CONFIDENTIAL!

GERMAN AND AUSTRIAN TACTICAL STUDIES

TRANSLATIONS OF CAPTURED GERMAN AND AUSTRIAN DOCUMENTS AND INFORMATION OBTAINED FROM GERMAN AND AUSTRIAN PRISONERS FROM THE BRITISH, FRENCH AND ITALIAN STAFFS

V

COMPILED AND EDITED AT THE ARMY WAR COLLEGE
DECEMBER, 1917

WASHINGTON
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WASHINGTON, *December 7, 1917.*

The following pamphlet, entitled "German and Austrian Tactical Studies," is published for the information of all concerned.

[062.1, A. G. O.]

BY ORDER OF THE SECRETARY OF WAR:

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I.

EXPERIENCE GAINED FROM THE SEPTEMBER (1915) OFFENSIVES ON THE FRONTS OF THE SIXTH AND THIRD ARMIES.

[Translation of a German document.]

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I.

EXPERIENCE GAINED FROM THE SEPTEMBER (1915) OFFENSIVES ON THE FRONTS OF THE SIXTH AND THIRD ARMIES.

The events of the great September offensives, as far as can be ascertained from subsequent discussion with the staffs concerned, may be summarized as follows:

A. ENEMY'S PREPARATION FOR THE ATTACKS.

For weeks prior to the commencement of operations the enemy threw out saps practically along the whole front of his attacks to within 100–50 meters or less from our trenches.

Our aviators were continually locating new support and communication trenches. The latter extended in the Champagne as far back as 10 kilometers (6¼ miles). The number of hostile aerodromes kept on increasing. In the Champagne there were finally about 200 enemy aeroplanes in action against 60 of ours. Near Arras squadrons of about 20 machines each appeared. Important air raids were undertaken against railway junctions. The task of our own aviators was rendered very much more difficult by the additional number of hostile machines. The French and English artillery kept on increasing. In several corps as many as 130–140 active enemy battery positions, as against about 36 of our own, were located in each corps sector by aeroplane photographs and the survey sections. From the middle of September onward the enemy's artillery and trench-mortar activity was always on the increase and numbers of mines were blown. All these preparations made it clear that an attack was coming.

After six days' registration and three to four days before the great offensive of September 25, the hostile artillery started its methodical bombardment with guns of all calibers and with ever-growing intensity. Continuous bombardments of several hours' duration were interspersed with periods of slow fire and short bursts of rapid fire. The bombardment was equally intense along the whole stretch of front-line trenches. Heavy fire was directed against the communication trenches, rear lines of defense, rest billets, and villages to a distance of 15 kilometers (9½ miles) behind the front. Our batteries were subjected to

severe shelling by guns of large caliber, and the observation posts, even those farthest back, were heavily fired on. In the Champagne, the Bazancourt-Challerange railway was cut in several places, so that we were obliged to unload trains farther back than we had intended. During the last few hours before the infantry attack the enemy made use of gas shells, so that with our infantry and artillery positions hidden in smoke clouds the observation posts were, to some extent, rendered useless.

B. THE EXECUTION OF THE ATTACK.

2. In the Champagne the main attack was launched simultaneously on a front of 32 kilometers (25 miles). The French infantry advanced, under cover of gas-shell clouds, in thick skirmish lines in considerable depth; each wave was succeeded closely by another, and the regiments of a division followed each other, a divisional front extending over about 1 kilometer.

After a French attack on the 24th had been repulsed a second attack, preceded by another severe bombardment, was launched on the 25th. This, too, was, generally speaking, driven back. Only in the neighborhood of Souain did the French achieve any success. Some days before we had withdrawn an infantry brigade from that sector. The resulting gap had been temporarily filled by thinning out the line on either side and bringing up a "cavalry battalion." The relief by freshly arrived infantry units was impossible to carry out owing to the intensity of the bombardment.

Only at this weak point in the position were the French successful in breaking through. The advancing masses swung right and left, and got behind the fire trenches which had so far held out, took them and thus pierced a wide gap in the front system. The artillery which was in position between the first and second lines, owing partly to the communications having been cut and partly to the smoke clouds, did not notice the advance of the hostile infantry in time and a number of batteries fell into the enemy's hands.

The advance came to a standstill in front of our second line, which had been promptly occupied by all available reserves, including recruit depots. During the night we were successful in saving many guns from between the first and second lines.

Fierce close fighting took place in the area between the first and second lines which had been overrun by the enemy. This is

the sole explanation that can be given as to why the French, who broke through about midday, did not reach the second line (2–4 kilometers back) until several hours later. We have to thank the stubborn resistance of our troops and the irresolute action of the French infantry, who failed to make quick enough use of their initial success that the second line was not pierced and that time was secured in which to occupy it in sufficient strength. The large number of prisoners taken by the enemy leads to the assumption that some of the occupants of the front-line trenches surrendred as soon as they perceived that the enemy was in rear of them. On the other hand, companies of other regiments engaged the enemy from behind and took several thousand prisoners between the two lines.

Evidently counting on successfully breaking through, the French had prepared a special communication trench for their cavalry to come up by in columns of half sections. Through this a French cavalry regiment advanced up to our old front line, crossed it, and appeared in column of troops before the second-line positions held by the One hundred and fifty-eighth Infantry Regiment. This cavalry regiment was entirely annihilated.

3. In the Sixth Army the Seventh Corps completely repulsed a gas attack made by the English. The One hundred and seventeenth Division, just farther south, was likewise attacked with gas. Under cover of this cloud, rendered more dense by a smoke-producing contrivance, the English, whose trenches in this sector were separated from ours by a stretch of 300–500 meters, succeeded in capturing the positions of both wing regiments of the division. Further, on the southern flank, the support companies occupying the cellars of the well-known village Loos were overrun and several batteries were captured. The center regiment of the division waited for the gas clouds to pass over it and then repulsed the attacking Englishmen, who were equipped with smoke helmets. Not until it found itself practically surrounded by the Englishmen, who had broken through on its right and left, did the regiment, from sheer necessity, fall back.

By putting in all the reserves, as well as the recruit depot and also a part of the eighth division, which was in army reserve, the second line was held and part of the ground gained by the Englishmen was immediately recovered. The enemy on a front of 6 kilometers had driven a semicircular wedge into our posi-

tion, forming a salient, the extreme easterly point of which lay 3 kilometers behind our original line. The present line consists partly of our old second line as it was before the attack and partly of newly dug trenches connecting the first and second lines.

As regards the Sixth Corps, the result of repeated attacks by the French, who considerably outnumbered us both in infantry and artillery, was that the corps was to some extent pushed back. The right wing—the Thirty-eighth Fusilier Regiment—only gave way when it was entirely outflanked from the north by the French, who had broken through near Souchez. On the right wing the ground lost amounted to about 1 kilometer, while on the left wing a line of trenches situated, generally speaking, some 250–500 meters behind the original line was held. The behavior of the French infantry opposed to the Sixth Corps is described in the report of the Twenty-third Infantry Regiment as follows:

"The first French attacking line consisted of a thin skirmish line equipped with hand grenades. As soon as this had reached our front trenches, attacking columns in close order left the enemy's trenches. These consisted either of parties about 50 strong, formed in column of fours, or irregular lines in close order. For purposes of close combat the French were armed with bayonets and hand grenades. Whereas in the trenches the fighting was principally carried out with hand grenades, in the open country the bayonet was successfully employed by the companies of our regimental reserve during the counter attack. Sections for bringing up matériel followed the enemy's attacking columns. The French showed remarkable skill and speed in consolidating the positions which they won. In places where we seriously threatened them they offered little resistance and were soon prepared to give themselves up. Each French infantry company carried red and yellow flags into the attack with it to act as indications to their own infantry and artillery of the newly-won positions."

C. EXPERIENCES.

4. The experience gained from the September offensives confirms in the main the correctness of the observations made by the Second Army. Certain points have been particularly emphasized; only a few new points have come to light.

The very instructive reports handed in by the units of the Sixth Corps form the basis of the following summary.

GENERAL.

5. The infantry, after enduring in its dugouts the 70 hours' artillery preparation of unparalleled intensity, repulsed, practically along the whole front, an attack, preceded by gas clouds, launched by a considerably superior opponent. In certain places the enemy broke through in close masses and appeared in rear of our troops, but the trench occupants, under courageous and determined leadership, fought their way backward with the result that they made thousands of French prisoners. On the other hand, at a few other places, under apparently similar conditions, the front line gave way before the gas attack or surrendered when attacked from the rear, but this merely demonstrates afresh the enormous value of good "morale."

6. Every officer, noncommissioned officer, and man must believe (as has indeed been once more proved by the experiences of this battle) that our infantry is superior to that of the enemy, even though the latter be superior in actual numbers. Even if strong hostile detachments penetrate into our trenches or succeed in getting in rear of our front-line system, the fight must be carried on in any circumstances and with all possible means. If the supports press forward at the right time (*see* p. 17), it will almost always be possible with their help to drive the enemy out of the trenches again and to take prisoners. At the very least, a stubborn resistance to the last man will provide the necessary time for reserves to be brought up to occupy the rear positions, and thus prevent the enemy from breaking through, as well as the loss of any artillery.

7. The moral effect of almost three days of the most intense preparatory bombardment is naturally very great. The strain on the infantry under such conditions is quite terrific. In order to render officers and men capable of a supreme effort and to preserve their fighting energy through the exhaustive strain of days of continuous battle it is necessary to provide in the most careful and farseeing manner for the bodily comfort of the troops. It is also important that the men should not be accommodated in the dugouts in small parties of three or four, but in two or more groups under responsible leaders. This will enhance the prospects of a successful resistance. Another essen-

tial for insuring a feeling of confidence among the troops is the timely supply of all material for trench warfare (small-arm ammunition, hand grenades, extemporized obstacles, sandbags, wooden props, etc), and, above all, the assurance of reliable artillery support. Gas attacks proved ineffectual wherever the troops applied the means of protection provided quickly enough and in the proper manner and allowed the gas clouds to pass over them. Hostile gas attacks can only achieve success when the advancing cloud causes a panic. Everything depends, therefore, upon the troops being imbued with the knowledge that hostile gas attacks are harmless.

TACTICAL.

COMMAND.

8. Wherever the front line is protected by a strong broad obstacle surprise attacks are impossible. Even with the assistance of gas an attack over a good obstacle can not be carried out without artillery preparation. The preparations, therefore, for an attack on a large scale have so far always been recognizable. This enables the higher command to bring up its reserves of men and ammunition in good time.

9. During the battle itself the higher command has the greatest difficulty in forming a correct picture of the situation. For this reason it is essential that all means of communication (telephones, light signals, cyclists, mounted orderlies, runners, etc.) should be provided, so that if one or more means of communication fail it may still be possible to pass on orders and messages. Divisional staffs must from the outset detail officers for the tactical observation of the battlefield from prepared and well-chosen posts, and must be in communication with them and with the observation balloons by means of telephones.

10. The telephone connections forward from the regiment and battalion were for the most part cut. The surest means of communication proved to be daring, reliable men, who worked their way backwards and forwards from shell hole to shell hole. The provision of some special means of recognition (arm band) for these men proved of value. Otherwise they were often held back by officers in the front line and used for other purposes. Regular relay posts in the communication trenches appear to have been less useful, because these were either killed

or buried by artillery fire. Fairly good results were achieved in certain places with light signals (motor lamps can be used for this purpose as an improvised measure).

11. The light rocket signals proved on the whole satisfactory. Light pistols should also be kept handy in the fighting posts of sector commanders, in order that signals may be sent from the front line. Barrage fire must, however, only be called for in cases of absolute necessity. Light-pistol signals sent unnecessarily out of nervousness led, in certain cases, to such an expenditure of ammunition that artillery support failed at the critical moment, owing to lack of sufficient ammunition supply. (See Ia No. 161, Secret, of 9/10/15.)

12. The connection between the infantry sector commander and the artillery group commander, which is so essential to the satisfactory cooperation of the two arms, is best provided for if these two are near enough to one another for verbal communication during the battle. When this is impossible, artillery officers who are intimately acquainted with the whole sector must be allotted to the infantry commanders and must be in telephonic communication with the artillery staffs. It is very advantageous if it can be arranged that the limits of each infantry sector coincide exactly with those of the corresponding artillery group. Difficult points opposite the front line, for instance, villages, or strips of dead ground affording covered approaches to the enemy (copses, wooded river banks, etc.), must never form the boundaries of sectors. Boundaries should, in the first instance, be chosen with this object in mind.

13. It has already been laid down in Second Army No. 161, Secret, of 1/10/15, that the front line must everywhere be marked by boards painted diagonally red and white. In order that the trench positions must be shown as soon as possible after the gain or loss of ground, the infantry should render sketches to headquarters with the least possible delay. Similar sketches for the use of the artillery should be prepared and sent in by the artillery officers attached to the respective infantry staffs. This is the sole means of preventing losses amongst the infantry from our own artillery fire, and of insuring that the enemy's forces which have penetrated our trenches are dealt with by our artillery.

14. The number of spare maps available showing the regimental sectors (1/10,000 or thereabouts) must be such that all the officers, down to platoon commanders, of newly arrived reserves can be immediately provided with a good trench map.

15. The question of careful training of special officers and other suitable individuals (also cavalry) as guides (both by day and by night) to freshly arrived units, has already been referred to in the Pioneer General's 846/15 of the 1st of August.

INFANTRY.

16. At many points of the front attacked, and wherever the breadth of the regimental sectors admitted of it, only four companies held the front-line trenches, each company, as far as can be ascertained, holding a sector of 300–600 meters. As a rule the regiment had four companies in support, the rest forming regimental or brigade reserves, etc. In this connection it should be noted that the billeting of supports in villages immediately behind the front was a failure. The speedy collection of the support companies, which were accommodated in the numerous cellars of the heavily bombarded villages, proved impracticable.

Supports are better kept (at any rate during critical periods) in the rearmost trenches of the first-line system or in the intermediate line; this will at the same time form the best means of improving these defenses.

17. The reserves at the disposal of the corps headquarters were in some cases very small, often only one battalion per division. These, too, were soon placed at the disposal of the divisions. In many cases portions of the supports had already been sent into the front line while the artillery preparation was still being carried out in order to replace losses.

18. The experience of the recent offensives emphasizes the advisability of a considerable distribution in depth. The available front-line troops are insufficient for a close occupation of the support trenches, but a weak garrison will be enough to bring the enemy to a standstill here after he has broken through the first positions. The all-important point is that the enemy should be engaged from the support positions as well as from the front positions. This should be insured by means of well-placed machine guns and emergency garrisons, mainly in the neighborhood of points where the communication trenches run from the front positions into the support line.

19. The front trench of the first-line system must be sufficiently strongly garrisoned (but no more) to make it certain that, provided the parapet be promptly manned, a hostile attack

will be driven back. The better the arrangements are for enfilading the front trenches, more especially by machine-gun fire, the smaller can be the infantry garrisons.

20. Again, in the September battles, there were several points in the line at which the men were surprised in their dugouts. For this reason it has several times been suggested that the front trenches should be held more or less strongly by sentry posts. On the other hand, it has been proved that in most places the parapet was manned promptly enough. It is of the utmost importance that a good lookout should be kept, good alarm arrangements provided, suitable exits to dugouts built, and that the alarm should be duly rehearsed. (See Second Army, No. 138, Secret, of Aug. 1.) Above all, however, every group commander and individual man must know that the success or failure of the defense depends entirely on the timely manning of the parapet. All must be made to understand that the moment the enemy enters our trenches he begins bombing the dugouts. The great point, therefore, is not to lose a second, but even if the alarm is not given in time to hurry to the firing line the moment the artillery fire lengthens.

If, as was suggested, the greater part of the companies is kept in the support trenches, the men will come up too late for the defense of the front line, and the latter is sacrificed. In this army the standing order that the front-line trenches must invariably be held is to be absolutely adhered to.

21. As soon as an attack threatens the first support line will be occupied by the supports, of which a portion will defend the trenches themselves, particularly the entrances to communication trenches, and the rest will form strong bombing parties who will be ready to advance in aid of the front line.

22. The remaining available troops will never suffice for a simultaneous occupation of the second support line. Here there will be a few odd reserve companies, with a few emergency garrisons at points of special importance.

Supports and reserves occupying the first and second support lines can only properly fulfill their task if, from these positions, also, as careful an observation of the enemy's movements is carried out as in the front line.

23. For the defense of the intermediate and main second lines only the corps or army reserves come into consideration. The bringing up of the last reserves—namely, recruit depots, cavalry,

and train—must also be carefully prepared (ammunition, iron rations, etc.).

24. If the enemy breaks through at any point it is the duty of the neighboring troops to take him immediately in flank whether by rifle or machine-gun fire or by bombing parties from traverse to traverse, which nearly always have the desired effect.

In beating off an attack, as well as in the recapture of lost trenches, hand grenades have always played a most prominent and successful part. Men who are not familiar with the use of hand grenades proved more dangerous to themselves and their comrades than to the enemy. They threw their grenades away at random from sheer fright of the unfamiliar weapon. All infantrymen and pioneers must be trained in bombing just as thoroughly as they are in the use of the rifle. An effort should be made to see that every individual man throws at least one live hand grenade during the course of his training. During the defense there was too great a tendency on the part of the men to throw their grenades too soon. First of all rifles must be used, and not until the enemy has approached quite close will hand grenades be employed; it is then that their effect is so good.

MACHINE GUNS.

25. Machine guns which were in position on the parapet or in the trenches during the artillery preparation were, of course, destroyed. As a result of this it was to some extent considered that machine guns were no longer suitable for use in the front-line trenches. This is a fallacy. Machine guns must remain in the machine gunners' own dugouts until the enemy attack is launched, then quickly transferred to a convenient position on the parapet without the sledges, which are too heavy for work in the trenches. Employed in this manner they will achieve excellent results. It is important that the machine-gun formations should secure light improvised sledges, pivots, or something of the kind, and, apart from this, that they should train all their men to shoot without sledges and with sandbag supports. This method of shooting must be learned. The large errors which occur when shooting in this manner are of no consequence when the enemy is at assaulting distance.

26. The number of machine guns allotted to every regiment is now so high that a proportion of the guns ordinarily used

in commanding positions in the first and second support lines and firing over the front line can easily be employed as emergency guns in the intermediate and main second-line defenses. This will not unduly reduce the fighting strength of the front line. Machine-gun formations (machine-gun sections, also cavalry machine-gun sections) are particularly suitable for use, as mobile reserves in the hands of commanders.

If ordered into action from prepared emplacements in either the intermediate or main second line these would stop the further advance of an enemy who has overrun the front-line system.

TRENCH MORTARS.

27. Owing to their slow rate of firing, the heavy trench mortars are not well suited for beating off an assault. Their limited range necessitates their coming into action close behind the front-line trenches, where they would nearly all be quickly destroyed or buried by the hostile artillery before they could change positions, a task rendered all the more difficult by their excessive weight. Nevertheless, their value before an attack in the engagement of hostile trench mortars and targets which our artillery would not dare to touch, owing to their proximity to our own front line, must not be overlooked. Their emplacements must, therefore, be well built with ample dugout accommodation for the men and ammunition. Bullet-proof shields must also be provided for the mortars themselves. Alternative emplacements must be prepared. Good results were secured with medium and light (also improvised) trench mortars. These are not hampered by any want of mobility.

ARTILLERY.

28. The support of the artillery has been described by the infantry in many places as excellent, and especially where the infantry and artillery commanders were in constant close touch with one another through having command posts adjoining. The artillery only failed where ammunition was lacking, and this was already the case in several places on the evening after the first attack.

29. The number of rounds allotted to each field battery for the event of a hostile attack should ordinarily amount to 2,000; for the light field howitzers and 10-centimeter guns, 1,500

rounds each per battery; for heavy field howitzers, 200 rounds per gun; for 21-centimeter mortars, 100 rounds per gun will be sufficient. There is no necessity to keep a corresponding number of rounds constantly in readiness in the ammunition stores, especially for the field-gun batteries. In ordinary circumstances stocks of 1,000 to 1,500 rounds will suffice. But as soon as signs of a hostile attack are recognized the stocks of ammunition must be made up to the above-named figures and kept up to this level without fail throughout the days of increased artillery activity preliminary to the attack. Deep dugouts for storing ammunition must be prepared everywhere, including the positions eventually intended for the use of the extra reinforcing batteries.

30. Wherever the battery emplacements and dugouts for the men were well built, the effect of the hostile heavy artillery was comparatively small. All the reports of the Sixth Corps agree in stating that the numerically superior hostile artillery never succeeded in silencing our batteries for any length of time. It often happened, however, that batteries could only make use of three of their guns at a time, so that their effectiveness was reduced, at any rate, in forming a barrage.

31. The majority of the losses were sustained during the bringing up of ammunition. Firing was in no way hindered by gas shells. The gas was harmless and the bursting capacity of the gas shells insignificant.

32. Losses of matériel were not always made good quickly enough. It is essential that reserve matériel should be kept close at hand. It proved useful to employ one of the reinforcing batteries to replace individual guns which had been put out of action. It is more important that batteries which have carried out their registration should be maintained at their full strength than that a new battery should be put in which is unfamiliar with the various targets and ranges. The enemy often engaged batteries, which he was particularly anxious to put out of action, from as many as three different directions. The fact that in spite of his numerical superiority he was unable to achieve the desired result only goes to prove how futile it is to attempt the same thing with weaker artillery. And the artillery of the defender is always the weaker. During the days of the enemy's artillery preparation, it will be possible, given good observation, to engage with heavy field howitzers or mortars such batteries as are particularly objectionable to our infantry,

and at the same time to bombard hostile observation posts. As a general rule, however, as soon as an intended hostile attack is recognized, the attention of our artillery must be concentrated on the enemy's infantry, their preparatory work, and their dug-outs. But as soon as it becomes obvious that an immediate attack is contemplated, and particularly when the assembly of troops is reported in the enemy's trenches, these last must constitute the artillery's sole objective until the attack has taken place and been driven back (see C. G. S. of 30/9/15, No. 8533*r*). If, during the critical hours, fire were still to be directed against the hostile artillery, the barrage batteries would have too wide a target to deal with, and there would be gaps in the barrage which the enemy would recognize and profit by.

33. It is desirable that each field battery should be allotted a sector of not more than 200 meters in breadth for barrage purposes. This is only feasible in the case of attacks on a narrow front in the repulse of which all the batteries in the neighboring sectors would participate. For attacks on a wider frontage, each barrage sector will have to be considerably broader at first and will only be reduced to the desired breadth after the extra reinforcing batteries have been able to come up.

34. In order that light pistol and light signal messages from the front line may be picked up, in spite of smoke and gas clouds, it is desirable to have elevated observation posts near the batteries.

35. The fact that, after the enemy had pierced the front line in the Champagne, a large number of guns were captured by him renders special precautions necessary. If possible, arrangements should be made to protect all batteries by means of a continuous well-built intermediate line. Steps must also be taken that an enemy who has broken through is engaged by the batteries at close range and finally received with case shot.

36. Small caliber case-shot guns—for instance, the 5.7-centimeter Belgian gun—will be best employed in the close defense of rear positions or in the vicinity of such batteries as are not supplied with case shot, and which are therefore incapable of defending themselves at close quarters. The provision of special gunners is, in the latter instance, unnecessary. If the enemy approaches within case-shot range a few of the gunners of the batteries concerned can be employed on the case-shot guns. Practice in firing with case shot must be carried out.

37. The bringing up of guns of any kind into the front-line trenches has been proved a serious mistake ever since the introduction of intense bombardments. They are sure to be destroyed or buried. Guns which were in the front line near Souchez never fired a single shot.

PREPARATION OF DEFENSES.

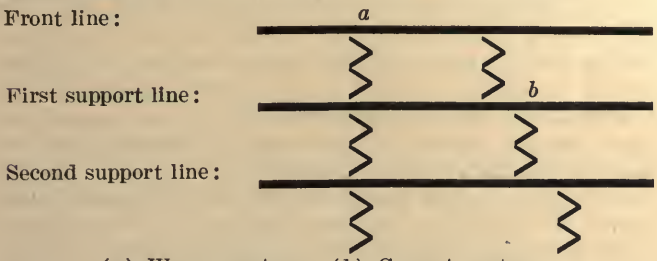
38. The defenses on the front of the attacks were for the most part inferior in construction to those on the second-army front. At many points the energetic artillery work of the enemy had rendered a steady improvement of the trenches impossible, particularly the erection of strong wire entanglements.

39. The front-line system everywhere consisted, as far as is known, of a network of trenches over which the enemy's shelling was about evenly distributed. This goes to prove that the preparation of a second support line has its advantages, even if the available forces are insufficient to admit of its occupation, as it encourages the enemy to scatter his artillery fire over a wider area. Dummy trenches served the same purpose with equal success. Broad, deep fire trenches with unrevetted interior slopes, broad berms, and strong traverses offer the best resistance to an intense bombardment. On the whole, mined dugouts about 10 feet below the surface have proved satisfactory. The losses from the intense bombardment were comparatively slight. The entrances to the dugouts were often destroyed or blocked. The frames of these must, therefore, be well braced and specially strong. Steep slopes above the entrances must be avoided. Very heavy shells (28 centimeter) penetrated into these dugouts.

40. The wire protecting the front line in certain corps sectors amounted to a mere emergency obstacle, owing to the enemy's persistent shelling, and was soon cut. On the other hand, good entanglements on posts proved efficient in holding the enemy up even after the heaviest bombardment. In places the obstacles in front of back defenses had not been destroyed by hostile shelling; these were extremely effective. In general the necessity has been recognized of protecting all defensive lines, even the second and third lines of the various systems, with good strong entanglements on posts, constructed wherever possible in several rows.

41. To meet the attack itself, all firing was done over the parapet. Steel shields or loopholes are only necessary for sentries; a few of these will suffice.

42. It was often observed that the French directed their attacks more particularly against those points in the front line into which the long communication trenches ran. If they gained possession of these points they immediately tried to set up their machine guns there in order to prevent German supports from coming up, and at the same time cut off the occupants of the front trenches between any two such points. This shows the necessity of having numerous communication trenches, but of avoiding building them straight from front to rear. The entrances to communication trenches must be so designed that they can be blocked immediately and defended. The zigzag form is preferable to the straight line with traverses. The communication trenches, too, should be broad and deep, with sloping walls revetted as little as possible and should be provided in numerous places with good recesses for defense.



(*a*) Wrong system. (*b*) Correct system.

43. The reports of the various units show in particular that traffic up to the front line during a battle can only be properly regulated if each battalion sector possesses at least one through communication trench for traffic towards the front, and another for traffic towards the rear. In principle these trenches should, in ordinary circumstances, only be used for traffic in one direction. Wherever there was an insufficiency of communication trenches, which resulted in the traffic being blocked, reinforcements were unable to come up and losses were increased because the men, in their endeavors to move forward, climbed out into the open.

BRINGING UP SUPPLIES, ETC.

44. It is most essential that thorough preparations should be made for bringing up supplies to the front line. The following

measures, based on the experiences of regiments of the Sixth Corps, are recommended:

The entire supply service should be placed under the charge of an energetic officer or sergeant major in each regimental sector. Sufficient lighting material and rations for three days (including iron rations for each man) must always be kept ready in the front line. The same amount of supplies must be stored in the first and second support lines as soon as the supports and reserves are brought up.

45. During times of great nervous strain the men suffer far more from thirst than they do from hunger. Therefore drink should be provided for before anything else—coffee, tea, and soda water. Alcohol should only be given in moderation, because of the lassitude which ensues. Tobacco, cigars, matches, and chocolate were extensively consumed. Bacon and smoked meat were often more popular than tinned meat, probably because the former could be carried in the pocket and occasional bites taken. As a thirst quencher dried fruit is recommended. Solidified alcohol for warming up tinned meat was found useful. For the transport of drink and food, large quantities of specially suitable barrels and baskets must be available.

46. It was found necessary to post a noncommissioned officer in front and in rear of a ration party, otherwise the men went astray and the food did not arrive intact. Depots in rear-line trenches were found useful. Above all, it is necessary that the officer in charge of the supplies should have a thorough knowledge of the line and be kept well informed as to the situation, so that he can be relied upon to send up the necessary supplies without waiting for requests from the front. When communications were cut, it sometimes happened that the troops were subjected to terrible thirst. Certain men state that they had nothing to drink for 48 hours. The firing line was, for the most part, so thinly held that it was necessary to avoid sending men back. It is therefore necessary from the very start to detail special carrying detachments.

47. The bringing up of supplies of small-arm ammunition, light and signal cartridges, grenades, emergency obstacles, sandbags, infantry shields, entrenching tools, etc., must be regulated in a similar manner. Above all, the supply of grenades must never run short. Never wait until all the front-line supplies are exhausted and the troops are in trouble, for then it will be too late.

48. It is recommended that a pioneer depot (communication-trench park) for each company sector should be formed in a bullet-proof dugout somewhere about the second-support line, in any case not too far forward. The company parks will draw from regimental parks, situated in as central a position as possible; these again will draw from brigade or divisional parks.

MEDICAL SERVICE.

49. Motor ambulances should be sent as far forward as possible. Medical dugouts should be approached by ramps or steps. Steep steps are not convenient for moving wounded.

(Signed) v. BELOW,
Commanding Second German Army.

II.

REPORT ON THE EXECUTION OF THE RAID ON THE SPION, APRIL, 1916.

[110th Reserve Infantry Regiment, in the field, Apr. 15, 1916.]

27

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II.

REPORT ON THE EXECUTION OF THE RAID ON THE SPION, APRIL, 1916.

[110th Reserve Infantry Regiment, in the field, Apr. 15, 1916.]

A.

1. By order of the division, regimental orders were changed in the following respects:

(*a*) The bombardment of the Weisse Steinmauer by Minenwerfer on the morning of the day before the raid was canceled in order that the enemy's attention might not be drawn unnecessarily to that locality.

(*b*) An additional medium Minenwerfer was detailed to cut the wire at the point of entry, making altogether one heavy and three medium Minenwerfer detailed for this purpose; consequently, apart from the close-range weapons of the pioneers and the light Minenwerfer of the 228th Minenwerfer Company, only one medium Minenwerfer cooperated in the feint.

(*c*) Stradtmann's patrol was instructed not to leave the Hohlweg at the twenty-third minute, but to wait for the conclusion of the intense bombardment in order to avoid, at all costs, unnecessary losses from the splinters of our own shell.

2. An increase in the amount of "K" gas shell available and the arrival of "T" gas shell led to changes in the "number of rounds" in Appendix 2. Furthermore, a reduction in the amount of (21 cm.) mortar ammunition available led to alterations in the corresponding figures of Appendices 2 and 4.

B.

3. The registration of the batteries already in position began on April 5 and, as arranged, was concluded by the 9th.

On the evening of the 8th one light and one heavy battery of the 29th Reserve Field Artillery Regiment bombarded the

enemy's wire in front of 76y for 45 minutes in order to allay any possible suspicion aroused in the enemy in spite of the precautions observed.

4. During the night of April 8–9 one (21 cm.) mortar, and on the night of the 9–10th two 4-gun heavy field howitzer batteries and the 1st Battery, 29th Regiment, took up the positions indicated by the artillery commander.

5. The heavy, the four medium, and the five light Minenwerfer of the 228th Minenwerfer Company took up their allotted positions by night between the 3d and 7th of April.

The 1st Reserve Company, 13th Pioneer Battalion, installed two "Albrecht-Mörser" on the Lehmgrubenhohe for bombarding the Nordrondell.

6. On April 9 the commander of the 1st Reserve Company, 13th Pioneer Battalion, decided that, apart from the mine included in the project of the raid, it would very shortly be necessary to fire another mine, seeing that the enemy was working only a few yards away from the head of the gallery. It was arranged to combine the latter with the feint bombardment to be carried out on the morning of April 10. As, however, the enemy always showed most activity in his gallery between 6 and 8 a. m., the mine was to be fired during these two hours under all circumstances, with a view to causing him the greatest possible number of casualties. On account of the mist the feint bombardment to be carried out in conjunction with the registration of the newly installed batteries could only commence at 11.15 a. m.

The mine was fired at 7.43 a. m., after the presence of the enemy's miners had been definitely ascertained by means of the microphone. The effect of the mine was extraordinarily powerful below ground; a new crater, however, was not formed, for the mine chamber was 105 feet below the surface. Immediately after the explosion our field artillery and close-range weapons bombarded the enemy's trenches in that neighborhood. At 8.05 a. m. all our close-range weapons opened another burst of fire.

C.

7. The feint bombardment came in consequence as a further surprise to the enemy.

From 9–10.15 a. m. the heavy and the three medium Minenwerfer registered the point of entry and considerably damaged the wire, firing in all 8 heavy and 28 medium Minenwerfer shell.

Apparently one medium Minenwerfer shell penetrated a dugout, from which cries were heard.

8. At 11.15 a. m. the artillery feint bombardment commenced in accordance with "Orders for a raid on the Spion." It was carried out as prearranged. This alone caused the enemy an appreciable number of casualties, according to the statements of prisoners. (See Appendix; examination of Englishmen, Z. D., 14.)[1]

A new crater, about 66 feet in diameter, was formed by the explosion of the mine Z on the left flank of the mine field. The heavy Minenwerfer and the close-range weapons of the 1st Reserve Company, 13th Pioneer Battalion, took part in the feint bombardment to the extent of a few rounds.

The five light Minenwerfer had registered on the enemy's trenches behind the craters from 9.30–10.30 a. m. and fired 261 rounds during the feint bombardment.

9. From 3.10–5.25 p. m. on the afternoon of April 10 the four medium Minenwerfer registered at intervals, with 22 rounds, on the enemy's trenches and wire at 76y.

10. The enemy replied to the feint bombardment by shelling our trenches in La Boisselle and toward Pozieres, while a section of heavy caliber howitzers (8-inch) shelled the neighborhood of the battalion command post in La Boisselle.

D.

11. On the morning of April 11 it was decided to commence the operation at 8 o'clock that evening. Watches were compared afresh at 7 p. m.

Owing to the change in the weather, the error of the day for the artillery was considerable; it had to be worked out by individual batteries and allowed for. Further, the first five minutes after opening fire had to be devoted to correcting by deliberate ranging.

12. The whole operation, as far as concerns the infantry and also the artillery and pioneers, was carried out entirely as prearranged. During the whole period the enemy's artillery was in complete uncertainty as to our point of entry. At about 8.06 p. m. the enemy's artillery opened a feeble and aimless fire and for a while shelled the English front-line trenches in sector 77. The feint drew their fire to the neighborhood of the Blinddarm,

[1] No copy of this Appendix was captured.—Translator.

and until shortly before 8.50 p. m. not a single shell fell in the neighborhood of sap No. 3.

Only at 8.47 p. m. did the enemy begin to sweep from Becourt Valley toward Besenhecke with 4.7-inch shrapnel; at 8.51 p. m. the first of the enemy's shells fell near our front-line trench east of sap No. 3.

13. Consequently, the feint met with entire success and throughout the entire raid drew almost the whole of the enemy's artillery fire and the fire of several machine guns (see "Report on the feint on the evening of April 11, 1916," p. 17).

14. The course of events with the raiding party may be followed in Capt. Wagener's report on the raid (see p. 18).

15. The fire for effect of the Minenwerfer on the point of entry, with 14 heavy and 70 medium Minenwerfer shell, destroyed the enemy's wire so completely on a width of 44 yards that on breaking into the enemy's trench the raiding party did not notice when they crossed the wire entanglement.

16. The effect of our artillery fire on the enemy's personnel and trenches was quite remarkable. Indeed, from the start, the gas clouds from the "T" and "K" gas shell, of which the grouping was perfect, were blown back over our lines by the strong west wind, so that all sentries and machine-gun lookouts were obliged to wear masks. That the gas completely confused and paralyzed the enemy was apparent from the condition of prisoners immediately after their capture and from the fighting in the enemy's position. The gas had even such an effect on our own men that the commander and one man of the 1st patrol, on leaving the trenches, were violently sick, and another man fell down overcome by sudden gas poisoning. However, the latter was on his legs again in a couple of minutes and could not be prevented from hurrying after his patrol.

