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The Field Artillery Journal

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The United States Field Artillery Association

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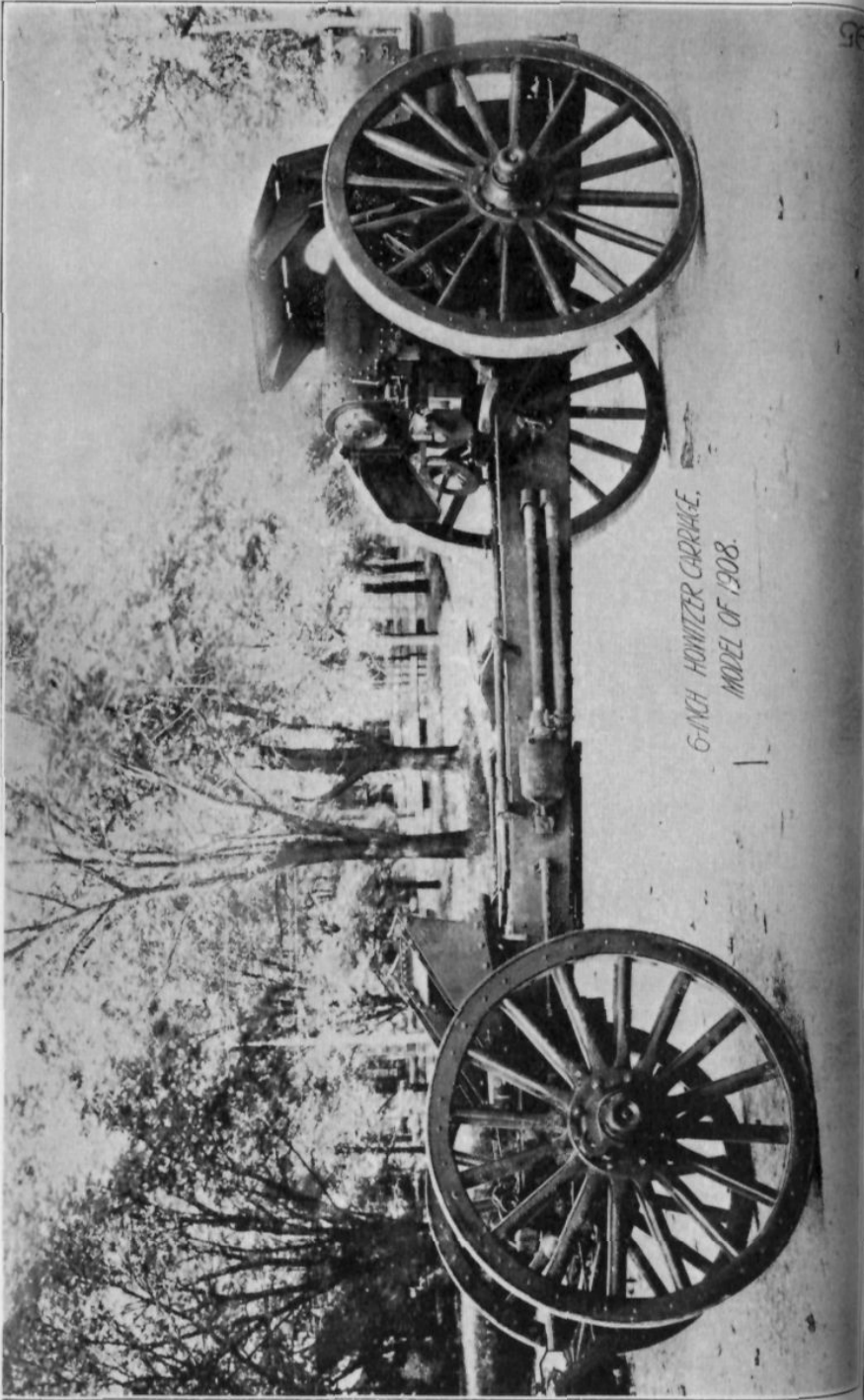
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6-INCH HOWITZER CARRIAGE.
MODEL OF 1908.

The Field Artillery Journal

Vol. I

OCTOBER-DECEMBER, 1911

No. 4

FIELD SERVICE EXERCISES FOR A BATTALION OF LIGHT ARTILLERY

BY G. AUBRAT, MAJOR OF FIELD ARTILLERY.

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(CONTINUED FROM SEPTEMBER NUMBER.)
THIRD SERIES.

Detailed Study of Positions, on the Ground.

In the sessions devoted to this work, the purpose of the battalion commander is to show how artillery may make use of the ground, under the various conditions to be met with on the battle field. He thus teaches his personnel to understand quickly such orders as they may expect to receive during maneuvers on varied ground, and prepares them to act in perfect accord with his ideas, under all circumstances.

METHOD OF INSTRUCTION.

The battalion commander acts as director. He assembles his personnel at some point within the area selected, and there gives his first situation. This includes (a) the mission assigned the mixed detachment of which the artillery forms a part; (b) the general location on the ground of the other troops; (c) the precise disposition of the artillery, and the mission given it; (d) such information concerning the enemy, and only such, as the artillery battalion commander would get in actual service.

He next points out the precise limits of the ground which the artillery is permitted to use, calling attention to any noteworthy features, and, if necessary, riding over parts of it with the whole party. He then has each officer select the position which he considers best adapted to the conditions, and the emplacement for the

guns in the position. The different solutions having been proposed, he discusses them, and finally gives the solution which he considers best. The exercise may be repeated on the same ground, the conditions being slightly varied; the party may then move to a new place, and a similar series of exercises may be taken up.

The problems are so prepared as to increase gradually in difficulty, until finally the officers are required to face the most difficult situations likely to arise in service.

At first, the director selects a position, and studies only the different gun emplacements available in it; he gives the artillery a single definite mission, and assumes a definite force and position for the enemy. Later, he gradually extends the area allotted to the artillery. He makes its orders more complicated, requiring it to provide for several contingencies. He gives only vague information of the enemy: for example, he may say, "Our infantry is engaged with the enemy's skirmishers, who are invisible; it is probable that they occupy such and such a line; shrapnel are bursting at such and such a place; gun flashes have been seen in such and such a direction."

PROGRAM.

The program of this series contains no exercises with the matériel; it may be somewhat as follows:

1st Session.—Examination of the different emplacements that may be taken in the same position, under various conditions; all the elements of the problem are known.

2d Session.—Study of the different positions that artillery may take, within a certain limited area, under different conditions; and, as in the previous session, selection of a gun emplacement in each position. All the elements of the problem are known.

3d and remaining sessions.—Study of the positions and emplacements to be taken by artillery within a given area, under a series of hypotheses corresponding to the varying conditions of the battle field.

IMPORTANCE AND PURPOSE OF THESE EXERCISES.

An officer unaccustomed to these exercises often sees more than one solution to the problem given him. He hesitates, first, to choose from among the possible positions; then, having selected his position, he is undecided as to the gun emplacement; and after all fails to find the best solution. Actually, as experience

shows, in each concrete case there is one best solution, and one only. When all the conditions are clearly and definitely given, this solution should not be hard to find, but the artilleryman should be able to solve the problem even when this is not the case. If he wishes to be considered thoroughly competent, he should be able to give orders to his batteries without hesitation, even if he has no definite orders himself. That is to say, he should be able to find a satisfactory solution to his problem, even if his data are incomplete.

What, in general, are these data? They are the sum total of all he knows of the intentions of the commander of the whole force; of the mission assigned him; of the dispositions of both friendly and hostile troops; of the targets which he may have to fire upon and of the terrain.

From these data he must decide upon the maneuvers required to get his guns into position; the precautions to be taken to avoid the enemy's fire; the preparation to be made for opening fire; and the methods of fire to be used.

But among these data, certain points, as, for example, the intentions of the commander, and the duties assigned to the artillery, are furnished to the artilleryman, and it is not within his power to make them more or less explicit. Other points, such as the possibilities of the ground, he determines for himself. Experience shows that a skillful artillery officer can always find, without serious difficulty, the best dispositions to be made, if he knows the ground thoroughly. Hence we may say that an artillery officer can not solve properly the problem of putting his guns in action, unless he is skillful in reconnaissance.

This, then, is the purpose of this series of exercises—to teach officers to make a rapid yet complete reconnaissance of a given piece of ground, and to select the position and emplacement best suited to the particular case.

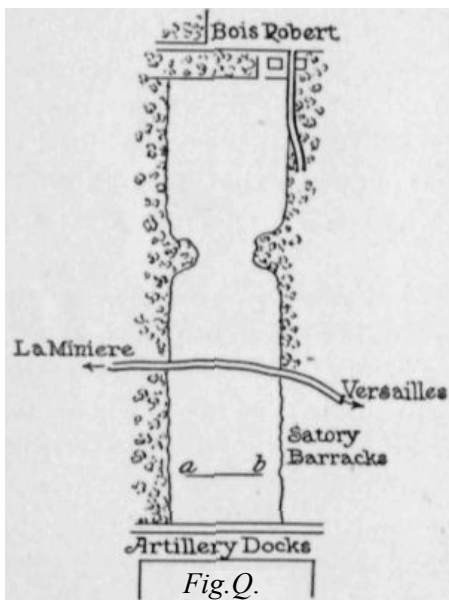
FORM OF REPORTS.

In reporting each exercise, we shall give, first, the general information given by the director at the outset; then, in turn, each situation given the artillery, with the mission assigned it—that is, the statement of the problem. Then will come a summary of the discussion of the solutions; and, finally the general remarks made at the close of the session.

REPORT OF THE FIRST SESSION.

The director assembles his party on the plateau of Satory, near the crest of the Docks, and announces as the program of the session, "examination and discussion of the possible gun emplacements in a given artillery position, under various conditions, all the elements of the problem being known." He then continues as follows:

"For the first part of the session, we shall take this crest as a position. I have chosen the drill ground for this first exercise, because you are all familiar with it.



"The Satory plateau, as you see, is a strip of ground about 3,300 meters long, and from 400 to 600 meters wide (Fig. Q). It is almost entirely surrounded by woods. At one end are the Artillery Docks; at the other is the Porte de Bois-Robert, with its woods, its house and its enclosure walls.

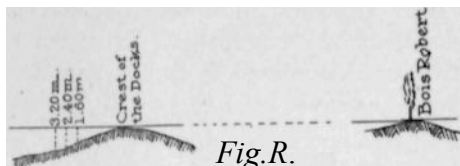
"Between this crest, (*ab* on the sketch) and Bois-Robert, there are only a few unimportant folds in the ground. Toward the Docks, the ground falls off enough to give artillery more than flash defilade (3 meters) with reference to the foot of the

trees at Bois-Robert. You may easily test this by a very simple device, which may be used at any time to determine any line of defilade in rear of a crest.

"Post a corporal on foot at the line of dismounted defilade, and, directly in rear of him, your trumpeter, mounted, on the line of mounted defilade; then let the corporal pace the distance to the trumpeter. If he now continues on down the slope the same number of paces, the point thus determined will be on the line of flash defilade. (Fig. R.)

"The height of the man on foot, you will note, is about 1.6 meters, and that of the man on horseback 2.4 meters. The corporal, then, when he reaches the trumpeter, will have come down the hill

0.8 meters. If he goes on the same distance, he will, assuming the slope to be uniform, descend 0.8 meters more, so that he will be 3.2 meters below the crest."



Part 1.

GENERAL SITUATION NO. 1.

"Two mixed detachments meet on the Satory plateau. Our force, Red, is near the Docks; the enemy, Blue, near the Porte de Bois-Robert. Both detachments are advance guards, with orders to gain a footing on the plateau and hold on until the arrival of their main bodies.

"We will consider a few of the situations that might present themselves to the artillery. To make the case as simple as possible, we will assume that the woods bordering the plateau limit the ground allotted to the artillery; in other words, we will consider that the artillery is acting with other troops, and disregard every thing outside of its own immediate sphere of action."

SPECIAL SITUATION NO. 1.

"The infantry is engaged; one skirmish line is on the Versailles—La Minière road, the other at the narrowest point of the clearing.

"Two Blue batteries are in observation on this side of the woods at the Porte de Bois-Robert, barely concealed from this crest; they were observed while coming into position. One of them has already fired upon our infantry along the road.

"The Red advance guard has only one battery. Its commander is with the advance guard commander on this crest, and is familiar with the situation. As the head of the battery reaches the edge of the clearing, he receives the following orders:

"The enemy has two batteries in front of Bois-Robert, You will take position here. You may have to engage the enemy's artillery until the artillery of our main body can come up, which will not be for half an hour, so make your dispositions accordingly."

"Where should the guns be placed? You have ten minutes to look over the ground, and talk it over among yourselves if you like; at the end of that time be back here."

When the party reassembles, the director discusses the proposed solutions and makes his own comments on the problem.

SUMMARY OF DISCUSSION.

The two Blue batteries are in observation. For the one Red battery to expose itself to view even a few moments before opening fire, is taking unnecessary risk of being put out of action.

The first essential, then, is to get into position without being seen. This excludes from consideration any position on the crest or in front of it, and any position in rear with less than dismounted defilade.

The enemy's artillery has been in position for some time, and probably has an observer in one of the trees near at hand. If this observer sees the battery while it is getting into position, the enemy can fire upon it before it can reply.

This brings us to a second essential—the defilade must be taken with respect to possible observing stations in the trees just in rear of the enemy's artillery position.

The battery commander, then, must decide whether to take dismounted, mounted or flash defilade, either against the ground level or the tree tops at Bois-Robert.

A position with *dismounted defilade* makes it necessary to dismount drivers and cannoneers before coming in. This will make occupation of the position slow; and the same is true of limbering up if it is found necessary to change position. The battery commander, however, can be within earshot of his battery, and his observation is good. Adjustment of fire will be quick and easy, but the flashes will be visible and the battery vulnerable.

With *mounted defilade*, the battery can come into position easily, and limber up at a trot if desirable. It will be less vulnerable, but adjustment of fire will not be quite as easy. The captain will not have his men as well in hand, for he will have to go farther away to observe his fire.

Flash defilade will enable the battery to maneuver and fire without exposing itself; but the preparation of firing data will be more difficult, the adjustment slower, and fire for effect less flexible. The captain will have to be a long distance from the guns; chiefs

of platoon can not see the fall of the shots, and can give him no assistance in adjusting the deflection. The battery will be practically invulnerable, since the enemy will not be able to tell where it is.

The director now makes the situation even more definite. He assumes that the hostile batteries are close together in the middle of the clearing, and that parts of the matériel are visible. He allows the officers a few minutes more to talk over the problem among themselves, then hears the various solutions proposed, and continues his discussion as follows:

The enemy's artillery has a front of about 50 mils (140/3.000)—not too much for our battery to cover. It is visible enough to make adjustment easy. Our battery, on the other hand, will be a difficult target, especially if it goes back pretty well toward the line of flash defilade; if it can open fire first, it should have a very good chance even against the odds.

The orders of the advance guard commander, given above, show the battery commander that he may count on plenty of time for preparation. He is not to be called upon to engage the two hostile batteries unless it becomes absolutely necessary. He may, then, take his time about getting into position; but he must be ready to silence the hostile artillery as quickly as possible, if he does get orders to fire upon it.

Dismounted defilade seems to be indicated. Since some time will pass between the occupation of the position and the opening of fire, an observer in the trees would have time to report the presence of the battery; hence the defilade must be with respect to the tree-tops.

This emplacement satisfies the requirements better than any other. It assures priority of opening fire, and facilitates adjustment and conduct of fire. It will be necessary to come into position dismounted, but the orders of the advance guard commander justify the expenditure of the time.

SPECIAL SITUATION NO. 2.

The second situation is the same as the first, except that the orders of the advance guard commander are now as follows:

"You see the two hostile batteries this side of Bois-Robert; open fire upon them, and silence them as quickly as possible. I can not wait for the artillery of the main body, for it will not be here for half an hour. Take position here."

SUMMARY OF DISCUSSION.

For the reason given above, positions on or in front of the crest, and those in rear of it with less dismounted defilade, may be rejected at once.

Fire must be opened as soon as possible. This eliminates a position with dismounted defilade, for it would have to be occupied slowly, with drivers and cannoneers dismounted. But the enemy's artillery must be silenced as quickly as possible; hence flash defilade is inadmissible, since it would make preparation and adjustment slow.

A position with mounted defilade permits opening fire with the minimum loss of time. The battery can come into position at a trot, and the preparation and adjustment will not be much slower than in the more advanced position.

In this case it is unnecessary to consider the enemy's observers in the trees. The battery can come into action quickly, and the observers will probably not be able to communicate their information in time to be of any use. The defilade should be taken with respect to the foot of the trees.

As it happens, the line of dismounted defilade with respect to the tops of the trees coincides with that of mounted defilade with respect to the foot, and the emplacement of the guns may be the same in both

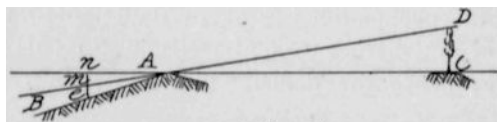


Fig.S.

situations. This will be evident from an inspection of Fig. S. The slope of the ground AB is 1 on 50; if the trees are 20 meters high and the range is 3,000 meters, the slope of the line AD is 1 on 150. Hence if ln is 2.4 meters, the height of a man on horseback, mn will be one third of 2.4 meters, and lm two thirds, or 1.6 meters, which is the height of a dismounted man.

SPECIAL SITUATION NO. 3.

As before, this situation differs from No. 1 only in the tenor of the orders of the artillery commander. These orders are now as follows:

"The enemy has three batteries in front of Bois-Robert. If

you can not entirely silence them, at least try to neutralize them partially until the batteries of our main body can get up, which will be in about half an hour. At any rate, prevent them from supporting their own infantry. Your position will be behind this crest."

The positions of the three hostile batteries are—one close to the woods on the right, one on the left, and one in the center of the clearing. Nothing can be seen of the two flank batteries; parts of the matériel of the one in the center can be seen—enough to make it possible to get a 50 meter bracket, but not enough to justify fire for demolition.

SUMMARY OF DISCUSSION.

The crest gives a maximum defilade of 4 meters with respect to the foot of the trees at Bois-Robert. This maximum defilade should be taken in this instance.

If any less defilade is taken, the flashes will be visible to the enemy. When fire is opened, two of the hostile batteries may perhaps be momentarily neutralized, but certainly not all three; the third will come to the assistance of the others, and neutralize the fire of our battery. If it takes such a position that its flashes can be seen, its only chance of success will be to fire simultaneously upon all three of the enemy's; this might have some effect, but it would be very hazardous.

Now let us see what will happen if the battery takes position with maximum defilade, the captain observing his fire from just behind the crest.

The Red battery sees the flashes of the enemy's guns, and opens fire upon them. Not knowing the position of the Red battery, the enemy can not reply at once. The battalion commander, however, probably has an observer in a tree a little in rear of the batteries, which, by hypothesis, are in observation. The crest under observation is at a range of 3,000 meters, and has a front of 600 meters, or 200 mils; each battery is observing a front of 70 mils. The flank batteries are crossing their fire, for the two little salients in the middle of the long sides of the clearing interfere with the view. The battalion and battery commanders are all together at the foot of the tree used by the observer.

Considering, as before, the lines of defilade, we readily see that a defilade of 4 meters with respect to the foot of the trees means

2.66 meters with respect to their tops. The observer in the tree, then, can not see the guns, but he can see a little of the flashes.

If, for example, the Red battery opens fire upon the center Blue battery, the observer reports: "Artillery behind the center of the crest; front 20 mils. The third poplar tree from the right marks the center." Under the most favorable conditions, the center battery can not possibly reply in less than two minutes. Time must be allowed for the observer to make his report, for the captain to determine his deflection, and for the personnel of the battery to prepare to fire. Since this battery is partly visible, it will in all probability be neutralized before it succeeds in firing an effective salvo.

The other two batteries, although they have every reason for haste, in order to catch the Red battery while its whole attention is engaged, can not fire in less than three or four minutes. The battalion commander must make his decision and give his orders, and then the captains must go to their batteries, 300 meters distant, and determine their deflections.

The Red battery, then, has a good chance of success against the Blue battalion, if its flashes can be seen only by the observer in the tree; it may be temporarily neutralized, but probably nothing worse.

SPECIAL SITUATION NO. 4.

Two batteries at Bois-Robert are firing upon our infantry. The following orders are given the battery commander:

"You see those two batteries in front of Bois-Robert. Open fire upon them, and put them out of action as quickly as possible. I can not wait for the batteries of the main body; they will not be here for half an hour. Take position here."

The conditions are the same as in Situation No. 2, except that the two Blue batteries are not in one line, but in echelon, with 200 meters interval and distance; and nothing but the flashes is visible.

SUMMARY OF DISCUSSION.

As in Situation No. 2, the position should be taken with mounted defilade against the ground line at Bois-Robert. If the battery goes farther forward, it will have to come in dismounted, losing time, and it will be an easier target for the enemy. If it goes farther back, the preparation and adjustment of fire will be too slow.

Both the situation and the terrain point to this decision, as more fully explained below.

Distribution of fire. The only chance that the Red battery has of success is to assign each of the enemy's batteries as a target to one of its own platoons. It can open fire first, and each platoon can cover the entire front of the target assigned. Our target is easy; the enemy's will be difficult, for our flashes will be barely visible over the crest. Under the circumstances, it would seem that one platoon should be a fair match for a battery.

But if the Red battery fires exclusively upon one of the Blue batteries, with the idea of changing later to the other, the advantage is with Blue; the battery not under fire for the time being can adjust its fire unmolested, and probably neutralize Red. The advantage, however, is only temporary; the action might continue a long time, somewhat as follows:

Red fires upon Blue; Blue is neutralized, its personnel taking cover. Red has the superiority. But it can not continue to fire all the time, or it would soon exhaust its ammunition. When it ceases, Blue sends its cannoneers to their posts again, and resumes the fire; Red is neutralized, and Blue has the superiority. The definite superiority will go to that side which best economizes its ammunition; that is, to the one which succeeds in neutralizing its opponent with the minimum ammunition expenditure.

These considerations give an idea of the skill in handling fire which artillery officers should acquire. To silence the enemy with the minimum expenditure of ammunition, and then to keep him silent, they must be able to fire both quickly and accurately, and know how to profit by any favorable circumstance.

Use of ground. The ground permits the battery to take position at a trot, and the captain can observe the fire without going very far from the guns. The trees at the end of the clearing make good aiming and registration points. The battery, then, should come in at a trot, open fire and get an adjustment as quickly as possible.

Let us now suppose that the battery, placed with dismounted defilade against the ground line at Bois-Robert, can get good aiming points, but can not when placed with mounted defilade. In this case, to facilitate the preparation of fire, the former emplacement should be chosen.

Again, it might be that there was no good aiming point to be

found, no matter what emplacement was chosen. In this case the difficulty would be the same in any one, and it would be best to take flash defilade, thus getting the maximum protection.

Finally, we might assume that there were no aiming points, and that the slope was very gentle, as on the other side of this same crest. Here the battery commander can find no observation station near the line of flash defilade. If he places his guns on that line, he must organize some system of communication—placards, arm signals, telephone, or relay line—and must allow the time for preparation.

To sum up, given a particular situation, the artillery commander first eliminates all emplacements which will disclose the presence of the battery before it opens fire. He defilades against the ground line, if he wishes to come into action rapidly; against the tree tops, if he has time to come in slowly. He then selects his emplacement from those remaining available, giving special attention, according to circumstances, to rapidity in getting into position or in opening fire, or to facility of preparation or adjustment, or to convenience of handling fire for effect.

In war, of course, things will not happen in accordance with our theoretical notions. In the first place, batteries, or even battalions, will rarely operate separately; and innumerable other causes will enter to upset our preconceived ideas. The arrival of artillery will often be unknown to the enemy, on account of fog, or insufficient scouting, or perhaps the carelessness of a scout; fire will not always be adjusted; batteries will be only momentarily silenced, and will reopen their fire unexpectedly; in short, there will be a thousand causes of error, of every conceivable nature.

But all this only emphasizes the more strongly the necessity for the artilleryman to familiarize himself with various problems in maneuver and fire. Such mental gymnastics teach him to estimate a situation, make his decision quickly, and formulate the orders necessary for its execution. They are the best possible exercise for developing, in time of peace, the initiative of all grades.

SPECIAL SITUATION NO. 5.

The situation is similar to the preceding ones, but the enemy now has no batteries in observation. The orders from the advance guard commander to the artillery commander are as follows:

"The enemy has no artillery as yet on the front which you are to observe. Make your preparations to neutralize any that may appear there. Take position here, and open fire without further orders."

SUMMARY OF DISCUSSION.

The battery is to be in observation. Shall it be on the crest, in front, or in rear? Let us examine different possible cases.

1. The enemy places one battery in observation.

The Red battery, no matter where it is in this general position, can certainly put the hostile battery out of action, for it must expose itself in coming into position. But the enemy will most certainly not commit such a blunder, if the Red battery is in sight. Hence it must take a position which will permit it to remain invisible until it fires, so that it can act by surprise upon anything in its front.

The line of defilade of the matériel, with respect to the tree tops, satisfies the requirements. A calculation similar to the one in Special Situation No. 2 shows that this is the same as the line of dismounted defilade against the ground line; for if lm be taken as 1.2 meters, the height of the matériel, ln will be 1.8 meters, or the height of a dismounted man. The battery will come in mounted as far as the line of mounted defilade; then go on dismounted to the line of dismounted defilade; there unlimber, and run the guns into place by hand. Everything will remain concealed until fire is opened.

2. The enemy brings two batteries into position.

The Red battery can fire upon the hostile batteries while they are in motion, and is almost certain to put them out of action. But the enemy will not risk this maneuver, if he can see the Red battery. The position just described is still the one to be preferred.

3. The enemy brings in three or four batteries, at irregular intervals and distances.

In this manner, after sacrificing a battery or two, he will probably get the others into action. But even in this case the same emplacement is best for Red, on account of the facilities it offers for firing upon the enemy's batteries while they are approaching their position. In a more retired position, the Red battery could hardly use its fire so quickly and effectively.

SPECIAL SITUATION NO. 6.

This situation is a continuation of No. 5.

Red. The advance guard battery has been silenced. During a lull in the enemy's fire, it has withdrawn part of its matériel by hand behind the crest. The commander of a battalion of the main body, arriving a few minutes ahead of his column, meets the artillery commander, who shows him the situation, and orders his battalion into position behind the crest, to fire upon the enemy's artillery.

Blue. The battalion has replenished its ammunition. It consists of three complete batteries, posted as before: one battery in the center,

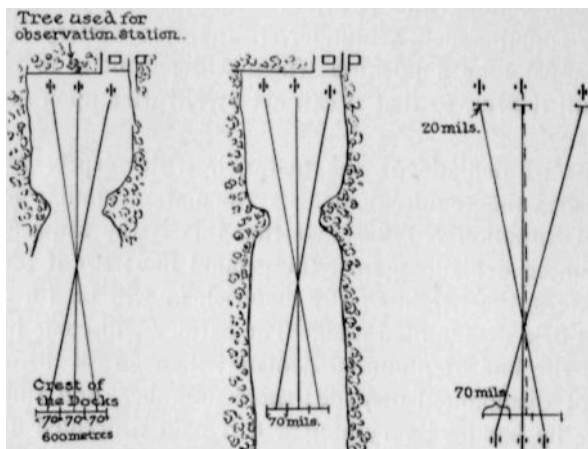


Fig. T.

Fig. U.

Fig. V.

slightly exposed to view; one on each flank, close to the woods, entirely under cover, only the flashes of the guns being visible. Each battery has a front of observation of 70 miles; the guns are laid with the firing data determined in the previous firing (Fig. U). The battalion commander and the three captains are at the foot of the tree where the observer is posted (Fig. T).

SUMMARY OF DISCUSSION.

The first solution that suggests itself is to place the battalion in rear of the center of the crest, with mounted defilade against the ground line. This emplacement will give it priority in opening fire;

and each battery commander can get good aiming or registration points, and observe his fire without going far from his guns.

But it will be worth while to study the problem more closely, and discuss a number of different questions. Should the batteries be placed with normal or increased intervals? Should we increase the intervals between guns? Should the batteries open fire simultaneously or successively? Would it be well to try a rapid dash into a position on the crest?

The solutions which are *a priori* permissible are:

I. The battalion takes position with mounted defilade in rear of the center of the crest. Each battery takes one of the enemy's batteries for target. When all are ready, they open fire simultaneously.

II. As before, but only one battery opens fire.

III. The battalion is on the line of mounted defilade, one battery in the center and the others on the extreme flanks. Targets are assigned as before. All open fire at once, the flank batteries crossing their fire.

IV. As before, but only one battery opens fire.

V. The battalion takes position on the crest, by a swift, unexpected movement. The batteries take the regulation interval. Targets are assigned as before, and each battery opens fire as quickly as possible.

