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Vol. III APRIL-JUNE, 1913 No. 2

FIRE FOR EFFECT.

BY CAPTAIN FRANCOIS ADOLPHE TRÉGUIER.

**Translated from the French by Lieut. Col. Ernest Kinds, 5th F. A.*

(Continued from January-March, 1913, number.)

ARTICLE III.

Determination of the slope.

The above discussion proves that the battery commander should have at least an approximate knowledge of the character of the slope in order that he may properly deliver fire for effect, giving the greatest probable effect for the minimum expenditure of ammunition. But generally he will, of course, have no knowledge of the slope; he may, indeed, estimate the probable value of the slope to be beaten, basing his estimate upon the average slopes of the country; and upon this estimate he will base his choice of the kind of fire for effect that he must let loose as soon as possible after the fire has been adjusted upon the crest. But when this first fire for effect has taken away from the enemy all or at least part of his freedom of action, the battery commander will then endeavor to strike him with more accuracy by determining the character of the slope upon which he is located and by deducing therefrom his approximate position in rear of the crest.

The method of determining the slope is based upon the following principle:*

The ball of smoke from a percussion burst has a height of about 4 meters. Therefore, let us fire percussion shots starting with the range of the crest and increasing the ranges by 25 meters in succession. So long as the smoke may be seen over the crest, the point of fall is less than 4 meters below the plane of site of the crest. On

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*Pointed out by Lieutenant Zambeu in *Revue d'Artillerie for* October, 1909.

the other hand, it is at least 4 meters below when on increasing the range by 25 meters the ball of smoke is not seen.

The distance of this last point of burst from the crest is given, as we have already seen, by the formula $d = \Delta R\ (1 + \quad)$, in which ΔR is the increment of the range of the crest. Furthermore, the point of fall of the first range giving bursts from which the ball of smoke is not seen is approximately 4 meters below the plane of site; and we may without sensible error write: $d \quad = 4$ meters.

Whence $d = \quad = \Delta R\ (1 + \quad)$. Therefore, $p =$

By varying the range of the crest, and thereby changing ω, we obtain for different values of ΔR the following values for the slope:

ΔR	Ranges.				
	2000	2500	3000	3500	4000
25	4.5%	5.7%	6.7%	7.7%	8.5%
50	3.5%	4.2%	4.7%	5.2%	5.5%
75	2.8%	3.3%	3.6%	3.9%	4.1%
100	2.4%	2.7%	3.0%	3.1%	3.3%

It is sufficient in practice, therefore, to use percussion fire starting with the range of the crest and increasing the ranges by 25 meters, in order to determine the character of the slope in rear of the crest and to deduce therefrom the kind of echelon fire to be used.

ARTICLE IV.

Comparison of the relative visibility of flashes and percussion bursts.

Whenever the flashes of the enemy's guns can be seen we need not trouble ourselves in regard to the character of the slope. A simpler method may be used to determine the kind of fire to adopt.

Since the flash and the ball of smoke from a percussion burst have very approximately the same height, it is sufficient, in order to obtain a bracket of the hostile artillery, to compare the visibility of the flashes and the percussion bursts.

For example, we can just see the top of the flashes of the enemy's artillery located behind a crest at 2500 meters range. Let us fire

percussion shots increasing the ranges by 25 meters, and let us suppose that range 2525 gives bursts which are clearly visible; at range 2550 we can see the top of the balls of smoke; at 2575, no smoke from the bursts is seen.

It is very evident that range 2575 is long with respect to the hostile artillery and that 2525 is short. Consequently, the kind of fire for effect to use is an echelon fire with 25 meters variations in range, covering this 50-meter bracket.

REMARK: It is understood, of course, as has been stated above, that the search for this narrow bracket must not be undertaken until after a first fire for effect has been executed and the enemy has in consequence already been deprived of a part of his freedom of action.

ARTICLE V.

Case in which the hostile artillery is on the counter slope.*

The mehod which we have just discussed for finding the narrow bracket cannot be used if the hostile artillery, in place of being on the slope in rear of the crest, is on the counter slope. How can we determine whether or not this is the case?

In adjusting the fire upon a crest the most advantageous height of burst is not the height of 1 mil above the crest, as it is in the case of a visible target. Indeed, we know that at mean ranges the probable variation of the height of burst is about 1 mil. Therefore, if the mean height of burst is 1 mil above the crest there will be 75% of bursts above the plane of site of the crest and 25% only below it. Consequently, there will be a considerably greater number of shots not observable than there will be observable.

On the contrary, if the mean height of burst be at zero—that is, in the plane of site of the crest itself, there will be 50% of shots below this plane of site, almost all of which, even the overs, will probably be observable.

Now, suppose that we adjust upon the crest with the mean height of burst in the plane of site of this crest. If the artillery is on the slope, the chances are that we will see some of the flashes in front of the bursts of salvos which are long with respect to the crest. If, on the other hand, no flashes are seen in front of these bursts, we are still in doubt.

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*The supposition still holds good that the hostile artillery has not flash defilade.

Another indication of the position of the hostile artillery may perhaps be given by the first fire for effect, which will be executed after the adjustment upon the crest. If this fire silences or causes a decrease in the intensity of the enemy's fire, we may almost certainly conclude that his artillery is on the slope. On the other hand, if his fire does not slacken, we shall still be in uncertainty as to his location.

In this case, since positions on the counter slope, although not infrequent in time of war, will certainly not be as frequent as positions behind the crests, it seems best at first to assume that the hostile artillery is in rear of the crest and to endeavor to determine the short bracket as has been indicated above. If the second fire for effect, executed over this short bracket, should give no more results than the first one gave, the artillery is probably not on the slope in rear of the crest C (Fig. 6). It is probably at A on the counter slope in rear.

How shall we strike it in this case?

We shall indicate two possible methods, which, we must frankly admit, will not always be successful. But at least these means will be available to those who have carefully studied them beforehand, whereas battery commanders who have given no previous thought to the subject will be at a loss to know what to do when opposed to an enemy so placed, or they will expend the greater part of their ammunition without result.

1st Method.—Starting with the long range of the bracket of the crest and keeping the corrector which gives the mean point of burst in the plane of site CD of this crest, increase the ranges by 200 meters each time, for example, so as to get a hostile flash which is seen in front of the burst of a salvo. If we succeed in this, we shall have a bracket the long range of which is over with respect to this artillery, and we can then cover the ground between this point and the crest with echelon fire.

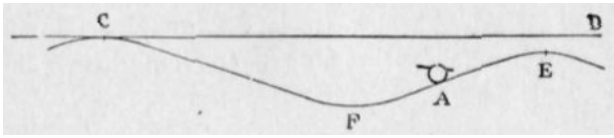

Fig. 6.

2nd Method.—Fire percussion shots using increments of 100 meters in range starting with the long range of the bracket of the crest. This percussion fire will after a certain time begin to strike the counter slope FE; and at a certain range R, the chances are that we will see the balls of smoke from the impact bursts, since the flashes of the hostile artillery located on this counter slope are visible.

We have then one of two cases:

1. The balls of smoke are more clearly visible than the hostile flashes. In this case it is very probable that the range R is long with respect to these flashes. This being the case, we will continue by decreasing the range R by 25 meters in succession until we can no longer see the percussion bursts. We then have the short range of the bracket with respect to the hostile artillery.

2. The balls of smoke are but little more visible than the hostile flashes. We will then diminish the range R by 25 meters each time until the percussion bursts disappear from view. We have then a range which is short, and starting with this range we will execute an echelon fire with time fuze using increments of 25 meters in range until we reach the range R plus 25.

CHAPTER III.

FIRE WITH EXPLOSIVE SHELL.

ARTICLE I.

Against artillery visible only by its flashes.

The determination of a short bracket of the hostile artillery by the method indicated above is particularly advantageous when we want to use explosive shell against it. In such cases as this we know that, after we have found a 100-meter bracket of the crest using explosive shell, the regulations recommend starting with the long range of the bracket increased by 50 meters, and then proceeding with ranges decreasing by 25 meters until we see that the shots are certainly short.

For example, the crest has been bracketed between 2500 and 2600. Explosive shell will be fired at the ranges 2650, 2625, 2600, 2575 and 2550, presuming that 2550 gives shots that are undoubtedly short.

The regulation method has evidently the great merit of simplicity, but there are two objections to it:

1. It requires quite a large expenditure of ammunition, since in most cases we have to fire at five ranges;

2. The greatest objection, however, is that it covers the ground in the opposite manner from that which the degree of slope requires.

To illustrate, let us suppose that hostile artillery with a defilade of 2.6 meters is behind the crest above referred to (2550) and let us examine the effect produced by the regulation method of fire, first in the case of a gentle slope (1%), then in the case of a steep slope (6%).

CASE OF THE 1% SLOPE.

The hostile artillery is 260 meters in rear of the crest. Now, if we refer to the table of variations of the points of fall, we see that the greatest range of the Regulation method, 2650, has its point of fall at about 110 meters from the crest. This range is, therefore, 150 meters short of the target. The regulation fire for effect will consequently be wholly ineffective in this case.

CASE OF THE 6% SLOPE.

The hostile artillery is about 43 meters from the crest. Now, the point of fall for range 2650 is at 300 meters beyond the crest, that for 2625 at 225 meters, that for 2600 at 150 meters, and that for 2575 at 75 meters. Only the range of the crest, 2550, will have any effect on the target.

In other words, if the slope is gentle, the hostile artillery, the flashes of which alone can be seen, is far from the crest, whereas the projectiles in the regulation fire for effect strikes quite near it. On the other hand, if the slope is steep, the target is close to the crest, while most of the shots in the fire for effect strike far beyond it.

Now let us see what will happen if we use the method of determining the narrow bracket, by comparing the visibility of the hostile flashes and the balls of smoke from percussion shots.

Under the supposition that the crest is at 2550, we will proceed by successively increasing the ranges by 25 meters, and as before, let us suppose that:

2575 gives bursts which are clearly seen and more visible than the flashes;

2600 gives bursts of which only the tops of the balls of smoke can be seen;

2625 gives no visible bursts.

We have then a bracket 2575 short, 2625 long, and it is very clear that it will be sufficient to cover this 50-meter zone with explosive shell; whence economy in projectiles, and, what is of more importance, a certainty of beating the zone occupied by the enemy.

But here an apparent difficulty arises: the bracket having been obtained by percussion shrapnel, we have to pass to explosive shell fire, and the latter are about 2 kilogrammes lighter than the shrapnel. But this change is very simple.

By consulting the range table we see that for ranges of approximately 2500 meters the range is practically the same for shrapnel and for explosive shell. At 2000 meters the shrapnel elevation must be decreased 25 meters for explosive shell. At 3000 meters, on the contrary, we have to increase it by a little more than 25 meters—38 meters, to be exact.

But suppose that at 3000 we increase the range by 25 meters instead of 38, an analysis will show that the results obtained are sensibly the same on account of dispersion of shots.

Let be the bracket CL (Fig. 7) found with percussion shrapnel. Let us suppose further that on passing to the fire for effect with explosive shell we have obtained exactly the same ranges and that we execute the fire for effect at the short range C, the mid range of the bracket M, and the long range L.

On account of the dispersion, we know that we shall have 63% of the shots falling between C and L, as the figure shows.

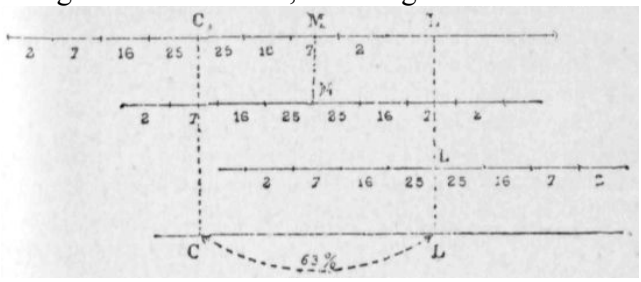

Fig. 7.

Let us suppose that upon passing to fire for effect with explosive shell, we increase the range determined with percussion shrapnel by 25 meters, 13 less than the 38 meters which is the difference between the trajectories of these two projectiles. The mean point of impact of the short and the long ranges will be no longer C and L, but C' and L', 13 meters short of C and L (Fig. 8) and the 63% of shots will fall between C' and L'.

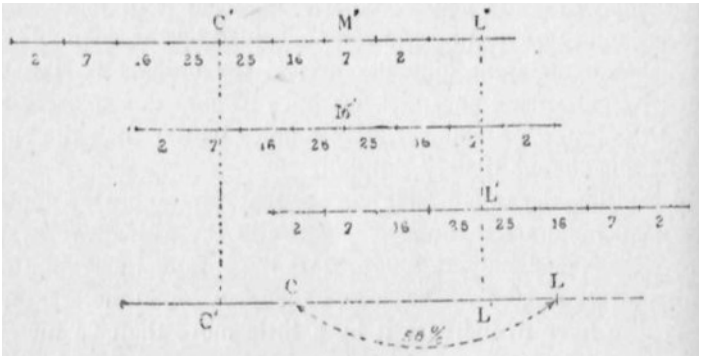

Fig. 8.

Since at this range, the probable deviation is about 11 meters, it is very easy, from the scales of dispersion indicated on the figure, to see that between the points C and L—that is to say, in the zone occupied by the hostile artillery—there will be 58% of shots. In other words, if the fire for effect consists of two salvos at each of the three ranges, 15 out of the 24 shots would fall in the zone considered if we fire with the ranges exactly the same as in the percussion shrapnel fire, whereas 14 would strike this zone if we merely increased the ranges by 25 meters.

We see, then, that passing from the percussion shrapnel bracket to the corresponding high explosive bracket is very simple indeed:

For ranges of approximately 2500 meters, make no change;

Below 2500, diminish the ranges by 25 meters;

Above 2500 up to 3000, increase by 25 meters;

Beyond 3000, the ranges must be increased by 50 meters.

For example, the bracket obtained with percussion shrapnel is 2800-2850. The fire for effect with explosive shell will be at the ranges 2825, 2850, and 2875.

REMARK:—This method, we repeat, is not as simple as the regulation method, which we have no intention of condemning. But it has, as compared with the latter, the great advantage of beating the exact ground occupied by the target, and of avoiding—in the case of gentle slopes, for example—a fire for effect wholly ineffective.

CONCLUSION TO BE DRAWN FROM THE FOREGOING DISCUSSION.

This study of fire against artillery located in rear of crests has shown us that when the hostile flashes are visible, we can determine a narrow bracket enclosing it, and consequently can silence it, and perhaps inflict upon it very sensible losses. On the other hand, the location of artillery whose flashes are not visible cannot be accurately determined by the opposing side. If the latter has no aerial observatory, he will either give up firing upon artillery of whose position he has no knowledge whatever, or he will expend over wide areas a great part of his ammunition without any appreciable results. So batteries should not hesitate to take at least flash defilade whenever such defilade is compatible with their mission and whenever the requirements of command, observation or communications do not prevent.

ARTICLE II.

Against artillery whose matériel is visible.

The Regulations say "The number of projectiles required to hit one of the two carriages of a section varies with the range and the conditions of observation. It is, on an average, 15 or 25 projectiles, according as the range to the target is 2500 or 3500 meters."

This number of shots indicated by the Regulations is indeed that which, in firing in time of peace, executed by cannoneers who are perfectly calm and thoroughly drilled in the mechanism of fire, is required to hit one of the carriages of a section. But in war, when we must reckon upon numerous errors due to nervousness of the personnel, in our opinion, this number will be greater.

It is very essential that officers should have a thorough knowledge of this matter in order that they may not, in certain cases, begin without due consideration, a fire for demolition which would require a much greater expenditure of ammunition than they had at first estimated.

Let us take the height of the gun shield to be 1.35 meters, and that of the caisson to be .93 meters; that is, for the two, a mean height of 1.14 meters. If we take as the average width of the piece and of the caisson, 1.1 meters, the two carriages will present a visible surface of about 2.5 square meters.

Furthermore, let us assume that the fire is accurately adjusted, so that the mean trajectory passes through the center O (Fig. 9) of this visible surface.

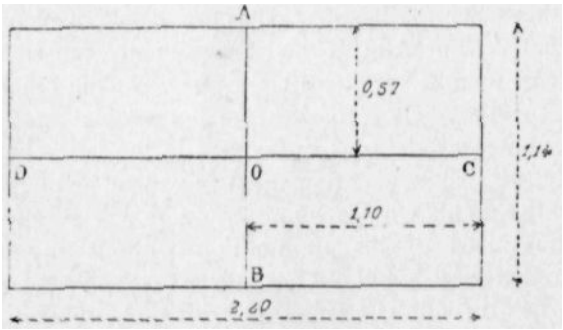

Fig. 9.

At 2500 meters the probable deviations given by the tables are: 0.9 meters vertical deviation, and 0.8 meters lateral deviation.

But these tabular deviations are obtained in accurate proving ground firings; they will be very different on the battle field on account of errors referred to above. It is admitted that in practice we should double these deviations.

Consequently, we will take as probable deviations at 2500 meters: 1.8 meters vertically and 1.6 meters laterally.

According to the law of dispersion, the number of shots striking a horizontal band of the height OA is: 25% of = 7.9%. Similarly an equal number of shots will strike a horizontal band of the height OB; so the probability of striking a horizontal band of the height AB is 15.8%.

The probability of hitting the vertical band of width OC will be: 25% of = 17%; and for the vertical band of twice that width CD it will be 34%.

Finally, the probability of hitting the portion common to the two bands considered—that is, the surface which we desire to hit—will be the product of the separate probabilities, or .15 × .34 = 5% approximately. That is, one shot in twenty will hit the target.

At 3500 meters, the probable deviations in actual service will be: 3.6 meters vertically, 2.6 meters laterally.

Hence, the probability of hitting in height is:

$2 \times .25 \times \qquad = 7.9\%.$

Probability of hitting in direction is: $2 \times .25 \times \frac{1.1}{3.6} = 21\%.$

Therefore the final probability is: .079 × .21 = .016; that is, one shot in 62 will hit the target, gun-caisson.

Again we must not lose sight of the fact that we have assumed that the mean trajectory passed through the center of the surface to be hit, which will rarely occur.

But if the fire has been adjusted so that the mean trajectory passes through a point at a distance of once or twice the probable deviation from the center O, which will be the case more frequently than the preceding, the number of projectiles required will be considerably greater.

Let us assume, for example, that the mean trajectory passes through a point at a distance of once the probable vertical deviation above the upper edge of the surface to be hit, and that the direction has been adjusted on a point at distance of once the probable lateral deviation from the center O of this surface. We shall then have:—

1. At 2500 meters:

Probability of hitting in height: $16\% \times \qquad = 10\%.$

Probability of hitting in direction: $25\% + 16\% \times \qquad = 31\%.$*

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*TRANSLATOR'S NOTE.—31% is the probability of hitting in direction when the mean trajectory passes through the right or left edge of the target. If it passes through a point 1.6 meters (once the probable lateral deviation) to the right or left of the center 0, the probability of hitting in direction will be $25\% \times \qquad + 16\% \times \frac{1.1}{3.6} = 28\%$. Final probability: 10% of 28%=2.8% or 1 shot in 35 instead of 1 shot in 33.

Final probability: 10% of 31% equals 3%; or 1 shot in 33.

2. At 3500 meters:

Probability of hitting in height: 16% × =5%.

Probability of hitting in direction: 25% × =21%.

Final probability: 5% of 21% = 1%; or 1 shot in 100.

400 explosive shell would therefore be required at 3500 meters to put 4 of the enemy's guns out of action.

Maximum range.—This range of 3500 meters seems to be the maximum range at which we should undertake fire for demolition.

At 4000 meters, indeed, the probable deviations under service conditions will be: 5 meters vertically, 3.2 meters laterally.

Under the supposition that the fire has been adjusted as above, to within one probable deviation, both vertically and laterally, we should have:

Probability of hitting in height: 16% × = 3.6%.

Probability of hitting in direction: 25% × = 17%.

Final probability: 3.6% of 17% = .6%; or, 1 shot in 166. To destroy four hostile guns, we would need 664 explosive shell.

CHAPTER IV.

FIRE UPON THE GROUND SLOPING DOWN TOWARD THE FIRING BATTERY.

ARTICLE I.

Changes to be made in the corrector.

Let A and B (Fig. 10) be the points of fall on the horizontal plane PAB of a gun P, pertaining to two trajectories whose ranges differ by 100 meters. AB = 100.

If E be the point of burst at a height of 1 mil above the point A, the point of burst E_1, if the corrector be not changed, will be on prolongation of the line PE, and we shall have, for all practical purposes, $E_1B = EA$.

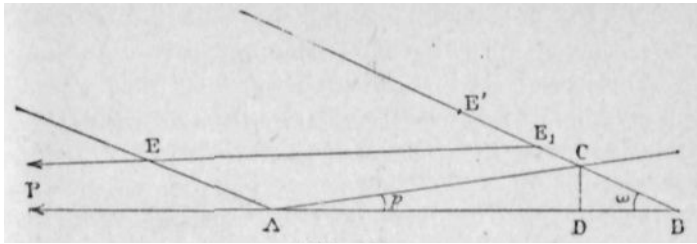

Fig. 10.

Let us assume that at the point A, the ground begins to slope upwards, making an angle *p* with the horizontal AB and intersecting the second trajectory at a point C.

If we desire the point of burst to be at E', at the same distance from C that E is from A, we must move it back along the trajectory a distance $E'E_1$ = CB. Let us now calculate the value of CB as a function of the slope *p*. To do this, from C draw CD perpendicular to the horizontal AB. We have then: CD = CB = AD .*

Hence, $CB=AD\frac{P}{\omega}$. But AD=AB—DB=100—DB. And as DB is very approximately equal to CB, we may, without sensible error. write: $<CB = (100 — CB)\frac{P}{\omega}$. Whence CB = .

Now by varying the slope ρ and the range, that is ω, we obtain for CB, corresponding to an increment of 100 meters in range, the values shown in the following table:

	Slope			
Range	2%	3%	6%	10%
2000	24	32	48	61
2500	17	24	38	51
3000	14	20	35	46
3500	11	17	28	40

Now we know that an increase of 1 in the corrector brings the point of burst back towards the battery about 30 meters at ranges under 2500 meters and about 25 meters for greater ranges. Therefore,

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*CD = CB = AC $\frac{P}{1000}$ = AD $\frac{P}{1000}$, since AC=AD, without sensible error.—*Translator*.

an examination of the above table leads us to adopt the following simple rule:

For ranges under 2500 meters, increase the corrector by 1 for an increase of 100 meters in range, if the slope is not steep; if the slope is steep, increase the corrector by 2.

For ranges greater than 2500, increase it by 1, unless the slope be gentle, in which case the corrector should be changed only after two or three increments of 100 meters.

ARTICLE II.

Fire against a target moving down the slope.

Let us assume that a battery which is observing the slope AC (Fig. 11) has determined the range 2550 and the corrector for firing

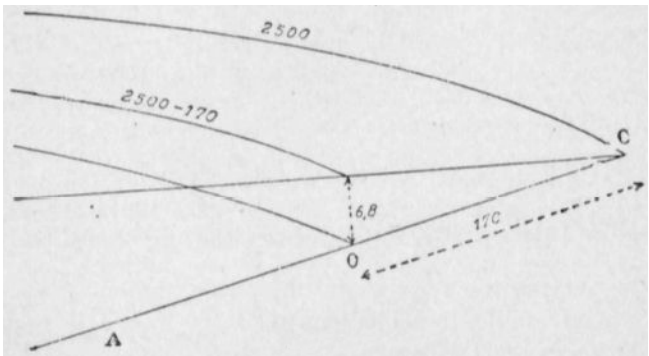

Fig. 11.

upon the crest. Suddenly the battery commander sees an objective cross the crest line and start down the slope, which we will assume to have a mean value of 4%. What kind of fire for effect shall be use against this target?

There are two cases to be considered: That of a rapidly moving target, cavalry or artillery, coming down the slope at a rapid gait; and that of a target moving less rapidly, infantry for instance.

If we estimate the time required for the battery commander to see the target, to judge of its direction, to order perhaps a change in the deflection, and finally to give his commands for fire for effect, we must conclude that under the most favorable circumstances at least twenty seconds must elapse before the first salvo is fired. The bursts of the projectiles will not occur until six or seven seconds

later; so that from the time the target crosses the crest until the projectiles burst about thirty seconds will have elapsed.

In the case of a rapidly moving target, artillery at the gallop, for example, the target will have passed over about 170 meters during these thirty seconds, and consequently will be at O (Fig. 11) or at .04 × 170 = 6.8 meters below the crest. Its angle of site will therefore be = about 3 mils less than that for the crest.

In order that the trajectory may pass through the target it would have to be fired, as will be seen from the figure, with the range of the crest, 2500, diminished first by 170, then by as many times 30 meters as there are mils in the decrement of the angle of site—that is, with the approximate range:—2500—(170 + 3 × 30) = 2500—260.

But this double decrease in the range would not be sufficient to give the greatest effect upon the target at O. We would also have to decrease the corrector by an amount exactly equal to that by which the angle of site of the target has been diminished; that is, by about 3 mils.

All this is somewhat complicated and requires study. So in the case of a rapidly moving target, where the battery commander has no time for reflection and where the fire for effect must be launched at the earliest possible moment, the simplest, and therefore the best, method will be: either to diminish the range of the crest by 400 and execute progressive fire with a corrector corresponding to the mean range of this progressive fire; or else to keep to the range of the crest decreased by 400 in order to form a barrier in front of the target.

If the target is infantry coming down the slope at double time and if the battery commander wants to attack this infantry by successively decreasing ranges, as we have seen done, he must take care not to be timid in diminishing his ranges; otherwise, his salvos will always burst beyond the target.

Indeed, infantry at double time will pass over 100 meters in thirty seconds. We must then for the first salvo, decrease the range of the crest not by 100 meters only, but by 100 + × 30 = 150 meters.

CHAPTER V.

FIRE AGAINST OBSTACLES.

The Regulations say "Most obstacles may be destroyed by field artillery at the cost of a greater or less expenditure of ammunition."

This statement is somewhat vague, and it may not be amiss, for the benefit of battery commanders, to make a study of the greater or less facility with which various obstacles may be destroyed, of the kind of projectile which should be employed, of the approximate number of projectiles required, and of the time required for the demolitions.

In field warfare the obstacles to be encountered by an offensive force are of two kinds: obstacles proper, such as walls and high embankments which delay the advance of the assailant, even though they may not be occupied by the enemy; and certain points of support, such as houses, farms, villages, steep slopes and parapets, if they are occupied by the defender.

Let us consider for a moment the conditions which seem most favorable for attacking these different obstacles.

§1. WALLS.

Two courses are open to the artillerist in attacking a wall: To make a breach in it so as to enable the infantry to move forward, or to strike the defenders who are firing through the loop-holes which they have made in the wall.

The number of projectiles and the time required for breaching a wall evidently depend on several conditions: the thickness and height of the wall, the nature of the construction, the more or less exact adjustment of the fire. But we can, at least in the case of walls, consider that average conditions will obtain, for example, such as are ordinarily encountered in the case of park walls, which have been and will always be frequent obstacles in warfare.

Knowledge of this question is indispensabe to battery commanders in order that they may begin fire for demolition not too soon, otherwise the enemy would have time to mask the breach, but also in time to avoid delaying the forward movement of the attacking infantry.

Let us suppose that a battery has received orders to make a breech 40 meters wide in a wall 2 meters high at a range of 2000 meters.

It is considered that about 16 to 17 kilogrammes of ammunition per running meter* are required to make breach 40 meters wide, we must strike the wall with about 660 kilogrammes of ammunition, or 91 projectiles, under the supposition that these projectiles are very evenly distributed.

Let us assume that the mean trajectory of the bracket passes through the point B (Fig. 12) at a distance of once the probable deviation above the center O of the wall.

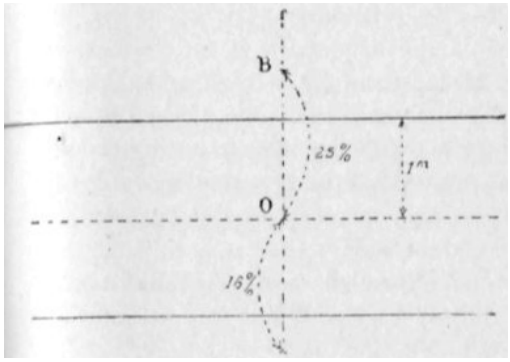

Fig. 12.

The probable vertical deviation under service conditions at a range of 2000 meters being 1.2 meters, we shall have the following percentage of hits on the wall:

$$.25 \times \frac{1}{1.2} + .16 \times \frac{1}{1.2} = .34.$$

That is one shot in three will hit the wall, and therefore 91 × 3 = 273 shots must be fired.

As we have assumed that the projectiles which strike the wall are very evenly distributed, which will never be rigidly true, we will have to reckon upon an expenditure of about 300 rounds, that is 75 per gun.

Since this fire has to be as precise as possible, we cannot count on a rapidity greater than five shots per gun per minute. Therefore after the adjustment of the fire has been completed about fifteen minutes will be required for the battery to make a breach of 40 meters.

This fire will generally be made with percussion shrapnel.

Let us now suppose that we wish not to make a breach but to reach the defenders behind the wall. Time shrapnel will produce no effect because of the small angle of incidence which the bullets have with respect to the ground. Percussion shrapnel bursting against the external face of the wall will have no greater effect.

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*Course of artillery, by Colonel Fayolle (War College).

We must therefore have recourse to explosive shell, which, bursting behind the wall, may have a great effect if the burst occurs under favorable conditions.

§2. EARTHWORKS.

A shrapnel or an explosive shell bursting in an earthwork makes a crater in it, throwing up the earth around the edges on all sides. But this crater will soon be filled up again by the earth from neighboring craters, so that earthworks cannot be destroyed, and they continue to give shelter to the defenders.

The most that can be done if the earthwork is an obstacle to the advance of the assailant, as for example, a high embankment with a vertical exterior face, is to decrease the value of the obstacle by transforming this vertical face, by. firing into it until it is reduced to an inclined plane so that the infantry may more easily surmount it. But to do this as many projectiles will be required as for breaching a wall of like dimensions; that is a considerable amount of ammunition must be expended, and generally it will be out of proportion to the assistance rendered to the infantry in enabling it to get over the earthwork.

Therefore fire against earthworks will generally be for the purpost of attacking the defenders who are sheltered by them; and in this case the Regulations prescribe that "Time shrapnel or explosive shell will be used."

We must understand throughly the meaning of this statement. It cannot mean that we may indifferently and in all cases fire upon the defenders either with time fire shrapnel or explosive shell.

If the defenders are firing and consequently are partly exposed, and if our infantry is at least 500 meters from the earthwork, we must fire time shrapnel because its great extent of sheaf will surely cover all the bracket inclosing the target.

But if our infantry is quite near the earthwork so that there is danger of hitting them with time fire, one of two things will occur: Either the defenders will expose themselves in order to fire, in which case, if the range is not over 1500 to 1800 meters, percussion shrapnel will give a very considerable effect, probably greater for the same number of shots than that of explosive shell.

If, on the other hand, the defenders that we wish to reach are completely sheltered behind the earthwork, explosive shell alone

will produce any result. It is true that in this latter case quite a large number of shots will be required because of the small radius of action of the explosive shell. This number will vary inversely as the precision of adjustment of the fire. It is therefore extremely important for the infantry to conceal as much as possible the intrenchments behind which they take shelter.

REMARK.—It may not be out of place here to call attention to the superiority of the new explosive shell.

Let us assume, for example, that we want to attack, with the old shell, defenders who are sheltered in a ditch .6 meters wide at a range of about 1500 meters. In order that the shell may have any effect it would have to burst in the ditch. Furthermore, let us assume that the range used gives a mean trajectory which passes exactly through the center of the ditch. As the probable variation in range under service conditions is 15.8 meters, the percentage of shots bursting in the ditch would be: 25% × × 2 = .9%, or 1 shot in 111.

But if the mean trajectory does not pass, as is most likely, through the ditch itself, and has its point of fall at a distance of once the probable deviation, let us suppose, from the ditch, the percentage of shots striking in the ditch is only: 16% × = .6%, or 1 shot in 166. The amount of explosive shell formerly furnished each battery would not have been sufficient.

But in order to obtain effect, there is no necessity for the new shell, which bursts in air after ricochetting, to strike in the narrow band formed by the ditch, and consequently a smaller number of shell will be sufficient to obtain effect upon the defenders behind their shelter.

§3. HOUSES, FARMS AND VILLAGES.

Artillery can render untenabe by the enemy any isolated house, since it can very quickly destroy its walls; also any farm house not surrounded by an enclosure permitting the defenders to keep outside of the buildings.

Fire against houses will be, so far as possible, not with percussion shrapnel as in the case of an ordinary wall, but preferably with explosive shell which have a double action; shock action against the wall penetrated, and action both material and moral against the personnel inside the house.

Against villages, in addition to firing against the edges, artillery may have to bombard them in order if possible to reach the reserves which are in the interior and in order to render the buildings untenable. This fire will preferably be executed with explosive shell. It will generally be quite a rapid fire, executed by salvos or rafales of echelon fire so as to cover the entire depth of the village, slightly before the moment of assault in order to immobilize the enemy's supports, to sap their morale, and on the other hand to increase that of the assailants.