That the resistance offered by the enemy in the sector occupied by No. 1 platoon should have been greater than that met with in the sector held by No. 3 platoon, depended, in the opinion of the regiment, not only on the fact that the commander of No. 1 platoon showed conspicuous smartness and bravery in encouraging his men to hold out, but that, owing to the line curving back somewhat, only a small proportion of gas shell actually fell in the trench.

17. As his batteries became free after the artillery preparation of the raid, the artillery commander switched them on to those of the enemy's batteries which appeared to him of most importance: 703, 767, 724, 713, 714, 702, and 707.

On the part of the enemy, 4 heavy and 10 field batteries were actually engaged.

18. On the whole, the expenditure of ammunition was as laid down in the "Tables of Distribution of Artillery Fire" for the feint bombardment and for the raid itself.

The total expenditure amounted to—

3,543 field gun.
829 light field howitzer.
540, 9-cm. (gun).
30, 10-cm (gun).
110, 12-cm. (gun).
984 heavy field howitzer (including 200 "K" and 178 "T" gas shell).
25, 21-cm. (mortar).

According to the estimate of the 29th Reserve Field Artillery Regiment, the enemy fired a total of about 1,500 rounds.

E.

19. The result of the raid may be gathered from Capt. Wagener's report (see p. 18), and from the confirmatory report of Lieut. Boening.

The following were captured: Twenty-four unwounded and five wounded Englishmen. In addition, 1 Lewis machine gun, 1 rifle with telescopic sights, and 20 ordinary rifles, as well as a large number of steel helmets, belts with ammunition pouches, packs, haversacks, and gas helmets.

Our casualties are: One man, slightly wounded in the forehead by a hand grenade splinter, who was bandaged in the advanced dressing station and immediately rejoined the raiding party. All other injuries sustained by Dumas' patrol in the course of the fighting are quite negligible and can not be considered as wounds.

F.

DEDUCTIONS.

20. The regiment of Royal Irish Rifles created a most favorable impression, both as regards the physique of the men and their mode of repelling an assault. But for the effect of gas shell it would not have been possible to clear the section of trench held by one entire company and the flank of the company on its left, so thoroughly that not an Englishman remained alive in the trench.

Consequently, the regiment attaches the greatest importance to a bombardment with gas shell, but considers it necessary that the enemy should, at the same time, be shelled with H. E. shell, in addition, in the event of strong bodies of troops not being available for the subsequent assault.

In an operation like that of the evening of the 11th, which was to be carried out with the lowest effectives possible, it was essential that the enemy should have already suffered appreciable losses from our artillery, so that the patrols were not confronted by strong compact detachments but only by isolated groups, whose morale had suffered by the sight of their dead and severely wounded comrades around them.

21. The artillery was most successful in mastering the flanking defences, but the regiment considers that the more gas shell are employed the easier this, too, will be.

22. The present experience shows that there is no risk of endangering one's own position and one's own raiding party, for the wind could not be more unfavorable than it was in this case. In the most unfavorable circumstances the raiding party would have to advance close up to the enemy's trench, wearing gas masks, and remove them when on the point of breaking in. In any case an attack with gas masks on would appear to be scarcely feasible. However well the masks are fitted and however thoroughly the men are practiced, the mask hinders a general survey and makes it impossible to pick up one's bearings, which the patrol commander must do of necessity. In addition it overstrains the lungs, which are already severely tried by running and by the impression caused by passing events.

23. If the enemy's front-line trench has been successfully cleared on a width of 150 to 200 yards, as in the present case, and if the enemy has not up to that moment opened a barrage on the point of exit, then, in the opinion of the regiment, a farther advance into the enemy's second-line trenches offers no great difficulty. It is only necessary for fresh assaulting parties to be launched and for the necessary arrangements with the artillery to be made in good time.

In the opinion of the patrol commanders, no further obstacle would have been encountered had fresh patrols advanced in and parallel to the communication trenches and cleared out the Weisse Steinmauer position.

The regiment is also of opinion that, without a doubt, a further inroad into the enemy's third trench and into his last positions in the Labyrinth could have been achieved with inconsiderable loss.

24. After the raid Lieut. Boening, one of the participants, acting under regimental orders, examined the English prisoners on prearranged points and brought to light many details of especial importance to the regiment. For this reason the regiment considers it desirable that, in all cases, prisoners should be examined by officers with personal knowledge of what is of importance for the regiment to know, and that the majority of prisoners should only be taken away after this examination.

(Signed) FRHR. V. VIETINGHOFF,
Colonel and Regimental Commander.

Distribution.

28th Reserve Division	1
56th Reserve Infantry Brigade	1
29th Reserve Field Artillery Regiment	1
Ersatz Abteilung, 76th Field Artillery Regiment	1
I Abteilung, 29th Reserve Field Artillery Regiment	1
109th Reserve Infantry Regiment	1
111th Reserve Infantry Regiment	1
1st Reserve Company, 13th Pioneer Battalion	1
228th Minenwerfer Company	1
110th Reserve Infantry Regiment:	
Headquarters	2
3 battalions	3
12 companies	12
Labor company	1
1st Machine Gun Company	1
2d Machine Gun Company	1
55th Machine Gun Section	1
Capt. Wagener	2
Reserve	5
	37

REPORT ON THE FEINT ON THE EVENING OF APRIL 11, 1916.

[110th Reserve Infantry Regiment, in the field, Apr. 15, 1916.]

1. The feint fulfilled its object in every way.

2. From April 5 onward, the artillery repeatedly shelled the trenches and wire at 76y. In particular, on the evening of April 8 the wire at 76y was shelled continuously for 45 minutes by the heavy and light artillery. In the same way the close-range weapons of the 1st Reserve Company, 13th Pioneer Bat-

talion, kept up daily a deliberate bombardment with "Erdmorser" and Minenwerfer on the whole extent of the wire between La Boisselle Cemetery and the Galgen. A machine gun, posted every night in the Blinddarm, prevented the enemy from repairing the wire.

On April 10, from 3.10 to 5.25 p. m., a medium Minenwerfer of the 228th Minenwerfer Company registered on the wire and the position at 76y with 22 rounds, so that by this time the wire there had been in great measure destroyed.

3. On April 4 I posted the dummies, which had been previously prepared, in the Blinddarm and between the Blinddarm and the southwest corner of La Boisselle. The dummies were arranged in three groups, which were fastened on to laths, operated by strings leading to dugouts, thus insuring the safety of the men operating them, even in the event of the heaviest enemy fire.

4. On the evening of April 11 the artillery opened fire at 8 p. m. as arranged, supported by the close-range weapons of the 1st Reserve Company, 13th Pioneer Battalion, and by one medium Minenwerfer of the 228th Minenwerfer Company.

At 8.14½ p. m. the mine "A" was fired at the right extremity of the mine field. A column of flame shot up to an extraordinary height and stones of appreciable size were scattered to a distance of 330 yards. The crater formed is quite shallow, but has a diameter of 50 feet.

Whereas at 8.06 p. m. the enemy's artillery was already aimlessly shelling the English front-line trenches in sector 77 and then the trenches in the southwest corner of La Boisselle, immediately after the explosion it concentrated on the positions adjoining the mine and on the Blinddarm. At this moment the heavy artillery opened on the Blinddarm, the majority of the shells being blind.

At 8.15 p. m. our artillery ceased their intense bombardment of the English front-line trenches; 30 seconds later I gave the order for the dummies to be exposed above the parapet of the Blinddarm. The dummies between the Blinddarm and the southwest corner of La Boisselle could only be hoisted a few minutes later, because they were partly covered with stones from the mine explosion. Immediately the dummies appeared, a brisk fire was opened by two of the enemy's machine guns, one in the neighborhood of the Scheere and the other near the Galgen. The machine gun in the Galgen fired less on the Blind-

darm itself than on the depression in front of the enemy's wire.

A few minutes later the dummies disappeared, but on reappearing were greeted afresh with intense fire. Five dummies were hit by bullets from rifles or machine guns; nearly all were more or less knocked about by shell fire or fragments of stone; one was torn off the lath by a shell.

At 8.25 p. m., when our artillery and Minenwerfer again opened a terrific fire on the enemy's trenches, the enemy's machine guns immediately ceased fire, while the artillery continued firing until about 9 p. m.

The expenditure of ammunition by the close-range weapons was as follows:

	Rounds.
Lanz Minenwerfer	204
Erdmorser	26
Albrecht Morser	57
1 medium Minenwerfer of 228th Minenwerfer Company	48
5 light Minenwerfer of 228th Minenwerfer Company	474

5. I am under the impression that the enemy was completely deceived by the feint attack.

(Signed) BACHMANN,
Second Lieutenant.

CAPT. WAGENER'S REPORT ON THE RAID ON THE EVENING OF APRIL 11, 1916.

[In the field, Apr. 12, 1916.]

At 4 p. m. the raiding party marched from Martinpuich through Pozieres, then by the Lattorf Graben—Regimentstrichter—Krebs Graben to the appointed dugouts on the left of sap No. 3, where the evening meal was found ready prepared.

At 8 p. m. the artillery preparation commenced as prearranged. Shortly after fire was opened, the whole of the enemy's position from Windmuhle to Besenhecke was wrapped in grayish-white smoke, which the wind drove back over sap No. 3 into our lines.

By 8.10 p. m. it was impossible to remain in our trench east of sap No. 3 without wearing a gas mask. This was still the case at 8.20 p. m., when the patrols moved forward from their

dugouts to the Hohlweg, in the following order: Stradtmann, Dumas, Böhlefeld, and Freund. Lieut. Boening followed close behind Lieut. Stradtmann.

By 8.25 p. m. the party was posted ready in the Hohlweg. The clouds of gas and smoke, however, still hung so thick over the enemy's trenches that it was impossible to distinguish whether our own shells were still falling on the point of entry or whether our artillery had already lengthened their range.

At 8.27 p. m. Lieut. Stradtmann received the order to advance to the attack with his patrol. Lieut. Boening, with the six stretcher bearers, left the Hohlweg simultaneously and in rear of Stradtmann's patrol, and posted connecting files, whose positions were marked by red signal lamps shaded to the front and to the sides.

At 8.28 p. m. Dumas' and Böhlefeld's patrols advanced. Following the line of connecting files, they reached the point of entry, to find that Stradtmann's patrol was already in possession of 16 yards of trench, and had captured three prisoners. The latter had come out of their dugouts just as Lieut. Stradtmann appeared in front of the enemy's trench. They carried hand grenades and rifles with bayonets fixed, but were immediately disarmed by Lieuts. Boening and Stradtmann.

Dumas' patrol immediately turned to the left down the trench, and in a few steps came upon a half-destroyed machine-gun emplacement. Reservist Nadolny, of Stradtmann's patrol, was already occupied in digging out the buried machine gun. Lieut. Dumas penetrated farther along the enemy's trench, and soon reached the communication trench which runs, roughly, along the dividing line between target sectors 79 and 80, toward the Weisse Steinmauer. At this point a large dugout had been wrecked, apparently by a direct hit. Lieut. Dumas had previously sent three men of his patrol along behind the enemy's trench; they reached the communication trench about 11 yards behind the front-line trench. A few Englishmen, who came out of this communication trench, endeavored to reach the parados of the front-line trench, whence they evidently intended to defend it. They were, however, surprised by our three men and bayoneted.

Meanwhile, Lieut. Dumas, with the rest of his men, forced his way farther along the trench, and just north of Besenhecke reached the communication trench which leads to the brown prolongation of the Weisse Steinmauer (white stone wall).

They passed another wrecked dugout, in which dead bodies were seen. Adjoining the above-mentioned communication trench, another large dugout was found, which the patrol intended to clear. As, however, a number of Englishmen advanced upon Dumas' patrol from the communication trench and alongside it, a mêlée ensued with grenades, rifles, and pistols, in the course of which the enemy, after suffering evident loss, either retreated or surrendered, while none of Dumas' patrol received wounds of any account.

Meanwhile, Lieut. Böhlefeld advanced along the enemy's trench to the right of the point of entry, and in a few yards came to three large dugouts, of which one was wrecked and full of dead and wounded. At his summons, the enemy came out of the others and surrendered without more ado. Lieut. Böhlefeld sent back the prisoners and asked for reinforcements in order to clear the dugouts, undertaking, meanwhile, to hold the enemy's trench with two men.

At 8.30 p. m., as no noise came from the point of entry or from the right of the same, while from a point some 65 yards to the left shots and reports of grenades could be heard, I ordered Vice-Sergt. Maj. Elb to advance with five men and reinforce Dumas' patrol. Lieut. Erb, the regimental adjutant, attached himself to this party. He was wearing an oxygen-breathing apparatus and had been waiting in the Hohlweg. Shortly after the sounds of fighting ceased on the left, and the first batch of prisoners was brought back from the enemy's trench. I had come to the conclusion that we had the upper hand everywhere, especially on the right, and with a view to exploiting fully our success, I ordered Lieut. Freund to cross the enemy's trench at the point of entry with 15 men of the supports, and to attack the Spion from the rear. At the same time, I sent forward Vice-Sergt. Maj. Wölfle with four men to reinforce Lieut. Böhlefeld.

In order to have a reserve in hand for meeting all eventualities, I ordered up the commanders of the two groups on the flank of the 12th Company, which was stationed immediately to the right of sap No. 3. The groups had been warned in the afternoon and given the necessary instructions. Whilst Vice-Sergt. Majs. Elb and Wölfle, with their men, went in search of Dumas' and Böhlefeld's patrols, Lieut. Freund dashed across the enemy's trench at the point of entry and followed it along to the right as far as the communication trench which leads into the front-

line trench near the Spion. Freund's patrol leaped into the enemy's front-line trench on both sides of the communication trench, captured 10 men almost without a struggle, and secured several rifles and articles of equipment. A few Englishmen who offered resistance were bayoneted; Volunteer Herrmann, of the 7th Company, and Lance Corpl. Haufler, of the 4th Company, particularly distinguished themselves. A few Englishmen attempted to get away, but were shot dead.

Volunteer Herrmann further discovered an extemporized trench mortar. The latter could not be carried off, however, as it was securely built in. Vice-Sergt. Maj. Wölfle, who arrived on the scene shortly after, destroyed the trench mortar as well as he could with hand grenades and pistol shots.

Böhlefeld's reinforced patrol had accompanied the advance of Freund's patrol along the trench, and came across three or four more wrecked dugouts, which were filled with dead. Individuals standing about in the trench were killed by the patrol or made prisoners. During this affair Under Officer Nössler, of the 11th Company, repeatedly distinguished himself.

Whilst our party was breaking into the enemy's trenches or perhaps even before, a party of the enemy, approximately 25 to 30 strong, succeeded in getting away from the front-line trench and making their way back to the Weisse Steinmauer, but were again driven back by our artillery fire, and now came running toward Stradtmann's patrol. The latter, apprehending a counter attack, opened fire. Ersatz Reservist Walzer, of the 11th Company, followed by Under Officer Staiger, of the 10th Company and others, raised a cheer and charged the Englishmen, bayoneting two of them. Those who did not put up their hands and surrender were killed.

Lieut. Erb had soon caught up to Dumas' patrol and took part in the subsequent fighting, which was practically continuous for almost every one of the enemy offered resistance. With hand grenade and pistol, Dumas' patrol killed more than 20 of the enemy besides wounding a large number. In this fighting Volunteer Hees, of the 6th Company, particularly distinguished himself. Always to the fore, he alone accounted for several Englishmen. On our side only one man was slightly wounded.

In consequence of the events described above, Dumas' patrol remained in the enemy's trench considerably longer than intended. When all the other patrols had returned to the Hohlweg, the Dumas-Erb patrol was still missing.

Hereupon, Lieuts. Boening and Stradtmann, with several non-commissioned officers and men, went back to the enemy's lines and searched the trench to the left until they met the Dumas-Erb patrol on its way back. Here again Under Officer Nössler, of the 11th Company, 110th Reserve Infantry Regiment, distinguished himself.

At 8.50 p. m. the last men of the entire party had returned to the Hohlweg and went back to their dugouts.

At 8.51 p. m. the first shell fell on the front-line trenches east of sap No. 3.

At 8.57 p. m. the artillery commander was informed that the artillery fire could be gradually broken off.

At 9 p. m. a heavy battery near Albert dropped a few shells near sap No. 3.

At 9.05 p. m. the conclusion of the operation was reported.

The following were captured: Twenty-four unwounded and five wounded prisoners, 1 Lewis gun, 1 rifle with telescopic sights, 20 ordinary rifles, and a large number of steel helmets, belts with ammunition pouches, packs, haversacks, and gas helmets.

Our casualties consisted of one man slightly wounded in the forehead by a splinter from a hand grenade. He was bandaged in the advanced dressing station and immediately returned to the patrol.

Forty copies, as appendices to the report of the 110th Reserve Infantry Regiment on the raid of April 11, 1916.

(Signed) WAGENER,
Captain and Company Commander.

APPENDIX A.

CORRECTIONS TO THE TABLES OF DISTRIBUTION OF ARTILLERY FIRE.

(See Appendices 2 and 4 of the "Orders for the Raid on the Spion" by the 110th Reserve Infantry Regiment, April 6, 1916.)

[Corrections to table in Appendix 2.]

½ 1st and ½ 2d Battery, 52d Foot Artillery Regiment.	4 Y	127/132	5	D	same....	D	same.	B	same.	B	28....	B	same.	D×	Up to 100 K gas shell 150 heavy field howitzer.	See "Remarks," par. 2. Section commander — Oswald.
5th and 8th Batteries, 6th Foot Artillery Regiment.	4 Y	261/217	6	D	same....	D	same.	B	same.	B	29....	B	same.	D×	100 K gas shell, 150 heavy field howitzer.	See "Remarks," par. 2. Section commander — Leister.
3d Bavarian Landsturm Battery.	4 Y	128/201	14	D	same....	D	7.....	B	same.	B	11....	B	same.	B	100 heavy field howitzer, 100 T gas shell.	Including 20 T for the Ringwerk No. 14 and 25 T for counter-battery work.
659th Russian.....	4 Y	204	...	...	17 and 20	D	same.	B	same.	B	1 section 17a.	B	same.	B	130 heavy field howitzer.	Including counter-battery work.
473d Belgian.....	4 Y	218	...	...	20 and 17	D	same.	B	same.	B	27....	B	same.	Bϕ	Up to 110 heavy field howitzer, 125 T gas shell.	Do. Including 50 T for counter-battery work.
212th.....	2 Y	203	...	...	23.....	D	same.	B	same.	B	30a...	D	same.	D	25 (21-cm.) mortar.	
8th Battery, 26th Field Artillery Regiment.	4 |	741	...	...	.....	...	4.....	B	same.	B	15....	B	same.	Bϕ	Up to 270 light field howitzer.	
							4b....	B	same.	B	4a....	B	same.	Bϕ		

550th	2 ↓	904			9	D	same.	B	same.	D×	Up to 85—9-cm.
Do	2 ↓	905			10	D	same.	B	same.	D×	Up to 70—9-cm.
Do	2 ↓	929			13	B	same.	B	same.	B	Up to 85—9-cm.

REMARKS.

4. Rounds required for purposes of registration are included in these figures, but not those required for the feint bombardment or in Appendix 1.

5. Another 750 rounds of field-gun ammunition are available as a reserve and for counter-battery work.

6. 50 K gas shell for the 3d Bavarian Landsturm Battery for Sector 7, and 50 K gas shell for the 473d Belgian Battery for Sectors 20 and 17 will be held in readiness and only fired in the event of the wind proving unfavorable for T gas.

[Correction to table in Appendix 4.]

212	2 Y ↓	203	23	same	.....	Firing may be carried out from the first to the thirtieth minute. The 212th (21-cm.) Mortar Section will register on 23 with a few rounds.

III.

EXPERIENCES OF THE FOURTH GERMAN CORPS IN THE BATTLE OF THE SOMME DURING JULY, 1916

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III.

EXPERIENCES OF THE FOURTH GERMAN CORPS IN THE BATTLE OF THE SOMME DURING JULY, 1916.

I. ENGLISH TACTICS.

1. INFANTRY.

The English infantry has undoubtedly learned much since the autumn offensive. It shows great dash in the attack, a factor to which immense confidence in its overwhelming artillery probably greatly contributes. The Englishman also has his physique and training in his favor. Commanders, however, in difficult situations showed that they were not yet equal to their tasks. The men lost their heads and surrendered if they thought they were cut off. It was most striking how the enemy assembled and brought up large bodies of troops in close order into our zone of fire. The losses caused by our artillery fire were consequently large. One must, however, acknowledge the skill with which the English rapidly consolidated captured positions.

The English infantry showed great tenacity in defense. This was especially noticeable in the case of small parties, which, when once established with machine guns in the corner of a wood or a group of houses, were very difficult to drive out.

Generally speaking, however, our infantry returned from the fight filled with the conviction that it was superior to the English infantry.

2. ARTILLERY.

Particularly noticeable was the high percentage of medium and heavy guns with the artillery, which, apart from this, was numerically far superior to ours. The ammunition has apparently improved considerably.

All our tactically important positions were methodically bombarded by the English artillery, as well as all known infantry and battery positions. Extremely heavy fire was continuously directed on the villages situated immediately behind the firing line, as well as on all natural cover afforded by the ground. Registration and fire control were assisted by well-organized aerial observations. At night the villages also were frequently bombed by aeroplanes.

3. CAVALRY.

The frontal attacks over open ground against a portion of our unshaken infantry, carried out by several English cavalry regiments, which had to retire with heavy losses, give some indication of the tactical knowledge of the higher command.

II. ORGANIZATION.

4. ALLOTMENT OF SPECIAL FORMATIONS FOR THE BATTLE.

The reports on the experience gained in the Battle of the Somme submitted to corps headquarters unanimously agree as to the necessity for an increased allotment of weapons, means of communication and transport of all kinds, such as Flammenwerfer, antiaircraft sections, antiaircraft machine guns, captive balloons, reconnaissance and battle planes, double telephone sections, motor lorries, horse-drawn vehicles, motorcycles, bicycles, light-signaling detachments, wireless stations, etc. The heavy fighting has undoubtedly proved the great value and the necessity for the allotment of all these means of warfare. On the other hand, it is not considered possible to allot all these permanently to and as part of the war establishment of divisions and corps on as large a scale as is required.

It is therefore necessary to hold ready in reserve for large operations sufficient numbers of additional units of the above-mentioned description, under army or general headquarters, just as is done in the case of heavy artillery, battle-plane squadrons, and pioneer formations, and to place them at the disposal of new corps brought up for the battle.

In this memorandum a permanent increase in personnel and matériel has only been asked for on the scale considered necessary for the normal conditions of trench warfare.

5. INCREASING THE STAFFS.

The composition of the staffs of the higher commands, which have been reduced during the war, proved inadequate in actual fighting. It is necessary to detail to staffs, as soon as the nature of the tasks is known, a sufficient number of orderly officers and intelligence and liaison officers. The orderly officers are at the disposal of the commander concerned, chiefly for the collection of intelligence in the front line.

6. CORPS HEADQUARTERS.

The staffs of the Fourteenth Reserve Corps and the Fourth Corps were quartered for several days in the same building. They had to share the available telephone communications during that time. This caused difficulties, which were particularly felt during critical periods in the fighting, when all branches of both staffs were working at extremely high pressure at the same time.

7. DRAFTS IN RESERVE FOR THE INFANTRY COMPANIES.

In the fifth division a fourth platoon was formed in the infantry companies. At first these reinforcements for replacing casualties were kept back with the first-line transport (field kitchens). They were sent forward only when the losses of the three other platoons made reinforcements necessary. When they went forward the fourth platoon took with it all that had been found necessary in the particular fighting (hand grenades, entrenching tools, rations, etc.). This arrangement proved very successful.

8. INFANTRY PIONEER COMPANIES.

The infantry pioneer companies of each infantry regiment of the corps proved of great value. Full use, however, was not made of their special training, as the fighting provided them with more urgent work. These companies, which consisted of men of experience and accustomed to work together, proved most valuable in the many difficult and unexpected problems which continually faced the regiments—for instance, in the provision of the front-line trenches with the matériel necessary for carrying on the fight.

9. INCREASE IN MACHINE GUNS.

A wish is generally expressed for an increase in the number of machine guns. Their value in defense has again been shown, particularly in those cases where gaps in our position caused by a long continued, concentrated, heavy artillery fire could not be filled.

Machine-gun reserves, with the necessary men, ought undoubtedly to be provided for every regiment, brigade, and division. On the whole, it is considered to be very desirable to have at least 30 machine guns for every infantry regiment.

III. TRAINING.

10. TRAINING.

The instructions based on our previous experience in defense and attack all took for granted a carefully constructed trench system. The troops on the Somme found practically no trenches at all.

The front line, and the ground for a considerable distance behind the fighting front, was kept under fire by the enemy's artillery; this fire was almost continuous and of a volume never before experienced. Several lessons for the training of the troops were learned as the result of this bombardment; the most important ones, on which all the troops are agreed, are the following:

Every individual must be trained to the highest possible degree of self-reliance, so that he may know how to act during the critical periods of his own or the enemy's attacks, when he must generally be left to his own resources and is beyond the control of his superiors.

Crossing ground which is being heavily shelled.

Training of the infantry in establishing relays of runners.

Increase in the personnel trained in the use of our own and captured machine guns (officers and men).

Training in the use of all kinds of German hand grenades.

Training as many men as possible in the use of the enemy's hand grenades.

Attacks by sectors according to time-table, following close up to our barrage. Formations organized in as great depth as possible to be able to cope with surprises. The absolute neces-

sity of this has again been proved in attacking in wooded country with a restricted range of vision.

Rapid execution of counter attacks over open ground under different conditions. Bombers in front, skirmishers about 10 meters behind them, a number of small bodies in support slightly farther in rear. In wooded country these move in file, otherwise in extended order.

Training in the rapid preparation of shell holes for defense and in digging trenches by small parties in captured ground. Marching in file to form up on the tracing tape.

The employment of improvised materials in constructing defenses if prepared materials are not available.

IV. LESSONS FROM THE FIGHTING.

A. CONSTRUCTION OF POSITIONS AND THE DEFENSE.

11. INFANTRY POSITIONS.

Narrow trenches with steep sides again proved very disadvantageous and caused considerably more casualties (men being buried) than shallower trenches with a wide sole. This result is due to the fact that the splinter effect of the majority of English shells is not as good as their destructive effect. One regiment is of opinion that the garrison is better protected if the men lie down or crouch at the bottom of the trench without any further cover than it is if the so-called "rabbit holes" are used.

A cover trench roughly parallel to the front fire trench is not sound. Such trenches are destroyed by the enemy's fire at the same time and in exactly the same way as the actual fire trenches. To obviate this, trenches sited more in accordance with the ground, and consequently with a certain irregularity of trace, are recommended instead of the formal type of cover trench hitherto in vogue.

The Lochmann wire entanglement ("carpet" entanglement) has not proved satisfactory, as its transport is too difficult. A better method is that of screw posts and barbed wire, which is cut up into 20 to 30 meter lengths under cover, and then fastened to the posts.

Curved sheet-iron frames are considered a suitable substitute for timber frames, as their elasticity frequently enables them to keep out heavy shells.

12. ARTILLERY POSITIONS.

The English custom of shelling villages heavily led to the adoption of the principle that batteries should never be sited in the villages themselves, but at least 100 meters away. In this manner the casualties of the artillery were considerably diminished.

The employment of steep slopes for battery positions must also be discarded for similar reasons. When not possible to site batteries alongside existing fire trenches, etc., which are not in use, it has been found best, having regard to English methods of fighting, to select sites for batteries in open country which is merely concealed from direct observation. The main essential is, of course, that such positions in the open should be immediately concealed from aeroplane observation. Wire netting, tent squares, etc., covered with material found on the surface of the ground around the position have proved useful. As material for the construction of dugouts arrived a greater degree of security was attained.

13. BATTLE HEADQUARTERS.

Battle headquarters, also, when the artillery fire is so heavy, should not be sited in villages, on steep slopes, or at other points which stand out conspicuously on the ground or on the map. In cases where the existing telephone system necessitated the utilization of such unsuitable points as battle headquarters, it resulted in frequent interruptions in personal and telephone traffic by artillery fire and overcrowding in the few available cellars in the villages.

Staffs when going into their battle headquarters must see that there are as many clear signboards as possible to indicate the way to them. Owing to lengthy searches for battle headquarters, many casualties have occurred which might have been avoided.

14. RELIEF OF INFANTRY AND PIONEERS.

When troops are relieved in the trenches it is of the utmost importance that the outgoing troops are careful in handing over the position. Whenever the tactical conditions permit, this should take place on the spot, the various commanders and subordinate commanders meeting together for the purpose. At any rate, it is absolutely essential that the incoming troops should be thoroughly informed as to the tactical situation, by means of

personal conferences between the outgoing and incoming commanders, with the assistance of maps and sketches, which will be taken over by the latter. A perfectly clear picture must be given of the state of the positions, etc., particularly of their weak points, and also of any work which it had been intended to carry out, the degree of importance attached to it being specified.

In order that a relief may be properly carried out, it is also necessary that the commanders of the incoming troops should acquaint themselves, by daylight, with the lie of the ground; it may be necessary to send them on ahead in motor cars. The troops, too, must, if possible, be able to gain a general idea of the position while it is still daylight. Reliefs must, therefore, unless there are cogent reasons against it, be begun at dusk and completed during the early hours of the night.

If it is impossible to give the incoming troops an idea of the ground beforehand, then detachments of the outgoing troops must be left behind in the trenches. It is very important that the junction points with other troops should be absolutely clearly indicated, as these are so easily forgotten when reliefs are carried out under heavy fire.

Losses on the march up to the trenches can be minimized if the stretches of ground which are under fire are crossed in as small parties as possible. One infantry brigade recommends that the relief be carried out by platoons, at short intervals of time, and considers that the troops should move up in file. No hard and fast rules can be laid down. The choice of the formation in which the troops are to move will always depend on the nature of the ground.

When troops which are advancing are to be relieved, as much engineer and constructional material as possible must be taken with the relieving troops. In all cases the men must carry as many large entrenching tools as they can.

15. ENGAGEMENT AND RELIEF OF ARTILLERY.

The same principles hold good for the relief of batteries as for infantry. If the tactical situation is such that reinforcing batteries have to be brought up at night, without having had time to reconnoiter by day, then the want of knowledge of the ground must at least be counterbalanced by getting into touch as soon as possible with the artillery already in position, and by making the fullest possible use of the knowledge of the ground which

that artillery possesses. If the reenforcements come under the orders of artillery commanders who are already in command in the sector, the staffs and officers already engaged must, as soon as it is known that reinforcing batteries are to be brought up, be detailed to reconnoiter battery positions for the commanders who have not yet arrived. The officers who carry out these reconnaissances must then be allotted as guides to the new batteries when these move up into position.

16. DISTRIBUTION OF THE INFANTRY.

One of the most important lessons drawn from the battle of the Somme is that, under heavy, methodical artillery fire, the front line should be only thinly held, but by reliable men and a few machine guns, even when there is always a possibility of a hostile attack. When this was not done the casualties were so great before the enemy's attack was launched that the possibility of the front line repulsing the attack by its own unaided efforts was very doubtful. The danger of the front line being rushed when so lightly held must be overcome by placing supports (infantry and machine guns), distributed in groups according to the ground, as close as possible behind the foremost fighting line. Their task is to rush forward to reinforce the front line at the moment the enemy attacks, without waiting for orders from the rear. In all cases where this procedure was adopted we succeeded in repulsing and inflicting very heavy losses on the enemy, who imagined that he had merely to drop into a trench filled with dead.

The essential conditions for success are, therefore, that the various formations should be organized in depth, but that their units should be employed side by side. Only in this way is it possible to insure that a counter attack in sufficient strength and with unmixed units can be made, if the enemy has succeeded in penetrating the line, an occurrence which can not always be avoided when the artillery fire is so heavy.

Even the company commander must, in any circumstances, neglect to provide himself with a reserve consisting of a few groups, and, if possible, of machine guns as well. The subsector commanders must also have at all times sufficient troops at their disposal to be able at once to drive the enemy out, by means of a counter attack, should he succeed in penetrating into the position. It is self-evident that regimental and higher commanders

must have complete units at their disposal as a reserve. The more troops that are held in reserve the better. A considerably greater allotment of machine guns by army headquarters when troops are moved to the battle front is absolutely necessary, as this will enable infantry to be held in reserve on a sufficiently large scale. The great advantage offered by the increased possibility of exchanging the garrison of the front line with the reserves is perfectly obvious.

17. ORGANIZATION OF THE ARTILLERY.

The formation of corps artillery was ordered by army headquarters with the object of avoiding, at any rate as far as the more permanent heavy artillery was concerned, the frequent changes in command, due to the frequent changes of the field artillery brigades. From the experience now gained, it seems advisable to place a few heavy batteries under the commanders of the divisional artillery, in order to enable them to carry out all the tasks allotted to them as rapidly as possible.

18. RESERVES OF PERSONNEL AND MATÉRIEL FOR THE ARTILLERY.

The supply of fresh guns was usually carried out rapidly. Nevertheless, it is very desirable that each field artillery brigade should retain a few guns, with their detachments, to act as a reserve. Possibly it might be sound only to engage two of the three batteries of an Abteilung at first, and to retain one in reserve to replace casualties. Heavy batteries of four guns should only have three of their guns in position during such critical fighting, in order to have a reserve available for immediate use.

19. ARTILLERY BARRAGE FIRE.

It was found very difficult to form a continuous barrage, without gaps, in front of our own lines, owing to the occasional uncertainty as to the position of our front line, which was continually changing during the fighting, the frequent changing of batteries, the regrouping of the artillery, which was often necessary, the bad conditions for observation, the permanent interruption of the telephone communications, and the practically continuous heavy fire which was maintained behind our front line.

Whenever we were successful in establishing such a barrage in a comparatively short time, it was entirely due to the forward artillery observation officers. The only means of communication which these officers possessed, as a rule, were light pistols and runners. By full use of these means it was possible to carry out an approximate registration. The method employed was for the battery, at the exact time previously agreed upon, to open fire with a definite number of rounds on a point which was easy to observe. The fall of the shell relative to this point served as the basis of the registration for the barrage in front of a specified sector. It was necessary to supplement these observations by means of personal verbal reports. It was found specially useful for the artillery observation officers who relieved each other to go forward twice a day. This, unfortunately, led to heavy casualties among artillery officers, but saved the infantry many losses. (Regarding the action of the artillery observation officers during an attack, see Par. IV, ch. 34.)

In cases where it was not possible to register for the barrage in the ordinary manner, the employment of various natures of shell (time shrapnel, time H. E. shell and percussion H. E. shell), fired at various ranges, proved to be a useful expedient for a barrage. The different effects of the various natures of shell at any rate caused the fire to be distributed in depth and breadth over a considerable area. The disadvantage of this method is the large expenditure of ammunition incurred, without which the desired effect can not be obtained.

20. BARRAGE FIRE OF INFANTRY AND SNIPERS.

Over ground which can not be observed and at night the unaimed but horizontal barrage fire of infantry and machine guns, during and immediately after critical periods, affords rest and protection to troops, who are probably shaken for the moment, and not only scares the enemy but inflicts losses on him.

The excellent results obtained from selected snipers posted at good viewpoints, in trees, etc., are particularly emphasized by one regiment.

21. ACTION TO BE TAKEN DURING CONTINUOUS HEAVY SHELLING.

It has been found to be a good plan, during the continuous heavy bombardment of incomplete front-line positions, for the garrison to advance 100–200 meters and to lie down in the open without any cover.

It is advisable for a battery, the position of which has been discovered by the enemy, not to change its position in such circumstances but to increase its cover as much as possible, as every new battery position is soon discovered when the enemy's aerial activity is so great. Further, frequent changes of position, involving new digging-in and the removal of the ammunition during the same night if possible, are beyond the strength of the detachments which has already been taxed by continuous firing.