VI. The battalion takes position as just described, but at wide intervals, one in the center and the others on the extreme flanks.

Discussion of solutions. I. The battalion, in the position described, is in the sector of observation of the enemy's center battery. When it opens fire, each of its batteries has a separate target. Adjustment will be complete in three or four salvos at most, for it can take its range and corrector from the advance guard battery.

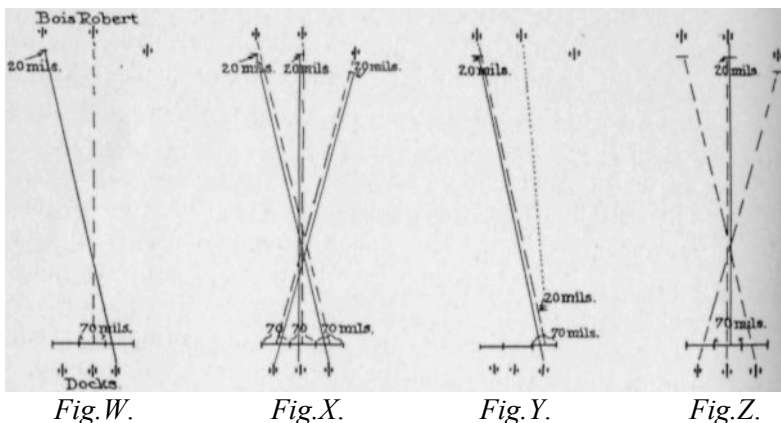
By the time fire is adjusted, the enemy's center battery will be firing. The other two will open within a minute or two, the captains acting on their own initiative or on the orders of the battalion commander.

Theoretically, Red should gain the superiority. It opens fire first, and gets in three or four salvos before any are fired at it. It has an easy target, for the enemy's center battery is visible, and the flashes of the others are only partly concealed; while the enemy's target is much more difficult. And besides, for a given number of shots fired on each side, Red has much the greater density of fire

upon its target; for the battalion and battery commanders, before opening fire, have made a careful distribution over the enemy's actual front.

The hostile artillery can make no such accurate distribution. It sees nothing but flashes, and those only indistinctly; and its batteries can not open fire all at once, but only successively. In fact, it may well be that the flank batteries will not succeed in getting in any effective shots at all.

II. If the battalion takes the position just described, but opens with only one battery at first, it loses all its advantage. Suppose that the right battery opens upon the hostile battery diagonally opposite. After firing three or four salvos, the enemy's center battery replies (Fig. W).



The commander of this latter battery has seen gun flashes in his sector of observation, on a front of not more than 20 miles. But in order to measure the front accurately, he would have to wait for several more salvos. This he will not be likely to do, for time presses; he will be very likely to open fire on the whole 70 miles front, without changing his distribution. Even if he does close in his sheaf, he will probably prefer to err on the safe side, and he will cover at least 30 or 40 miles instead of only 20.

Thus the three Red batteries would probably be neutralized by a single one of the enemy. One Blue battery will be put out of action, but both the others will be uninjured.

This second solution is inadmissible.

III. The three Red batteries are on the same line as before, but

with increased intervals, covering the whole breadth of the clearing; they open simultaneously, each on its own target, and can probably fire three or four salvos each before the enemy can reply effectively (Fig. X).

The Blue batteries, in their turn, will each fire upon a separate target. As they are prepared to cover a front of 70 mils each, and wish to open as quickly as possible, they will probably not change their distribution.

Here again the advantage is with Red. Each battery has the priority of fire upon its opponent, and can neutralize it with a less number of shots, since it can adjust its fire much more accurately.

IV. Conditions are as before, but only the Red right flank battery opens. The battery opposed to it replies, but is soon silenced. The enemy's center battery comes to its assistance. All the batteries on both sides join in successively. Without pursuing the analysis farther, we easily see that the advantage should ultimately be with Red, which may even have one battery left intact (Fig. Y). As explained above, its opportunities for adjusting fire are better, and it can accomplish results with fewer shots.

V. The battalion comes into action on the crest at a trot, having made all preparations for opening fire beforehand. The chiefs of platoon and the gunners have come ahead as far as the line of dismounted defilade to see the aiming point, and the instruments have all been set for the first shot (Fig. Z).

Even if the Blue battalion is not very active in reconnaissance and observation, it can hardly miss seeing Red come into position. The Blue center battery will open fire the instant a target appears in its sector of observation, and in three or four salvos will throw Red into some disorder.

Both the other Blue batteries will probably be in action before Red fires a shot. They should without hesitation leave their own sectors of observation to fire upon the Red battalion, even if they had received no orders providing for such a case.

All the chances, then, are in favor of Blue. However, it should be remembered that carelessness in observation or reconnaissance, or any one of a hundred accidents, might give Red a fair prospect of success.

VI. The battalion comes into action as before, but with increased intervals between pieces and batteries. The result will be that

instead of a duel between two battalions, we shall have three duels between batteries, taking place at once. As in the preceding case, the advantage is on the side of Blue, which can open fire first.

Intervals between guns. It will sometimes be advantageous to increase the intervals between guns. Suppose, for example, that a battery is behind the Docks crest. The only way the enemy can determine its position is by measuring the front covered by the gun flashes. If, then, intervals be increased, but not to such an extent as to make the battery hard to control, the enemy will have to cover a broader front with its fire, and hence will have to fire more projectiles to accomplish a given result.

This procedure is, of course, of no use when the battery can be seen, as in the case of the Blue center battery.

COMPARISON OF THE PROPOSED SOLUTIONS.

I. Keeps the battalion well in hand, and assures priority of fire. Gives it an advantage of three or four salvos over the battery in whose sector of observation it comes, and five or six salvos over the other two.

II. Inadmissible.

III. Makes the artillery duel a fight of battery against battery. Reduces the vulnerability of the battalion, but renders command more difficult, especially if the action lasts some time and the line is reinforced.

IV. Preferable to the others, when it is necessary to keep one battery in reserve.

V and VI. To be rejected, theoretically. But in reality there are cases when these solutions would be the best. Thus, it might be necessary to sweep ground in front, which would be in the dead angle if the batteries were concealed; or, for moral effect, it might be desirable to bring the artillery boldly up to the crest, or to the forward slope. There might, too, be local conditions which would prevent the guns from being seen, even on the crest, until they opened fire.

Part 2.

The director takes the party to the other end of the clearing, where the Blue batteries were assumed to be, and takes up a new series of problems, as follows:

"The ground here offers no distinct crest. So far, we have been

comparing the advantages of different degrees of defilade. Here no such question enters, and our choice of emplacements will depend upon other considerations. We will take up in succession two distinctly different situations."

GENERAL SITUATION NO. 1.

"A Blue advance guard, containing three batteries, is approaching the Satory plateau, with orders to drive back the opposing Red troops and hold the plateau."

SPECIAL SITUATION NO. 1.

"Shots are heard from the front, in the woods on the right and left.

"Red. The infantry occupies the two little patches of woods projecting into the sides of the clearing, but has not advanced beyond them. No artillery has shown itself.

"Blue. The commander of the artillery battalion, preceding his batteries, arrives at the Porte de Bois-Robert. He is informed of the situation, and given the following orders:

"Make your dispositions to support the advance of our infantry, by firing upon the enemy's infantry. At the same time be ready to fire upon any artillery that may appear along the Docks crest."

GENERAL SITUATION NO. 2.

"A Blue rear guard, containing two batteries, has orders to delay the enemy as long as possible on the Satory plateau."

SPECIAL SITUATION NO. 2.

"The Red infantry occupies the little patches of woods, as before. A battery, whose flashes were visible beyond the crest at the Docks, supported them as they advanced and drove out the Blue infantry.

"The Blue artillery battalion, which had been in position behind the patch of woods on the north side, was forced to retire before the hostile infantry. It is just reaching the Porte de Bois-Robert, marching under cover of the trees along the north edge. Just before his batteries arrive, the battalion commander receives the following orders:

"Delay the advance of the enemy as long as possible, firing chiefly upon his artillery."

The director now sends the officers to make a complete reconnaissance of the ground and select emplacements, telling them to be back with ten minutes.

SUMMARY OF DISCUSSION.

Result of the reconnaissance. The terrain in question may be divided into three parts. (See Fig. Q.)

1. The strip of ground fifty meters wide, occupied by the woods, walls and houses of Bois-Robert.
2. The open ground west of Bois-Robert, back of the wall.
3. The ground east of Bois-Robert, in front of the wall, where the party is assembled.

The only possible artillery positions are in the third part. The first is inaccessible to artillery, and fire could not be observed from any point in the second. This third part, then, has been thoroughly reconnoitered, with the following results:

The center, near the axis of the clearing, is visible from any point on the crest at the Docks; guns can not be entirely concealed. The flanks can be observed only from the diagonally opposite parts of the crest; on the left, about 400 meters in front of Bois-Robert, there is a slight depression, capable of concealing a battery; on the right, there is enough cover to hide a battery anywhere, and a little better defilade close to the woods.

A wall runs along the edge of the woods on all sides, so that the road by the Porte de Bois-Robert is the only means of communication to the west.

SPECIAL SITUATION NO. 1.

The first point to be considered is, whether to place the battalion in readiness, or put part or all of it in position. It will, of course, be understood that if it is held "in readiness" the battalion and battery commanders, with a few men, will be in observation, while all the rest remain with the batteries, which will move up as near as possible to the positions they will probably occupy.

There is only one case where it will be advisable to remain in readiness. If the battalion commander had reason to believe that he would not have an opportunity to fire until the Blue infantry had occupied the little salients of the woods, it would be well to wait, and when he came into action move forward so as to get a position under cover of the salients.

Otherwise his battalion should take position as quickly as possible. The longer he waits the more danger there is that he will find hostile artillery already in position behind the crest, ready to interfere with his maneuvers.

Our previous discussion has shown us what an advantage Red has, from the nature of the ground. If all three Blue batteries are placed in observation, there is some danger that they will all be put out of action without having accomplished anything. Prudence would seem to suggest that one battery be held in reserve; but, on the other hand, to do this would reduce the chance of success in an artillery duel.

Three plans have been suggested—to hold the whole battalion back in readiness; to put it all in action; and to compromise, putting in one or two batteries and holding back the rest. The battalion commander can not make an intelligent choice until he knows more of the situation.

If he decides to put all three batteries in observation, he must take full advantage of all the accidents of the ground, and, if possible, echelon his batteries and place them at wide intervals, so that a single Red battery can not fire upon all three at once. The intervals between the guns should be such as to give them the maximum cover.

The left battery is placed in the depression mentioned above, with regulation intervals between pieces. Another is placed close to the woods on the right, with reduced intervals. The third is in the center; it can not be entirely concealed, but is extended on a broad front.

Before ordering the batteries into position, the battalion commander assigns each captain one third of the front for observation, which gives each of them 70 mils. The flank batteries cross their fire.

The battery commanders indicate the aiming points to their chiefs of platoon and gunners, and make all preparations which will tend to avoid delays in coming into action. The three batteries move up simultaneously; the limbers are sent to concealed positions in the woods on the flanks.

If only two batteries go into position, they take the flank positions already described, and each is assigned a front of observation of 100 mils. If only one battery is used, it will have to be placed in the center, so that it can get a view of the whole length of the opposite crest.

SPECIAL SITUATION NO. 2.

Two considerations guide the battalion commander in his selection of emplacements. He must be able to do the work assigned him, and at the same time his line of retreat must be open.

In a march to the rear, it is absolutely necessary that the movements of the limbers be concealed. Thirty seconds' effective fire will throw the teams into confusion. Consequently, the batteries will find it best to take the two flank positions above described. They can come into position in the same manner as before, each observing half the front and crossing fire. When it is necessary to move, the guns should be run back by hand into the woods, and limbered there. The left battery can then withdraw by the road through the Porte de Bois-Robert; the other can follow the wood road and get into the main road by enlarging the narrow gate, which can be done very easily.

This ends the session. Before dismissing the officers, the director sums up the results of the day's work as follows:

"In the first part of this session, we considered the different ways in which artillery might utilize the Docks end of the clearing. We discussed the different degrees of defilade, trying to determine what was the best emplacement for a battery or a battalion under varying conditions. In passing, I showed you a simple means of determining the line of flash defilade, and of estimating a slope. All this has led us to formulate certain rules which it may be well to recall to your minds.

"When any artillery commander takes a concealed position, in order to get priority of fire, he takes his defilade with respect to the enemy's guns if he intends to move into position rapidly and open fire at once. He takes it with respect to the enemy's probable observing stations, if he means to move slowly, or if he is taking a position in observation.

"Increasing the intervals between guns or batteries diminishes vulnerability, especially if nothing is visible but the flashes. But such a disposition is not always advisable. It renders the conduct of fire more difficult, and causes serious inconvenience if new batteries come up and are forced to take position in the intervals between batteries already in action. We should never forget that our first duty is to do as much harm as possible to the enemy; our second, to take care of our own batteries.

"Finally, we have seen that in some cases batteries ought to open

fire successively, while in others it is essential that they open simultaneously, so as not to expose themselves unnecessarily to fire to which they can not reply.

"In the second part, we studied the ground in front of Bois-Robert, to see how artillery here could best engage batteries at the other end of the clearing. In this, we distinguished two cases—advance guard and rear guard. For the advance guard artillery we outlined three solutions: the whole battalion in readiness, the whole battalion in position, and an intermediate case. The artillery commander has to make his choice among these according to the general situation. In the rear guard action, we have emphasized the necessity of getting the batteries close to the edge of the woods, so as to conceal the movements of the limbers."

Report of the Second Session.

PROGRAM.

Study of the different positions that artillery may take, within a certain limited area, and selection of a gun emplacement in each position. All the elements of the problem are known.

MANNER OF CONDUCTING THE EXERCISE.

The battalion commander assembles his officers, scouts, and agents of communication on the Versailles—La Minière road, near Satory farm, and explains the idea of the exercise. He then designates an officer to represent the artillery commander, and has him reconnoiter a position and select gun emplacements, taking care that all shall fully understand the dispositions made. When the reconnaissance is finished and the emplacements decided upon, the officers are again assembled for discussion; after which other similar problems are taken up.

DESCRIPTION OF THE TERRAIN.

The direction of fire is nearly parallel to the Versailles—La Minière road, on the Satory plateau. A profile and plan of this ground are shown in Figure A'. An observer crossing the Satory plateau, and seeking to reconnoiter a hostile artillery position on the crest BB', will find that he can see the crest only through two gaps in the woods EE'; one of these is where the road disappears in the Bièvre valley, and the other 300 or 400 meters to the right.

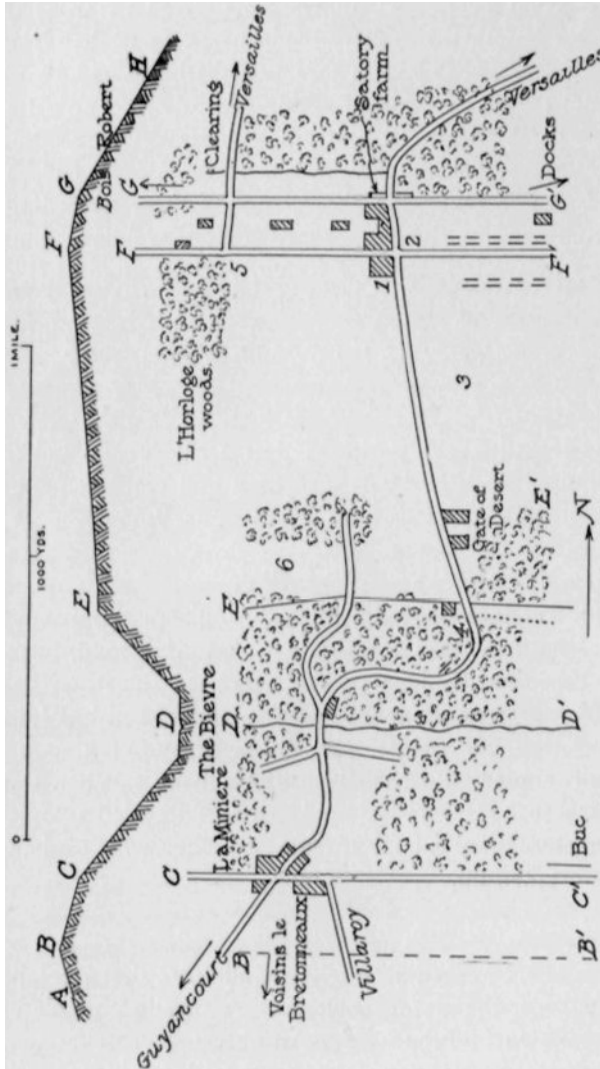


Fig. A'.

Seen from the road, the crest appears just over the first gap, between La Minière and the point of woods to the left; the front between these two points measures 200 mils. In front of the crest is a row of small fruit trees, marking the line of the La Minière—Buc road.

Part I.

The director assembles his party, and states the problem as follows:

GENERAL SITUATION.

"Two detachments of troops of all arms meet in the Bièvre valley. One, Red, is here on the plateau; the other, Blue, represents the enemy, and is on the other side of the Bièvre, near La Minière. Both detachments are advance guards, and both have orders to cross the Bièvre and get possession of the high ground on the opposite side."

SPECIAL SITUATION.

"The Red artillery commander arrives on this plateau with the advance guard commander, about ten minutes ahead of his three batteries. He is at once informed that hostile artillery is in position to the left (east) of La Minière, and has fired upon infantry on the Versailles—La Minière road. Flashes have been seen over the crest on the horizon, directly in prolongation of the road. An observer on the roof of a building (1, Fig. A') reports that he can see two batteries. Considerable rifle fire can be heard in the Bièvre valley.

"The commander of the advance guard gives the following orders to his artillery commander:

"Open fire as soon as possible upon the enemy's artillery. Choose your own position, but do not go too far from the road."

Captain A is designated to represent the commander of the advance guard artillery and authorized to use the detail from his own battery as staff officers, scouts and agents. The reconnaissance being finished and the position selected, the whole party is assembled again, and Captain A makes his report, enumerating the possible positions, stating their advantages and disadvantages, and giving the reasons for his choice. The director points out any mistakes that have been made, and leads the discussion.

REMARKS OF THE DIRECTOR.

"First I will go over what Captain A actually did, and then point out wherein he should have acted differently.

"Upon receipt of the orders of the advance guard commander, Captain A made a detailed reconnaissance of the position where we now are (Fig. A', 1). He found that guns placed any farther back than these woods (Fig. A', 2) could not fire, the view being cut off by the buildings and trees, and that he could not get his guns into any position in front of the crest without their being seen. He was thus forced to look for a different solution, and gave the following orders to one of his staff officers:

"'You know the orders I received. Go and see if you can find any suitable position on the right (west) of the road, where the batteries can go without being seen.'

"He then went himself farther forward, toward the Bièvre. About 400 meters ahead and 100 meters to the left he found a position on the front slope which seemed to answer the requirements very well (Fig. A', 3). The tall trees in front gave more than flash defilade, and the position could be reached under cover by making a slight detour toward the Docks. Fire could be observed from a point a little to the right rear. The extent of the position, however, was not sufficient for the whole battalion.

"While he was examining this position, his staff officer rejoined him and reported as follows:

"'There is a suitable position on the road along the edge of the Satory woods. On the side of this road toward the enemy, there is a high hedge; on the other side, a strip of cleared ground from 20 to 25 meters wide. Farther back, in the woods, there is a clearing which could be used by the limbers and reserves. The trees interfere with the view more or less, and it would be necessary to place each gun carefully; but there is room for eight guns, and they can be placed so that all can see a tall poplar at La Minière, which would make a good aiming point.'

"The reconnaissance was now complete, and Captain A made his dispositions (Fig. B'). He placed one battery on the left of the road, in the position he himself had found, on the line of flash defilade, and the other two in the position located by his staff officer.

"Before giving my opinion on the positions themselves, I will point out certain errors made during the reconnaissance.

"Captain A did not use his time to the best advantage. He made a detailed reconnoissance of a restricted portion of the terrain before he got any general conception of the whole area to be covered, and so did not begin using his staff officers soon enough.

"He finally sent his first staff officer to the right of the road. This division of the ground,—commanding officer on the left of the road, staff officer on the right,—is evidently very proper; but the division could have been made much more intelligently if the battalion commander had first gotten a general idea of the terrain to be reconnoitered.

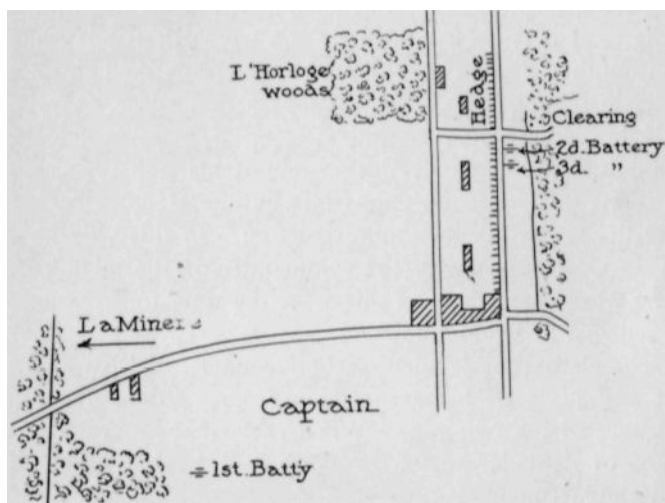


Fig. B'.

"Being in haste, Captain A went only 400 meters to the front. But he would have done much better to go farther. If he had gone to the first turn in the road (Fig. A', 4) he could have seen down into the valley and gotten a good idea of the appearance of the ground in front of the enemy's position.

"We will make a reconnoissance on these principles, and see what might have been done in this particular case."

The whole party then goes over the ground, the director explaining his movements as he goes.

"The orders from the commander of the advance guard require the artillery to get to work at once. The artillery commander can not afford much time for reconnoissance, so uses his staff officers freely. He calls them up, points out the target, and explains the

situation. He tells them that what he wants is positions that can be reached unobserved, so as to assure priority in opening fire; if such can not be found, then positions which require the shortest possible exposed movement.

"The battalion commander, with his staff officers, goes over the ground generally, moving parallel to the crest, and keeping in front of the buildings and trees, so as not to lose sight of the objective."

The party moves as indicated. The director points out that the crest occupied by the enemy's artillery is visible from anywhere near the road, through a gap in the woods; that as they move away from the road it is soon hidden by the trees; that it is seen again through another gap as they approach the Bois de l'Horloge, and finally is lost altogether when they pass that place. Arriving at the Bois de l'Horloge, he continues:—

"The battalion commander leaves one of his staff officers to look for positions in the second gap, while he himself goes back to reconnoiter the ground commanding the first. In this way he is able to keep in close touch with the commander of the advance guard. With the work divided up in this way, the time for reconnaissance can be reduced to a minimum.

"To complete the detailed reconnaissance, the battalion commander and his staff officer need only move to the front on the median lines of the two gaps. When each of them reaches the desired line of defilade, he moves along it and selects the limits of the gun emplacements."

The whole party completes the reconnaissance as indicated in front of the first gap. This reconnaissance is carried well to the front, as far as the turn in the road overlooking the Bièvre. The director then continues:—

"To sum up the procedure, the battalion commander gallops along the front, keeping in front of the crest so as to see the general line of his objective. He divides his ground into two strips, each one in front of a gap in the woods. He reconnoiters one of these, and his staff officer the other, moving forward on the center line of the gap until the desired defilade is found, and then examining the available front on that line."

Leaving the subject of reconnaissance, the director next takes up the proposed solution, as follows:

"The emplacements selected by Captain A are well concealed,

and can hardly be improved upon; but the details of handling the batteries should be changed a little. Let us consider the probable course of the battle.

"The orders call for immediate action. Captain A, quite properly, opens with his first battery, which is on the forward slope with flash defilade. He considers that it will be dangerous for the two batteries behind the hedge to open upon the enemy's batteries, which are in observation; they can not locate the enemy precisely, and would probably be silenced as soon as they disclosed their presence. I quite agree that the first battery should open, adjust on the crest at La Minière, and then use zone fire. The enemy can not reply, for the gun flashes are not visible. All it can do is to let the cannoneers take cover, and wait for an opportunity for effective fire again.

"But I cannot approve the solution altogether; I have another to

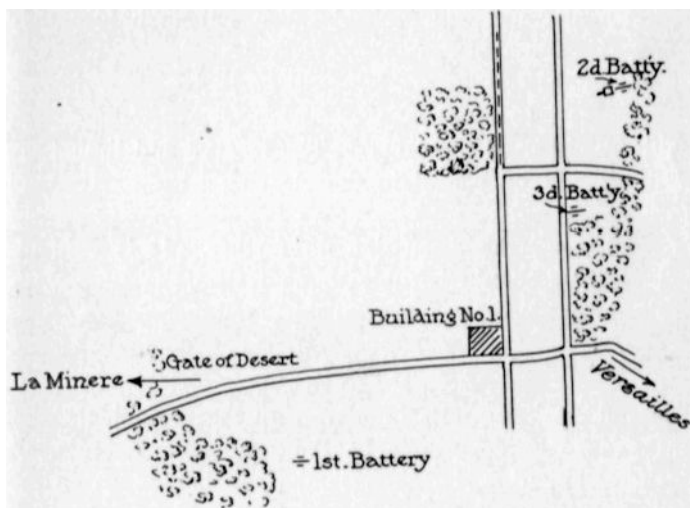


Fig. C'.

propose which I believe to be better (Fig. C'). I would place the first battery as Captain A did, but with extended intervals between pieces; the second in double section column behind the Bois de l'Horloge, with observers in the corner of the woods; and the third behind the hedge. The first battery opens fire to get an approximate adjustment; an observer on the roof of a building locates the target as follows:

"Aiming point, the tall lone poplar in La Minière. Both the enemy's batteries are to the left of the aiming point; one from 120 to 160 mils, the other from 180 to 220.'

"The captain of the first battery determines the corrector of the day, distributes his fire so as to get one platoon upon each of the enemy's batteries, adjusts on the crest, and, with the assistance of the observer, gets a bracket on the target. Very likely the enemy, seeing the projectiles fall near his batteries, and being unable to tell where they come from, will cease firing, and it will be unnecessary to open zone fire; there will be use enough for the ammunition thus saved later on. As soon as the adjustment is completed, the battery ceases firing and remains in observation.

"After a time the third battery will reveal its presence, perhaps firing upon infantry crossing the crest. The enemy's batteries, seeing the flashes, will open fire upon it; the first battery will come into action again, and will probably silence them before they can get in any effective shots.

"The second battery meanwhile will be limbered, waiting for a chance to come into action against any new target that cannot be dealt with by either of the others. The reserve and limbers of the third battery will be placed in the clearing back of the Bois de l'Horloge.

"We need carry the discussion no farther. It is evident that the Red artillery should be able to neutralize the Blue with one battery, keeping the other two available for other use."

Part 2.

All the officers being now familiar with the ground, the director begins to vary the conditions of the problem. Keeping to the same general situation, he changes the number of batteries, and then calls for a new selection of positions.

1. Red has only two batteries; Blue unchanged.

Solution. First battery in same position on the left of the road, forward slope, flash defilade, extended intervals.

Second battery in double section column behind the Bois de l'Horloge, captain observing from the edge of the woods. When the first battery has adjusted its fire, the second takes position, and opens fire as soon as a suitable target appears. The second battery thus operates under the protection of the first, which is always ready to neutralize any artillery that fires upon it.

This solution would be satisfactory even if the strength and position of the enemy's artillery were unknown; but in this case the action of the first battery would be much slower, since it would have to locate the enemy before commencing adjustment.

2. Red has only one battery; Blue unchanged.

Solution. The battery is placed as above described for the first battery.

3. Red has two batteries; Blue has four or five in observation.

Solution. Both Red batteries are placed in the above-described position on the left of the road. The sheaf is formed to cover as broad a front as possible; the batteries adjust their fire successively, and then remain in observation. If necessary, platoons or even single guns may be assigned to separate sectors, and fire independently, sweeping the broadest possible front.

Part 3.

The director now gives Captain A the following problem:

"Return to the original general and special situations. You are here, near the Bois de l'Horloge, with your staff, scouts and agents. Your batteries are in position; the first to the left of the road, the second behind the woods and hedge, the third behind the hedge. Your fire has produced the anticipated effect; the first battery keeps the enemy's artillery silent, and the second and third have from time to time fired upon his infantry, without suffering any serious loss. You have no definite information of what the infantry is doing, but the indications are that it is making progress, and that it might be well to send at least one battery forward to support it.

"Being now for the moment relieved from anxiety as to the enemy's artillery, take such action as you consider necessary."