CONCLUSION.

In the course of this study, we have not laid down absolute rules; we have merely endeavored to bring out the comparative properties of the various kinds of fire so that they may be made the basis of a rational decision by the battery commander, whose duty it is to select the kind of fire for effect to be used.

The lessons which have been brought out in the course of this study may be summed up as follows:

For a 400 meter bracket, the fire will be an echelon fire with increments of 100 meters in range.

For a 200 meter bracket, it may be an echelon fire with ranges varying by 100 meters; but if the situation does not demand the 100 meter variation, it will generally be better to make 50 meter changes.

For a 100 meter bracket we may in most cases use echelon fire at the short and mid ranges of the bracket.

In firing against artillery whose flashes are seen in rear of the crest, the corrector should not be diminished as the range is increased.

If we have no knowledge of the character of the slope in rear of the crest, the echelon fire most likely to be effective is one in which the variation in range is 50 meters using three or four different ranges. If this first fire does not give sufficient results we should try to find by the method of percussion bursts, a narrow

bracket which will enable us with certainty to strike the hostile artillery, either by time fire or by explosive shell fire.

On the other hand, if the hostile artillery has flash defiade and we have to cover the slope in rear of the crest, since the echelon fire to be employed will have 100 meters, 50 meters, or 25 meters variation in range, depending upon the steepness of the slope, it will be best, if we want to avoid losing a large amount of ammunition, to endeavor to determine the approximate value of the slope by the method of percussion bursts.

Finally, we have endeavored to throw light upon the question of the number of shots required to destroy *matériel* and obstacles, and upon the kind of projectiles to use in the different cases.

The questions treated here include then, approximately, those which are presented to the battery commander for decision at the moment he must make his choice of the kind of fire for effect to be used. Consequently it is incumbent upon him to think over the subject if he expects to fulfill his mission in the best manner possible. Our object will be largely attained if the present study contributes to make this task easier for him.

AMMUNITION SUPPLY.

A MAP PROBLEM SOLVED AT ARMY STAFF COLLEGE.

BY MAJOR H. G. BISHOP, 5TH FIELD ARTILLERY.

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Note: Section 235, F. S. R., states: "Ammunition trains are usually commanded by Artillery officers, assisted by infantry or cavalry officers who will have immediate charge of small-arms ammunition supply in combat."

The Report of the General Staff on the Organization of the Land Forces recommends an organization for the ammunition column of a division, etc., which is shown diagrammatically in Plate I. The report also states: "The personnel of this service (Field Artillery) is charged with receiving ammunition from the line of communication troops, transporting it up to the neighborhood of the combatant troops, and distributing it to the various combat trains of Infantry, Cavalry and Field Artillery."

In view of the foregoing, it appears that the Field Artillery will be required to perform this service: viz., handling the ammunition columns of divisions, etc., and the following practical problem is submitted as an example of such duty.

The appended solution is a composite one, underlying the best ideas of the present Staff Class.

NOTE: Where "orders" are required in the solution of the following problem, make reasonable assumptions as to the subordinates, messengers, etc., who are present and give the orders of the individual in the first person, exactly as he would speak or write them, except that in any one requirement "information of the situation" need be given but once; that is, it may be omitted from subsequent orders in that situation if more than one order is given, unless there are to be variations in the information given out.

Sketches may be made in pencil and only roughly to scale.

The situations for the 7th, 8th and 9th Requirements are given out sealed, and the first six requirements should be written up before reading the latter situation.

The organization recommended by the General Staff in its recent report for the ammunition service will be followed. The diagrams of this organization are posted in the war game room.

The class may work by committees, not over three members to a committee.

Situation:

On October 21st a Blue division containing one volunteer brigade moving down from the north into hostile territory, drove a Red force

out of Gettysburg and bivouacked the night of October 21st-22d east of the town. At 5 p. m. that night the 1st Section of the trains arrived at Gettysburg and the 1st Echelon Ammunition Column was assigned by the train commander to the grounds of the County Almshouse for bivouac. The remainder of the 1st Section and the train escort (one platoon infantry) went on to bivouac in the Penn College Grounds. The inhabitants are intensely hostile and the country is full of armed "home guards." It is understood that a company of infantry from the volunteer brigade is policing the town of Gettysburg. No troops are visible or otherwise reported in the vicinity of the bivouac.

1st Requirement:

Orders for the night of the commander of the 1st Echelon Ammunition Column. Sketch of bivouac of the 1st Echelon. (Omitted.)

Situation—Continued:

At 9:20 p. m. the commander of the 1st Echelon receives the following message:

Headquarters 1st Blue Division,
Cross-roads 550, Hanover Road,
21 Oct. 12—7:30 p. m.

Commander of the Trains:

Send to Benner's farmhouse. Hanover road, to arrive there at 9:30 p. m. tonight, infantry ammunition for twelve combat wagons and three-inch artillery ammunition for ten artillery caissons. Combat wagons and caissons ordered to meet your wagons there at 9:30 p. m.

X,
Chief of Staff.

Noted, 9:00 p. m. Comply at once.
A. B., Train Comdr.

2d Requirement:

Orders of the commander 1st Echelon Ammunition Column.

3d Requirement:

Sketch showing order of march of the detachment from the ammunition Column. Sketch of bivouac of the 1st Echelon. (Omitted.)

Situation—Continued:

Upon arrival at Benner's farm the officer commanding the detachment from the ammunition column finds five combat wagons and ten artillery caissons parked in the farmyard. He is the senior officer present.

4th Requirement:

Method adopted by this officer for expeditiously transferring the ammunition. (There is no moon.)

Situation—Continued:

Upon completion of the ammunition transfer, the ammuntion officer discovers that the five combat wagons present are all from the regular brigades, that the volunteer brigade had had two regiments in action that day and did a lot of shooting, that the volunteer brigade is supposed to be biouacked down the Hanover road, north of the road on a creek about a mile and a half. The regulars say that one of their brigades is on outpost and the other bivouacked south of the road about a mile and a half distant.

5th Requirement:

Orders or action of the ammunition officer.

Situation—Continued:

By 12:30 p. m. October 22d, the 2d Echelon Ammunition Column has arrived from the Provisional Sub-Depot at Biglerville (7 miles north of Gettysburg), also the commander of the Ammunition Column. The 1st Echelon has just refilled and with personnel, equipment and stores complete is standing parked in the grounds of the Almshouse. Intermittent artillery and infantry fire to the eastward has been heard all the forenoon, and since 11:30 a. m. almost continuous artillery fire, including the fire of howitzers. From various sources it is learned that at daylight the division moved out on the Hanover road in pursuit of the retreating Reds, that the latter had been putting up a rear guard fight all forenoon, but had eventually gone into position west of the Little Conewago and that about 11:00 a. m. the division was preparing to assault the position. Considerable rioting has been going on in Gettysburg with shooting and several

buildings are afire. The train commander and his staff rode into Gettysburg about the middle of the forenoon and have not been heard from. The remainder 1st Section Supply Train mostly empty is standing parked in the College grounds.

6th Requirement:

(a) Any action by commander of Ammunition Column during the forenoon to keep in touch with the situation.

(b) His orders, if any, at 12:30 p. m., and the orders of the commander of the 1st Echelon, if any are required.

(c) If 1st Echelon moves, state route.

Situation—Continued (*Sealed*):

The division attacked the enemy in position on the Geisleman—588—607—Ridge about 11:30 a. m. and was repulsed. At 3:30 p. m. the division is holding the Trostie Ridge against a vigorous counter attack. The 1st Brigade is in action north of Hanover Road, the 2d Brigade south of the road, and the volunteer brigade is extending the line northwest on the Smith Store spur to meet an envelopment. Two battalions of three-inch artillery are in action just west of 602, two more three-inch battalions are in action just west of 609 and the two howitzer battalions in action near Valley S. H. The cavalry regiment which has been engaged in mounted and dismounted action all day is reforming near Breashner closely pressed by the hostile cavalry. When the general put in the reserve brigade he announced that he would "fight it out on this line." The commander of the Ammunition Column has been with Division Headquarters for the past hour near 601 cross-roads.

7th Requirement:

What use has been made of the agents since the Ammunition Column commander left Gettysburg?

Situation—Continued:

At 3:30 p. m. the commander of the 1st Echelon reports to the commander of the Ammunition Column in person with his adjutant at 601 cross-roads and states that the head of the 1st Echelon has arrived at Square Corner.

8th Requirement:

(a) What use has been made of the agents since the commander 1st Echelon left Gettysburg?

(b) What are the orders of the commander of the Ammunition Column?

(c) What are the orders of the commander of the 1st Echelon?

Situation—Continued:

At 3:35 p. m. the commander of the trains appears in person and informs the commander of the Ammunition Column: "The 2d Division was passing through Granite Hill at 2:00 p. m. The provisional sub-depot is to be moved to Hunterstown at once. The chief ordnance officer of the field army wishes to know at once how much ammunition is ahead of your 2d Echelon."

9th Requirement:

Report of the commander of the Ammunition Column.

AMMUNITION SUPPLY.

AN APPROVED SOLUTION.

1st Requirement:

Major A, commander of the First Echelon, assembles his staff and the company commanders and issues the following verbal orders:

"Our Division drove the Red Force out of Gettysburg today. The inhabitants around here are intensely hostile and the country is full of armed 'home guards.' Our division bivouacs east of Gettysburg tonight. It is understood that the town is being policed by a volunteer company. Our First Echelon will bivouac in the grounds of the County Almshouse here. The remainder of the 1st Section trains and the escort go on to bivouac in the Penn College grounds about one-half mile to the southwest.

"Extreme vigilance must be exercised all night to prevent any attack on the trains or stampeding of the animals.

"This Echelon will park in column of platoons facing southeast, its left parallel to the farm road on the north side of the ground.

"The carriages will form line at 15 yards interval, each platoon at 20 yards distance. The picket lines will be laid on the rear wheels

of the carriages. Personnel of each platoon will bivouac (in shelter tents) in line in rear of its carriages.

"Kitchen and company officers bivouacs will be established on the left flank, latrines on the right flank opposite the center of each company.

"Animals will be watered by company from head to rear of column at the stream crossing near the Harrisburg road. Bathing water opposite the right flank of the bivouac. Drinking water from the wells and taps in grounds.

"Buildings will not be entered and men not on duty will be restricted to the grounds here.

"In case of alarm, drivers and mounted men will stand to horse on the picket line, cannoneers and spare men will fall in under arms at their bivouacs.

"Lieut. X is detailed Officer of the Day. Comdr. Gun Amm. Co. will detail two N. C. O.s and 12 privates mounted and Comdr. Inf. Amm. Co. four N. C. O.s and 20 men dismounted to report to Lieut. X for guard. Lieut. X report to me at once for orders.

"I shall bivouac on left flank opposite center company.

Special Instructions to Lieut. X.

"Establish double sentry posts on each of the four sides of our bivouac.

"Mounted patrols all night both north and south of us on the Harrisburg and Carlisle roads—Bivouac your guard opposite our rear on the Carlisle road."

The Adjutant should be sent to report dispositions for the night to the Train Comdr.

It is believed that the Echelon should be parked as compactly as possible and thorough preparation made for its security during the night. It is logical to suppose that the combatant troops will shortly equire some ammunition and from the hostility and known aggressive power of the inhabitants arrangements must be made to secure the safety of the Echelon during the night.

2d Requirement:

Major A notes time of receipt of the message 9:20 p. m. and orders:

To Comdr. Gun Am. Co.:

"Turn out at once 10 caissons and two agents to go to the front; have them report to Lieut. Y."

To Comdr. Inf. Am. Co.:

"Turn out at once 12 wagons of ammunition to go to the front, also 20 men from your reserve. Have them report to Lieut. Y."

To Lieut. Y.:

Shows him the message. "You will take command of the ten artillery caissons, 12 wagons of infantry ammunition, 20 reserve dismounted men and two agents and proceed to Benner's farm as directed in this message. I advise you move by the Carlisle road and the public square in Gettysburg, sending advance information to the volunteer troops there. Upon completion of this duty return with your empties to this bivouac."

An exact computation of the amounts of ammunition due to the different carrying capacity of the wagons of 1st Echelon and the combat wagons would hardly be necessary or advisable due to advisability of getting the detachment promptly started. If too much ammunition goes forward, bring it back.

3d Requirement:

The wagons and caissons should be formed into a solid column, preceded by the mounted agents to mark the route and advise volunteer troops of the coming of the column. A point or advance guard of one noncommissioned officer and two men should precede the column by 300 yards, about one noncommissioned officer and five men should follow the column and the remainder of the guard march at its head with Lieutenant Y.

It is not thought advisable for Lieutenant Y to try and lead his column across country or through the suburbs of Gettysburg. The column is already late and time is likely to be lost. The volunteer company is more likely to be policing the main streets than the suburbs, and the main streets are likely to be lighted. The chances of losing his way are less and the chances of assistance from the volunteer company are greater if he takes the main streets. Positive orders to move by any specific route might embarrass his future actions.

4th Requirement:

The principal points in this requirement are considered: To make the transfer in the farmyard—thus keeping the road clear. It is thought that this is a good general principle to always follow, never start anything to block, even momentarily the roads in rear of our own troops. The caissons would simply shift teams and personnel, the infantry wagons would unload and load the boxes. If lanterns are insufficient, start bonfires. Keep up the security service by outposting to front, rear and flanks.

5th Requirement:

If Lieutenant Y sends the empties back and waits at Benner's with the remainder of wagons he must turn over one or the other of two important duties to a noncommissioned officer. If he takes all the wagons back he is abandoning part of his mission. To send or take loaded wagons in search of the missing wagons is embarking on an expedition the outcome of which is doubtful. The missing wagons may not have started and again they may have gone astray. Division headquarters is only a mile away on the turnpike and is undoubtedly in telephonic communication with the brigades. It would seem better to hold all wagons at the appointed meeting place, Benner's farm, and send an agent to Division Headquarters to get the matter cleared up.

6th Requirement:

(a) The commander of the 1st Echelon has six agents, each company in his command has two corporals on its company staff available for scout and agent duty. The commander of the Ammunition Column upon his arrival brings in six more agents, a total of 18 men trained to this service.

Early that morning the commander 1st Echelon had better send three of his best agents to Division Headquarters to report location of 1st Echelon, get orders and send back information and orders, another to Train Commander for same purpose, and when the firing is heard to eastward—a party of two to scout to 581 and roads south of Granite Hill, a second party to examine a route southeast to the Hanover road across country. The Ammunition Column Commander could add little to these dispositions upon his arrival

except possibly to send agents to Gettysburg to learn the situation there.

(b) As the 2d Echelon, Ammunition Column, has come up, it is fair to assume that the 2d Section trains are in, or about to arrive. If not, all the train empties should be started back to Biglerville. At 12:30 p. m. the Ammunition Column Commander assembles the organization commanders and orders:

"The division moved out at daylight on the Hanover road in pursuit of the retreating Reds, whom I understand have been putting up a rear guard fight. This accounts for the intermittent firing we have heard all forenoon. About 11 a. m. the Reds are reported to have gone into position west of the Conewago and the division was preparing to attack. Apparently this attack is now in progress. There has been considerable commotion in Gettysburg, and the train commander, who went there about the middle of the forenoon, has been missing since.

"As senior officer I assume command of all the trains here.

"The 1st Echelon, Ammunition Column, will move out at once across country to Hanover road and eastward, getting in touch with the division.

"Remainder of the trains will park here in College grounds under command of senior officer. The escort platoon will remain with them.

"I shall march at head of the 1st Echelon, Ammunition Column, until it is on the Hanover road and then join Division Headquarters."

(c) Route of 1st Echelon: Out of park and southwest by Harrisburg road to the north and south street on eastern limits of Gettysburg—south on this road to across Stevens Run—thence southeast across lots to Hanover road. Reserve men of Infantry Ammunition Company covering the march.

7th Requirement:

Agents of 1st Echelon scouting ahead and marking route. Agents of Ammunition Column, commander to each infantry brigade and artillery regiment to get reports of ammunition supply and instructions from these commanders as to where to meet their empty combat wagons. These men should be started out as the line of battle is approached with orders to reassemble and meet 1st Echelon

at Square Corner. The Ammunition Column commander goes in person to Division Headquarters to learn the tactical situation and instructions of the general; his adjutant remains at Square Corner to meet the agents.

8th Requirement:

(a) If by the time the head of the 1st Echelon reaches Square Corner the agents of the Ammunition Column commander are not encountered, the commander, 1st Echelon, who, since leaving Gettysburg has been using his agents to scout the road and mark the route should dispatch them at once to the infantry brigades and artillery regiments to get the orders of these commanders as to where they want ammunition delivered, if any.

The commander of the 1st Echelon should try to reach Division Headquarters to get in touch with the situation and learn the intentions of the general.

(b) Orders of the commander, Ammunition Column:

"The division attacked the Geiselman ridge over there and there (pointing) artillery battalions as you see, and our cavalry which has been engaged in mounted and dismounted action all day is reforming near Breashner closely pressed by the enemy's cavalry. I have gotten no reports yet from any of the organizations, though my agents have been sent to each, but the whole line must need resupply at once. Break up your column and put it at the disposal of the various commanders.

"I shall remain here with Division Headquarters."

(c) The 1st Echelon commander undoubtedly halted his column about south of Bihl and proceeded to park it under cover of the woods north of the road. Also, it is reasonable to suppose that, due to the double effort to get contact with the brigades and artillery regiments (agents of both the commander of Ammunition Column and commander 1st Echelon) the commander 1st Echelon has, by time of his return to Square Corner, pretty definite information as to the needs of all organizations and the location of their empty combat wagons. Also, it is very probable that many combat wagons have been found west of Square Corner going to the rear after the issue to troops about 11 a. m. and were promptly refilled. In general, it would therefore be well for the 1st Echelon commander to take as many of his officers to vicinity of Square Corner as he can get hold of, orient them as to the situation and direct:

"The Howitzer Company is at the disposal of the commander howitzer battalions near Valley S. H.

"The Gun Ammunition Company at the disposal of the artillery commander near 602 and 609.

"The Infantry Ammunition Company will send two wagons to vicinity of 612 to report to cavalry commander. The remainder of the company is at the disposal of the brigade commanders.

"Make every effort to keep in touch with the organizations you are supplying, and send all empties to Boneauville at once."

(Note.—When the commander 1st Echelon got his column in park west of Square Corner, he had exhausted his own resources and the situation is too complicated for him to handle it in detail. It is thought he will do better now by orienting all his officers and turning the details over to the three captains. It is practically a deployment of his column. It would be well for him to remain at Square Corner and continue to oversee operations. Therefore he would add):

"I shall take post at Square Corner; my adjutant goes to Boneauville to take charge of empties."

9th Requirement:

If the agents have been properly used, the commander Ammunition Column should by this time have reports from some or all of them, and he should have a fair idea of the inroads about to be made on his 1st Echelon, and should be able to report about how many caissons and wagons are about to be emptied. In the absence of this he can only make a clear statement of the facts concerning the operations of the troops during the day and state his belief that they have about exhausted their supply and will empty his 1st Echelon. Whether or not they are liable to use up that before the day's end, is dependent upon the details of the situation at that moment which he should know. A safe reommendation would be that sufficient ammunition be gotten into Hunterstown tonight to resupply the entire ammunition column.

THE TRAINING AND INSTRUCTION OF A FRENCH FIELD ARTILLERY BATTALION.

It is probable that officers of our service, along with most other professionals, believe that the French field artillery has a higher battlefield efficiency than the artillery of any other country. If the Germans do not openly acknowledge this superiority, they at least have given indisputable evidence of suspecting it. Leaving aside any question of matériel, their prescribed methods have each year followed more and more closely those of the French, until in 1911 they finally renounced whatever remained of their own fire methods and frankly adopted those which had been in use by their rivals during a period varying from five to ten years.

Our whole theory of field artillery is now based upon the French, and the method of employing our guns in action would closely resemble theirs; but the system pursued in training our individual batteries and battalions is not based upon theirs and indeed very little resembles it. We seek to accomplish the same result by different means, to arrive at the same point by a different road. Our resources and our needs are different, and it is evident that we may be making better use of the one and more surely serving the other by the system we now employ than would be the case if we adopted the system the French employ.

Nevertheless, it would appear to be of great practical value for us to examine in detail the system pursued by the French artillery in training its units for battle, and this will now be undertaken. But at the outset it may be well to remark that this paper is not a plea for the adoption of the French system, but simply an attempt to give a résumé of methods employed in a highly efficient service, in order that our officers may draw their own conclusions from the comparison which will inevitably arise in their minds.

This comparison, it may as well be said now, will probably be most vivid in what concerns two things: First, the unit of training in the French artillery is the battalion, while the unit of fire is the battery; the unit of training in our artillery has always been the battery, and there has been, though it may no longer exist, a tendency to make the unit of fire, sometimes at least, the battalion or even the regiment.

Second, the comparison will bear upon the strength in horses and men. The French battery has as a rule 57 horses and 90 men; our battery has 120 horses and 133 men. Officers of our service are perhaps inclined to believe that the training of artillery can not be accomplished without having a complete personnel constantly available for each battery. A shortage in officers and men is frequently considered an insurmountable obstacle to any sort of training, and it is not too much to say that some of us are inclined to give up when such conditions obtain. It is, therefore, a most interesting thing to see how difficulties of this kind, not occasionally but ever present as they are, get themselves resolved in the French artillery.

Before plunging into the heart of our subject it is absolutely necessary to make a few general observations on French organization.

There are four fundamental principles underlying their entire system of national defence. These are: First, the maintenance in peace of the units required in war, these units having only such strength as is necessary for peace training and the exigencies of mobilization.

Second, the maintenance of a trained reserve, composed of men having served two years in the active army. This reserve is utilized in expanding the units; for the first line it is about five times as numerous as the peace effective.

Third, universal and compulsory military service.

Fourth, the arrival of all recruits at one and the same time each year.

There are certain exceptions to these principles (for example, on mobilization each regiment forms a battalion which does not exist as such in peace), but as given, they outline the foundation of the system in so far as concerns our present purpose.

The first three of the principles above enumerated are really only of interest in the discussion of organization; we will therefore omit any further reference to them and confine ourselves to the detailed consideration of only such things as affect training. At least one of these three principles is never likely to be adopted by our country, and all of them are dependent upon the enactment of law. The fourth principle is, however, essential to the question of training. Should the War Department desire to do so, it would seem entirely possible for it to apply this fourth principle in so far as concerns the recruits for any individual regiment.*

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*Recruits now join U. S. regiments in semi-annual drafts.

Looking now at the actual organization of the French regiment, we find that the regiments are far from having an identical composition. Without going into the reasons for this difference it seems sufficient for our purposes to select a type regiment under type conditions. Our type regiment consists, then, of three battalions of three batteries each. The colonel has at his disposal a numerous staff, but as most of this staff is occupied with business affairs having little or no counterpart in our service, we may reduce his actual staff to the lieutenant-colonel, two captains and half a dozen orderlies, clerks, etc. The major commanding a battalion has no permanent staff in peace, except that for maneuvers, training, etc., he has a lieutenant taken from one of his bateries.

The battery strength varies, but the standard is as follows:

1 captain.
1 or 2 lieutenants. As a matter of fact, only one battery of a battalion is likely to have two lieutenants.
1 or 2 adjutants. Batteries having 1 lieutenant have 2 adjutants; those having 2 lieutenants have 1 adjutant. As a matter of fact, it is rare that more than one adjutant is present with a battery. Adjutants are re-enlisted noncommissioned officers resembling warrant officers in the navy; in duties, etc., they correspond more nearly to our officers than to our n. c. officers.
1 maréchal des logis chef, in charge of all paper work and accountability.
1 maréchal des logis fourrier, assistant to chef.
8 maréchaux des logis, sergeants; of these one is a chief mechanic.
1 horseshoer.
6 brigadiers—corporals—of whom one is a clerk.
6 gun pointers.
1 blacksmith.
1 mechanic.
1 saddler.
1 assistant horseshoer.
2 musicians.

The above personnel forms what is known as the "cadre." The French attach the highest importance to the training of this cadre, for around it is grouped not only the peace effective, but the reservists called in upon mobilization. In France it is an accepted maxim that the value of the cadre measures the value of the organization.

In the artillery, at least, it might even be said that the sergeants and higher noncommissioned officers are regarded as the real cadre. There are innumerable advantages held out to worthy sergeants to induce them to remain in the service and to induce worthy men to seek the position. These inducements vary from a high rate of pay to an assured and comfortable position as an official in the civil service; but these are too complicated to be discussed here, even in part. Not only are inducements held out to secure the right sort of men, but every effort and care is lavished on the training and development of the sergeants; as a result they are unusually capable and efficient.

It would seem that under our present conditions the high development of noncommissioned officers is even of more importance to us than to the French. For in the United States the men grouped around these noncommissioned officers, in the event of a sudden expansion for war would be, for the most part, not only untrained, but frequently of a type intolerant during the first few weeks of service to all ideas of discipline.

But to return to the strength of the French battery: The battery has 60 privates; of these one is a shoemaker, one is a tailor, one is an assistant saddler, one is an assistant blacksmith, and two are cooks. The total number of men on the peace footing is thus 90 or 91.

The battery has 4 officers' horses, 21 saddle horses and 32 draught horses, 57 in all.

Aside from the mechanics, horseshoers, and men with other trades as noted above, all duty corresponding to our extra and special duty is supposed to be performed by sections and detachments which do not count as a part of the strength of the batteries—that is, men not of robust constitution drafted into the "services auxiliaires." As a matter of fact this is almost purely a theory, for the resources of conscription do not nearly suffice to fill up the ranks of the batteries and furnish the personnel employed in making, overhauling and maintaining the enormous war supplies on hand in every French garrison.

While different in kind, the French service is cursed to an even greater extent than ours with what corresponds to our extra and special duty and with fatigue work. If we take into account the cooks and others necessarily employed within the battery, we find that the number of men having constant special employment, either

within or without the battery, amounts to not less than 30 men per organization; at certain times this number may run as high as 40. If we add to these men constantly employed, the sick and the men on guard and fatigue, it will, I think, be admitted that the French face a much more difficult problem as far as training goes than is ever the case with us. In fact, the problem is so great that at first sight one is tempted to believe it incapable of solution.

With so much by way of necessary preface, we may now take up our subject proper—that is, training, and inquire into the means which have been evolved to surmount the terrible handicap of an apparently inadequate peace effective in horses and men of the individual battries.

The new men arrive about the 10th of October and number about 40 per battery. From this date until the 1st of March everything is concentrated on the training of the recruit. The men specially employed are all drawn from the old men, or, putting it another way, all the men in their second year's service have special employment of one kind or another. In France it is accepted as an axiom that the first six months of the recruit's service is really the crucial period of his transformation into a soldier. Perhaps this is true to even a greater extent in our service, but the French officer realizes that the first six months of the man's service is the only period during which the recruit's entire time is certain to be devoted to his training. This fact, together with the simultaneous arrival of the recruits, leads the French officer to a more systematic, persistent and logical course of instruction than is usually the case with us. Another result is the ruthless suppression of everything in the shape of training not visibly calculated to increase the man's efficiency for war. (Thus, for example, in changing the posts of the gun squad, there is no such thing as a fixed method to be memorized: the chief of section simply says, Jones change with Johnson.)

One of the most important things in the French system is the general rule that no maneuver, drill or other exercise is ever held without a distinct and clear idea being formulated beforehand as to the exact object to be accomplished by the particular exercise. Furthermore, this object is usually communicated to the men. Thus, at the beginning of standing-gun drill, one will hear: "During this hour we are going to study the breech mechanism, dismantle and assemble it, and drill at loading the piece."

There are many hours in the recruit's day devoted in this way to a well-defined object. In fact, from the 10th of October until the 1st of March the recruit's working day may be said to commence at 6 a. m. and to continue until 5 p. m. It is true that after he has his principal meal at 10:30 a. m. he is supposed to have a rest until 12:30 p. m. However, as rest is not considered incompatible with the cleaning of clothing, arms, etc., the statement made would appear to be substantially accurate.

A striking difference between French methods and our own is the initiative left to subordinates. Remembering our own ways, we would naturally ask to see the French War Office orders which prescribe the details of this preliminary instruction. There are no such orders other than what is contained in the drill regulations. Neither are there Division orders, Corps orders or Brigade orders on this subject. There is indeed a regimental order, but that contains little more than the announcement of the dates upon which the colonel intends to make his inspections of the several parts of the instruction.

The initiative and its accompanying responsibility is thus thrown upon the captains, or, better expressed, the initiative is left with those men who are to be held responsible for results. At the same time there is a direct control on the initiative of the captains, for a major is directly responsible for his battalion, and on Friday of each week the captain must submit to him a schedule detailing hour by hour the employment which the battery proposes to make of the following week. From his observation of the progress of the instruction and his scanning of the proposed employment of time, the major is enabled to directly and intelligently supervise his captains.

It must, however, be said that the major seldom finds occasion to interfere in the battery instruction. He does, indeed, make suggestions, but, perhaps by reason of the pride always felt by men who are given full initiative to meet the responsibility thrown upon them, the major seldom finds it necessary to change materially a captain's programme.

But to return to our recruits; a short time after their arrival they are divided into three classes: those deemed capable of becoming corporals; those designated as drivers; those designated as cannoneers. The recruits of the first class are assembled by battalion and instructed under the direct supervision of an officer designated by the battalion commander. Drivers are trained as drivers and for

the posts of those cannoneers having the simpler duties. Cannoneers are trained almost solely as cannoneers, though in some batteries a few of the cannoneers are given a limited training as drivers. It will be noticed that the men being trained for corporals are expected to learn twice as rapidly as those being trained as drivers or as cannoneers. Much attention is therefore given to the choice of the men who are to follow the corporals' course. It is usual to designate a considerably greater number of men for this course than there are vacancies to be filled; in this way opportunity for choosing among men having the proper instruction is afforded. This is very important, for, of course, the men have been in service too short a time at the moment when they are designated to follow the corporals' course to enable the officers to formulate any opinion as to their aptitude for command. As has already been said, the instruction of the future corporals is by battalion; towards the 1st of March they are examined by regiment. This examination takes into consideration drill, general bearing, deportment, aptitude for command, etc. Those of the men who pass this examination successfully are placed upon a list in the order of the rank gained by them in the examination, and all vacancies are filled in regular order from the list thus established. It will be seen that under this system the men promoted corporals enter, as a rule, a battery other than that in which they have served their first six months. The French consider this as highly desirable; indeed, when it happens that the man next to be promoted would enter his own battery, an arrangement is frequently made to effect his transfer with some other corporal. A similar system is followed for the instruction of those corporals who desire to become sergeants; in this case the instruction is by regiment and the men themselves are expectd to do a large part of their own training.

During the whole of the first period (10th of October to 1st of March) all recruits have numerous foot drills and gymnastic exercises. These drills and exercises, aside from their persistency, are not materially different from those used in our service except in one important particular. The French make but very little use of gymnastics specially intended to give the "set up." As a consequence, the French private never has the "military bearing" that many of our men have; on the other hand I would say that the physical power of the recruit is increased to a greater extent under the French system than under ours.

Coming to the instruction of the cannoneers, the first thing that strikes us is the fact that the drill and what corresponds to our gunner's instruction is carried on at one and the same time. Perhaps in the arrangement of the last sentence "gunner's instruction" should have been placed ahead of "drill," for it is an unvarying principle that the man is never required to perform any of his duties at the piece without having first had explained to him the parts of the matériel which he is to handle, the exact manner in which the part functions, and its relation to other parts and to the service of the piece as a whole. Every effort is made to instil into the man an exact appreciation of what he is doing, the effect he is causing, and in general the *"why?"* of everything. In fact, the characteristic of the French individual instruction is the everlasting WHY. No attempt is made at rapidity in the first two or three months; on the other hand, every stress is laid on accuracy and on the man's understanding *why* he does a certain thing in a certain way.

Thus, during the first couple of months it is extremely rare to hear any impatience manifested on account of the man's being slow; he may take as much time as he likes, provided his task is accurately done and he understands WHY he has done the particular thing in the way prescribed. The principle underlying all this is that the French believe, having gained understanding and accuracy, that rapidity is easily acquired and that rapidity without accuracy and understanding is not worth acquiring. Perhaps we believe the same thing, but do we always apply it? During the first part of the standing-gun drill all of the cannoneers are exercised in all the posts of the gun squad, but after a couple of months they are gradually arranged according to their ability and only the best are exercised in the duties corresponding to those of our Gunner and Number One.

It thus appears that one of the essential features of the French system is that they specialize the men, while we train them all to fill the various posts in the gun squad, and, in addition, give them all some instruction as drivers.

All the preliminary instruction of the cannoneers is in the barrack yard or on the street immediately in front of the barracks, and it is not until after the 1st of March that the school of the section mounted is taken up for both cannoneers and drivers. A simple panorama painted on the barrack wall suffices to give aiming points, and actual experience shows, the French say, that the preliminary

instruction of the gun squad does not require a drill ground in our sense of the word.