22. EMPLOYMENT OF "GREEN CROSS"[1] (GAS) SHELL.

The wish expressed in many quarters that the question of firing with "green cross" (gas) shell should be left to the artillery commanders of divisions, with a view to taking better advantage of the tactical situation, could not be acceded to, as the employment of this ammunition depends too much on the nature of the ground and weather conditions, which can only be fully appreciated by experts, and these were all, in the case in question, at the army group headquarters.

It is, however, sound, if sufficient field artillery is available, to allot permanently several batteries for the purpose of firing with "green cross" ammunition so as to avoid taking away batteries for firing with it from the divisional artillery commanders, without previous notice, at a time when their services are being relied on for the execution of other tasks. During the periods when it is not possible to fire with "green cross" ammunition (for instance, almost always during the day time), the batteries will be at the disposal of artillery commanders as reinforcements.

According to apparently reliable information, the effect of the "green cross" ammunition was good.

23. BOMB THROWERS AND TRENCH MORTARS.

The "Priester" bomb thrower again proved itself to be a very effective weapon in the fighting on the Somme.

Trench mortars, at least the light pattern, should be brought up into position at the earliest possible moment, even if the trenches are bad or if there are no trenches at all. They must not be held in reserve for fear of possible losses.

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[1] The exact nature of this ammunition is not known, but the expression "green cross" probably refers to some form of gas shell.—(Translator.)

24. STRONG POINTS.

The preparation for subsequent defense of villages and other strong points afforded by the form of the ground behind the front line can not be begun too soon. Villages should be divided into sectors for purposes of defense, and should be provided with garrisons, however small these may be, and machine guns. Supports and reserves must not be quartered in the villages close to the line owing to the particularly heavy shelling to which these are exposed. The boundary of a sector should never run through a village.

25. RETIRED INFANTRY POSITIONS AND SWITCH LINES.

The first necessities for retired positions and the extremely important diagonal switch lines are entanglements, dugouts, and communication trenches. The number of these positions should be increased by continual work and by making the fullest possible use of all available forces. It is always possible to dispense with digging the fire trench, which can be comparatively quickly constructed. This point must also be kept in mind from the start when constructing retired positions in quiet sectors.

In view of the experience gained the following scheme appears to provide the most practical organization for the construction of retired positions and communication trenches while fighting is in progress:

In the front-line area (the rearward limits of which vary according to the circumstances) the work will be done by the divisions. A responsible commander and a party of pioneers, who do not change when the division is relieved, will be allotted to each of these positions, etc., to assist the divisions. The working parties detailed by the divisions will be under the command of officers from those divisions, who are responsible for the quantity of work that is done. Particular conditions may make it necessary to attach working parties to the divisions to prepare positions, the rapid construction of which is of great importance. These must be detailed from troops not intended to take part in the fighting, otherwise they must be provided from the divisional reserves. It is an established principle that any detachment of troops which is holding a position in the rear must work at strengthening it.

The supervision of the labor formations working at night requires much personnel. It is better to avoid the use of labor

formations in the construction of positions which, though only occasionally, are under heavy fire.

Special officers must be detailed for the construction of positions, etc., required in the area behind the lines. These will be immediately under the orders of the army group or of army headquarters. In order to furnish the necessary labor, pioneer and labor companies must be permanently allotted to them, as well as reliefs of other available troops and the necessary transport for bringing up materials.

26. RETIRED ARTILLERY POSITIONS.

Experience has shown that the important point in the construction of artillery positions behind the lines is to begin with the construction of observation posts, cable trenches, and communication trenches. Battery positions can be constructed by a battery in one night, if necessary, provided that the materials are available.

B. ATTACK.

27. METHOD OF ATTACK AND TIME REQUIRED.

Insufficiently prepared attacks and counter attacks nearly always fail through being too hurried.

The greatest care must be taken to differentiate between counter attacks, which are undertaken immediately after the loss of a length of trench, or of any other section of ground, with reserves which are on the spot, and those which are ordered by a higher commander and for which the reserves of a higher formation must be brought up.

In the latter case the full time necessary for the preparation of the attack and the disposition of troops in the front line is frequently not sufficiently considered. In this respect it is to be noted that the transmission of orders to the front line occupies more time than is often supposed; the telephone lines are destroyed, and messengers can only work their way slowly through the enemy's barrage. Even if the order has reached the front line, it requires some time to circulate it and explain the method of carrying out the attack and its objective to the troops, distributed as they are in groups. Similar difficulties arise in the case of reserves which have been brought up. They advance slowly across country with which they are generally unac-

quainted, and which lies under heavy fire. The commanders of the reserves have to form an idea of the tactical situation, and for this purpose are obliged to get into communication with commanders already in the front line. This all requires time and creates friction, both of which are increased at night and in country where the view is restricted (village or wood).

In the case of counter attacks, which are to be carried out with the aid of strong reserves, a thorough artillery preparation is necessary. This, too, requires time. The experience of the battle of the Somme has again and fully confirmed the long-established principle:

A counter attack must either follow immediately, and the decision to counter attack must come from the front line and the forces, for it must be ready to hand before the enemy's attack is entirely finished, or the counter attack must be methodically and thoroughly prepared by the artillery and carried out with reserves who have been instructed as to the tactical situation and the nature of the ground.

If counter attacks which, on account of the situation, ought to be methodically prepared are hurried, they cost much blood and cause the troops to lose their trust in their leaders if they fail, which nearly always happens in such a case.

28. APPROACH MARCH AND DEPLOYMENT.

Before bringing up troops into the zone of the enemy's artillery fire, the commander must obtain a clear idea, by means of clever scouts and by his own observation, how the enemy's fire is distributed over the ground to be crossed. When selecting the route, areas which are hardly or not under fire will be taken into consideration rather than the nature of the ground and the cultivation. Depressions and sunken roads which are invisible to the enemy are, as a rule, under such heavy barrage fire that it is not advisable to make use of them. Villages which lie in the enemy's zone of fire are to be avoided on principle.

29. METHODICAL ATTACK.

An advance to the assault with a simultaneous lifting of our own artillery fire has proved extremely successful in the attack. This was also the case when a definite rate of advance for the infantry was settled and our artillery fire was lifted, step by step, in accordance with this, on a prearranged time table. Only

in cases where the infantry, through lack of practice in this new method of attack, pushed right through, was the progress of the attack checked.

30. ASSAULTING PARTIES.

The detailing of assaulting parties in an attack has proved very useful. Their chief advantage lay in the freshness of the specially selected personnel who had not been engaged in previous fighting. The careful training beforehand of the assaulting parties resulted in these troops proving themselves quite equal to all tasks which fell to their lot in village or wood fighting. They felt that they were a body of elite troops, which indeed they proved themselves to be.

31. ATTACKS IN WOODS.

When attacking in a wood, it is preferable, instead of the usual skirmish lines following one after the other, to employ small assaulting columns following a single line of assault.

The employment of small Flammenwerfer in wooded country which is full of obstacles and in which there is no extended view suffers in an attack with a distant objective under the disadvantage of the heavy weight of the apparatus. It is better to use the Flammenwerfer from a well-prepared assaulting position and against well-defined, close objectives which have been previously reconnoitered.

The "Priester" bomb throwers have been successfully used to clear out shell holes which could not be reached with hand grenades.

32. PROCEDURE AFTER A SUCCESSFUL ATTACK.

In order to be able to entrench rapidly and hold captured ground, carrying and working parties (see also Par. XI, 65) must follow the assaulting troops, under the leadership of energetic officers.

C. COOPERATION OF INFANTRY AND ARTILLERY.

33. COMMUNICATIONS BETWEEN COMMANDERS.

When the corps was put into the battle the units of the troops already engaged were very much mixed. The arrangements for artillery command were not sufficiently clear in all cases.

The bringing up of new divisions had, on account of the tactical situation, to take place as quickly as possible and in the dark. Necessary reliefs and movements of troops were taking place almost daily.

Owing to all these circumstances and to faulty telephone communications it was very difficult to establish touch between infantry and artillery. In many places it was a long time before touch was obtained, greatly to the disadvantage of our infantry, which was heavily engaged. The greater the difficulties in establishing this absolutely necessary touch between infantry and artillery the greater must be the efforts of both sides to secure communication. The best means to this end is for the infantry regimental commander and the artillery group commander to be near each other. If this is impossible their posts must be connected by telephone as soon as possible, in order that there may be continuous exchange of important information. One artillery liaison officer of each of the groups in question (in certain circumstances several groups) must remain continuously with the infantry regimental commander.

34. COMMUNICATIONS IN THE FRONT LINE.

The number and position of artillery observation officers (see also Par. IV, A 19) depend on the tactical situation and the ground. They must be connected with the subsector (battalion) commanders in front of whose sector their artillery is working, in order to be able to receive and forward rapidly all requests and messages which come from the front line. In an attack artillery observation officers must be sufficiently far forward to be able to observe our own front line continuously. It is not usually sound for them to remain in the foremost firing line. In country with a restricted view, as was the case in Delville Wood and Longueval village, our own front line could only be seen by the artillery observation officers if they followed immediatey behind the foremost line. There still remain, of course, the difficulties of sending back important messages as rapidly as possible, especially those with reference to shells which fall short and so endanger our own infantry. These difficulties can be overcome by means of signals with light pistols and by orderlies (relays), if proper arrangements are previously made, and the most reliable officers and orderlies (cyclists) are detailed for the responsible task of artillery observation and for the delivery of messages during an attack.

It may nevertheless happen that events on the battle field, especially if the fire is as heavy as that in Delville Wood and Longueval, may prevent important messages from the artillery observers from reaching the fire commander sufficiently quickly. One regiment, therefore, has made the very valuable suggestion that artillery information centers should be pushed forward as an additional safeguard. Battalions and companies should be informed of the position of these centers, so that the result of their observation and their requests can be sent there as well as to the normal centers.

V. MEANS OF COMMUNICATION.

35. TELEPHONE COMMUNICATIONS.

The existing telephone system proved totally inadequate in consequence of the development which the fighting took. This was aggravated by the division of the sector hitherto held by Stein's army group into two separate army groups, which required the provision of several new lines. The conditions here were, therefore, particularly unfavorable. But in trench warfare difficult conditions must always be reckoned with in this relation. It is therefore considered necessary to allot a double telephone section to each division to reinforce the corps telephone detachment, and to extend the existing lines by means of the stores in reserve, as soon as the division arrives in the front line. The shortage of lines which was discovered to exist reacted most disadvantageously on the communication between the infantry and the artillery, and could only be, by degrees, made good.

It is advisable as far as possible to avoid erecting lines through villages, as they are subject to a heavy fire there. If lines start from villages, they should be diverted by the shortest route over open fields in the desired direction.

To enable lines which have been damaged by shell fire to be repaired as quickly as possible it has been found useful in practice to establish permanent telephone parties in dugouts along the lines; it is the duty of these parties to test the lines frequently and see that they are in working order.

It is most desirable that the staffs of every field artillery regiment and Abteilung, as well as those of every foot artillery regiment and foot artillery battalion, should be permanently

provided with the larger pattern folding telephone box, so as to avoid the large number of separate boxes otherwise necessary at a regimental, or Abteilung, or battalion command post. These take up room and are difficult to supervise properly.

The usual practice of changing telephone apparatus when reliefs were carried out proved to be a source of very marked interruption. It must not take place when the fighting is so severe. The outgoing units should hand over their apparatus to the units which are relieving them. These remarks apply particularly to folding telephone boxes, the removal of which caused considerable interruption in the service.

36. WIRELESS COMMUNICATIONS.

It is desirable that light wireless stations should be allotted to the staffs of infantry regiments and battalions, in order to improve the communications in the front area. They could be formed from the stores in reserve.

37. RUNNERS.

Runners and the establishment of relays of runners have proved very useful everywhere. The casualties were comparatively slight. All important information and orders should always be sent in duplicate. One infantry brigade recommends that 100 meters should be the normal distance between the relay stations of runners in the fire zone.

38. MOTORCYCLES AND BICYCLES.

The headquarters of corps, divisions, and brigades must each have two motorcycles from the reserve stores placed at their disposal when they go into the front line. The establishment of motorcycles proved insufficient for the heavy fighting; this deficiency was painfully evident. The establishment of ordinary bicycles was also not sufficient for the work to be done.

39. LIGHT-SIGNALING LINES.

The existing organization of the light-signaling service does not meet requirements. It is considered urgently necessary that a complete light-signal detachment should be formed in each corps. A total of about 30 signal lamps of medium range is required to enable a signal line to be established for every

infantry reglment and every artillery group. Besides these, four light-signal sections, with apparatus of a greater range, are required to establish long-distance light-signal communications in the divisional sectors. The temporary allotment of light-signaling apparatus from reserve stores can not be considered satisfactory, as the full utilization of this method of communication depends mostly on the signal stations working well together and with their respective command posts.

Until this urgent demand can be complied with it is suggested that an auxiliary light-signal detachment should be formed in each division by making use of the personnel of the searchlight sections. It was not possible to employ the searchlight sections for their proper work in the fighting on the Somme. Good results were obtained by an attached division, which had already formed an auxiliary light-signal detachment. Another division of the corps succeeded in forming two auxiliary light-signal stations and in maintaining satisfactory communication over a distance of 12 kilometers by flashes on the horizon, although direct vision was not obtainable. The great value of communication by light-signaling was made doubly clear by the continual interruptions of the telephone communications.

40. LIGHT-PISTOL SIGNALS.

The communication between the front line and the artillery for the direction of barrage fire was entirely confined to light-pistol signals. It was found that three light pistols per company are not enough and that the ammunition supply is too small. It is considered necessary that the establishment of light pistols should be at least doubled by additional pistols from the reserve stocks, and that a large supply of ammunition should be provided before units go into the front line. As a result of the difficulties experienced corps headquarters were obliged, when the fourth corps was relieved, to order all the light pistols which were still available, together with their ammunition, to be handed over to its successors, although the light pistols were part of the war establishment.

41. BALLOON AND AEROPLANE OBSERVATION.

The means for providing the artillery with aerial observation has proved to be insufficient. It has again been shown, as, indeed, had already been recognized under less difficult condi-

tions, that it would be a great advantage to add a captive balloon and at least two observation aeroplanes to the war establishment of each field artillery brigade (of two regiments).

Matters would not be improved by temporarily allotting these important means of obtaining observation, for good results can only be attained by continual cooperation between the observer and the fire commander.

The numerical superiority of the enemy's airmen and the fact that their machines were better were made disagreeably apparent to us, particularly in their direction of the enemy's artillery fire and in bomb dropping.

The English aeroplane observers also made use of sound signals to communicate with their batteries while in the air. It is very likely possible that a rapid means of communication with the batteries can be established in this way; it might be very serviceable as a complement to wireless messages, which are frequently interrupted. Experiments in this direction are being carried out in the fourth corps.

42. ANTIAIRCRAFT MEASURES.

The number of our battle planes was also too small. The enemy's airmen were often able to fire successfully on our troops with machine guns by descending to a height of a few hundred meters. The German antiaircraft-gun sections could not continue firing at that height without exposing their own troops to serious danger from fragments of shell. This has produced a desire for the antiaircraft defenses to be supplemented by machine guns; these must, if necessary, be supplied from the reserve stocks. A further lesson to be learned from this surprisingly bold procedure on the part of the English airmen is that the infantry make too little use of their rifles as a means of driving off aircraft.

The best defensive weapons among the antiaircraft guns were the batteries of four 10-centimeter guns of the foot artillery. The antiaircraft guns mounted on motor cars are considered less useful for the present conditions of fighting than the stationary guns, as they continually require new telephone connections with the antiaircraft telephone exchange system as they alter their positions.

It has already been found necessary, even in quiet sectors, to fit up some field-gun sections as auxiliary antiaircraft defenses,

to supplement the regular antiaircraft-gun sections. This was still more necessary in the battle of the Somme. It is desirable that at least one battery of each field artillery brigade should be equipped with guns mounted on light field-howitzer carriages, so as to have guns at hand which can be quickly employed either for antiaircraft purposes or for forming a barrage. To make these guns still more useful for defense against aircraft, it is also desirable that each field artillery brigade be equipped with portable antiaircraft mountings (pivots) for two antiaircraft-gun sections. It would be possible to arrange for the transport of these mountings by the light-ammunition column, on two-wheeled trailers.

43. SPECIAL REPORTING DETACHMENTS.

In consequence of the comparative slowness with which reports from the front-line trenches reach the higher commanders, when sent by the usual channels, it has been found necessary for commanders to make arrangements independent of these channels, and to keep themselves informed by their own agents of the course of the fighting. For this purpose the most practical method is the employment of so-called "spy troops" (spah trupps) as well as the orderly officers who go forward from time to time. These special reporting detachments consist of one officer and a few picked noncommissioned officers and men, equipped with infantry telephone apparatus, to connect up with existing lines. They should choose their own position so that they can observe any particular sector in which fighting is taking place.

Their duty is to insure that reports on the progress of the fighting reach the commander by whom they have been sent out, as quickly as possible, by means of a combined system of telephones and runners. To enable these detachments to work successfully in action, they should be formed in the divisions during quiet periods and be thoroughly trained in the duties which they have to perform.

VI. ARMS.

44. SMALL ARMS.

Numerous complaints have been received of rifle breech actions being completely clogged with dirt both in attack and defense. It is therefore advisable to fit a cover over the breech

of the rifles, like that used in the English Army, which can be easily unfastened and then hangs from the rifle.

The 1908 pattern pistol has proved to be a very useful weapon for hand-to-hand fighting in villages and woods. It is also recommended by several units as a useful weapon for machine-gun detachments in close fighting. One field-artillery regiment recommends the adoption of the new pattern sword bayonet with saw edge, which has already been experimentally adopted for mounted troops. Automatic rifles (musketen) are stated to be useful weapons for trench warfare.

45. MACHINE GUNS.

Machine guns usually have to be brought up over open ground under a heavy barrage. The great weight of the gun has again proved to be a serious disadvantage under these conditions. Even if the gun is dismounted, it is very difficult to drag up the heavy sledge over ground which is under fire. All regiments are unanimous in recommending the introduction of a lighter form of gun carriage, modeled on that of the improvised gun carriage used by the machine-gun marksman sections. One regiment has obtained good results with a gun carriage of its own invention, which is even lighter.

Complaints have also been received that the ammunition boxes and water jackets of the machine guns are too heavy. It is proposed that the lighter boxes and jackets used by the machine-gun marksman sections should be generally adopted.

The wheels of the machine-gun hand carriages, used by the marksman sections, are not strong enough for paved roads, so that these carriages are not adapted for use on the march, but they have proved suitable for bringing the machine guns into action, and very useful for the transport of ammunition, rations, and wounded.

Spare parts for machine guns must be kept in readiness in large quantities behind the front line, so that they can be brought up to the troops quickly if required.

46. HAND GRENADES.

The hand grenade was the most important infantry weapon both in attack and defense. It is universally suggested that the supply of hand grenades should be increased. If it is possible to insure a supply of different kinds of hand grenades, the gen-

eral opinion is in favor of the use of "ball" and "egg" grenades for attack, despite their small effect, in preference to cylindrical grenades with handles, as a larger supply of the two former can be taken into action.

It would appear advisable to use only one kind of hand grenade. This would simplify training in the use of hand grenades. In fighting such as we have had on the Somme defense and attack continually alternate. It is not always possible to bring up sufficient quantities of the particular hand grenade which is best suited to the conditions of the fighting at the moment, but as the cylindrical grenade with handle is on the whole the most effective it is recommended that this pattern should be universally adopted.

47. GUNS.

The guns of the field artillery proved on the whole to be thoroughly satisfactory. Their failure was usually due to the ammunition, or to the fact that the number of rounds fired was greater than the life of a tube permits. Jams were frequently experienced with field guns. These were due to steel cartridge cases (manufacturer's mark A. E. G.) and brass cartridge cases with steel base (Sp: 61). These cartridges often jammed when the breech was opened and could only be removed by the use of the rammer. The rate of fire was in consequence considerably reduced. Repeated forcible opening also damages the breech. It is true that many jams may have been due to the fact that the necessary care in the storing and handling of ammunition could not be observed under the conditions which existed on the Somme.

The buffer proved to be the weakest point of the howitzer. The leather washers burn through and the glycerin runs out. The bad working of the buffer affects the sides of the carriage, which are rather weak, so that damage easily occurs.

VII. AMMUNITION.

48. VARIOUS KINDS OF AMMUNITION.

A supply of good ammunition of even quality and character is an absolute necessity for rapid preparation for action, a high rate of fire, and accurate shooting, particularly if a barrage is to be placed close in front of our infantry.

The long shell of the light field howitzer was supplied with five different fuses, of which two kinds had to be fired with safety precautions. Fresh registration or ranging is required when a change is made from one ammunition to another. At critical moments, or in the dark, it is not possible to ascertain with what kind of fuse every shell is fitted. This ammunition besides is supplied without shell baskets. It is therefore difficult, and takes time, to bring the reserves of long shell up to the guns.

The old pattern of field-gun ammunition has proved efficient.

The use of the "green cross"[1] ammunition is very hard on the guns, for in consequence of the limited possibilities of using it, a great quantity of ammunition has to be expended in a short time. For example, a light field howitzer battery fired over 3,500 rounds of this ammunition in 24 hours.

49. EXPENDITURE OF AMMUNITION.

The average daily expenditure of ammunition per gun during the whole period of the fighting was:

	Rounds.
(Field) guns	145
Light field howitzers	170
Heavy field howitzers	119
10-cm. guns	118
(21-cm.) mortars	51

The small expenditure of (field) gun ammunition is to be attributed to the small supplies available. Instructions had to be issued to the troops to be economical with (field) gun shell.

The highest daily average expenditure per gun reached during the period of fighting in the army group for the different kinds of guns was:

	Rounds.
(Field) guns	322
Light field howitzers	479
Heavy field howitzers	233
10-cm. guns	321
(21-cm.) mortars	116

[1] The exact nature of this ammunition is not known, but the expression "green cross" probably refers to some kind of gas shell.—(Translator.)

The following quantity of ammunition is considered necessary:

Battery.	In the battery position.	In reserve with the division.	In reserve with the corps.
	Rounds.	*Rounds.*	*Rounds.*
(Field) guns	2,200	500	2,200
Light field howitzers	2,200	500	2,200
Heavy field howitzers	1,400	300	1,400
10-cm. guns	1,600	400	1,600
(21-cm.) mortars (2 mortars)	300	80	300

Large quantities of ammunition can only be provided near the battery by extensive distribution in the surrounding country. Carrying ammunition over long distances by men must be avoided, as their endurance is fully taxed day and night by firing and entrenching. The more ammunition is collected near the battery position, the more will be exploded by being hit. Another result of storing large quantities of ammunition in the battery position is that on changing position a large part of it must be left behind in the old position, the subsequent removal of which, if, indeed, this is possible, can only be accomplished with the greatest difficulty.

50. AMMUNITION SUPPLY.

The supply of artillery ammunition of all kinds during the first days of the battle did not equal the great expenditure. Reserve supplies were only available in very small quantities. On July 14 an English attack took place which necessitated a great expenditure of ammunition. It was impossible to replenish the supply in the battery positions from the ammunition brought up by the L. of C., or from the ammunition depots of the army groups, to such an extent as to insure that the requirements for the next day would be met. The army group was compelled to ask for ammunition from Stein's army group, and this had to be partly brought up by night, under difficult conditions, from the advanced ammunition depots of the two divisions nearest to the army group in the north.

From July 15 onward the supply of ammunition was better. The amount sent up to the batteries was made up by supplies from the L. of C. in such quantities that, as a general rule, the amount of ammunition laid down in paragraph 49 as being

necessary in the battery positions and in reserve with the divisions was always available. The army group was also able to collect gradually a small reserve of ammunition (exclusively field-gun ammunition), but the supply was never sufficient to make good the expenditure in the event of the railway being blocked for one or two days. The lack of gun ammunition was always felt, and large reserves were never available. It is true that army headquarters always succeeded in bringing up the gun ammunition trains quickly and sending the ammunition from these trains to the battery positions, but a block on the railway might have had serious consequences. It is absolutely necessary to place so much ammunition at the disposal of the army groups that the above-mentioned "iron rations" are available in the battery positions and in the divisional and corps ammunition depots.

The supply of ammunition was arranged for by corps headquarters as far as the corps and divisional depots. Motor lorries, artillery ammunition columns, and infantry ammunition columns, supply parks, and supply columns equipped with heavy country carts, were all under one organization. As soon as the arrival of the trains was announced the columns were despatched to the detraining stations. The means of transport were sufficient. The divisions had at their disposal the battery and light ammunition columns, one supply park or supply column, and in some cases a foot artillery ammunition column as well.

Motor lorry columns have been very efficient and have carried out their duties very satisfactorily. The allotment of the country carts to the columns, which were used as a temporary measure to bring up artillery ammunition, proved a practical arrangement.

There should be ammunition depots for a large quantity of ammunition close to the detraining stations. In addition, light railways are required from the detraining stations to the depots. These were not provided, and consequently a large quantity of ammunition was piled up along the railway lines immediately beside the detraining station.

VIII. ENGINEER STORES.

51. PIONEER PARK DETACHMENT.

A pioneer park detachment must be available in every corps to take over the management of the parks and the supply of

engineer stores as soon as the corps is moved into a new position. Until an establishment for it is approved the detachment must consist of troops drawn from the corps, but it must be formed before the corps takes up its new position. The pioneer commander must have a suitable officer at his disposal, who will be in charge of the supply of stores; he should not, if possible, be on the establishment of any pioneer unit. The park detachment must be sent to its sphere of action as soon as the employment of the corps is decided upon. In the interest of the troops only specialists should be attached to it.

The officer in charge of the supply of stores must be able to move about, so that he can take personal action quickly should blocks occur. A small motor car should, therefore, be allotted to him.

52. PIONEER PARKS AND THE SUPPLY OF ENGINEER STORES.

A special pioneer railhead for pioneer stores must be provided. In order to facilitate supervision and traffic, ammunition and food supplies should not be unloaded at this station if possible. Entire trains loaded with pioneer stores must be brought up to insure an ample supply. This will also obviate the necessity of shunting at the stations in the zone of operations.

To enable him to send pioneer stores quickly up to the parks, the officer in charge of stores must have sufficient transport at his disposal; motor lorries from the reserve depots are most suitable. Each divisional pioneer park must have half a motor lorry column at its disposal. Horse-drawn vehicles are only to be used in cases of emergency, owing to their limited capacity and speed.

In front of the divisional pioneer parks small regimental parks containing pioneer stores, rations, and the most important articles of equipment must be pushed forward for the battle and established in convenient positions, distributed along the front immediately behind the trenches. The farther forward these regimental parks are the better for the fighting troops who have to fetch their material from them. They should be under the supervision of officers or senior noncommissioned officers. It is the duty of the regimental store officers to see that the parks are constantly kept filled.

IX. CLOTHING AND EQUIPMENT.

53. STEEL HELMETS.

The steel helmets, issued immediately before and during the battle, gained a great reputation among the troops in a very short time. It is considered desirable to equip artillery observers and antiaircraft posts with steel helmets.

54. JACKETS AND FOOTGEAR.

Owing to the fact that the buttons down the front of officers' jackets are now covered up it is impossible to attach field glasses and pocket torches to them. For the assaulting parties lace boots and puttees proved satisfactory.

55. PACKS.

Generally speaking, the knapsack has proved superfluous in such critical fighting, both in defense and attack. The fighting kit is sufficient. A sandbag converted into a knapsack, in addition to the haversack and jacket and trouser pockets, has proved useful for taking a larger amount of supplies into the fighting line.

56. WATER BOTTLES.

It has been found necessary during hard fighting to supply infantry with large tin water bottles (capable of being slung) from the reserve depots, in order to carry a double supply of water, as infantry fighting in the front line suffers more from thirst than from hunger.

57. ENTRENCHING TOOLS.

Repeated requests from all arms for an increased supply of entrenching tools must be met by their provision from the reserve depots behind the battle sector.

58. HAND STEREOTELESCOPES.

It is very desirable that the troops be supplied with hand stereotelescopes as they are easy to carry and are therefore more convenient than stereotelescopes or semistereotelescopes for observers during heavy fighting.

59. MAPS.

The original supply of maps was insufficient, not only as regards quantity but also as regards detail. The latter was particularly apparent owing to the fact that during the unfavorable conditions for observing which prevailed firing had at first to be carried out chiefly by the map. Even if it could not be expected that all the numerous battery positions (which in comparison to the original front in June are well behind the line) could not be reconnoitered and fixed beforehand it would nevertheless have been of advantage if a large number of points on the ground in question had been fixed and inserted on the map. The subsequent supply of maps was also inadequate.

60. ILLUMINATING MATERIAL.

Arrangements can be made for the troops to have at their disposal a sufficient supply of illuminating material by the issue of a certain quantity from the reserve supply of paraffin, lights, and spare batteries for electric pocket lamps. For the artillery, illumination is absolutely essential when firing at night to enable it to distinguish the reference points, to set fuses, etc.

X. HORSES AND VEHICLES.

61. HORSES AND VEHICLES.

The horses have stood their strenuous exertions comparatively well. This may be attributed to the fact that oats were available in considerable quantities.

The supply of horses and vehicles to the troops has reached the utmost limits owing, on the one hand, to the permanent reduction in the establishment of horses, and, on the other hand, to the permanent increase in fighting material and articles of equipment.

For bringing up trench material and sending forward food and ammunition at times when there are heavy demands for transport, it is very desirable that divisions should be allotted motor lorries and sections of horse-drawn columns from the reserve supply.

In the case of machine guns the absence of spare horses, which had been struck off the establishment, was badly felt. In one

machine-gun company all the riding horses, including that of the company commander, had, owing to the lack of spare horses, to be used as draught horses.

XI. FOOD SUPPLY.

62. RATIONS.

It is necessary that fresh troops going into the line, when the precise state of the battle is uncertain, should be supplied with the third iron ration. All troops were unanimous in their request for increased supplies of bread, rusks, sausage, tinned sausages, tinned fat, bacon, tinned and smoked meat, and tobacco, in addition. There was also urgent need for solidified alcohol for the preparation of hot meals.

In various quarters the necessity for a plentiful supply of liquid refreshments of all kinds, such as coffee, tea, cocoa, mineral waters, etc., is emphasized still more. On the other hand, the supply of salt herrings, which increase the thirst, was found to be, as a general rule, very undesirable. There is no necessity for an issue of alcoholic drink in warm and dry weather.

Similar requests for improved rations, suited to the prevailing conditions, when in position, were made by the artillery.

63. CANTEEN STORES.

The fact that individual batteries of a field artillery Abteilung are often, for tactical reasons, some little distance apart, and the supply wagons are engaged in bringing up rations, has the result that the field artillery is in a less favorable position than the infantry as regards the supply of canteen stores, which are carried on the supply wagons of the Abteilung staffs. A large number of other units, by regulation, carry no canteen stores with them and have to depend upon the friendly assistance of other troops. It is therefore necessary, on principle, that infantry units should allow the sale of canteen goods to artillery units, etc.

64. RATION SUPPLY.

No special difficulties arose. The supply columns proved sufficient. The corps arranged for rations to be brought up to the divisional depots.

65. CARRYING UP RATIONS.

The formation of carrying parties (see also Par. IV, B 32) was of great use in bringing up rations and also in supplying troops with ammunition and stores. Wherever infantry pioneer companies were not used for this purpose these carrying parties were formed within companies; this has the advantage of the feeling of cameraderie which prevails between such carrying parties and their fighting troops.

During a battle it is advisable to provide each battery with four "food carriers" from the reserve supplies.

XII. MEDICAL SERVICES.

66. RELIEFS.

The medical units of the corps went into the line with the divisions. The reliefs necessitated by this proved very useful, and this arrangement is preferable to taking over medical units already in the line and belonging to other corps, when the latter are relieved. The duties of the medical services during continuous fighting in trench warfare are so strenuous that the medical personnel urgently requires relief at the same time as the troops. Furthermore, the medical personnel takes greater pleasure in its difficult task and carries it out with more devotion if it is assisting the formation to which it belongs.

The relief of a field ambulance presents, it is true, many difficulties. It is best for the incoming personnel to arrive in the morning and for the outgoing personnel to leave during the afternoon of the same day. Should both parties be spending the night in the same place, the outgoing personnel must, if necessary, bivouac, in order that the quarters may be at the disposal of the personnel on duty.

67. MOTOR AMBULANCES.

The attaching of a motor-ambulance column to the army group proved itself very useful. In this connection it was found sufficient to place only a small proportion of the cars at the disposal of the casualty clearing stations (Hauptverbandplätze). The majority must be kept together, so as to have a supply of cars available for use wherever they are most needed for the moment. This motor-ambulance reserve was principally used to transport cases to hospital trains.

68. STRETCHER BEARERS.

It was of great advantage that before the corps was sent into line 50 stretcher bearers had been trained in each of the divisional field recruit depots, and were still there at the time the corps went in. The great demand for stretcher bearers, which was universal, was in this way met to a certain extent.

69. COMMUNICATION BETWEEN MEDICAL UNITS.

Telephone communications also assumed great importance in consequence of the wide distribution of the medical arrangements. It is desirable that the regulations should point out the importance of having ample telephone communications between all the various medical units in the line, so that these are not neglected until all the other telephone communications have been provided.

XIII. BILLETING AND TRAFFIC BEHIND THE FRONT.

70. BILLETING.

Owing to troops in the front line being constantly relieved, a frequent change of town majors was necessary. In the case of extensive billeting, difficulties occurred owing to town majors having first to acquaint themselves with the billeting conditions whenever troops moved in, and, further, agricultural products, special buildings, and orders in force could not be properly handed over. Permanent town majors must be appointed for villages in the areas in which the columns and trains are working and in the rear portions of the divisional billeting areas.

At times, when there is no great activity at the front, arrangements must be made for the construction of large wooden sheds in the back areas to accommodate men and horses.

71. MILITARY POLICE.

The police service behind the front is of the utmost importance. During any protracted fighting, men of sufficient authority and energy should be posted on all roads leading to the rear from the battle zone. Points of concentration for suspects should be arranged by the divisions as close as possible to the dressing stations and casualty clearing stations. In the villages behind the fighting line not only should there be a strict control

on all exits but an internal control should also be inaugurated. Detailed regulations should be issued by the town major, who will appoint sergeant majors and other personnel for carrying out this service.

72. ROAD TRAFFIC.

Regulation of traffic on all roads is the duty of the field mounted police, assisted by cavalry. Each division should have at least one through road allotted to it whenever possible.

XIV. RAILWAYS.

73. RAILWAY BUILDINGS.

The fighting front of the army group Stein (later Armin) was at first dependent on the railway station at Bapaume for the whole of its supplies. This station was complete and well constructed. During the first days of the operations the railway buildings came under fire, trains could only run into Bapaume during the night, and the detraining station could no longer be used. The stations under construction further to the rear were not yet complete. In addition to the detraining stations required in normal times, well-constructed detraining stations must be provided so far back that even if the first or second line has to be abandoned the enemy's artillery will not be able to shell them (about 13 kilometers).

Even in quiet times all railway construction must be carried out from this point of view, taking into consideration the fact that during operations on a large scale at least three times the usual number of men must be provided for. The wish expressed by the troops that railways should be provided to facilitate the transport of material to the front-line trenches, and that the pioneer depots, sawmills, etc., which in normal times are close to the front, should be connected by railways is easily understood. On no account, however, should comprehensive railway establishments further in rear be neglected; during the battle period these insure supplies, although during quiet periods their importance is not so apparent.

All such railway stations must be provided with long sidings for ammunition, pioneer, supply, and hospital trains. In addition, each siding will be provided with good roads to and from it and good dumping places.

74. DETRAINING PERSONNEL.

During important operations the detraining personnel must be permanent. The changes in commanders and men detailed from the front for this duty caused by the continual reliefs of the fighting troops had a very disturbing effect, and every one of these men is urgently required in the front line. The work at the detraining stations requires a staff with knowledge of local conditions, under the leadership of an experienced and energetic official. Insufficient staff is the cause of slow detraining, congestion at the stations, and blocks in the traffic along the whole section of the line.

One officer provided with a motor car must be made responsible for the whole of the detraining arrangements.

(Signed) SIXT V. ARMIN,
General Officer Commanding.