Captain A calls Lieutenant A, and gives him the following orders:

"Reconnoiter the ground in front, with a view to a possible advance to some position on the other side of the Bièvre, near La Minière."

To make the exercise more realistic, the director gives Lieutenant A two envelopes, containing written statements of the information he is assumed to get by reconnaissance. These statements are as follows:

No. 1. To be opened at the crest of the wooded slope running down to the Bièvre.

From this point you see the Red infantry, which is making very slow progress in crossing the stream. La Minière is stubbornly defended by Blue infantry behind the stone walls. You are compelled to wait half an hour, before La Minière is occupied by Red infantry; you can then go ahead again, by the main road.

No. 2. To be opened on approaching La Minière.

You find the main road blocked. The enemy has retired, but has built a strong barricade, and fired the buildings on the road. You succeed in passing La Minière by a trail to the left of the main road, and reaching the crest formerly occupied by the enemy's artillery.

The Red infantry is deployed along this crest. Looking toward the enemy, you see a column of artillery on the road, coming out of Villaroy.

Lieutenant A takes two scouts and starts on his reconnaissance. After he has gone the director turns again to Captain A, and says:

"The situation is still unchanged; the hostile artillery is silent, and your infantry is making progress. You are here, on the Versailles—La Minière road, when you receive the following order:

"Hostile infantry, entrenched in La Minière, is delaying our advance; bring up one of your batteries to set fire to the place and support the attack."

Captain A sends orders to the commander of the first battery, by his agent of communication, to cease firing and join him on reconnaissance. He then moves forward at a gallop, accompanied by the director, who represents the commander of the detachment.

At the point 4, Fig. A', the director points out the wall that is to be demolished and the buildings that are to be set on fire; Captain A gives the following orders to the commander of the first battery:

"Take position here; set fire to those buildings, demolish that wall, and support the infantry attack. The range is not over 1,000 meters."

COMMENTS OF THE DIRECTOR.

"I can not altogether approve Captain A's dispositions. I would differ with him as to selecting the first battery for the forward movement, and also as to the position assigned to it.

"Captain A knows that his batteries have a very poor view of

La Minière. One of them ought to be sent forward, even if orders had not specifically required it. The first battery is, of course, the nearest, and it has probably suffered but little from the enemy's fire; besides, it can bring up its limbers and move to the new position without being seen by the enemy, which the others can not do.

"But if the first battery moves, the enemy's artillery is again left free to act, and all the benefit gained by the previous adjustment and registration is lost. The captain has had to organize a system of communication with his battery and with his observer on the roof, and the whole is now in working order. This being so, it is unquestionably better to leave the first battery where it is, and send one of the others forward.

"Captain A himself joined the commander of the detachment. This was logical; he needed first-hand information. The agent who brought him his orders guided him to me here. I pointed out his target, and then designated an officer to report to him as commander of the first battery.

"Captain A chose a position just above the road at the turn. This was unsatisfactory, for several reasons. In the first place, it is too near the enemy, about 900 meters. Further, it is accessible only by a march of approach of a hundred meters through the woods; the carriages can get through perfectly well, but they can not trot, and the rifle fire is heavy enough here to make it very dangerous to pass. There is another position that is much better."

The director leads the party to the position in question, at the point 6, Fig. A', and continues:

"This position, you will note, is at a longer range, 1,100 or 1,200 meters. The battery can reach it unobserved, and open fire by surprise; and even after opening, it is almost invisible. The limbers can find cover very near the guns.

"Of course, Captain A is not entirely responsible for selecting an inferior position. Events were moving rapidly, and he did not feel justified in taking the time for a complete reconnaissance, so took the first position that seemed at all suitable. Still, he might have sent both his staff officers to reconnoiter, instead of only one. If the second had followed the general rule, he would have found this place at once. The rule, as you remember, is to advance directly toward the obstacle that is to be destroyed, and get a good view of it; then look for a position, going to the rear again if

necessary. Starting from the building marked 1 on the map, and marching upon the lone poplar at La Minière, one comes straight to this position.

"But this position ought also to have been found by Lieutenant A. He was sent to reconnoiter on the other side of the Bièvre, but on reaching the crest overlooking the Bièvre found that the infantry was delayed at the stream, and that he could not get to La Minière for half an hour. He should have reconnoitered a position here, and gone back or sent one of his scouts to inform the battalion commander.

"This example shows how important it is for a battalion commander to start reconnaissances both to the front and rear as soon as he goes into position; and also how strongly the initiative of reconnaissance officers should be developed."

Part 4.

The director now states a new problem for Captain A.

SPECIAL SITUATION.

"La Minière is in the hands of our infantry. The Red commander takes the commander of the artillery forward with him to La Minière, telling him to let his batteries follow."

The party returns to the main road, and starts for La Minière. At the bridge over the Bièvre they meet Lieutenant A, who reports the result of his reconnaissance:

"The main road is blocked. The road to the right is impassable for carriages. The open field on the left gives access to a good position."

The party turns into the field, following the lieutenant, who, on the way, gives Captain A the following additional information:

"There is room enough to the left of La Minière for a number of batteries. You can get any required defilade, and the observation is excellent. There are plenty of aiming and registration points—two church steeples, a tall lone poplar, etc."

Reaching the point where the La Minière—Villaroy road crosses the crest, Lieutenant A points out the position and gives what further information he has.

The director comments as follows:

"The information given by Lieutenant A while on the road was of no use. Captain A would have seen all that instantly when he

reached the position. The lieutenant should have remained in the position to observe the enemy; a scout could have guided Captain A.

"The report which he made after reaching here was not in logical and concise form. Captain A had to ask a number of questions; and the final result was too much useless detail, and not enough precision on the important points. The report should have been made somewhat in this form:

"To the right of the main road the crest falls away, and offers no concealment. Here in front of us is Villaroy; to the right, Guyancourt. The main road, marked by the line of trees, passes to the left of Guyancourt, and farther on goes through Voisins-le-Bretonneux, where you see the church tower among the trees. When I reached here first, I saw a column of artillery coming out of Villaroy, and moving toward Voisins.'

"If the lieutenant, instead of coming back to the bridge, had remained here, he would probably now be able to give valuable information about the enemy, as, for instance, that the enemy's artillery was in position at a certain place, and that flashes had been observed on a certain front.

"In a word, Captain A might reasonably expect an officer sent ahead on reconnoissance to guide him to this position by the shortest route; to make it unnecessary for him to go to the right of the road looking for a position, when there is so good a place to the left; to orient him when he gets to the position; and to give him as much information as possible as to the enemy's position and movements. On the way here, he should have found and reconnoitered the best position for firing upon La Minière."

Part 5.

The director now announces a new situation.

GENERAL SITUATION.

"The battalion forms a part of a detachment of all arms, sent out to protect a convoy marching from Voisins-le-Bretonneux to Versailles and Rocquencourt."

SPECIAL SITUATION.

"The battalion has been on the crest between Guyancourt and Voisins. It has now come up to take position in observation behind

this crest. In order to permit the convoy to get through Versailles, the detachment has to delay a force of the enemy, and the battalion is required to remain on the Bièvre as long as possible, even if it loses one or two batteries.

"Captain B commands the battalion, which is in observation in this position. We will discuss the choice of emplacements later on. You have taken such action as was immediately necessary, and are now considering the selection of positions farther back, on the Satory plateau, to be occupied later. Use the officers, scouts and agents of your own battery, and make the necessary reconnaissances."

After looking over the ground, Captain B gives the following instructions to Lieutenant B:

"Our orders are to remain here as long as possible. We shall probably, however, have to withdraw across the stream before long, and take position on the Satory plateau. Go over there, and look for suitable positions, keeping in mind that, there as well as here, we shall have to remain as long as possible. Take two scouts with you. Whatever happens, you will have at least half an hour to make the reconnaissance. When you have finished, report to me here."

While waiting for the return of Lieutenant B, the director takes up a series of exercises in the use of ground, similar to those he conducted at the beginning of the session on the Satory plateau. He assumes that the batteries belong to a battalion coming from Versailles, and discusses their action under various conditions. First he makes them a part of an advance guard; then part of the main body, coming up to reinforce an advance guard battalion; finally part of the corps artillery, coming up to reinforce the six batteries of the divisional artillery already in action. Then he reverses the situation, and, instead of dealing with a force advancing from Versailles, takes up the case of a retreat from Voisins-le-Bretonneux. Having thus made full use of the north slope of the crest, he begins a similar series of problems on the south slope.

Among other things, he takes up the dispositions to be made by the Blue artillery under the first situation, to oppose the three Red batteries in the positions above described. He shows that it is possible for the Blue batteries to remain in observation, without being discovered, until they are required to open fire, provided their matériel can not be seen from the roof of the building numbered

1. From this he concludes that Red can not have complete information as to the strength and position of the Blue artillery, unless a very complete system of observation has been organized before the arrival of the batteries. And to justify this conclusion, he demonstrates on the ground that, although the Blue batteries are entirely hidden when in position, their march of approach can not be concealed (Fig. D'). In a case like this, the Red artillery commanders should keep in mind the general principle, that the best way to locate hostile artillery is not to look for it when it is in position, but to observe it while on the march.

The director further points out the necessity of frequent practice in fire with percussion shell against artillery, since circumstances may

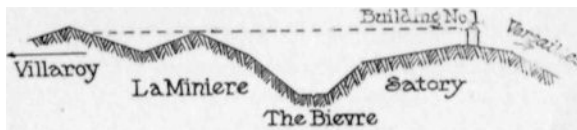


Fig.D.'

often make it necessary to attempt such firing even when the target is very indistinctly visible. One might, for instance, encounter a situation like the following:

Call the Red batteries R', R'' and R'''; the Blue, B' and B''. R' is below the line of flash defilade, and is entirely concealed; R'' and R''' are masked by trees and hedges, but are partially visible; B' and B'' are concealed, but have less than flash defilade. We will assume that the action has been going on for some time, and all the batteries have been firing more or less. R' has been firing at both B' and B'', but is now in observation, ready to take up the fire again if necessary to protect R'', R''', or the Red infantry, from hostile artillery fire. R'' and R''' have fired upon Blue infantry; they have suffered somewhat from the fire of B' and B'', but, on account of the protection of R', have not been silenced. B' and B'' have been practically silenced by artillery fire from a position which they have been unable to locate, but have occasionally been able to fire a few rounds at R'', R''', and the Red infantry.

Under these conditions, the effort of B' and B'' should be to silence R'' and R''' and occasionally fire upon the Red infantry. The question is, how to accomplish this. The most promising solution is slow continuous fire, interrupted whenever the fire of R'

becomes too severe. But if shrapnel is used nothing definite will be gained; the Blue batteries should fire shell, and try to put some of the Red guns permanently out of action.

To sum up, the solution of the problem of B' and B'' is to keep up a slow continuous shell fire upon R'' and R''', whenever the fire of R' is not too severe; at the same time, they should be ready at any moment to fire upon the Red infantry.

The director then takes up the convoy problem, first assuming that the battalion belongs to the defending force, then to the attacking. Having finished the discussion of positions on the La Minière crest, he calls upon the lieutenant who was sent out to reconnoiter to make his report to Captain B; after which he makes the following comments:

"Lieutenant B's reconnaissance was not properly made. He evidently did not grasp the extent and importance of the work assigned him.

"The batteries are required to remain in position as long as possible. The battalion commander, then, must be with his batteries, to decide the critical moment when they are to limber up, and can not start for the Satory plateau until his last carriage starts down toward the Bièvre. The reconnaissance officer must be relied upon to find the possible positions, so that the battalion commander will have only to make his selection.

"Lieutenant B's report was too vague and too voluminous. He did not seem able to determine in his own mind the relative importance of the different requirements to be satisfied by the positions, and did not appreciate that the conditions of this problem are the reverse of those we have been considering hitherto.

"In the previous problems the batteries had to come up and take position in the face of hostile artillery in observation. Their march of approach and the occupation of their positions had to be concealed. But now the batteries are themselves going into observation. Not their arrival, but their departure, has to be concealed; and this departure, too, will have to be made at the last moment, when the enemy's artillery is in position, and perhaps has adjusted its fire.

"Lieutenant B, then, should have selected positions where the limbers could be brought up unseen. His first step should have been to go over this position here. The enemy will have to use it for his artillery, and we ought to know what he can see. If

Lieutenant B had done this, he would have seen at once that there are only two gaps in the woods on the north slope of the Bièvre valley, and hence only two general positions that artillery can occupy on the Satory plateau to fire on the La Minière crest; he could then have selected at once the only two areas that need be reconnoitered—the ground just to the right (east) of the main road, and the northeast corner of the Bois de l'Horloge. On his return, his report might have been something like this:

"To the right (east) of the main road, 300 or 400 meters this side of the left end of the line of buildings, there is a position on the forward slope, with more than flash defilade behind these trees. There is another position on the left (west) of the main road; the corner of the Bois de l'Horloge and the road bordered by trees mark the right end of it. About fifty meters behind that road there is another, with broad clear spaces bordering it, concealed from us here by a thick high hedge; two batteries could be put in there, with the limbers and reserves in a clearing behind. There is a dirt road through the woods, leading to Versailles; I had a scout reconnoiter it.'

"This amount of information should be the minimum. If Lieutenant B happened to be lucky, he would be able to add something like this:

"In the same direction, but not so far back, just at the top of the slope overlooking the Bièvre, there is still another position for three batteries, commanding perfectly this crest, La Minière, and the main road. The guns can be screened in the underbrush, and can limber up and get out without being seen by the enemy."

The director next calls upon Captain B to explain his dispositions, and, having heard them, comments as follows:

"I agree with Captain B as to the manner of conducting the withdrawal by echelons. The first echelon consists of two batteries, which are sent to the position near the Bois de l'Horloge; the third battery remains in position until the last moment, and then, according to circumstances, either takes the position we selected some time ago to demolish the walls at La Minière, or is placed in readiness behind the Bois de l'Horloge.

"Captain B was quite right in rejecting the position on the forward slope. It is hard to get out of in the face of an advancing enemy, and, having no view of the ground immediately in front, the guns would be exposed to surprise. And it would not do to

use the ground just in rear, since this would draw the fire of the enemy in the direction of the main road, where the convoy would be marching."

This ends the session. The director briefly reviews the exercises, and indicates the principles to be deduced from them.

1. *Reconnaissance* by battalion commander, in an advancing force; hostile artillery in observation.

When a battalion commander finds it necessary to make a reconnaissance quickly, he assigns specific parts of the work to his staff officers. These assignments may be made, if the time is very limited, even before he personally looks over the ground. In any case, he pushes the reconnaissance well to the front.

2. *Use of ground* in a forward movement; hostile artillery in observation.

Aside from the considerations of moral effect, which will often compel artillery to come out into the open and advance to the support of the infantry, there are other reasons which may sometimes lead to the selection of an unmasked position. Artillery can get results only by becoming seriously engaged; and it may frequently be desirable to bring on a duel by exposing a target to the enemy. It thus gives the action the direction which it desires; and the enemy's artillery actually becomes less dangerous, when it opens fire, than it was while it remained in observation.

3. *Change of position* to demolish an obstacle.

This exercise showed how important it is to reconnoiter to the front and rear as soon as artillery goes into position. The general rule for reconnoitering a position for this purpose should be noted: advance toward the obstacle to be demolished so as to get a clear view of it; then select the position, going to the rear again if necessary.

4. *Reconnaissance* by reconnaissance officer of an artillery battalion, in preparation for a change of position to the front.

The reconnaissance officer should try to save the time of the battalion commander in every possible way. He shows him the shortest way to the position, orients him on his arrival there, and saves him unnecessary riding in looking for positions. He organizes the system of observation before the arrival of the batteries, and keeps the battalion commander informed of the positions and movements of the enemy.

5. *Use of ground*.

One illustration demonstrated the importance of trying to locate

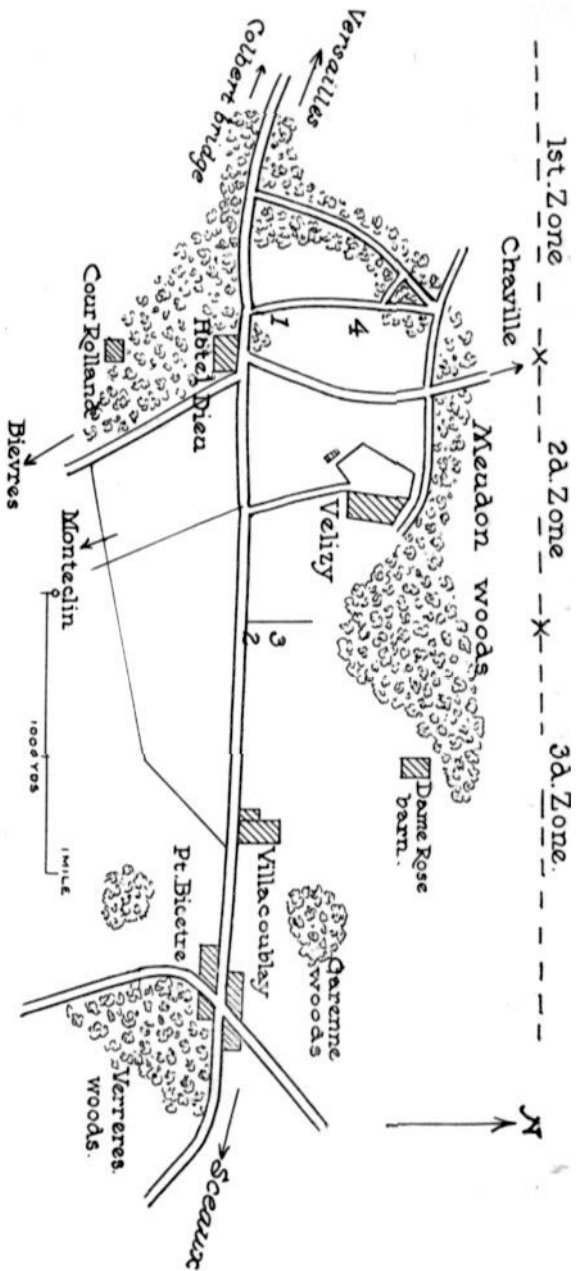


Fig. E'

the enemy's artillery on the march, before it comes into position. Another emphasized the necessity of practice in shell fire against artillery which is only partially visible.

6. *Reconnaissance* by reconnaissance officer of an artillery battalion, in preparation for a change of position to the rear.

The reconnaissance officer must furnish information as to the possible positions, sufficiently definite to enable the battalion commander to make his selection after a very hasty personal reconnaissance.

7. *Selection of position* in observation in rear, to delay a pursuing enemy.

It is essential that the position be such that the batteries can get out of it unseen.

Report of the Third Session.

PROGRAM.

Exercises in reconnaissance and selection of position, the conditions simulating as nearly as possible those to be expected in war.

The party assembles on the Versailles—Sceaux road, opposite Villacoublay. The program includes four exercises:

1 and 2. Reconnaissance by reconnaissance officer of an artillery battalion, during a march in retreat.

3. Use of ground.

4. Complete preparations for putting a battalion in position. The battalion commander makes all the dispositions and gives all the orders necessary in actual service.

DESCRIPTION OF THE GROUND.

The ground to be used in this session is bounded on the north by the Bois de Meudon, and on the south by the Versailles—Sceaux road (Fig. E'). The trees along the road are thick, and form a sort of curtain, limiting the ground sharply. For convenience of description we will divide the area into three parts:

1. West of the Chaville—Hotel-Dieu—Bièvres road.
2. From this road to the crest between Vélizy and Villacoublay, marked by a dirt road.
3. East of this crest.

We will imagine ourselves going successively to the points where the artillery commanders will have to commence their reconnaissances,

and study the panorama that they will have before their eyes.

The artillery commander, standing northwest of the little Bois de l'Hotel-Dieu (1, Fig. E') and looking toward Villacoublay, sees on his left the Bois de Meudon, and a little to the front the village of Vélizy, marked by a church tower (Fig. F'). Extending to the right from the village is a wall, with a barn at the end of it. On the right the view is limited by the Bois de l'Hotel-Dieu and the trees along the main road. Between the road and Vélizy is the crest of a hill, with a line of trees that seems to indicate the existence of a road. Beyond the crest are a clump of trees and the roofs of Villacoublay.

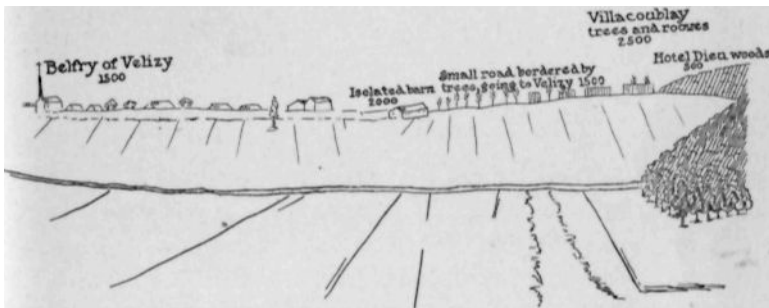


Fig.F.'

Placing himself at the top of the hill west of Villacoublay (2, Fig. E') and looking west, he finds that he can not see the point where the main road leaves the Bois de Meudon. The road runs in a straight line, but does not follow the undulations of the ground; it falls off sharply where it crosses the Bièvres road.

Moving out a short distance on the crest (3, Fig. E'), and looking toward Versailles, he sees on the left the trees along the main road, and, through the trees, the park wall of Cour-Roland, 2,000 meters away. To the right are Vélizy and the Bois de Meudon. Between the road and the isolated barn near Vélizy, he measures a front of seven fingers, or about 220 mils; this whole front is occupied by the edge of the Bois de Meudon. He observes that the ground slopes gently down all the way to the woods, forming a sort of glacis 2,500 meters wide. The Bois de l'Hotel-Dieu seems continuous with the Bois de Meudon, and the slight undulation in the ground at 4, Fig. E', is not noticeable.

Looking in the opposite direction, he notes that there is a sharp

slope down to Villacoublay, so that batteries firing toward Versailles may take any desired degree of defilade.

If now the artillery is coming from Versailles, to fire in the direction of Petit-Bicêtre, its commander, on reaching this crest, will note that the road runs in a straight line for over 3,000 meters; it is visible as far as Petit-Bicêtre. Moving off the road to the south, he sees that the ground falls off gently to a little branch of the Bièvre. On the horizon are Petit-Bicêtre, and the Bois de Verrières, but the ground between is hidden for the most part by trees. Going north of the road, he finds that the houses in Villacoublay completely limit his view from the crest; and the Bois de la Garenne hides the vicinity of Petit-Bicêtre from any point along the edge of the woods as far as Dame Rose.

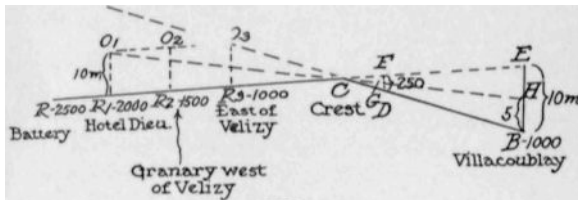


Fig.H'.

The profile (Fig. H') parallel to the main road, will make matters clearer. Elevations and distances are given in round numbers. The approximate ranges are:

AC, battery to crest, 2,500 meters.

A'C, Hotel-Dieu to crest, 2,000 meters.

A''C, barn at Vélizy to crest, 1,500 meters.

A'''C, eastern edge of Vélizy to crest, 4,000 meters.

BC, Villacoublay to crest, 1,000 meters.

The height of the trees and roofs in Villacoublay, and of the possible observing stations at A, A', A'', A''', is taken at 10 meters; that of a mounted man at 2.5 meters; that of a battery in action, 1.25 meters.

Assuming these values, the line of mounted defilade passes through D, which is located as follows:

$DF = \frac{1}{4} BE = 2.5$ meters.

$DC = \frac{1}{4} BC = 250$ meters.

An observer at O' can see half of DF, or 1.25 meters; one at O'' three quarters of it, or 1.8 meters; one at O''' can see it all. These results are verified on the ground.

A battery going into position in observation behind the crest must have at least enough cover to conceal the guns from any possible observing station of the enemy. If now the enemy can get no closer than O' (Hotel-Dieu), the position will be at D, for:

$$DG = \frac{1}{4} BH = 1.25 \text{ meters.}$$

$$DC = \frac{1}{4} BC = 250 \text{ meters.}$$

If the enemy's observing station is at O" (barn at Vélizy), the position will, of course, have to be farther back.

A battery going into position to fire at once should have mounted defilade against the enemy's guns; the position is again at D, 250 meters from the crest. And flash defilade against the enemy's guns will give about the same position as dismounted defilade against O', both being about 300 meters in rear of the crest.

Exercise No. 1.

RECONNAISSANCE BY RECONNAISSANCE OFFICER OF AN ARTILLERY BATTALION, DURING A MARCH IN RETREAT.

The director announces the following

SITUATION.

A battalion of three batteries constitutes the artillery of a rear guard, covering the retreat of a body of troops from Petit-Bicêtre to Versailles and St. Cyr (Fig. E').

At the beginning of the exercise, the batteries are assumed to be in observation near Petit-Bicêtre. The battalion commander calls his reconnaissance officer, points out to him Villacoublay and the crest behind it, and says:

"The battalion will probably soon be ordered to take position in observation behind that crest. Go and reconnoiter it, so as to orient me when I arrive; take two scouts with you. I shall probably be here about half an hour more."

This situation is given out, not at Petit-Bicêtre, but on the main road, about 500 meters east of Villacoublay, in order to save time. The director designates Lieutenant A to make the reconnaissance, and asks the other officers to look over the ground so as to be able to take part in the discussion. When Lieutenant A has completed his reconnaissance, the party assembles on the crest west of Villacoublay, and he makes his report. After the general discussion, the director sums up as follows:

"Lieutenant A has done his work well, in the sense that he has given the battalion commander all necessary information. I have, however, two criticisms to make—one with reference to the form of his report, the other with reference to the conduct of the reconnaissance.

"His report should have been more concise. It would have been enough if he had said:

"I have found only one position—to the right of the road, near the haystacks. On the other side of the road, along the crest as far as the woods, the view is limited by the houses in Villacoublay. Still farther to the left and front, along the edge of the woods, the Bois de la Garenne, which you see over the houses, prevents seeing Petit-Bicêtre.'

"As for the position near the haystacks, Lieutenant A, seeing me look in that direction, might have said:

"The ground in front and to the left is partly hidden by the trees along the road. The batteries can get out of the position under cover of the haystacks, following that road, and regaining the main highway farther on.'

"The reconnaissance was made very quickly. When Lieutenant A reached Villacoublay he sent a scout to the right, toward the Bois de Meudon, to look for a position, and he himself went toward the haystacks. But it was only a piece of luck, that he happened to do this. The proper course would have been for him to come on to this point (2, Fig. E'), and get a general view of the whole terrain.

"If he had done this, he would have found that the ground naturally divided itself into three parts. The first is south of the road, and *a priori* there should be good positions there.

"The second part is the crest between the main road and the Bois de Meudon. At first sight, it looks as if Villacoublay would cut off the view; but there might be places that are not cut off, and the whole crest should be gone over.

"The third is the edge of the woods to the left front of the crest. The ground here is somewhat lower, and the Bois de la Garenne seems likely to hide Petit-Bicêtre; but this also should be verified.

"In a case like this, where there is time enough, it is best to take such a general look over the ground before giving any orders. Here the lieutenant would have been led logically, and not by chance,

to reconnoiter the ground about the haystacks himself, and send the more intelligent of his two scouts to the other side of the road. The scout then could have been given a single definite order; not, as was actually the case, to make a complete reconnaissance, but simply to go to two specific places and find out whether he could see Petit-Bicêtre and the positions where they had left the batteries."

Exercise No. 2.

The director sends Lieutenant B to make a reconnaissance similar to Lieutenant A's.

The situation is still the same; the lieutenant is reconnaissance officer of a battalion of artillery, which forms part of a rear guard marching toward Versailles and St. Cyr. The director gives him the following instructions (Fig. G'):

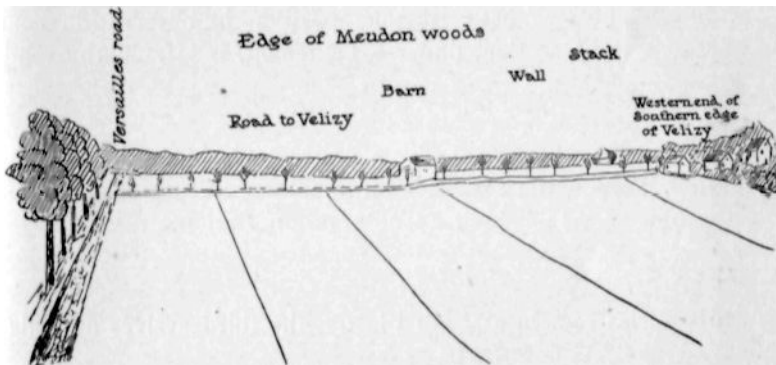


Fig. G.'