Coming now to the instruction of the drivers, we find two principles which may be said to sum up the French methods in training drivers. First of these is the extreme care taken in the first two weeks to avoid accidents and to give the men confidence. This care is, perhaps, sometimes pushed so far as to become a fad, but the French say that the essential to good horsemanship is confidence, that the first few weeks is the time during which the question of the man's acquiring confidence is settled once for all, and an accident, however minor during the first month, means that as a rule the man never rides with facility. On account of this theory the work during the first month is at a very slow pace, no "stunts" are attempted, and men showing nervousness are given the gentlest horses and are coaxed along in every possible way.

The second principle is the thorough training of the recruit in the school of the soldier mounted, before taking up the school of the team hitched. As a rule, it is about the 10th of January before the latter school is taken up; 3 months are thus devoted to the individual instruction of the soldier mounted. It should be noted that in the individual instruction much of the work after the first month is at the gallop, but that the gallop in the team hitched is practically unknown except in the horse artillery. In support of this custom the French say that in war the loads behind the teams practically preclude the use of the gallop, that the trot saves time and horseflesh, and that the officer who in peace spends time on maneuvering his battery at the gallop does so at the expense of more profitable work. On the other hand, in individual instruction the French consider the gallop as highly important to the rapid acquisition of a correct seat. Therefore the artillery in this respect merely follows the rules established at Saumur and universally practiced in the cavalry.

The French do not have better trained drivers than we do; they do, however, make drivers out of all the men they start out to train as such. The French never get rid of a bad driver by making a worse cannoneer. Exceptions may, of course, sometimes appear, but the general rule is that no changes are made in assignments to the classes already mentioned. Following the order of intelligence of the men, the most intelligent are assigned to the corporal's class, the next to the cannoneer's class, and the least intelligent or having less education than the others to the driver's class. It should be

stated that the formation of future corporals is greatly aided by the schools for the military preparation of boys which exist throughout France. These schools are in no sense institutions for general education, but simply give a short course in the essential duties of the soldier. As a rule, each battery has a few recruits holding certificates from these schools and these men invariably form a part of the corporal's class.

Aside from the instruction already mentioned, the men are, of course, instructed during the first period in all the small details of the soldier's life, such as the care of arms, revolver practice, personal sanitation, etc.; but these matters do not seem to call for any special remarks here.

During the first period, also, great attention is paid to developing the morale of the young soldiers and to inculcating that spirit of devotion to duty which lies far deeper than those external manifestations which we are apt to consider as forming of themselves the acme of perfect discipline. Interesting, however, as are the French methods for increasing the morale and discipline of the men, those methods do not appear to be immediately applicable to our service, for the reason that the conditions under which the French recruit enters the service as well as the sentiments actuating the young soldier, are as different from the conditions and sentiments found in our service as night from day. This is in no sense an intimation that we lack the means of developing that esprit and that form of discipline upon which the French lay so much stress. On the contrary, we can find among our men many motives upon which we can play, but it is in the character of our own recruits and not in that of the young Frenchmen that those motives must be sought.

The study of foreign services, the results they seek and the methods they use to attain them, is certainly instructive to our officers; but it will not do to lose sight of the differences in primary conditions which enter any comparison we make between them and us. If we find that what they accomplish is superior, we can not always conclude that we could attain the same ends by the same means. On the other hand, I do not think we should be discouraged from seeking equal results by the play of forces which we may possess and our foreign friends be deficient in. I believe American youth and American character as fertile ground as French youth and character. Each must be cultivated in its own way. At present the military fruits produced from these elements are richer in France than in

America, but I believe that the fault lies wholly in our husbandry.

Not a month goes by but one may read in some of our periodicals articles in which the authors point, with more or less pitying contempt, to the foreign conscript who, ignorant, unwilling, and as devoid of sentiments of independence and self-reliance as a lamb, is tyrannically driven into the service of a country in which he was born, but in which he has no rights and for which he has only a lukewarm affection. According to these articles the profit of the comparison is all to the advantage of the free-born, alert, capable, self-reliant American who voluntarily engages to serve his country from sheer patriotism. It is certainly of the highest importance to develop a sentiment of superiority stimulating to the morale of soldiering men, and provided that sentiment is really created, it may not be of first importance whether the methods employed are based on truth or not. On the other hand, studies which pretend to offer suggestions for increasing our military energy and output do great harm when they assume false premises in the lessons they draw from foreign services. Where premises are wrong, conclusions are apt to be erroneous.

So far as all this concerns France it may be said that the conditions surrounding conscription are in principle simple and may be stated in a few words. Every Frenchman, whether prince, duke, peasant or banker, is bound to military service and serves his two years with the colors, unless he be absolutely physically incapacitated. Government and liberty in France are not unlike those things which we know under the same names; the French therefore have universal and compulsory military service because the people so will it. Since the French have universal service, it is but natural that some of their recruits are less intelligent than are our men; but it should be remembered that this works both ways and that many French recruits are not only very intelligent, but for their age are highly educated. The physical average of the French soldier is below that of our men; at the same time, due perhaps to his pride, the marching powers of the French soldier have elicited the admiration of all our officers who have seen him at work.

It would require a long paper by itself to deal with the subject of target practice, but the matter is of such overwhelming importance that no excuse is needed for here entering into some of the details of what we may call recruit target practice, or that held for preliminary instruction purposes during the winter, before the second

period begins on March 1. This firing is solely for the instruction of the recruits, of the noncommissioned officers and of some of the junior lieutenants.

As a rule the first of these practices is held about January 5, and some thirty rounds per battery are fired; the second practice is held toward the 1st of February, when some fifty rounds per battery are fired; the third and final preliminary practice is held toward the end of February, when some eighty rounds per battery are fired. The most striking thing to us is the amount, one hundred and sixty rounds per battery, thus expended in preliminary practice. The fact is that the French, living up to the principle that artillery which can not hit is useless, furnish over six hundred rounds per battery per year for target practice.

The preliminary practice takes place in the open fields at a place so chosen as to give one or two good days' marches in reaching it. The difficulties under which the French struggle are well illustrated by the fact that each battery only turns out one harnessed section for the march and target practice. The personnel taken numbers some forty or fifty per battery, the men not needed with the harnessed section making the march on foot, except that the sergeants are mounted. These marches are considered very valuable in training the cannoneers to march on foot, for the French cannoneers habitually walk when the battery is not maneuvering or moving at a fast gait. The nine sections thus turned out by our type regiment of nine batteries are combined into a single organization and marched under a couple of officers. The remaining officers, accompanied by the sergeants not needed with the column, march by battalions and employ the time in solving such technical and tactical problems as the major may formulate. These marches are thus made the occasion for interesting terrain rides.

In reality, firing in the open fields as practiced here does not give the opportunities that we might picture to ourselves. France is a thickly-populated, highly-cultivated country, and the crops are all in the ground at this season; the fields of fire are thus strictly limited and it is necessary to fix the battery positions from other than tactical considerations. As a result there is, on these fields at this period, no opportunity for reconnoitering, choosing and occupying the position under service conditions. It must be said, however, that it is doubtful if the French would, for this preliminary firing, do any of this latter work, even though it were entirely possible,

for the real object of this practice is the instruction of the young soldier, and they always hesitate lest any secondary task obscure the main issue. The position of the firing battery is, then, staked out and the battery simply puts its guns alongside the stakes. This position is always so chosen that the targets are in full view from the pieces; but as a rule indirect laying is used.

But we left our nine batteries with only one section each and have not mentioned the formation of the firing batteries. A short distance before reaching the firing position the sections are consolidated in such a way as to form two firing batteries of four guns and five caissons (eight batteries have harnessed a gun section, while the ninth battery has harnessed a caisson section); the captains of the batteries that are to fire first take command of the batteries that are thus formed, replacing the cannoneers of sections not their own by the men of their batteries who have marched on foot. As has already been said, there is no occupation of the position in the tactical sense. Once the matériel is in position the men, other than those who are to begin the firing, are assembled by their officers, by batteries, about ten paces in rear of the guns which they are to fire in their turn. For the first practice the firing is very slow, the sole objects in view being: 1st, accustoming the recruits to the firing, giving them confidence; 2nd, demonstrating the functioning of the piece, and especially demonstrating the effect of changes in the firing data.

The French, as has already been indicated, are very strong in their belief that each cannoneer must know exactly what he is doing and the effect he is producing. Furthermore, they appear to succeed in imparting to most of the men a very accurate appreciation of all the practical part of the theory of fire (if the expression may be used), including the trajectory, deflection, deflection difference, angle of site, corrector, etc. The recruit having already been thoroughly instructed in all these things before leaving his barracks, let us briefly notice the manner in which his officers confirm and render visible to him the theoretical knowledge he has thus acquired.

During the firing one may hear the officers saying to their men: "The battery is going to fire on that line of infantry, using direct laying; you will see, after we fire, how difficult it is for the pointer to take his proper portion of the target." After the battery fires: "You see that now, with the smoke in front of it, the pointers have

difficulty in seeing their portion of the infantry; then, too, those shots were not all the same distance apart. That, then, is the reason we almost always use indirect laying, even though the gunners can see the target. * * * You notice that those shots burst high up in the air; we will now decrease the corrector by so much, and you will see that the shots will burst nearer the ground. * * * Now we will increase the angle of site by so much, and you will see the bursts raised again. * * * You noticed that those bursts were very close together. We will increase the deflection difference and you will see how the bursts will open out."

While incomplete the above gives a fair idea of the methods employed. Sometimes the method is varied in that the battery firing has its instruction limited to the functioning of the matériel, etc., while the officers of the batteries not firing point out to their men the effect which will result from the commands given by the officer commanding the firing battery. In any case the batteries not firing are being instructed by their officers and it is for this purpose that they are grouped around the matériel.

The second and third practices continue the instruction of the recruits, but are more especially devoted to the instruction of the sergeants and junior lieutenants, and it is from this latter point that we will consider these exercises. For this instruction a sergeant, say, is given command of a battery or a platoon and is directed to adjust his fire upon a designated objective. So soon as the sergeant believes that he has obtained the bracket demanded by the circumstances of the case, he fires a verifying salvo, commands "close the chests; simulated fire," and gives the commands for that kind of fire-for-effect which he considers called for by the situation. Upon the conclusion of this simulated fire the critique is held. This critique is generally commenced by the captain and completed, if necessary, by the major. During the critique all the officers of the battalion are present. After the remarks of the captain and the major, the officer or noncommissioned officer who has conducted the firing may present his side of the case; then, any officer may point out anything he considers to be of interest; finally the major usually sums up the things done correctly, the faults committed and the lessons to be learned.

During the firing the officer or noncommissioned officer commanding the battery or platoon is left entirely free and is neither hindered nor aided in his work. After each round or salvo the

officer firing calls out in a normal tone of voice the sense of the round or salvo as it appears to him, thus, "short, 20 right, graze." These observations are recorded and form the basis for the critique. It is seldom that any criticism is made concerning the accuracy of the observation of the officer firing. On the contrary, it is rigidly insisted that the corrections made in the firing data be bold and in absolute accordance with the observations announced by the officer conducting the fire. Thus, from the technical point of view the principal criticism usually heard is lack of boldness or apparent lack of confidence in the observations announced. Another not infrequent criticism relates to the opening of the sheaf. As a general principle any opening of the sheaf which gives a first salvo distributed on the front less than about double the front of the battery is criticised. It is also to be noted that the adjustment of the sheaf to the front of the objective is seldom undertaken until toward the end of the bracketing process, and is sometimes not made until the verifying salvo. It should be understood that these latter remarks apply only in case the first salvo is distributed on a front about double that of the battery firing; if the first salvo shows an extremely open or an extremely closed sheaf, its partial adjustment is undertaken on the second salvo.

On the tactical side the instructor always discusses whether or not the bracket sought corresponded to the tactical requirements and the applicability of the fire for effect (simulated) to those requirements; the latter (fire for effect) is also made the subject for discussion from the technical point of view.

It has been noticed that it is exceedingly rare that any criticism is made of the accuracy of the observation of the range, etc., announced by the officer firing. The reason for this is to be found in the fixed principle that every exercise must have a single well-defined object in view and must not be complicated by secondary considerations. Now, according to the French, the object in view is to habituate the officer firing to make bold corrections, logically deduced from the observations he makes after each salvo. On the other hand, the officers and noncommissioned officers not firing, grouped always around the firing battery, receive their principal instruction along the lines of accuracy of observation.

It may be said that the grouping, however orderly, of men and officers around the firing battery, does not add to the tranquillity of the officer conducting the fire. However, the French say that the

confusion thus caused is as nothing to that which will be found on the battlefield, and the officer who proposed to add to the repose of the person conducting the fire, by causing every one not connected with the firing battery to remain at a distance, would be laughed to scorn.

Before closing our comments on the first period of instruction it is necessary to glance briefly at the winter instruction of officers, noncommissioned officers and of men specially employed or "on detail."

The tactical instruction of officers is usually by battalion and comprises map problems, war games, and terrain rides. During the winter months this work follows the well-known methods of our Service Schools, special stress being laid on the action of the other arms. The exercises are held once a week and are conducted by the battalion commander in person.

There are also map exercises for the field officers and senior captains of the garrison and of the division. These garrison and divisional exercises are especially useful in bringing together the officers of different arms and in establishing a common understanding between those arms. In fact, it is difficult to over-estimate the value of thus assembling men of all branches. It will probably be agreed by most of our officers who have attended the Service Schools or the War College that one of the greatest advantages they derived from work at those places consisted in the close contact with officers of other arms. Unfortunately we can not hope, under the present distribution of our army, to practice the French method of habitually bringing the higher officers together for tactical instruction. It is, however, believed that work of this kind could be more largely developed than at present. Some of our garrisons contain regiments of two or even three arms, for example, Fort Leavenworth, Fort Russell, Fort Riley and Fort Sill; a few field officers from each of these garrisons might in the winter be assembled at small expense to participate in studies which would prove of immense benefit to the whole service.

With the opening of spring or shortly before, the French also begin a series of terrain rides of a somewhat special character; but it seems simpler to take these up when we come to consider the second period of instruction.

Several lectures on field artillery fire are ordinarily given during the winter season; these lectures usually deal with new ideas advanced

at home or abroad. Then, in case an officer has attended experiments of any kind or has engaged in some special work, he is expected to give a description of the work or experiments.

For the lieutenants there is instruction in equitation three times a week under the "captain instructor" of the regiment, who is usually a graduate of both the courses at Saumur, *i. e.,* has had two years there, separated by 5 or 6 years with his regiment. He is always a most excellent horseman. Perhaps it would have been more accurate to say that there is compulsory instruction for lieutenants, for it is not unusual to see captains and majors voluntarily joining the classes.

For the sergeants there are several forms of instruction. Those who teach riding in their own batteries are united two or three times a week for instruction in equitation. The advantage of this is seen in the uniformity of training of the recruits.

Once a week all the sergeants of the battalion are instructed by a lieutenant in the mechanism, etc., of the piece; this instruction is in great detail and is characterized by the eternal WHY. Then, once or twice each week the sergeants of each battery are united into a gun squad and drilled for half or three-quarters of an hour by the lieutenant. Some of us may laugh at this, but a fair trial of the idea will very likely show why the French believe in it.

Before the arrival of the recruits a sergeant is designated in each battery as instructor in gymnastics. These sergeants are united by regiment and are put through a course of instruction by a lieutenant who has followed the course at Joinville (the Army school of gymnastics).

Finally, one noncommissioned officer from each battery, other than the first sergeant or clerk, unite to form a regimental class in paper work.

In the above sketch no attempt has been made to indicate all that is done in the way of instructing the "cadre" during the winter months, but it is believed that enough has been said to substantiate the conclusion that, notwithstanding the great initiative allowed subordinates, the instruction of recruits is very uniform because the actual instructors are not only thoroughly trained, but are all trained in the same school. The instruction of noncommissioned officers as practised by the French, while possessing disadvantages, permits choosing instructors who are experts in their particular lines. No time whatever is devoted to the instruction

of officers in what we call law and Army Regulations. Routine paper work is considered the province of clerks, and a sufficient number of instructed men are kept available to act as such.

We have already seen that, since the number of men specially employed numbers some 30 or 40 men per battery, but few of those in their second year's service are available during the period devoted to the training of the recruits. On Wednesday mornings, however, all these employees—there are no exceptions—are available for drill, and for four solid hours they are put through the most intensified system of practical instruction that can possibly be imagined.

While treating of the preliminary period, mention should be made of a form of drill which experience shows to be of remarkaable efficiency in developing quickness and self-possession in the recruit. This consists simply in having the recruits fall out and assemble in their proper order, in a new place—perhaps a dozen paces—all at the double time. During the first couple of months this falling out and falling in is practised perhaps a dozen times an hour. Our batteries practise, to a limited extent, a similar method in the standing gun drill, but the results noted here would seem to justify extending the method and in systematically persisting in causing all formations to be made at the double time.

Up to the present we have been considering solely the preliminary or winter instruction of the command. By March 1st this period is over and the recruits are considered to be sufficiently advanced to take the field in an emergency. Should war break out before this date, these men would be left in garrison, their instruction continued and their places taken by the old men liberated the preceding September. Later on they would fill up the depleted ranks of their regiment.

We will now consider the second period of instruction commencing March 1st and continuing until the autumn maneuvers. This period is chiefly if not wholly devoted to the instruction of the battery of maneuver. Inasmuch as the French battery of maneuver requires some 85 horses and 80 men, and each battery has only 57 horses and 90 men, the first question that naturally arises is how they manage to accomplish any serious instruction when even this small force of 90 men is reduced by the special details we have already mentioned.

The system is as follows: The season is divided up into periods

of nine days each (Sundays excluded). In our type regiment the first three days of one of these periods sees assignments of the battalions as follows:

1st Baattalion, "for maneuver;
2nd Battalion, "for complement;"
3rd Battalion, "for service."

For the second three days the arrangement is:

2nd Battalion, "for maneuver;"
3rd Battalion, "for complement;"
1st Battalion, "for service."

Similarly for the third three days and for the other nine-day periods.

The term "for maneuver" means that each battery of the battalion in question is brought up to the complete maneuver strength by drafts on other batteries for men and teams. "For service" means that the battalion so designated keeps its men having special trades, shoemakers, tailors, etc., at work, furnishes the guard and fatigue parties, and the men, saddle horses and teams needed by the battalion "for maneuver." The battalion "for complement" keeps its men with special trades at work and, if necessary, assists the battalion "for service" in details needed; men not thus required are available for drill within the battalion.

The battalion "for maneuver" has available for drill all men except officers' strikers, the cooks, two stable police, one or two men in charge of stores, the sick, and such men as may be absent from the regiment. Nevertheless, each battery for maneuver has to be furnished from 10 to 20 men and some 35 horses. (The statement just made should be modified by saying that it is only during the morning hours that a battery for maneuver may use for drill its special employees; during the afternoon these men work at-their trades.)

The morning drill hours during this second period are usually from 6.15 a. m. to 10.15 a. m. Be it understood that this time does not include harnessing or unharnessing; the batteries leave the park at 6.15 and return at 10.15.

The method above described of linking batteries, in order to bring each battery up to the strength necessary for battery maneuvers during three days out of every nine, may sound complicated. As a matter of fact, its operation in practice results in no confusion or complications. The actual working is something like this: The

first, fourth and seventh batteries (being the first batteries of each battalion) are, for example, linked. Let us suppose that the first battalion is for maneuver tomorrow. This afternoon the 1st sergeant of the first battery notifies the 1st sergeant of the seventh (service) that the first battery will need so many men and so many horses for tomorrow's drill; the men and horses are reported at the proper time, usually 5.45 a. m., and that is all there is to it. If by any chance the seventh battery is unable to furnish the necessary men and horses, a call is simply made upon the fourth battery.

Unquestionably it is undesirable to be forced to get along with a peace effective so reduced as to render this method necessary; however, no country can afford to maintain in peace all the forces needed in war, and there are strong arguments, especially in the case of Field Artillery, for increasing the number of units, even though it has to be done by decreasing the peace strength of those units; for only in this way can the necessary frame work or cadre of trained officers and noncommissioned officers he held ready so that each organization can be at once raised to war strength without serious loss of efficiency.

This is neither the time nor the place for a discussion of organization, which subject we have moreover promised to avoid, but it is believed that certain of the principles embodied in the French system of doubling up batteries might advantageously be employed in our service. For example, we might use the ideas contained therein when, for any reason, our batteries are much reduced in strength. The scheme of having one organization perform all guard, fatigue, etc., has already gained ground with us, and if a willingness to extend it becomes evident, this extension might follow the French system; that is, should it be impossible to have *all* the men of an organization available for drill during a few hours *every* day, then they should be made available during several consecutive days two or three times a month. Either of these arrangements or both combined produce an organization ready at all times for field work.

Such an arrangement added to the principle of linking batteries would make it possible for us, with our large effectives in men and horses, to frequently do what is very rarely possible for the French: have exercises of a battery on a war footing. Such work as a matter of monthly routine would be of inestimable value to the officers, and in view of the large traning grounds available at any

season for our artillery battalions, a real benefit could result. If the French put a battery on a war footing it could, during most of the year, only maneuver on the road.

Let us now note some of the things which would at once strike an American officer during the exercises of a French battery of maneuver. The movements are all simple and are habitually executed at the trot. At drill the gallop is never used by the teams, and it is rare to see a battery at the walk. In the course of a morning's drill a battery will probably occupy at least half a dozen different firing positions; during the time such positions are occupied the horses have ample rest from the exertions of the constant trot employed during all movements.

The taking up of a position is always preceded by a reconnaissance, and in general all things are done as in campaign, except that of course the reconnoitering party is not as far separated from the battery as would be the case in war. Naturally all firing data, etc., is calculated, assumed corrections are made, etc. Absolute accuracy is always demanded of the gun squads, and to this end they are frequently assembled while the officers verify the setting of rights, the pointing of the piece, etc.

While not having immediate relation to training proper, it may be interesting to know that the French seldom take an aiming point in rear for the initial laying of the piece for direction. (As is well known, the construction of their sight does not permit using an aiming point in rear during the fire). In cases in which an aiming point sufficiently distant can not be had to the front, the captain usually prefers to lay the first piece by causing it to point on his station (with a suitable deflection); the other pieces being laid for direction by reciprocal pointing on the first piece.

The French captain usually dislikes to be at a distance from his battery, though this tendency is now being attacked in the military press, and the necessity of commanding at a distance and by telephone is being urged. They are perhaps more inclined than we to make the position of the guns closely dependent upon the location of the observing station. They are now adopting an observation ladder, with the idea of reducing the number of cases in which the captain must be at a distance from his battery; but they have also lately provided him with a telephone to make command at a distance more effective. In other words, they are seeking improvement in various directions.

A very noticeable thing in the maneuvers of the battery is the small attention paid both during the march and in the firing position to the accurate alignment of the carriages. The noncommissioned officers are even taught to disregard both intervals and alignment in occupying the position, when by so doing the gun may be placed on better ground for firing. Consequently, it is not usual to see a battery in position having irregular intervals and in which no attempt at alignment is to be discovered. Indeed, the battery is frequently exercised in taking positions in which the nature of the ground precludes accuracy in alignment and intervals.

The amount of instruction that most captains manage to compress into four hours of drill of the battery of maneuver is really remarkable. The secret is to be sought in the practice, already mentioned, of carefully planning the work to be done beforehand. The French have an axiom which one hears constantly repeated, "To command is to foresee;" not only do they repeat this, but they live up to it.

The batteries which are "for complement" can always turn out one or two sections for drill. The drill of these presents nothing worthy of special note except that the section, during the second period, is always treated, when in the firing position, as a part of the battery. For example, the assumed number of the piece (1, 2, 3, 4) is always announced and commands are given (by a lieutenant or an additional noncommissioned officer) exactly as if the battery were complete; corrections of deflection, difference, etc., are of course made in accordance with the commands.

A battery which is "for service" is fortunate if, after furnishing the various details required of it, there remains available for battery work more than 3 or 4 sergeants and an equal number of privates. However discouraging this may be, the captain does not on that account renounce all idea of giving these men and his officers some instruction; on the contrary, he manages to get in a considerable amount of useful work. To explain the method of accomplishing this one must now take up the somewhat special form of terrain ride, which has already been mentioned and which so far as known has never been extensively practised in our Field Artillery. Only the outlines of the method will be traced as the details in what concerns the battery are fully set forth in Colonel Aubrat's book, a translation of which recently appeared in the FIELD ARTILLERY JOURNAL.

About the 1st of March the colonel conducts one or more terrain rides which serve as a basis for the work by the battalions and batteries. The assumed situation considers the regiment as forming the artillery of a division, which in turn forms a part of an army engaged in some particular operation. As a rule the assumed division occupies a position on a flank, as under this assumption more interesting and probable minor situations may be developed than when the division occupies the center. It should be noted that the fact that the division forms part of an army is not allowed to bring about elaborate situations or strategical studies. Nor is any effort made to study the handling of the division in those details belonging to its general staff officers. The situation is presented clearly and concisely in so far as concerns the artillery, but according to the French, this very presentation necessitates accurate indications as to the location and dispositions of friendly infantry.

The personnel employed for the regimental terrain ride is as follows: The colonel accompanied by one or more officers of his staff, and, if practicable, by an officer of another arm, acts both as commander of the artillery and as director of the maneuver, though he may sometimes detail another officer to act as commander of the artillery. He has two or three orderlies at his disposition. The majors have their agents, scouts and orderlies. The batteries have all the available sergeants and two or three orderlies.

The problem assumes, for example, the division in march toward a certain objective. At the commencement of the problem the point of the advance guard comes in contact with the enemy. These assumptions and the order of march of the division having been communicated to all officers, the several units place themselves on the road in exactly the places which they would occupy in the actual case. From this moment all orders, etc., are sent exactly as they would be in campaign. Reconnaissances, etc., are made, and finally the regimental part of the problem is ended by the entry into action of the several battalions.

The entry into action of all the battalions having been completed, the officers are assembled and the colonel conducts his critique, in the course of which he indicates problems, assumptions, etc., which he believes may be usefully studied by the several battalions. The skeleton is thus formed upon which the battalion and battery commanders may conduct studies in any desired detail.

For these detailed studies the battalions return to the ground on the days when they are "for service," that is, on those days when only their officers and a few noncommissioned officers are present. The battalion commander causes the personnel to occupy the posts they would actually occupy in campaign, and proceeds to develop an exercise in which all orders, commands, etc., are given and transmitted exactly as if the matériel were present in an actual battle.

Coming down to the battery we find the captain giving his commands in the same way. Both in these exercises and at other times we frequently notice the captain exercising himself under the direction, or rather upon the indications, of his lieutenant. For example, the captain is given or assumes a certain situation requiring fire on a certain objective; he gives his commands and the lieutenant indicates the fall of the shots upon the terrain; the captain then gives his corrected commands, and so on. The ranging and consequent fire for effect having been terminated, the lieutenant may then indicate a new objective, etc. Needless to say, the captain frequently exercises his lieutenant in the same way.

In all these studies on the terrain of any artillery force one fundamental principle is never lost sight of, viz., that artillery is an auxiliary arm which acts always in conjunction with other arms and whose great function is to aid the infantry to advance.

What is sought, and we believe manifestly secured, by this special system of training for officers, is that their tactical education is improved, and above all they gradually grow to give the orders and commands necessary for any suddenly presented situation, by reflex action rather than by conscious effort of the brain.

It is of course evident that a man may play on the instrument constituted by the various organs which make up a firing battery just as he plays on a piano. In the one case he produces sound effect, in the other fire effect. The object of the French training "with cadres" is to give such easy familiarity with the instrument used that the desired combinations of corrector, range and deflection are struck simultaneously and without consciously thinking of each separately, just as the notes on a piano constituting a chord are struck at once by any man sufficiently exercised not to be obliged to remember what to do with each finger.

The system of work above outlined was evolved under the press

of a lack of sufficient men and horses; however deplorable this lack may be, there is no doubt that for certain purposes the absence of the matériel and men, far from being a serious prejudice to certain instruction, may be considered to actually facilitate it.

During this second period of instruction the final target practice is held. Some 500 rounds per battery are available for this purpose. The problems vary from the employment of a battery to that of a regiment, but it is worthy to note that there is no such thing as conduct of fire by battalion. Nevertheless, the solution of the problems presented to the battalion commander during the battalion firing call for all the attention and vigilance that one man is capable of. This subject of the conduct of fire by battalion commanders is of great importance, and it is believed that we should seriously consider, if it has not already been effected, the close limitation of a method discarded, so far as known, by every other country.

From the French point of view the battalion commander's function during fire is purely tactical, and any attempt at conduct of fire on his part is considered a mistake, for the reason that it removes his attention from that close observation which constitutes the basis of his decisions for the employment of the fire of each of his three batteries.

The participation of the field artillery in practical work with the other arms takes place chiefly during the target practice period, and finally in the month of September come the maneuvers which complete the year's training. During this time the artillery and the other arms are diligently exercised in the practical arrangements, insisted upon in all terrain studies, for securing intimate communication between all arms or units co-operating in march or battle towards the same tactical end. During the past three years more attention has been given by the French military press to the matter of communication between the several arms than to any other one subject. That no one particular methed of accomplishing this liaison has as yet been generally accepted as the best is indicated by the heated nature of the controversies between the advocates of the various systems proposed: moral liaison, physical liaison, liaison from the top, liaison from the bottom, or combinations of two or more methods of liaison. In one form or another, however, the liaison always exists between the artillery

and the infantry. It is true that in our service we also advocate this liaison, and our drill book prescribes it; but how often do we actually establish it at our small maneuvers; how often do we think about and give orders for it at target practice; in short, how much do we even mentally practice it? It may be interesting to note that while the artilleryman believes in the liaison, it is especially the French infantryman who insists that his artillery must promptly provide for this communication between the two arms.

There is everywhere noticeable a very close understanding between the French infantry and artillery. This understanding is brought about in many ways, but most of all, perhaps, through the practice of permitting officers of one arm to serve in organizations of another. The periods of service of this kind vary in length from two weeks to a year. The shorter periods are of course so arranged as to fall at an especially interesting time; for example, infantry officers may serve with the artillery during target practice; artillery officers may serve during maneuvers with the infantry. The French general staff is recruited solely from officers who are graduates of the War College, and before commencing the War College course, the officers admitted must serve for three months in each of the branches of the service to which they do not belong The French officer thus commences the study of general tactics with a far more intimate knowledge of the workings of the three arms than is ever the case in our service. So great is the advantage resulting from this system that its adoption in our army is unhesitatingly advocated.

It seems useful in closing to make a résumé of the essential features of the system of training which has been described. These are:

1. The simultaneous arrival of the year's contingent of recruits.
2. The linking of batteries, whereby one at least of each battalion or one battalion of each regiment can drill once at least every three days at full maneuver strength in horses and men.
3. The highly useful training accomplished by batteries whose strength for the time being consists only of its officers and a few noncommissioned officers.
4. The great initiative allowed to the captains is not considered inconsistent with a firm control of the training by the majors.
5. The unit of fire and of fire instruction is in all cases the

battery; the tactical unit and the unit of tactical instruction is almost invariably the battalion.

6. The great attention given to the individual recruit during the first months of instruction, and the careful explanation to him of the *why* of everything.

7. The systematic work devoted to developing good noncommissioned officers; the formation of classes of candidate-corporals and candidate-sergeants by battalion or by regiment, and the assiguments from these classes, of noncommissioned officers to batteries other than the battery of origin.

8. Simplification of all formal drill and complete elimination of all ceremonies such as muster, Saturday and other inspections, reviews and guard mounting; the substitution for these of daily, business-like informal inspections of individual articles: one day, blankets; another, shoes; another, mess kit; another, overcoats, etc.

9. Working hours of officers almost wholly devoted to soldier work, practical or theoretical, and the elimination of time devoted to law, administration and regulations.

10. Large allowance of ammunition for target practice and the amount of this expended on elementary training.

11. Careful planning beforehand of each day's and each week's work, in view of a distinct object to be accomplished; this *not* by the War Department, but by the officers conducting the instruction.

12. A system of fire control requiring, in addition to the captain, one officer only.

One final comparison can be usefully made between the French service and ours. Due to the historical influence of the battle methods obtaining during our Civil War, a light battery commander grew to regard himself, his lieutenants, his horses, his men and his guard as things separate and apart from the rest of the garrison, and the isolation of our batteries under the old system, placed as they were, one at each post, confined and sanctified this custom.

When batteries were first united into battalions, little change took place in our habits. The battalion commander had learned what little he knew of his duties under the old system, and no impulse arose to change his attitude toward his captains or that of the captains toward each other. Rivalry existed, and this was as often noxious as healthy. A battalion commander would have been

thought quite mad who attempted to indiscriminately take horses and men from one captain to enable another to carry on his regular drills. Later on, when regiments were created and young captains as well as young majors fell into command, the impress of the major upon his battalion and upon *all* of its officers increased, but never to the extent seen in France.

It is believed that a great step forward will be taken when our majors command and train their battalions on the French system, and it was largely with a view of presenting its advantages that this paper was written.

THE MODERN ARTILLERY FIGHT.

BY H. ROHNE, LIEUT.-GENERAL, UNASSIGNED, ROYAL PRUSSIAN ARMY.

Translated from the Artilleristische Monatshefte, By 1st Lieutenant E. L. Gruber, 5th Field Artillery.