IV.

LESSONS DRAWN FROM THE BATTLE OF THE SOMME

By STEIN'S GROUP[1]

[1] General von Stein (commander of the Fourteenth Reserve Corps) was actually in command of all the German troops between Monchy and the Somme at the beginning of the allied offensive.

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IV.

LESSONS DRAWN FROM THE BATTLE OF THE SOMME.

To First Army Headquarters:

Herewith replies to the questions raised in the memorandum from Gallwitz's army group.

1. Have the principles on which the construction of trenches has been carried out up to date proved to be sound, particularly as regards entanglements, the depth and dimensions of mined dugouts, and the nature and size of the entrances to dugouts?

The following orders were issued by corps headquarters:

"The *first-line position* will be held if the enemy attacks. It must therefore be repaired immediately before any other work is undertaken. It consists of the first, second, and third trenches, and should have, if possible, two rows of wire entanglement in front of each trench. There should be at least two communication trenches in each company sector from the third trench to the first trench, but the points at which they enter and leave the second trench should not be opposite one another. The number of dugouts should be increased until there are sufficient to accommodate the infantry garrison which the division considers necessary for the repulse of a prepared attack.

"Accommodation should be provided first of all for the present garrison and supports in the first trench and for the present sector reserves in the second and third trenches. Further construction may then be taken in hand. Each battalion sector must have at least two through communication trenches.

* * * * *

"The intermediate and second-line positions consist of at least two trenches, each provided with two rows of wire entanglements, which should be on pickets, and the same number of communication trenches as in the first-line position. Each of

the present regimental sectors must be provided with sufficient accommodation for at least one battalion.

"In view of the heavy guns which the enemy is employing, the thickness of earth above dugouts should be increased for any new ones that are constructed. It may be as much as 19½ feet, depending on the nature of the soil, but the depth below ground must not prevent a quick response to an alarm. All dugouts must have at least two entrances. Dugouts should be constructed under the parapet, not under the parados, and the entrances should be in the front slope of the trench."

These principles have on the whole proved sound. Partly owing to the increase in the number and effect of the enemy's heavy artillery, the following alterations are suggested:

Obstacles.—There should be two or three rows of wire entanglement, each from 3 to 5½ yards deep, with an interval of from 5½ to 11 yards between each, this interval being provided with trip wires. The outer edge of the farthest entanglement should be about 55 yards from the trench. The wire should not always run parallel with the trench, but should follow the lie of the ground.

Dugouts.—The thickness of earth overhead should be from 23 to 26 feet, and more in the case of command posts and the dugouts for the medical services, telephones, and kitchens. The dugouts for the men should have sufficient accommodation for two groups (i. e., 16 men), with two entrances separated by a traverse. Several dugouts should be connected up to form corridor dugouts with accommodation for a platoon. The dugout recesses should be on the same side as the entrances—not facing them. Entrances should be 4 feet by 5¼ feet, and should be well stayed and braced to increase their power of resistance. Inclined galleries offer more resistance than frames built in on steps one below the other.

2. What were the garrisons of first, second, and third trenches and of the retired positions?

The following orders were issued by corps headquarters:

"The garrison of the first trench of the first-line position should be strong enough to repulse the enemy's attack, assuming that the men reach the parapet in time, but no stronger.

"The second trench of the first-line position is garrisoned by the supports, one portion of which is specially detailed to defend the entrances to the communication trenches, while the other portion consists of strong specially formed bombing parties,

which are held in readiness to rush forward at once to the support of the foremost trench. This maneuver must be practiced as if it were a regular drill. Local conditions may make it necessary to station part of the support in the third trench.

"The fighting strength of both the front trenches would soon be exhausted if the sector reserves were not put in. These must therefore be brought close up in good time, either into the third trench or into special reserve trenches. In case of an attack they should be moved forward into the second (or third) trench to replace the reinforcements which have already gone forward (the supports) and continue the task allotted to the latter."

The method in which the trenches were occupied on the morning of July 1 is shown on the attached 1/80,000 map. (Not attached.)

From this it will be seen that the first-line and intermediate positions were occupied by the regiments holding the foremost line. Where the line ran more or less straight the companies were organized in depth, so that part were in the first trench, part in the second, and sometimes even in the third. The battalion reserves were in the third trench, the regimental reserves in the intermediate position.

3. Did the garrison prove to be too strong or too weak?

Most regimental sectors were too wide. The width of front held by an infantry regiment which has to resist a hostile attack prepared by heavy artillery fire should not exceed 1,300 yards, so that the regiment can be organized for action in depth. It is, as a rule, sufficient to have one man to every 2 to 3 yards as an emergency garrison in the first trench.

4. Where were the reserves, and were they strong enough? Were the complete units held in reserve posted in the villages or in the trenches?

The positions of the reserves are marked on the attached 1/80,000 map. (Not attached.)

The following orders were issued by corps headquarters:

"The sector commander must be relieved of anxiety as to his forces being exhausted too soon by moving up the divisional reserves. They should not be left behind in villages in the rear, but should be brought up to reserve trenches on the battle field as soon as the threatened sector can be ascertained from the direction of the enemy's artillery fire. Whether they stay there one day or several days is a matter of indifference.

"In critical situations it is not sound to quarter reserves in villages immediately behind the front. It has nearly always proved impossible to assemble the troops quickly when they were scattered in numerous cellars, etc., in a village which was being heavily shelled. In such cases the reserves should be in the trenches."

In accordance with these orders, the greater part of the divisional reserves was stationed on the second-line position. In cases where, owing to the shortage of working parties, there were not enough dugouts in the second-line position, a small part of these reserves was obliged to remain in villages beyond the principal zone of fire. In the case of the second guard reserve division, the tactical situation made it possible to retain a battalion in the huts at the Bois de Logeast.

The reserves for the 28th Reserve Division and 12th Division were not sufficient. In the case of the 12th Division, they consisted, on the evening of June 30, of troops which had been withdrawn from the first-line position because the divisional commander considered that they had been badly shaken by artillery fire.

The corps reserves consisted, on the morning of July 1, of the 16th Bavarian Infantry Regiment, four squadrons of dismounted cavalry, and the Württemberg Cyclist Company. These were too weak. To be able to meet all possible situations, two complete divisions would have been necessary, one of which should have been in and near Bapaume and the other south of that place.

5. How can our machine guns be most effectively placed and employed? For instance, on commanding points, firing from trees (raised platforms).

The following orders were issued by Corps headquarters:

"When the ground permits of machine guns being employed on commanding points in the second and third trenches, with a view to firing over the first trench, every advantage should be taken of it. It is advisable to employ the bulk of the machine guns not in, but behind, the first trench. When fixing their siting the possibility of delivering both frontal and flanking fire must not be forgotten.

"Used as an emergency garrison for the intermediate or second-line position, they may prevent a break through if the enemy succeeds in overrunning the first-line position.

"Machine-gun units are particularly suitable for employment as a commander's mobile reserve.

"Machine guns which are left in breastworks or trenches during the enemy's intensive bombardment will be destroyed unless they are covered by very strong concrete emplacements. It will generally be impossible to erect such concrete structures in the first trench. Machine guns must, as a rule, be kept in the dugouts of their crews until the enemy assaults, and must then be placed rapidly in position at suitable points on the parapet, without making use of the sledges, as these are too heavy for trench warfare."

No alterations are necessary in these orders. The effect of the machine guns and the surprise of the English at finding so many intact machine guns after a seven days' artillery preparation, as ascertained from numerous prisoners' statements, are well known.

No machine guns were placed in trees.

6. What nature of the enemy's guns, trench mortars, and projectiles caused the largest number of casualties, and what caused the most damage to the trenches?

The largest number of casualties was caused by artillery fire (H. E. shell and shrapnel up to 12 centimeters, i. e., 4.7 inches).

The trenches were damaged most by heavy trench mortar projectiles; next to these, heavy shell from 15 centimeter (6 inch), upwards caused the most destruction.

7. Was communication maintained between the front line and battalion and regimental battle headquarters? What means were employed? Have you any proposals?

The following orders were issued by corps headquarters:

"Buried cables have proved very successful in the reserve corps. When crossing the open they are buried to a depth of at least 5¾ feet, and in trenches they are laid at least 2½ feet below the surface of the sole of the trench. When laying new lines, a greater depth is advisable (6½ feet and 3¼ feet). Further, when cables are led into dugouts, command posts, etc., they must be laid underground."

In the sectors which had been prepared by the 12th Division from Mametz to the Somme, the lines were for the most part laid above ground.

On 26–6–16 the corps reported to army headquarters in its morning report:

"The telephone communications on the old front of the reserve corps have proved reliable. In the Mametz sector, which

has just been taken over, and in the 12th Division they are conspicuously bad."

On 30–6–16 the telephone communications in the 2d Guard Reserve Division, 52d Division, and 26th Reserve Division were still, on the whole, good. In the Thiepval sector, which was particularly heavily shelled by the enemy's heavy artillery, communication between battalions and companies had to be maintained by means of runners. In the 110th and 111th Reserve Regiments of the 28th Reserve Division, which were also much shelled by heavy artillery (9.2 inch), it was possible to make uninterrupted use of the telephones on the buried cable lines in the first-line position and in the artillery position.

The lines between the artillery and the infantry were, in the course of time, entirely destroyed. In the sector of the 109th Reserve Regiment and 62d Regiment telephone communication ceased almost entirely by 25–6–16, while in the sector of the 63d Regiment much damage was caused a little later. On 30–6–16 runners took the place of telephone communication in all three regimental sectors of the left wing.

Proposals.—Exposed telephone lines should be laid only far behind the front line; if possible, never in front of the third-line position; even in rear of this position they should be replaced by buried cable in those villages which, on account of the proximity of a railway station, etc., are liable to bombardment by heavy artillery. In front of the third-line position buried cable (armored cable) should be laid at a depth of 10 feet across open country and 5 to 6½ feet when beneath the sole of a trench provided with trench boards. The construction of the cable trenches must be concealed as much as possible from the enemy (work to be carried out by night or in misty weather, and trenches covered up so as to conceal them from aeroplane observation). The routes of the cable trenches must be marked on the ground by stone slabs and recorded on maps which can be given to the repair detachments.

Telephone communications alone, however carefully they may be constructed, are not sufficient. Several means of communication must always be available.

At many points on the front the *light-signaling stations* have proved very successful. Small *wireless stations* are said to be under trial. No information as to the result of these experiments is yet available.

Carrier pigeons and communication by means of aeroplanes are also said to have been effective at other points on the western front. The Fourteenth Reserve Corps has not had sufficient experience with these.

When all others fail, the runner still remains as the last means of communication. Numerous *runners* must be trained to know the ground. Dugouts should be constructed at intervals along the routes used. Runners should never be sent out singly.

8. Have the signals for requesting barrage fire proved effective?

The barrage fire signals have proved effective. The light-signals should always be followed, immediately if possible, by detailed reports by telephone from the front line to the artillery group commanders. Better arrangements should be made for the supply (of signal lights). The English imitated our barrage fire signals. To meet such eventualities, an ample supply of a different kind of signal should be available in the Army, or better still with the corps, so that the signal can be changed immediately.

9. Has the construction of the battery positions proved satisfactory? What is the best method of storing the reserve of ammunition with the batteries?

The gun emplacements should be covered in with concrete overhead cover only if the latter is sufficiently thick to keep out 9.2-inch shells. Weaker concrete cover is harmful, as the damage to the guns is thereby increased if the concrete is penetrated, and buried guns take longer to extricate. Further, it requires a very long time to repair concrete emplacements.

If it is not possible to protect the gun emplacements against shell of the largest calibers by providing concrete of sufficient thickness or strong cover of logs dogged together, it is better to put up with splinter-proof cover (without concrete). This will be the most usual form of cover.

To guard against the incendiary effect of shell, very little timber should be used for concealing gun emplacements; if used, it should be covered with sheet iron or painted with asbestos paint.

Gun detachments and ammunition should be accommodated in and close to (50–100 meters) the batteries, in dugouts provided with at least 23 feet of earth cover. The ammunition

dugouts situated close to the batteries should be connected with the latter by blinded trenches or by mined galleries.

10. Were the supplies of ammunition sufficient? What results were obtained with T-shell (lachrymatory gas shell)?

The supplies of ammunition on 24–6–16 consisted of—

1. The ammunition stored in the battery positions.
2. The ammunition in the divisional columns.
3. The corps reserve in columns or in depots.

The quantities stored in the battery positions were:

For a field gun battery, 2,400 rounds.
For a light field howitzer battery, 2,000 rounds.
For a heavy field howitzer battery, 1,200 rounds and 300 T gas shell.
For each (21 cm.) mortar, 220 rounds.

The light ammunition columns of the field artillery were full, the battery columns for the heavy field howitzers each contained an average of 300 rounds, and the battery columns for the (21 cm.) mortars were almost empty.

The corps reserve consisted of:

25,000 rounds for field guns.
3,750 rounds for light field howitzers.
1,200 rounds for heavy field howitzers.
750 rounds for (21 cm.) mortars.

The average daily expenditure during the artillery duel from the 24th to the 30th of June amounted to—

For a field-gun battery, 1,500 rounds.
For a light field-howitzer battery, 1,050 rounds.
For a heavy field-howitzer battery, 520 rounds.
For each (21 cm.) mortar, 100 rounds.

On July 1, the day of the infantry attack, the average expenditure was:

For a field-gun battery, 2,270 rounds.
For a light field-howitzer battery, 1,800 rounds.
For a heavy field-howitzer battery, 940 rounds.
For each (21 cm.) mortar, 200 rounds.

The quantities stored in the battery positions consequently sufficed to meet the average expenditure. There are, however, occasions which involve a specially high expenditure by individual batteries; for instance, individual batteries on individual days fired:

Field-gun battery, over 4,500 rounds.
Light field-howitzer battery, over 3,000 rounds.
Heavy field-howitzer battery, over 1,200 rounds.
A single (21 cm.) mortar, over 250 rounds.

Although it is probably not possible to raise the "iron ration" of the field-gun batteries as high as 4,500 rounds, nevertheless the figures for the highest expenditure show that the average expenditure should not be taken as a basis for determining this "iron ration."

Consequently, it is considered essential that the following amounts should be maintained in the battery positions:

For a field-gun battery, 3,000 to 3,500 rounds.
For a light field-howitzer battery, 3,000 rounds.
For a heavy field-howitzer battery, 1,500 rounds and 300 T gas shell.
For each (21 cm.) mortar, 250 rounds.

Batteries to which ammunition can be brought up by day can manage with a smaller "iron ration."

As the supplies were brought up in good time, no serious want of ammunition was felt. It is considered essential that the whole of the divisional columns be kept filled. The corps reserve must be regulated in accordance with the facilities for bringing up supplies from the army to the corps. If these had not been good as regards the Fourteeth Reserve Corps (some of the ammunition trains were able to run beyond Bapaume), the reserves, especially in the case of light and heavy field howitzers, would certainly have proved inadequate.

The bombardment of hostile groups of batteries with *T gas shell* repeatedly caused a marked diminution in the enemy's fire, a fact which was also observed by the infantry in the front line. T gas shell should be stored in special dugouts.

11. How wide were the zones of barrage fire? What width is necessary?

The average widths of the zones of barrage fire for a field battery were:

	24–6–16	1–7–16
	Yards.	*Yards.*
In the 2d Guard Reserve Division	395	440
In the 52d Division	410	385
In the 26th Reserve Division	455	440
In the 28th Reserve Division	620	440
In the 12th Division	550	435

The widths of these zones were too great. A field battery is unable to cover more than a width of 220 yards and yet insure that the barrage is effective in spite of guns being put out of action and of the absence of support from neighboring sectors.

12. What suggestions have you for the employment of our aviators, with special reference to cooperation between the artillery flights and the artillery?

On June 24 the reinforced Fourteenth Reserve Corps, holding the front from Monchy to the Somme (i. e., a front of more than 19 miles), had at its disposal 4½ flights and a pursuit flight (Jagdstaffel), making a total of 28 machines.

This allotment was insufficient to maintain command of the air against the enemy who was far superior in numbers. Further, the new English battle planes were superior to our own.

The organization of the aviation units was not suited to their effective employment. Reconnaissance machines and single-seater battle planes should form part of the same unit.

Proposals.—(1) A corps flight should consist of 12 reconnaissance machines and 8 single-seater battle planes, which mutually assist each other. (2) The artillery of every division must be allotted an establishment of one artillery flight, consisting of six machines. The permanent cooperation of the same battery and artillery commanders with the same artillery aviators is absolutely essential.

The machines of both the ordinary and the artillery flights must be employed offensively. The flights of hostile machines behind our front can only be restricted by forcing the enemy to defend himself over his own ground. The artillery machines with their escorts should form a continual protection for our own front.

13. How was the feeding of the garrisons of the trenches carried out during the fighting?

The quantity of "*iron rations*" in the position was increased to 5 days' rations. Ample supplies of mineral water, cigars, chocolate, and solidified alcohol for warming up food were provided. The arrangements proved exceptionally satisfactory.

The provision of kitchens and storerooms in mined dugouts and of spare kitchens is necessary. Carrying parties with baskets, etc., *to carry up food into the front line* during pauses in the artillery fire, are also required.

14. Medical services.

Dressing stations (*Truppenverbandplätze*).—In rear of every battalion sector it is advisable to have one bombproof medical dugout with accommodation for 30 wounded, or two dugouts each for 20 wounded. It is necessary to provide these dugouts with an ample supply of medical stores, rations, and lighting materials sufficient for five days or longer. Telephone apparatus, stretchers (hand and wheeled) and oxygen breathing apparatus are also necessary. The medical personnel should include squads from the medical companies under competent leaders who know their way about the whole sector.

As regards the artillery, it is necessary to provide a bombproof medical dugout, a surgeon, the necessary personnel, and the stores mentioned above for every four batteries, assuming that they are not far apart. This dugout should have a central position close to a main road.

Halting places for ambulance vehicles (*Wagenhalteplätze*).—These should be situated not more than 4,400 yards behind the front, as otherwise the transport from the dressing stations is too exhausting for the stretcher bearers and lasts too long for the wounded. Bombproof dugouts for 30 to 40 men should be constructed at these halting places. Experience shows that a large number of wounded tends to collect at these points.

Main dressing stations (*Hauptverbandplätze*).—These should as a rule be sited beyond the zone of artillery fire, in bombproof shelters near a main road. It is necessary that eight motor ambulances, instead of four, should be provided for the front held by a division.

One medical company per division is not sufficient to provide the necessary number of stretcher bearers in trench warfare if the battle lasts for several days. Owing to the much greater difficulties of transport in the trenches, the stretcher bearers quickly become exhausted and must be frequently relieved if the removal of the wounded is to be carried out without a hitch. The establishment of a division should comprise not less than two medical companies.

Collecting stations for slightly wounded (*Leichtverwundeten-Sammelplätze*).—A collecting station for slightly wounded was established in each division, from which men who were slightly wounded were dispatched to the ambulance section (Krankentransport Abteilung). This was not sound in practice, as a

large number of wounded collected at the ambulance sections and it was not possible to arrange immediate transport for them.

It would be better to arrange for a corps collecting station for slightly wounded, where these could be treated and be properly bandaged. They would then be evacuated as ambulances became available.

Field hospitals (Feldlazaretten).—Field hospitals which have been formed should have four motor ambulances allotted to them.

Ambulance sections (Krankentransport Abteilungen).—Where the sector held by a corps is of considerable width ambulance sections must be divided up and allotted to more than one railway station. Hospital trains should be shunted on to sidings so that they do not interfere with other railway traffic.

15. What experience was gained regarding the enemy's tactics, infantry, machine guns, artillery, and trench mortars?

Infantry, machine guns, and trench mortars.—Previous to the attack the enemy's infantry patrols showed increased activity. The foremost trenches were probably lightly held during the intense artillery fire. The troops for the assault were apparently assembled in the trenches in rear.

The attack on July 1 was well prepared, and the infantry was splendidly equipped with all kinds of weapons for the close combat. It was provided with a large number of Lewis guns, which were brought into action very quickly and skillfully in newly captured positions. It is very desirable that our infantry should be equipped with a large number of light machine guns of this description in order to increase the intensity of its fire.

The individual English soldier is well trained and shows personal bravery. The majority of the officers, however, are not sufficiently thoroughly trained. They are lacking in ability to exploit a success and to follow it up quickly.

Small blue lights and small flags are said to have been used by the enemy to communicate to the rear and to indicate the line reached. Telephone connections were established very rapidly.

The enemy's trench mortars were skillfuly served and produced effective results.

The German infantry is, nevertheless, superior to the English and will be still more so when it is better equipped with weapons for the close combat and with light portable machine guns.

Artillery.—The enemy's artillery registered skillfully and inconspicuously. The guns proved accurate; the effect of the shells was good, but the percentage of blinds was high.

On many occasions the enemy purposely refrained from shelling batteries and observation posts, the positions of which were obviously known to him before the offensive began. It was obvious that all the artillery which he must have had on the ground was not used for the purpose of repelling our trench raids. It was a mistake on his part to make the limits of the zone covered by his intense bombardment on the front of the 2d Guard Reserve Division coincide exactly with the limits of the zone of attack. This made it easy for us to switch batteries, at the very outset, from sectors which were not threatened on to those which were being intensely bombarded.

Gas and smoke clouds were employed before the attack in the hope not only of causing us casualties but also of drawing our barrage fire, thus enabling the enemy to ascertain its intensity and location, and the positions of our batteries. In the actual attack, gas and smoke clouds were employed alternately. At some points on our front the last cloud was a smoke cloud, under cover of which the first waves of the attack appeared suddenly just in front of our trenches.

(Signed) V. Stein,
Lieut. General.

V.

THE GERMAN ATTACK OF JULY 31, 1917, ON THE CERNY PLATEAU.

[Translation from the French Bulletin G. Q. G., Aug. 28, 1917.]

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V.

THE GERMAN ATTACK OF JULY 31, 1917, ON THE CERNY PLATEAU.

(Translation from the French Bulletin G. Q. G., Aug. 28, 1917.)

HEADQUARTERS AMERICAN EXPEDITIONARY FORCES,
GENERAL STAFF, INTELLIGENCE SECTION (A),
October 15, 1917.

NOTE.—The information which follows is derived from cross-examinations held at the third C. A. and at the tenth army, as well as from documents found on prisoners.

The study of "the German attack of July 31, 1917, on the Cerny Plateau" gives in a very complete way the details of a divisional attack with limited objectives.

The characteristics of this attack follow:

1. Extreme brevity of preparation fire as such; this fire lasting only 5 minutes, the assailants arrive in the position when the defenders are just beginning to shelter themselves.

2. Suppleness of the attacking arrangements of the battalion and the company, arrangement which varies with each unit.

3. Companies were dislocated in view of the attack, in order to form, with men picked from the various groups, a certain number of "stosstrupps," and a reserve troop, detached.

4. Rôle of the "stosstrupp" which is in fact merely an "advance guard" which "leads and shows the way."

I. OBJECTIVE OF THE ATTACK AND DIVISION OF FORCES.

A. OBJECTIVE.

Since the cessation of our attacks the enemy wishes to recapture the entire Siegfried position, on the Cerny-la-Bovelle Plateau, the enemy wishes to reach the line, consisting of the

Hayden-Mahler-Memel trenches, and the Fourragere trench, and unite with the elements which they have already taken of the Franconie trench.

Thrown back in April-May on the northern slopes of the La Bovelle Plateau, they succeeded at the end of June in reestablishing themselves on the plateau from the south of La Bovelle up to the eastern approaches of Cerny. To the south of Cerny they are clinging to the northern slopes of the Chemin-des-Dames.

They therefore have to capture a salient easy to approach at the center and on the left wing (east), but difficult to approach on the right wing, where they have not yet retaken a foothold on the heights.

B. DIVISION OF THE FORCES AND OF THE COMMAND.

The command is in the hands of one man (general commanding the Thirteenth D. I.), thus insuring in the best way the combination of efforts.

There are three regimental sectors:

(*a*) Sector of the 13th R. I.: This is a maneuver sector, with a difficult outlet (first and third battalions placed side by side; the second in immediate reserve).

The first battalion, wing battalion, is spread out over a front of about 375 meters, having probably three companies in line and one company in support.

The third battalion, on its left, placed holding a front of 450 to 500 meters, has three companies in line and one company in support.

(*b*) Sector of the 15th R. I.: This is the center of the line. The second battalion is spread out over approximately 750 meters, having its four companies in line. (The first and third battalions being held in reserve.)

(*c*) Sector of the 55th R. I.: This is the left wing; the second battalion has two companies in line.

Reserve Troops.

(*a*) The second battalion of the 13th R. I. is placed as reserve on the right wing (eastern shelter of Cerny).

(*b*) The first battalion of the 15th R. I. is placed behind the center of the attack (probably as a brigade reserve), having detached a company to the left wing (shelter of the eastern tunnel).

(*c*) The third battalion of the 15th R. I. is placed on the northern borders of the plateau (probably as a divisional reserve) and furnishes Tragertrupps to the assaulting units.

II. PREPARATION OF THE ATTACK.

A. INFANTRY.

(A) THE INFANTRY IS ALLOWED TO REST UP TO THE HOUR OF ATTACK.

The attacking battalions, all of which have held the Cerny-La Bovelle sector, sent back to rest on the 21st and quartered 8 or 9 kilometers from the front (Parfondru, Veslund). To give them rest the lines are taken over by parts of the Eleventh B. D. They only return to the sector in the night of the 30th to the 31st. On their arrival they are sheltered in "stollen" near the first line, and do not take their position of departure until a few minutes before the attack is launched.

The assaulting troops are really fresh, not weakened by the demoralizing influence of bombardments, losses, or fatigue; fresh troops, without being new, familiarized with the sector which they have occupied and knowing their objectives of attack well from previous observations made on the spot.

(B) SPECIAL INSTRUCTION IN VIEW OF THE ATTACK.

The whole of the positions to be taken had been represented with a great deal of exactitude on the ground north of Vesbud; trenches and communicating trenches had been dug to a depth of 30 or 40 centimeters; positions of departure and objectives had been staked out with flags having the same conventional numbers as those marked on sketches distributed before the attack.

While they were resting, starting on the 22d, rehearsals of assaults were held, to begin with, simply with battalions and regiments; then, on the 26th, 27th, and 28th of July, rehearsals of the whole were carried out, one of which was held in the presence of the general commanding the division. Stosstrupps were likewise formed and trained for their special mission.

The mechanism of the attack was minutely foreseen; every man knew his place of departure, his objective, his mission; for the men handling machine guns the itinerary and the position of the battery were fixed for every piece. (See annex sheet No. 1.) Every battery chief, every commander of Stosstrupp or Kampftrupp received a sketch marked according to the numbers of the flags used in the rehearsal, and showing the itinerary to be followed.

Nothing is left unforeseen in the mission to be carried out; it has been endeavored to have everyone reach a state of reflex action during the attack. Thus the troops will only have to repeat a known maneuver on known ground.

This technical and moral preparation of the infantry will cause the blow to be delivered with the maximum of vigor.

Finally, to make sure of surprising the enemy as much as possible, the commanding officer leaves his troops in ignorance as to the hour of attack up to the very last moment; they only know the day X; they do not know the hour X. In the eighth company of the 15th R. I., the company commander had told his men on the evening of the 30th that they would attack on the 31st at 9 o'clock in the evening. But the next day at 12 o'clock they found out that the preparation would begin at 12.55 and the assault at 1 p. m.

B. PREPARATION OF THE GROUND.

It has been entrusted to troops which will not carry out the attack; some of them only will participate in it as supporting units (second battalion of the 13th R. I.; third battalion of the 15th R. I.).

Discreet preparations are commenced, the purpose of which is difficult to discern; lines and numerous defense accessories are built; old trenches (Franconie trench) repaired; of machine guns installed on the Franconie. The creation of a continuous trench removing a noticeable indentation (between the Le Meduse trench and the Zouave Charlet trench) would be likewise justified by the defensive.

More precise indications as to the purpose of these preparations appear only during the last days in the work on the old Yser tunnel (which is prolonged under our lines) and especially with the creation of new emplacements of mine throwers.

On the whole, a summary and rapid organization.

C. ARTILLERY PREPARATION.

The Germans noticeably increased their artillery strength a few days before the attack, by bringing up a number of trench mortars; these mortars tried out the range in a very discreet manner (few shots). They were to form the nucleus of the German artillery preparation.

The artillery (field and heavy) is grouped together without being moved, in order to form provisional units which will be able to produce a concentrated fire.

An important bombardment is started on the 27th, on the whole Cerny-Ailles front, having without doubt a destructive effect, but also appearing to be an isolated artillery rehearsal.

On the 28th occurs an intermittent sprinkling of the first lines.

The actual preparation lasts only from 12.55 to 1 p. m. on the 31st, thus combining to the greatest degree the effects of violence and of surprise; the assailants reach the position when the defenders are just beginning to seek shelter.

III. THE CARRYING OUT OF THE ATTACK.

A. STOSSTRUPPS.

They are made up of men drawn from the normal personnel of the companies. These men are, if possible, volunteers; if there are not enough volunteers, the remainder are chosen by the officers. Every "Stosstrupp" is especially trained for its mission on the rehearsal ground.

NOTE.—The company "Stosstrupp" is not a permanent part of the company. Formed for the attack, it is generally disbanded afterwards and the men go back into their various platoons. In fact, it is becoming more and more usual for all the men in the companies to receive the instruction of "Stosstrupps."

But it seems that, besides the three regular sections, the existence of a fourth section is becoming more and more general. This section acts as a sort of reserve of the company commanders, remaining at his disposal, to be used by him at the difficult point of combat, in the offensive as in the defensive.

It is composed in general of the best squads and of specialists; three squads of light machine guns, three squads of grenade throwers.

Strength.—Variable; varies from 8 men (one group) to 20 men.

It almost always includes foot soldiers, to whom the attack is entrusted; pioneers entrusted with the destruction of shelters and obstacles; and always, it seems, one light machine gun to defend the captured ground (with three gunners, one non-commissioned officer, chief of the piece, and at times a gunsmith).

In certain cases the "Stosstrupp" is formed almost entirely of pioneers (as was the one ordered to take the southern outlet of the Yser tunnel; it seems that a flame thrower went with it).

Armament.—Foot soldiers always carry 10 grenades and their gun. (NOTE.—This equipment is lighter than that of the foot soldiers of the following waves, who carry 20 grenades besides gun).

Pioneers.—They carry shears, etc., and their rifle (those of the Garde are armed with a revolver).

Men handling machine guns carry their revolvers.

The number of Stosstrupps and their composition are exactly determined according to the mission of the companies and the depth of the objectives to be reached, thus:

There were three Stosstrupps of 20 men at the seventh company of the 15th R. I., which made up the flank of the attack and had a distant objective assigned to it.

There were two Stosstrupps—one of 10, the other of 23 men, 1 officer, and 1 ensign bearer—at the eighth company of the 15th R. I.; this company was placed at the center, but had more than 600 meters to cover.

There were three Stosstrupps of 10 men at the ninth and twelfth companies of the 13th R. I.; this company attacked on a more narrow front and had been assigned closer objectives.

B. METHOD OF PROGRESSION.

The Stosstrupps play a double part—leaders and scouts. They leave in waves, advancing in open order as far as the first French line, then spread out in the trench and try to clear it. The first wave joins them; relieved by it, they rush on again toward the second line, and so on, as far as the final objective which they themselves clean out, assisted by the following wave.

Their normal method of progression is in extended waves and in open country.

As soon as a strong resistance is offered, they advance through the communicating trenches in the following order (example taken from the seventh company of the 15th R. I., see plan No. 2):

The Stosstrupp leader goes first; then grenade throwers in a row or "teil" of 6; then pioneers, in a row of 3, 1 ensign bearer; again grenade throwers in a row of 6; finally the machine-gun men (4 plus 1 noncommissioned officer).

The speed of the advance is very carefully regulated in agreement with the artillery:

From 12.55 to 13 o'clock, fire on the Iglan and Deimling trenches.

From 13 to 13.03 o'clock, the fire is carried back to the Dresde and Mirberg trenches.

From 13.03 to 13.06 o'clock, the fire is carried back to the Brahms and Bruckner trenches.

From 13.06 to 13.10 o'clock, the fire is carried back to the Memel and La Fourragere trenches.

From 13.10 o'clock on the fire is carried to the south of the Chemin des Dames.

The Stosstrupps arrive with the last shells; they have barely two minutes to spend in each trench, and they leave the actual fighting to the following waves.

The distance between the waves (or "fight waves") and the Stosstrupps is likewise very precisely regulated; before the start, the various waves are massed in the most advanced trenches (parallels, sapheads) with the Stosstrupps; they run forward automatically as soon as they see the Stosstrupps, or the preceding wave arrive in the first trench; when the objectives are farther away, the distance between waves is predetermined (in the ninth company of the 13th R. I., 10 meters between the Stosstrupp and the first wave; 15 meters between the first and second waves).

The carrying troops (Tragertrupps) themselves follow at a short distance, then the reserves, which unite the captured position with the position of departure.

In short, everything is set in operation so as to obtain first of all an extremely rapid action; the speed of the blow seems to be the first element of success, in the opinion of the German commanding officer. The object of this rapid progression is to

reach commanding stations by surprise, neutralize the local commanding staff by isolating them from their troops; then attack, in case the range was too short, and to inform the coming continues in the first line the third should already be occupied.

In the rapidity of this advance no trace is found of the hierarchy which the German order of May 11, 1916, established. (NOTE.—"Principles for the execution of an infantry attack in trench warfare." Translation of the G. Q. G. of July 13, 1916, under No. 9178), between the various assaulting waves. Assaulting wave (Sturmwelle); clearing-out wave (Aufraumungswelle); strengthening wave (Verstarkungswelle).

The common mission of all the waves is to fight; the waves follow each other in succession and without stopping. There is but one distinction; the Stosstrupp does not give battle; its mission is to open the way; the other waves fight. The Germans rely especially on the following maneuver: Overrun the enemy and pass beyond him to reduce the strong positions.

C. LIAISONS IN THE ASSAULT.

They are very thoroughly planned out.

(*a*) *Liaison with the artillery.*—In each battalion one artillery officer with a few gunners starts with the Stosstrupps and the first wave to insure the lengthening of the range during the attack, in case the range was too short, and to inform the commanding staff of the objectives reached. Variously colored rockets are used to ask for a lengthening or a shortening of the range.

(*b*) *Liaison with acrial observation.*—The stosstrups were supplied with white panels and newspapers to mark the front. An infantry avion must follow the attack.

(*c*) *Liaison with the commanding staff.*—With the company staff go:

1. Runners (melder).

2. Signal men (winker) with small electric searchlights (a different colored light for each battalion).

3. Finally, two out of three companies of the first wave were equipped with two couples of carrier pigeons and two pigeon attendants.

If the final objective was reached the infantry immediately signaled the fact by means of white rockets.

CONCLUSIONS.

From the few items of information which precede, it seems that one can deduce the following principal points of the technique used by the enemy in sudden attacks with limited objectives:

I. Stosstrupps are being used more extensively.

II. Stosstrupps have a tendency to become more mixed in their composition. They are tending to become a chance groupment, instead of a selected formation (Elite group).

III. The number of Stosstrupps varies (as does the whole plan of attack) according to the mission and to the ground to be covered.

There is no rigid formula; there are merely fixed categories which are altered according to the demands of the situation.

IV. Increasing importance given to the violence of the blow:

1. During the preparation;

2. In the attack, not only by the leading units (progression at fixed time and very rapid), but by the waves (following very close and automatically).

Annexed Document.

[Twelfth R. I., No. 435, machine gun.]

DISTRIBUTION OF MACHINE GUNS IN "BLUCHER."

Itinerary of the assaulting machine guns.

Gun No. 5 will follow Stosstrupp No. 5 into the first French line and will be placed in position at point 370K.

Gun No. 6 of the second machine-gun company will follow Stosstrupp No. 10 in the first French line and will be placed in position at point 370.

Gun No. 2 (of the first machine-gun company) will follow Stosstrupp No. 9 into the first French line, point 370. After the successful outcome of the attack, it will be placed in position at point 371 p. in our new first line.