"To the right, near the edge of the woods, you see the village of Vélizy; in front is the Bois de Meudon; to the left, across the road, is the Hôtel-Dieu farm and the walled park of Cour-Roland. The battalion will probably get orders before long to take position in observation in front of the woods; go and reconnoiter the ground, taking two scouts with you. I shall probably be here half an hour more."

After Lieutenant B's departure, the director at once took up Exercise No. 3. He then led the party toward Hôtel-Dieu, received the lieutenant's report, and took up Exercise No. 4. In the course of this latter exercise, it became necessary to go over in some

detail the proper method of reconnoitering the ground covered by Lieutenant B; for this reason the two exercises were discussed together.

Exercise No. 3. Use of Ground.

GENERAL SITUATION NO. 1.

A battalion of artillery forms part of a detachment escorting a convoy which is approaching Versailles and St Cyr. The tail of the convoy is at Hôtel-Dieu. The infantry intends to defend Villacoublay; the artillery is retiring by echelon.

SPECIAL SITUATION NO. 1.

One battery has been left in position near Petit-Bicêtre; the head of the column of the other two is on the road opposite Villacoublay.

Solution. The two batteries take position in observation near the haystacks; one section, under a lieutenant, is left on the road.

SPECIAL SITUATION NO. 2.

The battery left behind at Petit-Bicêtre arrives at Villacoublay.

Solution. The battery is placed in readiness in rear of the other two, the officers establishing an observation station.

SPECIAL SITUATION NO. 3.

Two batteries remain at Petit-Bicêtre, the third arrives at Villacoublay.

Solution. The battery takes position in observation as in Special Situation No. 1.

GENERAL SITUATION NO. 2.

The artillery belongs to the rear guard of a command marching from Versailles toward Sceaux; the rear guard has orders to delay the enemy as much as possible. Its infantry holds the line of the Vélizy—Montéclin road; the enemy's infantry has reached the park of Cour-Roland and the Hôtel-Dieu—Chaville road.

SPECIAL SITUATION NO. 1.

A battalion of three batteries is assigned to the rear guard. The

battalion commander has no information as to hostile artillery.

Solution. Two batteries are placed in observation north of the road, with dismounted defilade against the tops of the trees near the hostile infantry (O', Fig H'). This position gives flash defilade against the probable position of the enemy's guns. One battery is close to the road, the other about the middle of the crest. The third battery is left behind, entirely out of sight of the enemy, in readiness; the officers establish an observation station.

SPECIAL SITUATION NO. 2.

Two battalions are with the rear guard. The regimental commander knows nothing of the positions of the hostile batteries.

Solution. The first battalion is placed in observation as above described, its left on the road. The intervals between batteries are made as wide as possible, to force the enemy to distribute his fire over a broad front, the battalion extending from the road to the woods. The second battalion is held in readiness, in line at close interval, just back of Villacoublay; the officers are in observation.

GENERAL SITUATION NO. 3.

The positions of the infantry are as before; but the force is now advancing from Sceaux upon Versailles. Three special situations are taken up.

SPECIAL SITUATION NO. 1.

One battalion is with the advance guard; its orders are to fire upon the enemy's artillery as soon as it is discovered. Our infantry holds Vélizy and the wall west of it; it is under fire from hostile artillery near the point 4, Fig. E'; the flashes of the guns are visible.

Required. Orders of the battalion commander (1) to the officer assigned to reconnoiter the enemy's position; (2) to the commander of the battery which is to open fire first.

SPECIAL SITUATION NO. 2.

As soon as the first battery opens fire, it is itself fired upon by hostile artillery whose position can not be discovered by the first battalion; the director assumes that this position is at 1, Fig. E'. A second battalion comes up to support the first, and is ordered to reply to the hostile artillery.

Required. Orders of the battalion commander (1) to the officer sent out to locate the target; (2) to the commander of the battery assigned to open fire when the target is located.

SPECIAL SITUATION NO. 3.

A third battalion, from the main body, comes up before the artillery duel is decided. The first two battalions are in position on the crest north of the road; the enemy has a continuous line of guns from the Hôtel-Dieu to the woods, probably seven or eight batteries. The third battalion is ordered to breach the wall at Cour-Roland, and prepare the attack upon the park; its commander is informed that the enemy's artillery is partly silenced, and ceases firing every time it is fired upon.

Required. Selection of positions for the batteries, statement of how they will occupy them, and discussion of method of securing firing data, adjusting and conducting fire.

Exercise No. 4.

COMPLETE PREPARATION FOR PUTTING A BATTALION IN POSITION,
UNDER SERVICE CONDITIONS.

The director assembles his party at the crossroad near the Hôtel-Dieu, and gives out the following:

GENERAL SITUATION.

Two detachments of all arms meet on the plateau between Vélizy and Villacoublay. *Red* is the advance guard of a division marching from Versailles toward Sceaux; it includes three batteries. Its orders are to get possession of the plateau, so that the division may deploy there. The enemy, *Blue*, coming from Sceaux, is trying to drive *Red* back upon Versailles.

SPECIAL SITUATION.

The commander of the three batteries is with the advance guard commander. The batteries, marching with the infantry, have just crossed the Pont-Colbert.

On the right, the Red infantry is entrenched along the Bièvres road, and behind the walls at Cour-Roland. The Blue infantry is deployed 1,000 or 1,200 meters in front of them, and firing has begun. On the left, shots are heard in the woods; the enemy is

firing from the wall at Vélizy. Nothing can be seen of the enemy in the center, where the roofs of the houses in Villacoublay appear over the crest.

To be prepared for anything that may happen, the commander of the advance guard gives the artillery commander the following orders:

"Bring up your three batteries, and be ready to fire as soon as a target appears."

The director assigns Captain A to represent the battalion commander, and gives him the lieutenants, scouts and agents of his own battery. The party accompanies Captain A, observing his dispositions; from time to time, the director discusses them with the other officers.

Captain A is directed to send back for his batteries; to organize his system of observation, and search for targets; to provide for a complete reconnaissance; and to give his orders to the battery commanders. When the preparations are all complete, the director assembles the party for final discussion, and says:

"I have very little criticism to make; Captain A has given a model solution. I will merely review his dispositions in detail.

"After receiving his orders, he first sent for his batteries. Calling up the agents of communication, he gave the following orders:

"All battery commanders will come forward for reconnaissance. The officer commanding the column will turn the batteries out to the left of the infantry, and bring them up at a trot, halting before the head of the column comes out of the woods here.' (6, Fig. E'.)

"He next organized his system of observation, and started a reconnaissance to find the enemy's artillery. Calling Lieutenant C, he said:

"Organize the system of observation, and try to locate the enemy's artillery; take three scouts with you. The battalion will take position somewhere near here. Be sure to find some place where an observer can see in behind that crest in front of Villacoublay.'

"The first glance showed Captain A that his position would have to be in the immediate vicinity of the place where he then was. South of the road, in front of Cour-Roland, there was no satisfactory position; it was too open, and besides, the enemy's infantry was too close.

"He now began a complete reconnaissance, going over the ground with his remaining staff officer and scouts. He found one good

position in rear of the little patch of woods (1, Fig. E'), with room enough for one battery. The church tower in Vélizy made a good aiming point; flash defilade could be taken. Observation of fire was easy; from a position near the left hand edge of the woods the whole crest in front of Villacoublay was visible.

"Continuing to the north by the road through the fields, he noted that the ground to the east sloped like a glacis clear up to the crest, 2,500 meters distant. Assuming that the enemy's artillery would be in observation, he thought of making use of the edge of the woods west of him; so sent Lieutenant D, with a scout, to see if a position could be found there, concealed by the trees.

"As Captain A came nearer the woods to the north, he found that the wall at Vélizy began to hide the crest. Fifty meters farther on, he noticed a little fold in the ground, which gave dismounted defilade against the top of the wall and the crest to the right of it. Being now some distance from the main road, the trees there no longer cut off his view to the southeast; and he found that he could see the prolongation of the Villacoublay crest beyond the road. There was room enough in the position for two batteries.

"But he realized that it could not be used unless it could be reached by some road other than the one he had followed. Calling up a scout, he showed him the corner of the woods where the batteries had been ordered to halt, and sent him to find a road there through the woods, out of sight of the enemy. This being a simple matter, it could safely be entrusted to any well-instructed scout.

"Captain A then returned to the main road, and soon received the reports of his assistants. Lieutenant D reported that there was no practicable position in the woods; that a road ran parallel to the edge, 50 or 100 meters back, but the trees between were too thick for carriages to move. The scout who was sent to look for a road reported that there was a trail through the woods which would enable the batteries to reach the desired position unseen.

"Lieutenant C reported that he could find no place from which he could see behind the crest; he had tried a number of places, but could get no better observation station than a tree near the Hôtel-Dieu, where he had left a scout.

"It is on this one point, the organization of his observation system, that I would disagree with Captain A. The duty he assigned

to Lieutenant C was very difficult, in fact impossible. He should not have sent him out without more definite instructions. A glance at the relative positions of the infantry should have shown him that the only possible observation stations were in the trees near the Hôtel-Dieu. If the enemy's artillery was behind the Villacoublay crest, out of sight from the tops of these trees, there was no possible place where an observer could go without encountering the enemy's skirmishers.

"In a case like this, if scouts have not been sent out a long time in advance, an artillery commander can get no information whatever about the enemy's artillery until it comes into action. This was the situation in which I intentionally placed Captain A.

"The battalion commander now had all the information that he could get, to guide him in deciding how to use the ground. He knew the form of the ground, the available cover, the roads of communication, the position of the friendly troops; in short, everything that could be found out by reconnaissance under the circumstances. As to the enemy, his information was very scanty. He knew nothing, or next to nothing, of the strength, position and dispositions of the hostile artillery or infantry, nothing of the locations of the reserves. This is the usual state of affairs in active service. He was, however, fortunate in having clear, definite orders as to what was expected of him. This is by no means always so; and officers should not hesitate, when necessary, to ask to have their orders made more definite, or to use their own discretion, according to circumstances, in carrying them out.

Captain A placed his first battery behind the Bois de l'Hôtel-Dieu, and the other two near the Bois de Meudon, with dismounted defilade. The sector of observation of the first was from the main road to Vélizy; of the second, the part of the crest south of the main road. The third was given the same sector as the first, with orders not to open fire until after it.

"Three officers were designated to represent the battery commanders, and Captain A gave them the following orders:

"The first battery will go into position in observation here (1, Fig. E'). Place your guns as near the woods as possible, so as to be entirely concealed. Open fire without further orders upon any target appearing on the crest between the main road and Vélizy; the range is about 2,500 meters. Commanding officers of the second and third batteries come with me.'

"Going over to the position near the edge of the woods to the north, he gave the following instructions to the remaining two battery commanders:

"Here are your positions: third battery on the left, close to the woods, second on its right without interval. Bring your batteries in through the woods; this scout here has found a road which he will show you. The second battery will observe the crest south of the main road, the third on this side.

"Lieutenant D will post an observer for you in one of the trees. Fire as soon as you see a target; if, for instance, artillery should come into position in your sector, open without waiting for orders. Do not fire upon anything outside of your own sectors, unless the target is too large for one battery.'

"In anticipation of orders to change position again, Captain A had reconnaissances made in front and rear, and located roads under cover leading to Versailles and Vélizy."

The director then returns to the second exercise, and discusses the work of Lieutenant B.

"On the way here Lieutenant B rode beside me, and gave me the results of his reconnaissance. As we approached the Hôtel-Dieu he informed me that there was no position south of the road. On the road behind the Bois de l'Hôtel-Dieu, he pointed out an excellent position for one battery (1, Fig. E'). Finally, farther out on the same road, near the woods (4, Fig. E') he said: 'Here is another position, for two batteries, with dismounted defilade against the crest where the enemy's artillery will probably be; this road leads to Versailles through the woods.' I then asked him the following three questions:

"Is there a road from here direct to Vélizy?

"Is there a road through the woods from here to the main road?

"Can guns take position in the edge of the woods there to the west, under cover of the trees?

"He was unable to answer, for the reason that, during his reconnaissance, he had not succeeded in putting himself in my place. A battalion commander has to remember that his batteries ought to get into position as quickly and as secretly as possible, and he naturally tries to get off the main road and use trails through the woods. Then, too, if he is ordered to limber up and march upon Versailles, he will want to get his three batteries together as soon as he can, and the wood roads will again be necessary. As for



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positions in the edge of the woods, I will admit that they are dangerous, for the enemy can adjust on them easily; but the cover does, nevertheless, give a certain freedom of movement; the enemy's artillery can not fire all the time, and limbers can be brought up unseen during lulls in the fire."

The session being ended, the director calls attention, in conclusion, to the principal lessons of the day, which he states as follows:

"When a reconnaissance officer is sent to look for positions in rear, the first thing to do, if he has time enough, is to take a general look over the ground. He can then divide the work between himself and his scouts, giving to them particular, definite things to look for, while he himself attends to the work that requires more judgment. To be sure that he will not forget anything, he tries to imagine himself in the place of the battalion commander, and considers not only the existing state of affairs, but the probable developments in the near future.

"All this was shown by the first two exercises. In the third we found occasion to note what a difference there is in the relative value of positions at different seasons of the year. We have been over this ground in February, when the ground was frozen, and in July, when the country was covered with standing crops. Today, in April, we see that the position on the Villacoublay crest is better than the one at the Hôtel-Dieu; in February, the frozen plowed fields about Villacoublay were impassable for guns, or even for mounted men, but the Hôtel-Dieu position was as good as it is now. In July, the standing grain concealed guns anywhere about the Hôtel-Dieu, and there were three good positions there; one behind the woods, with flash defilade, the other two near the southern edge of the woods, with mounted defilade. On the other hand, the presence of the crops did not add anything to the value of the Villacoublay position.

"In the fourth exercise, Captain A's reconnaissance may be taken as a model. It was very thoroughly and rapidly made, and everything was done in the most logical manner."

[TO BE CONTINUED.]

HINTS FOR THE INSTRUCTION OF MILITIA BATTERIES.

BY MAJOR WILLIAM J. SNOW.

(Continued.)

THE MIL.

The Field Artillery Drill Regulations say—

To Set the Deflection Scale of the Panorama Sight.

143. The limb of the instrument is divided into 64 equal parts. The micrometer scale is divided into 100 equal parts, a complete turn of the micrometer corresponding to one division of the limb. The micrometer, therefore, serves to subdivide the divisions of the limb into 100 parts; hence, the least reading of the instrument is $\frac{1}{6400}$ of the circumference, or $\frac{1}{1000}$ of the radius, very nearly. The least reading is called a *mil*. A deflection of one mil corresponds, therefore, to a deviation at the target of $\frac{1}{1000}$ of the range.

The *mil* is the basis of all our field artillery firing calculations. It is a unit of angular measurement, and the battery commander's telescope, ruler, panorama sight, angle of site and corrector scales are graduated in it. Angle measuring instruments in use in civil life (transit, theodolite, surveyor's compass, etc.), are graduated in degrees, minutes, and seconds; but such a graduation is unsuitable for the rapid work required in field artillery.

For instance, assume the aiming point to be in rear and the deflection to be 3,425 mils, and the deflection difference to be minus 15; were our instruments graduated in degrees, minutes, and seconds, the corresponding deflection would be 192° 53' 37", and the deflection difference would be 51' 34". Under the former system of notation, chiefs of platoon readily and quickly get the deflections for the guns to be 3425, 3410, 3395, 3380, and under the latter notation, the deflection is slowly and laboriously determined to be 192° 53' 37", 192° 2' 3", 191° 10' 29", and 190° 18' 55".

It is evident that the greater the number of figures to be used, the greater the liability to error in transmitting them and setting them off on scales, and the greater the loss of time, especially in converting from one unit to another—as minutes to degrees, etc., while, as a matter of fact, rapidity is the essence of the present gun. We may say, therefore, that the mil is the very foundation of using the

present gun; therefore, officers cannot be too familiar with it. It may be defined as the angle under which a yard is seen at 1,000 yards; it might also be defined as the angle whose sides subtend one yard length of arc at 1,000 radius. The mil, therefore, enables us to pass quickly from angles to distances—thus a reading of 1 mil gives us 1 yard displacement at 1,000 yards, 2 yards at 2,000 yards, 3.5 yards at 3,500, etc. Two mils gives us 2 yards at 1,000 yards range, 4 yards at 2,000 yards, etc. Five mils gives us 10 yards at 2,000 yards, etc. We can also pass conversely from yards to mils; for example, a target 10 yards wide at a range of 1,000 yards would read 10 mils. Twenty-five yards wide at 2,000 yards would read $25 \div 2 = 12.5$ mils. Officers should practice this conversion of mils to yards, and *vice versa*, until thoroughly familiar with the mil and its use.

Firing Instruction—Officers.

When we come to the Firing Instruction of the officer, in order that he may handle the machine which will be created by thoroughness in the instruction of the enlisted personnel just noted, he must thoroughly master Part III, Field Artillery Drill Regulations, in its entirety, and especially Chapters IV and V (The Firing Battery and Preparation and Conduct of Fire). The last-mentioned chapter is for him the most important in the entire Drill Regulations. While it is realized that much of this instruction cannot be practically applied in an armory, yet the subject can be studied, and should be recited upon; an analysis of the examples given on pages 141 to 152 will help materially to understand and impress upon the memory this important chapter.

To illustrate, consider Example 1. The firing is by battery, in accordance with paragraph 353—troops exposed in the open. The deflection is 0—hence it is a case of direct laying. The corrector is 20, in accordance with paragraph 352—"for the quick adjustment upon troops in the open, fuzes may be set from the commencement of the fire, but with a corrector which will surely give low bursts and a large percentage of bursts on graze," etc. It is noted that the salvo is short and all shots burst on graze. In the second salvo, the deflection is 5 less than in the first, showing that the first salvo went to the left (see paragraph 390) of the target by an amount the battery commander estimates (see paragraph 370) as 5 mils or 20 yards. All the shots having burst on graze, he adds 5 to the corrector (see paragraph 395). All the shots having been short, he increases

the range 400 yards (see paragraph 401). He observes that he is still short, so for the next salvo he again adds 400 yards; but he makes no change in his corrector because two shots burst in the air and two on graze (see paragraph 398). His salvo at 4,800 is seen to be beyond the target, therefore he now knows the range to be between 4,400 and 4,800 and gives the next 4,600 (see paragraph 401). He is now satisfied with his adjustment and passes to fire for effect using zone fire, range 4,500, in accordance with paragraph 409, and raising his corrector two mils in accordance with paragraph 399. His fire is evidently effective, and confusion results in the target, whereupon the captain determines to do more accurate firing than is possible with zone fire, and hence begins to use volleys at successive ranges (see paragraph 358). He then continues using volley fire two rounds, locating the target definitely between 4,600 and 4,700 yards, and firing at the short, mid and extreme limits of the bracket according to paragraph 358.

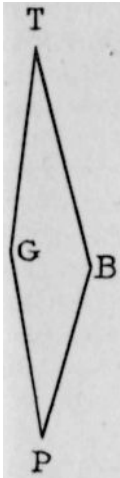
In a similar way, all the examples of the book may be analyzed and much instruction derived therefrom. The reason for every change made in the data appears somewhere in the Drill Regulations.

Computing Firing Data.

In indirect laying, the success or failure of the firing depends upon the officer commanding the battery. The men at the guns usually do not see the target and do not know what they are firing at—they merely set off the data given them and execute the kind of fire ordered. The captain must, therefore, be able to compute his firing data with facility, and to manipulate the sheaf skillfully. This is a matter entirely of practice. Paragraphs 272 to 275 and 426 to 440, Field Artillery Drill Regulations, should be studied carefully. Having learned how to make the computation, officers should practice them in the armory or at any desk, by assuming certain data, such as they would have to get in actual firing and then performing the calculations necessary to use these data. All that is necessary is a pad, pencil, and ruler. Draw a rough sketch showing the position of the right gun, the observation station, the target, and the aiming point, and assume values for the distances involved, and the deflection of the target from the aiming point as seen from the observation station; and then, using these values, make the necessary calculation.

For example:

1.



Let T represent the position of the target.

B represent the position of the battery commander's observation station.

P represent the position of the aiming point.

G represent the position of the right gun.

A represent the angular distance from T to P, measured at B.

Assume $BP=3000$ yards.

$BT=2000$ yards.

$GB=100$ yards.

$A=\text{Angle } PBT=3400$ mils.

Then $P = -\frac{20}{3} = -7$ (the negative sign is used because the aiming point is in rear).

$$T = \frac{20}{2} = +10.$$

$n = \frac{100}{20} = +5$ (the positive sign is used, because the station is on the right side of the battery).

Hence $D=A+n(P-T)$

$$D=3400+5(-7-10)$$

$$D=3400+5(-17)$$

$$D=3400-85=3315=\text{Deflection of right gun.}$$

If we want to use parallel fire, $DD = P = -7$, thus covering a front equal to that of the battery.

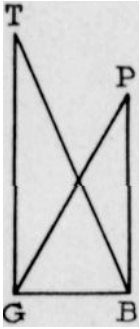
If we want to converge the fire, $DD = P - T = -7 - 10 = -17$, thus shooting at a point—as in breaching a wall.

If we want to cover a front of 200 yards at the target, $F = \frac{200}{20} = 100$ mils; then $\frac{F}{4} = 25$, and $DD = (P - T) + \frac{F}{4} = -17 + 25 = +8$.

2.

Assume

- BP=2500 yards.
- BT=3000 yards.
- GB= 40 yards.
- A = 400 mils.



Then

$$P = \frac{20}{2.5} = +8$$

$$T = \frac{20}{3} = +7$$

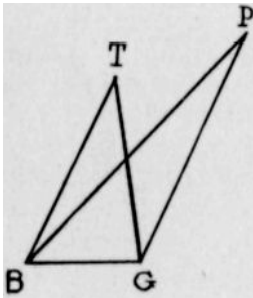
$$n = \frac{100}{20} = +2$$

$$D = A + n(P - T)$$

$$D = 400 + 2(8 - 7)$$

$$D = 400 + 2(1) = 400 + 2 = 402$$

3.



Assume

- BP=3500 yards.
- BT=2500 yards.
- GB= 100 yards.
- A = 250 mils.

Then

$$P = \frac{20}{3.5} = +6$$

$$T = \frac{20}{3.5} = +8$$

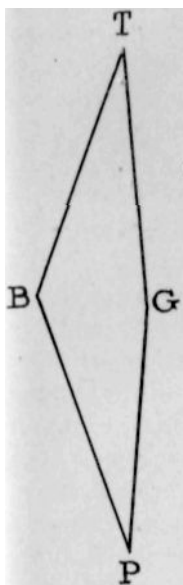
$$n = \frac{100}{20} = -5$$

$$D = A + n(P - T)$$

$$D = 250 - 5(6 - 8)$$

$$D = 250 - 5(-2) = 250 + 10 = 260.$$

4.



Assume

$$BP=4000 \text{ yards.}$$

$$BT=2200 \text{ yards.}$$

$$GB= 80 \text{ yards.}$$

$$A =3050 \text{ mils.}$$

Then

$$P= \frac{20}{4} = -5$$

$$T= \frac{20}{2.2} = +9$$

$$n= \frac{80}{20} = -4$$

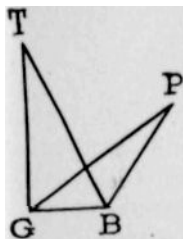
$$D=A+ n (P-T)$$

$$D=3050-4 (-5-9)$$

$$D=3050-4 (-14)=3050+56=3105 \text{ (3105 is used instead of 3106, as being close enough—see par. 438).}$$

It will be noted that in the preceding examples, the observation station (B) is taken in prolongation of the line of guns, and that the aiming point is not more than 400 mils from the normal to the battery front. In case either of these conditions is not fulfilled, the problem is a little more difficult—though not much.

5.



Assume

$$BP=2100 \text{ yards.}$$

$$BT=3900 \text{ yards.}$$

$$BG= 100 \text{ yards.}$$

$$A = 850 \text{ mils.}$$

As A is more than 400 mils from the normal, P must be corrected for obliquity. To do this take the battery commander's ruler and use the table on the reverse side, as explained on page 116 of the Handbook for 3-inch Field Artillery Material. Thus, for 800 mils and a range of 1000 yards, P=14, and hence for 2000 (or 2100 yards) P=7.

Therefore,

$$P = +7$$

$$T = \quad = +5$$

$$n = \quad = +5$$

Hence

$$D = A + n(P - T)$$

$$D = 850 + 5(7 - 5) = 850 + 5(2) = 860$$

It is noted throughout the above examples, that as the conditions become more complicated, the results become less accurate; but there is no loss in rapidity in making the calculations, and they are sufficiently accurate to enable the first shots to be placed in the general vicinity of the target. In actual practice, their exact distance from it laterally can be measured with the battery commander's telescope or ruler, and then applied to the second shots, thus bringing them exactly in line, and in much less time than would be necessary to make exact computations. Many and varied problems can be practiced on paper indoors as has been indicated, and when facility of calculation has thus been secured, work can be begun outdoors in checking up for accuracy. In the indoor work, not only calculate the deflection of the right gun, but calculate it for the left gun, and then transfer it to the right one; having gotten the deflection, make various assumptions as to the target—width to be covered, assume a new target at a certain distance from the old one, and determine the changes to be made quickly in the data; assume an angle of site and a corrector, and determine the commands that should be given to carry out the problem, were you actually firing.

The Battery Commander's Telescope.

This is an accurate angle-measuring instrument graduated in mils. Its method of use is stated in the Handbook of 3-inch Field Artillery Material. The instrument is essential for accurate computation of indirect laying firing data, and practice in its use is necessary to all officers. Not much, beyond learning to set it up, level it, and read the different scales quickly, can be learned in the armory; but everything necessary for skillful use can be learned by practice outdoors. If a tripod be made with a socket to hold a panorama sight, and this tripod and sight used to represent the right or directing gun of the battery, then all deflection computed using the telescope, can

be checked by the panorama sight just as well as if the gun of the battery were present. The battery commander's telescope, the sight, and their tripods can easily be taken out on a street-car line by officers for practice, and different aiming points, different targets, and different observation stations selected and practiced with. The socket and tripod for the sight would be quite inexpensive, and with the exception of inability to check angles of site, answer fully as well as a gun; if, in addition the socket is constructed to measure angles of site (but this would be expensive), the device answers absolutely as well as a gun; and two such sights at the proper distance apart to represent the right and left guns of a battery, with one man at each, would enable deflection differences to be checked up, and would very effectively replace all the matériel and personnel of the battery in the very important practice of computing firing data and manipulating the sheaf.

Skill in this work having been obtained, the signal detail can be used for maintaining communication, and thus practice in their work also obtained.

Practice in using the telescope and computing firing data—checking up by means of the panorama sight—must be continued until skill and accuracy are obtained if an officer expects ever to be an efficient battery commander. After he has acquired the necessary facility and accuracy in computing firing data, using the battery commander's telescope, he should pass to the more rapid method of measurements shown later in this paper; but he should not attempt these rougher and merely approximate methods, until proficient with the slower and more accurate telescope. With this instrument, his computations should check to within a very few mils.

The Battery Commander's Ruler.

Next to the battery commander's telescope, comes the ruler in accuracy in measuring deflections. But the ruler also has other functions, either alone or in connection with the telescope.

The ruler and its method of use are fully described in the Handbook of 3-inch Field Artillery Material. Do not forget that the string as issued on the ruler is too long, and that you must adjust it, by tying a knot in it at the point that you will always bring in contact with your person—either held in the teeth or at the point of the chin, or at the top button, etc. Most officers prefer the point of the chin. Set up the battery commander's telescope and check the deflection readings of the ruler against the correct ones as gotten by

means of the telescope, until a fair degree of accuracy results. The ruler is so small that it can be carried in the pocket, and constantly practiced with, until skill is obtained. In addition to using for measurements, learn to determine whether from a selected position you can fire over a mask—the method of determining this is explained in the Handbook. Of course, if the guns are in position, the simplest way of finding out whether you can shoot over the woods or other mask in front, is to look through the bore of the gun and see whether the shot will clear the obstacle; but very frequently in the field the selection of the position, while you are making a reconnaissance, previous to the arrival of the guns, depends upon knowing whether shots will clear the mask, and also the closest range at which you can shoot and still clear the mask; and for these purposes the battery commander's ruler is necessary.

And again, although we try to select an aiming point, in indirect laying, not over 400 mils from the normal to the front, yet this is not always possible, and in such cases, the "parallax" must be corrected for obliquity; the tables on the back of the ruler are used for this purpose, and their method of use is explained in the Handbook. Therefore, this little instrument is one of the most useful in the battery, and every officer should practice with it until proficiency is secured. In the Regular Army, it is sometimes used in place of the more accurate but slower battery commander's telescope at target practice—the telescope not being even taken out.