The views of different nations on artillery tactics vary greatly, even within the armies themselves. It is generally recognized that the principal or sole mission of the artillery should be the support of its infantry. But the manner in which this mission is to be performed is the one point of discussion. When the infantry advances to the attack, the artillery must clear away all obstacles which may obstruct this advance. What are these obstacles? First, the fire of the hostile artillery and then that of the artillery and infantry. Therefore, the hostile artillery should be engaged first and then the artillery and infantry. This would be a logical supposition. But right here we encounter differences of opinion; for many maintain that the artillery should husband its fire until the hostile infantry has disclosed itself, and then turn and engage the latter. Others say that the effect of artillery fire is so small, anyway, that it really is not an obstacle of great consequence to good infantry. Such infantry would be able to move forward without artillery support. It is true that this view is not general, but it must be mentioned to present a complete case.

Most writers on tactics are agreed that the artillery must support its infantry, and in so doing they must engage the hostile artillery, but opinions vary as to how this should be done. Some say that no infantry attack can succeed until the hostile artillery is beaten decisively—many even demand that it be completely destroyed. This was the general view after the Franco-Prussian War. The great superiority and effect of the German guns had practically swept the French artillery off the battle field after a relatively easy fight. The German artillery was then able to concentrate its mass against the hostile infantry position in order to prepare the latter for the attack. From this was deduced the doctrine of a sort of battle drama composed of two distinctly separate acts: First act, artillery duel; second act, shooting up the infantry position. Since then great changes have taken place. The artillery now has a better aiming and pointing

device, facilitating the delivery of fire from masked positions, and, above all, the long recoil mechanism and shields. These improvements have increased the rate of fire very much, and thereby the effect against all targets in the open. At the same time, the effect against hostile artillery has been greatly diminished. It was realized that it would take too much time to break down the opposition of and obtain complete fire superiority over the hostile artillery. The German Infantry Drill Regulations therefore stated (374): "Although an attempt should be made to obtain a *previous* fire superiority in artillery, the execution of the infantry attack should not be made dependant on this alone." In my opinion, emphasis must be placed on the word "previous." In other words, the artillery fight will, in the main, be carried on during the advance of the infantry.

Now comes the important question, on whose answer the whole doctrine of the employment of the artillery depends. Should the annihilation (complete, overpowering) of the hostile artillery be insisted upon, or is it sufficient if the latter be just temporarily silenced and crippled, and in this way prevented from delivering an effective fire on the infantry? There cannot for a moment be the least doubt that a complete annihilation is preferable to a crippling. But the great point, the only point, is this: to do this a preponderance of forces is absolutely necessary; will there still remain sufficient forces to engage the infantry?

Frontal shrapnel fire can lead to no decisive results in the artillery fight. The gunner and No. 1, the most important members of the gun crew, are well protected by cover and almost impossible to hit. The rest of the personnel—officers included—are also protected by shields, so that the probable number of hits will hardly approximate one-sixth of the number of hits against a battery without shields. There are no German firing experiments under war service conditions avialable for discussion.* In the French Regulations for 1910 the following firing experiments are given. With the fire of a battery distributed over a front of 100 meters, target being a shield battery whose personnel was posted as for service conditions, the average numbers put out of action by one "tir progressif" (zone fire) were:

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*Translator's note.—The experiments mentioned have no doubt been made, but are kept secret, and, as the writer states, "they are not available for discussion."

At 2000 m.—20 per cent of the personnel.
At 2500 m.—18 per cent of the personnel.
At 3000 m.—15 per cent of the personnel.
At 3500 m.—12 per cent of the personnel.
At 4000 m.—11 per cent of the personnel.

When the battery ceased firing and the personnel took cover these losses were cut down to 8.15 per cent* at range 2500—4000.

This effect seems very small, but is nevertheless very appreciable if we consider that it was caused by 32 rounds—8 from each gun—in the maximum time of 1½ minutes. A "tir progressif" searches a zone 450 meters in depth. An adjusting fire of long duration† is therefore not necessary. Formerly, a 200 meter bracket was prescribed, but the Regulations of 1910 says a 400 meter bracket is sufficient. Including the 3 officers, there are 45 persons in the firing position of a French battery. Taking just one-half of the effect at 4000 meters, a battery which is itself firing would sustain a loss of from 2 to 3 persons as the result of one "tir progressif." These losses are not apt to lead to a complete overpowering of a battery, but the personnel would be compelled to seek the cover of the shields and to temporarily suspend fire, and this would again diminish the probable losses. Anyway, the battery would be unable to continue its fire without confusion, or change to another target. The battery would, however, be crippled.

If a battery be fired upon with H. E. shell the losses may become greater—due to fragment hits on the cannoneers immediately behind the shields. This is especially true for the howitzer shell, whose cone of dispersion is such as to project the majority of its fragments at right angles to the trajectory, and some even to the rear. According to the French Regulations, P. 4, foot note to par. 192, 50 H. E. shell equally distributed over an area of one hectare,‡ will on an average, give hits on one-third of the personnel within the area, *i. e.,* one shell will, on an average, effectively cover an area of 200 sq. meters.

In order to compare this effect with that of shrapnel fire we must start from similar conditions. The "tir progressif" covers with its fire an area of 100 meters front and 450 meters depth, *i. e.,* an area

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*These results are based on experiments made against guns with shields of the old pattern. The new shields give a somewhat better protection.

†Translator's note.—Meaning, probably, "exact adjustment."

‡Translator's note.—Hectare = 10,000 sq. meters = 2.45 acres.

of 45,000 square meters. To cover this area with H. E. shell in the desired manner, *i. e.,* 50 shell per hectare (10,000 square meters) would require 225 shell, or seven times the number of shrapnel necessary to search the same area. A very similar distribution* would be obtained by beginning at the short limit of the bracket (or even from a drop back of 50 meters) and then walking through to the long limit of the bracket with successive salvos or volleys by increments of 25 or 50 meters. If the "walk through" is by increments of 25 meters each gun will have to fire at least 3 rounds at not less than 16 different ranges. If the walk through is by increments of 50 meters six different ranges will be sufficient, but each gun must then fire at least 6 rounds at each range.† This cannot be called a very simple method of fire. Since the new range must be announced after each salvo or volley, the rapidity of fire cannot be very great; it will take at least 15 minutes to fire the 192 rounds in this manner.‡

The French Regulations, therefore, make no mention of shell fire under these conditions, and limits this fire to such cases where a more limited area is to be searched. Artillery behind the crest is mentioned only in very general terms (P. 4, 192). In this case a 100-meter bracket should be obtained on the crest, and then, beginning with a range of 50 meters greater than the long limit of the bracket, the area behind the crest is searched by successive decrements of 25 meters in range until undoubted shorts are observed. After shifting the sheaf this method is repeated in order to obtain a uniform distribution and the required density of hits. Depending upon the position of crest within the limits of the bracket, it would be necessary to fire at from four to seven different ranges. Effect, however, would be obtained only when the target is not very far behind the crest. But there is never any assurance that this is the case.

If a 100-meter bracket can be obtained and the target is not far behind the crest, an effect equal to that with the "tir progressif" can

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*Translator's note.—With H. E. shell.

†This is with a 4-gun battery; with a 6-gun battery 4 rounds at each range would have to be fired.

‡Translator's note.—The writer evidently contemplates a progressive method of fire in which changes in the range or in deflection, or in both, will have to be announced after each volley or salvo. To fire 192 rounds by the "tir progressif" would require 9 minutes of actual firing. If we add to this the time necessary to give the commands for each of the six "tirs progressifs," it is evident that the writer's estimate of 15 minutes for the method he contemplates is not excessive.

be gotten with shrapnel fire at two successive ranges 100 meters apart—16 rounds.

With shell a positive effect cannot be obtained unless the hostile artillery is out in the open, because only against such a target can a sufficiently small bracket be obtained with any degree of certainty.

I would like to remark here that the explosive charge of the French H. E. shell is fully 15% of the weight of the projectile. On bursting its fragments are projected in general at right angles to the trajectory as in the German howitzer H. E. shell. The explosive charge in the H. E. shell of the German field gun is from 2 to 3% of the weight of the projectile; the greater mass of the fragments forms a cone of dispersion of 114º, *i. e.,* the fragments are projected forward and sideward, and therefore less able to hit the personnel behind the shields. Consequently the number of figures hit would never amount to 33% by a great deal.*

These considerations, namely—that shell fire necessitates a very exact adjustment, the success of which can never be counted on, and furthermore the fact that successful results will always take much time—were sufficient to cause the French Regulations to prescribe that in the general case it would be sufficient just to cripple the hostile artillery and that its complete destruction was not to be attempted except in special cases when a hostile battery's fire was inflicting exceptional damage. It was further laid down that in the execution of its mission, the artillery was to employ no more forces than were absolutely necessary to its fulfillment in the shortest possible time, so that the greatest number of guns might always be available to oppose any new targets that might appear.

The principal exponent of the views embodied in the Regulations is General Percin, who has in various articles propounded these principles with much spirit. Since his retirement for age a certain opposition to his views is making itself felt. By some parties the demand is made that the artillery must not be content with a mere crippling of the hostile artillery, but must go further and try to completely destroy it. Quite recently General Fayolle has come forward as the leader of this opposition in an article entitled *"Concentration des feux et Concentration des moyens."*† The General was formerly an instructor at the Ecole Superieur de la Guerre and is now in command of the artillery of the 12th

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*Translator's note.—Which is the case with the French H. E. shell.

†Paris, 1913. Henri Charles-Lavanzelle. Price, 4 frs.

Corps. His style of writing is pleasant and clear. His opposition is couched in the form of a letter addressed to an infantry field officer who has just completed a detail with the field artillery and still retains some doubts concerning a few things. This infantry officer does not concur in the opinion that a mere crippling of the artillery is sufficient and its complete destruction unnecessary, and he does not hesitate to tell the artillery general of his doubts. Above all, he is not quite satisfied with the principle of the "Economy of Forces." He points to the German Regulations according to which a superiority of fighting power should, if possible, be developed in the artillery fight.

In his answer the General compares the effect of two opposing lines of artillery, one of which is much superior to the other in number of guns and front occupied. He comes to the conclusion that the effect of the numerically stronger artillery is very much greater than might be expected from the proportion of guns in the two sides. As a matter of fact, supposing the intervals to be the same in both cases, the effect of a 6-gun battery firing on a 4-gun battery is twice that of a 4-gun battery firing on a 6-gun battery. Before accepting this comparison we must make the hypotheses that the time for adjustment will be the same in both batteries and also that other conditions (rapidity of fire of each gun and the effect of individual shots) are the same for both sides. If two 6-gun batteries having an interval of 50 meters between batteries, fire on a 4-gun battery (proportional strength 3:1) the fire effect of the two 6-gun batteries when compared with that of the 4-gun battery will be as 12:1.

From this, General Fayolle concludes that the principle of "Economy of Forces" is wrong. Although shielded batteries could not be expected to inflict much damage upon each other with shrapnel fire, the whole proposition seemed quite different to him when it came to H. E. shell fire. He has a high regard for the effect of the latter; the wounds caused by its fragments are more severe and the moral effect greater. For this reason he says that toward the end of the Russo-Japanese War both the Russians and the Japanese showed a great preference for the H. E. shell.* Therefore it would be necessary to combat the hostile artillery with a superiority in guns. This applies, he says, only to that part

*No authority for this statement is advanced and none can be advanced, because the Russian Artillery was not supplied with H. E. shell.

that has disclosed itself, for no effect worth the mention is to be expected against artillery whose flashes are not visible. He suggests that perhaps the use of aeroplanes might be of some assistance here.

He states that the fire of several batteries ought to be easily concentrated on a battery in position on a crest. The burst of the shell fired at it would at least be seen, and by obtaining adjustment with a single battery, the direction of fire for the rest of them would be given. But this is a dangerous belief! If the fire of the one battery is really properly adjusted, it will not need the help of the others. Its effect will be so great that the battery fired upon will at least be prevented from returning an effective fire. If the fire has not been properly adjusted, the firing of the other batteries at the shell bursts of the first will be simply an unnecessary waste of ammunition.

The consequence of the principles of General Fayolle will be that perhaps unconsciously an artillery duel will be carried on merely for its own sake. The important fact will be overlooked that the artillery's prime mission is the support of its infantry. Only those batteries firing on our advancing infantry should be subjected to a heavy fire and the others just sufficiently to hold down their fire and thereby prevent them from firing upon our infantry. As soon as the infantry of the defense shows itself, which will in general first take place when the attacking infantry enters the fire zone of the defense, the infantry of the defense must be brought under effective fire of the attacker's artillery and it is very important that the latter be able to do this without annoyance. For this reason there should be other batteries available for this purpose, whose duty it would be to immediately engage all hostile batteries whose fire might be preventing our "Infantry batteries" from accomplishing their task.

If it be taken as of first importance to oppose the enemy from the start with overwhelming forces, there is danger of playing one's last trumps prematurely. I will show this by an example, not taken from personal experiences, but from the author of "Retrospect of Firing Practice, 1912 (Art. Monatshefte, Nov., 1912, p. 389 *et seq*). Hostile artillery is developed over a front of 400 meters.* and is to be attacked immediately in order to prevent it from delivering an effective fire on our advance infantry. Against this

*The front was measured 180 mils. The map range was 3000 meters.

hostile artillery a regiment (6 batteries) goes into position and opens fire with all its batteries, each of the two battalions being assigned a sector approximating one-half of the hostile front. In this way each battery was assigned a front of about 70 meters. While the batteries were in the process of adjusting their fire, the enemy opened fire from his left flank with several new batteries—counter batteries—which up to this time had been withheld. Thereby the hostile front was increased 80 mils (240 meters) and now had a width of 630 meters. Every battery was now forced either to undertake a change of target or make a change in distribution. This can usually be done in an orderly manner in practice under peace conditions with a well-trained personnel, but it is fraught with great difficulties under conditions of actual war, and it is certainly very doubtful if any of the batteries would ever have adjusted their fire. If the principle of the "Economy of Forces" had been followed only one battalion would have been used to open fire on the batteries first observed. Each battery would then have had to cover a front of about 130 meters; this is not excessive for as I have shown in an article (Recent Studies on the Shrapnel) a 6-gun battery can cover a front of 150 meters with a fire of adequate intensity. The latest interpolations of the Drill Regulations state that a light battery may be assigned to effectively cover a line of artillery equal to its own front, *i. e.,* 100 meters. Accordingly a front of 130 meters would have been too large—one of 70 meters too small. In a fight it is, however, impossible to divide a front with such nicety as to make it come out even. General Fayolle would have approved of throwing all six batteries into the fight from the start. If fire had been opened with 3 batteries only, which in my opinion would have been sufficient to hold down the fire of the batteries firing upon our infantry, there would have been available three unengaged batteries to fire upon the hostile batteries of the left flank with a very fair chance of success, because these unengaged batteries were themselves not under fire and not a single battery would have been compelled to undertake a change of target while the hostile artillery would have had to do so in order to protect itself.

General Fayolle places a special importance on oblique and enfilading fire. There certainly is no doubt that against artillery such fire is more effective than frontal fire. But to artificially create these conditions by unusual and special dispositions would lead to

endless refinements. Just to go back to the example discussed above! If the right battalion had opened fire the result naturally would have been a cross fire—perhaps even an oblique fire, but if the left battalion had opened, cross fire would have been out of question. The batteries of both sides last thrown into the fight would have opposed each other with frontal fire.

In my opinion the surest solution of the question "What is the best way to fight artillery?" is the introduction of the unit projectile. It could be used as time shrapnel, every attempt being made to adjust fire as accurately as conditions will permit. By doing so all movement either within or in rear of the battery—*i. e.,* resupply of ammunition and change of position would be made practically impossible. In addition, hits from fuze heads would be just as numerous as direct hits from percussion shell, so that a good effect on the matériel and on the personnel behind the shields could be counted on. Against a battery in the open a change to persussion fire could also be made very easily. If the fire of two batteries were concentrated on one, one of the two could use time fire and the other percussion fire. In this way the two batteries would interfere least with each other, which would be unavoidable with any other division of the fire.

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Note.—Gen. Rohne's reputation is well known. As an active officer and as a writer he has done much for the German Field Artillery. His ideas are always supported by good reasoning, and his progressiveness and impartiality are shown by his favorable attitude toward most of the French ideas. Remembering this, a reader must give great weight to any criticisms he may make of their methods, of which he has made a thorough and exact study for many years. His articles usually appear in the *Artilleristische Monatshefte,* a journal of which he has been editor-in-chief for a long time.

"WHAT LESSONS ARE TO BE DEDUCED FROM THE RUSSO-JAPANESE WAR FOR THE USE OF FIELD ARTILLERY IN WAR?"

BY LIEUTENANT KOERNER, 15TH REGIMENT, FIELD ARTILLERY.

Translated from the Artilleristische Monatshefte, by 1st Lt. W. J. Buttgenbach, Coast Artillery Corps.

From the Russo-Japanese War we anxiously awaited many things that might be new regarding troop leading and the use of the separate arms, especially for field artillery. As the details come to us results prove far different than we expected. In the beginning of the war there were not sufficient troops in Manchuria to take up the offensive, and as a result the Russians were required to take up a defensive attitude. The one-track railway in the wilds of Siberia delayed the deployment. Further, when the Russians were strong enough they allowed themselves to remain on the defensive behind their constructed works. So the war became practically one of *"position"* and showed little of what the ever-changing conditions of a campaign will bring.

We are forced to believe that the experiences of the artillery indicate only in a limited sense the relation of this arm to the war of the future. The artillery armament of both belligerents did not correspond

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NOTE:—Abbreviated titles of authorities referred to in foot-notes:

Tettau:—"18 Monate mit Russland's Heeren in der Mandschurei" von Freiherr von Tettau, Major und Bataillonskommandeur im 2. Bad. Grenadierregiment Nr. 110.

Gertsch:—"Vom Russisch-Japanischen Kriege 1904-05" von Oberst Fritz Gertsch. Brigadekommandeur und Instructeur der Schweitzer Infanterie.

Luttwitz:—"Das Angriffsverfahren der Japaner im Ostasiatischen Kriege 1904-05" von Freiherr von Luttwitz, Major im Grossen General-Stabe, Berlin.

Leoffler:—"Der Russisch-Japanische Krieg" von Loffler, Major im Konigl Sachsischen Generalstabe.

Liaojang:—"Kriegsgeschichtliche Einzelschriften." Herausgegeben vom Grossen Generalstabe. Aus dem Russisch-Japanischen Kriege. 1904-05. Heft 43/44: "Die Schlacht bei Liaojang."

Bronsart:—"Erlebnisse beim Japanischen Heere" von Major Bronsart von Schellenderf, erschienen im Vierteljahrsheft fur Truppenführung und Heereskunde," 1906 1. Heft S. 22.

to those technical advances that had been made up to the time. Today, nearly all European powers have the long-recoil guns and shields. Both of these factors were missing. The Japanese gun was of a *quick-loading type* that had to be run back into the firing position by its personnel after every shot. The teams were poor as the Japanese horses are an inferior lot. The ammunition supply consisted of shrapnel and shell, the latter having no time fuses.

The Russians, on the other hand, had the long-recoil system, but no shields. This gun had been introduced into their service only very shortly before the war, and the troops had had no proper training nor artillery practice with this material. The ammunition supply consisted of shrapnel whose fuses had a greater radius of action than the Japanese, but no shell, and as a result the Russians often wished they had back the old gun with its shell.

Both sides had mountain artillery, but neither had sufficient. The Russians soon learned that their gun was too heavy, especially in the hill country between the Yalu and Liao-Yang, being too difficult to withdraw, especially under the enemy's fire. It was only toward the end of the war, when battles were no longer fought in the hill country, that they had sufficient mountain batteries, and also at this time they received shields for their field guns.

It may be stated here, considering the lessons as to the use of artillery, that almost everything that has been found of permanent value is contained in the new German Regulations.

The first thing it is desired to take up is to consider what effect we may expect from field artillery in a campaign. Before the war much was said and written in our technical press in regard to the rearmament of the artillery. Gun factories with a selected personnel showed us practices with remarkable results. Thus, involuntarily, great things were expected in battle, but when we saw the casualty reports we were much surprised to see how ineffective the results really were. Later on, reading detailed reports, we came to the conclusion that the poor results achieved were due less to the gun than to its improper use.

It was shown that artillery fire against visible targets in an open country is very effective.[1] In this connection we need but consider

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[1] Cf. Tettau, Vol. II, page 250. "As was told me (Battle of Sandepu) the Japanese artillery tore whole lanes through the advancing columns."

the advance of the Koslowsky Regiment in the battle of the Shaho.[2]

Even now, it has become far more difficult to actually destroy artillery. This war shows that batteries whose position was known, even when under cover, suffered severely, and in many cases were compelled to cease their fire for the time being. This is especially seen in the battles of the Yalu, at Kintecheu, and at Wafangu, where the Russian batteries were posted on the heights. In a similar way we read also of effective Russian fire against hostile positions.[3]

In later battles also, the effective use of artillery fire was lessened considerably, and this may be explained on the following grounds: On both sides cover was not only eagerly sought, but the artillery forces stayed farther apart. The Russians knew that their shrapnel fuses had a greater radius of action than those of the Japanese, so they stayed so far to the rear that they need not fear the Japanese shrapnel. The Japanese, however, were armed with a shell whose radius of action exceeded that of the Russian shrapnel, and they, in turn, kept far enough to the rear to be out of the zone of the Russian shrapnel fire and still expect effective fire with their shell. As a result, with a distance of 4,000 meters, where we have a steep angle of fall with it a lessened danger space, the actual artillery effect was little. It is thus evident that to expect results with artillery worth while it is necessary to close sufficiently with the enemy so that effect may be expected. It also happened that in many cases the positions of the hostile batteries were not located. They fitted so well into the terrain, and were so covered from the heights above, that it was mere accident for the enemy to find, from his own position, the exact range. The Russians attempted to reach such targets with a dispersion of fire, but seeing nothing, they fired at all kinds of ranges, using up immense quantities of ammunition with practically

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[2] Cf. Tettau, Vol. II, page 355. "The Koslowsky Regiment was formed in eight or nine long skirmish lines that followed one another with a depth of 60 to 80 paces. (Every line seemed to consist of one company, and due to the intervals, covered a front of several hundred meters.) Between individual men the interval was four to five paces. The reserve was formed in a similar manner. Hardly had the first lines passed my position when the Japanese artillery (which had previously been firing intermittently, in the country east of Yuhuantun) opened up with a murderous fire with shell and shrapnel. Not the least bit of cover was afforded by the open country, so that the loss in these lines was considerable. Everywhere the Japanese shell tore large gaps in the oncoming regiment, reaching several lines at once, due to their short distance between them. Ignoring these losses, the Russians kept on advancing as if on the drill ground."

[3] Cf. Tettau, Vol. I, page 204. "Oku made the attack on the positions south of Taschikiao, but failed, due to the effective Russian fire.

no results. This dispersed fire was a result of imperfectly imitating French fire tactics. They, first of all, committed the error of trying to establish a too narrow bracket. The height of burst was generally too high and the burst interval too great, so that the effect on the target was little or nothing. In several cases, the Japanese infantry, whose destruction seemed certain, escaped with very little loss.

A further reason for poor results is found in the false use of shell. Due to peace time results, one perhaps puts exaggerated value on shell fire and is led to expect too much. We further read that in this war shell fire, at first, made a tremendous impression, but, as we see from all reports, unless the target was actually struck,[1] the results were little.[2] If the shell struck somewhat beyond the target the result was nil, the fragments in that case had not sufficient penetrative energy, and the shell usually buried itself in the ground. Further dispersed fire with shell against targets whose range was not exactly known, even if the bracketing had been correct, gave no results. Field batteries under cover need not believe that they are silenced by heavier batteries firing shell. On the other hand, dispersed fire with shrapnel with its greater depth of dispersion, will always stand a better chance to do something against batteries in position.

In this war shell was lacking in time fuses. Where one has to attack deep shelter trenches and targets under cover, shrapnel or time-fused shell are required. Effective results may only be expected when it is possible to attack such trenches from the flank, a fact well settled before this war. On the other hand, should one desire to use field guns against strong works (and such one must consider the meter-thick, frozen clay walls of winter, that mostly surrounded all Chinese villages) one should expect poor results. A definite result was not attainable by such fire, although the enemy found himself compelled to remain under cover, thereby allowing the

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[1] Cf. Tettau, Vol. II, page 138. "If a shell hit exactly the target aimed at, then the damage was terrible. Before our eyes a shell struck a lead horse of a returning ammunition wagon, both horse and the driver were literally torn to pieces.

[2] Cf. Tettau, Vol. I, page 218, Vol. II, page 157. "The 85th Wyborg Regiment in dense column (apparently as double column) laid down west of the Mandarin Road as a Shimose shell landed in the battalion between two companies separated by only a few paces interval. I thought that a great loss was sustained, but found out that not a man was hurt." Tettau, Vol. II, page 268. I remember that on a forenoon in an occupied village some 50 Japanese shell fell there, that has no other result but to damage one rifle in a stack.

attacking infantry to advance. This was, in such case, an effective use of artillery fire.[1]

One would expect more effective results from field howitzers than from field guns, when firing shell against targets behind cover. Howitzer shell fire should give good results against shielded guns whose position is known.

Finally, in connection with the question of effective use of projectiles, it behooves us to consider how these were used. When one reads of the enormous quantites of ammunition expended, the question naturally suggests itself as to how these enormous quantities are to be supplied. Modern rapid-fire guns can fire in a shorter time a greater number of shots than some of the individual guns in some Russian batteries we read of.[2] If one would use the great speed of fire possible with modern batteries, the personnel not only would be worn out, but the ammunition supply entirely exhausted. It therefore, must be definitely stated than an unnecessary expenditure of ammunition is unallowable, and a timely change from deliberate fire, increased rapidity of fire and interrupted fire must be made. The Regulations of the French Field Artillery already insisted upon this fact, even before the war. In Part VI, paragraph 618, we read the following: "To make the proper use of the rapid-fire principle of field artillery, one must, by sudden, sharp and powerful *rafale* of fire, take the control from the enemy, and give to other arms the opportunity to seize definite positions of the terrain, so necessary for the ultimate purpose. These fire *rafales* must, however, be separated by definite pauses."

The Russians observed this latter point very little. Instead of keeping the targets they could actually see under a scattering fire, they fired over the whole terrain with, of course, no results.

As the artillery positions were in some cases previously selected and laid out, and liberally supplied with ammunition, it was not always possible to remove all this ammunition when, later, these positions were abandoned in the withdrawal of the troops. So the Japanese, at the Yalu, not only got possession of Russian guns, but also sufficient ammunition for these guns, so that in the battle of Liao-Yang they could be used against the Russians, their former

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[1] "This result can, however, be attained even with better result, by the use of shrapnel." Editor, *Artilleristische Monatshefte*.

[2] Cf. Tettau, Vol. I, page 302. "During the 30th of August the first and second battery of the 9th Artillery Brigade expended about 6000 projectiles.

owners. The waste of ammunition on the part of the Russians may be justified in view of the fact that they always withdrew, and that it was better to expend it rather than let it fall into the hands of the enemy.

For the Japanese the situation was otherwise. As the war continued their distance fron their base was always increasing, so that their rear communications were always becoming further extended, while those of the Russians were bringing them nearer their own base. Thus for the Japanese, the question of replenishing their ammunition supply became one of more difficulty, and they had to become more economical in its expenditure.[1] I would like to mention the example of the batteries in the battle of the Putiloff Hill, where their batteries ceased fire entirely, when a blizzard arose.[2]

In connection with the use of artillery, we come next to the question of positions. The firing position may be open, partly covered or wholly covered.

The first battles showed plainly that coming into position on a superior height without cover was in most cases equivalent to early destruction. One must keep out of sight, at least as far as it is possible to do so. When one reads that batteries under cover suffered very little from hostile fire, yet were able to fire effectively themselves, it is clear that such a position is the only proper and fitting one to be used in war.

An artillery position under cover is surely advantageous. The old Regulations for Field Artillery (Berlin, 1907) says briefly and very much to the point: "Positions under cover make the finding of the target very difficut for the opponent, and is a means to deceive him as to the strength and aims of the attacker. It lightens the supply of ammunition as well as changes of position, and for the artillery allows it to preserve its fighting strength for the decisive work

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[1] Gertsch, page 99. "From time to time the two batteries again commenced firing, though never very long, and only until the two half batteries answered. These then fired a longer time, sometimes heavily and continuously for a half an hour. So it went on till evening. The losses of both batteries at end of the day were, 1 officer and 4 men killed, 2 officers and 13 men wounded, the result of at least 1000 shots.

[2] Cf. Bronsart, page 44. "Towards 1 p. m. a heavy snow fall commenced. The volume of the artillery fire on the Japanese side was lessened considerably, while during this time the Russians fired all the more. The Japanese infantry used the invisibility of the air promptly and pushed forward, while the artillery replenished their ammunition supply. As the snow storm ceased about 3 p. m. the Japanese guns started firing again."

of the attack. Even under circumstances it gives it the opportunity to make an unexpected attack in battle."

One is forced to mention here that its use in these positions was not as great as might be assumed from reading the reports. I have here in view the work of Shlyssarenko's brigade in the battle of Liao-Yang, which from Russian accounts appears very successful, but reading the Japanese accounts give us an entirely different picture.[1]

These different accounts may be due to the fact, that when the Japanese noticed that the attack of the enemy was expected, they withdrew their personnel and did not fire during that time; the Russians then reached the conclusion that their fire had silenced the Japanese batteries, and were so much the more astonished when later, these batteries again commenced firing.

I am willing to admit that since this war, instruments for fire direction have been so much improved, and troops have had so much training with them, that it is now possible for batteries under cover to shoot up targets as easily as was done formerly when guns were

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[1] Cf. Tettau, Vol. I, page 302. "Colonel Shlyssarenko then directed the fire of his two batteries,—both being fully under cover in the valley—against Group "A" which was hardly silenced after 35 minutes. Then he directed the fire of the 2d battery against the artillery Group "C" while the 1st battery kept down every attempt of Group "A" to reopen fire. At 9 a. m. Group "C" was silenced; Group "B," whose position was only given from the direction of its fire and the dust clouds stirred up by the blast, was now under fire by the 4th battery of the 3rd East Siberian Rifle Artillery Brigade, with effective results. Every attempt of the Japanese artillery to open again that day was answered by both batteries and was silenced with rapid fire. (Description according to Russian accounts.) Towards noon the two batteries attacked the infantry that had taken up a position barely 500 meters from the trenches of the 10th and 12th East Siberian Rifle Regiments in a kaoliang field, on the near side of the hill, and drove them out of the high kaoliang by lively shrapnel fire. Upon coming into effective range of the guns, the Japanese suffered severe losses. The Japanese were not able to locate the batteries, so they scattered shells on the north ridge of the hill on both sides of the ravine, but did not hit them.

Cf. Gertsch, page 204. "The artillery battle lasted till noon with apparently no results. The Russian batteries were firing only against the artillery of the 10th Division. (Groups "A" and "C." described above.) The 2d Battalion of the Guard Artillery (Group "B." above) was constantly under fire without result. The shrapnel all burst 500 meters short.

Cf. Liao-Yang, pages 40/41. "Accoding to eye-witnesses on the Japanese side, the opposing fire of the enemy's artillery lasted all day with no diminution, the left groups (A and C) had, however, a hard time of it, partly under fire from the artillery and then from shelter trenches. The batteries of Shlyssarenko that had sustained almost no loss, and on the 30th of August had the decided advantage, were, however, unable to put the Japanese batteries out of action, for the next day they were able to reopen their fire with their usual strength.

posted in the open; further, we have means now at hand for measuring auxiliary base lines, so that a change of direction in fire presents no difficulties. It will also be possible to hit moving targets from positions under cover, providing that they do not change direction too quickly. This war has shown, however, that we must consider the dead angle that these positions bring with them; further, that our field of fire may be restricted to certain ranges, so that from these positions generally it is not possible to assist the infantry attack to its culmination. This is undoubtedly a great failing. Could we, as an example, take up a position in an advance 200 meters in rear of cover for a battery, it would give us too great a depth and cause us to miss perhaps the favorable moment for action. The bringing up of gun carriages and coming into position in the open, would in many cases, give the enemy a favorable target and would bring with it swift destruction. It would be far better if we could designate in advance the required batteries and have them come up to their position in echelon on the flank, and from there aid the infantry attack with a flanking fire. The other batteries in position would continue their fire between times to keep down the enemy's artillery.

On the other hand, the covered position may be said to have the objection, that too much time is necessary for its preparation. Primarily, one must find a good position for observation, then this place must be definitely announced to the batteries, and lastly, a dependable communication system with the battery must be established. In most cases these arrangements can be made before the battery arrives, for the chief of the artillery. during the march, rides in front with the battery commander, and as the orderlies of the batteries can be easily reached while the batteries are coming on more slowly, there is ample time available. While the battery commander locates his observation station and settles on its position, the orderlies designate the proper roads to the on-coming battery, and the others are connected by wire.

In the next place I wish to take up the question of these preliminary arrangements and see what we may note in the experience of this war along these lines.

