OFFICIER ORIENTEUR DANS L'ARTILLERIE,"—Paris, Chapelot et Cie., 1910.