Measurement of Angles—Hasty Methods.

The battery commander's telescope is a very accurate instrument—but as it requires setting up on a tripod and leveling before use, it is necessarily more or less slow; moreover, there are occasions upon which the telescope is not available, or if available, the measurement is not of sufficient importance to justify setting up the instrument. For these and various other reasons, it is very desirable, in fact, absolutely necessary, that a field artilleryman be familiar with various expedients he may use. Some of the rapid methods are described in the Field Artillery Drill Regulations "Measurements of Angles," pages 166 and 167. Every officer should "calibrate" his hand, so as to determine the width in mils of his thumb, his hand, and at least the average of the first, second, and third fingers. This he can readily do by setting up the telescope, standing close to it, while he notes the width of country hidden by the hand, etc., and then measuring this width with the battery commander's telescope—if desirable he

may use an assistant to drive stakes or poles to mark the extent of space hidden by the hand, and then measure it with the telescope. As hand measurements are not susceptible of great accuracy, the width should be determined only to the nearest 5—that is, if the finger measures 33, call it 35. These widths having once been determined should be written down and preserved, in order that they may not be forgotten.

There are many expedients that may be used in measuring angles. Several of these are stated in the following extract from an article by General M. M. Macomb, in the Infantry Journal:

(a) There are two methods of holding the hand in measuring angles in mils; one with the hand open, palm outward, which many of our officers prefer, and the other with the hand closed, and measurements taken over the knuckles, which seems to be most popular in the French service.

(b) A string held by the ends at arm's length and previously graduated (with the aid of the battery commander's telescope), by knots every 100 mils can be used in making quick rough measurements up to 1,600 mils (a right angle).

(c) 1,600 mils may be laid off quickly to the right from any well defined point as an origin by having an observer hold his field glass steadily directed at the object while an assistant on his left places his eye in the plane formed by the faces of the outer ends of the binocular tubes and notes where it cuts the terrain. In a similar manner 1,600 mils may be laid off to the left and two points 3,200 mils (180°) apart established.

(d) The battery commander's ruler can be laid upon the megaphone used as a tripod or on a fence-post, stump, rock, or other convenient support and sighted toward an object, and a back sight taken without disturbing the ruler will then establish a point 3,200 mils from the first object.

It is surprising how much accuracy can be obtained by these methods of measurement. All that is required is practice. The Regular Army use them a great deal—in some cases even having target practice, indirect laying. At the recent French maneuvers, it is believed telescopes were not used—all measurements being made by some of the above quick methods.

Designation of Objectives.

Much delay sometimes occurs, and frequently errors also, in designating objectives. This is particularly so in indirect laying and especially in a well-featured terrain where possible aiming points are numerous. For instance "Aiming point, that red barn," upon one

occasion led to an error of about 400 mils, by some of the gunners laying on a red house that was in the vicinity of the barn. Such mistakes can be avoided by carefully studying the Field Artillery Drill Regulations "Designation of Objectives," pages 167, 168, and 169, and following the method there described. This can be practiced in the open country by the officer designating objectives in the prescribed manner to some other member of the battery, who upon the completion of the designation, points the battery commander's telescope upon the point the officer has, according to the listener, described; the officer then looks through the telescope to determine whether the objective seen is actually the one he had in mind. In this method, the angular distances used in moving from feature to feature should be determined by the battery commander's ruler or simply by the hand and fingers. This practice can be begun in the armory and continued in the open country.

Map Reading.

Ability to read a contoured map is very essential to a field artillery officer. Not infrequently battery positions are tentatively selected from the map. The practicability of country is also so determined—size of streams to be crossed, location of bridges, grade of roads, presence of woods, wire fences bordering roads, etc. But the most important considerations are the suitability of the position selected and ability to reach it under cover—clearly necessitating a knowledge of contours and form lines. A book now quite generally used on this subject is "Military Map Reading" by Captain Sherrill, which can be purchased through the Division of Militia Affairs. Not only must all officers be able to read a map, but also the scouts, agents, and signal detail, and especially the scouts. Having acquired this ability, the officers can practice on a map, in the armory, the use of their scouts and agents in marking the route, protecting the battery from surprise, etc., as will be shown later in this paper, and thus prepare themselves for outdoor work.

Occupation of Positions.

As an illustration of the use of the scouts, agents, and signal details in the field, the following procedure in occupying a position for firing is given.

By the term "occupying a position," as here used, is meant all movements and operations of the field artillery from the time its commander receives orders to take up a position (designated only in

general terms, usually in the order), to the complete installation of the component parts of the artillery ready for action. Up to a few years ago, the matter was a simple operation; now it is otherwise. For with the development of the munitions of war, exposing artillery to an invisible attack from an unknown quarter before it can reply, all operations preliminary to firing have assumed a capital importance. Batteries can no longer rush into an unreconnoitered position, for a battery is a big target; it is practically helpless while limbered; if struck by fire while going into position, it cannot move off a short distance, and, like infantry, lie concealed in a fold of the ground; nor can it, like cavalry, move rapidly to the attack leaving the dangerous ground behind; but, on the contrary, it can merely present a large helpless mass of men, horses, and carriages.

In the following example, it is assumed that a battalion is the unit under instruction, as this is the true tactical unit, the use of isolated batteries being exceptional in war. But the procedure shown is equally applicable and necessary to a single isolated battery.

The artillery commander is directed to occupy with the artillery a designated position for the purpose of accomplishing some tactical employment. His movements will then be the following—

1. He starts on a reconnaissance with his staff, noncommissioned staff, scouts, agents, mounted orderlies, and signalmen.

2. On the way, he examines the general lay of the country, determines the position of the reserves, and possibly of the limbers and the train if the latter is under his charge, and the adjutant or sergeant-major drops off agents to guide the batteries that are following; scouts may be sent to examine anything suspicious; mounted orderlies may be sent with messages.

3. Arriving at the general position, he reconnoiters it, the enemy's position, and the intervening ground to the extent of the time available, selects the general battery positions, his own station, determines upon the sector to be assigned each battery, or special mission to be given it. The adjutant has the ground thoroughly scouted in the immediate vicinity. The sergeant-major receives the battalion commander's directions as to the establishment of communications, which the signal details then establish under the sergeant-major's direction. The adjutant, in the meantime, has, by means of his scouts or agents or both, gained contact with the adjacent friendly troops, and so stations his scouts, or other available men, as to guard the position against surprise if necessary, pending the arrival of the batteries. The adjutant may possibly then make a panoramic sketch.

4. In the meanwhile, the battery commanders arrive, having either accompanied the major or been sent for by him, an agent conducting them in the latter case to the position. They then determine the exact location of their guns and observing stations, have their communications established, start their reconnaissance officers to compiling firing data, making panoramic sketches possibly, etc. In the absence of instructions from the major, the captains pick out positions for the limbers.

5. The batteries are subdivided and prepared for action, the battery trains are probably consolidated by the quartermaster sergeant and taken to the place designated; the reserves are probably consolidated and taken by a lieutenant to the place designated; the firing batteries are met by their captains and placed in position. All this involves more work for the agents.

6. The entire field will then be completely organized to the limit of time available. For instance, the artillery may seek by fire to develop the enemy to the extent of giving the commanding general an idea as to how the enemy is occupying the ground, a clear idea of which can be obtained only by an advance of part of the infantry; to protect this infantry as well as to keep the artillery informed of the developments, it will be necessary for an artillery officer to accompany the advance, sending back word by telephone of what he finds. This involves work for the signalmen of the battalion.

If the battalion commander controls the fire, the adjutant, sergeant-major, etc., will have to manipulate the telescope, plotting board, etc.

Subcaliber Practice.

Target practice with subcaliber ammunition can be had outdoors or in the armory. Outdoors any rifle range, and there is usually one in the vicinity of cities or towns where batteries are located, can be used for this practice. Indoors it is only necessary to have a hall seventy-five to one hundred yards long, and even a smaller one might be made to answer the purpose. Across the end of this hall, behind the targets, must be built a box, at least two feet in thickness and of such height and width as to make certain that any shot fired will hit it. Its size will depend, of course, on the distribution of the targets and it should be as large as possible so as to admit of considerable distribution. This box must be filled with sand, two feet of which is ample to stop the subcaliber bullets.

Subcaliber fire is useful in training the men in setting the sights and quadrant and in laying the piece. Considerable variety may be introduced into the work which may thus be made interesting as well as instructive to the men. If targets representing a battery in action or infantry and cavalry in column be made of plaster of paris, and dried for a month or so, the effect of a bullet striking them will be visible to the men at the guns and will make the work more interesting. These targets may be drawn on tracks across the front of the sand box, thus giving practice in firing at moving targets. In constructing the cars and tracks to carry these targets, care must be taken that no metal is used where it might be struck by the bullets. One National Guard battery has a painted canvas representing a varied terrain which is stretched across the front of the sand box and the targets are placed in front of this painting in appropriate places. By making the tracks for the moving targets a succession of up and down grades these targets are made to appear to follow roads pictured on the painted canvas. Small toy balloons fastened in front of the sand box make very realistic targets.

In order to give training in indirect laying a curtain of some light cloth may be hung in front of the gun. This will not interfere with the bullet, which passes through, but will make the target invisible to the men serving the gun. An ingenious battery commander may think of a number of ways of making this subcaliber practice both interesting and instructive to his men.

Map Solutions of Artillery Problems.

Due to the existence of the large biennial encampments, maps have become available; in addition, the service schools use a variety of maps, so that any battery can provide itself with a supply without difficulty. Much useful practice can be thus obtained in an armory, in solving strictly artillery problems.

In this work, it is advisable to proceed always in a systematic method, and thus acquire a habit of estimating a situation. This habit once acquired, will be of great value to an officer, not only in solving map problems, but also in actual maneuvers, and still more in campaign. The man who has never acquired this habit in time of peace of clearly resolving a situation into its elements will have much difficulty in thus thinking clearly amid the distractions of campaign. It is, therefore, suggested that any given problem be considered under the following heads, and always in the same order:

1. Considerations affecting the enemy.
2. Considerations affecting our own troops.
3. Considerations affecting the terrain.
4. Decision.

As an illustration of the character of the problems that can be solved, and not as a perfect model solution, the following is given:

Battery Problem.

(Map of Fort Riley Reservation.)

Situation. The enemy is intrenched along the ridge Randolph Hill—Saddle Back, prepared to withstand an attack. Our force, consisting of a brigade of infantry, Battery A, First Field Artillery, and one troop of cavalry, occupies the line Custer Hill—Morris Hill. The battery is in a concealed position at the former, when at 9 a. m. it receives the following orders:

Commanding Officer,	No. 1.
Battery A, First Field Artillery.	
A detachment of the enemy, consisting of one battery and two regiments of infantry, is in position on Randolph Hill—Saddle Back ridge. Our infantry, operating by way of Hay Camp Spring and Wolf Cañon, will move forward to the attack at 9.30 a. m.	
Prepare and assist the infantry attack.	

A

Major, 1st Field Artillery.

Solution.

Considerations Affecting the Enemy. As he is intrenched and preparing to withstand an attack, there is small probability of his assuming the offensive. His infantry force is less than ours; his artillery the same as ours. But he has the advantage of intrenchments. While the location of his battery is not definitely stated, it is probably not far behind the crest, as being on the defensive, he will ultimately probably come to direct fire to repel our infantry assault. His line of trenches is about 2,500 yards long—not too great to reach from any part of our position. The artillery has probably tabulated the firing data to all prominent points of the terrain, and can, therefore, open an effective fire at once.

Considerations Affecting Our Own Troops. While before 9 a. m. we did not know the enemy's strength and the presence or absence of artillery, yet we knew that he was intrenched in his present position, and therefore our artillery may be assumed to have taken up its present position unseen by the enemy. We are, therefore, enabled to utilize the element of surprise in making an attack.

As our infantry will attack by way of Hay Camp Spring and Wolf Cañon, it would be advantageous to us if the battery could be placed rather to the flank, so that we can keep up its fire to the last minute of the infantry assault. A position in the general vicinity of Custer Hill would therefore be suitable, assuming that the troop of cavalry will support the battery in its rather exposed position. As the attack will not begin for half an hour, and as the battery is now in the immediate vicinity of its permanent location, we have ample time for a careful study of the ground.

As the enemy will probably stay in his trenches for some time, we may expect to have fixed targets, and the principal duty of the artillery will be to hold down the fire of the enemy's battery and of his trenches, so that our infantry may advance. The effect of fire upon fixed targets is as great from a defiladed position as from one in the open, and in addition, from such a position, our artillery can obtain the advantages of surprise, and concealment from the enemy's artillery fire. We shall, therefore take up a defiladed position, if we can find one.

Considerations Affecting the Terrain. The next question is how much defilade we shall take. The map shows that we can get any amount desired up to flash defilade and even more, and that our fire would reach the trenches and be equally effective from any amount of defilade we may use. We, therefore, select flash defilade (13 feet below the crest), the map showing such a position about 250 yards west of the crest of Custer Hill. In order to hinder the enemy's artillery from reaching us with searching fire, it might be well to place our guns 200 or 300 yards still farther west, on the eastern slope of Four Way Divide, as searching fire is generally limited to going 400 yards behind the crest.

Having gotten a position for the guns, we now select one for the limbers. The map shows the entire country to be rolling and that by placing the limbers in the draw on the Governor Harvey Road, south of 9, they will be concealed, out of the line of fire, and within easy communication of the guns. From the conditions of the problem, no forward movement of the enemy is anticipated early in the attack, and no early movement of our battery; hence the limbers are sufficiently close to the guns. These same considerations lead us to select the same place for the reserve, the map showing that the artillery can move anywhere and that most of the terrain west of Custer Hill is invisible from the enemy's position; we thus secure ease of replenishing ammunition and security

of it from the enemy's fire. If we assume that we came up the Governor Harvey Road from Republican Flats, our train was probably left there with the brigade train.

Having now reached a decision as to the location of the firing battery, the limbers and train, we may take up the subject of firing.

From Orders, No. 1, at 9 a. m., we know that the enemy has a battery, and that our infantry will not be under hostile infantry fire until 9.30 a. m. As during this half hour the enemy's infantry can inflict no damage on us, there is consequently no gain in keeping him under our artillery fire. We will, therefore, devote such part of this time as remains to us, to the enemy's battery, while we fire only enough on the trenches to determine their exact range at different parts—which information we will tabulate. We must first find out where the enemy's battery is, and then the kind of projectile we will use will depend upon whether our target is visible. If it is, high explosive shell will be used with a view to getting direct hits on the matériel. If invisible, we will have to draw its fire, then determine its direction, and search. To determine direction, watch for flashes and dust of blasts, and other means failing, note the direction of furrows made by his projectiles. In this particular case, an auxiliary observer (officer or scout) at Morris Hill, communicating with the battery by telephone if practicable, would be of great assistance. We now come to *supporting the infantry attack*.

The enemy being intrenched, we can assist our infantry only by keeping the enemy under cover, so that he cannot fire. The present gun allows this to be done over a much wider front than that of the battery, by either sweeping or shifting the sheaf. During the progress of the infantry attack, the battery commander will watch carefully for the points at which our infantry meets the most stubborn resistance, and, if possible, turn his fire upon the cause of this resistance. When our infantry reaches the point where it is no longer safe for us to fire on the trenches, the battery commander will continue to fire, using an increased range, with the object of preventing reserves from strengthening the firing line, or from making a counter attack. Just as the infantry reaches a crisis, the limbers and reserves should be brought up to about 200 yards of the firing battery, and supply it with ammunition, so that if our attack succeeds the battery may move promptly to the captured position, increasing the rout of the enemy and helping to hold the position at this critical moment; or if the attack fails,

we will need plenty of ammunition to cover the retreat of the infantry.

Asume, now that the following message is received:

Commanding Officer,

No. 2.

Battery A, First Field Artillery.

Enemy's right flank dislodged from Randolph Hill. Move forward and enfilade him toward Saddle Back. Much disorder of enemy reported. Fire on routed parties.

A

Major, 1st Field Artillery.

It is not improbable that when this message was received, the battery commander, having carefully watched the progress of the attack, is, with his scouts, already moving rapidly to Randolph Hill. In any case, he would probably reach there in advance of his battery, so that when it arrives he could promptly indicate its position for going into action. This is a case of a hasty reconnaissance—but the reconnaissance would not be entirely omitted. When the enemy's right flank is dislodged from this hill, his battery is probably in flight, and as the enemy's infantry is fully occupied with our infantry, the question of protection for our battery is of minor consideration, and hence we take the position which can be most quickly and effectively used. Such a position would be on top of the hill. In carrying out its double mission (enfilading the trenches and increasing the disorder of routed parties) the battery commander might assign one platoon to each of these missions. He would probably use rafales.

By making further assumptions, the action can be further developed.

Conclusion.

The foregoing "hints," while brief and incomplete, are believed to be useful in calling attention to some necessary work that can be done with the present limited facilities of batteries.

It will be noted that these hints pertain to firing and not marching—in other words that no mention is made of horses. This is due to the fact that, while few militia batteries possess means for carrying on mounted instruction, all that are equipped with the 3-inch matériel can practice the ideas set forth in this paper; and that ability to deliver an effective fire is the ultimate end for which field artillery is maintained. Therefore, no means of obtaining fire efficiency should be neglected.

It will be noticed that all the preceding pages may be summed up in the following:

1. The enlisted personnel must be thoroughly drilled in using the sights, quadrant, fuze setter, etc.
2. The commissioned personnel must carefully study the Field Artillery Drill Regulations and be able skillfully to apply the principles therein enumerated.

Finally it must be borne in mind that the entire idea of a field artillery battery is that it is a firing machine, which must act with accuracy and rapidity in order to strike the fleeting targets of the modern battlefield; for conditions are now such that men no longer expose themselves in masses for a sufficiently long period to enable the unskilled firing organization slowly and laboriously to adjust its fire. Targets must be struck quickly or not at all.

CONCERNING MASKS.

BY CAPTAIN JENNINGS C. WISE, ADJUTANT FIRST BATTALION F. A. VA., VOLS.

A most interesting article entitled, "Concerning Masked Fire," recently appeared in the *Infantry Journal*. This article could be read with much profit in all branches of the service. Its tendency is reassuring. It exhibits that breadth of view which alone can amalgamate the integrals of an army into a harmonious unit. It warns the artilleryman and the foot soldier that the process of differentiation is fatal to effective military cooperation. Just as its doctrine of war is that which gives to an army its energy and direction of motion, so is the spirit inculcated in its various parts that which enables the whole to move with celerity and certainty, and to strike with the maximum of effect. Any counsel then, which tends to engender a spirit of harmony, of inter-respect, of inter-dependence, among the parts of an army, is desirable and is to be commended. It is not the object, nor the actual effect, of Colonel McMahon's article, which the writer desires to criticise. It is to the latent ambiguity in the expression "masked fire" which makes itself so apparent in his paper, and which is so frequently noticed elsewhere, that attention is called.

In paragraph 313, Field Artillery Drill Regulations (1908), positions are defined as *masked* or *unmasked*, according as they afford concealment or not; and fire is defined as *masked* or *unmasked*, according as the guns are concealed or not.

From these definitions it would seem that anything which screens the guns from hostile view falls within the meaning of the word "mask" as here contemplated.

In paragraph 447 it is said: "When a position for masked fire is to be occupied, it is necessary to make sure that the projectiles from each gun will clear the mask ***."

This language plainly indicates that the mask is to be cleared by the trajectory, and that more than mere concealment by a screen is contemplated. Many other instances of the ambiguous meaning of the term "mask" might be cited. As used in our regulations and in military works, both American and foreign, the term is pregnant with an inexactness, or perhaps, better, an indefiniteness. This will plainly appear if we consider the following sentence: "The Russian batteries were silenced by the masked fire of the Japanese artillery at the Yalu."

As a matter of fact the Japanese employed direct laying on the occasion referred to, the guns being well screened by transplanted trees, and other natural objects, but there is nothing in the foregoing expression by which we are informed whether direct or indirect fire was employed. The word "masked" describes the fire as viewed from the hostile position. It does not definitely describe it at the point of fire.

A mask is essentially something which covers. Yet the word suggests to us something which may be seen through—it has eyes, so to speak. And so, when we refer to a fringe of trees, or a hedge, which covers or hides the guns, yet through which may be seen, and through which fire may be delivered, as a mask, the term as applied is consistent with our sense of the word. There is nothing, then, about the word "mask" any more than there is about the word "screen" which indicates an impenetrable covering such as a hillside, or a dense thicket, over which the projectiles must pass. It would be an empiricism to assign to the term "mask" one meaning and arbitrarily employ the word "screen" to indicate another. Masked fire, or screened fire, whatever we may choose to style it, contemplates an obstacle to the view of the enemy, but not necessarily an interposed obstacle to the direct fire of the guns.

When the fire is referred to as indirect, a covering screen is necessarily contemplated, hence there is no occasion to use the expression "indirect fire masked," or "masked fire." If it is indirect it is bound to be masked.

This fact suggests a means by which the present ambiguity of the expression "masked fire" may be circumvented. If "masked fire" be taken to mean direct fire only, screened, our intended meaning is fully conveyed in accurate technical phraseology. The word was used in this sense long before Langlois evolved his system of indirect fire.

There still remains the difficulty as to the application of the term to the obstacle screening the guns, for if we refer to an object as a mask, without further description, we are unable to tell whether direct or indirect laying is contemplated in connection therewith. Suppose, for instance, a battery commander received the following order:

"Open fire as soon as you can gain position, using the trees in your immediate front as a mask."

If positions for both direct and indirect fire were equally available, in the advance edge of the trees for the former, in rear of the trees

for the latter, the ambiguity under given circumstances might lead to uncertainty and confusion. It may be argued that a bald order of such character, without any previous mutual understanding between the sender and receiver thereof, or without some determining circumstance, would not occur. Be that as it may, the fact remains that the word "mask" alone is not determinative. It needs something to explain its meaning; it is ambiguous, and the use of such a term is not technically desirable. The alternative remains of either discarding the term altogether, or of using it in such connection as to give it a definite meaning. The latter course is the preferable one.

If the order had read: "Open indirect fire, etc.," no misunderstanding could possibly arise. And if the term "masked fire" is taken to mean direct fire screened, and the order had read: "Open fire, etc., using the trees in your immediate front as a mask," no ambiguity would exist. The distinction may appear too subtle to be of practical importance. Yet there is a distinction fruitful of misunderstandings, the chances of which should be eliminated from what has become a most exact *scientia*.

In proof of the possible misunderstandings arising from the use of the terms "mask" and "masked fire," attention is now directed to the title of Colonel McMahon's article. One would naturally suppose that the article referred to "masked fire" in general. It refers, however, to one particular kind of masked fire, that is, indirect fire, which it endeavors to defend as highly practical when employed with judgment. Surely it was not intended to reassure the infantry and cavalry as to "masked direct fire." No soldier, with drill ground experience only, would require the merits of a system under which his opponent is concealed, to be pointed out. Such an undertaking were below the dignity of a General Staff officer. Colonel McMahon's article would have been more properly styled "Concerning Indirect Fire."

While we are on the subject of masks and indirect fire, it may be well to refer to another ambiguity existing in the Drill Regulations, more of a practical nature than otherwise. We are told, with much *abandon*, that when a suitable observing station is not to be had, an observing tower, or a tree, will be pressed into service. This is equivalent to saying that when a suitable observing station is unavailable, a tree *must* be used, for, if a description of our observing tower were included in the Handbook of 3-inch Material, it would read like the chapter in the Natural History of Ireland on Snakes—"There

are no snakes in Ireland." And so, may I ask, who, except perhaps some highly impracticable though zealous artillery officer, more mechanic than gunner, has seen an observing tower in the United States?

On occasions, observing stations have a way of making themselves as scarce as hen's teeth. Odd to say, it is just when these useful perches are not to be found, that desirable trees are also lacking. An instance is here recalled when it was utterly impossible to secure sufficient elevation above the guns to observe the target by natural means. Nor could a single piece be directed upon the target by lining several men, due to the fact that a heavily wooded swamp lay between the guns and the crest, a dense thicket covering the latter.

Some one jokingly suggested the erection of a temporary tower. It would have been a simple matter to cut the necessary poles, but unfortunately there were no nails handy, nor suitable ropes to lash with. While an inventory of the essentials of a "hasty tower" was being taken, strange to say, the simulated enemy rudely changed position before he could be shot up. It was quite inconsiderate to say the least, even if rather military, for had he kept still some means might have been devised to locate him with precision. When the battalion commander petulantly enquired why the battery had not opened fire, the default was explained by the general desire to see that Irish snake, the observing tower!

Nothing could be more ludicrous and undignified than some of the attempts which portly battalion and battery commanders have made to ascend to the lower branches of that natural tower, the tree. If trees, with all the practical difficulties they present, are to be relied upon, when one so kindly lends itself to the success of the occasion, artillery spurs should not conform to the new type of a shorter shank, but should incline to the tree clamp pattern. Indeed, such a spur would prove far more useful to our fire directors than the present type to the ordinary horseman. But seriously, would it not prove highly advantageous to train in each battery a number of linemen, expert in tree climbing as well as in wire stringing? What with our lines of communication, and the sylvan acrobatics so necessary, a force of such men in a battalion would be invaluable. When once he had reached the desired elevation, a rope could be made fast by the climber, whereupon the fire director could be assisted to a post of vantage by means of a block and tackle rigging provided with a bamboo painter's chair. This is really not an impractical suggestion, though savoring of the humorous. The

weight of the tree clamps, tackle and chair, should be reduced to a minimum, and would not add materially to the entire weight of the equipment.

Our friends in the infantry and cavalry are pardonable if a serious consideration of such things provokes their smiles. Yet something of the sort must be adopted very soon, for observing stations, like aiming points, are not ever present in the landscape. Our friends are reminded that little more than half a century back a board of our most experienced officers reported the percussion cap utterly impractical for military purposes.

There is one objection to a too facile employment of the tree, which presents itself to fire directors and reconnaissance officers. When the tree comes into more general use, the height of burst is sure to be increased by guns firing for effect to the mean height of the prominent trees in the section being searched, and Lincoln green doublets will not afford much protection to those in observation.

There is no reason why some device, even more handy than a tree, cannot be furnished the Field Artillery. It is here suggested that a sectional extension-ladder of light construction be issued along with the battalion and regimental reel carts. This ladder should consist of possibly four six-foot sections so constructed that in extension an ascent of twenty-four feet could be made. By jointing the sections into two ladders, and bracing them one against the other in a vertical position, the ladder-tower could be held firmly in position by corner guys staked to the ground. By fitting the side pieces of the base sections with spiked ends, the staunchness of the tower could be increased, thus affording a secure position with twelve feet of elevation to an observing officer.

The sections, disjointed, could be stacked upon the top of the rear carriage of the reel cart, swung beneath it, or perhaps clamped to the body between the wheels and the end of the chest. Including the sections, the guys, and the stakes, the total weight need not exceed 100 lbs. If necessary, in rough country, six horses could be placed in draft instead of the four now authorized for reel carts. An increase of two horses to a battalion, and eight horses to a regiment, for the sake of effective fire, is a mere picayune compared to the benefit to be derived. If necessary, the bass drums and piccolos could be dismounted, or the band itself turned into a "hook and ladder" corps. As General D. H. Hill said in disapproving an application for transfer from a company to the band: "shooters are more necessary than tooters."

COMMAND AND COMMUNICATION.

Lieutenant Colonel E. Thionville, in the *Journal des Sciences Militaires*, October 1st 1911. Translated for the *Field Artillery Journal*.

The artillery has two objectives on the battlefield—the enemy's infantry and artillery.

Before the days of the rapid fire gun, the accepted doctrine was that these two objectives should be dealt with separately. It was taught that the artillery should first engage the enemy's guns, using all available batteries, and seek to gain superiority of fire; then, after silencing the hostile artillery, turn to the infantry. There were thus two separate and distinct phases of the battle: first an artillery duel, then preparation for attack by the infantry and artillery together.

With the old matériel the artillery duel might lead to decisive results. Indirect fire being very difficult, direct fire was the rule. The guns were always more or less visible, and might be destroyed by artillery fire; the greater the number of batteries firing, the quicker and more certain the result.

But with rapid fire guns it is not at all the same; indirect fire has become the rule, and hence the guns are usually to be discovered only by the flashes. It is impossible to get the same destructive effect as upon batteries in the open. High explosive shell will, it is true, reach the personnel in spite of the protection of the shields; but hits can be gotten only by accident, not by systematic fire. Even if the destructive effect is obtained, one can never be sure of it; if the hostile artillery ceases its fire, it may be because it is dismantled, or it may be that it is simply waiting for a favorable opportunity to open again. It is still necessary to observe it constantly, and it will not do to disregard it and turn to another objective.