The observation station should not be too far from the battery, so that the battery commander does not lose control at important times, and must be so placed that he can observe the progress of the infantry attack. However, in the Manchuria war, we read that at

the Yalu, the Japanese had observation stations on the hills east of the river, some 4 kilometers away from their batteries. In this case, however, it was proper, for here they had howitzers which had for their objective the Russian defences, and did not concern themselves with the moving targets of battle. We also see that the observation station of Colonel Shlyssarenko at Liao-Yang was too far away from his batteries, but in this case it did not matter much, as here, too, we had a battle of position.[1] Using maps also leads to many errors as to direction of fire. Further, the number of guns in proportion to the infantry was too small on both sides. Among the Russians we find only small artillery groups together and these were spread out too much among the infantry. The exchange of shots that might be looked for against opposing artillery was hardly possible, which is not likely to be the case in the next war.

Here we may notice a case where a group commander alone controlled and observed the fire of 16 guns, so that the chiefs of batteries were almost ignored; it is doubtful if this serves a useful purpose.

Even if all the observation stations were on the same point, it seems that it would be better that the battery commander see his own target. He can follow it better and is in a position to attack new appearing targets at a great advantage. It is only in the beginning of an action, as long as opposing passing fire is to be expected, that the attack on the part of subdivision commanders from positions under cover may be considered proper, but only in so far as the shots of the different batteries can be kept separate. On the other hand, it would be better for the battalion commander to designate the targets or the fields of fire for the different batteries, and in general, the battery commanders should then be given full control and only be interfered with when the battalion commander notes that errors are being made.

Whenever possible, it is desirable that the observing stations be kept separate and near the batteries. For observing points we note the use of elevated positions, tree tops, roofs of houses and the like. The Japanese had three meter high ladders for use in the kaoliang fields, which were found extremely useful. In the foot artillery the use of ladders was also noted. This war has

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[1] Cf. Tettau, Vol. I, page 302. While the batteries were fully under cover in the valley the brigade commander about 800 meters in front directed its fire by means of flag signals from his observation station.

shown that such observing ladders would be quite an advantage for field artillery.

In picking out artillery positions one must be sure that the trajectory, using the desired elevation, will clear, not only the cover itself, but any trees which might cause a premature burst of shrapnel and thereby endanger friendly infantry. On the other hand, the nearer the approach to the enemy, the easier is a knowledge of his position. Is the ground dusty? It may happen that so much dust is stirred up in the taking up of a position that the enemy may recognize where a battery is coming up; this may be sometimes avoided by change of gaits. Further, if one does not remain far enough from the edge of cover, the flash of the gun may be noted by the enemy, and he will know exactly the line of fire and thus help his own ranging. On a dusty ground, the blast of firing may stir up dust clouds so that the position will be revealed, just as in the case of the gun's flash. This may be avoided if the ground in the immediate vicinity be wetted down or covered with grass or tentage.

A position too far back from the edge of cover will generally put the observing stations too far from the guns and will further make the co-operation of the field artillery with the infantry attack one of difficulty. In every case, the object of fire and reconnaissance will govern in how far a battery should be in rear of cover.

If too great a distance intervene between the artillery and its own infantry, then the field artillery that is not yet armed with carbines, will require a particular infantry support. The Russians often had for this purpose two companies for every battery; this is, however, somewhat too much. I would like to say here that if carbines be available, the men of the echelon that are not used in firing be equipped with them, and they be posted in advance as far to the front as possible, so the batteries may not be rushed by every cavalry patrol that may come along.

Communication between the battery and its observing stations was had in various ways. We see instances of chains of sentries, use of wig-wag flags and telephones. In the beginning of the war the Japanese complained of their telephones, though they were used during the entire war, and were found to be a useful addition. In prepared positions, of course, there is ample time for laying lines, but we find much use is made of telephones at the different moments of field operations. Now-a-days, use must be made of all these technical aids that may be available. Here, we must mention that

besides the use of telephones, we find the Japanese had signal flags, so in case of any interruption communication could be always kept up.

The use of flags and telephones is indeed a new departure for field artillery, and for its proper use will require much time to train a personnel. This, however, must not be a hindrance. Time must be found during peace, to train a sufficient number of men in their use. Constant practice is required for proficiency with flags, and this knowledge is also easily forgotten. Reserve troops in time of war will hardly know anything of signalling, so it will be necessary to train enough men from the regular personnel. It might even be advantageous to train these men as specialists and along particular lines. When, as is often the case, large bodies of artillery are brought together, as in the spring, these men could all be combined under the charge of some technically-trained officers and thoroughly trained in all branches of signalling and then returned to their organizations. This work should also be done in the infantry and cavalry so that communication with these different arms could be taken up when necessary. For, after all, the principal lesson that we may learn from the Manchurian War is, that it is only by the working together of all arms and a mutual co-operation between them that definite result is obtained. Further, the other arms, as soon as they obtain information of the enemy, must advise the artillery. Means must also be found that the despatch of this information is expedited. There must not only be communication officers sent out but also officers who will keep artillery commanders advised at all times as to the progress of the infantry attack, and there should be, besides, a system of flags and signals kept up for the same purpose. The Japanese found it advantageous to make use of national flags with their advanced line to show the artillery if a position was taken by the infantry or if the artillery should fire at longer ranges, though in such cases it was very easy to misunderstand the signals sent.[1]

A position under cover simplifies in many ways the work of the personnel. A position in parallel is simply a mechanical affair, that after being trained therein, presents no difficulty; the position of the

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[1] What the problem becomes when communication cannot be kept up we see in Tettau, Vol. II, page 126. "On the heights of Hentai the Japanese easily captured 24 guns one morning, as the infantry supporting these guns withdrew in rear of the line of batteries, and did not notify the artillery of the withdrawal.

directing gun can be given a definite direction by the use of straight edges, where it is not possible to put the gun and its caisson directly in rear of each other. It would further be an advantage that each gun have a box compass, or have the observing battery telescope made with a limb, to measure horizontal angles, for then the battery could be laid in a certain direction direct from the observing station. A long discussion as to targets is not necessary. Changes of target by the gun pointers is out of question. Changes in targets can be made by the use of simple commands or by making a change in the angle at which a gun may be laid. In other cases where direct fire is used, it will be necessary that every gun pointer, when pieces are not all aimed at a common auxiliary aiming point, will see the target aimed at; besides, there should be sent to the battery the bearing or definite angle as to direction of the target, so that those who can not see it may know where to fire, and every section commander can be sure he is on the designated target. This takes up more time than firing from a position under cover, for when firing from cover the battery commander can handle the entire matter, for in the battery commander's telescope he has a scale that gives him the angular correction necessary to make a change of direction in his fire.

If the targets move towards the gun firing under cover, it will be necessary to raise the trajectory so as to clear the top of the covering mask; if this can not be done, it will be necessary to move nearer to the front and if possible find another covered position. Here we see a case where one may note all the advantages of a position under cover, also its shortcomings. A position may sometimes be chosen, due to its proximity to a good observing station, the dead angle may be greater, but it may be easier to continue the advance from there, also the problem of the flash must be considered. Could this be minimized it would be a great advantage.

In this war we find that the partly-covered position was much used by the Japanese, because in the beginning, indirect fire presented many difficulties to their artillery, and in using direct fire they obtained a far greater result in hits. They found means to hide the position of their guns from the enemy by using masks and dummy positions. For the former they made use of hedges, at times building them of branches. Dummy batteries were improvised by using tree stumps protruding over cover. If shots were fired from the vicinity of these, the Russians generally opened on them.

It was often necessary, where there was no other position available, or where definite results could not be expected in any other way, to take up positions in the open. In taking up such positions it was highly desirable that the guns be unlimbered out of sight of the enemy, as at this time the artillery is most vulnerable. In a similar manner the same thing may be said in regard to limbering up.[1]

The Japanese brought up their artillery to its position mostly in the dark. This may be an advantage in the case of prepared positions, but in a rencontre the artillery dare not hold back, even under great losses, to come into action where circumstances require it.

Next, I would like to consider the spade and its use; for war showed that much use was made of it. In the beginning of the war the Russians made the error of laying out their works on the highest points, forgetting to cut off the sharp corners and neglecting to cover up the new up-thrown earth with sod or branches. Their earthworks were visible from afar and gave the hostile artillery a fine target. Through their great losses they soon learned better and did not occupy these works, but held others some 100 meters in rear. These first trenches were then just so much time wasted, and had at most the advantage that the Japanese artillery fired at them, although they were not occupied. In the later battles (Putiloff Hill), they learned to lay out their works better, and these were not so often located by the enemy.[2] The Japanese built cover for their personnel, as they had no shields and given more time, they also built overhead cover against splinters.

Modern shielded guns are amply protected against fire from the front and in many cases it is sufficient to bank up earth against the bottom of the shield. The use of entrenching tools will be an aid to put a gun in its most favorable position for fire. In a defensive position, however, previously laid out, trenches will only be useful in so far as they fit the terrain and from which fire can be delivered in all directions.

We find in modern war that targets are dimly visible and difficult

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[1] Loffler, Vol. II, page 118. "At the withdrawal of Mukden a Russian battery was seen carrying out exactly the regulations, retiring under heavy shrapnel fire, at a "walk." The battery remained lying inside of 200 meters, while the neighboring battery, which withdrew by piece at a gallop, came off without a loss.

[2] Bronsart, page 56. "In the steep clay banks of the Shaho covers for batteries was built that were wholly uninjured; several were built between the Ptilow and Novgorad Hills fitting into the terrain and sustained no loss. Only the works that were visible were hit.

to locate. Defensive positions are hard to see—harder still to tell whether occupied or not—or even whether they are real or dummy positions. For these reasons ample reconnaissance becomes of prime importance. In the Manchurian war this work was poorly done. This may be due to the poor cavalry work of both sides, as we see from the use made of their patrols. The Japanese used Chinese spies (or Japanese officers dressed as Chinese), who, due to the lack of care by the Russians, were able to get everywhere in the vicinity of Russian works, from whence they exchanged signals with the Japanese, according to a prearranged plan. The best and surest way of finding out if positions are occupied is the advance of infantry, whose close approach forces the occupants to withdraw from cover and so gives a favorable target to the artillery. If one wants the enemy to disclose his own position by his fire, we can use the "decoy batteries," which have been used with good effect by the Japanese.

It has also been found in this war that the group arrangement of batteries is far more practibale than the long line formation that never can be found to fit very easily into the terrain. The former gave the Japanese ample fire control, as the groups were linked together by telephone, so that in important cases, the fire of the entire group could be concentrated upon one point when found necessary. Group formations have the further advantage that a flanking fire on the opponent is sometimes possible. Under fire from the flank, shielded batteries will suffer from shrapnel.

The lesson most to be considered that this war teaches us, is the necessity for a loyal co-operation of all arms.

In their early battles the Japanese, in accordance with old ideas, commenced the infantry advance only after the artillery battle had been finished. They found, as at the Yalu, that after a hot artillery duel, and breaking up of Russian artillery, the Russian infantry had suffered no loss, and further, that the Russian artillery was able the next day to reopen again with the same energy. This showed that the artillery duel has no value. The artillery in such cases will withdraw its personnel under cover, and begins afresh only when they can aid their infantry, and when the attacking infantry in its advance to take a position furnishes a favorable target.

The artillery must keep under fire that part of the enemy most dangerous to the infantry. At the longer ranges this will be the enemy's artillery. The enemy must then, in the beginning of an action, be kept back by artillery fire to prevent him from shooting

up the infantry in its advance; the infantry, however, must not delay its advance; at the most it must give its own artillery time to deploy and be held back till the commanders obtain a definite idea of the situation. Then it must advance, making most favorable use of the terrain.

The artillery remains in its old or initial position as long as it can effectively support its own infantry from that point. If that be no longer the case, it can not remain there, but must advance and support the infantry attack. In the Russo-Jajanese war this manner of advance failed on both sides. The Russians did not leave their positions under cover and the Japanese feared to make changes in position on account of their poor horses. Only mountain guns were brought forward by troops. The Japanese particularly feared positions giving no cover, and did not follow their infantry with limbered pieces, dreading being put out of action too quickly, and thus made their only changes in position during the night. The mountain artillery was also more easily brought up, being less noticed by the enemy. This, however, furnishes no reason for using mountain artillery in this manner as these guns have an effective range of only about 2,000 meters. For use at such ranges, machine guns had better be employed. They can be moved more easily, and have given a good account of themselves in this war. In any case, the artillery can not remain in the rear when the infantry advances. But the time for changing its position must be so chosen that the infantry in its critical moments is not left without artillery support. It is therefore necessary for the artillery to advance in echelons.

The modern quick-fire gun has so great a rate of fire and such an effective result, considering each shot by itself, that the French Regulations for Field Artillery insists that only those batteries be put in action that are absolutely necessary for a certain purpose, and the other batteries be kept in readiness to take up new targets. Batteries thus engaged with hostile artillery do not find their effective use destroyed by changing targets. Batteries are designated for the support of the infantry attack.

The German field artillery regulations require that a reserve in the larger units be maintained, but holding back the reserves does not go as far as it did with the Russians. They were in constant fear of losing guns and finally were brought to realize that many of their disasters were due to the careful husbanding of artillery. Besides,

the Russians kept their reserves so far in the rear that they never came into action, and the batteries in front, being too few, suffered severely, while those in rear stood by idle. This false use of artillery was due partly to their organization. The large batteries of 8 guns and 12 caissons were found too cumbersome, even after being formed into half batteries. The position of regimental commander was entirely lacking. The large brigades were on this account unwieldy. Units were scattered all over; the artillery was divided among the infantry and in many cases the largest artillery force brought together was the brigade.[1] This breaking up of units put the Russian artillery at a great disadvantage when compared with the concentrated Japanese artillery. Among the Japanese the artillery consisted of six gun batteries; six batteries constituted a regiment. Nearly always their artillery was used together and as a result gained many advantages. It thus follows, that in spite of a group arrangement of the artillery positions (which are connected by telephone) they must be controlled as a unit. Where individual batteries were kept back in certain cases, they were, at least before the artillery combat, so near to their firing positions that they could be put in action when needed. In artillery combat, whenever possible, there must be a superior number of guns brought into action, even if later on it is possible to withdraw some of the batteries to accompany the infantry in their advance. The batteries that are to attack the hostile infantry must fire on the points of assault. Generally this will require a position in the open, of which a modern battery must not be afraid; they will have a certain amount of cover from their shields.

In attacking the opposing infantry, it is not expected to avoid firing over their own infantry where this course is necessary. In the Russian infantry this was sometimes found to be very uncomfortable, due in some cases to defective fuses; on the other hand, the Japanese directed that its artillery continue in action up to the last moment, which was particularly possible when using shell as their point of burst could be distinctly noted. We even read that amongst the Japanese it was considered better to have some of their own shells landed in their own lines rather than lose the support of artillery too soon or have its fire diverted to other targets.

If the artillery accompany the infantry advance, it must take up a position from which it can defend against counter attack, and also

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[1] The battalion is evidently meant.

fire upon and create disorder in the ranks of the retiring enemy. What effect such fire may have, we see in the Russian withdrawal from Mukden. Although the Japanese were hardly able to take up the pursuit, due to their weakened condition from long battles, they yet caused great consternation among the Russians by the fire of their batteries.

On the other hand, should one's own troops fall back, then the artillery dare not also withdraw, as it happened among the Russians, for in the decisive moments of a withdrawal the infantry generally suffers its greatest loss. Here the artillery must keep its position even if it results in the loss of guns.

The sending to the rear of ammunition wagons is advisable, but if batteries, especially the fighting batteries, send their own caissons to the rear, they will probably find themselves short of ammunition, as happened in the case of the battle of Hamatien.

We find many points of value in this war concerning advance guard artillery. They can be of greatest use when firing from positions under cover, with wide intervals, deceiving the enemy as to their strength and by which means they can sustain an action against much greater artillery force. They may add to the deception by changing their position, changing their direction of fire, etc.

The experiences of this war have a particular value, when we consider the case of a deployed enemy, or an attack against an enemy in position, and note how the Japanese handled these questions. In such cases a definite plan of action and an early reconnaissance, especially by infantry, has its place. The position must be often picked out days in advance, and the actual occupation of the position left until nightfall in order to prevent undue loss. Fire, itself, must only be opened in most exceptional cases. We read of much night firing in this war, but nowhere do we find results worth while. It is thus strongly urged to make only an infantry attack in the night, and even then firing is to be avoided, recourse being had to the bayonet.

The defense in a future war will also find much use for the spade. It should also know the ranges to prominent points in the terrain, so as to lose no time in opening with an effective fire.

The best range finder for the artillery remains the observation of its own fire. This is especially true when firing at the longer ranges, for the conditions of the day greatly affect the trajectory, and it would be false to expect to build up an effective fire depending on

range-finder ranges. It could happen, as it did with the Russians, where their ranging was ineffective, to waste their entire fire. If one should desire to restrict firing to certain ranges we have a very simple aid.[1]

In conclusion I would like to say a few words concerning howitzers and heavy artillery, which were often used in this war, as would be the case in a war of position. The results accomplished by these batteries were little. Against visible works they undoubtedly had an effect, though in many cases these works were not occupied. Against positions under cover that were not known, their effect was nil. The positions and roles ascribed to heavy artillery as a result of proving ground demonstrations were not realized. Bringing these guns into position brought with it many difficulties.[2] Complaint was also made that the shooting of these batteries fell off very much during the war. The Japanese howitzers showed themselves of use in the battle of the Yalu in action against visible batteries that were out of range of their field guns. They were also of use against defensive positions. Here we see also the use of concrete cover.[3] The field artillery learned to appreciate the use of this auxiliary arm. Thus we see that heavy batteries have a role in destroying strong cover and can be used against known shielded batteries; and further, by their fire against points of assault, they can exercise a strong moral influence. On the other hand, firing against targets under cover, whose position is not definitely known, is only a waste of ammunition.

Recapitulating, briefly, the principal lessons that this war teaches us, we see conclusively that effective artillery fire does not follow from the ability to take up positions on an elevation right smartly, nor does it depend upon the number of seconds required to open fire. On the contrary, it teaches the necessity for creeping from view of the enemy while going into position, although it recognizes the occasion

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[1] Cf. A. M. March, 1909. "The preparation of fire action for field artillery.

[2] Liao-Yang, page 24. "As there was a lack of satisfactory teams the heavy guns were dragged by men along the railroad track and were necessarily put in position along the track."

[3] Bronsart, page 47-48. "The howitzers were put on concrete foundations whose building took over 14 days. Every gun required four minutes for loading and to be ready to fire. The ammunition was shoved along by men on a field railway from Ninkuantun. Along the same railway these howitzers were dragged by oxen, and were under cover from sight and were protected by sand bags. The ready prepared shell lay in the open in large piles (60 to 80) in rear of the batteries, the most remarkable thing was that the Russians were unable to reach these howitzers."

when boldness and fearlessness in going into action in the open will be demanded. It shows us the importance of opening fire at the proper instant with masses of guns against those targets which momentarily disclose themselves and are likely to prove most dangerous to one's own infantry. It emphasizes the importance of keeping in touch with the other arms. Finally we see the great necessity for husbanding ammunition and reserving fire until needed to protect the actual infantry advance.

The strong determination to defeat the enemy and to the utmost sustain the infantry must ever remain the fundamental rule for the artillery.

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TRANSLATOR'S NOTE:—Considering the vast and growing amount of military literature growing out of the Russo-Japanese War, the within article presents in a short and concise review, some of the problems that concern the use of field artillery in war, with some deductions that will repay reading, perhaps not particularly to officers of the field artillery, but to those of other arms with whom field artillery will co-operate and further shows that while there are different arms on the present firing line, they all have their particular use.

INSTRUCTIONS FOR THE OPERATIONS OF FIELD ARTILLERY IN COMBAT; THE NEW DRILL REGULATIONS FOR THE RUSSIAN ARMY, 1912.

Translated from the Revue Militaire des Armees Etrangeres by 1*st Lieut. West C. Jacobs, C. A. C.*

After the Manchurian War, Russia thought to profit by the experience acquired during the course of that campaign in all branches of military art in order to reconstruct, modernize, and revivify its drill regulations. Aside from the Artillery Drill Regulations which dated from the adoption of the new rapid-fire gun, that is to say, from 1904, all others were rather out of date.

A committee, called The Committee for Instruction of Troops, was created in 1906 for the special purpose of the bringing the drill regulations up to date. It was dissolved late in 1909 after having drawn up an Infantry Drill Regulations (April 6, 1908), a Firing Regulations (March 12, 1909), and an Instructions for Making Field Fortifications (June 25, 1909).

In 1910 appeared Instructions for the Conduct of the Infantry Combat, which, enlarging the scope of the Drill Regulations of 1908, indicates to officers the doctrine and principles according to which these regulations should be adapted to the various phases of the combat.

In 1912 a flood of new regulations appeared. Our object is to give herewith a succinct analysis of them, pointing out the progress made and the interesting similarities with analogous French regulations.

We will examine successively:

1. Instructions for the operations of field artillery in combat;
2. Cavalry drill regulations;
3. Regulations for instruction of cavalry;
4. Regulations for instruction of infantry;
5. Field Service Regulations.

Instructions for the operation of Field Artillery in Combat of March 12, 1912:

The Russian Field Artillery Drill Regulations date from 1904, the year when the latest model matériel, the field gun, model 1902, was

put into service. However, these regulations did not specially provide for the combat and the latest word on the subject was contained in a Provisional Drill Regulations published in 1900. Since this latter date, the adoption of the new matériel, the progressive evolution of technical and tactical use of artillery, and the enforcement of the new Infantry Drill Regulations necessitated official instructions concerning the employment of artillery in combat.

These instructions comprise an introduction and two parts: Service of Artillery in Combat and the Action of Artillery in Battle.

Introduction

This introduction lays down the principle that the essential role of artillery is to support the other arms. It indicates the characteristic qualities of the arm and the conditions governing its use that arise from these qualities, and distinguishes between the particular use of batteries of field artillery, of mortars and howitzers, of mountain artillery, of horse artillery, and of siege artillery. Apropos of the mountain artillery let us quote the passage concerning it; it proves the tendancy which now exists in the Russian Army to normally employ mountain artillery as guns used by a battalion.

Mountain batteries can be used in the normal combat in the open field when there is reason for having a closer connection with the infantry, or in operations in a broken country difficult of access, and in general, in all cases where the need is felt for artillery (particularly light), and lending itself perfectly to the terrain.

FIRST PART.

Service of Artillery in Combat.

In this part are grouped the series of operations which artillery is to execute starting from its arrival on the field of battle, and which the French regulations, adopting another method of classification, have divided under various titles: Artillery in combat, instruction of horsed batteries, instruction of artillery, service of artillery in the field.

General Remarks.

These remarks indicate the nature and limits of the role of each of the various commanders: detachment commander (up to the present time in all Russian drill regulations, this term designates

any unit—army or battalion—placed under a single commander) artillery commander, commander of a group of batteries, and battery commander.

The detachment commander is responsible for the employment of the artillery in the combat conformably to the end in view and for the fulfilling of his mission. The artillery commander is responsible for the efficiency of the artillery and the choice and use of the means at hand to fulfill the mission assigned to him.

It seems that the Russian regulations, similarly to the French, still further limit the initiative of the artillery commander while extending the duties of the detachment commander.

The artillery commander should receive from the detachment commander (not receiving, he should request) orders and information concerning the initial mission of the artillery, the sector to occupy, the time available in which to open fire, opening fire, new missions and new sectors to be occupied as a result of the development of the combat, the probable points and directions of the attacks, and the moment of the final attack.

March Towards the Emplacement.

The commanders of the groups of batteries march accompanied by their aides (an officer called an "adjutant" and a mounted telephone operator). In addition, each battery places at the disposal of the group commander one officer and the greatest possible number of scouts. Each battery is commanded by a lieutenant-colonel with four subalterns. There are also 9 mounted and 3 dismounted scouts, and 2 mounted and 6 dismounted telephone operators. The batteries follow under the command of the senior subaltern.

The group commander assures freedom of movement for his batteries. To this end, a patrol of noncommissioned officers precedes the column. Furthermore, the regulations emphasize the advisability of sending forward, the day preceding the movement, one or more reconnoitering officers to plan itineraries.

In the neighborhood of the enemy it is useful to employ certain precautions to avoid indicating the presence of the artillery; for example, to advance rapidly from one cover to another.

Reconnaissances, Inspection of the Field of Battle, Service of Communication.

Each artillery commander should be convinced that any delay on the part of the artillery going into action may be the cause of the

most deplorable results. Therefore, his reconnaissance should be carried out with the idea of immediately opening fire. . . . Furthermore, it must not be forgotten that the success of any artillery operation depends upon complete and scrupulous preparation made for the entrance into battery. It is also highly important, unless absolutely unavoidable, that the artillery commanders should not be annoyed by weather conditions during their reconnaissances and preliminary operations.

The reconnaissance by the group commander has, above all, a tactical purpose; that of the battery commander, a technical one.

In the reconnaissance by the group commander, the Russian regulations provide for a preparatory advance reconnaissance, serving to prepare for the reconnaissance by the group commander himself. This differs considerably from analogous prescriptions in the French regulations. It is interesting to examine this point.

We have seen that, from the beginning of the march toward the emplacement, the group commander has at his disposal 3 officers and from 20 to 27 scouts (to make a logical comparison, it must be remembered that a Russian group comprises 24 pieces, that is to say, it equals 2 French groups). One of these officers is designated commander of the service of reconnaissance (this is the reconnaissance officer of the French Army; in the Russian service, he is a captain). He takes command of this personnel and, in general, forms from 1 to 3 advanced reconnaissances of from 6 to 8 scouts each. After having received his instructions from the group commander, this officer reconnoiters up to the most advanced infantry line. The principal mission of these reconnaissances is to occupy the points of all the terrain to the front favorable for observation. They are also for the purpose of studying the terrain occupied by the enemy, to find the probable positions of the hostile artillery, the positions favorable for their own artillery, and the approaches thereto. This officer also commands the personnel of the itinerary reconnaissances spoken of above.

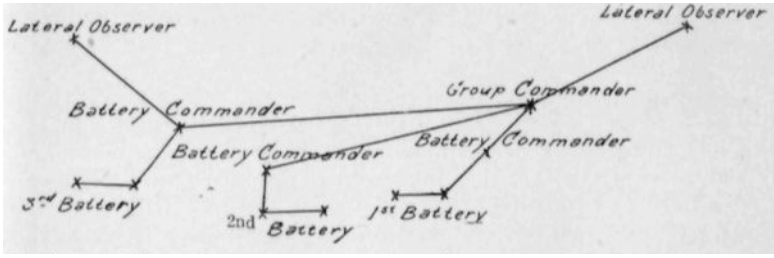
When the group commander has received his mission from the artillery commander, he starts in reconnaissance accompanied by the adjutant and the scouts that are not with the advanced reconnaissance. The battery commanders, with the remaining scouts, the telephone operators and the signalmen (per battery: 2 mounted and 6 dismounted telegraph operators, with 4 field instruments), follow the group commander and, while awaiting his orders, stay as near as possible to the position from which the reconnaissance is made.

The commander of the service of reconnaissance communicates to the group commander the result of his observations, informs him of the dispositions he has already made, and receives further instructions. He sends the itinerary scouts to their battery commander.

During the combat this officer remains under the direct orders of the group commander in order to direct further reconnaissances. His mission is to relieve the group commander of the details of the service of reconnaissance and to permit him to devote his whole attention to the tactical side of the question. . . . The other battery officers under the direct orders of the group commander may be returned to their batteries as soon as the first reconnaissance has been made.

From this it is seen that the commander of the service of reconnaissance is none other than the reconnaissance officer of the French Army. The Russian regulations seem to allow him a greater initiative and to confide to him, subject to approval by the group commander, the important part of the reconnaissance.

The adjutant of the group fulfills the functions of the commander of the service of reconnaissance. He organizes the necessary means of transmission, receives and transmits communications, prepares plans and sketches, etc.; in general, he takes no part in the service of reconnaissance. In fact, the service of communication, so sharply separated in the Russian Army from the service of reconnaissance, operates according to the following plan:



At the position of the group commander there are generally 4 telephone lines and 4 permanent signalmen, as well as 4 mounted orderlies.

The principles underlying the reconnaissance by the group commander and the battery commander are the same as those laid down in the French regulations. As in the French regulations, the Russian

regulations confide more especially the inspection of the field of battle to the group commanders and to the higher artillery commanders. It seems, however, that the responsibility of the group commanders in the Russian artillery is greater. In order that the observations made may cover the greatest possible number of points, each group sends additional observers to the front and sides. Preferably experienced officers and noncommissioned officers are especially designated to accompany the advanced infantry units. They inform the group commander of changes occurring in the situations of both sides, of the enemy's advance to the attack, etc. Observers will not limit themselves to the sectors assigned to them but watch all the visible field of battle. . . . The results of important observations will be sent to nearby troops. It is important that there be established an uninterrupted exchange of observations between all artillery commanders and nearby troops.

Choice and Preparation of Positions.

The Russian regulations classify artillery positions as open, semi-defiladed, and defiladed; these last correspond to a position where the flash of the guns can not be seen. The regulations discuss the advantages and disadvantages of each, but emphasize that:

the principal condition to be satisfied by an artillery position is to fulfill its tactical purpose, that is to say, to permit artillery to accomplish its combat mission.

These regulations show a preference for fully defiladed positions, at the same time indicating the conditions under which this preference should give way to other considerations.

In any case, when the situation permits it, it is important to make use of defiladed positions that guarantee freedom of action to the artillery and to allow it to remain at the disposal of the commanding officer. . . . In case it is impossible, from any cause whatever, to take a defiladed position, a semi-defiladed position will be occupied. Open positions will not be taken unless the situation is well-defined, the objective visible, the hostile artillery at a distance or overcome, defiladed positions not available, or time has lacked for the preparations for opening fire and the establishing of communications. . . . If circumstances require that fire be opened immediately, the choice of position is in no way to be retarded by secondary considerations; in this case any position will be a good one if it permits the artillery to accomplish its mission, and it is better to take up a

poor position than to run the risk of leaving the troops without artillery support while seeking a better one. Artillery commanders are not to forget that there are occasions when artillery should act audaciously and sacrifice itself in open positions.

The Russian regulations indicate the different requirements that an observation station should fulfill, the necessity of concealing and protecting it from fire, and of establishing an auxiliary station which will permit of observations being continued if the first station is put out of action. The general rule is laid down that the location of the observation station is incumbent upon the group commander. The regulations state the advantages and disadvantages of formations on the same line or on several lines, and of extending and closing intervals. The normal interval between batteries of a group is given at 100 paces, with 30 paces between guns of a battery.

The long halts of artillery during the battles in Manchuria led the Russians to emphasize the utility, in certain cases, of artificial cover (smoke, for example), and intrenchments.

To deceive the adversary, it is useful to construct hasty intrenchments and simulated observation stations at a distance from the actual ones; during firing, smoke will be made in the dummy intrenchments.

Occupation of Positions.

This should be done under cover and as rapidly as possible. The second condition supersedes the first should the situation demand it. In all other cases the importance of the second is emphasized by the regulation:

Going into battery under cover is an extremely difficult problem, for the enemy may guess the movements of the artillery merely by observation of isolated horsemen. Nightfall will often solve the difficulty. The commander should not hesitate to follow a long and roundabout way to assure the movement being under cover. It will often be found useful to deceive the enemy by simulated movements. . . . If the nature of the soil causes it to be thought that the dust will draw the enemy's attention, it is better to march at a walk

Contrary to the principle laid down in the French regulations, the limbers do not stay with the guns. As a rule, the three lines of each battery in a group are joined one to another respectively.

Changes of Position.

These are subject to the same rules as indicated in the French regulations. The Russian regulations point out that the difficulty of artillery in changing position under fire on open ground will frequently compel it to make these changes during the night.

Direction of Fire.

The Russian regulations point out the importance of a concentrated direction of fire.

The concentration of fire of several groups will be obtained more from the concurrent solution of problems of fire in accordance with a general idea than from the simultaneous fire on a common objective.

Firing will preferably be done by group.

Efficiency and appropriateness of fire will above all be secured; by uninterrupted observation, a continuous interchange of information, as complete a preparation for fire as possible, and by the location of points of known distance on the terrain.

Concerning the circumstances under which artillery may fire over the heads of its own troops, the Russian regulations, as the French, point out that they may vary according to conditions. They give no figures for the distances separating the two lines of infantry, but indicate that on a flat terrain artillery may fire, at a range of not less than 1,650 yards, over infantry 660 yards to the front. They point out (and this emphasizes the importance attached to communications by the Russians) that the best means of being able to fire as long as possible is to depend upon the artillery observers who are following the infantry.

The choice of projectile depends upon the nature of the objective; concerning this question the regulations point out the general characteristics of time fuse shrapnel, percussion shrapnel (enemy under cover), explosive shell (against wood and stone structures, earthworks, villages, gun shields), and projectiles for field howitzers.

The choice of objective depends upon the tactical situation: Artillery above all should adapt itself to the needs of the other troops.

It is necessary to know how to make a judicious choice between the moment of the weakening of the fire of the hostile artillery and the moment of the final assault by the infantry.

The Russian regulations are in complete accord with the French as regards the best methods of employment of artillery against artillery and against obstacles and localities. They are extremely succinct concerning the use of artillery against infantry and are content to point out the importance of good distribution of fire and of firing on the reserves. They give no information concerning the use of artillery against cavalry or aerial objectives.