Gun No. 10 (of the first machine-gun company) will follow Stosstrupp No. 12 in the first French line to point 279.1. After the successful outcome of the attack, it will be placed in position in the first French line just to the right of exit S of the Cerny tunnel.

Gun No. 11 (of the third machine gun company) will follow Stosstrupp No. 18 into the first French line, and will be placed in position at point 278K.

There are munition depots near guns 2 and 3.

There will be one machine-gun man in line as a reserve for every machine gun used in the attack.

FOOD SUPPLIES.

Each man is to have two days of reserve food supplies and two water cans. The first machine-gun company will insure the supply of hot nourishments; the rations will have to be handed over to it.

(Signed) GOESMANN,
Officer in Charge of the Machine-Gun Service at the General Staff.

VI.

NOTES ON THE GERMAN ATTACK AT BOIS LE CHAUME, SEPTEMBER 25, 1917.

[Translated from Bulletin, Second Bureau, Standard French Army.]

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VI.

NOTES ON THE GERMAN ATTACK AT BOIS LE CHAUME SEPTEMBER 25, 1917.

[Translated from Bulletin, Second Bureau, Second French Army.]

HEADQUARTERS AMERICAN EXPEDITIONARY FORCES,
GENERAL STAFF, INTELLIGENCE SECTION (A),
October 16, 1917.

Object: Occupation of Bois de Chaume.

General of infantry, Von Soden, at present commanding the western Meuse army group, summoned together on Sunday, the 23d, the officers taking part in the attack and declared to them:

"The former German positions must be carried at any cost and must be maintained. Our present position is not tenable without holding the Croix de Vaux (Vaux crossroad)."

Gen. Von Kuhne addressed his division (the 13th D. R.) in similar terms and added: "We must sacrifice ourselves; above all things the height must be carried in order to prevent the enemy attacks."

PREPARATION.

(*a*) Effectives taking part in the attack, two companies of storming troops—the 13th division reserves divided up as follows:

For assault: One battalion of 39th reserves, 1 battalion of 57th reserves, 2 battalions of 13th reserves, 1 battalion of each regiment in reserve for attack, 1 battalion of 39th reserves, 1 battalion of 57th reserves, were already holding the sector and were charged with organizing it after the attack. (These units had relieved on the twelfth units of the 35th D. R. and 56th D. I.) A regiment of the 78th D. R. and the 258th reserves.

(*b*) Effectives supporting the principal attack: On west flank, the 223d reserves of the 48th D. R.; on east flank, the 259th reserves of the 78th D. R.

These two regiments were to attack the first French trench and to maintain it as long as possible.

The rehearsal took place on a terrain representing the position to be attacked, at the Schmiedeckerlager, near Romagne, where the two companies of storming troops tried out the attack, with the units which were to follow and support them.

The storming company attacking on the west, commanded by Lieut. Balderman, was trained (practiced) with the battalion of the 39th reserves (13th D. R.).

The storming company attacking on the east, commanded by Lieuts. Habel and Stellvertretor Schwoer, trained with the units of the 258th reserves (78th D. R.).

The units of the 57th reserves and the whole 13th reserves (13th D. R.) trained separately.

Two rehearsals of the whole action, Friday, 22d, and Saturday, 23d, took place in the presence of Gen. von Gallwitz, commanding the fifth army; Gen. von Soden, commanding the western Meuse group; Gen. von Kuhne, commanding the 13th D. R.

FORMATION OF THE ATTACK.

The storming company on the west, supported by the 39th reserves (13th D. R.), was to follow the Louvemont-Azannos Road and envelope the La Chaume trench as far as the point 29.44.

The storming company on the east, supported by the 258th reserves (78th D. R.), was to envelope the Gaulois and Cevennes trenches, and reach likewise the (x) point 29.44 ((x) point de raccordement—junction, meeting point).

The 57th reserves and the 13th reserves were to make a frontal attack up to the La Chaume and Cevennes trenches (see plan).

If the attacks succeeded, the commanders of the attacking troops were to retire, without waiting for the order, three hours after the attack.

The battalions assigned to occupying the trenches were to set to work immediately.

THE ATTACK.

After a minute preparation lasting eight days, the troops for the assault were carried in autos from the Schmiedeckerlager (starting at 8 p. m. on the 23d) and unloaded between Azannes and Gremilly, reaching their positions between 1 and 2 o'clock of the morning of the 24th.

The assaulting troops immediately took up their assaulting positions in the sector between the Louvemont-Azannes Road and the Croix de Vaux, in front of the troops occupying the sector. These were stationed as follows, counting from west to east: One battalion 39th reserves, 1 battalion 57th reserves, 1 battalion 260th reserves.

The attack was delivered at 5.30 a. m. Although bothered at first by the volleys of the preparation fire of their own artillery (falling too short), the assaulting troops nevertheless made fast enough progress in the western section; but on being caught by our artillery barrage, and especially by our machine-gun barrage, they ran against a stubborn resistance of the French troops, and fell back in disorder into the Bois le Chaume.

Our own men, counter attacking promptly, threw the enemy's lines into complete disorder.

The enemy's left wing seems to have been blocked from the very beginning of the attack.

Last of all, the enemy's frontal attack (57th and 13th reserves) was caught on the flank by our troops, who were following up their counter attack (coming from the west and the southeast).

After hand-to-hand and grenade fighting lasting several hours the enemy was completely driven back and left about 120 prisoners in our hands.

RESULT.

Thanks to the magnificent resistance of the French troops (which both officers and men among the prisoners willingly acknowledged), the enemy suffered a complete check, with very heavy losses; e. g., Lieut. Balderman, commanding the western storming company, on reaching the La Chaume trench had only two noncommissioned officers and five men left besides himself.

Lieut. Matthies, of the 57th reserves, attacking with the third wave, had to use them to make up the losses of the three assaulting companies and had all his own section wiped out.

Lieut. Offer, of the 13th reserves, was left alone with 2 men out of the 40 who started out. The rest were all killed during the grenade fighting, which, according to him, lasted more than three hours.

Lieut. Balderman, commanding western assaulting company (Rohr battalion) made the following statement:

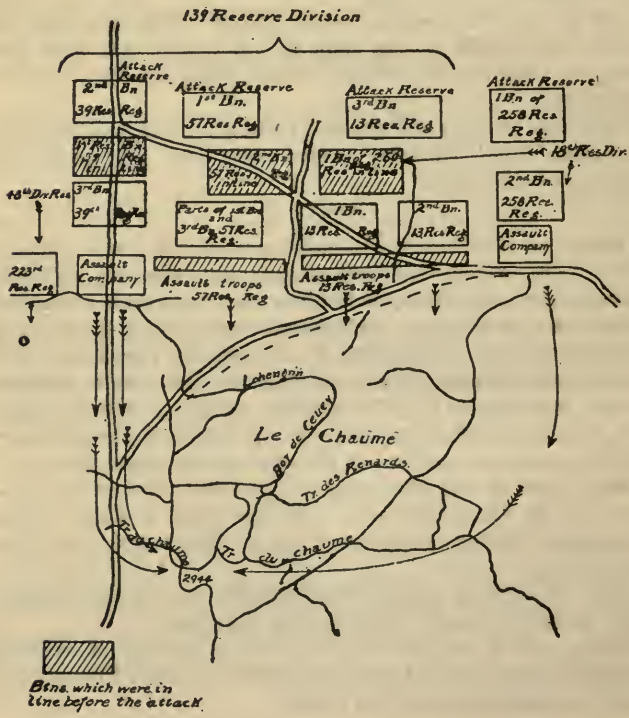
"They told us we had in front of us a division of working troops (travailleurs), but they (the 245th and 348th French regiments), counter attacked like tigers.

CONCLUSION.

The enemy seems to be absolutely determined to retake the position of Bois le Chaume, which is absolutely indispensable for him, and does not hesitate to engage on this very narrow front the strength of six battalions (admitting that all the troops who were in reserve for organizing the position once taken were not able to come into action).

An officer taken prisoner, questioned in regard to this, replied: "If it is necessary to take the height, cost what it may, we will begin again; although," he added, "we have suffered very heavy losses there."

Scheme
of a German attack on Bois Le Chaume
Sept 25 1917



VII.

GERMAN DEFENSIVE TACTICS.

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VII.

GERMAN DEFENSIVE TACTICS.

Headquarters American Expeditionary Forces,
General Staff, Intelligence Section (A).

Recently captured documents indicate a new method of defense on the part of Germany. The primary underlying principle is greater distribution in depth. In other words, instead of holding a defensive position with large forces, making the chief resistance either in the first-line trench or in the supporting trenches, they have adopted a method of defense so that the resistance gradually increases as the attacking force penetrated toward the rear. It might be described as a "coil spring defense," because under the new method the first blow of the assault is taken up gradually by ever-increasing forces of troops, with the result that as the assault slackens the defense increases, just as the strength of a spring becomes greatest as the pressure reaches its maximum.

In order to effect a rebound from the assault the Germans have adopted a method of preparing a counter attack to take place immediately, when the assaulting troops have reached their limit and are stopped by the heavier defensive lines. For this counter attack troops are placed in counter attacking positions well back from the front-line trenches. They are supported by field artillery horsed and ready for immediate action. When the assault stops, the counter attack is launched vigorously, supported by light artillery. It is thought by the Germans that this method of attack enables them to catch the assaulting forces when they are exhausted from the attack, are out of liaison with their artillery, and as a consequence the Germans are able to win back with minimum loss to themselves a large portion of the ground taken. The following extracts from captured German documents give in detail the formation for defense and for counter attack, together with the aim to be obtained in each instance.

(See "Diagram showing the organization of a regimental sector" attached.)

NOTE.—

(*a*) There are only two companies in front line instead of three.

(*b*) The commander of the battalion in front line has only his own four companies at his disposal instead of five.

(*c*) The support battalion is distributed in depth, instead of three out of the four companies being concentrated in the second-line position.

(*d*) The number of machine guns immediately behind the front trench has been reduced from eight to four, the bulk of the remainder being distributed some 400 to 800 yards behind the front line.

The note attached to the diagram lays down that—

(*e*) During a hostile bombardment the trench garrisons are to take cover in shell holes in front of their trenches and there await the attack.

(*f*) The front line should not be held by individuals at regular intervals, but the garrison should be distributed in small groups each under a reliable stout-hearted man.

(*g*) The companies of the support battalion will be formed up in accordance with the nature of the ground; this will often necessitate their being in file or even in single file.

GERMAN PRINCIPLES OF DEFENSE (AUG. 5, 1917).

A captured regimental order, dated July 31, 1917, lays down that—

(*a*) The front line is not to be continuous, but several shell holes are to be connected to form "nests" for groups and occasional light machine guns.

(*b*) A continuous belt of wire is to be put out in front of the above (*a*) positions; the wire is to be loose, irregular in trace, and not too high, so that it can be enfiladed when possible.

(*c*) Shell-hole accommodation should be improved by letting in frames or making underground framed passages between neighboring holes, great care being taken to prevent observation by aircraft.

(*d*) Machine-gun positions are to be well camouflaged and are not to be surrounded by high wire.

(*e*) Communication trenches should run diagonally.

(*f*) Wire in front of the second line should be continuous, but gaps must be left for offensive purposes and be clearly marked.

METHOD OF HOLDING A SHELL-HOLE POSITION.

NOTE.—The following translation of a German regimental order and the diagram appended to it show a method of holding a shell-hole position in advance of the front line, with the object of concealing the main line of resistance and of avoiding the effects of the enemy's bombardment:

[19th Inf. Regt. Regt. H. Q., 25–6–17.]

1. The systematic destruction of our defenses forces us to dispose our forces thinly and in depth, in order to prevent the enemy from recognizing our main line of resistance and in order to disperse his fire.

The attached diagram indicates how a front of 450 yards can be held against fourfold superiority in numbers by 7 groups, 3 machine guns, and 3 Granatwerfer.

2. This disposition is only practicable if entanglements are completed simultaneously which afford special protection to the flanks. Low wire in shell craters, connection with the remains of former lines of wire will give the whole the appearance of destroyed belts of wire rather than that of a specially prepared system. The construction of this should be expedited by all possible means.

3. The defenses and garrison must be concealed from hostile airmen by day; only thus can our power of resistance be maintained to meet an attack.

The lateral communication trench (former front line) must be constantly repaired. This important work should deceive the enemy as to the position of the line of resistance and divert his fire.

4. Next in order of importance is the construction of dugouts for the machine guns and supports in the ground between our lines. It must be possible to find in and round Oppy the defensive positions of former garrisons, which are apparently buried and not conspicuous.

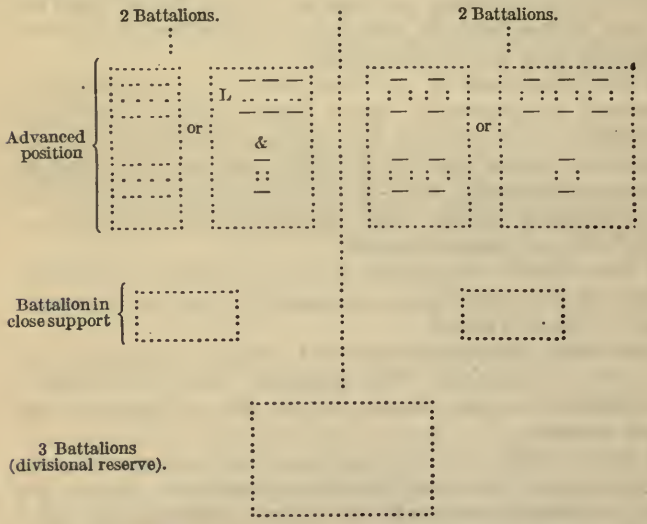
The most careful concealment of this work, especially of the building material for making the shafts, is the duty of all commanders of working parties; they must satisfy themselves, before leaving the place where the work has been going on, that the work on the defenses has been satisfactorily carried out.

(Sd.) SCHUSTER.

GERMAN METHOD OF HOLDING THE LINE.

From the statements of prisoners captured recently on the Ypres battle front, it appears that, when the enemy holds a divisional sector with two regiments in front line, each of these regiments has two battalions disposed in depth in advanced positions (shell holes, strong points, buildings, etc.) and one battalion in close support; the third regiment is in close reserve for immediate counter attack. The average front held by a battalion is 750 yards.

The following diagram illustrates this method of holding a divisional sector:



ENEMY'S DEFENSES (AUG. 17, 1917).

A captured order of the Fourth German Army deals in detail with modifications in the construction of defensive positions in accordance with recent fighting experience. Great stress is laid on—

(*a*) Concealment, especially from the air.

(*b*) Organization in depth.

(*c*) Evacuation of battered front-line trenches and occupation of an advanced line of shell-hole posts with strong points in rear of it.

(*d*) The construction, at irregular intervals, of wire entanglements throughout the whole area of the fortified zone.

(NOTE.—Captured maps show wire in hedges and tree rows throughout the area behind the front. This, owing to its situation, is often invisible on aeroplane photographs.)

(*e*) The siting of communication trenches so that not only can they be used for defense, but their destruction will entail a large expenditure of ammunition.

(*f*) Where shallow shell-proof dugouts are not possible, deep dugouts will be used even in front line.

(*g*) The siting of machine guns in concealed emplacements outside the trench lines, instead of in the angles of the wire entanglements, as was the general principle in the Hindenburg line.

MACHINE GUNS.

An order by the C. G. S. of the German Field Army, dated January, 1917, emphasizes the importance of the defense retaining practical control of the area behind the front trench system, and lays down that—

(*a*) The most certain means of limiting the success of an enemy who has penetrated the front line is the employment of concealed machine guns distributed in depth and checkerwise behind that line.

(*b*) Owing to the increase in the number of machine guns with infantry a considerable number can be specially detailed for this.

(*c*) An officer should be temporarily allotted to each divisional sector to select the sites and supervise the construction of the emplacements.

ENEMY'S TACTICS (AUG. 10, 1917).

(*a*) A regimental order of the 95th Division, dated July 29, 1917, contains the following:

"The capture of 84 men in front line shows that the garrison was too strong."

(*b*) An order of the 454th Infantry Regiment, 235th Division, dated July 28, 1917, emphasized the necessity of *immediate* counter attack by the counter-attack regiment (Stoss Regiment) without waiting for orders, and states that the regiment will be at once backed up by a counter-attack division (Stoss Division).

A captured order of the 235th Division shows: In order to avoid observation by hostile aircraft, movements in relief were to be undertaken in the early morning. In clear weather battalions were ordered to march in small parties, and at once to take shelter on the approach of the enemy's aeroplanes.

GERMAN TACTICAL METHODS.

This process has been exemplified by the move of the 79th Reserve Division, from Maldeghem toward Thourout, replacing the 3d Guard Division as a counter-attack division to the Dixmunde group; the 3d Guard Division in turn replaced the 23d Reserve Division in front line.

The 12th Division was apparently retained as a counter-attack division in the vicinity of Menin for the Wytschaete group and is now, or was yesterday, relieving the 22d Reserve Division.

ERRATA.

"German tactical methods." Immediately following this title, insert the following:

A captured order shows that the Germans are adopting the following general defensive organization in front of our attack, viz:

(1) In immediate support of the divisions in front line there are divisions, probably one for each group, detailed for counter attack solely, and called "counter-attack divisions."

(2) Divisions relieved in front line after exhaustion are moved into rest. Their place is taken by the counter-attack divisions, and the place of the counter-attack divisions is in turn taken by divisions farther back.

(3) In divisions in front line it appears to be the intention to retain one regiment as a counter-attack regiment.

Page 128, subdivision 6 (*a*) should read: "In front of forward shell-hole line."

Page 129, subdivision (*e*), "Character of construction" should read "Character of construction. (See illustration A.)."

Page 131, subdivision (*o*), parenthesis should read: "(Note illustrations C, D, and E.)"

I. Diagram showing the organization of a regimental sector. See paragraph 1, page 123.

II. Diagram showing method of holding a shell hole, paragraph 1, page 123.

III. Diagram showing "A character of construction," paragraph B–*c*, page 129, B wire, paragraph B–*k*, page 130, C. D. E., order in which work is carried out; see paragraph B–*c*, page 131.

EXTRACTS FROM THE CONSTRUCTION OF DEFENSIVE POSITIONS.

[Translation of a German document, dated German Army Headquarters, June 30, 1917.]

1. Three categories:

A. Construction of positions on the battlefield.

B. Construction of new positions.

C. Modification of old positions.

A. CONSTRUCTION OF POSITIONS ON THE BATTLEFIELD.

1. Dugouts in old trenches (principally 1–2 lines) proved to be man traps. Hence discarding of rigid rules for more flexible method.

2. Strength in defense must be in concealment. All positions capable of being photographed will be destroyed by enemy's preliminary artillery fire.

3. Severity of enemy's fire makes it impossible to keep trenches in repair and attempting to do so exhausts the troops without results.

4. Consequently construction of positions must be employed when battle begins. *There must be a deliberate transition from the old pattern position which is visible to a zone of defense organized in depth. This must allow of offensive action by the defense from positions which are, as far as possible, concealed and are lightly held in front and more strongly held in rear.*

PRINCIPLES.

1. As destructive fire of enemy increases the mass of the infantry will be removed from forward trenches and dugouts and will be distributed in depth in the open before the first infantry attack takes place.

2. It is the duty of all commanders on the battlefield to give timely orders for the methodical redistribution of the troops and to carry out such orders unhesitatingly.

3. During battle continuous trenches are no longer insisted on in front-line positions, their places being taken by shell-hole nests held by groups and single machine guns, distributed checkerwise. Shell holes to be improved by mining frames or by joining adjacent shell holes by tunnels lined with frames, dirt thrown in adjacent shell holes, or *scattered on ground.*

4. Close behind first shell-hole line strong points will be constructed for—

(*a*) Machine guns.

(*b*) Assault troops.

(*c*) Elements of support already brought forward.

5. *Strong points.*—(*a*) Usually constructed in dugouts, but (*b*) failing these, in open.

6. *Wire.*—(*a*) In front of forward shell line. Irregular in trace, but as far as possible forming a continuous system; (*b*) fill shell holes in advance of front line with wire to prevent occupation by enemy; (*c*) *farther back* shell-hole nest should be provided with wire entanglements, but local in extent, since continuous belts make offensive action on part of defense more difficult; (*d*) sufficient wire entanglements so arranged as to force enemy in particular directions and bring him under machine-gun fire; (*e*) all defensive works *must remain hidden* from the enemy. Conspicuous works and connected trench lines *do not* fulfill this important condition.

7. *Supports and reserves.*—(*a*) Great part of supports and reserves will be accommodated in the open, in and near shell holes, in woods, hollows, etc., wherever *cover from air observation exists;* (*b*) villages draw enemy's fire and therefore must be *avoided whenever possible;* (*c*) supports and reserves must work methodically at construction of continuous system, consisting of several lines of trenches which must be screened as much as possible from the enemy's observation (reserve slope position); (*d*) this system will form a support for the defenders who are organized in depth in front of it.

8. *Construction.*—(*a*) Strongly wired with gaps for passage of troops to attack through; (*b*) must consist of several lines of trenches; (*c*) deep dugouts will only be constructed in the second and third line; (*d*) first line will contain small dugouts for about one-sixth of the garrison; (*e*) system will generally be the artillery protective line about 1,650 to 2,200 yards in the rear of foremost shell-hole line; (*f*) additional lines will be constructed farther in the rear on these principles to form supporting positions, if there is sufficient labor.

B. CONSTRUCTION OF NEW POSITIONS.

(Note illustrations A and B.)

The principles laid down for the construction of a zone of defense organized in depth must be applied from the outset by the simultaneous construction of the front-line positions, the artillery protective line, and the communication trenches between them, when constructing new positions.

The principles of organization in depth must be followed in the disposition of machine guns and trench mortars, and particularly in the distribution of the artillery, with its observation and command posts. It is *not sufficient* that only the infantry should be disposed in depth. The chief strength must be sought by organization in depth, the proper distribution of force over the whole fortified zone, and concealment.

(*a*) *By concealment.*

1. Against air observation, by photographs of our own positions to insure that due precautions are being observed.

2. Dummy works to deceive the enemy.

3. Impressing on every man the necessity of concealment and the knowledge that artillery positions and machine-gun emplacements in the fortified zone, which are located during construction, lose value.

(*b*) *Dugouts.*—Construction must be begun at once throughout the whole depths of the defensive zones.

1. Dugouts will accommodate the following troops: (*a*) In the first trench, one-sixth of garrison of front-line position (fighting troops); (*b*) the second line, one-third of garrison; (*c*) farther to the rear as far as the artillery protective line (exclusive) about one-half of the fighting troops.

(*c*) The same principles are followed in construction of artillery protective line which is intended for occupation by supports.

(*d*) *Additional dugouts.*

1. Numerous dugouts to be constructed outside the trenches in readiness for methodical distribution of trench garrison over intervening area.

2. Outside the trenches at the commencement of the defensive battle.

(*e*) *Character of construction,*

1. Where mine dugouts can be constructed, there must be 26 to 33 feet of earth over them and at least two exits.

2. Concrete dugouts must not be conspicuously high and the slope of the earth covering them must be flat.

3. Timber of good dimensions should be employed for casing when constructing mined dugouts, so that the exits will be wide and high, facilitating rapid egress of the garrison. Exits should have sufficient thickness of earth cover.

(*f*) *In the front line.*

1. Must be shellproof.

2. Only sufficient accommodation for small proportion of garrison as laid down in paragraph *b* 1.

(*g*) Where possible, should be constructed of material of great resisting power, such as concrete, iron, and joints, which facilitate the rapid exit of the men and allows construction of shellproof dugouts at less depth than necessary by mined dugouts.

(*h*) *Observation posts.*

1. Splinter-proof observation posts should be built close behind dugouts.

2. Observation will normally be carried out from these.

3. In an intense bombardment observation will be carried out in the front line, in addition to the observation posts, by stout-hearted men leaving dugouts at frequent intervals and observing over parapet.

(*i*) Exits should be provided from the rear leading to the surface behind the trench, preferably into *shell holes*, thus providing exit for garrison when enemy has penetrated into trench.

(*j*) *Protection.*

1. By means of several recesses at entrances to dugouts containing sentries able to engage the enemy as soon as he enters the trench, and by keeping the entrance free, enable garrison to come out.

2. By trench block in concrete dugouts, enabling the entrance to be kept under fire, preventing the enemy from forcing an entrance.

(*k*) *Wire.*—(See illustration B.)

1. In advance of the foremost trench a strong and continuous wire entanglement consisting of three belts, each 33 feet wide, with intervals of 15 to 33 feet between belts.

2. Irregular in trace and not too high.

3. *Particular care to be taken* to insure that front belt of wire can be swept by flank fire.

4. Wire should not be taut, because if taut it is severely damaged by concussion caused by bursting shells.

5. In emergency, strong wire fences 3 to 5 feet high at intervals of 6 to 10 feet can be employed.

(*l*) *Method of construction.*

1. Construction of the front belt of wire, outer edge of which should be 65 feet in advance of the front trench.

2. In front of second and third trenches (and in the case of rear positions in front of the front trench also) gaps must be left for passage of troops moving to the attack.

(*m*) Posts should not be driven in these gaps, the wire being merely placed in readiness.

(*n*) *Protection of wire.*

1. The first three belts must be protected by sentries in holes of short-length trenches behind them.

2. In zone of defense organized in depth wire entanglements will be distributed over entire area in blocks about 30 feet deep, irregular and not continuous, or in numerous lengths of strong-wire fencing, advantage being taken of natural cover, such as hedges, sunken roads, etc.

(*o*) *Order in which work will be carried out.* (Note illustrations C, A, and E.)

1. Tracing.

2. Wiring.

3. Construction of dugouts.

4. Actual digging of trenches, unless lack of material renders it necessary to proceed with (4).

(*p*) *Machine-gun emplacements.*

1. Construction of a large number in the ground between various lines must be begun immediately.

2. They will be sited on slopes and in hollows, with special object of securing flank fire.

3. Commanding points will not be used.

4. They must be a surprise to the enemy, and therefore will not be placed in the angles, where the enemy is bound to suspect their presence. (See illustration C.)

5. Dummy emplacements to be constructed at these points.

6. Machine guns sited in concealed emplacements, flank, or in rear.

(*q*) *Protection of machine guns against air observation.*

1. Concealment from air observation by erection of wire netting covered with brushwood over excavation and building materials.

2. High wire surrounding emplacement will disclose its position to the aviator.

3. Belts of wire or several strong wire fences so arranged that the enemy must run into them and which can be swept by fire their entire length are more advantageous.

(*r*) *Communication trenches.*—Where possible should be constructed between the several lines obliquely without greatly increasing their length with result that they will provide a network of trenches in which the communication trenches provided with wire and organized for fire purposes can be at the same time utilized as switch lines. (See illustrations D and E.)

(*s*) *Advantages.*

1. Enemy can not clearly locate defensive system.

2. In order to destroy position he must bombard entire area between first and third lines.

3. This renders artillery preparation more difficult and increases area with which it must deal.

4. An enemy penetrating the position is caught in the network and is prevented from surrounding those portions of the trench garrison which are holding out in front.

5. If communication trenches are dug in straight lines as in sketch b, enemy can bombard the separate lines and neglect the ground between them.

C. RECONSTRUCTION OF OLD POSITIONS.

1. The majority of the dugouts are in the first trench. This leads to crowding in the forward line with disastrous consequences.

2. In the back lines where possible this must be corrected by digging a new trench in front of the old first trench.

THE EMPLOYMENT OF COUNTER-ATTACK TROOPS.

[Extracts from translation of a German document, dated Headquarters Reserve Corps, June 13, 1917.]

EMPLOYMENT OF COUNTER ATTACK.

Immediate and rapid counter attack carried out by reserve battalions which have been kept concentrated in close proximity

and are provided with field artillery held in readiness to move (counter-attack artillery) leads to the immediate recapture of the whole position. In such cases it has been possible for the counter-attack artillery to gallop in the open and deliver a very heavy and disastrous fire.

(*a*) *Preparation.*

1. Success can only be obtained by very careful preparation, necessitating a carefully thought out plan of operation with the subordinate commanders acquainted with the ground. As far as possible preliminary practice should be held. Particularly careful preparation must be made where regimental or divisional boundaries are in question.

2. Preparations for counter attacks to be carried out within the divisional sector *must be made by the division* in that sector.

(*b*) *Basis of the preparation.*

1. All reserves will be placed at the complete disposal of the divisional commander.

2. The resting battalions of the division will be brought into and in front of the third-line posiiton.

3. Counter-attack regiments will be brought closer up.

4. If only one division is attacked it can rely on the group, placing at its disposal for immediate counter attack three additional battalions and two or three batteries of field artillery.

5. Guides for troops of other divisions not familiar with the ground is of extreme importance and must be arranged beforehand.

(*c*) *Employment of second-line fighting divisions.*

1. To be billeted in the rear billeting area.

2. To be brought forward into forward-bivouacing area.

(*a*) They will bivouac in concentrated groups of infantry regiments with artillery; (*b*) billets will not be expected as units must be kept together and villages and camps, for the most part, will be under fire.

3. On approach of hostile attack, troops will be brought forward from bivouac area to their assembly positions for the attack, and will be held in readiness there.

4. Attention must be paid to protection against aerial observation.

5. Troops will be best disposed in infantry regimental groups.

6. They must deploy at an early moment so that when they receive orders or a hostile attack takes place, the counter attack can begin without any loss of time.

7. Single batteries will be allotted to infantry regimental groups for tasks to be carried out in direct cooperation with the infantry (antitank defense in the engagement of machine guns).

8. These artillery units should remain with their teams hooked in.

9. The remaining batteries will be in a position of readiness faced according to the requirements of the situation with their teams within easy reach.

10. Dispatch riders from the divisional cavalry should be with infantry and artillery. It is important that both be well supplied with these dispatch riders.

11. Infantry will wear assault kit and carry an ample supply of ammunition. All unnecessary equipment will be left in their last billeting area.

12. Divisional commanders and all commanders in the counter-attack division should be close to their troops on the field of battle in accordance with the principles of open warfare.

13. The schemes for the employment of the second-line fighting division must be based above all on the consideration that the counter attack will have to be carried out between the second and third-line positions and behind the second-line positions with the object of at once retaking any guns that have been lost and eventually recapturing the whole position. The positions of readiness for batteries will be chosen correspondingly far forward as the observation posts and battery posts must be reconnoitered.

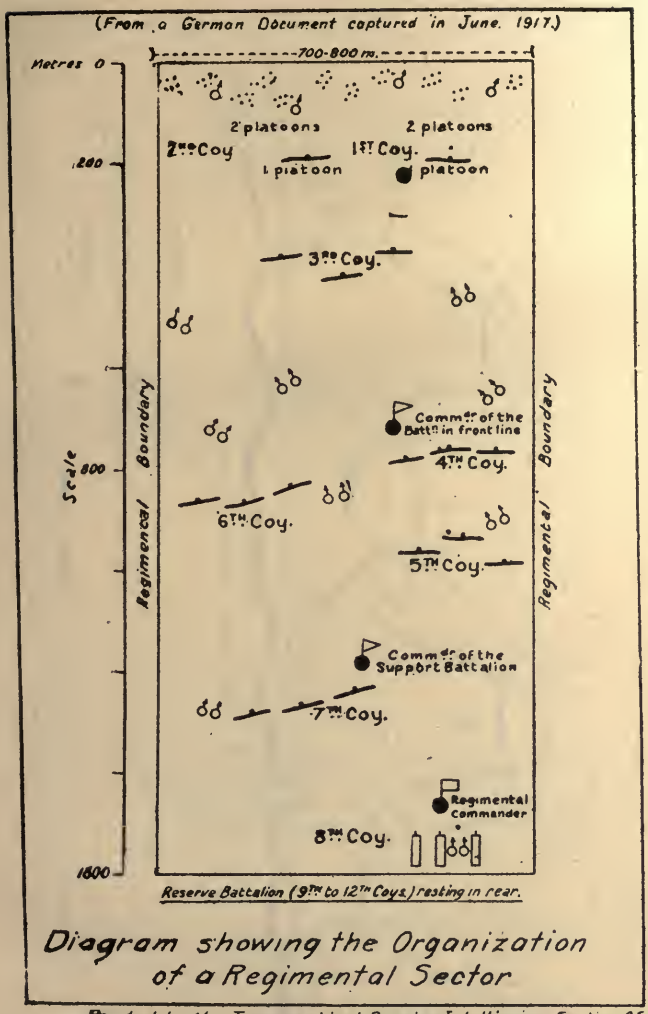


Diagram showing the Organization of a Regimental Sector

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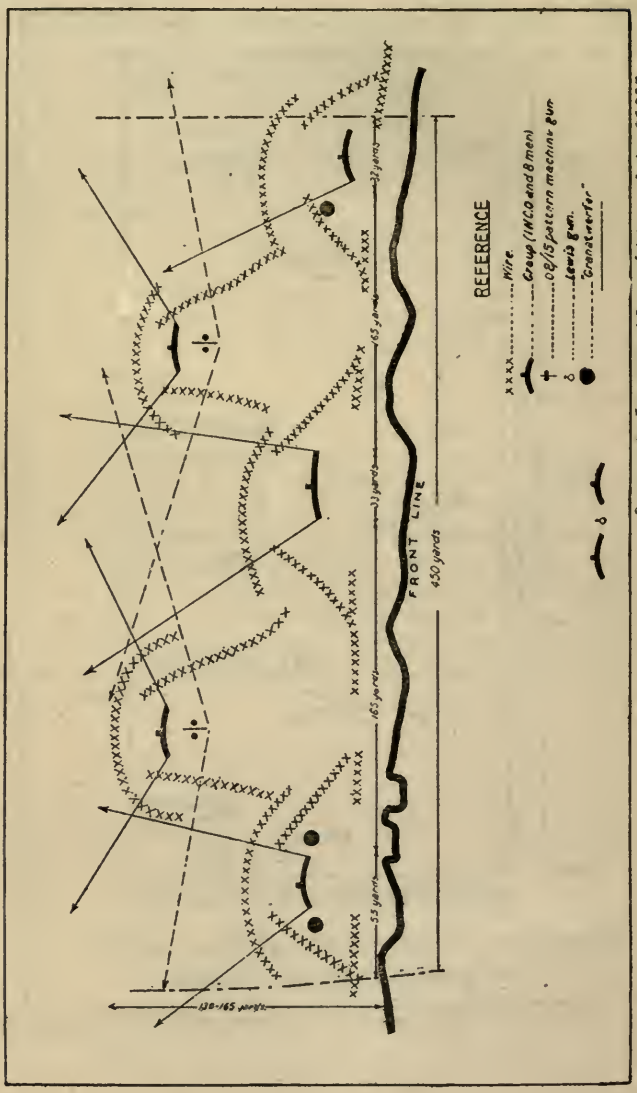
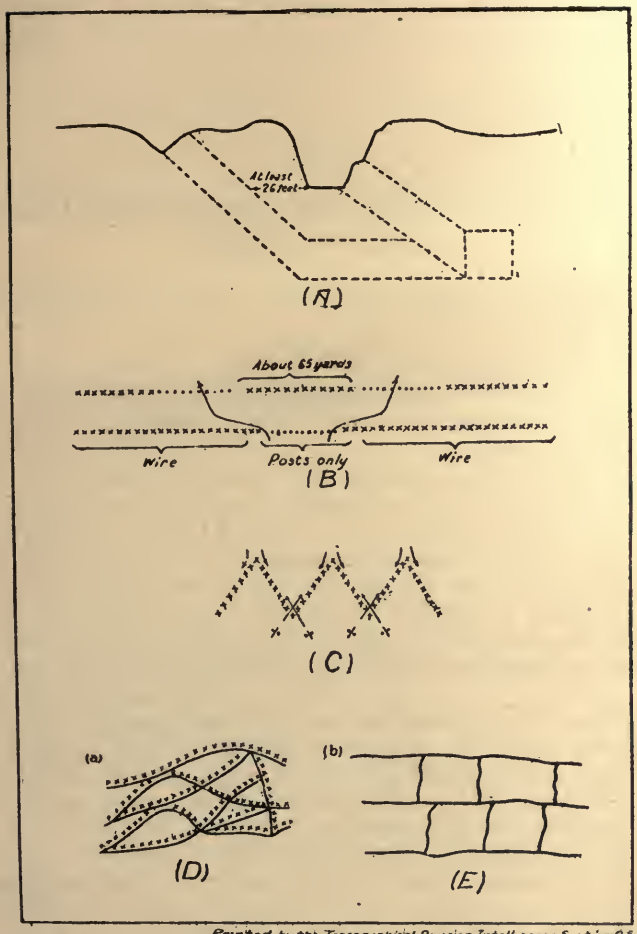

REFERENCE
Wire
Coy. (M.G. and 8 men)
08/15 pattern machine gun
Lewis gun.
Trench mortar.
FRONT LINE
450 yards
33 yards
65 yards
33 yards
165 yards
33 yards
130-165 yards



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VIII.