The artillery, then, can not delay its support to the infantry until the enemy's artillery is silenced. It must render this support from the very beginning of the action, assigning certain batteries to fire upon infantry. But these batteries will themselves be fired upon by the enemy's artillery, and will have to be disengaged; and the enemy's batteries will try to fire upon our infantry, and this must be prevented. There will, then, always be an artillery duel, but

it will no longer be a separate phase of the battle, monopolized by the artillery; it will be an episode in the infantry action taking place around the position to be carried. It will end only with the battle itself.

"Every attack," says paragraph 28, Title V, Regulations of September 8th, 1910, "will have its artillery duel, and each of the two parties will try to preserve the liberty of action of its own batteries. The batteries on both sides being masked, the duel will be more stubbornly fought than formerly, rarely decisive, and continually breaking out afresh."

The artillery duel, then, is not an end in itself; it is merely a means of supporting the attack upon a particular point, or of cooperating in its defense. The attack or the defense itself is the final object of every artillery engagement.

The engagements centering about the different supporting points which mark the fighting front, taken together, constitute the battle, or at least that part of the battle which takes the longest time, the preparatory stage. These partial engagements will sometimes be of an offensive, sometimes of a defensive nature, and in each of them the artillery will take that part defined in the introduction to Chapter V of the Regulations—"close touch with the infantry in attack, co-operation with it in defense."

What, precisely, is meant by this definition of duties, and why the difference?

In the offensive, the objective is clearly defined—the supporting point that is to be attacked. The duty of the artillery is to aid the infantry in this attack, by firing upon that part of the objective which, for the time being, is most effectively checking the advance of the infantry. The attacking troops do not all advance at once, along the whole front; some are firing while others are moving. When any part of the infantry tries to advance along a particular line, the fire of the artillery should be directed upon that part of the enemy's position which commands that line. The commander of the advancing infantry, then, should determine the time and place for the intervention of the artillery, and should have means for communicating his decision to it.

On the defensive, it is impossible to designate an objective beforehand, for it is not known where and how the enemy will attack. All that can be done is to give to both artillery and infantry particular sectors of observation, leaving them to engage any hostile

force that may appear there. The time and place for the action of the artillery are thus dependent upon the movements of the enemy, and the infantry can not indicate targets to it, as it can do on the offensive. This makes it unnecessary to establish actual communication between the two arms; they act in co-operation, however, for each of them fires upon any target appearing within its sector of observation, so as to check any advance.

This, then, is the explanation of the difference noted in the Regulations; on the offensive, the artillery fires upon targets designated by the infantry, at the moment when its fire will have its maximum effect; on the defensive, it observes a definite sector, and within that sector selects its own targets.

This distinction, so clearly indicated in the Regulations, has not been universally accepted. Many have insisted that, both on the offensive and defensive, the artillery should restrict its action to firing upon a registered zone, bringing an effective fire to bear instantly upon any infantry target appearing there, but selecting its targets at its own discretion, without regard to their relative importance at the given moment, or to the losses suffered by the infantry.

But this is not logical. It is essential that, on the offensive, both infantry and artillery concentrate their efforts upon that particular objective which is at the moment most seriously impeding the advance of the infantry. It is only the infantry, which is suffering from the fire, that is in a position to select this objective; hence the necessity for a system of communication between the infantry and artillery.

What is here meant, of course, is communication between the actual commanders on the spot, or what is called communication "by subordinates"; special provision has to be made for this, since it does not come within the sphere of ordinary military command. The Regulations say nothing of communication "by superiors," which is controlled by the commander of the whole force, for this is always in existence, operating through the usual military channels. Both artillery and infantry are under the orders of the commander of the whole force, who makes the plans and gives the orders. These orders are sent to the artillery commander, who divides the work among the batteries, assigns them their positions and duties, and indicates to them the part they are to play. All these points have to be settled by the superiors, before the subordinate commanders, infantry and artillery, can get in touch with each

other—before the communication "by subordinates" can even begin.

Let us now inquire how this communication is to be established.

The War Department circular of March 10, 1910, laid down the principle that the troops assigned to the same duty should all be under the same commander; and hence that batteries designated to support the attack upon a given point should be placed under the orders of the commander of the attacking infantry. The application of this principle brought about a temporary grouping of the troops assigned to attack each point, consisting of both infantry and artillery units, under the senior infantry officer. The duties of the commander of the whole force were thus limited to determining the composition of these separate groups—which, by the way, varies during the action, on account of progressive reinforcement of both infantry and artillery—assigning commanders to them, and giving general instructions; each temporary commander had then independently to decide upon the means to be employed in carrying out his orders. The divisional and corps artillery battalions were thus drawn one by one into these separate groups, as the action developed, and passed from the control of the senior artillery officers into that of the local infantry commanders—except, of course, in cases where the entire divisional or corps artillery was assigned to support the same attack, when the divisional or corps chief of artillery himself became a part of the local command.

This principle was not accepted by the Regulations of September 8th, 1910. Paragraph 38 says:

"The commander of an artillery battalion assigned to support a particular attack establishes communication with the commander of the attacking infantry. This communication between the two arms implies subordination of the artillery only in respect to the execution of its mission; the command remains in the senior artillery officer of the force, through whom the commander-in-chief works in co-ordinating all his energies toward the same end."

The language of the Regulations does not suggest any less close touch between the two arms, nor an abandonment of the principle that the artillery acts only as an auxiliary to the infantry. It seeks to secure unity of command, in order to co-ordinate the various partial attacks. Unquestionably, the troops assigned to a single duty should have a single commander; but this they already have in the person of the chief who assigned them. There is no reason why he should delegate his authority to subordinates; he is present in person, following the course of the action, and may at any moment

decide to alter his dispositions, or modify the composition of his subordinate groups. When the infantry and artillery units have been assigned the parts they are to play, he can not, of course, concern himself with details of execution; but he, or his chief of artillery for him, should give the artillery its orders as to position and targets. Why, then, should the artillery be placed under the orders of the infantry commander, who has nothing to say about how and when it is to come into action? And what orders could the infantry commander give it? He has nothing to do with the batteries that keep down the fire of the enemy's artillery, but only with those that are to fire upon the point of attack. These batteries make their preparations to do this as well as possible, but they can not cover the whole front with a continuous hail of projectiles. The infantry commander, then, should designate the particular points to be fired upon from time to time, according to the situation of his troops. This is all that is required of the communication by subordinates; and for it to work successfully it is not necessary to put the artillery under the orders of the infantry commander. A preliminary conference between the infantry and artillery commanders is all that is necessary.

"To assist the infantry," says paragraph 27 of the Regulations, "the artillery should keep down the fire of the defenders at the point of attack, and of all troops, in front or flank, which take the infantry for a target. To be effective, this intervention should take place at moments which can be determined only by the attacking troops, and at points determined either by them or by the enemy; and this makes it necessary that there be constant communication between the infantry and artillery. The artillery must also be prepared to oppose counter attacks, and occasionally to destroy material obstacles encountered by the infantry."

There are, then, two distinct duties required of the batteries supporting the infantry attack:

1. To fire upon the front to be attacked, at such times and in such places as the attacker may designate.
2. To observe the terrain outside of the front to be attacked, so as to keep down flank fire or repel counter attacks; here the time and place of intervention is determined by the action of the enemy.

The first-named duty is the more urgent; the first essential is to fire upon that which the infantry is to attack. The commander of the battalion which has one battery assigned to support a given

attack places this battery so that it can, without shifting trails, cover the entire front of attack. Each piece is given its own part of the front, and can, according to circumstances, use a slow continuous, or rapid intermittent fire. It is prudent to limit the front thus assigned to a single battery to 500 meters, both to insure a sufficient density of fire, and also to enable it to cover completely, without shifting the trail, not only the enemy's position itself, but also the ground in front of it down to the minimum range prescribed.

This plan is to be preferred to leaving the battery in observation on the whole sector, and letting it shift the entire sheaf from target to target, as called upon by the infantry commander. Not only would this make it necessary to shift the trails after each firing; but, since considerable time is taken in communication, each firing would probably be followed by a prolonged silence, which might have a bad effect upon the attacking infantry. As paragraph 21 of the Regulations says, the sight of the shrapnel bursting over the enemy's position is a powerful moral support for the infantry. The shrapnel must then be bursting all the time, over the whole front, so that the support of the guns will be felt everywhere; and this is impossible unless the battery can cover the whole front without shifting the trails.

The battery once in position, the battalion commander has a perspective sketch made, showing roughly the enemy's position as it appears from the battery, with the limits, in breadth and depth, which the battery can cover without shifting trails. He sends this sketch to the infantry commander by an agent of communication—officer or non-commissioned officer—whose duty is to assist the infantry commander in locating, from his own point of view, the points shown on the sketch. The infantry commander has then only to mark with a pencil on the sketch the point he wishes the artillery to fire upon, and return it to the artillery battalion commander. After fire is opened, the points of fall of the projectiles are the most convenient points of reference; it is easier to say,—“fire a little more to the right, increase your range,” than to mark points on even the best of perspective sketches. Hence the battalion commander should open fire as soon as he is ready, without waiting for the infantry to designate a target; the battery can keep up a slow continuous fire upon the whole front, until a message from the infantry, or the observation of the captain himself, indicates the proper target. The gun or guns that can reach that target without shifting trails will do so; the others will keep up a slow continuous fire upon the rest of the front.

One more thing is necessary; this fire must cease promptly if it becomes unnecessary or dangerous to the infantry. This is the affair of infantry signal men, communicating with the battery by means of a few simple signals.

A battery thus disposed can direct its fire instantly upon any point within the front assigned, down to the minimum range determined when it took position. But the intervention of artillery may become necessary at points outside of this sector, to meet flank fire or counter attacks. The battery will have to change target and meet the emergency, if no other guns are available; but if it is at all possible, the battalion commander should assign another battery or part of a battery to this duty, and not divert the first battery from its principal objective; it might be very dangerous to cease, even for a short time, the fire upon the point of attack. But such an emergency is not likely to arise early in the action, and the battalion commander will have time to prepare for it. Besides, a single battalion will not be left to support the attack throughout; other battalions will reinforce it. And this brings up the question, how the system of communication will work as the new units arrive.

Let us suppose that a battalion, in the advance guard, is supporting an attack by an infantry regiment. A second battalion is sent up from the main body. This new battalion might be used to assist the first, or to support a new attack at another point; this will be determined by the commander of the force, and the decision communicated through the commander of the artillery. But we will assume that it is ordered to reinforce the first in supporting the original attack, and that both battalions are placed under the command of the lieutenant colonel of the regiment to which they belong.

According to the War Department circular of March 10th, 1910, the temporary command, consisting of an infantry regiment and an artillery battalion, is reorganized so as to include both battalions; and the artillery lieutenant colonel reports to the infantry colonel as artillery commander, in place of the major of the advance guard battalion. The system of communication, which has just been established with more or less difficulty between the infantry colonel and the artillery major, is interrupted; the newly arrived lieutenant colonel of artillery says to the infantry colonel, "I am now in command of the artillery; you must communicate with me, not with Major X." It is easy to imagine what the infantry colonel would

say, and what would become of the system of communication.

It is unquestionably important for the infantry colonel to know that he now has two battalions of artillery to support him, instead of one, and that one or two additional batteries will assist the one already firing upon the position which he is to attack. But it is not at all necessary to derange the system of communication, if, as we have assumed, the first battalion has made its preparations to cover the whole front of attack, and is able to respond promptly to any demand of the infantry. The officer commanding the two battalions does not need to establish direct communication with the infantry; the major of the first battalion, who established the communication, maintains it, and connects by means of his agents with the lieutenant colonel, who can then direct the fire of the new batteries so as to get concentration on any desired point, or, if the battery positions permit, combination of front and flank fire. The indication of objective, more often than not, can be simply by fire; the shrapnel of the battery first firing will designate the target. As the combat progresses, the number of batteries supporting the infantry attack will of course increase; but it will not be possible to make a new subdivision of the target every time a fresh battery comes up. The batteries that open fire first can divide the target among themselves; others coming in later can only superpose their fire. This is the instinctive concentration of which the Regulations speak, and which becomes more and more necessary as the action approaches its crisis.

Thus we see how command and communication work in the case of our hypothetical two battalions, and what is the position of the lieutenant colonel who commands them. As soon as he receives orders to reinforce the first battalion with the second, he gets in touch, not with the infantry commander, but with the major of the first battalion, and finds out what assistance he needs. If necessary, he relieves those batteries of the first battalion that are firing upon artillery, so as to enable them to observe the flanks of the enemy's position and guard against flank fire and counter attacks; he designates batteries in the second battalion to join in the support of the infantry, and assigns artillery targets to the others; in short, as the Regulations say, he co-ordinates the efforts of both battalions to a single end.

Let us now suppose that the second battalion is to be used, not to assist the first, but to support another attack at another point. What will be the part played by the lieutenant colonel who commands the

two? Nothing at all, according to the War Department circular of March 10th, 1910, for each battalion would be under the orders of the senior infantry officer in its own sector. But under the Regulations of September 8th, 1910, the two battalions are not withdrawn from their own organization; and we shall see that the lieutenant colonel has a very important command.

In each attack, the infantry targets are definitely determined—those appearing in that part of the hostile position to be attacked. The defenders here will fire upon the troops advancing to attack them, rather than upon those attacking elsewhere, and the batteries told off to support the attacking infantry will fire only upon the infantry directly opposing them. But it is not the same with the artillery targets. The commander of the force, or his chief of artillery, has fixed the sectors within which the batteries assigned to the two attacking parties are to fire upon the enemy's artillery; but it may well happen that the batteries which they take as targets may be firing, not upon their own attacking party, but upon the other, for, other things being equal, flank fire is more effective than frontal. If, then, the two attacks are independent, and without mutual communication, how can the batteries know what effect their fire is having upon the hostile artillery?

Suppose, for instance, that a battery is ordered to fire upon a hostile battery whose position is indicated only by flashes. It opens fire, of course, without stopping to inquire whether these flashes are from shots intended for it or for its neighbor. But after a time, if the battery commander sees no shrapnel bursting near his own battery or the infantry in front of it, he may conclude that the hostile battery's fire is badly adjusted, and is doing no harm; he may then disregard it, or merely keep it under observation, firing with part of his guns only. There should be someone to say to him, "That battery is not firing at you, but at the troops of the other attack; it is damaging them, and you must act vigorously against it." Who is there to do this, unless it is the lieutenant colonel commanding the two battalions, who follows the progress of both attacks and observes the effect of the enemy's artillery fire upon both? Even in the case where each attack is separately supported by a battalion, the commander of the two battalions has an important part to play, for he is the only person who can keep each body of troops informed of the situation of the other, and so, as the Regulations say, co-ordinate the efforts of both battalions to a single end.

Finally, let us assume that, the two attacks being supported each by a battalion, the third battalion of the divisional artillery comes up.

According to the will of the commander of the force, this battalion may be assigned to reinforce one of the two attacks, or, in the language of the Regulations, it may have the duty of general observation of the field. What is meant by this?

This third battalion is directly under the orders of the commander of the force, or rather of his chief of artillery. It is a sort of artillery reserve, to be used as required; for instance, to fire upon hostile artillery which is particularly dangerous, or to create a diversion at some selected point. It does not establish communication with the other two, and acts only intermittently until such time as the chief of artillery assigns it definitely to one or the other of the attacking forces. When this is done, the two battalions supporting the main attack act as already described, under the lieutenant colonel, and the colonel commanding the divisional artillery handles all three battalions, co-ordinating them as before.

The principles explained for the three battalions of a division evidently apply equally well for larger units, as, for instance, the corps and divisional artillery in the action of an army corps. If the two divisions are making two separate attacks, the corps artillery may be divided between them at the outset, and the whole force of artillery assigned to each, under the commander of the divisional or corps artillery, communicate through the first divisional battalion engaged. Or, the corps artillery may be assigned to general observation of the field, and act independently under the corps commander or the general commanding his artillery; then, when the point for the main attack has been selected, the corps artillery may be assigned to support it, and the general commanding the artillery take direct command of the whole.

In the first case, where the corps artillery is divided, its parts reinforce the divisional artillery and come under the orders of the division commanders. In the second case, either of two conditions may arise; either the attack is delivered by one of the divisions, in which case the corps artillery reinforces the division, and the chief of artillery of the corps reports to the division commander; or it is delivered by reserves, under the orders of the corps commander, and the divisional artillery is withdrawn from the control of the division commander, joins the corps artillery, and comes under the command of the chief of artillery.

To sum up the principles of the Regulations of September 8th, 1910, we may say that the artillery, like the infantry, is under the complete control of the commander of the unit to which it is assigned, whether that be an organic unit, as a division or corps, or a

temporary tactical unit, as an advance, flank or rear guard, or special detachment. When it goes into action, this commander fixes its position and duty. If this duty is to support a particular attack, the artillery is not placed under the officer commanding the attacking infantry, but acts in harmony with him, firing upon the points which he designates, and using every effort to keep in communication with him.

The battalion which first establishes this communication maintains it throughout the action, although other artillery units may come up later; its commander communicates with his own direct superior, the officer commanding these battalions, and keeps him informed of the needs of the infantry so as to enable him to act intelligently.

The chief of artillery of the unit retains command of all the batteries engaged, whether they are supporting the same or different attacks, thus insuring that the will of the commander of the whole force is everywhere understood, and that all units act in harmony to the same end.

CAMP OF INSTRUCTION FOR MILITIA OFFICERS; FORT RILEY, KANSAS, JUNE 1ST TO 15TH, 1911.

BY MAJOR WM. S. MCNAIR, 6TH FIELD ARTILLERY
AND
CAPTAIN WM. I. WESTERVELT, 5TH FIELD ARTILLERY.

On June 1st, 1911, 73 field artillery officers of the Organized Militia assembled at Fort Riley, Kansas, for the purpose of pursuing a short professional course. The first day was given over to the incidents of camp making, official calls, selection of mounts, etc.; on June 2nd instruction began.

In view of the limited time, complete and definite plans for instruction were devised prior to the organization of the camp; with unimportant exceptions these plans were adhered to throughout the period of instruction.

In preparing a scheme of instruction it was decided that such features of the Field Artilleryman's professional knowledge as were common to other arms of the service or as pertained to a general education should be eliminated; the course was to be specialistic and technical as far as possible.

There was neither time nor ammunition for the acquirement of full practical efficiency in the service of the arm; administration, maneuver, tactical handling and the technical conduct of the fire of field artillery occupy too broad a field to be covered in a short time.

Administrative duties are common to all branches of the service; all militia officers of whatever arm, have had more or less experience in matters pertaining to keeping records, making reports, looking after the feeding of their men, camp sanitation, discipline, etc. This is the general knowledge of the military service.

With respect to the maneuvering of a battery or batteries: some of the men who will constitute volunteer light artillery troops in time of active operations will be more or less accustomed to the handling of horses; horses pressed into the service from farmers, contractors, drayage companies, etc., will ultimately settle themselves in the harness of the field battery and pull the guns along the roads or across the fields; and while they will not maneuver into positions as readily as the horses of the regular batteries which have been trained in time of peace, they will at least take the guns from place

to place and deliver them where they are wanted; and anyhow the training of drivers and horses is a long process which has no place in a fifteen day camp of instruction.

Tactics for the field artillery are functions of higher commanders, usually higher than a battery commander. Few of our states have any higher organization than a battery in their field artillery; therefore it was considered that at the present time the study of tactics for field artillery was too advanced for the camp of instruction under consideration.

With respect to the technical conduct of fire: let it be supposed that batteries are equipped with fine horses and well trained drivers; upon being sent into action they must deliver an effective fire; if they cannot, they are worse than useless since they encumber the field with their presence, furnish costly targets for the enemy's guns and mislead their general by encouraging him to believe, until the critical moment arrives, that he has a worthy force at his disposal. The delivery of an effective fire is the first consideration for field artillery. After a little field service in actual campaign, regular batteries would not be much better off than the militia batteries as far as their horses were concerned, since the large number of recruits and remounts received could not be trained to that degree of efficiency possible in time of peace.

As stated before, it was considered that technical instruction in the arm should be the dominant idea during the camp of instruction; plans were made accordingly. It was decided that the whole attention should be devoted to the technical conduct of fire, a part of the professional knowledge requiring special instruction, since it calls for a kind of information or practice that cannot be found already at hand, as we expect to find knowledge of horses.

The following program was published for the information of the instructors and of the officers attending the camp:

Program of Instruction.

GENERAL OUTLINE OF THE COURSE JUNE 1 TO 15, 1911.

Thursday, June 1.

Arrival of officers in camp.

Official calls.

Assignment of mounts.

Friday, June 2.

8:00 a. m. Selection of positions and determination of firing data therefor.

- 1:00 p. m. Inspection and adjustment of B. C. telescopes and practice in their use.
 4:00 p. m. 1st lecture—Gunnery.
- Saturday, June 3.
 8:00 a. m. Selection and reconnaissance of positions.
 1:00 p. m. Special instruction.
 4:00 p. m. 2nd lecture—Gunnery.
- Sunday, June 4.
 Officers' horses will be available for riding and instructors will accompany them if they so desire.
- Monday, June 5.
 8:00 a. m. Selection, reconnaissance and occupation of positions.
 1:00 p. m. Special instruction.
 4:00 p. m. 3rd lecture—Gunnery.
- Tuesday, June 6.
 8:00 a. m. Selection, reconnaissance and occupation of positions.
 1:00 p. m. Special instruction.
 4:00 p. m. 4th lecture—Gunnery.
- Wednesday, June 7.
 8:00 a. m. Selection, reconnaissance and occupation of positions.
 1:00 p. m. Special instruction.
 4:00 p. m. 5th lecture—Gunnery.
- Thursday, June 8.
 8:00 a. m. Selection, reconnaissance and occupation of positions with simulated firing.
 1:00 p. m. Special instruction.
 4:00 p. m. 6th lecture—Gunnery.
- Friday, June 9.
 8:00 a. m. Selection, reconnaissance and occupation of positions with simulated firing.
 1:00 p. m. Special instruction.
 4:00 p. m. 7th lecture—Gunnery.
- Saturday, June 10.
 Practice march involving a tactical situation.
- Sunday, June 11.
 Officers' horses will be available for riding.
- Monday, June 12.
 8:00 a. m. Target practice.
 1:00 p. m. Special instruction.
 4:00 p. m. 8th lecture—Explosives.
- Tuesday, June 13.
 8:00 a. m. Target practice.
 1:00 p. m. Special instruction.
 4:00 p. m. 9th lecture—Lines of Communication.
- Wednesday, June 14.
 8:00 a. m. Target practice.
 2:00 p. m. Talks by militia officers.
- Thursday, June 15.
 Breaking camp.
 Departure of militia officers.

The general program was supplemented by the following Memorandum for Instructors:

Fort Riley, Kansas, May 25, 1911.

MEMORANDUM FOR INSTRUCTORS.

The object of this course of instruction is to lead officers up to the point where they can reconnoiter and select good positions for batteries, occupy them in good order, and conduct the fire of the guns therein.

The course is too short to permit of detailed instruction in all of the various things which are necessary to make a good battery.

Instructed batteries will be used for this course and officers are to be taught how to use them.

To this end all of the instruction will be such as pertains to the *duties of officers* in handling well instructed units.

At the morning sessions all officers will be mounted and will work over terrain which is at such distance from camp as will require them to do several miles of riding each day over varied ground.

Instructors will give advice in matters of equitation where needed or requested during these rides.

Maps will be used in this part of the work to such an extent as will enable instructors to determine whether the officers are able to read maps and use them for artillery purposes.

Positions will be selected each morning and the firing data calculated for them by as many members of the section as practicable.

Fire will be simulated; the instructor will announce after each round the result of his assumed observation of the bursts and will require the next command to contain the proper data to correspond with his assumptions. In assuming the results of succeeding rounds the instructor must exercise great care to make his assumptions correspond to the changes in the command. Too much time must not be consumed in this part of the work at the morning sessions.

Beginning Monday, June 5th, and throughout that week a battery of the 6th Field Artillery will be attached to each section and will be officered by militia officers. These batteries will be caused to occupy the selected positions. The regular battery commanders will accompany the militia captain who is maneuvering the battery and will give him such assistance as he requires and will stand ready to take control in case it is necessary to prevent injury to men or matériel.

A simple tactical situation will be stated verbally by the instructor in each case, as a basis for the work of reconnaissance, selection and occupation of a position.

These problems should include those which require deliberate occupation and careful and accurate determination of data; also those that require more rapid work and approximate methods of determination of data. The more accurate work should come first. Some positions for direct laying should be used, but the greater portion of this work should be with masked positions. The calculated data should frequently be verified.

Instructors must endeavor to lead up to a state of training which will enable the militia officers to conduct the target practice of June 12th, 13th and 14th.

The problems for target practice will not be announced in advance, therefore, the officers under instruction must prepare themselves to execute various problems.

Afternoon work.

The afternoons will be utilized for special instruction dismounted.

In this instruction the instructors will devote themselves to personal instruction of individuals for the purpose of explaining to them matters in which the morning work shows them to need assistance.

It will not be possible to bring all members of a section to the same point of instruction, but instructors must try to cause each individual to make some progress beyond the state of instruction in which he is when he arrives at the camp. In order to bring this about he must distribute his attention to all of the members of his section. To some he can assign tasks and, by an occasional word of advice, cause them to reach results. To others he will have to devote more time and attention.

Each officer should be instructed according to his rank in matter of selection and occupation of positions, but all should be instructed in calculation of firing data.

The following are given as examples of suitable work for the afternoon period:

Captain A was unable to proceed to a point indicated to him on the map. He should have the map explained to him in the afternoon and be given a similar problem the next morning.

Captain B did not know the arm signals when he marched his battery to a position. Illustrate them to him and have him practice them.

Captain C did not give firing commands which were based upon assumed results of previous firing. Take him to the terrain board and give him a few illustrations.

Lieutenant D made many errors in calculation of firing data. Give him some work with the B. C. telescope in the park.

Lieutenant E has certain questions which he wants to ask. Give him a hearing and such instruction as he wants.

Each section will devote one afternoon session to the adjustment of fire control instruments.

Six sections will be organized, each one to consist, as nearly as practicable, of the commissioned personnel of a battalion. These sections will be permanent with permanent instructors.

At the lectures officers will be encouraged to make notes and to seek explanations from their instructors of points not understood.

Conduct of the Camp.

Having settled definitely, that the camp was for the purpose of imparting technical instruction this idea was kept constantly in the foreground; there was no rest—every divergent subject was ultimately connected with the idea of technical preparedness for the conduct of fire. During the first few days of camp instruction the accurate computation of firing data was carried on, resulting, in a remarkably short time, in a considerable degree of proficiency. Work on the terrain board was combined with that in the field and by June 8th few, if any, of the students were unable to compute promptly and accurately the firing data for even difficult problems. Chapter V of the Drill Regulations for Field Artillery was really the basis for instruction; the student was taught the reasons for the statements made therein and was impressed with the necessity for following the rules carefully.

After the accurate methods were thoroughly understood work was carried on with the B. C. ruler, using handbreadths or by estimation; nothing consistent with the idea of prompt and effective delivery of fire was neglected.

The preliminary work in computation of firing data and the exercise in selection, reconnaissance and occupation of position led up to the target practice on June 12, 13 and 14; these firings were conducted by officers of the organized militia—in fact every incident of such firings was under the superintendence of the selected officer. It is sufficient to say that they played the game well, using

with a fair degree of economy the ammunition available for the practice.

Lectures on the following subjects were delivered:

- a. The three-inch F. A. Matériel.
- b. The trajectory in vacuo and in air.
- c. Range table; analysis of.
- d. Computation of firing data (rapid calculation of elements of fire).
- e. Accuracy of fire and causes affecting it.
- f. Shrapnel fire, proper adjustment of.
- g. Ranging; application of fire.
- h. Explosives.
- i. Lines of communication.

The first eight lectures were drawn from the text on Gunnery and Explosives, prepared under the supervision of the Field Artillery Board by Capt. Westervelt; the last lecture was prepared and delivered by Lieut. Olmstead.

At all times—day and night—the instructors were available for use by those desiring additional instruction on doubtful points.

Conclusion.

It is believed that the Camp of Instruction was well worth while. A great thing was accomplished solely in fixing the attention of so many officers upon the ultimate use of the arm, viz., fire action. During the future months of service with their respective batteries they must of necessity work more keenly and with greater enthusiasm toward the realization of this ideal. Any experience which may come to them in the way of maneuver, administration or tactical use of the arm will augment materially their professional efficiency; they have been convinced that men and horses and matériel constitute a plant to be perfected according to the possibilities for so doing, but that the real strength of such plant becomes apparent after a position has been selected and occupied and the fight is on. The system of instruction assumed a perfect plant and aimed at creating an officer to control it at the critical time.