The respective roles of the artillery commander, the group commander and the battery commander are based on the same principles as in the French regulations. The limitations of their authority, especially that of the battery commander, are strictly defined.

The battery commander has authority to abandon the indicated objective:

(a) Upon the appearance of hostile skirmishers or machine guns within a dangerous distance, and in the case of a cavalry attack, for self-defense;

(b) Under the same circumstances, to lend assistance to nearby troops.

He reports these changes to the group commander. . . . He may, on his own responsibility, change objective to make the most of important and advantageous circumstances of the combat that are, at the same time, fleeting.

In these cases the battery commander is accountable for all responsibility assumed and is to weigh the relative importance of objectives and to take into consideration the exigencies of the situation of the moment. In all cases the battery commander is to immediately report to his group commander. When supporting an attack by his own infantry or when repulsing an attack by the enemy, such changes of objective are absolutely inadmissible.

Expenditure and Replenishing of Ammunition.

The Russian regulations define most happily the characteristics of that double necessity of artillery: strict economy and large expenditure of ammunition.

The rapidity of fire of the present-day artillery and the long duration of modern battles demand provision for an enormous expenditure of ammunition. Furthermore, there are times in the combat when artillery has not the right to husband its projectiles. Consequently, on one hand, it is necessary to economize as much as possible, and on the other, to assure an uninterrupted and abundant supply of ammunition.

The regulations lay stress on the means for restraining the expenditure of ammunition without limiting the fire of the batteries

(the fear of lack of ammunition had a great effect upon the decisions of the Russian commanders in the main battles in Manchuria), to strive only to fulfill well-determined missions, to cease firing as soon as the result sought is obtained, to fire only on objectives tactically important, not to husband ammunition in ranging but to make the firing after the range has been found to conform to the exigencies of the situation. The regulations say:

> Never to attempt to compensate for the inaccuracy or uncertainty of firing data by the number of shots fired, to refrain from firing to produce only a moral effect, and not to fire at night except after the most complete preparations.

The replenishment of ammunition is made in the Russian service by means of the battery reserves and group reserves which are analogous to the French echelons. The Russian battery comprises the firing battery (8 guns and 8 caissons) and the reserve battery (8 caissons, 1 spare carriage, 1 tool wagon, 1 rolling kitchen).

It is necessary to point out that the battery commander looks after the expenditure of ammunition and has nothing to do with its replenishment. The commander of the group reserve is responsible that an uninterrupted supply of ammunition is sent from the reserve to the firing position, and assures the replenishment of the reserve from the ammunition train.

The replenishment from the rear is carried on by means of brigades of artillery parks (organizations analogous to the French army corps artillery parks) and local parks (analogous to the French main park of an army).

For each brigade of artillery (1 for each infantry division) there is a brigade of parks composed of 3 parks which may form two or three echelons. The parks of the army corps are under the command of the senior artillery officer present.

Inversely to the principle adopted in the French artillery, it is the empty caissons of the battery reserves that are replenished from the first echelon of the parks. It is only in exceptional cases, upon written request from the battery commander, who is personally responsible therefor, that the echelon of the park can send to the battery the number of caissons asked for. Similarly, the forward echelons are replenished from the rear.

Replacing Losses. Support of the Batteries.

The replacing of casualties among the personnel and horses is done according to the same principles that the French apply. The Russian regulations authorize, however:

When the battery reserves are exhausted or it is impossible to replace losses in time from the first echelon of the parks, to provisionally supply the deficiency by selection of men from the supports (by order of the battery or group commander) or from the nearest troops (infantry or cavalry), after agreement with the commanders of the latter.

The principles governing the security of artillery in march and in position are the same as those of the French regulations. In Manchuria it was the general rule to assign a support to artillery units. The Russian regulations provide for the utilization of the support, not only from the point of view of tactical security but also as:

Assistance to overcome the difficulties of bad roads, to move the guns and caissons by hand, to dig entrenchments, to carry ammunition, and also to perform the simplest duties connected with the service of the pieces.

The commander of the artillery unit is in supreme command of the support: the special support is under the orders of the commander of the artillery sub-unit.

Details of Night Attacks.

Although the Russian regulations agree with the French as to the circumstances in which artillery may be efficiently employed at night, they seem to consider this employment as the normal one as will be seen from the following extracts:

During a battle of several days duration, at the end of each day the artillery will, without special orders to that effect, hold itself in readiness for a night attack.

The night firing of artillery, in the attack, has the special object of forming in rear of the point attacked a screen of fire isolating it from the reserves.

It must not be lost sight of that, at night, the flashes indicate clearly the artillery position; to deceive the enemy, it is useful to organize, sufficiently distant from the actual batteries, dummy batteries armed with petards.

At night, firing is directed by telephone and lantern signals. Searchlights may be employed to advantage.

PART TWO.

Artillery in Combat.

As in the French, the Russian regulations distinguish between the offense and the defense.

Generally speaking, all the ideas developed in this part are identical with those in the French regulations. We will point out only those upon which the Russians lay the most stress, or which are particularly novel to them, or which are of special interest due to the experience gained in the Manchurian war.

Concerning the attack of an enemy entrenched in position, the Russian regulations mention the importance of night operations and the co-operation of siege artillery. It is interesting to note the advantage these regulations attribute to the use of reconnaissances by fractions of artillery to cause the hostile artillery to unmask.

These fractions will extend over a large front, occupy defiladed positions, compensate for the number of guns by rapidity of fire, and go into action at different points by changing position rapidly; they will avoid taking positions near to those occupied or to be occupied by the artillery, or even in the general vicnity. By their artificial activity they can lead the enemy into error about the strength and disposition of the artillery. Following the same order of ideas, batteries of petards may be used.

In the following lines of the regulations is found a desire to react against the former tendency of the Russian artillery to open fire at extreme ranges.

The ranges of the first artillery positions depend upon the terrain and the general plan of combat. As a general rule, fire should be opened suddenly at appropriate ranges; it is desirable, therefore, to choose the first positions as near the adversary as the situation permits. On the other hand, sight must not be lost of the fact that the artillery is to support the infantry from the opening of the combat and consequently, the location of the first positions should not be too far forward.

The interest attached to the formation of an effective force of fire under a single commander is emphasized by the following:

All the artillery designated to support the attack, with the exception of a small fraction designated to co-operate closely with the infantry, is under the orders of a single commander, responsible for the success of the operations; in general, this commander will be the artillery commander of the fraction designated to make the decisive blow. . . .

To carry out the missions incumbent upon the artillery supporting the infantry attack, the harmonious co-operation of a large amount of artillery, co-ordinated by singleness of purpose and direction, is indispensable. Also, the co-operation of artillery with infantry can be completely realized only by using a great number of pieces. Small detachments of artillery and artillery which supports the partial attacks of infantry is often obliged to limit itself to the execution of the most important missions, sometimes successively.

Following is the criticism of the long premature preparations of which the combats in Manchuria offer so many examples:

The fire of artillery on fortified places, hasty entrenchments, and points of attack, is to be made simultaneously with the advance of the infantry upon these points, so that they can not be left unoccupied or feebly occupied. . . . Artillery fire without a simultaneous attack by infantry can not be productive of fertile results to the latter, and the efforts of the arillery should be in close harmony with the action of the infantry. However, this connection is not to be evidenced by the scattering of the artillery in small groups among the infantry units. Co-ordination of action is to be based upon singleness of purpose and agreement as to the missions of the combat, and to be manifested by co-operation towards the general success of the attack. Outwardly, this co-ordination is manifested by the subordination of the artillery to the commander of the troops designated to deliver the decisive blow.

The support given by infantry is well studied and the employment of mountain artillery, spoken of before, is here prescribed:

Most often the only practical means of advancing will be by rushes of small fractions, or even single pieces, from cover to cover. In case of heavy losses the infantry will aid in pushing the pieces and caissons by hand. The artillery will be ready to open fire at any minute, either to combat the obstacles which halt the infantry or to give it support in case of a momentary reverse. If mountain batteries are available, it is incumbent upon them to give immediate support. The action of artillery shoulder to shoulder with infantry is such a support, particularly from a moral point of view, that the batteries are not to shirk the risk that an immediate support entails.

On the defense, the Russian regulations make a distinction between the combat accepted for the purpose of reconnoitering the enemy on a chosen terrain previously prepared, and the combat taken up with a view to covering the operations of other detachments, barring the enemy's route, and gaining time.

In a combat of the first class, carefully organize the preparations

for fire, obtain flank and cross fire to sweep the defiladed zones and dead angles, establish a sure chain of communication and observation stations, study the zone of attack of the enemy, clear the field of fire, construct splinterproofs and breastworks, assure the possibility of night firing and replenishment of ammunition.

In a combat of the second class, compel the enemy to deploy as soon as possible, open fire early, change position frequently, and avoid decisive artillery duels.

As a general rule, it is prescribed that the moment for opening fire is indicated by the artillery commander, that the right to cease firing belongs to the artillery commander, and the right to temporarily withdraw the artillery belongs exclusively to the detachment commander.

The regulations are completed by two appendices.

APPENDIX I.

Service and Employment of Mountain Artillery in Combat.

We here find this new idea, already pointed out above, of using mountain guns as supporting artillery.*

When possible, mountain artillery advances on wheels; if it be necessary to cross a difficult terrain or especially bad bits of road, or reach a position difficult of access, etc., one or both methods of transportation may be used. These guns are used:

(a) In mountain operations;

(b) In operations in difficult and broken country;

(c) In combat on a normal terrain, to act in close connection with infantry as artillery able to accompany infantry anywhere, and in particular to accompany the infantry attack and reinforce the captured position;

(d) As a part of the small forces used to screen the main body or designated to support the advance cavalry.

APPENDIX II.

Service and Employment of Horse Artillery in Combat.

The only remark to make on this subject is that there are in Russia 3 groups of mountain horse artillery, with all the personnel mounted, and dismountable matériel that can be transported on horseback.

To sum up, these new Instructions contain all the tactical and

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* Russia has adopted a Schneider-Danglis gun. This matériel can be transported on animals and on wheels.

technical ideas at present accepted and in force in the French artillery. In them the subject of communications of all sorts is more developed, the service of reconnaissance and the preparatory measures for opening fire are studied more in detail, the limitations of the authority and the duties of each commander (detachment commander, artillery commander, group commander, battery commander) are more precisely defined, the organization of immense artillery commands and the more frequent employment of night firing are considered as normal. Last of all, there is this new idea of the employment of mountain artillery as an immediate infantry support.

These regulations, the necessity for which was being felt, will have an influence upon the Russian artillery all the more beneficial in that their application will be gradually inculcated by the practical lessons of the artillery course at Louga, where officers annually have at their disposal, during 7 months, a model field of fire and a corps of skilled instructors.

VISUAL SIGNALLING FOR FIELD ARTILLERY.

BY MAJOR A. S. FLEMING.

Evolution of the System.

On the separation of the Field and Coast Artillery the writer was assigned to the former and appointed adjutant of the Fourth Field Artillery. One of the most important duties of regimental and battalion adjutants of field artillery regiments is the training of the headquarters detachments, including the perfecting of suitable means of communication between the various elements of the regiment. The writer soon became convinced of the necessity of supplementing the telephone by simple, rapid, sure, and comprehensive visual signals. Various schemes were tried. Some were simple, sure, and rapid, but not sufficiently comprehensive. Finally the Semaphore (Two-arm) Code was adopted, supplemented by a numeric code which was devised to secure additional rapidity. The numeric code, however, necessitated a conventional signal to indicate its use in order to distinguish code numbers from simple numbers, and consequently was ultimately replaced by a letter code (see page 264).

A description of the system, certain rules, etc., which were found necessary to its operations; the Two-arm Code (see page 265), with conventional signals and instructions for its use; and the Letter Code with a tab index (see diagram, page 263); in short, the substance of all matter contained in this article comprised the "Field Artillery Code," which was printed in a small, loose-leaf book (fitting an ordinary breast pocket) which also constituted a B. C. Data Book and a memorandum book for general use. A copy of this book was furnished to each officer of the regiment. For the instruction of the enlisted men concerned the Two-arm Code with conventional signals and instructions for its use was printed on one side of a small piece of cardboard, the other side of which contained the "Extract from F. A. Code," which they were required to memorize. Fifty copies of this card were sent to each regiment of field artillery and that much of the system is in use in a number of those regiments.

The system, which is explained in detail below, was tried out and improved for two years in the Fourth Field Artillery and then submitted to the War Department, which referred it to the Field

Artillery Board. The final action is not known to the writer, but G. O. 15, War Department, 1913, authorizes the use of the Semaphore Code by the Field Artillery, and includes semaphore kits for the regimental and battalion headquarters detachments and for the battery scouts, signalers, musicians, and chief of the fifth section.

FIELD ARTILLERY CODE.

General Outline.

By actual experiment and use the Semaphore Code has been found to meet all field artillery requirements far better than the Army Code. Proficiency in its use is acquired in about one-third of the time, it is about three times as fast, and has practically (for the field artillery) no greater limitations as regards distance between stations. With two-foot flags it has repeatedly and successfully been used at distances up to 3,200 yards (between firing point and range party) which in service will probably never be exceeded and seldom equalled. Furthermore, the men take great interest in the Semaphore Code, even using it around barracks to communicate with each other, whereas they learn the Army Code slowly, take no interest in it, and soon forget it.

However, even the Semaphore Code fails to meet the necessary speed requirements of field artillery, as will any visual system necessitating the transmission of every word and letter of a message.

The Field Artillery Code (F. A. Code) was devised to minimize, as far as possible, the time required to transmit field artillery messages and to insure their receipt by the proper stations when several stations are in simultaneous existence. Generally speaking, it consists of three parts:

1. The Two-arm Code (see page 265), which provides a means of making intelligible visual signals and is the Navy Semaphore Code slightly modified to secure greater simplicity and ease of use. The letters are the same as in the Navy Semaphore Code, but most of the secondary or special meanings are different (*e. g.*, the first two letters represent numerals), since the same necessity for co-ordinating them with other codes does not exist.

2. The assignment of certain distinctive flags, etc., to the various technical and tactical units and the promulgation of the necessary rules for using them and for transmitting orders, etc.

3. The Letter Code*—all requisite words, phrases, etc., being represented by one, two (generally), or three letters and arranged alphabetically for sending (codifying) and receiving (interpreting). So far as practicable, and especially for the most important and more common expressions (*e. g.*, those pertaining to "Conduct of Fire"), the code letters are the customary or natural abbreviations, *e. g.*, AS—Angle of Site. After a little practice such code letters are retained by the memory and reference to the Letter Code for them becomes unnecessary.

The message having been codified, is sent by signalling the corresponding letters by the Two-arm Code. For the latter purpose two small flags† are used, one in each hand, as illustrated in plate on pages 264-65.

In the absence of flags any objects, as a handkerchief and cap, may be used if the distance is too great for the hands alone to be seen. Under favorable conditions (clear day and good background) and with the aid of a field glass, two-foot flags can be used up to about two miles. At long distances four-foot flags may be used and the position of the sender, if the background renders his location difficult, marked by planting a third flag or wrapping it around his body.

At night the same system may be used, substituting lanterns with different colored glasses for flags and using a third lantern (of different color) suspended at the height of the shoulders to mark the position of the sender. A special outfit for night signalling was devised by the writer and constructed by the Signal Corps, Lieut. Dawson Olmstead, 3rd Field Artillery (then on duty in the Signal Corps), aiding materially in its development. This outfit is described as follows in the pamphlet on "Telephone and Signal Communication for Field Artillery," by Lieutenant Olmstead: "This device is assembled in a leather-covered aluminum case 2″ × 4″ × 23″ and weighs seven pounds. The case contains three type "A"

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*The advantages of the Letter Code over a numeric code are:

1. Obviation of the necessity of indicating when the code is to be used, it being self-evident.

2. Fewer characters to be sent, the usual number being two instead of three for any codified word, phrase, etc. (26 single letters to 9 single numerals, 676 double letters to 99 double numerals, etc.).

3. The code letters, being as a rule the natural or usual abbreviations of the words, etc., represented by them, are readily remembered.

All of these reasons conduce to greater rapidity.

†In practice 2-foot flags with 30-inch staffs are used. For preliminary instruction 6-inch painted tin disks with 18-inch staffs are excellent.

Tungsten dry batteries, three Mazda (Tungsten) 7-volt, 2-candle power, electric bulbs (red, white and green, respectively), two brass staffs 18 inches long and the necessary wire connections. The white light* is permanently attached in top of case and the red and green lights† at the ends of their respective staffs. There is a switch on one of the staffs that controls all lights simultaneously. To use the device, remove the two staffs from the case, suspend case from neck by carrying strap, and make necessary wire connections. Grip one staff in each hand and press control switch, holding staffs in the positions shown for semaphore signaling. The signals from this device are readable up to six or seven hundred yards with the naked eye under ordinary atmospheric conditions and considerably farther with the aid of a field glass. A few of these instruments have been made up for experimental use in the Field Artillery."

If the telephone corporal and No. 1 be required to memorize the code letters for the commoner commands of fire control (a very easy matter) it will be found that a battery commander can have his commands delivered at the battery practically as soon as he gives them. This same plan has been successfully followed by the writer both in directing and conducting the fire of a battalion at service practice, all batteries being separated in the former case. No. 2 (at each B. C. station) and the signalers (one for each battery) at the battalion commander's station had memorized the code letters given in the "Extract from F. A. Code" on page 264.

The following diagrams represent the appearance of the Letter Code:

Receiving (left) page. Sending (right) page.

A	
Abandon ---------- AB	
Accompany ---------- AC	
Add ---------- A*	
Adjusted data for your station is---------- ADI*	

	A
	*A—Add
	*AA—All the guns.
	AB—Abandon.
	AC—Accompany.
	*AD—Adjust fire (on).

Extract from Letter Code.

A—Add.

AA—All the guns.

———

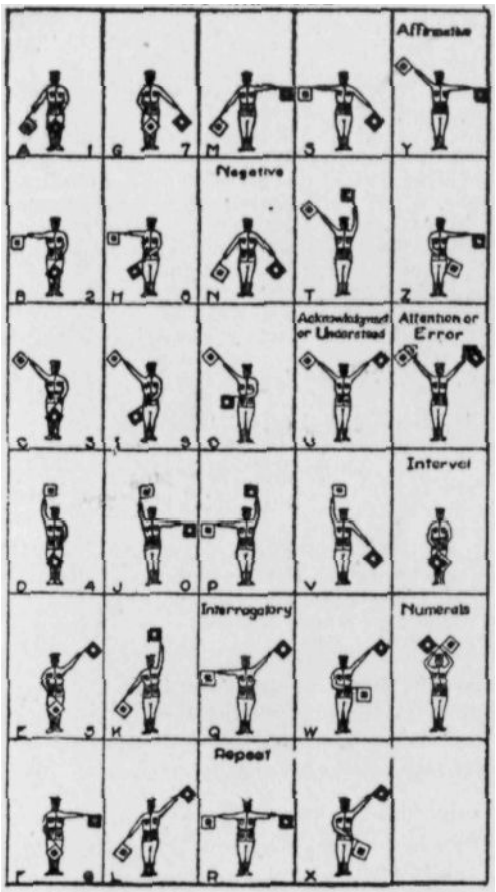
*See table page 266 for proper distribution of lights. Author.

†Included in "Extract from F. A. Code." To be memorized.

AD—Adjust fire (on).
ADI—Adjusted data for your station is.
AL—Draw ammunition from ammunition mules.
AKT—Draw ammunition from combat train.
AP—Aiming point.
AR—Draw ammunition from reserve.
AS—Angle of site.
BL—By battery from the left.
BR—By battery from the right.
BNL—By battalion from the left
BNR—By battalion from the right.
C—Cease firing.
CT—Change target.
CBA—Centre battery the adjusting battery.
D—Deflection.
DG—Diminish range.
DI—Diminish (by).
DS—Double common shell.
F—Commence firing.
FA—First piece add.
FS—First piece subtract.
FW—Fire at will.
HH—Hold fire.
I—Increase by.
IN—Interval.
IR—Increase range.
JA—Report when fire is adjusted.
JI—Report firing data when fire is adjusted.
JR—Report when ready.
K—Corrector or time (for fuze).
KF—Continue the fire (on, interval).
KS—Continue the fire, sweeping, (interval).
LA—Fourth (last) piece add.
LS—Fourth (last) piece subtract.
Left Bn (Btry) the adjusting Bn (Btry).
LGA—Left piece (gun) the adjusting piece (gun).
LPA—Left platoon the adjusting platoon.
MA—Measure angle of site.
MB—Measure deflection and angle of site.
MD—Measure deflection.
MO—March order.
MT—Moving target.
P—Pack.
PL—By platoon from the left.
PR—By platoon from the right.
PS—Percussion shrapnel.
QU—Quadrant.
R—Range.
RBA—Right (Bn) Btry the adjusting (Bn) Btry.
RGL—By regiment from the left.
RGR—By regiment from the right.
RPA—Right platoon the adjusting platoon.
S—Subtract.
SA—Second piece add.
SL—Shift fire left.
SM—Same.
SR—Shift fire right.
SS—Second piece subtract.
SX—Same as last round.

T—Target.
TA—Third piece add.
TC—Take cover.
TS—Third piece subtract.
UC—Use letter code.
V—Volley fire (rounds).
VV—Volley fire at successive ranges.

TWO ARM CODE



CONVENTIONAL SIGNALS AND INSTRUCTIONS.

To call or answer: "Attention" followed by call letter of station called. Repeat as necessary.
Both stations then make "Interval."

In order to utilize the F. A. Code to its fullest possibilities, the Letter Code should be carefully and periodically read through several times by all officers and signalers. The ease and rapidity of

codifying and interpreting code messages will thereby be greatly enhanced.

Repeat { last word: R, 1 "Interval;" or Q.
last sentence: R, 2 "Intervals."
last message: R, 3 "Intervals."
after (word): R, "Interval" (word).

End of { word: 1 "Intervals."
sentence: 2 "Intervals."
message: 3 "Intervals."

Error: "Attention—Interval," then repeat word.

To break in: "Attention."

Wait a moment: "Attention" followed by two or more "Intervals."

Acknowledgment or understood: U.

"Numerals" precedes every number sent and indicates numerals until "Interval" is made, after which letters recur without further indication. When numerals follow letters no intervening "Interval" is necessary.

"Negative," "Affirmative," or "Interrogatory," followed by "Interval" give corresponding meanings to the following signal.

Receiver acknowledges "Attention" whenever made, also "Repeat," etc., and end of message, *when latter is understood*.

If a letter or numeral occurs twice in succession swing one or both flags to the front.

While waiting for "Acknowledgment" or in case of delay remain at "Interval."

Do not use code letters: N—"Interval"—UC.

Words not in the code are spelled out.

Hints:

A to D: Left arm at "Interval," right arm progresses upward.

E to G: Right arm at "Interval," left arm progresses downward.

A to G: Complete series, one arm at "Interval."

K to N: Right arm inclined 45º downward, left arm progresses downward.

P to S: Right arm horizontal, left arm progresses downward.

H, I, and O: Left arm crosses the body.

W, X, and Z: Right arm crosses the body.

Opposite letters: A&G, B&F, C&E, H&Z, I&X, J&P, K&V, O&W, M&S, and Q&Y.

The numerals are the first ten letters in order.

The special meanings are generally represented by their initials, e. g., "Negative" = N.

Assignment of Flags, Etc.

In order to minimize the possibility of confusion in battalion and regimental work when several stations are in simultaneous existence flags, lanterns, and call letters are assigned as indicated in the following table:

				Battery.					
Organization—	Regt.	1st Bn.	2d Bn.	A	B	C	D	E	F
*Flag or Lantern	G	W	R	W	R	G	W	R	G
Call Letter	R	F	S	A	B	C	D	E	F

*R = red; W = white; G = red and white flag (two horizontal bars) or green lantern.

Rules for Using Flags, Etc.

1. Hold assigned flag in left hand.
2. Hold assigned flag of other station in right hand.
3. Assigned flag of an auxiliary station (including a station at a battery whose B. C. Station is elsewhere) is that of the organization to which it pertains; its call letter is that of its organization followed by "X."

Departures from these rules are authorized when absolutely necessary to secure visibility or distinctness. When lanterns are used similar rules apply.

Rules for Transmitting Orders, Etc.

1. Commands should be signalled in the order prescribed in Drill Regulations.
2. The following order† will govern in designating objects:

† Par. 450 Drill Regulations for F. A., 1911.

(*a*) Deflection origin, *i. e.*, RP*, AP*, M*, etc., with its number. (When only one is in use it or its number may be omitted.)

(*b*) Deflection
(*c*) Range } For receiving station.

(*d*) Character of object (target, etc.).

(*e*) Name of object (battery, house, etc.).

*Examples of Letter Code Messages.**

(A dash between parts of a message signifies "Interval.")

Original designation of RP (no opportunity to designate one in advance): TT—3200—3800—RT—LL = This station. Deflection 3200. Range 3800. RP, Lone Tree, *i. e.*, RP is the lone tree whose

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* NOTE.—A Reference Point (RP) is an origin of deflection for the purpose of locating targets, etc. It should preferably be near the center of the field of fire and at about the range of probable targets. If possible at least one should be selected before occupying a position and it should be thoroughly and unmistakably understood in advance of such occupation by all concerned.

An Aiming Point (AP) is an object on which the guns are laid with a deflection such that their fire will be delivered in the desired direction.

A Registration Mark (M) is a prominent feature of the terrain near which the enemy is known to be or expected to appear and on which the fire is to be or has been registered.

Reference Points, Aiming Points, and Registration Marks are each numbered serially as established.

†These are typical examples of commands habitually sent in the Fourth Artillery during the writer's service in it and the accuracy and rapidity with which fire can be directed or controlled by this method is astonishing.

deflection (at your station) from this station is 3200 and whose range (from your station) is 3800.

Designation of additional RP: RP—1—3320—3800—RP—2—CH = Deflection (from RP No. 1), 3320. Range, 3800. RP No. 2, Church.

Designation of AP: RP—2—210—3400—AP—LL = Deflection (from RP No. 2), 210. Range, 3400. AP, Lone tree.

Designation of M: RP—2—320—2800—M—KR = Deflection (from RP No. 2), 320. Range, 2800. M, Crest.

Designation of target: RP—2—330—3500—T—BG = Deflection (from RP No. 2), 330. Range, 3500. Target, Bridge.

Designation of target and distribution of fire: DF—RP—2—40—110—2700—T—IY = Distribute fire. Deflection (limits from RP No. 2), 40—110. Range, 2700. Target, Infantry.

Target previously designated to distribute fire: DF—RT—70 = Distribute fire right (from target) 70 mils.

Change of target: CT—M—2—20—3100—T—LI—V—3 = Change target. Deflection (from M No. 2), 20. Range, 3100. Target, line of infantry. Volley fire, 3 rounds.

Shifting and closing sheaf: SR—60—CS—20 = Shift fire right 60 mils. Close sheaf 20 mils.

Use of F. A. Code by all Arms.

The Two-arm Code should prove as valuable to the Cavalry and Infantry (within their requirements) as to the Field Artillery, especially for reconnaissance, fire control, etc. It is suitable for intercommunication in any command not exceeding a brigade, the Signal Corps providing communication between brigade and higher commanders.

The assignment of flags, etc., should follow the general plan adopted herein for the Field Artillery or special flags could be provided.

A separate Letter Code could be devised for each arm. which would make for simplicity within each arm at the expense of intercommunication by Letter Code with the other arms. A much better plan would be to have a single Letter Code common to all arms. The additional code letters necessary for Cavalry and Infantry would not greatly augment the present Letter Code, and there would be much less sacrifice of simplicity in each arm than might appear at first glance.

Notes on Communication.

The duties and personnel of field artillery service are prescribed in Part V, Drill Regulations for Field Artillery, 1911, but all field

artillery adjutants, members of regimental and battalion headquarters detachments, and battery scouts, signalers, musicians, and chiefs of the fifth sections should be required to qualify as telephone operators and signalers in order that any of them may be competent to perform these duties in an emergency.

As soon as a station is established its assigned flag should be hoisted, out of sight of the hostile position, and kept hoisted until proper communication is established; if necessary to the establishment of communication the call letter of the station desired may also be made repeatedly. If a station is to be changed or discontinued notification should be furnished other stations in communication with it.

The telephone should always be installed, if possible—flags or lanterns *may* be visible to the enemy. Circumstances will decide whether telephone or flags (or lanterns) should be used; both should not be used simultaneously. If possible, a message should be replied to by the same means used in sending it.

The following rules govern messages:

1. Place, date, time, address, and signature will not be sent unless specifically ordered.

2. When time permits all important messages sent or received should be reduced to writing, timed, dated, and numbered serially for that date; in such case messages sent should be authenticated by the proper officer, and messages received should have their source noted.

THE 8 CM. EHRHARDT-VAN ESSEN HIGH EXPLOSIVE SHRAPNEL.

Translated from Mitteilungen ueber Gegenstaende des Artillerie-und Genie-Wesens for the War College Division, General Staff.

This projectile, designed to combine the effect of both shrapnel and shell, thereby simplifying the question of ammunition supply, was designed by Lieutenant van Essen of the Dutch Army, and improved by the manufacturers, the Ehrhardt works at Dusseldorf.

The notable changes in the latest type compared with former models are:

1. The lower percussion mechanism has a counter safety spring intended to prevent premature explosions of the detached head.

2. The primer cap, formerly centrally placed, is not put sideways for the purpose of easier change.

3. A switch plate has been inserted by which the projectile can be set to function as a shrapnel, while the head or grenade portion continues along the trajectory, or the complete missile can be made to burst in air.

It should be mentioned that the percussion fuze cannot act short of 100 meters beyond the muzzle. In order to accomplish this end a powder train which is ignited by the fuze, must be consumed before the striker of the lower percussion mechanism can drop forward against the lower firing needle.

Here are given the experiments carried out with an 8 cm., M5, field gun.

1st. *Inquiry into the range and precision of the whole projectile, and of the detached grenade portion.*

There were fired alternately, two series each at 2000 and 5000 meters. In the first series the projectiles were observed for point of impact; in the second series they were times so that only the heads struck the ground.

The range of shots obtained are practically alike and the values of dispersions are favorable. The strike of the heads could be plainly seen because of the thick, dark gray cloud thrown up.

RESULTS.

	Ground Struck With			
	Whole Projecile	Grenade Portion	Whole Projecile	Grenade Portion
Number of shots	15	15	20	20
Angle of fire	3 15′	3 15′	11 35′	11 35′
Range (meters)	2011	2030	5060	5053
50% longitudinal dispersion (meters)	20	47	49	44
50% longitudinal dispersion (meters) according to firing tables	23	23	60	60
50% lateral dispersion (meters)	1.4	1.9	10.4	8.7
50% lateral dispersion (meters) according to firing tables	1.1	1.1	4.8	4.8
Largest length zone (meters)	59	139	136	102
Largest breadth zone (meters)	3.2	5.8	25.1	24.8

2. *Finding the effect and the angle of the cone by detonations in air.*

The target was 5.4 meters high and 20 meters broad, with a flooring in front of it 12 meters long and 20 meters broad.

Below are cited the most important data for comparison with that obtained with the 8 cm. single walled experimental shell (which was proposed for introduction) when used against a similar target.

The 8 cm. High Explosive Shrapnel.
Angle of cone, 160º.
Splinter hits on target, 130 sharp, 170 weak.
Splinter hits on flooring, 170 sharp, 180 weak.

The 8 cm. Experimental Shell.
Angle of Cone, 176º.
Splinter hits on target, 200 sharp, 80 weak.
Splinter hits on flooring, 120 sharp, 90 weak.

3. *Tests for effect as shrapnel by bursts in air at a target 2000 meters distant.*

The target consisted of 14 partitions, 2.7 meters high, 48 meters wide, and spaced at distances of 20 meters apart.

In the table below are shown the comparative shots of the 8 cm. high explosive shrapnel and the 8 cm. M. 5 shrapnel, with comparatively even points of burst.

Ammunition	Interval of burst referred to 1st partition	Total hits target 2.7 m. high		Number of files hit				Height of burst	Greatest number of rows hit
				target 2.7 m. high		target 1.8 m. high			
	Meters	Sharp	Weak	Sharp	Weak	Sharp	Weak		
High explosive shrapnel	25	415	516	198	227	150	174	7	31
8 cm. M. 5 shrapnel------	30	421	585	211	278	151	210	6	32
High explosive shrapnel	72	283	355	162	191	113	139	10	31
8 cm. M. 5 shrapnel_____	75	285	412	169	226	129	180	10	31

The 8 cm. high explosive shrapnel showed itself as to shrapnel action, practically equivalent to the 8 cm. M. 5 shrapnel. The same result was obtained in tests at 4000 meters.

4. *Results against gun shields, using air bursts.*

The target used was a flooring 96 meters long and 13½ meters wide, at the end of which erected a high screen 20 meters wide and 5.4 meters high.

The table gives a comparison with 8 cm. M. 5 shell.

Projectile	Height of bursts	Total hits			
		In flooring		In screen	
		Sharp	Weak	Sharp	Weak
High explosive shrapnel ____	3	109	182	10	18
8 cm. M. 5 shell _____	2	79	134		
High explosive shrapnel ____	5	116	232	24	48
8 cm. M. 5 shell _____	5	71	104	2	2

The superiority of the high explosive shrapnel over the 8 cm. M. 5 shell was demonstrated. It also proved slightly superior to the M. 5 shell in experiments in which the two projectiles were fired at gun shields, using both impact and air bursts.