THE CONSTRUCTION OF POSITIONS FOR THE COMING WINTER.

(Translation of a German document captured by the British.)

HEADQUARTERS AMERICAN EXPEDITIONARY FORCES,
GENERAL STAFF, INTELLIGENCE SECTION (A),
October 19, 1917.

1. With the approach of cold and rainy weather, a gradual diminution of the intensity of the fighting on our front may be anticipated. At the same time these weather conditions call for increased care in improving the accommodation of the troops in the trenches and for arrangements for providing them with hot meals. This can be achieved by constructing *continuous* trench lines with the requisite covered communications, which also facilitate the disciplinary supervision of units by their commanders.

2. The work of improving the positions must be begun immediately, wherever the tactical situation in any way permits.

3. It is essential to provide a continuous fire trench, capable of defense, in the present *foremost* fighting line. Some 330–440 yards behind it, a further continuous trench, consisting of lengths of fire trench connected by *narrow* lateral communication trenches, will be constructed as a third fighting line (third trench).

4. These two fihgting lines will be connected in each company sector by two communication trenches. In conjunction with these short lengths of trench of irregular form and at irregular intervals will be constructed to serve as a *second* fighting line (second trench).

5. The machine guns, well distributed in depth, will be sited in the ground between the trenches. They will not be sited on commanding ground, but will be well concealed on slopes and in hollows, with the special object of securing *flanking* fire.

The group regards these machine-gun emplacements, when strongly constructed and suitably sited, as the most essential requisite for the defense of the whole position when fighting is resumed.

The identification of active machine guns must be rendered as difficult as possible by the construction of *dummy* emplacements.

Cover from aerial observation is specially important during the construction of machine-gun emplacements. (The excavation and the dump of building material should be screened by wire netting and branches. Building should be confined to periods of poor visibility.) The emplacement should not be surrounded by high-wire entanglements, which betrays its position to the airman, but bolts of wire or several wire fences should be constructed so that they can be enfiladed by the machine gun and so that the enemy is forced to run into them.

If water is not encountered close below the surface of the ground the isolated machine-gun emplacements should be connected with the nearest trench by mined galleries or *covered* passages.

6. A dummy trench, with an entanglement of posts without wire, should be constructed behind the third-fighting line (third trench).

7. Suitable portions of the communication trenches should be arranged for delivering flanking fire over the ground between the trenches.

8. An *irregular* but connected entanglement in advance of the front trench should be aimed at. The shell holes there may with advantage be filled in with wire, in order to prevent the enemy from establishing himself in them.

Farther in rear only irregular lengths of wire entanglement and fencing will be employed, so arranged that counter attacks are not impeded. Full use should be made of wire so arranged as to force the enemy in particular directions and bring him under the fire of our machine guns.

Special attention should be paid to *siting all entanglements so that they are inconspicuous and are concealed from view.*

9. Small shelters should be provided in the first trench for about one-sixth of the garrison, and in the second trench for about two-sixths; dugouts should be built in the third trench and as far back as the artillery protective line, to accommodate three-sixths of the fighting troops.

The same principles are to be followed in the construction of the artillery protective line, which is intended for occupation by the supports.

The provision of numerous dugouts *outside* the trenches paves the way for the methodical removal of the troops from the trench lines into the ground between them, which must always take place immediately the defensive battle is resumed.

Where mining is possible, mined dugouts with 26–33 feet of earth cover and at least two exits should be constructed.

Concrete structures which should at the same time all be constructed for use as machine-gun emplacements, must be of low profile, and the slope of the earth covering them must be kept flat.

Dugouts to accommodate more than two groups (i. e., 2 N. C. O.'s and 16 men) are open to grave objections and should therefore be avoided.

10. All shelters in the first trench, in addition to affording complete protection against the weather, should be at least splinter proof.

Owing to the presence of water close beneath the surface of the ground, it is generally impossible to excavate to any depth; protection must, therefore, be sought by means of a good distribution of numerous small dugouts in those portions of the second and third trenches in which concrete work can not be carried out.

The attached sketches give suggestions for the construction of shelters and dugouts.

11. Arrangements for drainage must be considered when laying out the trenches. The several lines should be so traced that there is on one side a natural fall toward one of the drainage ditches which are so numerous in this area. Where this is not possible, catch pits should be provided from the outset (boxes built into the sole of the trench) from which the water can easily be removed by pumps or balers.

12. *The sides of the trenches* should be *revetted* at the bottom, in order to reduce as much as possible the labor of their upkeep. In wet ground more especially the method of revetting shown on the attached sketch has proved very satisfactory.

13. *For the supports*, the artillery protective line should be constructed on the same principles as the front-line position. It must be provided with a strong wire entanglement, in which gaps are left for troops to advance through; there should be

several trenches; dugouts should only be built in the second and third trenches; in the first trench there should only be shelters for one-sixth of the regular garrison.

14. In all positions the wire entanglements should be begun first. The construction of shelters and dugouts must be carried out at the same time throughout the whole defensive zone. The construction of machine-gun emplacements in the ground between the trenches must be taken in hand at once on a particularly liberal scale. Touch with the neighboring division must be assured in all defensive positions.

15. The consolidation of the positions in the manner indicated above presupposes that the utmost efforts will be made by all available personnel and that every quiet interval in the battle will be fully utilized. Every unit should be permeated with the desire to provide its men as quickly as possible with better conditions as regards both fighting and shelter on the battle field. Timely demands for all requisites for the consolidation of the positions will considerably facilitate an adequate supply of these stores in the divisional parks.

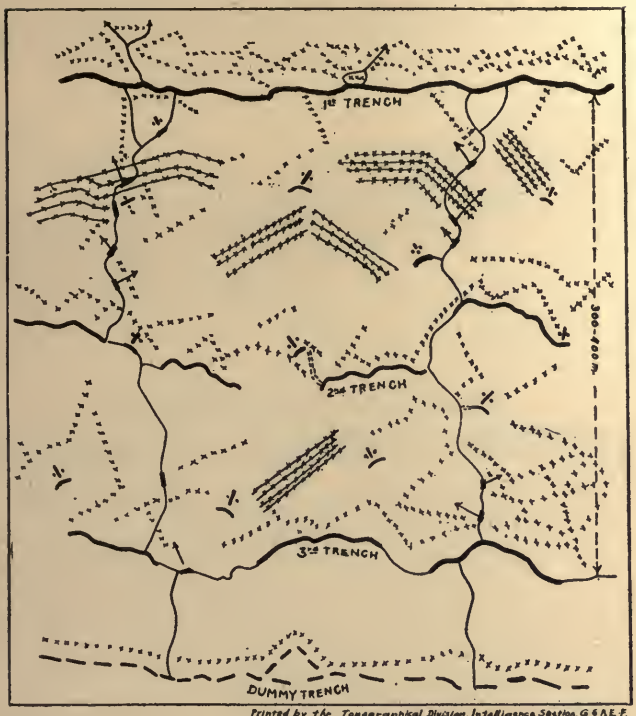
16. To begin with, the construction of the bridgehead and artillery protective line, in accordance with the above instructions, will be taken in hand by the 24th and 32nd Divisions.

(Signed) v. THAER,
Lieut. Colonel, C. G. S.

DIAGRAM SHOWING THE ORGANIZATION
OF A
COMPANY SECTOR FOR THE WINTER MONTHS.

Issued with an order of the Wytschaete Group, dated Sept. 5.1917.

The original is marked "Secret. Not to be taken into the front line."



Printed by the Topographical Division, Intelligence Section, G.H.Q. E.F.

IX.

INFORMATION GATHERED CONCERNING THE ENEMY'S ARTILLERY.

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IX.

INFORMATION GATHERED CONCERNING THE ENEMY'S ARTILLERY.

HEADQUARTERS AMERICAN EXPEDITIONARY FORCES,
GENERAL STAFF, INTELLIGENCE SECTION (A),
September 11, 1917.

Recent captured German documents and statements of prisoners show the following artillery tactical dispositions:

1. Move into the open under heavy bombardment.
2. To have numerous fire positions, resulting in frequent shifts of battery positions.
3. Supply of ammunition retained at these various fire positions.
4. Employment of short, sharp artillery fire before a surprise attack.
5. Warning against unnecessary fire.
6. Rules for artillery fire against trench mortars.
7. Communication between infantry and artillery.
8. An artillery liaison officer with the infantry when advancing.
9. Artillery instruction.
10. Use of artillery in misty weather.
11. Cooperation of the artillery with the aviation.
12. Unit of angular measurement used by the German artillery.

The following are statements from prisoners captured and documents covering the above:

I. (*a*) The following is an extract from the orders of the Ypres group, dated June 11, 1917:

"It is the duty of the artillery to evade the enemy's destructive fire and thus maintain its fighting strength. Field artillery can attain this object by moving into the open and evacuating battery positions which have been discovered and are heavily

shelled. In the case of heavy batteries, the effect of the enemy's fire must be minimized by distributing the guns in *echelon* at wide intervals.

"In the case of positions in the open it is only possible to keep ammunition in small dumps, merely protected against the weather; the effect of direct hits is also diminished in this way. As the large quantity of ammunition which has to be stored in readiness covers a large area, the wide distribution of the guns and the movement of batteries to a flank is facilitated.

"The general principle that in case of heavy bombardment the regular positions should be abandoned for the open must be applied also to the artillery."

(*b*) A prisoner captured near Hollebeke on July 31 made the following statement:

1. "The enemy's artillery casualties have been very heavy lately.

2. "When moving up to the line from Gheluwe the prisoner noticed a number of batteries in position in the open. These batteries apparently changed their positions frequently."

Another prisoner states that about a fortnight ago in this sector field guns were brought into forward positions at night for the purpose of gas-shell bombardments and were withdrawn again before dawn.

(*c*) The following information has been obtained from prisoners of the 26th Division, captured north of St. Julien on the 19th of August:

"A battery of field guns had been brought into position about a kilometer to the rear of the German front line as defense against tanks, which were expected to attack."

(*d*) An officer and noncommissioned officer of a field battery, captured on the 16th of August east of Westhoek, made the following statements:

"When the guns are put out of action they are generally replaced within 24 hours from a central artillery park. The practice of moving guns forward during the night is confirmed. Single guns are left in evacuated battery positions to give them the appearance of activity."

II. (*a*) A battery has, as a rule, three alternative positions.

(*b*) German documents captured by the French show the importance attached by the enemy to numerous alternative battery positions. A list, dated August 28, 1916, shows that a group near Bixschoote of 7 batteries of field and heavy artillery had a total of 32 positions.

Each battery had at least four positions:

1. The normal position (Feuerstellung) .

2. An alternative position (Ausweichstelling).

3. Main position in rear (Ruckwartige Hauptstellung).

4. Alternative position in rear (Ruckwartige Ausweichstelling).

(*c*) An order dated June 1, 1917, shows that all batteries in this area were to be provided with three positions—

1. The normal position.

2. An alternative position (Wechselstellung).

3. Position for a reinforcing battery (Verstarkungsstellung).

III. (*a*) The rule of keeping not more than 2,000 to 3,000 rounds in a battery position has been found impracticable, owing to the difficulties of bringing up fresh supplies frequently. The present system is to keep 2,000 to 3,000 rounds in each of the alternative positions, so that a battery has from 6,000 to 9,000 rounds within easy reach.

(*b*) Examination of German artillery prisoners shows that—

(1) Contrary to orders, 5,000 to 6,000 rounds are stored near the battery positions. The result is that the dumps are large and are often hit, and thus much ammunition is lost.

(N. B.—This is very high compared with the amount—viz, 3,000 to 3,500 rounds of 7.7-cm. ammunition—laid down by v. Stein on 8–9–16, in his "Lessons drawn from the battle of the Somme").

(2) Barrage fire continues for a period of five minutes, if the request is not repeated. Rate of fire, 9 rounds per gun per minute.

(French source, July 19. 1917.)

IV. On the front line, in front of the objective, a single salvo was fired before the onrush of the attacking troops, which jumped into the trench at midnight behind the exploding shells.

On July 8, on the Pantheon-Froidmont front, the infantry advanced after a three minutes' artillery fire (4.27 to 4.30).

July 10, north of Rheims (Neufchatel road), the troops supposed to accomplish the raid were to leave their trenches as soon as the first few minen shot at the French trenches had exploded.

July 12, a trench raid is executed after three minutes' bombardment.

V. *Economy of artillery ammunition and man power.*

C. G. S. of the Field Army II, 56,435. 20–5–17.

Too many bombardments of positions not occupied by the enemy (destructive shots carried out against empty trenches; unnecessary barrages; shots without sufficient data, especially by night).

Insufficient adaptability regarding infantry, artillery, and trench-mortar tactics.

(Sd.) *Ludendorff.*

VI. A captured order, issued on June 15, 1917, by the group of Ypres, lays down the following rules for artillery action against trench mortars:

(*a*) The methodical engagement of the enemy's trench mortars with destructive fire by day.

(i) Every effort must be made by infantry and artillery observers to locate trench mortar emplacements. Flash intersections form a useful indication.

(ii) As soon as a trench mortar has been located destructive fire must be opened on it. When the infantry ask for trench mortars to be engaged they must report, at the same time, the best place from which observation can be carried out.

(iii) Trench mortars should be engaged with deliberate observed fire; only 1 gun of the battery should be employed. A light field howitzer battery will generally suffice for the task.

(*b*) Engaging trench mortars by night.

(i) One gun of a battery (7.7-cm.) should register on a known or suspected trench mortar emplacement by day. The gun will be kept laid on the trench mortar by night, and will fire a few rounds as soon as the latter is active.

(ii) Harrassing fire will be directed at night against vicinity of trench mortar emplacements, in order to catch ammunition carriers.

VII. *Summary of measures against surprise attacks.*

COMMUNICATION BETWEEN INFANTRY AND ARTILLERY.

A. TELEPHONE COMMUNICATIONS.

A properly constructed and coordinated infantry telephone system, including underground lines, at least from the company commanders to the commander of the front-line troops.

A properly constructed artillery telephone system, including, invariably, two lines (one underground) from the batteries to

their own observation posts and *direct* communication between the artillery commander on duty and each control battery (as far as possible with a laddered circuit).

Telephone lines between the exchanges of these two systems.

Direct underground lines from the commander of the front-line troops to his control battery.

B. VISUAL COMMUNICATIONS.

1. *Communications by means of flare signals.*—These must be provided between the front line and the control battery concerned via the commander of the front-line troops, and from this battery to the observation post which permits of the best observation in the infantry regiment's sector, and, if necessary, to the batteries dependent on the control battery. Intermediate alarm posts, several men strong, must be established and continually occupied. In case of fog additional intermediate posts must be established at points fixed beforehand.

2. *Communications by means of lamp signals.*—These must be provided between the front line and the control battery concerned via the commander of the front-line troops, from the artillery commander on duty to each control battery, from the control battery to the observation post, which permits of the best observation in the sector, and between the batteries and their observation posts. The beams of light must be screened from observation from the side. Short code words must be arranged beforehand for ordering barrage fire.

C. COMMUNICATIONS BY MEANS OF SOUND.

1. *Alarm instruments.*—The posts should be established in the same way as for communications by flare signals. The following are the best arrangements:

(*a*) Loud sirens, driven by compressed air, should be employed to give the signal for barrage fire.

(*b*) Large bells should be employed for gas alarms.

In order that the sound may spread properly alarm instruments should not be sited in trenches and holes in the ground. If the artillery can not recognize the alarm signal with certainty it must be taken to mean both a call for barrage and a gas alarm. Every man must put on his gas mask if he hears barrage fire opened during fog and has not previously heard the sirens.

2. Machine-gun signals should be arranged beforehand in case of fog (5 rounds—pause—5 rounds) for ordering the opening of barrage fire. All machine guns sited in rear must take up the signal until barrage fire is opened.

D. COMMUNICATIONS BY MEANS OF WIRELESS.

Communications by means of wireless, with the assistance of the apparatus of the trench wireless detachment, from the foremost line (infantry and artillery observers, company), via the commander of the front-line troops, to the observation post which permits of the best observation in the divisional sector (divisional observation post), or direct to the artillery commander on duty (brigade battle headquarters), and thence to the division (artillery commander). Power buzzer stations will also be employed, especially for communication between the foremost line and the commander of the front-line troops.

E. COMMUNICATIONS BY MEANS OF SIGNALS BETWEEN ARTILLERY AND INFANTRY AEROPLANES AND THE GROUND.

These are carried out by wireless, signal lamps, flare signals, and by dropping messages; and from the ground to the aeroplane by means of cloth signals, signal lamps, and flares.

To enable wireless messages to be received from the aeroplane a fighting wireless station will be established at every artillery group and a receiving station with every division.

F. PERSONAL LIAISON.

An artillery liaison officer will be attached to each commander of the front-line troops.

INFANTRY.

1. Increased readiness for action at dawn and during foggy weather is necessary, as well as holding the front line more strongly, the dispatch of patrols over the ground in front of the position, while all machine guns should be kept ready to open fire. Rearward flanking works, strong points, and holding-on points must be continually occupied by emergency garrisons. Artillery which is particularly exposed to danger (close-range guns) must be protected by—

2. Special arrangements must be worked out for fog. Where necessary the reserves must be brought up closer to the front line in case of fog. Companies in rest should be pushed forward in case of fog, but never far from their quarters.

3. Arrangements must be made to bring up reserves quickly. There should be plenty of signposts. Guides should be trained and allotted.

4. Machine guns should be sited and distributed in such a way as to fulfil their object; the bulk should be sited between the lines and positions—not in the lines—properly screened from ground and aerial observation, and as far as possible in shell-proof shelters. They must completely command the whole foreground, intervening ground in rear, by a cross and flanking fire. In combination with the above the several belts of wire should be connected by cross belts, so that the obstacle is divided into compartments and the enemy is prevented from escaping the machine-gun fire.

5. Great emphasis should be laid on organization in depth. Assault troops, etc., must have perfectly definite objectives assigned to them. Measures taken must be tested practically. Alarm practices should be frequently carried out, especially gas alarms.

ARTILLERY.

1. At least one control battery should be detailed for each infantry regimental sector. It should have a central position relative to the batteries dependent on it, and have a plentiful supply of flares. Instructions should be given that the control battery will only open barrage fire by night or in fog. Barrage fire must be opened by a distinct succession of salvos, while the fact must be immediately reported to the group and the artillery commander on duty, and flare signals must be sent up.

2. Instructions must be given as to increased readiness for action at dawn and during fog. In the control battery the men must be at their guns; in the case of the other batteries, in the immediate neighborhood. Sentries must be posted in every battery to keep a lookout toward the front and toward the control battery; if necessary, these should be noncommissioned officers.

3. An alternative observation post must be provided for every battery beforehand.

4. Instructions must be given to batteries in case of thick fog to open barrage fire if any unusual sounds of fighting are heard in front of the position.

5. Provision must be made to engage tanks (short-range guns and guns accompanying the infantry).

6. Provisions must be made—particularly in the case of field guns and light field howitzers—to open fire at very close ranges in every direction, with the possibility of opening flanking fire on the ground between the positions. It must be possible to withdraw guns easily from their pits. Close observation must be possible from each battery.

7. Provision must be made to concentrate rapidly the fire of the batteries on threatened points, including those in adjoining sectors.

8. Targets should be allotted to batteries in case of a hostile attack. The results of registration must be preserved in both the battery position and the observation post; there must be *several copies* and these will not all be kept together.

9. A battery plan must be provided for each observation post and battery.

10. Steps must be taken to regulate annihilating fire, the allotment of targets, registration, and the fixing of the quantities of ammunition to be expended in annihilating fire.

11. Control of barrage fire and the bringing up of a number of light Minenwerfer must be arranged for; the latter should not be employed on other tasks.

12. All measures proposed should be tested practically.

VIII. *Artillery reconnoitering, following the attacking troops.*

A prisoner of the one hundredth battalion of foot artillery captured during the German attack of the night of July 14–15, west of Cerny, was part of a group of artillerymen which was following the second assaulting wave at the center of the attack and included four men under the leadership of an officer of the eleventh battery of the ninth foot regiment of reserve artillery.

The mission of this detachment was to find out the effects of the artillery fire and to take the necessary measures to better the fire immediately in case of need.

In this case he was to notify at once the artillery information officer, who was in the German trench (which they had started from), and was in communication with the rear by telephone.

IX. The following extracts are taken from captured orders issued between February and July, 1917, by the Ypres group, as illustrating recent developments in German artillery tactics:

(A) EMPLOYMENT OF GAS SHELLS.

"For bombardments with gas shells it is advisable, whenever possible, to select special battery positions in the neighborhood of the actual positions, even in the open, so as not to be interfered with by the enemy's artillery."

(B) COUNTER-BATTERY WORK.

"No opportunity for counter-battery work should be lost. * * * Batteries which are located during the night should be immediately shelled with the help of observation sections, either by batteries provided with flash reducers or by batteries in specially chosen positions."

(C) AVOIDING BRITISH DESTRUCTIVE SHOOTS.

"When it is clear that the enemy is registering, the battery should conceal itself as far as possible by occupying an alternative position before the enemy opens his destructive fire, which he often does not do until the next day."

(D) DISPOSITION OF THE ENEMY'S ARTILLERY.

1. "Artillery must be organized in depth and battery positions sited checkerwise, so that in case of the enemy breaking through all batteries are not put out of action at once.

2. "In order to have a reserve available for an immediate counter attack one or two batteries per divisional sector should, from the outset, be placed in positions about 5,500 yards in rear of the front line. Emplacements for such batteries should be sited above ground, so that direct fire can be opened on tanks or infantry which have broken through. Such batteries should only fire occasionally."

(E) CONSTRUCTION OF BATTERY POSITIONS.

1. "The thickness of the walls of reinforced concrete emplacements should be at least 5 feet. Only properly prepared concrete resists bombardments; concrete blocks do not.

2. "The floors of emplacements should be made of strongly built concrete, in order to resist a direct hit from a shell penetrating underneath the floor.

3. "An emplacement to hold a single gun or a section should be made about 100 to 450 yards from each battery position. This emplacement should be strengthened with concrete and well concealed; it will serve for the amount of fire which is ordinarily necessary and will protect the principal emplacements from aeroplane observation. The better emplacements in abandoned battery positions will often serve for this purpose. Isolated shelters for storing ammunition and other purposes should be constructed to a flank and in rear of the battery position.

4. "In battery positions with no concrete shelters the following is the only type of ammunition shelter which is to be constructed: 'Ammunition should be placed on thick planks in small heaps, surrounded by small earth walls and sheltered from the rain by a light roof, if possible, of corrugated iron. There should be a sufficient interval between the heaps.'"

(F) CAMOUFLAGE.

"It is necessary to confront the enemy with a constantly changing situation."

Great stress is laid on the necessity of camouflaging actual battery positions and simulating activity in dummy positions. Moving sections should fire constantly, especially at night, from different positions.

(G) ARTILLERY IN SUPPORT OF COUNTER ATTACK..

The following are taken from Ypres group intelligence summary of August 1, 1917, describing the battle of July 31:

1. "The counter-attack batteries followed close behind the attacking infantry, and the fourth battery opened fire on the enemy's infantry at a range of 660 yards. In addition, it put a tank out of action with a few rounds.

2. "Our attack took the English on the right flank and was completely successful. It was particularly well supported by the 2d and 3d Abteilungen of the 273d Fd. Art. Regt., which sent guns forward to Gravenstafel as soon as the situation permitted. These guns shelled the English at short range and put several tanks out of action."

X. ARTILLERY CURTAIN FIRES IN MISTY WEATHER.

A German order recently captured gives the following rules to be followed for enabling the quick execution of curtain fires in misty weather:

1. "The artillery groups should establish between their battery nearest to the line and the infantry command of the subdivision of the sector a line of relay posts for the safe transmission of demands for curtain fires.

"From experience acquired at Verdun and on the Somme the enemy launches strong attacks in the mist, when the heavy shelling of the preceding days has destroyed all the telephone connections. The transmission of requests for curtain fires must therefore not be hoped for by means of the telephone.

"Relay posts will be established 300 meters from one another, and each post be supplied with pistols, star shells, and sirens.

2. "So as not to lessen the personnel of active batteries it is necessary to draw men for the relays from the runner squads.

"In the event of its being misty weather the personnel should be brought up from the rest stations and placed at predetermined places."

XI. COOPERATION OF THE ARTILLERY WITH THE AVIATION.

A German order, dated the 17th of June, 1917, recalls to field batteries their duties in helping out infantry patrol planes, when the latter are flying low, and protecting the planes from the fire of enemy machine guns.

In the mentioned sector, one battery had as its duty the shelling of all known battery emplacements, while another battery was set aside for the purpose of shelling any new machine guns opening fire on the planes.

XII. UNIT OF ANGULAR MEASUREMENT USED BY THE GERMAN ARTILLERY.

Different systems of angular measurement were formerly employed in the field and foot artillery. In the field artillery the unit of angular measurement was 1/6, 400 part of 360 degrees, i. e., 3.375 minutes. In the foot artillery, the unit was one-sixteenth of a degree, i. e., 3.75 minutes.

A war ministry order, dated December 25, 1916, points out the inconvenience due to the fact of there being two systems of graduating sights, directors, etc., and lays down that in the future the foot artillery will adopt the system of graduation hitherto used by the field artillery. The sights of all natures of gun and howitzer will now be graduated in accordance with this system.

X.

THE EMPLOYMENT OF MACHINE GUNS IN TRENCH WARFARE.

[Translation of a German document.]

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X.

THE EMPLOYMENT OF MACHINE GUNS IN TRENCH WARFARE.

(Translation of a German document.)

First Battalion, 395th Infantry Regiment,
October 9, 1917.

1. In trench warfare, machine guns must maintain a methodical and intense harassing fire by day, and particularly by night, on the hostile trenches, communication trenches, and lines of approach. The machine guns detailed for harassing fire, together with their targets, and those detailed for antiaircraft work must always be specially marked on the machine-gun sketch plans, after the division moves into the line.

2. The engagement of the enemy's infantry aeroplanes (by machine guns) will be organized on the following principles:

(*a*) Regiments will detail a portion of the machine guns in the defensive zone for antiaircraft defense during the opening stages of the battle until the commencement of the infantry battle.

The remainder of the machine guns will keep under cover on the appearance of the enemy's infantry aeroplanes (*contact patrols.*)

(*b*) When the infantry battle commences, all machine guns not required for repelling the enemy's infantry assault will open fire on the aeroplanes which are attacking our infantry.

3. *Instructions for the engagement of the enemy's infantry aeroplanes* (up to a height of 1,000 meters).

Case (*a*).

(i) The aeroplane is flying in a direct or approximately direct line toward the observer.

(ii) The aeroplane is flying nearly straight overhead, away from the observer.

In both cases, fire should be opened by machine guns and by the infantry also.

When the aeroplane is approaching, aim will be taken straight at it.

When the aeroplane is flying away, aim will be taken below the aeroplane, up to a range of 1,000 meters, and directly at it above that range.

Machine guns will not open searching fire on an approaching aeroplane, but will do so (3 graduations) when the aeroplane is flying away.

If the aeroplane is not approaching directly in the line of fire, the direction of its flight should be traversed with fire to a width of 50 meters.

Sights should be set as follows:

Height of aeroplane.	Aeroplane approaching.	Aeroplane flying away.
Meters.	*Sights at, meters.*	*Sights at, meters.*
100– 400	1,400–1,700	400
400– 700	1,700–2,000	400
700–1,000	1,900–2,000	400

Aeroplanes flying at a height exceeding 1,000 meters should not be fired on. Fire will be opened at about 2,000 meters range. Sights once set will not be altered so long as the aeroplane remains at the same height. Variations of range does not entail a corresponding modification of the sighting.

Case (b).

If the aeroplane is flying across the front, or obliquely to a flank, it will be engaged by machine guns only.

Aim will be taken, on principle, in front of the aeroplane, in the direction in which it is flying.

In order to keep the aeroplane as long as possible within the zone of dispersion of the bullets, machine guns will both employ searching fire (Tiefenfeuer), and will alter the point of aim from one of minimum "lead" (in which the cone of dispersion certainly lies behind the aeroplane) to one of maximum "lead" (in which the cone of dispersion certainly lies ahead of the aeroplane).

This traverse will be made slightly faster than the speed of the aeroplane.

As soon as the point of aim of maximum "lead" is reached, fire will cease, and will be opened again at the point of aim of minimum "lead."

Table showing setting of sights and amount of "lead."

Range.	Angle of sight.	Sights set at—	Minimum "lead" and maximum "lead."	Searching fire.
Meters.		*Meters.*	*Aeroplane lengths.*	*Graduations.*
100– 600		600	2–5	3
600–1,000	Below 45°	900	5–11	3
	Above 45°	650		
1,000–1,300	Below 45°	1,200	8–16	3
	Above 45°	850		

The length of an aeroplane length is taken as being about 8 metres, and the velocity 160 km. per hour (100 m. p. h.).

4. The gun captains of detached machine guns, who are left to themselves in the open, must be provided with exact instructions which contain the following points:

In the order book:

(*a*) Habits of the enemy.

(*b*) The main task of the machine gun, with exact orders when fire is to be opened.

(*c*) The points at which stores have been established of R. and armor-piercing ammunition in belts or loose, hand grenades, light pistols, belt fillers, and portable wire entanglements.

(*d*) The arrangements for the supply of ammunition during the fighting.

(*e*) The points to be held by the infantry attached to the gun.

(*f*) When the gun ought to be in position, and where it must be kept when not in position.

On a sketch plan:

(*a*) The position of the machine gun and of the machine guns in the neighborhood.

(*b*) The sectors of the field of fire.

(*c*) The position of the trenches.

(*d*) Ranges.

(*e*) The positions of the platoon and company commanders' posts and the ammunition depot.

(*f*) The nearest telephone and lamp-signaling station.

The machine-gun captains in the position should be given small schemes to solve, so that during the fighting they can not be surprised by any situation which may arise.

When machine-gun teams are relieved, with every 1908 pattern machine gun a competent man should be left for 24 hours longer in the position. His duty is to instruct the new garrison.

5. Owing to the fact that the troops are equipped with a larger number of machine guns, regiments are now better able than was previously the case to employ their 1908 machine guns by sections. The employment of machine guns by sections has the greatest advantages compared with the employment of single guns as detached machine guns.

The team of a detached machine gun often feel as if they had been left in the lurch in an attack, especially if the enemy is advancing from several directions. In future, therefore, where the employment of single detached guns can not be avoided, 4 to 6 infantrymen should be invariably attached to the gun, as has already been ordered. These will not only take over the defense of the flanks but are also intended to stiffen the *morale* of the garrison and prevent them from feeling isolated.

The employment of machine guns by sections should be the rule. The guns can then mutually support one another and combine their fire on a particular area, or fire in two different directions. In a critical situation which lasts for days, the gun teams can obtain the necessary rest in turn, and casualties can be made good. In case one gun is put out of action, the other is able to continue the defense.

To transform machine guns employed by sections into real centers of resistance, by which we hope to repulse with certainty even the strongest hostile attacks, and to insure that they will be able to hold out, even when cut off, until the counter attacks delivered from the rear destroy the enemy or at least drive him back, it is necessary that they should be equipped for long-continued fighting. Iron rations, soda water, and especially enough ammunition—not necessarily in belts—belt fillers, spare locks, spare barrels, water for cooling purposes, etc., should therefore be stored in the positions. The guns and gun teams of such sections should never be posted in the same dugout or shell hole, so that the whole section may not be put out of action by one direct hit; they should be separated, but close enough to one another to form one battle unit under a single

command. The greatest importance must be attached to the fact that the command of a machine-gun section is in one officer's hands.

Although detached machine guns in their positions are regarded as emergency garrisons, and are therefore not to leave their positions (except to occupy alternative positions close by, which have been laid down beforehand), even if the enemy has pushed forward beyond them, the situation during an attack changes so quickly and in so many different ways that it can not be appreciated by the gun captain, who is engaged in serving the gun. It is therefore absolutely essential that there should be a section commander with every section; that is to say, with *every pair* of guns which are employed as a unit. He must be an energetic man, capable of quick decisions, and of thinking tactically, and possessing the necessary authority. *I therefore give orders that the section commander must always be with his machine-gun section.*

It is the duty of the regiment to see that the right individuals are appointed to the position of section commander. The most careful selection must be made. The most efficient individuals are only just good enough to be machine-gun section commanders. It is absolutely essential to appoint probationary officers to machine-gun companies in good time, as well as to continue their instruction in special courses behind the front. Reports must be sent in by September 8 that the above orders have been carried out.

The Einjahrigen detailed at present for the course for probationary officers will be trained at the machine-gun school in the use of both the 1908 and 1908–1915 pattern machine guns. In case it is desired that other Einjahrigen or probationary officers should be trained in the use of the 1908 pattern machine gun, in view of their transfer to the machine-gun companies, the applications from the regiments should be collected by the brigade and sent in to the division. The necessary instructions will then be given to the machine-gun school.

So long as the supply of officers and warrant officers is insufficient to fill all the vacancies for section commanders, these will be filled by energetic and competent senior noncommissioned officers. A list of the names of section commanders is also to be furnished by the brigade by September 8. The machine-gun marksman section will also furnish a similar list to the division by the same date.

I have satisfied myself that the steps which I wish to see taken have not yet been carried out in the case of some machine guns of the Nineteenth Reserve Infantry Regiment and the machine-gun marksman sections attached to it, thus:

(*a*) The principle that a machine gun should not open fire until the enemy has passed the machine gun which lies in front of it has not yet been adopted. In some cases, also, the machine-gun captains were not in a position to act on this general principle, as they had not the least idea where the machine guns in front of them were sited.

(*b*) The sketch plans in existence were, for the most part, inadequate. They did not show the neighboring machine guns and their principal field of fire. In practice it is useful to prepare a sketch plan which can be hung up in the position showing the method of cooperation of the neighboring machine guns, so that the gun team can get the information from it.

(*c*) It is very important that the company commanders should spend a considerable time with their sections and should discuss with them the different possibilities of the enemy's advance over the ground, with special reference to the sketch plan.

(*d*) Alternative positions were not marked out on the ground and therefore their positions were not accurately known.

(*e*) I must once more point out that whenever a gun team is relieved one man must be left behind 24 hours longer in the position to instruct the new team, except in cases where gun teams have already been once in the position.

(*f*) In the case of antiaircraft machine guns, the back-sight attachment for use in conjunction with the circular sight must always be fixed on the gun. In order that this attachment may be quickly removed, the screw at the top of the leaf of the back sight should be removed. In the case of machine guns which have to be removed quickly from the antiaircraft stand in order to fire from the ground, the auxiliary mounting, as adapted by Lieut. Braun's seventy-seventh machine-gun marksmen section, should be used.

The brigade will report as soon as each machine-gun company has been equipped with four mountings of this pattern.

(*g*) Machine-gun teams were still quite insufficiently equipped with hand grenades. Each man should be provided with 10 hand grenades, in two bags containing 5 each. The brigade and machine-gun marksman detachment will report by September 8 that this order has been carried out.

I request that the men be instructed frequently in these orders. I must once more call particular attention to the personal letter from the division which was sent to the machine-gun companies a few days ago.