During the camp many problems simulating fire were executed on the terrain board and in the field. These problems were considered solved when fire was adjusted, i. e., the correct range, proper corrector and satisfactory distribution determined; in one section every officer conducting the fire was assumed to have lost ten dollars for each round wasted due to failures to make the corrections

laid down in the drill book. During the first half of the camp this was an expensive proposition but by the end of camp it was hard—almost impossible—to catch an officer wasting his precious ammunition. In time of war the government would profit far above the money cost of this camp, if the officers constituting its student body were utilized as battery commanders.

THE INTERNATIONAL COMPETITION FOR OFFICERS' CHARGERS: ROME, MAY, 1911.

LIEUTENANT COLONEL T. BENTLEY MOTT, 2D F. A.

This friendly riding contest, open to officers of all nations, was by far the most interesting, the most instructive and the most difficult that I have ever witnessed. It was a genuine military event, stripped of every feature that was not practical and soldierly, and it may be said that any man who completed the tests of the three successive days, no matter how low may have been his final classification, showed himself a capital horseman. As will be evident when we come to describing each day's features, a man had to have not only courage and a firm seat, but good hands and excellent judgment, to complete the course at all. It goes without saying that he had to have a first-class horse, a frank and willing jumper over all sorts of obstacles, clever as well as powerful, always under control and with good staying powers.

I have frequently seen the horse shows of Paris, New York and London, and I believe that no lover of cross-country riding, especially no military man, could fail to agree that the Italian idea of a mounted competition is in every way superior to the French, American or English. The latter are all indoor affairs, frequently under electric light, the former is held by daylight in a 60-acre field and its surrounding territory; the sole object of the Italian competition is to compare practically the skill and endurance of rider and horse, while the others are "shows" in the real sense of that word, depending for existence upon a large attendance and heavy gate receipts; the one puts rider and horse face to face with fairly natural situations, the others in the presence of utterly artificial ones; it would be quite possible for a horse useless for any practical purpose to triumph at the London horse show, but the winner of the Italian contest must be a grand animal, fit for any work.

If we ever institute a contest for military chargers in our country, we could hardly do better than follow the lines laid down in Italy, and this reason alone would justify the description which will be given with some detail in the pages which are to follow.

The first test consisted in a march of thirty-one miles, partly on roads and partly across country. The course was not made known until the evening before the start. This was not a race; but each

competitor was expected to ride the distance inside of three and one-half hours, or be penalized one point for each minute in excess. The cross country part of the course was five miles in length and comprised only six obstacles.

There were 126 entries, two of them Chinese officers who did not start. Of the rest, there were one colonel, twelve captains and 111 lieutenants. Spain sent five competitors, Roumania two, France sixteen; the rest were Italians.

Ninety-two competitors finished the first day's ride inside the time limit, the others falling out or being penalized for one reason or another. The best time made was by an Italian riding an Irish horse—three hours and five minutes. All merely tried to get in on time, the desire naturally being to save the horses as much as possible for the work of the two succeeding days.

The day following the thirty-one mile ride, the competitors had to go over an outdoor course on the cavalry training ground of 3,280 yards, say one mile and seven furlongs, jumping twenty-two obstacles. A good idea of the character of the jumps can be had from the photographs. The competitors started singly, the start of each being given as his predecessor finished.

This also was not a race against time, the only condition being that the fifteen furlongs must be covered in six minutes. For every two seconds over this limit a penalty of one point was marked up. Knocking down part of an obstacle entailed a loss of two points, as did a refusal; fall of horse or rider, or both, entailed a loss of three points. The top rails of most, but not all, the fences were tied with cord, and a considerable blow was required to cause their fall and the resulting penalty. The stone walls were topped with rows of loose but heavy brick, which were often hit without being displaced. Merely hitting rail or bricks was not penalized.

Each competitor was assigned 100 points, and from this was deducted the total of his penalties.

The ninety-two officers who had successfully finished the thirty-one mile ride of the day before started in this race; and he would have to be a cold-blooded man indeed who did not grow enthusiastic in watching their performance. First came a straight gallop over an easy hedge, then a simple double, the fences only three feet high and twenty feet apart. After a sharp turn to the right about, an easy three-foot gate was met, and then a three-foot bank, with a tricky little ditch on each side, surmounted by a very thin hedge five feet high, which, of course, was dashed through, the bank alone being cleared. A sharp turn to the right was immediately followed

by a stout three-foot fence with a very small ditch on the far side, after which the severe business began.

Nos. 6, 7 and 8 are in or on the crest of a hollow with irregular slopes of about two on three. An idea of the look of the ground at these jumps can be had in the photograph marked Jump No. 8. The approach to No. 6 is level, the fence is two feet nine inches, and the horse lands on a sharp downward slope. I could get no photographs of No. 7; but the horse had to clear a little ditch and land on an earth bank five feet wide, then clear six and a half feet, landing on a higher bank seven feet wide and jump off this over a small ditch to the level, a drop of a little



NO. 8. (FRENCH). NOTE LOOSE BRICK ON TOP AND SIDES OF JUMP.

over five feet. The French horses jumped this obstacle without difficulty, but it was evident that they did not take to it with the easy confidence of the Italian mounts, which, though seeming heavier and less agile than the French, were perfectly accustomed to this kind of an obstacle. Jumps not unlike this are met with in the Pau fox-hunting country in the south of France, where I have hunted a great deal.

Jump No. 8 looked very trying, but few horses made faults at it. The wall was of solid masonry two feet two inches high, topped with loosely laid tiles.

Nos. 9 and 10 were simple water jumps, one eleven and a half feet wide, the other a double water jump, eight and a half feet for each ditch; they were in no sense difficult, but as they were placed side by side, and the course to be followed between formed a complete circle, they were a test of the horse's suppleness and of the fact that he was wholly in hand. No. 11 was a three-foot wall with a small ditch on each side, followed thirty feet away by a water jump six and a half feet wide. No. 12, a ditch with a hedge on the far side, offers nothing unusual.

The next obstacle, No. 13 (see photographs) was a steep hill in the



NO. 8. (ITALIAN). THE GROUND ON THE FAR SIDE HAS EXACTLY THE SAME SLOPE AS ON THE NEAR SIDE.

nature of a big fill in road construction, with a three-foot fence at the base of each slope. Obstacles of this nature are met with in going across country, and in the last day's test some of them had to be taken, and they looked more difficult than this one artificially erected on the training ground. I did not see or hear of a single horse making a fault at this obstacle.

No. 14 was an Irish bank six feet high, to be taken on and over; No. 15, a simple fence; No. 16, a jump from the level over a stone wall two feet nine inches, landing on a sharp downward slope similar to No. 6, of which there is a photograph. A sharp turn brings

up at No. 17, which is No. 6 reversed; the horse had to take off on a steep slope of two on three and clear a fence two feet nine inches high.

No. 18, a mound with a fence and ditch on each side, appeared to be the most artificial and unnecessary jump on the course. It looks very tricky, but it was cleared nearly every time without error. The mound was six and a half feet wide on top, and each fence three feet two inches high. The photograph shows this obstacle perfectly.

No. 19 was a simple hedge, followed immediately by a turn at right



NO. 13. (FRENCH.)

angles and a three-foot gate. More faults were made at this place than anywhere else, especially by the French officers in the team competition, when the process was reversed—the gate being jumped, the sharp turn following, and then the hedge. For fear of overriding the hedge, several officers slowed up too much at the gate, with the result that the horse had not enough speed and knocked down the top rail. On the other hand, one Italian officer went at the gate too fast, and could not turn in time to take the hedge. It was an interesting obstacle and a useful one.

No. 20, a hedge and ditch followed by a ditch and hedge, was a

simple affair offering no interest, as the hedge was thin. No. 21 was an Italian specialty, taken, I am told, from a jump sometimes met with in the Campagna. It is taken in both directions, as the photographs marked No. 21 show. The wall is not quite three feet high; but in clearing it going in the direction shown in 21 A, if going too fast there is danger of tripping at the ditch on the far side, and if too slowly, that the wall may not be cleanly cleared. If going in the direction shown in 21 B, corresponding difficulties are met.

No. 22 required a sharp turn to the left, followed by a jump over a



NO. 13. (ITALIAN.)

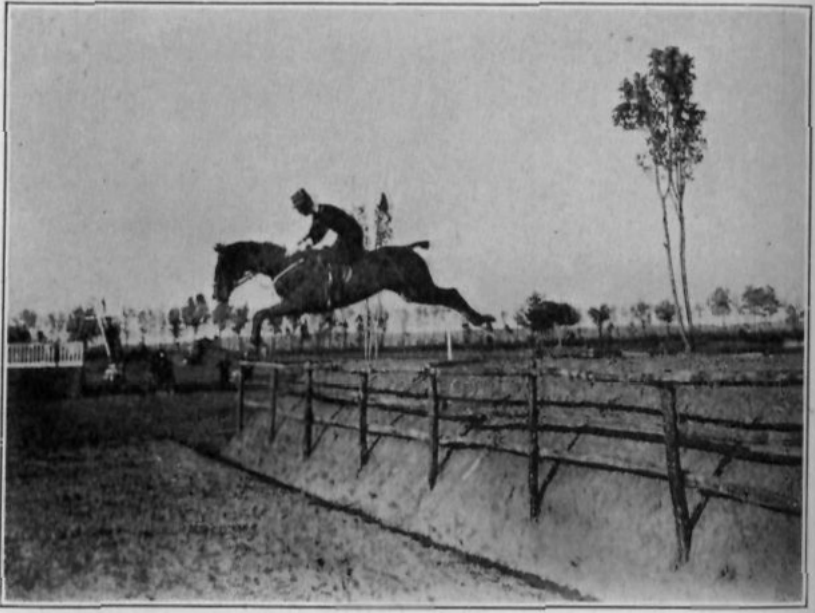
fence two feet nine inches high. Many took it diagonally, as the fence was so low.

As can be seen, Nos. 9 and 10, 19 and 20, were devised especially as tests of judgment in speed and of handiness.

In looking over these obstacles on the ground before the contest began, they appeared difficult rather than formidable, though I anticipated many more faults and falls than occurred. After seeing horse after horse go over the course, this impression, due to unfamiliarity, wore off, and I realized that any good rider on a horse previously trained to these jumps should be able to get across, even if not brilliantly. Most horsemen hate to take off on a sharp rise or

land on a slope, yet it seems quite practicable to do both with entire safety to man and horse, and the ability to do so seems useful.

At the conclusion of this two-mile jumping contest the thirty officers having the highest rating were selected for the final cross-country contest the next day, this being a veritable point-to-point race against time. The course was fifteen and a half miles, partly on roads and partly across country, and it was not disclosed to the participants until the moment of starting. The maximum time allowed was two and a half



NO. 18. (FRENCH.)

hours. There were fifteen natural obstacles to be jumped, and the cross-country part was over rough ground, comprising steep ascents and descents, ditches, brooks, post-and-rail fences, crossings of roads with fences on each side, etc. The grass on most of the course was very high, and there was much mud. No account was taken of anything except elapsed time; the horse could refuse or fall any number of times, provided he went over the obstacles and the course inside of two and a half hours.

The thirty horses having the fewest faults, which alone could compete in the final tests, were ridden nineteen by Italians and eleven by Frenchmen. It is very much to the credit of the French that, having sixteen horses in a total of 126 entered, eleven of these were

classed in the first thirty at the end of the second day, and in the final classification nine of these were classed in the first twenty-five. The French horses had made the long and rough journey from Paris to Rome, having certainly been more than forty-eight hours on the cars; they were comparatively new to these obstacles, having merely been trained over similar ones only a short time before leaving France, and in the final test neither they nor their riders were familiar with the nature of the country and the obstacles, as the Italians naturally were.

No Spanish or Roumanian officer was classed in the first thirty at



NO. 21 A. (FRENCH.)

the close of the second day, and so none rode in the final test. It may be remarked that the Spanish officers competing were all graduates of the Italian or French cavalry schools, and used the methods of their respective instructors. The Roumanians follow the French methods, and their riding instructors are all graduates of Saumur. The performance of these officers was extremely gallant, and while they seemed less experienced than their French and Italian competitors, they also, especially the Spaniards, had hard luck, and deserved more success than fell to them.

Before the contest a general impression prevailed among the

Italians that the best time in the point-to-point would not be less than seventy minutes. The best time was actually forty-four minutes, made by Lieutenant d'Orgeix, 2d Hussars (French), on his little Anglo-Arab "Romeo." The next best time was made by Lieutenant Gonnet-Thomas (French), on "Eclair," Anglo-Arab, in forty-nine minutes, in spite of three falls; he and his horse were literally covered with mud when they arrived. The next best time was by an Italian, Lieutenant Ubertalli, on "Camerata," Irish half-bred, in fifty-one minutes. The rest of the thirty



NO. 21 B. (ITALIAN.)

competitors all finished handsomely, making the distance in less than one hour and seven minutes.

The final classification for the three successive days' test was as follows:

1. Lieutenant Ubertalli (Italian), riding an Irish half-bred.
2. Lieutenant Gonnet-Thomas (French), riding an Anglo-Arab.
3. Lieutenant Cappi (Italian), riding an Irish half-bred.
4. Lieutenant d'Orgeix (French), riding an Anglo-Arab.
5. Lieutenant Caretti (Italian), riding an Irish half-bred.

The *Giornale d'Italia*, a much-read newspaper in Rome, makes these remarks on the classification: "It is to be noted that the winner,

Lieutenant Ubertalli, owes his victory to the points made by him in the obstacle jumping contest on the hippodrome (perfect performance, 100). The superiority of the French officers in the last day's cross-country race did not count enough to overcome their slight inferiority in the second day's jumping, 'precision jumping.' Our officers are too generous and capable not to disapprove of conditions which place visiting foreigners at a disadvantage."

Of course, no contest of this kind ever takes place without something being criticised, but in spite of the extraordinarily good management and generous intention which characterized the Italians'



NO. 22. (ITALIAN.) JUMP NO. 3, TAKEN IN OPPOSITE DIRECTION. SMALL DITCH ON NEAR SIDE—MERELY A SLIGHT ANNOYANCE WHEN GOING AS SHOWN.

arrangements, it is not unfair to say that the above remarks seem well founded. Lieutenant d'Orgeix went across a most difficult fifteen and a half miles of perfectly unknown country in the wonderful time of forty-four minutes. Lieutenant Ubertalli took fifty-one minutes, or sixteen per cent longer, to do the same thing. D'Orgeix had lost four points in the hippodrome jumping, that is, his horse had knocked down a top rail twice; Ubertalli had no faults against him. But the system of marking penalties was such that

this loss of four points in precise jumping outweighed to such an extent the seven minutes by which d'Orgeix beat Ubertalli in doing fifteen and a half miles across country, that the former officer was placed fourth and the latter first in the final classification.

Likewise as between the two Frenchmen classed second and fourth, Gonnet-Thomas took five minutes longer to go the fifteen and a half miles than d'Orgeix, but he had only one fault marked against him over the hippodrome jumps, while d'Orgeix had two. This placed Gonnet-Thomas number two in the final classification, and d'Orgeix four. I notice that French officers in general give more credit to d'Orgeix than to Gonnet-Thomas, and consider his performance superior.

Having watched this outdoor riding and jumping during ten days (for there were many other events in which Italian and French officers were the chief participants), two questions inevitably arose in the mind:—first, which seat is the superior for military purposes, the Italian or the French; and second, what is the value of such contests in general, and to our army in particular?

The Italians ride with quite short stirrups, both officers and enlisted men, whether in the military or English saddle, having approximately the same position. When riding over jumps or in general across country, they lean far forward like jockeys, the leg from the knee down sloping back toward the horse's flank. The photographs of Italian and French officers taking the same jump will best indicate the Italian seat as compared with the French.

In Jump No. 8, the full exaggeration of the Italian position is indicated. It is quite evident that for this jump, a most unusual obstacle, the position is intelligent, for the horse must be given every chance to get his hind legs over and the man has to look out for himself; but at jump No. 6, where the approach was level ground and the landing a sharp slope, the same position of the body was observed, only not so extreme. The photograph marked Jump No. 21-A illustrates the French seat in its classic purity; No. 18, the same seat slightly modified to meet special contest conditions, but still vastly far from the Italian position as seen at No. 22.

It would be unintelligent to dismiss the Italian seat because it offends ideas of cross-country horsemanship long accepted in both England and France, and believed in and practiced by our Mounted Service School. The Italian officers ride boldly and well, both over prepared obstacles and in the hunting field. The timber jumps in the Campagna, where much fox-hunting goes on, are second in stiffness

only to those met with on Long Island and in Virginia. Nothing that I have seen in England—and I have hunted there with six excellent packs—was as stiff, for most English obstacles are hedges, and if you don't go over you go through, or else have your fall considerably broken. But Italian "stationata" resemble post-and-rail fences; you go over, or you get a very nasty spill.

The Italian seat is probably a superior seat for races and exhibition jumping. It is more dangerous to the man, but it takes weight off the horse's hind quarters and reduces by that much his chance of tipping with the hind legs. But is it a good seat to teach officers? I believe not, and this opinion is supported by the best authorities in France.

At Tor di Quinto this year were Colonel Blacque-Belair, the head riding instructor of Saumur, Major Détoyat, instructor at the same school, Major de Colbert, formerly of the *cadre noir*, and other eminent masters. We talked of this point in all its aspects, and while admiring what was accomplished by the Italians and confessing that results alone count, these officers believed that their seat was not the proper one to reach military men.

The reasons may be briefly alluded to. An officer, on service at least, should use the seat most suitable for all-round military work, the seat he teaches his men and expects them to copy from him. If he is a man of rank or eminence in horsemanship, his example is a matter of great importance to those about him. In going across country in campaign, whether on reconnaissance or carrying a message, an officer's first thought is to arrive surely at the place he starts for. Speed is important, but not all-important. The Italian seat does not appear to be as safe for either man or horse as the French. In going across country, even at top speed, an officer must *see*—must observe the ground, the enemy if there be one, the military features of the terrain, the landmarks. If a man habitually gallops with his body inclined far forward, his head is inevitably down, and he sees about him only with an effort.

While these considerations apply to almost all fast work across country, when we come to the every-day work of the mounted soldier there is still less reason for adopting the cramped far-forward position preferred by the Italians. In mounted combat a man in that position is far less free to use his weapons and less secure on his horse than when by long habit he sits well down in the saddle, his body inclined only slightly forward and the stirrups long enough to enable the calves of the legs to grip the horse.

This much is insisted upon for the reason that many young French officers, enthusiastic riders in horse shows and cross-country races, have become seduced by the "American" seat, as it is called, from our jockeys who invented it. These young men, admirable and daring horsemen, lose sight to a certain extent of the special nature of the work in which this seat is an advantage, and are tempted to practice and teach it for other work for which it not so well adapted. The best authorities in military horsemanship in France are inclined to react against this sporting tendency. With that great liberty which is characteristic of French army methods, where results only are asked for and the means never rigidly prescribed, the colonels of cavalry regiments are inclined to let skillful and enthusiastic young horsemen ride any way they like, but they do not permit them to teach the men a system believed faulty for military work. These matters have been considered at Saumur, and the instructors there are careful to indicate the narrow limits within which they believe the Italian seat finds a useful application.

As our ideas in military horsemanship now closely follow the French, it seems well to have enlarged upon this point. I can only add as a personal conviction that nothing which was to be seen at Rome last May or in London last June, where French officers made so brilliant an impression, is calculated to make us feel anything but satisfaction in having chosen the French as our models. The French officers who took part in these events, and in others hardly less important, were in no case the same. A few specialists are not chosen to represent France at these various contests, but great numbers of youngsters from many different regiments, stirred by a fine desire to distinguish themselves, work hard to train a good charger and ask to be allowed to compete for the French uniform. The War Department—it is, I confess, surprising to see—does not give very great encouragement to these efforts either in the way of leave or financial aid. I believe this is simply because it does not have to.

What, now, is the military use of these contests? Very much the same, I should say, that a first-rate base ball nine is to a battalion of infantry, with this advantage added, that proficiency in mounted sports has a more direct application to cavalry training than has foot ball or base ball to infantry excellence.

Throughout the younger grades of the British, French and Italian cavalry there exists a veritable passion for riding over obstacles. In England, Ireland and a few parts of Italy this passion is largely gratified by riding to hounds, and the value of daring cross-country

riders in campaign is too evident to make it necessary to quote the experiences related by Marbot when describing the Peninsular campaign. But in France, with little exception, all stag and boar hunting is in forests and other country devoid of obstacles. There are only two packs of fox-hounds in the country. Therefore, in most of France and Italy this passion of young to middle-aged officers for riding over obstacles is gratified in an artificial way. Leaving out steeplechases, there are obstacle courses built on every garrison drill ground, and there are any number of military cross-countries where the hot blood of young soldiers can meet and test its merits in the excitement of physical struggle. These contests are encouraged on every hand by horse raisers, by societies for improving horse breeding, by the military authorities, by sweethearts and wives. All the forces, and others besides, which go to encourage athletic sports in our army, lend their influence to horsemanship contests in France and Italy. The result is that those countries have a body of mounted officers who are well mounted, who ride constantly, who are ready every day in the year to take the field, who have a most amusing and exciting form of physical exercise, and who grow into middle age, and even old age, still interested in the horse, keeping up their riding through mere force of habit or force of pride, refusing as long as possible to grow old or give up. This is a distinct advantage to any service.

War is movement, and movement intelligently directed means victory. No amount of passive courage or mental activity can replace it. The habit of movement, of physical exertion, must be acquired in youth and preserved through middle age. It can no more easily be acquired in the course of a campaign by oldish men than can a foreign language. To be really useful it must have become instinctive. That, as I take it, is what we mean by "training."

How does this apply to us?

Few will contend that physical activity has been or is even now a characteristic of our officers. Each one of us will readily recall the men who were our field officers six or eight years ago. How many of them ever spent five hours at a stretch in the saddle except for a practice march? How many ever amused themselves with out-door games of any sort? What sort of reception was given Mr. Roosevelt's order requiring a pitiful little test of ninety miles in three days? Was there an explosion of anger that such a puerility should be exacted of healthy men?

When we turn to the younger mounted officers, men from thirty

to forty years old, the difference is not enormous. I can remember very few at my stations, even in the last six years, for whom an hour or two of dull mounted drill did not fully satisfy the craving for the pleasures that come through the horse. Nor are the reasons hard to find. Going for a ride day after day out along a road, especially on an indifferent horse, is dull business when a man has had an hour or two of about the same thing during drill. Excitement and difficulty are lacking to the sport. Few do it; no example is set by the field officers, and the newcomers fall into the habits of the large majority. Riding for pleasure at our mounted garrisons is confined mostly to officers' daughters and young men who find an interest in accompanying them.

Polo is gradually changing this mental attitude of the younger element in some regiments, but many reasons prevent polo from becoming the sport of the majority in any garrison, and it can not be played during much of the year. The same remark applies with added force to racing. This brings us back to horse shows and jumping competitions such as the one at Rome which we began by describing.

Every officer of our service can afford to own a first-class charger. Every subaltern could fairly be required to spend from \$400 to \$600 for a horse, since in three or four years this amount is returned to him by the government, and for the succeeding years he gets \$150 a year as a simple bonus. I believe that the government should mount officers and withdraw the \$150 allowance, but that is another story.

Now, as soon as every mounted subaltern—to go no higher—owns a first-class horse that can jump or can be taught to jump, and there is an obstacle course laid out on the reservation, if the man has any blood in him at all he is going to amuse himself by riding out to school his horse over these obstacles. Jumping is very exciting sport and most men will ride a long way to enjoy it, and even those who do not love it think they ought to, and that leads to the same end. This is the whole secret of the passion so prevalent in England for fox-hunting. That country, more than any other, is full of obstacles that can be jumped, and has very few that can not. The whole country seems organized for the sport; it has become a tradition, and a useful one for health and pleasure, at the same time leading to the production of great numbers of splendid horses, ideal for military purposes. I have ridden across country with many Englishwomen between fifty and sixty years old, and men of that age going hard excite no comment whatever.

In almost all parts of America this sport is quite out of the question, owing to the nature of our fences; but being the greatest incentive to riding yet devised for people of all ages, some form of obstacle jumping can be artificially arranged. This is what has been done in France, Italy and Germany, where hunting across an obstacle-strewn country can not exist. In these countries the military authorities some years ago deliberately set to work to stimulate the interest of its officers in riding for riding's sake and not as a mere military drill. They recognized that to be successful something more exciting than mere walk, trot and gallop on the flat had to be provided—something, indeed, approaching English fox-hunting. What has been offered is the pleasure and stimulation of jumping obstacles, and how successful the effort has been can be estimated by any one who compares the amount of riding that is now done by officers of every age in France, Germany or Italy, with what prevailed thirty or even twenty years ago in the same countries when the present movement started, or with what prevails now in countries like the United States, where military men still ride almost exclusively as a military duty.

This stimulus to physical exertion along lines useful in military life has been just as artificial as that furnished by staff academies and war colleges to increased mental exertion; in the one case professional advancement has been the incentive, in the other pleasurable excitement. Each has been effective in vastly raising the standard of efficiency.

The time seems now to have come when we ought to bend our efforts in the same direction. Our service seems at last awake to the fact that it is very badly mounted, but the prospects of a steady improvement are so bright as to seem a certainty. We have a school of equitation that has about passed through the diseases of infancy and will soon become an acknowledged source of authority; we have a number of officers who already own and ride good horses; above all, we have a Chief of Staff who, more perhaps than any of us, appreciates the value of physical fitness and of hard riding as a means to that end. In a few years, then, we may expect our army to be largely provided with good horses; but I can not help urging that all our energies at this time should be concentrated upon mounting the *officers* well—when this is accomplished the men's mounts will improve as an inevitable consequence. But it is almost idle to mount the men on superior horses unless the officers have even better ones. Excellence almost always flows down hill.

When it is urged that officers be mounted "well," it is not meant that they should have merely better horses than at present, but better than those of any other service. We spend the money, and horseflesh *is* purchasable; why, therefore, should we not get the results?

Supposing, then, our officers distinctly well mounted (and that insures that the men will be), what are we going to do to keep up that condition and make them use the superior horses provided them? The answer, I think, is found in Rome. Provide an incentive. Lay out on every reservation a course over obstacles where the qualities of these horses may be exploited in the most delightful sport imaginable. Have contests, paper chases, races, and competitions in training, in the garrison and between regiments, for teams and for individuals. The younger men will take to it with enthusiasm, we may be sure, and it must not be forgotten that these subalterns will soon be field officers. Once we have a body of colonels who, in their younger days, have known the joys and excitement of riding straight over stiff country, we need harbor no further fears for the horsemanship of our mounted service or of our general officers.

Garrison life in America does not abound with pleasures. Certainly the variety is limited. We are far from towns and the usual excitements and interests craved by educated men. For the young officer life is often dull, but for those who have horses the outdoor amusements need not be confined to watching eight men play polo or eighteen play base ball. However, these horses must be good, or there is no interest in riding them, and some difficulty or danger must be offered to overcome, or no enjoyment ensues. A man generally does well what he enjoys doing, and others who have not the taste or the ability rarely know it—they follow the fashion. It is important, then, that the fashion established be a useful one.

It was very instructive to me to note that the eleven-day horse show at Rome was almost wholly a military affair, held on government land under War Department auspices and largely paid for out of military funds. There were gate receipts, it is true, but they could not have begun to pay the expenses. There were events for hunters and for gentlemen, but most of the entries even here were by officers, and the public interest centered chiefly upon them. The competition amongst regimental patrols of six men, representing thirty-one regiments, was one of the features of the show. We can well imagine the stimulus the prospect of going to Rome to represent the regiment must have been to all the enlisted men in every squadron throughout Italy.

The horse show in London is a very different affair. Here the civilian element is all-important, the military features, in comparison, insignificant. Italy has an elaborate military competition every year for the purpose of encouraging riding in the army; England does not need this, since her mounted officers have every inducement to ride, and they live in a community of hard-riding and horse-loving civilians.

The Paris horse show was at one time far more of a military event than it is now, when riding has spread into civil life. Moreover, horsemanship in the French army is now established on such a firm basis that the horse show stimulus is lost sight of. Nevertheless the military features are still a most important factor in the popular and financial success of the show, and much of the best riding is done by officers or ex-officers. Unfortunately, our service is in the same situation as the Italian as regards the need of an external incentive to riding, and this stimulus will have to be provided, as in Italy, by and within the army itself, until we become able to do without it as has happened in France.