5. *Experiments directed against brick walls and rubble work.*

It was found that the space around shielded guns is entirely within the cone of dispersion of the shrapnel element, while the shell portion (head) when it strikes squarely is sufficient to put the piece completely out of commission. When the impact of the shell element occurs in front of or to one side of the piece, the gun crew is, at least, incapacitated. The moral effect of such fire is

greater than that with ordinary shell because the shower of shrapnel balls is added to the explosion caused by the impact of the head or shell feature.

6. *Experiments directed against brick walls and rubble work.*

For comparison 8 cm. high explosive shrapnel and 8 cm. M. 5 shell were fired.

(a) Against a brick wall 1.2 meters thick, the mortar made of Portland cement. Cracks passing through the rear of the wall and small fragments caused by hits with the high explosive shrapnel were noted. The depths of penetration of both projectiles were the same. The work of destruction of the high explosive shrapnel was, however, considerably greater.

(b) The effect of a rubble wall 1 meter thick was the same with both projectiles. According to the firmness of the constituent parts the wall was penetrated by one of each of the projectiles, or a surface 1/5 meters in height and width and about 70 centimeters deep was torn out; the exterior stone layer in rear was chipped off.

EXPERIMENTS WITH 10 CM. HIGH EXPLOSIVE SHRAPNEL.

The arrangement of this projectile is identical to that of the 8 cm. high explosive shrapnel described above. The effect is therefore the same. The experiments were carried out in a similar manner, and were as follows:

1. *Determination of penetration of fragments in shields with air bursts, with report of angle of cone.*

For this test 8 cm. M. 5 shields were suspended on a vertical screen under which was a flooring. The results are shown in the following table which also contains results obtained with 10 cm. M. 5 shell and 10 cm. Krupp combination projectile, which were partially tried during the past year.

Ammunition	Burst Interval	Angle of Cone	Flooring		Screen		Shieds	
			Sharp	Weak	Sharp	Weak	Sharp	Weak
10 cm. high explosive shrapnel ----	10º	213º	180	420	100	250	3	40
10 cm. M. 5 shell ----------		113	63	8	40	30	2	10
10 cm. Krupp combination projectile ----------		165	300	200	250	160	6	45

The effect was better than that of the 10 cm. M. 5 shell, but inferior to that of the Krupp combination projectile. The latter, however, weighs 16 kg. compared with 14.7 kg., the weight of the Ehrhardt high explosive shrapnel.

2. *Determination of effect on an imaginary gun with protective shields and four dummy figures.*

A projectile with time fuze "A" which acted after penetrating the shield and all four figures were demolished. A second projectile was fired with time fuze "K." The shrapnel part exploded 25 meters in front of the target, the grenade part just after penetrating the shield. Two dummies were totally demolished and two others were struck, one by eight and the other by ten splinters. The effect of the first was certainly greater, although the effect of the grenade portion was sufficient to put the gun out of commission.

3. *Effect on a shrapnel target at a range of 4000 meters.*

The targets consisted of ten partitions, 48 meters wide and 1.8 meters high, spaced 10 meters apart, measured in the direction of fire.

Ammunition	Interval of burst to first	Height of burst	Total hits at 1 8 m		No. of rows hit at 1 8 m		Greatest No of rows struck sharp in one partition
			Sharp	All	Sharp	All	
10 cm. H. E. shrapnel	41	19	289	482	184	245	30
10 cm. M. 99 shrapnel (557 balls @ 11 gms.)	38	21	244	329	117	138	27
10 cm. M. 99 shrapnel (656 balls @ 9 gms.)	80	42	318	427	221	267	39

The shrapnel effect of the 10 cm. H. E. shrapnel was slightly inferior to the 10 cm. M 99 shrapnel with 9 gh. balls, and is really better than that with the 11 gm. balls.

4. *Effect on a brick wall I meter thick.*

The result was satisfactory.

SUMMARY.

The 8 cm. high explosive proved itself equal to the 8 cm. M. 5 field gun shrapnel, and superior to the shell. The 10 cm. high explosive shrapnel has fully met expectations, and is a perfect substitute for the ordinary shrapnel and shell.

GUN PITS FOR A FIELD BATTERY.

CAPTAIN CLARENCE DEEMS, JR., 1ST FIELD ARTILLERY.

Referring to the recent publication by the Army Field Engineer School entitled "Notes on Field Fortification," on page 59 it states that, "In many cases the guns can be placed in numerous positions concealed from view and employing indirect fire, and here no artificial cover is essential. In other cases the artillery will not be so fortunate, and artificial means of. protection for both guns and men will be needed. This is especially necessary in so-called 'dagger batteries'—i. e., *concealed* guns placed well to the front, ready to open fire at critical moments on a line of advance or restricted area." In this paragraph, just quoted, we then have it laid down as a principle of field fortification that:

1. It will probably be necessary for field artillery at times on the battle-field to be so placed that a natural masked position can not be found.

2. That the duties demanded of these batteries can best be performed if they can be kept concealed as long as possible.

3. In addition to giving concealment, as much protection as possible should be obtained by artificial cover to both personnel and matériel.

Considering the above elements, then the problem becomes one which demands some form of hasty field work, inconspicuous, yet secure.

Difficulty of concealment is the greatest part of the problem. As suggested in the "Notes" quoted above, sufficient protection can be obtained by filling in with earth the gap between the ground and the bottom of the shields. But this leaves the guns still conspicuous on the landscape and does not offer any scheme for the development of this cover if the guns are to remain in position for several days.

A system of cover for field artillery and its partial development is suggested in the above mentioned work, in which shelter for the cannoneers is first constructed, the gun and caisson being kept in the open near by, then a pit is dug for the guns, and finally these pits are connected by communicating trenches presenting a continuous parapet.

It seems that a wrong sequence of construction is suggested. Our guns and caissons have shields, aprons and doors made of metal of sufficient thickness to protect the cannoneers from small arms fire and shrapnel bullets. That being the case, better protection for the cannoneers should ordinarily be sought only after some attempt to conceal the pieces is made. It would then appear the proper order of construction would be as follows, certain details being also mentioned in their place:

(a) Make simple gun pits for the guns at normal intervals with a low, thick parapet covered with sod. The wings of the parapet of each pit should be extended to the rear, as these will act as traverses in the completed work. The guns now become partially concealed when placed in the pits made for them, and further concealment may be effected by tying weeds on the bright-wheel tires and by lowering the top shield except when actively engaged. If possible, the caissons should be kept under cover near by, and the hand fusesetters used at the piece.

(b) Make a trench between the guns throwing the earth forward so that it will continue the front of each gun pit in an unbroken parapet, connecting each pit with its neighbor, and in this manner securing inconspicuous construction and affording shelter to the extra cannoneers not needed in the pits and allowing a direct passage under cover from one pit to another.

(c) Make stations (preferably at least two) for the protection of the battery commander and such members of his detail as he needs to have with him. These stations should ordinarily be constructed at only such a distance from his battery that the battery commander can look into it and command it by word of mouth, and should, if possible (depending, of course, on circumstances) be placed one near each flank and to the rear of the line occupied by the guns. At this time cannoneers should complete ammunition pockets in each pit

(d) If the position will probably be occupied more than twenty-four hours, all efforts should be made to strengthen the emplacement by excavating to secure more cover for the cannoneers, using the extra earth to raise and thicken the parapet. At this stage the parapet may be made as high as the top of the main shield, a shallow embrasure being left for each gun to fire through, but covered from view from the front by a curtain of sod that can be instantly kicked out at the moment it is desired to bring the guns into action. Throughout the work of construction fresh sod must be always

ready to place on exposed earth. Overhead cover between the pits should be begun for the cannoneers. Additional trenches should be run from the emplacement to regularly established latrines, and communicating trenches to exits under cover, where practicable, should be commenced.

Not long ago the following method was used for instructing a battery. The position was selected to conform with a problem given and explained to all, and simple gun pits, as shown in the following sketch, were made (Fig. 1). But four were constructed, as they were made for the guns alone. All caissons could in this problem be put under cover in a gulch near by.

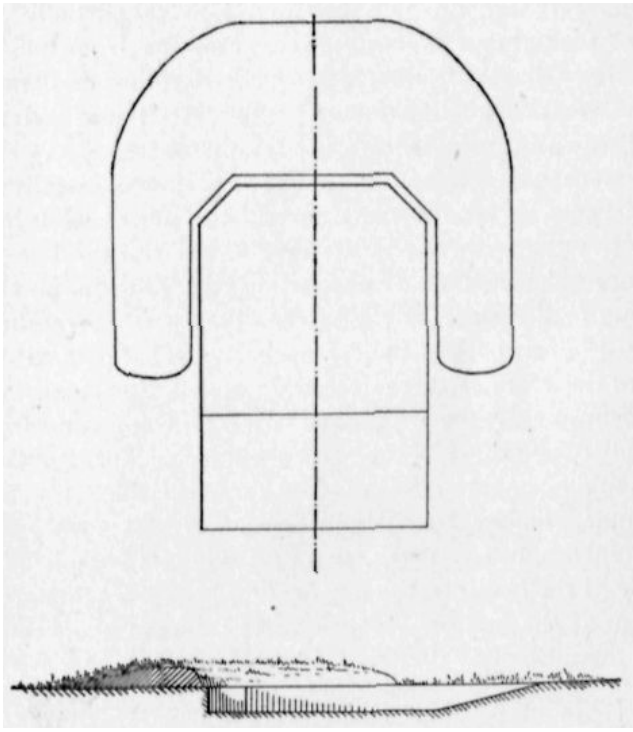

Fig.1.

The actual construction of the gun pit is effected by first pacing off a rectangle 6×4 yards, the greater length being in the direction of the line of fire. All of the sod is removed from this area and placed in a pile covering the front of the pit, about five yards to the front of it. Except for the two front corners which are cut off diagonally

about two feet from the angles, this rectangle for 4 yards back from the front edge, is deepened by excavating to a depth of 1 foot and 4 inches. Leaving an interior berm of 6 inches, the earth is thrown to the front, forming a parapet 8 feet thick at the base and 1 foot and 4 inches in height. The rear part of the main rectangle for the last two yards has the earth removed in such a manner as to form a ramp sloping from the bottom of the pit to the natural surface, thus permitting easy entrance and exit of the carriages. This earth is thrown diagonally to the front and helps form the side parapets.

After all the excavating is completed, the sod is placed on the outside of the parapet, and then on the top and wings. There will be enough left for this purpose and also to partially revet the interior of the parapet exposed to diagonal view from the front.

The battery line was then developed as shown in figure 2, the additional work being represented in broken lines, and the extra parapet thrown up being shown in cross-hatching.

The dimensions of the additional construction are really the same for the parapet as for the same part of the pit, being 1 foot and 4 inches above the natural surface and 8 feet thick. The wings of the pit are thickened on their outside, the filled-in portion being brought up to the same height as the other part. A six-inch berm is also used in this part of the entrenchment. That part of the trench parallel to the front is three feet wide and is excavated to a depth of three feet in rear, the front part, however, being cut down to only 1 foot and 10 inches below the natural surface. This leaves a bench, which should be about 18 inches wide, on which the extra cannoneers can sit under shelter from small arms fire. At each end of this shelter trench another trench, two feet wide, is completed into the pit in rear of the traverse, the bottom of which is a gentle slope up to the bottom of the gun pit. These latter trenches make an angle of 30º with the normal to the front of the line of gun pits.

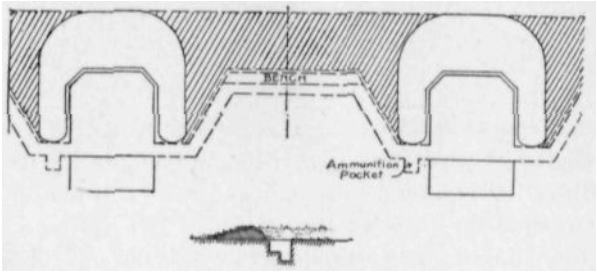

Fig. 2

The work was carried only through the third stage, the guns being put in the pits and made ready to fire over the parapet. It was found that even though in this particular case the ground was practically a plane surface covered with very low vegetation—grass and small ferns—with a decided pitch to the front, the main object desired had been obtained, namely, concealment. From a short distance in front the guns were not readily picked up, and excellent additional protection had been furnished the cannoneers so far as close range small arms fire and shrapnel was concerned. No scar showed on the terrain where fresh earth had been exposed and the guns themselves being olive drab in color, were not liable to be noticed at the artillery battle ranges except by careful examination through field glasses. Had the work been carried to the extent of providing cover as high as the top of the main shield and the embrasures been cutained with sod, the difficulty of picking up the battery from the position of the enemy would have been greatly increased. The time of complete construction through the third stage in ordinary soil for a full battery would be about three hours—probably less during the stress and excitement of existing danger. It could readily be accomplished during the night in case the battery should be moved under cover of darkness, and dawn should then find it properly protected in its new position which would very likely not be revealed until actual firing from it commenced.

A point, seemingly small, yet important, developed during this exercise. The earth was rather dark in color, and red. In order to avoid placing this tell-tale mark on the green vegetation, instructions were given to pile the sod, grass side up, five yards or so in front of the particular excavation that was being made. The sod coming off first acted thus as a mask to the baring of the darker earth. In the case of one trench where this was not done, the result was most noticeable from the enemy's position and attention was immediately drawn to the conspicuous mark on the ground. With the remainder of the battery kept under cover, this work probably could be done in the day time at the longer ranges without drawing artillery fire provided only a few men worked at one time, though it is believed that the greatest use could be made of protection of this kind for those batteries which would be sent forward under the cover of night for a closer attack.

The following sketch, Fig. 3, shows the simple form of protection used for the battery commander and two or three men with him.

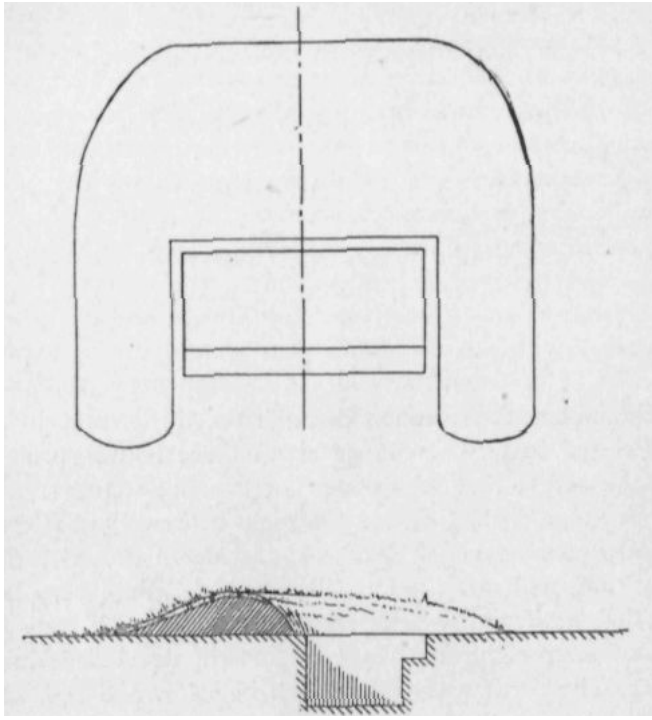

Fig.3.

The battery commander's station was a simple rectangular pit 5 feet by 10 feet, and 3 feet deep, with a step in rear, which also served as a seat, 2 feet high and 1 foot wide, the earth being thrown to the front and sides to form a parapet which was also covered with sod. As there was not sufficient sod removed from this excavation to cover the earth thrown out it was necessary to secure a little more from the adjacent ground, where it could be taken in small pieces and not be noticed from the front.

Among some of the advantages that may be urged for this form of cover for a battery are the following:

1. It is inconspicuous, and of low command.

2. It gives good protection to the cannoneers from the front.
3. The traverses protect it from enfilading fire.
4. It can be constructed in ordinary soil quickly.
5. It can be developed into a more elaborate work.
6. It is simple, and the construction easy to explain to the enlisted man.
7. It is of little depth, therefore requiring exact adjustment of range for hostile fire.

The only disadvantage particularly noticed is that which exists in all emplacements which have a part of their structure below the natural surface—and that is the question of drainage. As all of the

pits are connected, probably the water in most cases could be run off through a drainage ditch passing through all of them as well as through the shelter trenches between them, and an exit for the ditch being prepared at one flank.

Studying from a distance through field glasses the work of construction of this emplacement in the day time, it was noticed that the movement of figures laterally in direction from one pit to another attracted attention more than any thing else. With a small party working in one place, no especial attention was invited as what they were doing could not definitely be made out, and they moved but little. Concealment to some slight degree can be obtained

in the day time by eliminating all unnecessary passing to and fro.

If, in the course of their yearly instruction, batteries are required to dig gun pits and then to fire one problem at target practice either at them or from them, it is believed that from the practical experience thus gained we may be able to develop that form of hasty field work which will give us the greatest concealment with a reasonable amount of protection. There seem to be too many forms which are made for protection alone and which, because of their exposed parapets, invite hostile fire.

THE HEIGHT OF BURST OF SHRAPNEL A PRACTICAL LESSON OF THE BALKAN WAR.

BY COMMANDANT TRÉGUIER.

Translated by Captain B. F. Brown, 5th Field Artillery, from La France Militaire.

It has been frequently noticeable in the accounts of the war in the Balkans from the observers with the allies that the projectiles of the Turkish batteries nearly always burst too high and produced no effect. This result has not surprised us, since we all know that the balls of a projectile which bursts very high are no longer effective when they reach the ground. But even while thoroughly understanding this, are we very certain that we do not ourselves, in part at least, make the mistake of the Turkish artillerymen? Very frequently at the schools of fire, battery commanders announce their fire adjusted when the height of burst is noticeably greater than one mil. All those that conduct firing complain of this tendency of a great number of officers to adjust too high. If they make this mistake in campaign—and one does in war only what one has done in time of peace—the efficiency of their batteries will be notably diminished, and they will risk being worsted in a fight with an adversary less well armed but better instructed.

There is a clause in our regulations which we perhaps have not sufficiently considered, "A constant error of judgment of three mils by a battery commander is the equivalent, in point of view of effect, to the loss of about three caissons to his battery." Colonel Potel wrote recently, "It is because some service practice, even in actual war, has been conducted with too high bursts that shrapnel has been sometimes hastily judged noneffective."

Often, if the firing is improperly adjusted and the resulting fire for effect is entirely ineffective, it is because the observations taken upon bursts that were too high were completely erroneous. Why, then, do we continue to adjust too high? First, because there are certain commanders who like to see the pattern of the four bursts very clearly outlined, although an adjusting salvo which has not a percussion burst ought to be the exception. Also because many

officers are, above all, preoccupied with the adjustment of range, and are in a hurry to announce their fire adjusted, and not sufficiently careful to assure themselves that their bursts are not too high. Often the fault is not noticed by the director and it becomes, little by little, a habit. It is absolutely necessary to remedy this fault, at least if we wish to get from our gun all the effect of which it is capable, and this should not be very difficult. It would suffice if one made an absolute rule to lower the corrector whenever, in the course of the adjustment, there is not at least one percussion burst out of four. When the battery commanders bind themselves to that simple rule and when the different directors rigorously enfore it, then the lamentable habit of adjusting too high will have disappeared. However, we will never adjust too low, inasmuch as our fire for effect will always be executed with a height of burst of at least two mils, which gives nearly the same effect as is given by the proper height. Besides, when projectiles are bursting very low in front of a body of troops, there will perhaps be fewer men hit than if the burst were three mils high, but the moral effect produced will probably be greater. Therefore let us profit by the lesson that the Balkan war gives us today, by habitually adjusting low. It is only in this way that we will produce the moral and the material effect sought and avoid frequent errors of judgment.

NOTES ON FIELD ARTILLERY ORGANIZATION.

BY MAJOR W. J. SNOW, FIELD ARTILLERY.

It is understood that since the promulgation of the Report of the General Staff on the Organization of the Land Forces of the United States, the War Department has been formulating plans to carry out the principles set forth in that report.

With a view to starting discussion and ascertaining the sentiments of the Field Artillery as to the best organization for that arm, the following paper is submitted. It must be understood that the views expressed in this article are not final and unchangeable, but that they merely set forth certain features to be considered in the question of formulating a suitable organization for field artillery.

In this connection, it may not be out of place to recall to our minds the views of General Hunt, who was Chief of Artillery of the Army of the Potomac, from September 5, 1862, until the close of the war. Under date of February 6, 1863, General Hunt reported as follows:

> On assuming the command, I found the artillery much disorganized. * * * When the army left Washington, I was compelled to obtain on the roads the names and conditions of the batteries and troops to which they were attached. Not only were the batteries of the Army of the Potomac dispersed as stated, and serving with other divisions than their own, but I had no knowledge of the artillery of the corps that had joined from other armies than what I could pick up on the road. Many had not been refitted since the August campaign; some had lost more or less guns; others were greatly deficient in men and horses and a number were wholly unserviceable from all these causes combined. The first measures were directed to procuring supplies of ammunition and several hundred wagon loads were, when we were at Rockville, ordered to be forwarded from the arsenal at Washington. Batteries were forwarded from the Artillery Reserve, to the corps and divisions deficient in guns. Horses were taken from the baggage train and men temporarily detailed from the infantry, and by the time the artillery reached Antietam, it was (considering the condition in which the disastrous campaign in August had left it) very respectfully provided. * * * The conclusion of the battle found the artillery of the Army scant of men, of horses, of ammunition, of supplies of every description. The greater portion of the batteries

had, before entering on this campaign, neither the time nor the opportunity to replace the expenditures of the previous one. An almost complete reorganization and reassignment was necessary. All efforts were immediately directed to placing them in condition again to take the field. Notwithstanding these efforts, they were not fully prepared when the army crossed the Potomac, and large portions of the supplies they required were not received until they reached this place (Falmouth).

Under date of August 1, 1863, General Hunt reports as follows:

The promotion of many of the old artillery officers, and the invariable transfer which accompanied it to other duties, weakened the regular batteries exceedingly and at the same time deprived the divisional artillery of experienced commanders. The limitation of officers of four gun batteries, crippled the volunteer service, and the want of field officers added to the great difficulties under which the arm labored. It will perhaps hardly be believed that for the command and management in their operations of the artillery of the army, consisting of 412 guns, 980 carriages, 9,543 men and officers, 8,544 horses, besides their large ammunition trains, there were but 5 field officers of artillery in the army, and from the scarcity of officers of inferior grades, these officers had miserably inefficient staffs. Add to this that there was no commander at all of the artillery until a late period of the operations, and I doubt *if the history of modern armies can exhibit a parallel instance of such palpable crippling of a great arm of the service in the very presence of a powerful enemy*, to overcome whom would require every energy of all arms under the most favorable circumstances. It is not, therefore, to be wondered at that confusion and mismanagement ensued, and it is creditable to the batteries themselves, and to the officers who commanded them that they did so well. Fourteen guns were lost, but the most of these losses occurred in the rout of the 11th corps, before Colonel Wainwright or myself was placed in command of the whole artillery.

Under date of September 27, 1863, General Hunt writes as follows:

* * * In my report of the battle of Chancellorsville, I took occasion to call attention to the great evils arising from the want of field officers for the artillery. The operations of this campaign, and especially the battle of Gettysburg afford further proofs, if such were necessary, of the mistaken policy of depriving so important an arm of the officers necessary for managing it. In this campaign, for the command of 67 batteries (372 guns), with over 8,000 men, 7,000 horses, and all the material, and large ammunition trains, I had one general officer commanding the reserve, and but four field officers.

* * * * * *

In the seven corps, the artillery of two were commanded by colonels, one by a major, three by captains, and one by a lieutenant, taken from their batteries for the purpose. The two brigades of horse artillery, attached to the cavalry, were commanded by captains, and there was one field officer in the reserve. The most of these commands in any other army would have been considered proper ones for a general officer.

In no army would the command of the artillery of a corps be considered of less importance, to say the least, than that of a brigade of infantry. In none of these corps, should the artillery commander have been of less rank than a colonel, and in all there should have been a proper proportion of field officers, with the necessary staffs. The defects of our organization were made palpable at Gettysburg, not only in the field, but in the necessary and important duties of reorganizing the batteries, repairing damages, and getting the artillery in condition to renew the battle, or take the road in an efficient condition on the morning after the conflict. I respectfully and urgently call the attention of the Commanding General, and through him, of the War Department, to this subject.

Not only does the service suffer, necessarily from the great deficiency of officers of rank, but a policy which closes the door of promotion to battery officers, and places them, and the arm itself under a ban, and degrades them in comparison with other arms of service, induces discontent and has caused many of our best officers to seek positions wherever they can find them, which will remove them from this branch of the service. We have lost many such officers, and unless something is done to cure the evil, we will lose more.

Under date of February 21, 1864, General Hunt says:

* * * Our own tactics require a colonel or lieutenant colonel and two majors for four batteries serving together, with an adjutant and two assistant adjutants. The policy of depriving us of field, and partially of company officers, has injured the efficiency, and doubled the labors of artillery commanders. The artillery in battle covers a great deal of ground, and requires more supervision than infantry. The batteries are often, necessarily from the formation of the ground, separated by wide intervals, and yet they must work in harmony for a given object. Without officers to supervise and direct them, this is almost impracticable.

After a battle the batteries must be refitted, supplied with ammunition, repairs effected, and placed in condition for service on the march, by dawn the next day. This sometimes involves almost a reorganization. It cannot be well done without officers.

I called attention specially to the subject in my reports of the battles of Chancellorsville and Gettysburg. In the first battle, for the artillery of the army (412 guns, 980 carriages, 9,543 men,

8,544 horses, besides their large ammunition trains, and these distributed throughout the army) I had but 5 field officers, and these, for the want of disposable battery officers, had miserably inefficient staffs. In the Gettysburg campaign with 67 batteries (372 guns, 320 of which were on the field, with over 8,000 men, and 7,000 horses, and the necessary material pertaining to them), I had in the whole army but one general officer (commanding the artillery reserve), and 4 field officers. Of the 7 corps present, the artillery of three corps was commanded by captains, and that of one corps by a young lieutenant. Both brigades of horse artillery were commanded by captains. These facts need no comment, yet only those who were charged with the management of such a force with so little aid can fully appreciate the evils and the difficulties to which they led.

General Hunt closes his final report, dated June 1, 1865, with these words:

In my previous reports, I have had occasion to call attention to the want of a proper proportion of field officers for the artillery, and this I did especially in the reports on the battles of Gettysburg and Chancellorsville; and as there is no bureau, nor other center of administration for it, I take this occasion to present the same subject, in order that the results of our experience may not be lost. This is due to the reputation of the artillery in this war, as well as to the future interests of the service. At an early period of the war, orders were given that field artillery should be taken into the service only by single batteries, "in order to save field officers," this, while infantry regiments of a single battalion were allowed 4, with their proper staffs. Why this policy, so contrary to that of all modern armies and so destructive to the efficiency of the most complicated of all arms of the service, was adopted, I am at a loss to discover. Its effects have been but too clear. Not only has the service suffered from the want of officers absolutely necessary to its highest efficiency and economy, but this system has stopped promotion in the artillery, and as a consequence, nearly every officer of promise, as well as of any distinction, has been offered that promotion in the infantry, cavalry, or staff, which no amount of capacity, gallantry, or good conduct could secure him in our arm. The result is that, with a few marked exceptions, in which officers were willing to sacrifice their personal advancement and prospects to their love of the arm, the best and most distinguished of the officers of the artillery accepted positions elsewhere, or left the service in disgust, as opportunity offered. The effects of this, and of other errors of organization, has been but too evident; the artillery, although it has done much better, than under the circumstances could have been expected, or even hoped, has not attained to that efficiency which was possible, and has failed to retain the pre-eminence it

once held in our army, and in public estimation. The sacrifice of efficiency has been made at the expense of economy. I do not hesitate to say that the field artillery of this army, although not inferior to any other in our service, has been from one-third to one-half less efficient than it ought to have been, whilst it has cost from one-third to one-half more money than there was any necessity for. This has been due principally to the want of proper organization, which has deprived it of the experienced officers required for its proper command, management, and supervision, and is in no respect the fault of the artillery itself.

While this war closed long ago, and a revolution has taken place in field artillery, yet as this was the last war in which large quantities of our field artillery were used, and as failure to provide adequately for officers is apparently a part of our American system, it is important that the evils resulting from this shortage of officers, as set forth in General Hunt's report, be borne in mind, and that, in so far as we can, an adequate provision be made in any reorganization plans now under consideration. General Hunt's reports, from which the above extracts were made, show conclusively the necessity for a proper organization of the field artillery.

It is thought that the following notes set forth principles which should be considered now in formulating any plans based on the Report of the Reorganization of the Land Forces of the United States:

NOTES ON FIELD ARTILLERY ORGANIZATION.

1. The Field Artillery battalion is the tactical unit. It should therefore be so recognized, and made the basis of organization.

2. Battery and battalion organizations can be definitely prescribed, each being a complete unit in itself, and each can be prescribed so as to be suitable to the caliber and kind of weapon with which equipped.

3. Any organization higher than a battalion, provided by law, should be flexible in order to meet new and unforeseen conditions.

4. While it is possible to prescribe a definite organization of Field Artillery appropriate to Infantry divisions within the continental limits of the United States, the units of Field Artillery to be provided for foreign service will differ from those in continental United States and will even differ among themselves. A battalion organization will solve the problem.

5. For purposes of administration and instruction, as well also

as to provide the higher ranking officers necessary to properly control the Field Artillery in action, handle it and resupply it in campaign, battalions must be organized into regiments and brigades.

6. A rigid provision that a regiment shall always consist of a fixed number of battalions leads to these regiments being split in time of peace, with part in continental United States and part on foreign service; this is unsatisfactory. Such a provision in time of war may, probably will, lead to split regiments, with a cumbersome system of administration and supply.

7. As an illustration of the preceding paragraph, the case may be taken of a battalion of mountain artillery and one of light artillery maintained in the Philippines, the other half of each regiment being elsewhere. This is unsatisfactory and could be cured by a battalion organization under which the two battalions in the Philippine Islands could be organized into a regiment. Again, it has been stated that there will be in Oahu a regiment of light and a battalion of heavy artillery, thus giving another case of split regiments, under a rigid organization, with regimental headquarters for the heavy regiment elsewhere. This could be obviated by a battalion organization, under which the two battalions of light and one battalion of heavy artillery could be organized into a regiment. Panama will be another case of a split regiment.

8. Conditions similar to the above will obtain in ammunition batteries and battalions. An elaborate system is needed for continental United States while almost none is needed for Oahu under the plan of defense, and only a simple system is needed for Panama. Battalion and not the regimental system lends itself to the solution of this problem.

9. The following, exclusive of ammunition battalions, shows the amount of field artillery needed and the types; (subject to change—see footnote).*

(*a*) *For the First Division.**

4 battalions of 3 batteries of four 3-inch guns,—48 3″ guns.

2 battalions of 2 batteries of four howitzers,— {8 3.8″ howitzers. / 8 4.7″ "

Organized into two regiments, each having 3 battalions (page 72—Organization Land Forces).

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* In applying the system of flexibility mentioned in paragraph 3, supra, the President or the Commanding General of an army in the field could change the composition of regiments by substituting a number of battalions of guns (or howitzers) other than prescribed herein.

(*b*) *Same for Second Division.**

(*c*) *For Third Division.**

4 battalions of 3 batteries of four 3-inch howitzers, equal 48 mountain howitzers. (Query—Should this division also have other guns or howitzers?)

(*d*) *For the Cavalry Division.*

4 battalions of 2 batteries of four 3-inch guns, equal 24 3-inch guns.

(*e*) *For the Auxiliary Division.*

There must be at least one regiment of heavy Field Artillery consisting of:

1 battalion of 2 batteries of four 4.7″ guns —8 guns.
1 battalion of 2 batteries of four 6″ howitzers —8 6″ howitzers.

(*f*) *For Philippine Islands service.*

1 battalion of 3 batteries of four 3″ howitzers—12 mountain howitzers.

1 battalion of 3 batteries of four 3″ guns—12 3″ guns.

(*g*) *For Oahu.*

2 battalions of 3 batteries of four 3″ guns—24 3″ guns.

1 battalion of 3 batteries of four 4.7″ howitzers—12 4.7″ howitzers.

(*h*) *For Panama.*

1 battalion of 3 batteries of four 3″ howitzers—12 mountain howitzers.

(*i*) Summing up, we have:

	Bns. Horse Artillery	Bns. Light Artillery	Bns. Mountain Howitzers	Bns. Light Howitzers 3 8″ & 4 7″	Bns. 6″ Howitzers	Bns. 4.7″ Guns
*1st division		4		2		
*2nd "		4		2		
*3rd "			4			
*Cavalry	3					
*Auxiliary					1	1
*Philippine Islands		1	1			
*Oahu		2		1		
*Panama			1			
Total	3	11	6	5	1	1

* See footnote on page 290.

AMMUNITION SERVICE.