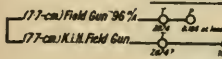
(Signed) BREITHAUPT.

GENERAL STAFF (INTELLIGENCE),
Advanced General Headquarters, October 27, 1917.

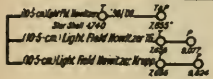
MAXIMUM RANGES OF GERMAN GUNS, HOWITZERS & MORTARS.

FIELD ARTILLERY.

(a) FIELD GUNS.

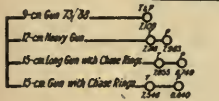


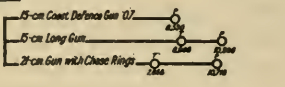
(b) LIGHT FIELD HOWITZERS.



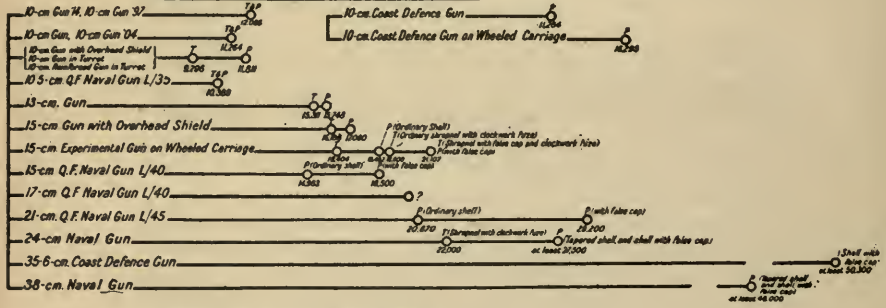
FOOT ARTILLERY.

(a) MEDIUM RANGE GUNS

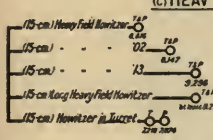


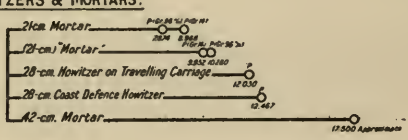


(b) HIGH VELOCITY & LONG RANGE GUNS.

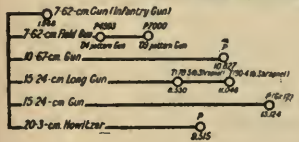


(c) HEAVY FIELD HOWITZERS & MORTARS.





(d) CAPTURED RUSSIAN GUNS.



Maximum Ranges in Yards
T — with time fuze
P — with percussion fuze

General Staff (Intelligence).
General Headquarters,
14th September, 1918.

This diagram cancels Ia/34612 *dated* 1.6.17

XI.

THE GERMAN ATTACK OF AUGUST 10, SOUTH OF LA ROYÈRE.

Investigation made by the Sixth Army.

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XI.

THE GERMAN ATTACK OF AUGUST 10 SOUTH OF LA ROYÈRE.

On the evening of July 30 we took the Gargousse trench from the enemy, making 218 prisoners, who belonged for the most part to the Third Battalion of the 202d Regiment and to the Third Battalion of the 203d Regiment (43d Reserve Division). The losses suffered by those who tried in vain to relieve the troops in line, and then to make a counter attack, were very heavy.

Nevertheless, the 43d Reserve Division was not withdrawn from the front. The German commander even had the troops told that they would be relieved only when the lost ground was retaken.

PRELIMINARY MOVEMENTS.

The 201st Regiment was chosen to execute the attack. On July 30 the First Battalion was taken to Filain. The 1st and 3d Companies were unable to counter attack because of our fire, which inflicted great losses upon them. The First Battalion of the 201st Regiment then relieved the 202d on the 31st.

The 2d Company had charge of blockading the communication trenches leading to La Royère. It had to be withdrawn because of its losses the morning of the 4th and went to Laval.

On the 6th the three other companies of the First Battalion of the 201st Regiment, which were relieved by the Third Battalion of the 202d Regiment, withdrew in their turn to Laval.

The Second Battalion of the 201st Regiment, after remaining in position two days before Filain, was sent on August 2 to Nouvion to rest.

The Third Battalion of the 201st Regiment remained in the Pantheon sector until August 4, when it was relieved by the Second Battalion of the 203d Regiment. It was sent toward the "Russenschlucht" (L'Abordage ravine), where it was replaced by elements of the Third Battalion of the 202d Regiment and by the 218th Regiment (47th Reserve Division).

PRACTICE FOR THE ATTACK.

On August 8 the three battalions of the 201st Regiment were united at the Mouille farm, between Athies and Eppes, where, in the presence of the commanding general of the division, they rehearsed an attack on trenches representing the French position south of La Royère.

LINE FORMATION OF THE 201ST REGIMENT.

On August 9 the First Battalion of the 201st Regiment returned to Filain, to gain La Royère, where it relieved the Third Battalion of the 202d Regiment, one company of which, the 10th, was kept in reserve in the quarries.

The Second Battalion of the 201st Regiment came into line on the right (west) of the First Battalion, relieving, during the night of the 9th–10th, elements of the 202d Regiment, as well as two regiments of the 103d Division, the 32d and 71st Regiments.

The Third Battalion of the 201st Regiment, passing through the "Russenschlucht," came into line the evening of the 9th on the left (east) of the First Battalion, relieving the Second Battalion of the 203d Regiment, two companies of which were kept in the ravine.

FORMATION OF RESERVES.

The First Battalion of the 202d Regiment served as reserve on the slopes descending toward the rear of La Royère. Its four companies, as well as the 10th, kept in the quarries, were at the immediate disposal of the commander of the attack, Maj. Randel, of the 201st Regiment, whose command post was established at La Royère.

The command post of the Second Battalion of the 201st Regiment was at the Saint-Martin farm in the quarries which sheltered two companies of a regiment whose number could not be determined. These two companies served as reserve for the right attacking front.

On the left, Capt. von Franzius, in command of the Third Battalion of the 201st Regiment, established his command post on the south slopes of the "Russenschlucht." He had at his disposal as reserve the two companies of the Second Battalion of the 203d Regiment held in the ravine. The two other companies of the Second Battalion of the 203d Regiment constituted

the defensive troops for the first line between the Béchade and Brunet communication trenches to the east of the front of attack. The center of this front seems to have been held by two companies of the battalion of which the two other companies served as reserve for the Second Battalion of the 201st Regiment. Elements of the 103d Division were farther west.

TROOPS FOR THE ATTACK.

The 201st Regiment was reenforced, as some companies had suffered losses during the end of July and the beginning of August.

The 2d Company was filled up by 50 to 100 riflemen drawn from the 1st, 2d, and 4th Companies of the 202d Regiment, who had been working in the fields with the "harvest command" of Laon.

The 9th Company was reenforced by 60 men from the 6th and 7th Companies of the 203d Regiment coming from Presles.

The divisional assault company furnished seven groups of the "Brigade school of assault," who not being yet adequately prepared as storming troops, were supported by two or three groups of assault battalion. (It should be noted that one of the prisoners captured by us was from the 8th Company of the 202d Regiment, coming also from the "harvest command" of Laon, and he had been assigned to a group of assault battalion as a grenade carrier.

The storming detachments were divided into four storm platoons, of which one was in reserve behind the spur of the Didier Mill, and the three others were assigned to the three battalions of the 201st Regiment.

In each of these battalions 10 to 12 men of the storm platoons were attached to each company to give them vim.

ARRANGEMENT FOR THE ATTACK.

On the west the Second Battalion of the 201st Regiment had the following mission:

The 5th Company was to make a flank attack at the junction of the Saltpetre trench with the Gargousse trench and the Senegal communication trench in the direction of the Negus communication trench.

The 6th Company, on the south of the farm, was to reach the junction of the Laiton trench with the Gargousse trench in

order to deploy toward the Negus communication trench, on meeting the 7th Company, while seeking liaison with the First Battalion toward the east.

The 7th Company, supported by the 8th, was to attack the front of the Senegal communication trench which formed our first line, and, after gaining a footing there, was immediately to spread out in order to join the two wing companies.

The First Battalion of the 201st Regiment, with the 4th Company in support, at the "Munitions-Hoehle" (east of La Royère), was arranged as follows:

The 2d Company was to attack the front of the Gargousse trench between the Laiton and La Royère trenches, while the 1st Company debouched by the latter trench, with the aim of pushing some of its elements as far as possible in the Voraces communication trench.

The 3d Company, reaching the Gargousse trench toward the Bechade communication trench, was to advance in the Vanités communication trench, keeping up the liaison with the Third Battalion in the Gargousse and Bandit trenches.

Each one of the 1st and 3d Companies was to be accompanied by a flame projector of the assault company.

The Third Battalion of the 201st Regiment, keeping two companies as support, was to attack as follows:

The 11th Company, leaving the Brunet communication trench, was to occupy the Gargousse trench toward the west and the French part of the Brunet communication trench, connecting with the 9th Company, which, leaving the west end of Balle trench, was to capture the Chasseurs communication trench and the Bandit trench.

The whole attack was thus to include enveloping maneuvers supporting the direct attack of each sector and gradually gaining ground in the conquered trenches. The enemy adopted the wedge formation for attack (Keilangriff) breaking in at determined places, with storming detachments marching at the head.

INDICATIONS OF ATTACK.

Statements of prisoners gave warning of the imminence of the attack, which extensive operations likewise presaged. The French commander was thus exactly informed, which was all the more important, as the enemy artillery did not increase its fire until a short while before the attack.

ARTILLERY PREPARATION.

As a matter of fact, it was not until the afternoon of the 8th that the bombardment of our first lines between the Pantheon and L'Epine de Chevregny and of our rear lines gave an indication of any preparation for attack, and which, moreover, in addition, caused our well-conducted counter preparation fire to cease.

The German artillery was fairly active during the nights of the 8th and the 9th.

On the 9th the enemy bombarded our first and our rear lines. On the 9th at 4 p. m., slow fire, at the rate of 1 round per minute.

From 6 to 10 p. m., considerable adjustment by airplanes on our batteries, and volleys of 20 rounds.

During the night from the 9th to the 10th intermittent fire.

On the 10th, toward 3 o'clock, large-caliber rounds, then soon after salvos of all calibers on our position (up to 4 shells per minute on all important points), with interdiction fire on our communication trenches, by time-fuse and percussion shells.

There were barely four minutes of heavily sustained drum fire (artillery and trench mortars).

EXECUTION OF THE ATTACK.

Before the rolling fire the German infantry, using communication trenches and shell holes, advanced southward of the Chemin des Dames to within an attacking distance.

At 25 minutes past 5 (German time), at a signal given from an airplane (rockets with red and white balls), the attack was made, while the enemy artillery opened its interdiction fire. Our artillery barrage did not reach the attacking troops. Only our infantry fire had any effect, but not enough to prevent the Germans from penetrating our trenches in places.

But our chasseurs held their ground at certain points of the first-line trench, particularly in the exits of the communication trenches giving access to the second-line trenches, in these trenches and in the saps.

The Germans who succeeded in getting a footing in the Gargousse trench could not deploy. The troops charged with the enveloping attacks failed. The V. B. barrage fire inflicted heavy losses on the enemy, increased by hand grenades and automatic rifles, while our artillery executed box fire and bar-

rages which at the same time prevented the arrival of reserves and also the retirement of the troops checked in their advance.

Also, when the French counter attack was started the Germans, in spite of their furious resistance, were unable to stop our advance. They lost completely the terrain momentarily occupied by them, and those not killed on the spot were immediately captured (we took 124 prisoners, including 2 officers), with the exception of a few men who, having taken shelter in shell holes, were subjected to fire of low-bursting, time-fuse shells and V. B. grenades, which finished them.

The repulse of the Germans was very bloody. Almost all the company officers were killed. The number of corpses left in the position and between the lines was very large. The 201st Regiment may be regarded as almost annihilated. The 43d Reserve Division did not regain the trenches that it lost July 30, but it seems that it had to be withdrawn because of its losses.

SUMMARY.

This German attack, well prepared, although insufficiently supported by the artillery, executed by troops perhaps not fresh enough, and certainly dominated by the moral superiority our chasseurs had acquired over them on July 30, failed completely, thanks to judicious measures and the heroic attitude of the French.

XII.

THE EXPERIENCE GAINED DURING THE ENGLISH-FRENCH OFFENSIVE IN THE SPRING OF 1917.

(10th JUNE, 1917.)

(Issued by the Chief of the General Staff of the Field Army.)

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XII.

THE EXPERIENCE GAINED DURING THE ENGLISH-FRENCH OFFENSIVE IN THE SPRING OF 1917.

INTRODUCTION.

Some of the *principles regarding the construction of field positions and command in battle,* laid down in the "Manual of Position Warfare for all Arms," have been specially emphasized during the fighting in connection with the last Franco-British offensive and have in some cases received further development. The *most important points,* especially those which were *not universally observed and do not yet appear to be fully understood,* are therefore dealt with in the following pages.

I.—CONSTRUCTION OF FIELD POSITIONS.

1. Sufficient attention was not paid to rendering all works as invisible as possible to ground and air observation. Screens and dummy works must be employed on a considerably larger scale than hitherto. (Cf. part 1*a*, pars. 3 and 19; part 1*b*, par. 5 *et seq.*)[1]

2. The more defensive works there are, the more targets must be engaged by the enemy, and the more will he be obliged to *scatter his ammunition.* Consequently, what should be sought is

[1] The references throughout the text to part 1*a*, part 8, etc., refer to the following translations:

Part 1*a*. "General Principles of the Construction of Field Positions," S. S. 558.

Part 1*b* has not been translated.

Part 5. "The Employment and Duties of Artillery Aeroplanes in Position Warfare," S. S. 560.

Part 6. "Communication between Infantry and Aeroplanes or Captive Balloons," S. S. 563.

Part 7 has only been partially translated. *See* "Extracts from the German official textbook regarding Minenwerfer," S. S. 548.

Part 8. "The Principles of Command in the Defensive Battle in Position Warfare," S. S. 561.

not to make the various lines, strong points, dugouts, obstacles, etc., extraordinarily strong, but rather to prepare a broad defended zone, with as many defensive works as possible, which are organized in depth and mutually flank each other. (Cf. part 1*a*, pars. 1, 2, and 8, 2d subpar.) The disadvantage that the various works must be weaker must be accepted.

If the dimensions are excessive (for example, in concrete structures, wire entanglements, etc.), it will only be possible to construct correspondingly fewer works. The regulation dimensions (part 1*b*) should therefore not be exceeded.

3. The statement that even strongly constructed positions will, in the course of time, be destroyed by the heaviest fire, must be admitted. When, however, on account of this, recommendations have been made that *no positions should be constructed*, it is going much too far. **Continuous fire trenches and communication trenches, and good entanglements and dugouts** alone enable a position to be permanently held with a small garrison in ordinary position warfare; they are also indispensable in the battle for the proper command, sheltering, and care of troops in the back lines, especially when the front lines have become shell-hole positions.

Further, only a well-prepared position will impose lengthy preparations on the enemy and the employment of an extraordinary amount of troops and armament.

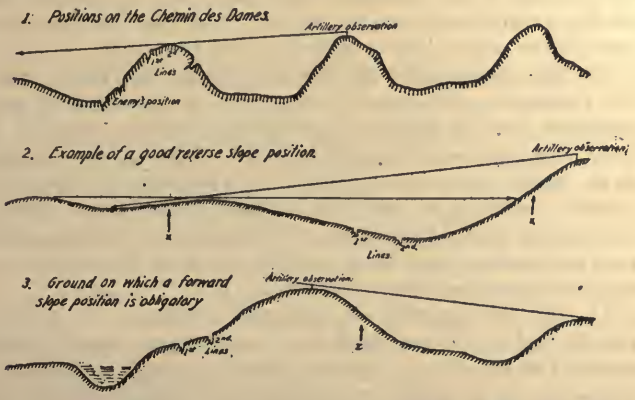
4. **The strength of the position** must increase from front to rear. (Part 1*a*, par. 7.) The front lines must, therefore, be generally considered as advanced positions, in front of which works to be held by advanced posts should be prepared. (Cf. par. 16.) Special value should, therefore, not be attached to the retention of ground. (Part 8, par. 6.) If, in certain cases, the lie of the ground necessitates the foremost line being held in all circumstances, it should be taken into consideration when preparing the position.

The distance from the advanced lines that the strongest works and the dugouts for the mass of the troops are constructed will depend entirely on the ground. (Cf. pars. 14 and 20.)

5. **The requirements of the artillery** play a decisive part in the selection and preparation of positions; sufficient attention is frequently not paid to this. (Cf. part 1*a*, par. 5, and part 8, pars. 1 and 28.) *Distribution in depth* and the *provision of reliable observation* and communications are particularly important for the artillery.

Only when sufficient shellproof ammunition dugouts and routes for bringing up ammunition (field tramways) are available can the *ammunition supply* in times of increased activity be considered, at least to some extent, insured. (Cf. part 8, pars. 2, 5, and 48 *et seq.*)

6. Forward slope and reverse slope positions (*see* sketch) are frequently wrongly appreciated. A decision in favor of or against one or the other, on principle, can not be made. The deciding factors are, on the one hand, *the effect of our own artillery*, which requires reliable ground observation (therefore not in the foremost fighting zone), and, on the other hand, protection against the observed fire of the enemy's artillery. (Part 1*a*, pars. 1, 5, and 9.) If the ground or the tactical situation (*e. g.*, touch with a neighboring sector) imposes the selection of a position which is unfavorable in itself, the disadvantages must be balanced as far as possible by the manner in which the position is constructed and garrisoned (and also is supported by the neighboring sectors).



7. It has been clearly shown that the **positions selected for the machine guns and the dugouts** must form the framework of all infantry battle positions. The greatest stress should be laid on this when a position is being methodically constructed. (Cf. part 1*a*, pars. 6, 7, and 11; part 8, par. 13.) The importance of an *inconspicuous disposal of the machine guns and dugouts in depth can not be too much emphasized.* Deep-mined dugouts in the front line and large tunnels have again proved to

be mantraps. Any deep dugouts which may still exist in the foremost line should therefore be destroyed (at the beginning of the battle, at the latest), and large tunnels should be reduced in size by blowing up portions of them.

8. The importance of well thought out improvements of the road and railway systems (part 1*a*, par. 21, and part 8, pars. 2, 5, and 48 *et seq.*), *of collecting dumps of building material, stores, and ammunition*, and of the *measures for the accommodation and welfare* of the troops, is still underestimated. The preparations for the defensive battle must begin with these. There have been many cases of want of coordination and cooperation within the staffs in connection with the arrangements for bringing up supplies of all kinds.

9. Villages, even when well prepared for defense, require too many troops and are particularly good targets for the artillery. The tendency to exaggerate the importance of villages and the elaboration of their defenses for the battle in position warfare must, therefore, be counteracted. (Cf. part 1*b*, par. 83 *et seq.*) Villages will, it is true, retain their importance in quiet periods for the quartering of troops, but it will be wiser not to include them in the actual scheme of defense *for the battle.*

10. The construction of defenses during the battle within the foremost battle zone is, as a rule, unsound. The work, especially that of carrying the material forward, demands too many men who could be employed in the fight or better utilized in the construction of back lines. It is impossible to prevent a position becoming a shell-hole position during heavy fighting. (Cf. part 8, pars. 12 and 15.) An effort should be made to connect the various shell holes by trenches, more or less deep, as soon as the tactical situation permits.

11. The construction of rearward positions (cf. part 1*a*, par. 23, and part 8, par. 45 *et seq.*) requires more careful preparations and can, if the available labor is more fully utilized, be carried out to a greater extent than has hitherto been the case. In order that the construction may not be based on obsolete principles, a sufficient number of experienced, mixed constructional staffs should be employed, consisting of senior officers of all arms and General Staff officers, and not only pioneer staffs. A regular program of work should always be prepared in writing so that, in case there is a change in the personnel employed, the work can be continued on a definite plan.

12. The construction of positions after the conclusion of the battle.—It is not advisable to convert the shell-hole posi-

tions into new fighting positions; the second or rearward positions should, wherever possible, be selected for the new fighting position and the shell-hole area held only with advanced troops (outposts).

II.—GARRISON.

13. The width of the divisional sector (part 8, par. 8) frequently exceeded 3,300 yards. This must also be the case in future. The divisions were generally quite capable of warding off attacks without assistance. Nevertheless, in special circumstances, second-line divisions (either complete or parts of divisions including artillery), known as **counter-attack divisions** ("Eingreifdivisionen"), will be brought up so close—that is to say, within range of the enemy's distant bombardment—that they can, if necessary, at once take part in the battle.

14. As regards the **infantry**, the principle of *allotting a weak garrison to the front line, distributing the machine guns in depth and chequer-wise behind this line*, detailing *emergency garrisons*, especially at sector boundaries, and providing protection for the machine-gun nests has been shown in most cases to be correct. (Cf. par. 4 and part 8, par. 13.)

On the other hand, stress must be laid on the necessity for *keeping the reserves well up*. This should not, however, lead to excessive crowding in the foremost fighting zone, which increases the losses and uses up the troops more quickly. The art of leadership consists in preserving the correct mean in this matter. Otherwise, it can not be denied that there is a danger of reserves or counter-attack divisions being prematurely used up. (As regards the employment of reserves in the battle, compare par. 22.) Wherever the distribution of the troops in depth ceases to exist during the battle, it must be immediately restored directly pauses in the fighting occur. (Part 8, par. 16.)

The more uncertain the attacker is as to where *the principal strength of the defense lies*, and as to the position of the principal defensive line, of the most important flanking defenses, of the strongest reserves, etc., the more difficult will the attack be. Adaptability to the tactical situation at the time is essential (cf. III, pars. 19 and 20); the distribution of the troops and the plan of defense must, therefore, be altered from time to time.

Every unit must pay attention to the *security of its flanks*. Emergency garrisons alone are not sufficient; detachments will

be detailed for employment on the offensive. In particular, special detachments ("Nahtkommandos" or contact detachments) will be formed at the boundaries of divisional and group sectors.

15. **Distribution in depth** is as necessary for the artillery and trench mortars as for the infantry and machine guns. (Cf. part 8, par. 28.) In this respect, too, mistakes have been made. Reserve batteries (with teams) and batteries in readiness in "positions in observation" are indispensable. (Cf. part 8, par. 22.)

16. Distribution in depth will be extended forward by holding the foreground with advanced troops of all arms, whenever the distance between us and the enemy permits. (Cf. par. 4.)

III.—CONDUCT OF THE BATTLE.

17. The employment of outposts to hold the foreground of the position has proved effective.

18. It is important that the defensive battle proper should be *commenced in good time.* (Part 8, par. 5.)

19. **Adaptability on the part of commanders,** in accordance with the principles laid down in part 8, paragraph 6, is as much an essential, rendered necessary by our general situation, as it is tactically advantageous. There should be no hesitation in exercising one's own initiative. *The superiority of an active defense, carried out in the spirit of an offensive, should be strongly emphasized. On the other hand, there are but few points on the ground which must actually be held at all costs. We have been obliged to learn to adapt ourselves to the inevitable loss of a number of positions, which we considered it absolutely indispensable to hold, after we had incurred heavy casualties to no purpose. The "morale" of the troops will never be lowered in such cases by a voluntary withdrawal at the right time* in accordance with orders, if they understand the reasons for such a step, while the obstinate retention of positions, which have obviously become unfavorable for us, must destroy their confidence in their commanders. Complaints are again being received from the troops that in its anxiety to prevent the loss of a few elements of trench the higher command prematurely pushes forward unnecessarily strong reserves. The result is that the forward area of the battle zone, which is exposed to the most intense fire of the enemy's artillery, is too strongly held

and avoidable losses are incurred. Although it may not be possible to avoid bringing large bodies of reserves close up, commanders must not lose sight of the aim of the defense in a battle. (Cf. part 8, par. 6.)

20. Greater adaptability on the part of the troops *during the battle has also shown itself to be necessary.* This is as true of the infantry and machine guns as it is of the artillery and *Minenwerfer.* (Part 8, pars. 15, 28, 43, and part 7.)

The battle in or for the *foremost line of trenches has developed into the battle for the first-line position.* During the artillery preparation the areas exposed to the heaviest bombardment should be avoided and those not swept by fire must be looked for. Experience shows that careful observation of the usual manner in which the enemy distributes his fire makes it possible to determine the position of such areas. The best procedure in these circumstances is to move toward the enemy if it is necessary to leave the trenches.

The casualties sustained if the men are lying in the open or in shell holes, so long as the fact has not been observed, are usually considerably less than if the troops remain, in all circumstances, in positions which are known to the enemy. Infantry and machine guns will, therefore, *often do better to endeavor to engage the enemy in the open* where they can find cover from observation in shell holes, and to use the trenches, as a rule, only to live in during quieter periods, or for traffic, or for better protection against the weather. The attacker will then have difficulty in finding out where it is necessary for him to concentrate his artillery and trench-mortar fire, and where and to what extent his infantry attack will meet with opposition.

On the other hand, such a disposition of the troops and system of command in battle *increases the difficulties of command, supply, and relief.* Men lying by themselves in shell holes are particularly susceptible to a strong *feeling of isolation* which weakens their power of resistance. During heavy fighting it is thus easy for gaps to occur in which hostile nests are formed without being noticed. Repeated efforts must therefore be made by all possible means to establish *communication* inconspicuously between crater and crater. Groups or small bodies of men must be held together by officers, noncommissioned officers, and stout-hearted men. The activity of patrols and infantry observers within our own position acquires an extraordinary im-

portance. Men engaged on these duties should receive special consideration in the way of decorations, leave, etc.

These tactics can naturally not be employed in the same manner on all occasions. The essential point is that we can not be content with demanding from our infantry that they *shall simply sit still and allow the enemy to shell them.* On the contrary, they must *be as active as possible themselves and use their heads and take the offensive against the enemy.* In this way they will carry on the fighting with less losses and greater success and their *morale* will be strengthened and improved.

This implies that commanders, even those of comparatively small units, must have a certain amount of freedom in deciding on the tactics to be employed.

21. Although the principles of "The Defensive Battle" permit of withdrawals of limited extent, the troops must retain a clear understanding of the fact that, as *the result of the fighting, each unit must maintain intact the ground entrusted to it, and that the definite evacuation of any piece of ground can only be carried out by order of the higher command.* The men must realize that their immediate duty is absolutely to prevent the enemy from penetrating the position for as long as possible, and that in all circumstances they have to destroy or eject any of the enemy who may happen to penetrate the position temporarily. *The offensive defensive, the immediate and independent counter attack,* must become second nature to every man and every commander. If this is the case, every detachment which is surrounded by the enemy will have the certainty that our own counter attack will immediately follow the enemy's attack, and that the longer resistance is maintained the easier will be the task of the counter attack. The enemy's troops who are surrounding our detachment will then be surrounded themselves and the number of our men who are taken prisoner unwounded will be much smaller.

22. It has again been proved that the immediate counter attack *plays the decisive rôle in the defense.* (Cf. part 8, par. 16.). *The immediate counter attack should strike the successful enemy at the moment of his success or immediately afterwards, and should, so far as is possible, take him by surprise and in flank.* It is the most effective method, and that which can be carried out with the least expenditure of man power and ammunition, of restoring the situation quickly and decisively.

If it fails, and if the enemy has succeeded in consolidating his position, only a methodical counter attack can lead to the

recapture of the lost ground. This usually necessitates the employment of men and matériel on a comparatively large scale. A commander has, therefore, always to ask himself before every *methodical counter attack* whether the possible success is worth the sacrifice.

In both immediate and methodical counter attacks, time and opportunity must always be given to the units detailed for them to be thoroughly instructed as to the ground and the conditions under which they will have to fight, and to prepare for the attack. In the case of the *methodical counter attack*, all these preparations have to be made after the decision to carry it out has been taken. There is plenty of time for its execution, as it does not matter whether the attack is delivered sooner or later. In the case of the *immediate counter attack*, on the other hand, the commanders and subordinate commanders of the troops who are to deliver it, and, if possible, the men themselves, must be given the opportunity of making their preparations *before they are thrown into the fight*, and a thorough understanding as to the details of the tactical situation must be established and maintained between the commanders of the troops detailed for the attack and the commanders of the troops in line. Otherwise, the inevitable results will be casualties and reverses. The higher command must consider it an important part of its duty to insure that a unit is never sent into a fight with the conditions of which it is entirely unacquainted. The subordinate commanders must insure that the time given them for purposes of preparation is thoroughly utilized. This applies as much to the employment of small local reserves as it does to the larger bodies of troops who are stationed farther in rear.

Troops who are detailed by the higher command to carry out immediate or methodical counter attacks should, as a rule, be placed under the orders of the commander of the sector in which they are to be employed.

It still frequently occurs that the *strength of the infantry* detailed for an objective, whether in an immediate or a methodical counter attack, *is excessive*. The commander must always ask himself what is the smallest number of men with which he can gain his objective. Strength, even in the offensive defensive, is in no way a matter of the numbers of troops employed but a question of the skill with which they are handled. On the defensive fronts the divisions in line will in most cases be sufficiently strong to repulse the enemy's attacks at once or by immediate counter attacks. It is, however, advisable to have

complete units in support behind them to meet special cases and as an additional precaution. The need of such reserves has given rise to the idea of counter-attack divisions. Before such divisions are engaged the higher command must always take into consideration whether they are to be employed as complete formations or whether portions of them will be sufficient to achieve the object in view.

While, on the one hand, the timely release of reserves is decisive for success, the army commander has on the other hand to insure that they are not prematurely weakened, so far as their fighting power is concerned, by being continually kept up too close to the fighting. This particularly applies to counter-attack divisions.

23. Artillery fire.—*An increased expenditure of ammunition*, particularly for counter-battery work and for the purpose of inflicting casualties on living targets with H. E. or gas shell, is necessary in the defensive battle and is always justified, so long as the ammunition is expended on the right lines. Many mistakes are still made in this respect.

Special pains should be taken not to miss the right time *to employ gas shell* before the beginning of the enemy's attack.

From prisoners' statements, however, the results achieved by the German artillery against the assaulting infantry are not always in proportion to the enormous quantity of guns and ammunition employed.

One of the principal reasons for this, in addition to *insufficient observation*, is to be found in the fact that *our artillery fire is too rigid.* A strong artillery defensive is not to be secured by making the automatic barrages as thick as possible. What should rather be repeatedly emphasized is the *importance of deliberate observed destructive fire, and of methodical annihilating fire.* The proper employment of gas shell and well-regulated *harassing fire* also promise good results.

Methodical annihilating fire, directed against the enemy's jumping-off trenches, must not be developed into a stereotyped and rigid system similar to automatic barrage fire opened without observation. On the contrary, it must *be varied* in accordance with the situation in regard to the width of the front and the depth of the area to be shelled, and must be concentrated, as each occasion arises, on the positions where the enemy's attacking troops have been detected or are suspected to be assembling. As a rule, the organization in depth of the enemy's at-

tacking troops makes it necessary for annihilating fire to cover an area of considerable depth.

Methodical annihilating fire gives the infantry far more effective support during a battle than automatic barrages, with their enormous expenditure of ammunition, which, after all, produces only slight results.

It is absolutely essential *that artillery fire should be flexible* and this can only be secured by means of the most extensive employment of *aerial observation* and by the thorough organization and maintenance of *artillery communications* of all kinds, which must be made independent of telephone lines in the main zone of hostile fire. The artillery fire must be quickly adapted to the results obtained by every reconnaissance and to every change in the tactical situation.

24. Infantry, artillery, pursuit and battle aeroplanes, as well as balloons, can lay claim to performances of extraordinary excellence; and yet there is a very great deal to learn in the cooperation of aeroplanes and balloons with the troops. They must be trained early to work together on the lines laid down in the regulations. (Cf., especially parts 5 and 6, and part 8, par. 22 *et seq.*) For this purpose aviation units should be detailed to the fighting troops as early as possible.

Corps, armies, and groups of armies must take the necessary steps to secure the concentration and cooperation of the aviation forces of the neighoring sectors, in the air, at the points where the fighting is heaviest, so as to gain the supremacy at these points. The manner in which available aviation units and balloons are to be employed, therefore, requires the most careful consideration.

As a matter of principle, one artillery flight and one protective flight, if it is available, should be attached to each division in line on the main battle fronts for the purposes of *artillery observation.* In addition, groups (corps) should have one or two reconnaissance flights at their disposal for contact patrol work and aerial photography, as well as for close reconnaissance. They should also be provided with one or two pursuit flights for the actual work of aerial fighting. The army will usually find one reconnaissance flight sufficient for its requirements, while it will have, in addition, the balance of the pursuit flights. The army thus has it in its power, by concentrating the pursuit flights in the sectors which are the most important for the time being, to put the enemy's aerial observation out of action for some hours and to secure our own.

The tedious and exhausting but decisive and useful work of contact patrols and artillery aeroplanes is particularly valuable. The part which contact patrols and pursuit flights can play in the infantry fighting by firing at the enemy's reserves and troops in trenches can exercise a great moral effect.

Bombing raids should, as a rule, be carried out by the bombing squadrons. If taken for such an operation, flights which are already employed are withdrawn from their proper duties.

Economy in the employment of their aviation forces is a duty which can not be too seriously regarded by all commanders. If they are employed too frequently both men and machines are overstrained and wear out too quickly.

On the quiet fronts, armies must insure the training of their pilots for contact patrol and artillery work by the judicious employment of the few aircraft at their disposal.

25. The value of "Minenwerfer" in the defensive battle is considered doubtful in several quarters. Even if it is admitted that they are primarily offensive weapons (they are indispensable for counter attacks), there are, on the other hand, enough well-known examples of good results achieved by all kinds of "Minenwerfer" (even heavy and medium) in the defensive battle. *"Minenwerfer" must be disposed in depth, and their employment must be flexible.* The cooperation of "Minenwerfer" and "Granatwerfer" in immediate and methodical counter attacks requires particularly thorough training. (Cf. part 7 and part 8, par. 43 *et seq.*)

IV.—GENERAL.

26. Clerical work.—Legitimate complaints are made as to the enormous increase in the amount of clerical work. This is already described as a tactical danger, owing to the fact that commanding officers—even down to battery and company commanders—are kept too much in their offices. Independence and initiative are also diminished by this fact. The supervision and checking which must be carried out by superior officers must not increase the amount of clerical work.

Written reports, explanations, and instructions of all kinds, as well as the preparation and keeping up to date of many kinds of sketch plans and maps, can not, it is true, be dispensed with, but the impression exists that it is possible to reduce the quantity. There must, for example, be something wrong with the

system if an artillery "*Abteilung*" has to keep a *register of correspondence in its battle headquarters* and has about *40 entries daily in this register.* The fighting must suffer from such a system, and an immediate alteration is necessary. Every officer in a responsible position, from the battalion commander upward, ought to ask himself if he can not settle a question verbally. Written directions from superior officers, important as they are, are not the only means.

27. Various incidents render it advisable to call attention to the fact that the "Manual of Position Warfare for all Arms," including this special part, must be regarded as *binding.* The orders which have been given by some officers, and which represent a considerable *departure from these instructions* in matters of principle, can not be permitted under any circumstances. On the contrary, in the interests of uniformity throughout the army, which is urgently necessary, it is expected that the principles laid down in these manuals will be applied absolutely, and without additions which alter their meaning.

XIII.

THE BATTLE OF MALMAISON (OCTOBER 23, 1917), AS SEEN BY THE GERMANS.

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XIII.

THE BATTLE OF MALMAISON (OCT. 23, 1917), AS SEEN BY THE GERMANS.

From captured documents and the interrogation of prisoners we have been enabled to follow the entire Battle of Malmaison from the German point of view, beginning with the period of preparation and continuing up to the withdrawal of the enemy. The documents and questionnaires emphasize in an astounding manner the extent of our success and the German failure.

THE ACTION.

I. The enemy was not in the least surprised as our attack had been expected since the beginning of September (Artillery Brigade order for the 103d Division of Sept. 8). The conviction held by the Germans that an attack was imminent increased little by little. The first days of October and the middle of that month appeared to them particularly critical periods.

The enemy seems to have known about our offensive preparations, but up to the last moment thought that only a slight diversion was intended, in order to hold a certain number of divisions on the Aisne, the main action taking place in Flanders.