It may seem that this discussion has gone far afield, but an examination of conditions in other countries is the best way to comprehend our own, and see in what manner improvement may be accomplished most quickly. I also feel like offering an excuse for insisting upon points that to many are self-evident. But I fear there are still numerous officers of our mounted service who believe that this riding is a fad and this jumping all fol-de-rol. What practical good will it do in war? they very properly ask, and if there were no ready answer they would be right in sitting down in placid satisfaction with the situation as it has existed since the Civil War. For that reason I have endeavored to furnish historical arguments for those who are not content with present conditions and are trying to improve them.

There is little doubt that habit is a factor of first importance in determining the output of all human endeavor. The habit of riding has not existed in the American army since the opening of the West and the close of our Indian campaigns. Even in those days it existed only in the cavalry, leaving the artillery, the general officers and the mounted staffs wholly unaffected. How, then, can this habit be revived, intensified, and spread to all who need it?

First, it is submitted, by taking measures to insure that every officer shall have one really first-class horse. This must be an act of authority, and not left to the individual to decide.

Second, by providing a stimulus which will insure that these horses will be ridden by their owners outside of the short hours of drill which prevail during most of the year. This stimulus is most readily furnished by the pleasure which all young men find in jumping good horses over difficult obstacles. Experience in other countries proves, if proof be needed, that this instinct can be relied upon as surely as that of the dog to chase a rabbit.

These ideas found a place in the scheme of rehabilitation imposed upon the French cavalry by its lack of success in the Franco-German war, and they have been amply justified. Much later the same process is to be traced in the progress made by the Italian cavalry, progress which in eight years has brought it to a place of formidable rivalry with its French competitor. The watchword has been, provide really superior horses, teach young officers to ride them over stiff obstacles, and no orders will ever have to be issued *requiring* officers to ride; they will do it joyfully and hence well. Italy is notoriously poor; she maintains an active army of 290,000 men and 54,000 horses for just half what our army costs us; yet she finds it wise to pay for officers' mounts sums far superior to what we consider necessary. Officers themselves spend freely to insure having for their pleasure really first-class horses, but there must be no mistaken notion that these officers are wealthy. Many a man pays out of his own pocket \$500 toward getting a good horse, who has not the income of our lieutenants. It is merely that prevailing sentiment in the service leads him to prefer this pleasure to another.

Returning to our own case, it may be said that once first-class horses and cross-country courses are provided, instruction in the use of both can be given by officers who have become proficient in the sport at Fort Riley or elsewhere. Contests can then be instituted, and there seems little reason to suppose that American youth will greatly differ from that of other nations in its enthusiasm for this form of exercise and progress toward excellence in it.

It is not my belief that being able to jump fences, hedges and stone walls will have any extended application in war, whether in our own country or any other; but peace practice in this amusement, interest and rivalry in it, has so far proved the greatest inducement yet discovered to make mounted officers serving at distant, dull garrisons, spend their leisure hours in the saddle rather than at the club.

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.

CONTENTS OF PERIODICALS.

JOURNAL OF THE ROYAL ARTILLERY. (Royal Artillery Institution, Woolwich, England).

September, 1911.

Pack Artillery; its Organization and Equipment.—Capt. W. M. St. G. Kirke, R. G. A.

Duncan Commended Essay, 1911. Similar to papers on the same subject in the July and August numbers; see FIELD ARTILLERY JOURNAL for September.

Co-operation between Army and Local Authorities.—Graham Wallas.

Lecture delivered at R. A. Institution Dec. 7, 1910; suggests methods by which military and civil authorities might help each other in administration.

Some Krupp Balloon Fuses.—Col. H. A. Bethell, late R. F. A.

Descriptions, with drawings, of three new designs of percussion fuzes. Their distinguishing characteristic is that they are sensitive enough to act on a balloon envelope or aeroplane wing, but still have an efficient safety device.

The Employment of Siege Batteries with the Field Army.—Lt. Col. J. G. E. Wynne, R. A.

Discussion of the organization and use of heavy field artillery; contains a cursory review of German, Japanese and French armament and ideas, and some criticisms on the British. Indicates that the British artillery is still struggling with a difficulty that annoyed us until very recently—the distinction between heavy field and siege guns.

Air Targets.—Abridged translation from Russian Artillery Journal, No. 4, 1911.

Replenishment of Artillery Ammunition in France and Germany.—Translation from Spectateur Militaire, June 1, 1911.

French Battle in S. E. Morocco in 1908.—Abridged translation from Streffleur's Militärische Zeitschrift, June, 1911.

October, 1911.

Pack Artillery; its Organization and Employment.—Maj. K. K. Knapp, R. G. A.

Duncan Commended Essay, 1911. See papers on same subject in previous numbers.

The Attack of Airships.—Maj. H. T. Hawkins, late R. A.

Notes that the proper opponent of the aeroplane is the aeroplane, but that guns are still necessary for the purpose. Discusses qualities and vulnerability of aeroplanes, and possible methods of gun attack. Concludes that shrapnel fire from special guns with automatic sights offers the best chance of success.

Indian Drafts.—"Ration Post."

Graphic and humorous description of the difficulties encountered by

the unfortunate officer who has to conduct a draft to India; the hints should be useful to an officer undertaking this duty for the first time. The paper will appeal to any American officer who has had to deal in a hurry with a "casual detachment."

Studies in Fire Command Training.—Capt. A. V. Langton and Lieut. M. Macleod, R. G. A.

Description of extemporized wireless installation for coast defense work.

The Tiger's Den.—Lieut. A. K. Hay, R. H. A.

Interesting account of the capture of Seringapatam by the British in 1799, with numerous photographs of the fortress as it now appears.

Field Artillery Equipment with Extended Field of Fire.—Translation from the *Revue d'Artillerie*, June, 1911, concerning the new Deport matériel which allows very wide limits of elevation and traverse. See citation in FIELD ARTILLERY JOURNAL for September.

The French Deport Mountain Gun.—Translation from the *Revue Militaire Suisse*, May, 1911, describing the type of gun which is held at extreme recoil for loading, and fired while moving in counter-recoil, thus utilizing momentum to shorten recoil.

Signalling from Aeroplanes.—Translation from the *Russki Invalid*, No. 144. Mentions briefly several proposed methods, and suggests sound signals with a motor horn.

November, 1911.

Finding One's Way by the Heavens.—Capt. Patterson Barton, R. F. A.

A readable paper on practical astronomy as applied to orientation. The subjects touched on are:—Diurnal movement of the heavens; movements of the sun; visibility of heavenly bodies at different latitudes; annual movement of the heavens; positions of heavenly bodies; keeping direction by stars; the planets; the moon.

A Mountain Battery, 1839.—Lt. Col. H. W. L. Hime.

Extracts from the notebook of Major H. G. Ross, R. A., dated San Sebastian, Spain, 1839, giving details concerning organization and equipment of a mountain battery of the British Legion.

R. H. A. Ammunition Columns in India.—Lieut. E. C. Fleming, R. H. A.

Statement of a few of the practical difficulties encountered by the subaltern in command of a column, with suggestions for improvements.

Communications in a Coast Fortress.—Capt. K. D. Hutchison, R. G. A.

This paper treats of methods of operation, not of systems of installation. While intended for coast artillerymen, some parts, such as telephone operators' orders, are applicable in the field.

Artillery Training.—"18-Pdr."

A short letter, discussing some of the criticisms of "Outsider," published under the above title in the number for August, 1911. The writer admits the objections urged against the system of classifying batteries by competitive firing, but urges that good is accomplished by it, and that the system should be modified, not abolished.

Horse and Field Artillery Training.—"B. N."

A somewhat more extended and comprehensive paper than the above. The writer goes over the matter of competitive firing and argues for its abolition; favors four-gun instead of six-gun batteries; proposes simplification of sighting arrangements and adoption of panoramic sights; recommends changes in caissons; suggests reduction in weight of projectiles

(the English field gun is an 18-pounder) to permit greater ammunition supply; and calls for combination projectiles, better fuzes, and automatic fuze-setters.

Coast Batteries: Can they be improved!—Major T. H. E. Anderson, R. A.

Submits for consideration certain specific points in which the writer believes improvement may be made, especially in more careful adaptation of type designs to local conditions.

Loss of Rotational Velocity of Shrapnel.—Capt. H. J. Jones.

Comments on the paper by Capt. Hill in the July number (see FIELD ARTILLERY JOURNAL for September) and questions his conclusions.

Extracts from the German Field Artillery Firing Regulations.—A translation printed by permission of the German publishers.

Tendencies of the German Field Artillery.—Translation by Maj. Hare, R. G. A., from the Revue Militaire des Armées Etrangères.

REVUE D'ARTILLERIE (Librairie Berger-Levrault, Rue des Beaux-Arts 5, Paris).

August, 1911.

Graphic Methods of Indirect Fire.—Capt. Lamotte.

Description of procedure for determining firing data by means of rough triangulation, using only such instruments as a reconnaissance officer could carry. Suggests no new principles; the procedure described might be of occasional use, but seems too refined. If applied under ordinary field conditions it seems probable that the results would be too inaccurate to be of much service. Application of the method to aeroplane reconnaissance is suggested; this should be worth experiment.

Instrument for Measuring Tension of a Wire.—Capt. Largier.

Apparatus and method for measuring tension in the wires of an aeroplane in flight.

September, 1911.

Invulnerable Batteries; their Value and Employment.—Maj. Sautereau du Part.

Points out the difficulty, amounting almost to impossibility, of making large forces of artillery "invulnerable" by customary methods. Argues that to accomplish this, some of the batteries must go far back of the mask—500 or 1,000 meters. This evidently makes necessary new methods of conducting and observing fire; to deduce these is the purpose of the paper. The battery commander's station being at any distance in any direction from the guns, and not necessarily visible from them, but connected by telephone, the problem is solved by an initial rough orientation by compass, followed by an ingenious system of trial shots; in estimating these, special tables, very brief, of range-deflection relations, are used. The system being slow, and requiring elaborate communications, it is not suggested as an habitual procedure, but only as an expedient to be used occasionally by individual batteries.

Graphic Methods of Indirect Fire.—Capt. Lamotte.

Conclusion of article begun in the August number; see *supra*.

ARTILLERISTISCHE MONATSFESTE (A. Bath, Mohrenstrasse 19, Berlin).

August, 1911.

The Empirical Laws of Atmospheric Resistance.—C. Cranz.

A continuation of the argument between Col. Haupt and the writer on

theoretical ballistics, carried on for some years through occasional papers in the Monatshefte.

French Field Artillery in Action.—Gen. Richter.

Criticism of the system of command of the French Field Artillery according to the Provisional Regulations of 1910.

Tests of Field Guns for the Chilean Army.—Gen. Rohne.

Description of tests of Krupp and Ehrhardt guns in 1909, resulting in the adoption of a Krupp gun by the Chilean army.

Care of Horses, and Field Artillery Interior Economy.

Suggestions on stable routine, and care of horses in field and garrison.

Erosion and Heat Cracks in American Guns.

Review of articles by Prof. Alger and Lt. Comdr. Yarnell in Proceedings of the U. S. Naval Institute, Sept. and Dec., 1910.

Gun Explosions and Smokeless Powder.

Review of the controversy caused by Hiram Maxim's open letter concerning American smokeless powder.

September, 1911.

Organization and Tactics of the Japanese Field Artillery.—Gen. Richter.

A most excellent review of the present situation in Japan. A few pages are devoted to organization and to technical data; the rest to tactics.

The English 12.7 cm. Siege Gun.

Description, with illustrations and tables, of the English 5-inch 60-pdr. gun. This appears to be of a type intermediate between 5-inch and 4.7-inch heavy field guns, approximating to the former in its ammunition and breech mechanism, and to the latter in its mounting.

Naval Attacks on Coast Fortifications.—Capt. Berger.

The principal interest of this article is in its discussion of reconnaissance from aeroplanes.

New Formulae for Computing Angle of Fall.

Formulae deduced from the work of Col. Haupt and Dr. Kranz, for computing angle of fall, when range, angle of departure and time of flight are known.

Giovanni Cavalli.—Lt. Col. H. Frobenius.

Sketch of the ordnance and engineering work of the late Italian general.

October, 1911.

Gen. Percin and the French Artillery in the 1910 Maneuvers.—Gen. Rohne.

A valuable paper, taking Gen. Percin's own book on these maneuvers as a text. After a general review of the accepted French ideas, the writer explains the experiments in the handling of large bodies of artillery in battle, which Gen. Percin wished to make, and the system of umpiring by which he hoped to make these experiments useful. Although the experiments were not carried out in the manner Gen. Percin proposed, nevertheless they had valuable results, and are now exercising great influence on the French theories of artillery tactics.

German Field Artillery Firing Methods.—Lt. Col. Hidikata.

Criticism of certain points in the German Firing Regulations of 1911, by a Japanese officer. The writer favors, for shrapnel fire, adjustment by battery, rather than by platoon or piece, and a 200-meter bracket in preference to 100. He also suggests the desirability of including "zone fire" in the Regulations.

Changes or Position.—A. Atabekoff.

This paper, translated from the *Russian Artillery Journal*, May, 1911, discusses the question of advancing to support infantry. The writer concludes that, while such changes will be necessary for a part of the batteries, they should be regarded only as a necessary evil, and made only when clearly demanded by the situation.

Transmission of Orders in Permanent Works.—Lieut. Goliasch.

The writer believes that in planning permanent works sufficient attention is not given to the system of communication. He here outlines a system which he considers suitable, using telephones, speaking tubes, and mechanical telegraph.

The Form of Projectile Heads.—Col. von Kobbe.

Mathematical investigation of the form meeting least atmospheric resistance.

Calculation of Recuperator Springs.—M. Pilgram.

The usual German practice is to compute the stress in recuperator springs statically, assuming a dead load. This paper presents formulae for making these computations, taking into account the acceleration of recoil, and wave pressures along the length of the spring column.

Adjustment of Range-finders.

New methods of adjustment, in addition to those described in the July number.

November, 1911.

Notes on Firing Practice, 1911.

A review, evidently by an officer of experience, of his observations during the practice season just ended. It is written in a spirit of the greatest enthusiasm for the panorama sight, and for all the new methods of laying which are now being introduced in the German service. It is novel and refreshing to find an authoritative German writer not only admitting, but insisting, that even in an unmasked position he prefers indirect fire, as being simpler and more accurate.

Preparation of Fire in Masked Positions.—Gen. Rohne.

This paper is especially interesting in that it shows so well the inner working of the German battery in action. Taking as his text an example from Wernigk's *Field Artillery Pocketbook* for 1911, the writer explains in detail how each operation is performed. Considering the methods described, Wernigk's estimate of time required to open fire (12 to 16 minutes) seems very low; the writer makes suggestions for quicker methods.

Time Adjustment for Percussion Fire.—Capt. Ludwig v. Majneri-Kempen.

It is only very recently that Germany has officially accepted time-fuze adjustment. The present paper points out instances where it is the only practicable method; as, for example, a target on a high narrow ridge, or on a tongue of solid ground in a marshy country.

Gun-Mountings with Recoil on the Carriage.—Gen. Bahn.

Additional historical notes, supplementing the article on the same subject in the July number.

Graphic Method for Calculating Trajectory.—Dr. Rothe.

A new method, claimed to be more accurate than old ones.

Artillery Notes from "Nauticus, 1911."—Gen. Rohne.

Review of the present status of naval and coast artillery.

MISCELLANEOUS ARTICLES.

ORGANIZATION.

Austria.

The reorganization now in progress will be completed in 1915. Active and landwehr divisions are to be alike in artillery. Each division will have one brigade, consisting of one regiment (six batteries of six guns each) and one battalion (three batteries of six howitzers each). Four divisions will have mountain equipment only. The type of field howitzer is not yet definitely settled; it will, however, be of thoroughly modern construction, caliber between 10 and 15 cm. Each of the ten cavalry divisions will have a horse artillery battalion of two batteries. Corps artillery is abolished.

Jahrbücher für die deutsche Armee und Marine, September, 1911.

Italy.

Under the law of July 17th, 1910, the Italian artillery is in process of gradual increase. The number of light regiments is to be 36, instead of the present 24, and two new heavy regiments are authorized. The new quarters are expected to be ready in 1913, and the last of the new Krupp guns are promised for the same time.

La France Militaire, August 6th, 1911.

Japan.

The present strength and organization of the Japanese artillery is as follows:

Field.—Twenty-five regiments, each of two battalions of three six-gun batteries, armed with Krupp 75 mm. rapid-fire guns, Mod. 1905. One regiment is assigned to each of the nineteen divisions, and the remaining six organized into three brigades. On mobilization each regiment forms a reserve regiment of four batteries, and a depot battery.

Horse.—Only two batteries now exist; six more are to be organized, so as to give two to each of the four cavalry divisions.

Mountain.—Three battalions of three six-gun batteries, and three independent batteries. On mobilization each battalion forms two reserve and one depot batteries. The mountain gun has the same caliber as the field gun.

Heavy.—Two brigades, each of three regiments, organized as for field artillery; also twenty-four coast battalions. On mobilization each battalion organizes a fourth battery; each regiment, two reserve battalions of two batteries each, and a depot battery. The heavy field batteries are armed with 10.5 cm. guns, 12 and 15 cm. howitzers, all of modern type.

Deutsches Offizierblatt, August 24th, 1911.

TRAINING.

New Austrian School of Fire.

A new field artillery school of fire was opened July 15 at Hajmasker. Ultimately it is to have one light and one heavy instruction regiment, and equipment for balloons and aeroplanes.

Jahrbücher für die deutsche Armee und Marine, September, 1911.

Coöperation Between Federal and State Batteries.

Capt. E. D. Scott, 5th F. A., proposes a system of affiliation of Regular and Militia batteries, the Regular battery commanders to act as instructors, and Militia officers to be authorized to serve for stated periods with Regular batteries.

National Guard Magazine, September, 1911.

Canadian Artillery Efficiency Returns.

Analysis of the orders publishing this year's results. Shows twenty-three field batteries organized, most of which spent sixteen days in camp. Fourteen of them have the new 18-pounder rapid fire gun, the others various older types.

Canadian Military Gazette, October 24th, 1911.

TACTICS.

Changes in Drill Regulations of German Heavy Field Artillery.

Amendments published in June, 1911, bring the heavy field artillery into much closer relations with the infantry. The heavy batteries are hereafter to be handled on much the same principles as the light; although they continue to be assigned directly to Army Corps, they are habitually to march and fight as part of the infantry divisions.

Deutsches Offizierblatt, August 24th, 1911.

Reply to an article in the *Militär Wochenblatt*, No. 120, 1910, which argued for the use of the heavy guns under the direct orders of the corps commander, taking the place of the old corps artillery. This writer urges, on the contrary, that they should be used in the closest connection with the infantry, marching well to the front in one of the infantry divisions, and going into action as early as possible.

Deutsches Offizierblatt, No. 13, 1911. French translation in *Internationale Revue ü. d. g. Armeen und Flotten*, September, 1911, and in *Journal des Sciences Militaires*, October 15, 1911.

Results of Firing Experiments.

Review of the general results of field artillery firing experiments, from the point of view of a well-informed infantry officer. Suggests experiment with a lighter, less powerful gun, sacrificing power to mobility, and especially to facility of movement by hand.

Lieut. Pasquale, in *Nuova Rivista di Fanteria*, August, 1911.

MATÉRIEL.

New Krupp field howitzer.

The new Krupp 10.5 cm. howitzer is an attempt to secure the advantages of both the constant-recoil and variable-recoil types, without their disadvantages. The recoil is constant for elevations up to ten degrees, giving maximum stability for direct fire; above this, the length of recoil is automatically reduced.

Kriegstechnische Zeitschrift, 9, 1911.

Krupp balloon projectile.

Description of a shell intended for use against balloons. It has a sensitive percussion fuze, with special safety device, and smoke tracer.

Deutsches Offizierblatt, August 17th, 1911.

Aeroplane gun.

Description of preliminary tests of Navy one-pounder aeroplane gun at Indian Head.

Army and Navy Register, September 2, 1911.

AERONAUTICS.

Observation from aeroplanes.

Report of successful observation of fire of heavy batteries from aeroplanes.

La France Militaire, August 12th, 1911.

Firing on air-craft.

Review of experiments made by various countries.
Kriegstechnische Zeitschrift, Nov. 8th, 1911.

Dropping bombs.

Description by R. E. Scott, late lieutenant U. S. Army, of his apparatus for dropping bombs from aeroplanes, with brief explanation of theory.
Scientific American, October 28th, 1911.

BOOKS.

Tactical Preparation of Artillery Officers. By Major Bourguet, 59th Artillery. Paris, Henri Charles-Lavauzelle.

Report of a series of tactical rides, by officers of an artillery battalion, accompanied sometimes by those of an infantry regiment; and of combined maneuvers of infantry and artillery. The preface points out that, on account of the nature of the service, the artillery officer is primarily occupied with technique, and special effort is necessary to secure for him tactical training; this series of exercises was devised expressly to this end. The book is a discussion of the results of the exercises, rather than a description of the methods; it is not only instructive, but very readable.

Infantry and Artillery in the Attack.—Colonel Lalubin. Paris, Henri Charles-Lavauzelle.

This book seeks to evaluate, from the standpoint of the infantryman, the support to be expected from artillery. The writer first cautions his readers that target practice results are not to be relied upon unreservedly in estimating war effect; that they can be used only as a point of departure for reasoning. He therefore follows the course of a battle in the conventional manner, trying to bring out how the artillery can act at each stage, and what the infantry can hope for. Saying at the outset that this support cannot be calculated mathematically, he does not attempt the impossible; he gives, throughout the book, a picture rather than a mathematical diagram. Taking the instant at which the artillery has to divert its fire from the enemy's trenches to be a crisis in the attack, he devotes a chapter to the battle up to that point, and another to what may happen afterward; in the latter he goes somewhat into detail as to the use of machine gun fire to supplement that of artillery. A third chapter discusses certain special cases, where thick country reduces or destroys the utility of artillery.

Three Years in the Confederate Horse Artillery. By George M. Neese. New York, Neale Publishing Co., 1911.

Personal experiences of a gunner in Chew's Virginia battery. Mildly interesting in parts, but of no general historical value.

Fourth Field Artillery Notes, Nos. 1 and 2. Fort Russell, Wyoming: Regimental Press, 1911.

These are the first of a series of leaflets, of only a few pages each, which the regimental commander intends to publish from time to time, primarily for the use of the officers of the regiment. The subjects dealt with are: No. 1, Functions of Mountain Artillery; No. 2, Principles of Conduct of Fire and Fire Direction.

ANNUAL MEETING FIELD ARTILLERY ASSOCIATION.

Pursuant to the notice mailed to all active members, the annual meeting of the Association was held at its office in Washington at 11 a. m., December 1st. Sixty per cent of the active members were present in person or by proxy.

The Secretary and Treasurer made verbal reports, which were accepted. Lieutenant Colonel John E. McMahon and Major William J. Snow, whose terms as members of the Executive Council expired at this meeting, were elected to succeed themselves.

After informal discussion of the affairs of the Association, the meeting adjourned.

FIELD ARTILLERY DIRECTORY.

REGULAR ARMY.

- 1st Regiment (Light).*—Col. David J. Rumbough: H. Q. and 2d Bn, Schofield Barracks, H. T.; 1st Bn, Manila.
- 2d Regiment (Mountain).*—Col. George W. VanDeusen: H. Q. and 2d Bn, Vancouver Barracks, Wash.; 1st Bn, Manila.
- 3d Regiment (Light).*—Col. Charles G. Treat: H. Q. and 1st Bn, Fort Sam Houston, Texas; 2d Bn, Fort Myer, Va.
- 4th Regiment (Mountain).*—Col. Alexander B. Dyer: Fort Russell, Wyoming.
- 5th Regiment (Light).*—Col. Granger Adams: Fort Sill, Oklahoma.
- 6th Regiment (Horse).*—Col. Eli D. Hoyle: Fort Riley, Kansas.

MILITIA

- 1st Inspection District.*—Lieut. Thomas D. Sloan, Inspector, Boston, Mass.
Massachusetts.—1st Bn, Maj. Charles F. Sargent: H. Q. and Btry. C, Lawrence; Btry. A, Boston; Btry. B, Worcester.
Rhode Island.—Btry. A, Capt. Ralph S. Hamilton: Providence.
Connecticut.—Btry. A, Capt. Luther E. Gilmore: Branford.
- 2d Inspection District.*—Capt. John W. Kilbreth, Jr., Inspector, New York City.
New York.—1st Bn, Maj. ———: H. Q., Btries A and B, New York City; Btry. C, Binghamton.
 2d Bn, Maj. John F. O’Ryan: New York City.
 Separate Btry. A, Capt. Guido F. Verbeck: Syracuse.
New Jersey.—Battery A, Capt. Harry L. Harrison: East Orange. Btry. B, Capt. Samuel G. Barnard: Camden.
- 3d Inspection District.*—Capt. Oliver L. Spaulding, Jr., Inspector, Washington, D. C.
Pennsylvania.—Btry. B, Capt. William T. Rees: Pittsburgh. Btry. C, Capt. Charles H. Cox: Phoenixville.
District of Columbia.—1st Btry. Capt. J. H. Shannon: Washington.
Virginia.—1st Bn, Maj. T. M. Wortham: H. Q. and Btry. A, Richmond; Btry. B, Norfolk; Btry. C, Portsmouth.
- 4th Inspection District.*—Lieut. E. P. King, Jr., Inspector, Atlanta, Ga.
Georgia.—Btry. A, Capt. R. J. Davant: Savannah. Btry. B, Capt. J. E. Eubanks: Atlanta.
Alabama.—1st Bn, Maj. J. Q. Smith: H. Q., and Btry. D, Birmingham; Btry. B, Montgomery.
Mississippi.—Btry. E, Capt. Dennis E. Hossley: Vicksburg.
Louisiana.—Louisiana Field Artillery, Maj. ———: H. Q., Btries. A, and B, New Orleans.
 Washington Artillery, Maj. ———: H. Q., Btries A and B, New Orleans.
- 5th Inspection District.*—Lieut. Charles M. Allen, Inspector, Cleveland, Ohio.
Ohio.—1st Bn, Maj. Harold M. Bush: H. Q., and Btry. C. Columbus; Btry. A, Cleveland; Btry. B, Toledo.
Michigan.—Btry. A, Capt. R. C. Vandercook: Lansing.
Indiana.—1st Bn, Maj. Frank E. Stevenson: H. Q., and Btry. C, Rockville; Btry. A, Indianapolis; Btry. B, Fort Wayne.
- 6th Inspection District.*—Capt. Charles C. Pulis, Inspector, Chicago, Ill.
Minnesota.—1st Bn, Maj. George C. Lambert: H. Q., Btries. A and C, St. Paul; Btry. B, Minneapolis.
Wisconsin.—Btry. A, Capt. P. C. Westfahl: Milwaukee.

- Illinois*.—1st Bn, Maj. Ashbel V. Smith: H. Q., and Btry. C, Waukegan; Btry. A, Danville; Btry. B, Chicago.
- 7th Inspection District*.—Lieut. Frederick M. Barrows, Inspector, Kansas City, Missouri.
- Missouri*.—Btry. A, Lieut. Eugene O. Sanguinet: St. Louis. Btry. B, Capt. George K. Collins: Kansas City.
- Kansas*.—Btry. A, Capt. W. A. Pattison: Topeka.
- Texas*.—Btry. A, Capt. F. A. Logan: Dallas.
- New Mexico*.—Btry. A, Capt. M. S. Murray: Roswell.
- 8th Inspection District*.—Capt. Dennis H. Currie, Inspector, Denver, Colo.
- Colorado*.—1st Bn, Maj. J. B. Goodman, Jr.: H. Q., Btries. A and B, Denver.
- Utah*.—1st Btry. Capt. ———: Salt Lake City.
- Oregon*.—Btry. A, Capt. Hiram U. Welch: Portland.
- California*.—Btry. A, Capt. Reuben A. Ford: Los Angeles. Btry. B, Capt. Ralph J. Faneuf, Oakland.
- Unassigned*.
- New Hampshire*.—Btry. A, Capt. Edwin L. Towle: Manchester.

ACTIVE MEMBERSHIP PERCENTAGES, FIELD ARTILLERY
ASSOCIATION.

4th Regiment -----	94
6th Regiment -----	89
5th Regiment -----	81
1st Regiment -----	74
2d Regiment -----	74
3d Regiment -----	72
1st Militia District -----	67
5th Militia District -----	64
Unassigned officers, U. S. F. A. -----	60
8th Militia District -----	46
3d Militia District -----	42
2d Militia District -----	38
7th Militia District -----	38
6th Militia District -----	35
4th Militia District -----	20

In order that the above table may be corrected before each issue of the Journal, Militia commanding officers are requested to keep correct lists of their officers constantly on file in the Secretary's office. Two States having failed to send in such lists, their batteries were taken, in calculating percentages, to have full complements of officers.