10. Coming now to ammunition batteries and battalions:

(*a*) For light artillery (page 305, F. A. D. R.), there is one caisson (106 rounds) per gun. Under paragraph 9 (*a*) hereof, there are forty-eight 3″ caissons per Infantry division.

(*b*) For the 3.8″ howitzer there are three caisson (3 × 48 = 144 rounds) per gun (page 20, Greble Board Report). There are eight 3.8″ howitzers per Infantry division, and under paragraph 9 (*b*) hereof, there are eight such howitzers per Infantry division, making 8 × 3 = 24 caissons.

(*c*) For the 4.7″ howitzer there are three caissons (3 × 30 = 90 rounds) per gun (page 20, Greble Board Report). There are eight such howitzers per Infantry division, making 8 × 3 = 24 caissons.

(*d*) For the First Infantry Division (and the same applies also to the Second Infantry Division), there would be (summing up the above *a, b* and *c*), 96 caissons, half for 3″ gun, quarter for 3.8″ howitzer, and quarter for 4.7″ howitzer.

The necessity for providing this same number of rounds per gun and howitzer is recognized in the Report on the Organization of the Land Forces (page 74), but instead of carrying the entire amount in caissons the ammunition supply is divided into two echelons, the first consisting of half of the above enumerated caissons, and the second echelon using wagons. Adopting this idea, we have (Report on the Organization of the Land Forces of the U. S., page 76):

1st Echelon { 1 gun ammunition battery of 24 caissons.
1 howitzer ammunition battery of 24 caissons.

2nd Echelon { 25 wagons—3 inch ammunition. } forming 1
10 " —3.8 " " } Artillery train
13 " —4.7 " " } Company.

To the above (same report) is added an Infantry train company for each echelon. These are organized (same report, page 77) as follows:

First battalion { 1 gun ammunition company.
1 howitzer ammunition company.
1 Infantry " "

Second battalion { 1 Artillery train company.
1 Infantry " "

The details of organization are given in the same report, résume of the commissioned personnel is as follows:*

First Battalion—Headquarters	1	Major	1	Lieutenant.
Gun Ammunition Company	1	Captain	2	"
Howitzer " "	1	"	2	"
†Infantry " "	1	"	3	"
Second Battalion—Headquarters	1	Major	1	"
Artillery Train Company	1	Captain	4	"
†Infantry " "	1	"	3	"

The Report on the Organization of the Land Forces of the United States (page 74) recommends that each of these battalions be obtained in time of war by expanding a third battery of the howitzer battalion existing in time of peace, giving temporary commissons as major to the captains, and commissions as captains to the lieutenants. This principle involves selection for promotion, a radical departure in our service, and it is not believed desirable to apply it to one arm only, at present. The officers for this service therefore will be included with the rank they should have. This necessitates for the First Division, two majors, five captains and seventeen second lieutenants; and the same for the Second Division. With a view to equalizing the grades, second lieutenants only are provided for the Divisional Ammunition service.

11. We will next consider the Third Division, equipped with mountain howitzers. Applying the same principle for ammunition supply would necessitate one colonel or lieutenant-colonel, two majors, five captains and seventeen second lieutenants (Report of Organization of Land Forces, page 73).

12. Oahu needs no ammunition service.

13. Philippine Islands should be provided with a limited ammunition service, but no special personnel is provided herein. It can be supplied from some of the units herein provided.

14. The commissioned personnel for the Divisional Ammunition service for one Field Army, based upon the Report on the Organization of the Land Forces, is as follows:

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* See diagram, opposite p. 188, this number, of the FIELD ARTILLERY JOURNAL.

† Infanry train companies have 30 extra mules; otherwise they are identical in organization with Infantry Ammunition companies.

OFFICERS REQUIRED FOR DIVISIONAL AMMUNITION SERVICE.

	Colone's or Lt. Colonels	Majors	Captains	2nd Lieutenants	Total
COMMAND	1			1	2
1st Battalion, consisting of		1		1	2
1 Gun Ammunition company			1	2	3
1 Howitzer Ammunition company			1	2	3
1 Infantry Train company			1	3	4
2nd Battalion, consisting of		1		1	2
1 Artillery Train company			1	4	5
1 Infantry Train company		1	1	3	4
Totals	1	2	5	17	25

TOTAL OFFICERS REQUIRED FOR DIVISIONAL AMMUNITION SERVICE FOR ONE FIELD ARMY OF THREE INFANTRY, AND ONE AUXILIARY DIVISION.

First Division	1	2	5	17	25
Second Division	1	2	5	17	25
Third Division	1	2	5	17	25
Auxiliary Division		1	2	4	7
Totals	3	7	17	55	82

15. Organizing the battalions stated in 9 (*i*), into regiments, would give:

Cavalry Division ---Horse Artillery—1 Regiment of 3 battalions of 2 batteries each, or total of 6 batteries.

First " ---2 Regiments of 3 battalions each (2 battalions light and 1 howitzer), or total of 16 batteries.

Second " ---2 Regiments of 3 battalions each (2 battalions light and 1 howitzer), or total of 16 batteries.

Third " ---2 Regiments of 2 battalions each of 3 mountain batteries, or a total of 12 batteries.

Auxiliary " ---1 Regiment of 2 battalions each of 2 heavy batteries, or a total of 4 batteries.

Philippine Islands ---1 Regiment of 2 battalions each (1 light, 1 mountain), or a total of 6 batteries.

Oahu ----------1 Regiment of 2 battalions each (2 light, 1 howitzer of 3 batteries), or a total of 9 batteries.

Panama ----------1 battalion (3 mountain).

Or a total of 10 regiments, 27 battalions, 72 batteries.

Assuming that each regiment has a staff of three captains (as is now the case in all arms), each battalion a staff of one captain and

one lieutenant, and each battery a complement of one captain, two first lieutenants, and one second lieutenant, this would require ten colonels, ten lieutenant-colonels, 27 majors, 129 captains (30 + 72 + 27), 158 first lieutenants ($144 + \frac{27}{2}$), 85 second lieutenants ($72 + \frac{27}{2}$).

16. The total number of officers which should be provided is shown in the following table.

	Colonels	Lt. Colonels	Majors	Captains	1st Lieutenants	2nd Lieutenants	TOTAL
Combatant units (par. 9).....	10	10	27	129	158	85	419
Divisional Ammunition Service, including Auxiliary Division.....	1	2	7	17		55*	82
Total	11	12	34	146	158	140	501

17. The table on page 296 shows in detail the distribution of all elements and commissioned personnel.

18. It is true that the number of lieutenants in a battery is reduced, but this is done with a view to securing an absolutely essential increase in the number of batteries at a minimum cost. Under the modern idea of the tactical handling of field artillery in battalions, it is believed that there is no need for the presence of more lieutenants than are provided herein.

19. The attached draft of proposed bill provides a reserve of field artillery officers obtained by utilizing the more efficient noncommissioned officers of that arm. Many of these men are splendidly equipped for this work and have received special training at the Fort Sill School of Fire for Field Artillery. Their knowledge should be utilized in time of war, rather than attempt the hopeless experiment of creating volunteer batteries with untrained officers appointed from civil life.

20. It will also be noted that the attached draft of the bill makes no provision for siege artillery. As far as known to the writer, no decision has been made by the War Department as to whether this class of material shall be assigned to the field or the coast artillery.

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* To be appointed from reserve upon mobilization of ammunition battalions at outbreak of war.

TABLE SHOWING DISTRIBUTION OF REGIMENTS, BATTALIONS, AMMUNITION BATTALIONS, BATTERIES, GUNS AND OFFICERS, ACCORDING TO PROPOSED ORGANIZATION.

	Horse Artillery 3″ Gun			Light Artillery 3″ Gun			Mountain Artillery 3″ How			3.8″ Howitzer			4.7″ Howitzer			4.7″ Guns			6″ Howitzer			Totals					Officers							
	Battalions	Batteries	Guns	Battalions	Batteries	Guns	Battalions	Batteries	Guns	Battalions	Batteries	Guns	Battalions	Batteries	Guns	Battalions	Batteries	Guns	Battalions	Batteries	Guns	Regiments	Battalions	Batteries	Guns	Ammunition Battalions	Colonels	Lt. Colonels	Majors	Captains	1st Lieutenants	2d Lieutenants	Totals
																												1*	2*	5*		17*†	25
First Division				4	12	48				1	2	8	1	2	8							2	6	16	64	2	2	2	6	28	35	19	92
																											1*		2*	5*		17*†	25
Second Division				4	12	48				1	2	8	1	2	8							2	6	16	64	2	2	2	6	28	35	19	92
																												1*	2*	5*		17*†	25
Third Division							4	12	48													2	4	12	48	2	2	2	4	22	26	14	70
Cavalry Division	3	6	24																			1	3	6	24		1	1	3	12	14	7	38
																1	2	8	1	2	8								1*	2*		4*†	7
Auxiliary Division																						1	2	4	16	1	1	1	2	9	9	5	27
Philippines				1	3	12	1	3	12													1	2	6	24		1	1	2	11	13	7	35
Oahu				2	6	24							1	3	12							1	3	9	36		1	1	3	15	19	11	50
Panama							1	3	12							1	2	8	1	2	8	1	1	3	12				1	4	7	3	15
Totals	3	6	24	11	33	132	6	8	72	2	4	16	2	4	16							10	27	72	288	7	1*	2*	7*	17*		55*†	82
																											10	10	27	129	158	85	419
																											11	12	34	146	158	110	501

* Required for ammunition service.

† To be appointed from reserve on mobilization of ammunition battalions.

The writer believes that if any class of troops is essential to an army, such army is entitled to a primary and not secondary service. Such primary service is possible only by assigning siege artillery to the field artillery arm. By assigning siege matériel to coast artillery troops, the service must, of necessity, be secondary, the main duty of the coast artillery being with seacoast guns. If, therefore, it be decided by the War Department that the field artillery should also include siege artillery, at least one regiment of such troops should be added to the provisions of the attached draft.

DRAFT OF PROPOSED BILL.

AN ACT TO REORGANIZE AND INCREASE THE EFFICIENCY OF THE UNITED STATES ARMY.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled: That the Field Artillery is the artillery that accompanies armies in the field, and includes mountain artillery, light artillery, horse artillery, heavy field artillery, and the ammunition trains.

SECTION 2. That the field artillery shall consist of seventy-two batteries, organized into twenty-seven combatant battalions which, together with seven ammunition battalions, shall be organized into such number of regiments not exceeding ten, and ammunition trains not exceeding three, as the President or the commanding general of an army in the field may direct.

SEC. 3. That each battery shall consist of one captain, two first lieutenants, one second lieutenant, one first sergeant, one quartermaster-sergeant, one stable sergeant, six sergeants, twelve corporals, one chief mechanic, two mechanics, two horseshoers, two buglers, three cooks, and one hundred and two privates; *Provided*, That the President may in his discretion increase the number of sergeants to eight, of corporals to nineteen, of mechanics to three, of horseshoers to four, of buglers to three, and of privates to one hundred and forty-six.

SEC. 4. That each combatant battalion shall consist of one major, one captain (adjutant), one lieutenant (supply), one veterinarian, a battalion headquarters detachment, and batteries as follows: Light artillery gun battalions and mountain artillery battalions shall contain three batteries; horse artillery, heavy field artillery gun, and heavy field artillery howitzer battalions shall contain two batteries; and light artillery howitzer battalions shall contain two or three batteries as may be prescribed by the President, or the commanding general of an army in the field.

SEC. 5. That each ammunition battalion herein provided shall consist of one major, one lieutenant (staff), one battalion headquarters

detachment, and three ammunition companies, or two train companies. *Provided*, that in time of peace each ammunition battalion shall be reduced to one major and three ammunition companies, or two train companies. *Provided further*, That the ammunition and train companies in time of peace shall be reduced as hereinafter provided.

SEC. 6. That each regiment shall consist of one colonel, one lieutenant-colonel, three captains (staff), one band, one regimental headquarters detachment, and such number of combatant battalions, and ammunition battalions as the President or the commanding general of an army in the field may direct. *Provided*, that nothing herein shall prevent the assembling in the same regiment of guns and howitzers, and ammunition battalions of different calibers and classes.

SEC. 7. That each battalion headquarters detachment shall consist of one battalion sergeant major, one battalion quartermaster sergeant, four corporals, one bugler, one cook, and eight privates. *Provided*, that the President, may in his discretion increase the number of corporals to ten.

SEC. 8. That each regimental headquarters detachment shall consist of one sergeant major, one quartermaster sergeant, one commissary sergeant, two color sergeants, one bugler sergeant, four sergeants, one bugler, one mechanic, one horseshoer, one cook, and eleven privates. *Provided*, That the President may, in his discretion, add five corporals and increase the number of mechanics to two.

SEC. 9. That each field artillery band shall consist of one chief musician, one chief trumpeter, one principal musician, one drum major, four sergeants, eight corporals, two cooks, and sixteen privates.

SEC. 10. That each ammunition company shall consist of one captain, two lieutenants, one first sergeant, one quartermaster sergeant, one stable sergeant, three sergeants, eight corporals, three horseshoers, two mechanics, three cooks and not more than three buglers, one hundred and thirty-eight privates, and such means of transportation as shall be provided. *Provided*, That mountain artillery ammunition companies may have one packmaster and one cargador; and *Provided further*, That, in time of peace, all ammunition batteries and train companies shall be reduced to one captain three sergeants, one mechanic, and three privates.

SEC. 11. That each train company shall consist of one captain, not more than four lieutenants, one first sergeant, one quartermaster sergeant, and not more than seven sergeants, sixteen corporals, one chief mechanic, six horseshoers, four mechanics, two buglers, three cooks, and one hundred and thirty-nine privates, and such means of transportation as may be provided. Provided, That in time of peace train companies shall be reduced to one captain, three sergeants, one mechanic, and three privates.

SEC. 12. That the ammunition train of each infantry division

shall consist of one colonel or lieutenant-colonel, one lieutenant (staff), one veterinarian, three sergeants, three corporals, two privates and two ammunition battalions. *Provided*, That in time of peace such ammunition train shall be reduced to one colonel or lieutenant-colonel and two ammunition battalions which shall be reduced as hereinbefore provided. *Provided further*, that whenever ammunition battalions shall be reduced as hereinbefore provided, they may be assigned to regiments of field artillery.

SEC. 13. That in time of war the artillery of each infantry division shall be organized into a brigade, with the commander and staff provided for such units by existing law or regulations; and the President is empowered, by and with the advice and consent of the Senate, to appoint from the officers of the field artillery, one commander for each such brigade who shall have the rank, pay and allowances of brigadier general, and one brigade adjutant who shall have the rank, pay and allowances provided by existing law and regulations, provided, that such appointments shall create vacancies in the field artillery arm which shall be filled by promotion from the next lower grade in accordance with existing law. *Provided further*, That upon the return of the army to a peace statute all promotions and appointments caused by this section shall cease and determine, and the officers so affected shall revert to the positions they would have occupied had no such appointments and promotions been made.

SEC. 14. That the pay and allowances of all officers and enlisted men provided for herein shall be the same as now or may hereafter be authorized by law. *Provided*, That enlisted men of field artillery, who qualify as scouts under such regulations as the Secretary of War may prescribe, shall receive five dollars per month additional to their pay. *Provided further*, That buglers shall receive the pay of privates.

SEC. 15. That all vacancies created or caused by this act which can be filled by the promotion of the officers who may be in the field artillery at the time of the approval of this act, shall be filled by the promotion of such officers according to seniority, subject to examination as now, or as may be prescribed by law. The vacancies remaining in the grade of second lieutenant shall be filled by appointment in the following order: First, of graduates of the United States Military Academy; second, of enlisted men whose fitness for advancement shall have been determined by competitive examination; third, of candidates from civil life; and all such appointments shall be made in accordance with the provisions of existing law.

SEC. 16. That for the purpose of providing officers for any volunteer field artillery force authorized by Congress, enlisted men of this arm, whose fitness for the advanced rank shall have been determined by their service, and who shall have been recommended by their battery, battalion and regimental commanders for such

advancement, shall be listed in the War Department as available for appointment as lieutenants and captains in said volunteer field artillery force; *Provided*, that such recommendation, when endorsed on a soldier's record and the War Department so informed, shall be good for not to exceed five years, unless removed therefrom in the meantime for good and sufficient cause; and such recommendation may be renewed at the expiration of the five years for another five year period upon passage of such mental, moral and physical examination as the Secretary of War may prescribe. *Provided further*, That enlisted men of field artillery so recommended for advancement, who are honorably discharged during any period when such recommendation is in force, shall become reserve officers of field artillery and in any period except the first may be required to attend any field artillery maneuver, camp or exercise for not to exceed fifteen days on any one calendar year, and while so attending shall receive the pay and allowances, exclusive of the benefit of retirement laws, of a second lieutenant.

SEC. 17. That the lieutenants herein provided for service with the headquarters, battalions, and companies of the ammunition column shall only be appointed upon the mobilization of such units; *Provided*, That upon the return of the army to a peace status and the reduction of such ammunition trains, battalions, and companies, the appointments made under this section shall cease and determine. *Provided further*, that the lieutenants of the Field Artillery Reserve shall be available for appointment to vacancies in the ammunition trains.

SEC. 18. That all laws or parts of laws inconsistent with the provisions of this act are hereby repealed.

EDITOR'S NOTE.—These notes and attached draft of proposed bill come at a particularly opportune time, when the reorganization of the army is being discussed, and legislation to that end is well within the bounds of possibility. THE JOURNAL expresses the hope that the matter will attract the interest of all field artillery officers so that when legislation is enacted, it will represent the crystallization of the best thought as to how the field artillery can fulfill its true role—the support of the infantry on the field of battle.

MEMORANDUM ON THE RELATION OF PROMOTION TO ORGANIZATION.

AN EXPRESSION OF THE VIEWS OF THE OFFICER OF THE —— FIELD ARTILLERY.

1. Conformably with the privilege extended in the preface to the published "Report on the Organization of the Land Forces of the United States," the following comments and suggestions are submitted with a view to their being brought for consideration before the General Staff, or any constituted board engaged in making a detailed study of the proposed plan for the purpose of securing specific recommendations for the executive and legislative action necessary to carry the policy into effect.

2. An analysis of the working of Rule 3 of the report shows that there will be a greater influx to the field artillery of officers of the other arms than to any other arm; that this influx will be so large compared to the number of officers of that arm remaining in it who have been trained as field artillerymen, as seriously to militate against its efficiency; and that those officers now in that arm will suffer a relatively much larger loss of promotion by its operation than the officers now in any other arm, due to the present relatively smaller proportion of field artillery than any other arm. The questions both of efficiency and fairness are therefore involved.

3. Applying this rule to the first increment proposed for the field artillery, six battalions, page 51, it is found that of the battalions added, four will be commanded by majors promoted from the captains of Cavalry, one by a major promoted from the captains of Infantry, and but one by a major promoted from the captains of Field Artillery. The organization of these six (6) battalions means the creation of but ten (10) batteries, while the increase of captains will be sixteen (16), twelve (12) of whom will come from the Cavalry 1st lieutenants, and four (4) from the 1st lieutenants of Field Artillery. Due to the change in the Field Artillery organization providing for three instead of four lieutenants to a battery, but three (3) 1st lieutenants will be affected, and there will be no influx from the other arms into this grade. Thus of a total increase of sixteen (16) command units in the

Field Artillery resulting from this increment all might be commanded by officers coming from other arms, and but five (5) could be by officers coming from the Field Artillery.

It should be noted that in accordance with Paragraph 1, Chapter 7, the twelve 1st lieutenants from the Cavalry would take their places in the upper third of the list of Field Artillery captains. Through subsequent increment, and casualities incident to the service, it is possible that some of these men might attain field rank before they could possibly become proficient artillerymen. This would certainly impair the efficiency of the Field Artillery, a remark that is obviously true also of the taking in of officers of other arms of field rank who have had no service in Field Artillery.

For the corresponding Infantry increment two (2) regiments, thirty-four command units (page 51*), but two, and these companies, will be commanded by officers coming from the oher arms, and the influx of commissioned personnel will be but one lieutenant-colonel, two captains, and twelve 1st lieutenants, and all from the Calvary arm except three 1st lieutenants; see following table:

First Increment.

	Colonel	Lieut.-Colonel	Major	Captain	1st Lieut.
Infantry	2	2	6	30	30
Artillery			6	16	0

Distribution.

Infantry	2	1	7	28	18
Cavalry		1	4	14	9
Artillery			1	4	3

Source of Artillery Promotions.

Major	1	4	1	=	6	
Captain	4	12	0	=	16	
1st Lieutenant	0	0	0	=	3	(To Infantry)

For the other increments proposed the results will be analogous with some variations in the numbers, except that for these increments the influx from the Cavalry to the Infantry will be slightly greater than the first, but practically the same for each. (See following tables:)

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* Report on the Organization of the Land Forces of the United States.

Second Increment.

	Colonel	Lieut.-Colonel	Major	Captain	1st Lieut.
Infantry	3	3	9	45	45
Artillery	1	1	3	14	13
Vacancies	4	4	12	59	58

Distribution.

Infantry	3	3	7	35	35
Cavalry	1	0	4	18	17
Artillery	0	1	1	6	6

Source of Artillery Promotions.

	Artillery	Cavalry	Infantry	
Colonel	0	1	0	= 1
Lieut.-Colonel	1	0	0	= 1
Major	1	2	0	= 3
Captain	6	8	0	= 14
1st Lieutenant	6	7	0	= 13

Third Increment.

	Colonel	Lieut.-Colonel	Major	Captain	1st Lieut.
Infantry	3	3	9	45	45
Artillery	1	1	3	14	14
Vacancies	4	4	12	59	59

Distribution.

	Colonel	Lieut.-Colonel	Major	Captain	1st Lieut.
Infantry	2	3	8	37	
Cavalry	1	1	3	16	
Artillery	1	0	1	6	

Source of Artillery Promotions.

	Artillery	Cavalry	Infantry	
Colonel	1	0	0	= 1
Lieut.-Colonel	0	1	0	= 1
Major	1	2	0	= 3
Captain	6	8	0	= 14
1st Lieutenant	6	8	0	= 14

Fourth Increment.

	Colonel	Lieut.-Colonel	Major	Captain	1st Lieut.
Infantry	3	3	9	45	45
Artillery	1	1	3	14	13
Vacancies	4	4	12	59	58

Distribution.

Infantry	3	3	8	37	37
Cavalry	1	1	3	16	14
Artillery	0	0	1	7	7

Source of Artillery Promotions.

	Artillery	Cavalry	Infantry		
Colonel	0	1	0	=	1
Lieut.-Colonel	0	1	0	=	1
Major	1	2	0	=	3
Captain	7	7	0	=	14
1st Lieutenant	7	6	0	=	13

Fifth Increment.

	Colonel	Lieut.-Colonel	Major	Captain	1st Lieut.
Infantry	3	3	9	45	45
Artillery	1	1	2	9	7
Vacancies	4	4	11	54	52

Distribution.

Infantry	3	2	7	34	33
Cavalry	1	1	3	13	12
Artillery	0	1	1	7	7

Source of Artillery Promotions.

	Artillery	Cavalry	Infantry		
Colonel	0	1	0	=	1
Lieut.-Colonel	1	0	0	=	1
Major	1	1	0	=	2
Captain	7	2	0	=	9
1st Lieutenant	7	0	0	=	7

A total of fifty-nine (59) command units will be added to the Field Artillery (exclusive of any ammunition service) by the five increments. Fifty-two (52) officers of rank commensurate to command these units will come from other arms. The remarks as to the effect on the efficiency of the Field Artillery made in considering the first increment are of course again applicable here.

Under the rule proposed markedly greater benefits in promotion accrue to the Cavalry than to any other arm, and in this connection it is pointed out that any reorganization of that arm into smaller regiments, and this seems probable and imminent, will give

it an impetus in promotion quite commensurate with any derived by the other arms due to their increase under the proposed scheme of reorganization.

The operation of Rule 3 would promote in the Cavalry three lieutenant-colonels, two majors, eleven captains, thirty-seven first lieutenants, and twenty-one second lieutenants, only about ten per cent of the present commissioned strength of that arm; but it is about thirty-two per cent of the present commissioned strength of the Field Artillery. The Infantry would gain promotion for but one captain. It is evident that the latter is not appreciably affected at all by the operation of the rule, the Cavalry is not greatly helped, while the Field Artillery is swamped because of its relative weakness. Efficiency is bound to suffer from such a condition.

Summed up it amounts to this: as to efficiency, the Infantry is not affected, the Cavalry gains only by reason of the good spirits engendered by an increased flow of promotion, while the Field Artillery is very adversely affected. As to promotion, the Infantry gains nothing, the Cavalry relatively little, while the Field Artillery suffers greatly.

The absorption of officers of other arms into the Field Artillery, especially in the command ranks, will retard the development of Field Artillery efficiency as an arm in direct proportion of the number of officers so absorbed.

4. For the maintenance of efficiency, as well as that no advantages in promotion may be given any arm to the detriment in promotion of any other, and fairness in promotion is only another essential to efficiency, it is suggested that the rule provided in paragraph 3, Chapter 7, of the report in question, be wholly expunged therefrom in any consideration given the report with a view to its adoption for executive and legislative action.

5. While still holding to our belief that it is to the interest of the service that promotion in any arm should be confined to the personnel of that arm, it is believed that the following proposition as a compromise measure would eliminate much that would be objectionable in the operation of Rule 3, as outlined in paragraph 3 of this paper:

Modify paragraph 3, Chapter 7, of the Report on Organization to read as follows:

"Whenever any part of the Infantry, Cavalry, or Field Artillery

is increased or the number of officers in any of these arms is increased the original vacancies above the grade of second lieutenant due to the increase shall be filled from the next lower grade in the three arms, the number of officers promoted from each arm to be proportional to the number of officers of that grade in the three arms as nearly as may be practicable: *Provided*, that not less than 50% of the vacancies so created in each grade shall be filled by promotion from the next lower grades in that arm: *Provided*, that this rule shall be suspended as to the Field Artillery until that arm shall have been raised to its proper proportional strength to the other arms of the service: *Provided further*, that the order in promotion in any arm shall be in the order of the lineal list of that arm, as now provided by law: *Provided further*, That, so far as practicable, officers shall be promoted in their own arm: *Provided further*, that when any officer is nominated for promotion into an arm other than his own he may waive such promotion, and in this case the vacancy shall pass consecutively to the officers next below him in the lineal list of his own arm: And *provided also*, that whenever any officer is promoted to any other arm under the provisions of this rule his position for subsequent promotion in that arm shall be fixed by his position on the list for rank and eligibility to command as determined by the date of precedence defined in paragraph 1 above."

BOOK REVIEWS.

A Critical Study of German Tactics. By Major dePardieu (authorized translation by Captain Charles F. Martin, 3rd U. S. Cavalry). Published by the U. S. Cavalry Association, Fort Leavenworth. $1.25.

This work, as its title indicates, is a study of German tactics based not only upon the different regulations issued between May, 1906, and October, 1909, but also the writings of their leading military thinkers. General Rohne in particular is copiously quoted in support of the author's views. Comparisons are made with the French practice under similar situations, and the probable results of the two methods are pointed out.

The scope of the work comprises the conduct of the battle, in which the offensive and defensive actions are discussed separately. also the details pertaining to the three arms. Considerable space is devoted to the subject of artillery including the use of the howitzers. The use of the advance guard, and the frontal and enveloping attack come in for considerable discussion. A strategical synopsis is appended.

The author in his preface lays stress upon the fact that great strategical and tactical principles of war are the same for all armies, but the details of execution must conform to the racial traits and temperament of the men who compose the fighting force. This necessitates acquaintance with the special aptitude and character of a people before undertaking to study their tactics.

Practically all text books on tactics used in our service and garrison schools were written by or modelled after German authors. On the other hand our Field Artillery regulations were patterned after those of the French. It would therefore seem that a work of this nature should prove highly instructive to the officers of our service. It is especially valuable for the artilleryman, and should give him a clearer idea of the co-operation of his arm with the infantry which he is to support.

Rapid Reconnaissance Sketching. By Captain C. O. Sherrill, Corps of Engineers. Published by U. S. Cavalry Association, $1.25.

This work is a concise, clear and practical treatise describing the tools, methods and steps necessary for the beginner to attain proficiency in rapid road, position, outpost, and place sketching. A chapter is devoted to topographical reconnaissance reports. A list of practice exercises is appended, and these should prove particularly helpful to those who wish to engage in this study without a teacher.

Modern artillery methods demand a clear knowledge of the terrain with a view to its use as artillery positions. The task of supplying this knowledge will fall largely to the lot of artillery reconnaissance officers who will precede their units by a greater or less distance. Facility in rapid sketching is absolutely necessary in the work of reconnaissance and should be regarded, not as an accomplishment, but as a necessary part of the education of all field artillery officers.

Lecons d'Artillerie. By Commandant E. Girardon, Chef d'Escadron d'Artillerie, 4th Edition, revised and added to by Commandant P. de Lagabbe, formerly professor at the Artillery and Engineer School. Paris: Berger-Levrault. Price, 10 francs.

This work was published originally by Major Girardon when he was serving as professor at the Artillery and Engineer School at Versailles. It was intended to amplify and supplement the Drill Regulations, and as a result it went through three editions to keep pace with the provisional Regulations as they appeared. When the 1910 edition of the latter appeared, Major Girardon had been succeeded at the Versailles school by Major Lagabbe, who undertook the task of making the text of the book conform to the Drill Regulations now in force.

The volume as now issued is a complete exposition of the French system of field artillery as far as technique is concerned, and contains little that is not already known to the student of modern field artillery. In what follows attention is directed to the main points of interest for our artillery officers.

In Chapter VI we find an interesting exposition of the gradual crystallization of French ideas as to masked fire. In the "Rapport Justicatif" which serves as a preface to the 1910 edition of their Drill Regulations, attention is called to the fact that in the 1903 edition individual and collective laying were regarded as of equal importance. In the Bulletin of April 27, 1906, however, we find a

decided change of opinion. "The teachings of the Manchurian war allow us to consider as settled that artillery which goes out into the open exposes itself to being reduced to silence in a few moments. Hence results the necessity for seeking invisibility at all times except when exceptional reasons force us to act otherwise." The Bulletin of April 18, 1908, further emphasizes this view: "The advantages of masked fire are no longer subject to question. The open position and individual laying are justified—by exceptional circumstances."

It is to be noted, also, that the French have reached a simple solution for the problem of making the projectile clear the crest. Their rule is as follows: "The condition of being able to fire from a point P behind a cover or mask C upon an objective B will be fulfilled when the angle of site of the top of the cover or mask, measured by a man kneeling, is less than or at most equal to the angle of departure corresponding to the range CB, diminished by the angle of site of the target with respect to the piece (increased if the target is above the gun)." This rule, laid down in the Drill Regulations, is discussed in its various phases in Major Girardon's books.

In recent years a tendency has appeared in our field artillery to abandon the adjustment by salvo in favor of that by platoon. The ostensible reason advanced is that the latter process is made necessary by scarcity of ammunition, but the true reason is based on the principle held by those who are advocates of the platoon adjustment, that it is impossible for one man to correctly observe four shots as to range, height of burst and distribution. Without going into the merits of the case, it may be interesting to note what others think on this question. On page 358 of the "Lecons d'Artillerie" the author gives the following advantages of adjustment by salvo:

"The observation of shots is easier and more certain. It is made independent of forms, covers and the nature of the terrain;

"The height of burst can be adjusted at the same time as the other firing data;

"There is a chance of producing, during fire for adjustment, considerable effect along the whole front;

"There is obtained a notable economy of time and often of ammunition."

The English artillery have lately adopted this system, which they call "Collective Ranging." In the articles on "Practice Camps, 1912," in the February number of the *Journal of the Royal Artillery*,

there is an interesting reference to this method of adjustment, from which it would appear that apparently we and the Germans are the only artillerists who cannot effectively observe four shots at one time. The lecturer, Colonel Bingham, concludes his remarks on this subject as follows: "If it (collective ranging) turns out a failure and there is a desire after next year's practice to do away with it, no doubt the authorities will do so, but reading as I have the report of every Brigadier-General, Brigade Commander, and Battery Commander, I may tell you the consensus of opinion is that it has come to stay."

The Russians go even farther. As a result of their experiences in the Manchurian War they have recently issued new Drill Regulations for Field Artillery, supplemented by "Instructions for the Application of Rules of Fire." Concerning the subject of adjustment by time fire, Captain Peloux, of the French Artillery, who reviews the Regulations in the February number of the *Revue d'Artillerie*, has this to say: "The old Drill Regulations prescribed that, when obtaining the bracket with time fire, the mechanism of the fire for adjustment was, in principle, 'fire by half battery' or 'fire by battery.'* To-day the fire by battery is the rule, on the ground, say the *Instructions*, that a salvo of eight shots enables one to make 'several simultaneous observations, affording more data for obtaining the elements of fire; in addition, it may happen that the consumption of ammunition is less than with any other method; but, even though it should be greater, there is no occasion for apprehension, for during the adjustment there is only one thing that counts, and that is time.' It is rather curious to note that the Russians increase the number of pieces participating in the adjustment at the same time that the Germans are giving up the use of continuous fire for adjustment in favor of fire platoon."

J. E. McM.

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*The fire by battery (*batarceiou*) corresponds to our fire by salvo.

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