Toward the 8th of October, when a plan for falling back could not be carried out, the enemy command decided to maintain the position by putting excellent divisions in line, in order to cut short any French attempt in that region.

The enemy had only an imperfect idea of the strength of our means of attack. The artillery officers taken prisoner attribute their ignorance of the artillery situation to the perfect camouflage of our batteries; the perfect method of employed preparatory fire, judiciously échelonèd, and which led the Germans to conclude that there was only question of displacement of the artillery and not of reenforcements.

Great was the surprise of the artillery officers when, a few days before the attack, there was the map of the batteries located as being in action at the opening of demolition fire.

Several artillery regiments were quickly brought up, but their action was practically nil, as it was impossible to cross the canal under the enemy fire.

It is beyond question (according to messages and declarations made by captured officers) that the German staff knew the date and hour of the attack. The fact that we advanced that hour at the last moment enabled two of our divisions to escape the effects of a counter-preparation fire which would in all probability have proved fatal had their start been delayed until the hour originally set.

In view of the indications of an attack by us, another division was brought into sector as a reenforcement for those occupying the menaced front.

This division, the 2d Division of the Guard, came into line on the 21st of September between the 103d Division and the 5th Division of the Guard.

The 103d Division was relieved toward October 12 by the 13th Division. On its right was the 14th Division and on its right again the 37th Division, one regiment of which occupied the trenches south of the canal.

On the left of the 2d Division of the Guards was the 5th Division of the Guards and on its left again the 47th Division of Reserves.

Several divisions were stationed near by, three of which, called divisions for intervention, were designed to act as supports, on the right to the 52d Division, on the left to the 9th Division, and in the center to the 43d Division of Reserves.

Finally, in addition to some elements of the 10th Division (in sector in the Saint Gobain forest), the 6th Division (brought from Russia) and the 3rd Bavarian Division (brought from Lorraine) were stationed near.

As our preparation progressed the units already in line, severely tried, had to be relieved by others then in billets, in spite of the difficulties in the way of these reliefs. The units charged with the defense of the successive lines took up their positions at the cost of severe losses.

Considerable reinforcement of artillery was achieved, especially in heavy artillery.

Between the 15th of September and the 15th of October 64 new batteries appeared on the front of the army, including 40 of large caliber. This brought the total number of batteries before our front of attack up to about 180, 63 of which were of large caliber.

This display of forces, the strength of the troops in line, and a certain miscalculation of the effort we were capable of, increased the self-confidence of the Germans. A small strip of

ground at most was to be abandoned where the width of the plateau was sufficient to permit a slight withdrawal without causing great inconvenience.

The order had been issued to hold on at any cost and to fight confidently, as the French were unequal to the Germans in close combat. The erroneousness of this opinion was soon proven, the care and pains taken in the preparation forcing the enemy to retreat across the canal and abandon the entire *Chemin des Dames.*

II. The enemy tactics combined a desperate defense of the first position by troops in shelters (the concrete of the Hindenburg line and the natural caves appearing to be bombproof) or fortified shell holes, and a counter attack of every echelon. The captured orders left no doubt on this subject, and preparations had been made with almost exaggerated minuteness.

III. As a matter of fact, the enemy did not execute a single maneuver, excepting in a few local actions, which were quickly overcome by our retaliation.

The effects of our bombardment were such as to result in the premature engagement of units originally destined for the counter attack, the losses occasioned throughout the area of action of our guns (which was very extended in depth) being so severe as to disorganize the plan and necessitate the utilization of all these units as reinforcements, without having control of the situation, as liaisons had become impossible.

ARTILLERY.

A. The enemy artillery did not hinder our preparations as it might have if an enforced or untimely economy in ammunition had not interposed.

The few ammunition depots which were blown up within our lines and the small losses they were able to inflict before we commenced our preparatory fire did not worry us, as the Germans were far from being able to comply with their instructions.

The enemy batteries were practically all paralyzed and their fire disorganized as soon as our bombardment began.

B. The counter-preparatory fire before the attack was violent and menacing, especially on our right front.

The German shells did not follow our waves on that part of the front and the barrage fires were everywhere else inoperative.

C. The movement toward the northeast, observed during the few days just before our attack, was accentuated after the 24th of October. The comparative inactivity of the batteries stationed

on the other side of the canal during the following period was proof of the enemy's confusion. It was not until after the complete evacuation of Chemin des Dames that an artillery line could be fixed upon. This line is not dense and has not been very active.

AVIATION.

The German aviation service was unable to cope with ours. Their pursuit airplanes tried to form barrages inside their lines, but rarely accepted a challenge, and we were able to make our adjustments and aerial as well as visual reconnaissances without hindrance. Bombardments on our rear were few and unimportant.

The aerial reconnaissance was very inferior. It did not discover the extent of the French preparations and the artillery reinforcements escaped notice.

MACHINE GUNS AND TRENCH MORTARS.

Machine guns formed the chief impediment to our progress, and also occasioned our losses (which were, however, relatively unimportant) during the attack. There are always some undestroyed machine guns, and their resistance can only be successfully met by quick and skillful dispositions, such as were taken on the 25th of October.

The trench mortars were silenced by our preparatory fire and had practically no effect.

DEFENSIVE ORGANIZATIONS.

The conquered defensive organizations did not call for especial notice. Those which had not been completely demolished appeared to be of the usual type. The natural caves of the region had been utilized to the maximum extent.

THE ENEMY TROOPS.

The opposing forces were for the most part excellent. Next to the 2d and 5th Divisions of the Guard were the 13th and 14th Divisions of the VIIth Corps, which were units selected from among the best. The other Division in line, the 47th Reserve, was perhaps a little tired, but the Intervention Divisions (52d, 43d Reserve, 9th) were in good condition, as were also those brought up as reinforcements (6th, 3d Bavarian, 10th).

The prisoners, even those belonging to the Guard, had the miserable expression of persons who had suffered, having remained several days under an incessant bombardment with-

out supplies. Their morale had been effected. Side by side with the serious resistance encountered there had been wholesale surrenders, and the counter attacks were seldom made with any zest.

Many of the prisoners were young, about 19 per cent of the total being of the class of 1918.

LOSSES.

Three thousand three hundred dead were picked up by us on the conquered terrain.

The total number of dead could not be less than 8,000, which would correspond normally to 30,000 wounded. By adding 11,500 prisoners, we may calculate the total German losses at about 50,000 men.

In addition to this, 200 guns, 222 trench mortars, 720 machine guns, and large quantities of matériel and ammunition remained in our hands.

The prisoners declared that our artillery fire caused such severe losses in the rear, in the cantonments and camps, which they had thought safe and on the roads and paths that some of the men thought they must have been betrayed, our information had been so accurate.

Our aviation service appeared to them to control the air, and, as a matter of fact, many more French than German airplanes were to be seen.

Our attack was no surprise to the Germans, some of whom were awaiting it as a deliverance. Nevertheless, the enthusiasm of our troops and the extent of our preparations were equally astonishing to many of the prisoners.

It is a current saying in the German army that France is exhausted; that the French army is incapable of a great exertion; that food is extremely rare and discouragement universal. But when prisoners reach our lines they are amazed at what they see and the surprise of those who think and are sincere is unmistakable.

Some officers, scarcely able to conceal their spite, declared that "with such means Hindenburg would have done still better."

EFFECTS OF THE ATTACK.

The dominating fact in the statements of the artillery officers and the battalion commanders is the profound impression made

by the efficacy and violence of the demolition fire, especially in rear.

The artillery fire resulted—

In completely demolishing the first-line defenses and severing all means of liaison.

In largely destroying the artillery.

In rendering all supplying of rations and ammunition impossible, as well as preventing relief.

The matériel destroyed by the bombardment south of the canal could not be replaced. The Germans had largely depended on their gas shells to check the French attack. All the reserve stores of gas shells were 5 kilometers north of the canal, so as to be outside the line of bombardment, and when they were needed it was impossible to have them brought forward. For the same reason the line troops were four days without food. They were completely exhausted and incapable of offering serious resistance when they were taken by our infantry.

SOME SUGGESTIVE DOCUMENTS.

The documents given below were found on the 2d lieutenant commanding the 4th company of the Augusta regiment, and include notes exchanged between a platoon commander, the commander of the 4th company, and the K. T. K., sector commander. These documents are added proof that our fire had disorganized the enemy first-line troops, had caused grave losses, demoralized both the commanders and their men, made relief almost impossible, and, in a word, had reduced the combat value and resistive force of the adversary to a very considerable extent.

October 18th. To the Company Commander.

Up to the present time I have 1 man killed and 5 wounded. I need at least 5 men to replace the 5 who are incapacitated. Captain Wilk (K. T. K., sector commander) writes me he sees no reason why I should not arrange for reliefs among the detachments. Such an exchange does not interest me in the least; I beg you will at least replace the losses. In any case I have room enough to shelter more men than I now have. I have so few men at my disposal that in case of an attack I must leave part of the trench *without garrison*, so that the enemy could penetrate at that point without any difficulty whatever. Please remember that I have only *one single machine gun* to defend an

extensive sector with; what can I do with one machine gun? I beg of you to ask the K. T. K. to let me have one more from the machine-gun company. I have a suitable shelter at my disposal for this purpose.

The two other platoon commanders tell me they also are afraid that the few men at our disposal will not be able to defend the trench alone.

Please report to the K. T. K. that the artillery has left me in the lurch.

Everything promises well.

(Signed) RITTERHAUS.

4th Company.—October 19th, 1917, 7.10 a. m., to K. T. K. Hans links (left).

Losses: The company lost yesterday 1 killed and 4 wounded. Lieutenant R. requests one more machine gun. Shall I send the light machine gun which I had repaired and have at my disposal into line?

(Signed) SIEBERT.

Answer from the K. T. K., October 19, 1917, 7.15 o'clock.

Yes. Agreed.

(Signed) WILK.

October 20th, 1917. To the Commander of the 4th Company.

I. The afternoon was almost unbearable; 1 killed, 1 wounded, 1 buried. Several shells struck my shelter.

II. I beg you urgently to intervene immediately and very energetically to have us relieved by to-morrow morning at latest. The officers and men are simply exhausted.

(Signed) RITTERHAUS.

4th Company.—October 19, 1917, 10 p. m. To the K. T. K. Hans links (left).

Second Lieutenant Ritterhaus urgently requests relief; the troops, as well as himself, are completely exhausted. Relief by part of the same company would not better the situation, as the only platoon available is in the same physical and moral condition; 1 killed, 1 wounded, 1 missing.

(Signed) SIEBERT.

Answer from the K. T. K., October 20th, 1917, 11.10 p. m., to the 4th Company.

In view of the bombardment actually taking place, relief does not appear opportune. If to-morrow morning is like this morning, a little calm or foggy, I shall have the 4th Company relieved by the 1st Company.

October 21st, 1917.—4th Company to the K. T. K., Hans links (left)—7.15 a. m.

I respectfully request to have the entire company relieved, or I can not guarantee the defense of the sector with the troops at my disposal. I made this same request at 4 a. m., but have as yet received no reply. I urgently request that my demand be granted.

(Signed) SIEBERT.

Answer from the K. T. K., October 21, 1917, to the 4th Company, 7.25 a. m.

The report sent in at 4 o'clock was received here at 6.30. In the answer I refused to order a new relief at the *present moment*. The remainder of the company will be relieved to-morrow morning. (French translator's note: Only a portion of the 4th Company was to have been relieved on the morning of the 21st.) Up to that time *you must hold out*. You have under your orders in the R. I. sector Lieutenant Jager with 4 grenade throwers of the 1st Company, Augusta; in R. 2 Sergt. Wienand with one platoon in the trench-mortar shelter, the company staff, and the assault battalion. The position absolutely must be held.

(Signed) WILK.

XIV.

ACTIONS ON THE CARSO, AUGUST TO SEPTEMBER, 1917.

(Austrian documents concerning the Artillery—Command—Third Army, Section II—Information.)

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XIV.

ACTIONS ON THE CARSO, AUGUST-SEPTEMBER, 1917.

HEADQUARTERS THIRD ARMY.

AUSTRIAN DOCUMENTS CONCERNING THE ARTILLERY, FOUND DURING THE OFFENSIVE OF AUGUST, 1917, AND INFORMATION OBTAINED FROM THE INTERROGATION OF PRISONERS.

From the documents found and the information obtained from the few prisoners taken, it is evident that the enemy has a new plan for the use of the artillery. Up to the present time the brigade of field artillery assigned to a division has been subdivided into battalions of various sizes, all dependent, however, upon the commander of the divisional artillery, with the exception of a few batteries or sections assigned to infantry commands for special duties. They now appear to be divided into two commands (Gruppen), one formed by regiments of field artillery and light howitzers and the other by regiments of heavy field artillery. *In defense*, batteries of the two first regiments are grouped into mixed *battalions for barrage*, in which may also be included batteries of other field regiments and of light howitzers from the same sector. They are commanded by a colonel of artillery (possibly the commander of the brigade of field artillery), tactically dependent upon the commandant of the infantry brigade. The regiment of heavy field artillery is commanded by a colonel or lieutenant colonel of artillery, who receives orders directly from the commander of the division.

This explains the phrase which occurs so frequently in the documents: "Artillery of the zone of the infantry brigade." It has not been possible to obtain precise information concerning the relations of tactical dependence which would explain the other phrase frequently repeated in one of the documents

translated: "Batteries tactically dependent upon the sector of the battalion."

The enemy is paying constantly increasing attention to liaison; thus two complete telephone systems have recently been provided for the artillery, one for the transmission of orders and one for fire adjustment.

COMMAND OF SUBSECTOR II.

[No. 166/11 Op.]

FIELD POST 391, *June 16, 1917.*

The tenth battle of the Isonzo has shown the decisive importance of "*annihilation fire*" (Vernichtungsfener) when it is opened suddenly and with extreme violence. Whenever it was possible to reach the enemy infantry in their points of concentration before the attack with *concentrated volleys*, the adversary was unable to make a serious attack.

It is therefore the duty of a well-organized and well-instructed observation service to discover every concentration of enemy troops *before* the attack, in order that they may be annihilated and the attack effectively prevented by a short but concentrated annihilation fire of all the available guns (not including the sections for barrage fire). If several zones are in question they will be subjected in succession to similar volleys.

If all the artillery of a subsector is to be used simultaneously, the orders to open fire will be given by the commander of the subsector, to whom all facts bearing on the question must be communicated without delay.

The order to fire must indicate the time at which fire is to be opened, the amount of ammunition for this heavy fire, and the area to be swept.

Only in case of imminent danger are the commanders of batteries to open fire immediately. The commander of the subsector will then provide other batteries for use in that zone.

Every care must be taken in order that by means of the other defensive measures of the artillery the original density and intensity of fire may be maintained.

The following are a few instructions on the subject:

A. BARRAGE BATTERIES.

(1) Barrage batteries must always be laid in the direction of the zone of barrage, with the guns loaded. Near each gun

should be placed one large case of shells and one of shrapnel, with fuses set. If the battery is used against other targets, one section must remain in readiness for barrage fire.

(2) Barrage fire must be opened one minute after request at latest.

To this end the cannoneers of one section must always be in readiness by their guns, even at night (section on duty).

At night an inspection officer must be present to supervise visual signals, to see that alarms are given without delay, and to superintend the firing of alarm guns.

The officer on duty, especially at night, must remain near the (telephone?) station of the guns.

The troops which are to be in readiness must be inspected often.

(3) All observation stations must be occupied day and night. During periods of calm expert noncommissioned officers may be detailed for night duty, but there should be an officer on duty in at least one observation station of each battalion, even at night.

In order to ascertain, even at night, whether a luminous signal is sent from the zone of action of his own barrage battery, small square apertures are made in each loophole with laths or small boards, through which the observer can see the zone of barrage of his own battery.

(4) A noncommissioned officer from every barrage battery is attached to every company commander in front of whose sector barrage fire is to be executed.

These noncommissioned officers will remain near the company commander and will be supplied by the infantry with signal lanterns, disks, and pistols, with which the following signals may be made:

Open barrage fire.

Extend fire in the direction of the enemy.

(5) The fire of each gun must be accurately adjusted for barrage fire, taking into account the progress of the two first lines and the intermediate terrain.

In first line the fire adjustment is directed by the battery commander, assisted by the company commander concerned.

The average trajectory should be from 100 to 300 meters in front of our own lines, depending upon the dispersion and direction of fire, the ground, and the safety of the troops.

As long as it is possible to hold the small posts in front of the first line the barrage must be maintained in front of them.

If they are obliged to retire on account of the situation or by order, the artillery must be notified without delay.

(6) The commander of the barrage battery must send officers to the front of the barrage fire from time to time in order to obtain accurate information on the situation and to maintain contact with the infantry.

In addition, the infantry in the first line must send all its officers, one by one, to the observation station of the commander of the barrage battery. On one hand, they will bring the battery commander information about the front, and, on the other hand, they will learn to know their sector from the point of view of the observation station of the barrage battery concerned.

(7) All commanders of all infantry units higher than a company are authorized to request barrage fire, also all inspection officers in the trenches. Requests may also be made by all artillery observers and all liaison officers.

(8) Barrage fire must be rapid but regular, and must last three minutes (volleys four rounds per minute for each gun of small caliber).

The continuation will depend on the observations, and will be requested again.

If no information is obtained, the volley is repeated until the signal for cease firing is given.

B. BATTERIES FOR INTERDICTION FIRE.

(1) All batteries in the sector of the brigade or division which are not intended for barrage fire are to be used for interdiction fire.

To these may be added the artillery directly dependent upon the commander of subsector II.

If interdiction fire is executed in front of the sector of adjacent divisions, it is called *sheltering fire.*

(2) Interdiction fire is not uniformly distributed; the most important sectors have the largest allotment ("normal" interdiction fire). In case of necessity it is concentrated against a given part of the front (interdiction fire in the "center," "right," "left").

Interdiction fire must be organized in the same way as barrage fire, according to the directions for defensive fire.

(3) All interdiction batteries not employed against other targets are available for normal interdiction fire.

(4) Interdiction fire will be opened upon request of the battalion commanders.

(5) The fire is executed in *waves* (duration, six minutes; one round per minute for small-caliber guns; one round every two minutes for medium-caliber guns; one round every six minutes for heavy-caliber guns).

In case of immediate danger, volleys of three minutes' duration, firing the number of rounds allotted for one wave.

(6) Interdiction fire must be opened at least two minutes after request.

(7) Interdiction fire must be kept as close as possible to the barrage fire.

(8) Observation stations to be occupied as in paragraph A (3).

C. DEFENSIVE FIRE.

(1) Barrage fire and interdiction fire combined form *defensive* fire.

(2) Each gun must be provided with a table in which all the elements for defensive fire must be kept accurately up to date.

(3) Observers, liaison officers, section commanders, platoon commanders, executive officers, battery and battalion commanders must also be provided with tables of the elements for defensive fire.

D. LIAISON OFFICERS.

(1) An artillery officer must be assigned to the command of every battery in the first line as liaison officer. They are selected from the officers of the batteries which are *tactically dependent upon the sector of the battalion.*

(2) The liaison officers must know all the needs and wishes of the infantry, and must inform themselves on their own initiative of the situation of the infantry, in order to report on the subject to the artillery commander. They must remain in the closest liaison with the infantry commanders of all grades.

They also supervise the noncommissioned officers for barrage fire.

(3) Liaison officers are appointed by the commanders of artillery battalions and receive from them precise instructions concerning their duties (mentioned in detail in the regulations issued by the headquarters of the Fifth Army under the title: "Artillery in Defensive").

(4) For the equipment of liaison officers, see page 41 of the above-mentioned regulations.

E. OBSERVERS.

See the above-mentioned regulations, pages 24–34, and Order No. 165/12 Op. of the commander of subsector II.

Artillery observers must report both to the battalion and the company commanders of their zone. They must often go through the trenches and must remain in close liaison with the infantry.

F. MEANS OF LIAISON.

(1) The telephone system must be put in order as soon as possible. The old lines must be transformed into double lines of a semipermanent character.

In the artillery separate junction boxes must be used both on the line for the transmission of orders and on the line for fire adjustment.

Communications between the rear and the first lines and vice versa must not be made through the battalion headquarters.

If possible there should be numerous reserve lines. The lines must be labeled with red tags with the corresponding identification mark.

(2) The greatest attention must be paid to means of visual liaison. Directions for the establishing of a service of visual signaling in the artillery are contained in the regulations of the headquarters of the Fifth Army, "Artillery in Defensive" (pp. 54–57 and Appendixes 1 and 2).

There must be daily practice in signaling, particularly between battery commanders and the gun emplacements.

These stations are regulated by the commanders.

G. GUN EMPLACEMENTS.

Particular care should be taken—

(1) That the intervals between guns should not be too short.

(2) That the emplacement and surroundings be kept clean and in order.

(3) To have a service of inspection and to arrest strangers, notifying the authorities thereof.

(4) To provide covered shelters for the officers, troops, ammunition, and telephones.

(5) To follow the required directions upon the appearance of enemy aircraft.

(6) To give the alarm against gas attacks.

(7) To organize the defense against close-combat attacks (wire entanglements, frequent practice with rifles and hand grenades).

(8) To provide for defense against aeroplanes with guns and machine guns, according to instructions.

(9) To keep the supplies sheltered in case of bombardment.

(10) To provide for the reception of the visual signals of the battery commander.

(11) The troops must know—

Where their own barrage zone is situated.

The meaning of rockets.

How far the infantry is in advance of them.

What is in the vicinity of the battery and what roads lead up to it.

Where the nearest communication post is situated.

(12) To have orientation tables near the battery in order to find the emplacement easily.

(13) To keep a supply of water in the battery.

(14) To detail an observer to observe the terrain directly in front of the battery during combat.

H. INDIVIDUAL ACTIVITY OF THE EXECUTIVE OFFICER.

In spite of all measures it will inevitably occur that liaison between the battery and the command posts and observers will be cut off during combat.

The worst thing possible would be to submit to the inevitable.

Every effort must be made to clear up the situation so that the battery may render service, with the help of the elements of fire already executed, until liaison is reestablished.

In such cases the executive officers must endeavor without delay to obtain information from the neighboring batteries, telephone stations, from the nearest infantry commands, etc. They will send patrols to points from which good observations may be taken, and will send messengers to tactical commanders.

By having recourse to all these methods simultaneously, one at least will certainly be successful.

I. TO COUNTER-BATTERY MORTARS.

After the last actions the enemy had not yet used these effective weapons. It is evident that he is working on emplacements for them.

It is necessary to prevent the use of this weapon.

The works of the enemy must be observed and any attempt to make mortar emplacements opposed. If an emplacement is made, any attempt at fire adjustment must be prevented by the artillery of heavy and medium caliber.

For this purpose the commander of the 35th Division has designated a battery of heavy howitzers as a *counter battery for mortars*. Battery 2/43 of heavy howitzers, from *Lieut. Col. Ruppert's* command, has been assigned to the 56th Brigade. Its assistance may be called for from time to time by direct request addressed to the battalion command.

These batteries do not have to wait for a request, but may open counter fire as a result of their own observations.

Every intervention of this kind must be communicated without delay to this command, which will arrange for demolition by concentrating numerous batteries of medium and heavy caliber.

K. DEFENSE AGAINST "TANKS."

For defense against tanks—

The 35th Division has two small and one medium caliber gun at altitude 43 of the road and 43 of the tunnel.

The 56th Brigade has two small caliber guns, and the Ruppert battalion must adjust the fire of one gun of the 2/43 battery of heavy howitzers on the road Bagni-San Giovanni and keep it in readiness for fire in that direction.

Barrage batteries must also be used for defense against tanks as far as this is included in their radius of action.

L. ARRANGEMENTS FOR ARTILLERY OBSERVATION.

(1) The barrage batteries must constantly observe the *barrage zone* and the terrain in rear as far as the line Adria-Werke elevation 85–144.

(2) *Long-distance observation* is the duty of the interdiction batteries of the 35th Division for the zone *north* of the railroad line Mescenizza-Monfalcone-Ronchi, and of the Ruppert battalion *south* of the said line.

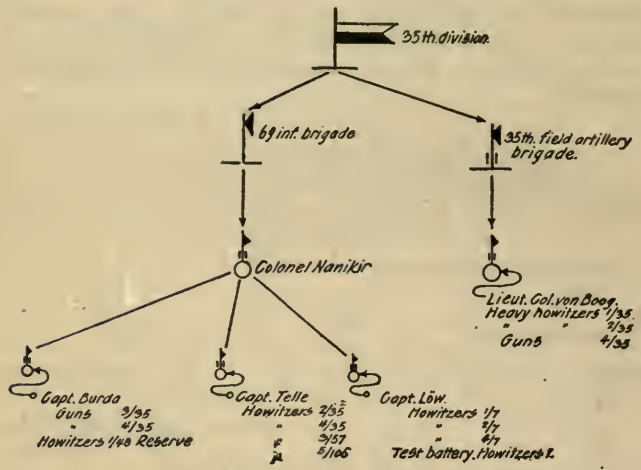
The observations of the Bleiweiss battalion extend over the entire zone.

* * * * * * *

The present order, which is to be turned over in case of change of command, is transmitted to the commanders of the 35th Division and of the 56th Infantry Brigade, and to the com-

mander of the 43d Brigade of field artillery, with a sufficient number of copies for distribution to the commanders of regiments, battalions, groups, and subgroups of artillery and of batteries.

F. M. L. SCHNEIDER.



I. R. Headquarters of the 35th Brigade of Field Artillery.

[No. 745/1 Op.]

To all groups (subgroups) of artillery and batteries, to the commands of infantry brigades and regiments, and to battalion commanders.

To the commander of the 35th Division, for information.

Field Post 617, *June 19, 1917.*

On and after this date the grouping of the artillery and the relations of dependence of the same are arranged as follows:

The telephone extension line between the test battery I of howitzers and the Burda group is not to be taken away, but transformed into a direct line between the Burda and Löw *barrage groups.*

(2) *Orders for defensive fire* (see next page).

Distribution: Groups (sub-groups) of artillery and batteries. Headquarters of infantry and regiments. Batallion Headquarters (1 copy).

ORDER FOR DEFENSIVE FIRE (35th DIVISION).

[IIb.=howitzer; 1/35=1st battery, 35th Regiment, etc.; *s.*=sezione=platoon.]

		South battalion.		Central battalion.			North battalion.		
Section		28 c	27 c	26 c		25 c	24 c		Section.
Barrage batteries.		Gun 4/35	Hb. 1/R. 57	Gun 3/35	Trial battery Probebt Hb. 1	Hb. 2/7	Hb. 1/7	Hb. 4/7	Barrage batteries.
Batteries for interdiction fire.	Normal.	Hb. 5/R. 106	Hb. 3/R. 57	Hb. 4/35			Hb. 2/35		Normal.
			s. Gun 4/35			s. Hb. 1/35	s. Hb. 2/35		
	North.	Defensive fire "North."				Hb. 5/R 106 / s. Gun 4/35	Hb. 3/R. 57 / s. Hb. 1/35	Hb. 4/35 / s. Hb. 2/35	Hb. 2/35 / s. Hb. 2/35	North.
	Center.	Defensive fire "Center."		Hb. 5/R. 106 / s. Hb. 1/35 / s. Gun 4/35	Hb. 3/R. 57	Hb. 4/35 / s. Hb. 2/35	Hb. 2/35		Center.
	South.	Hb. 5/R. 106	Hb. 2/35	Defensive fire "South."					South.
		Hb. 3/R. 57	Hb. 4/35						
		s. Hb. 1/35	Clear.						
		s. Gun 4/35	s. Hb. 2/35						

Batteries for interdiction fire.

NOTE.—To these may be added the batteries of the Bleiweiss group which are directly dependent upon the commander of subsector II, and also the batteries of contiguous infantry divisions (brigades) as far as their range extends into the zone of the 35th Division, and when they are not held to defend their own and other fronts.

DIRECTIONS FOR ARTILLERY ACTION.

Attack the hostile batteries with fire and gas energetically during the *artillery preparation of the enemy*. Prepare the distribution of targets methodically and bracket the fire.

Transfer the demolition fire to the adversary's trenches in order to observe more easily whether the first lines are occupied, establishing by means of reference points (on which the fire must be previously adjusted), the targets or zones, the demolition of which must be requested beforehand by the infantry. This is for the purpose of being able to open fire more rapidly.

As soon as it is proved or supposed that the enemy is *ready in the trenches* or in the assembly places, *annihilation fire* must be opened with the most intense concentration of all the guns. For this purpose establish certain sectors of fire (including roads and cross roads), bracketing the fire and organizing it by means of all the guns according to the directions for defensive fire. The object is to *suppress the attack* at the beginning or, at least, to shake and weaken the enemy infantry.

If the attack is launched, notwithstanding, it must be made to fail by defensive fire.

If *contact* is formed a barrier must be made to prevent the enemy from bringing up reinforcements.

If the enemy has *made a breach*, destroy the reserves.

If the enemy has *broken through*, direct a violent artillery fire on the enemy within our lines.

If an *immediate counter attack is made, cut the enemy off.*

A *methodical counter attack* must be initiated by methodical artillery preparation.

At critical moments artillery commanders do not have to wait for orders, as they are always delayed. They must therefore act *upon their own initiative.* A decision suitable to the circumstances will be greatly facilitated by active liaison with the infantry and a well-organized service of observation, also by a thorough knowledge of the trench system, previous agreement with the infantry and reconnaissance of the terrain.

The action of the artillery must be adapted to the method of defense. This no longer consists in *holding rigidly to one line,* but *defending a zone by maneuvers.* The fire of all the batteries should be adaptable and elastic, and there should be no pauses at critical moments.

As a general rule fire should always be adjusted by observation. Fire should be opened *automatically* only in case of surprise, under unfavorable conditions of visability, or when liaison has been cut off. As soon as possible, however, pass on to fire adjusted by observation. Always fire upon all targets which may present themselves.

No. 227/10 Op. no appendixes.

Imperial and Royal Command, 28th Division.

Field post 391, August 5, 1917.

Imperial and Royal 11th Infantry Regiment.

Received August 16, 1917.

No. 227/4 with no appendixes.

Imperial and Royal 11th Infantry Regiment, III Battalion, August 17, 1917.

NOTE.—The Austrians differentiate between direct fire against works (Zerstörungsfeuer), called "demolition fire," and direct fire against troops, either in assembly places, in the trenches, or in movement, which is called "annihilation fire" (Vernichtungsfeuer).

LEGEND.

(1) The "*target zones*" and the "*reference points*" used in the 28th Division are intended principally to simplify the sending of orders to the artillery, and also to facilitate communication between the infantry and the artillery.

(2) For evident reasons it was not possible to make the numbers of the "*target zones*" agree with those of the "*assembly zones*" of the map 1:25,000 issued by the commander of sector III.

Great attention must therefore be paid to the difference in meaning between "target zone" and "assembly zone." Always add the correct qualification to the word "zone."

On the other hand, each of the "assembly zones" established by the commander of sector III is always included in *a single* "target zone," and is therefore included in the designation of the respective "target zone."

Assembly zone 46 is included in target zone 37.

Assembly zone 45 is included in target zone 38.

Assembly zone 47 is included in target zone 35.

Assembly zone 51 is included in target zone 32.

Assembly zone 54 is included in target zone 26.

Assembly zone 56 is included in target zone 28.

Assembly zone 57 is included in target zone 28.

Assembly zone 58 is included in target zone 27.

(3) The enemy "assembly zones," established by Appendix No. 2 of the order of the 28th Division concerning defense, are replaced by the following target zones:

For assembly zone "*a*" the corresponding target zone is 37.

For assembly zone "*b*" the corresponding target zone is 33.

For assembly zone "*c*" the corresponding target zone is 32 +34.

For assembly zone "*d*" the corresponding target zone is 28.

For assembly zone "*e*" the corresponding target zone is 24 +25.

(4) The principal value of this system is that the designation of target zones and reference points is connected with a simple system of visual signaling of the artillery, which enables automatic fire, independent of observation, to be directed against all points and zones numbered *in front* and *in rear of the line*, even when telephone liaison has been cut off.

To be issued to the 55th and 56th Brigades, to infantry regiments 11, 28, and 47; to battalions III/3 BE and IV/77; to the commanders of regiment zones (Regiments streifenkommandos); to the "I. B. S." artillery (Infanterie brigade streifenartillerie); artillery of the zone of the infantry brigade.

Old Appendix No. 2 to be destroyed.

F. M. L. SCHNEIDER.

IMPERIAL AND ROYAL 11TH INFANTRY REGIMENT.

[No. 208/5 ris.]

FIELD POST 391, *July 26, 1917.*

The orders of the 35th Brigade of field artillery are to be communicated for barriage fire, interdiction fire, and covering fire for defense against the attacks of the enemy's infantry.

Strauch	56	55
Battery for barrage fire	Howitzers 4/35	2/3 battery, guns 4/35.
Batteries for interdiction fire	Mortars 305 mm. 10/1	Heavy guns 14/7.
	DEFENSIVE FIRE NORTH.	
	Mortars 305 mm. 10/1	Heavy guns 14/7.
	Heavy guns 4/35	Heavy howitzers 3/35.

Barrage fire is delivered in volleys of three minutes' duration; interdiction fire in volleys (three minutes) or waves (six minutes) firing each time six rounds per small caliber gun, three rounds per medium caliber gun, and one round per heavy caliber gun.

The battalion in line must send officers temporarily to the observation stations of the commanders of barrage batteries, to orient themselves.

Conform with the following:

On July 27 two officers of the III/3 BE. (one from Strauch 55 and one from Strauch 56) will be sent to the observation stations of the respective barrage batteries—the one from Strauch 55 to the observation station of the battery of guns 4/35, and the one from Strauch 56 to the observation station of the battery of howitzers 4/35. These officers will report to the commander of the 11th Regiment at 7 a. m., where a guide will be given them to the observation station.

They are to orient themselves carefully and give a brief report on the visibility of their own lines, the terrain in front, and the enemy's lines.

IMPERIAL AND ROYAL HEADQUARTERS OF THE VIIITH ARMY CORPS.

INSTRUCTIONS FOR THE USE OF ARTILLERY IN AN ATTACK.

Two offensives successfully executed in Serbia by my army corps with relatively small losses, against strongly held and fortified positions, have shown that the following method is the most successful and best adapted to the purpose:

(1) The part of the front chosen for the attack was divided into zones, according to the batteries, the zones being assigned with a view to the greatest possible effect from enfilade fire.

The batteries designated for this purpose adjusted their fire one after the other without attracting too much attention. Observation stations for observing the targets and the progress of the fire were made near the first lines and well sheltered. Safe (double) telephone liaison was established with the batteries.

(2) *Fire for effect.*—At certain intervals the fire of all batteries is concentrated for several minutes, at definite moments, to be determined with the greatest precision.

These short volleys are to be repeated at irrgular intervals during the day and, if necessary, at night. Between times the

fire should be very slow. The enemy must not know after which volley the assault is to be made and must be exhausted by the continuous alarm.

(3) The moment of the last volley preceding the assault is fixed with the greatest accuracy and communicated to all the commanders. At the appointed time the range is changed suddenly *without diminution of intensity and without the slightest pause, and is placed at a* few hundred meters beyond the enemy's position. The attack is launched at the same instant.

It is of the highest importance to leave the enemy unaware as to this change of range at the beginning of the assault, so that the enemy infantry shall not yet have occupied the fighting line but will still be in the shelters.

Independently of these batteries, the duty of which is to shell the front designated for the attack, a part of the artillery is naturally employed against those enemy batteries which are specially effective and is also used, without too great an expenditure of ammunition, to shell other parts of the front, which are not to be attacked, in order to deceive the enemy.

It is of capital importance for every artillery action to be prepared with the most minute care in order to lead the assaulting infantry to success with the fewest losses possible.

F. Z. M. SCHEUCHENSTUEL.

XV.

GERMAN PRINCIPLES OF ELASTIC DEFENSE.

(Translation of a captured German document issued by the chief of the general staff of the field army.)

XV.

GERMAN PRINCIPLES OF ELASTIC DEFENSE.

(Translation of a captured German document issued by the chief of the general staff of the field army. I/II No. 4432 secret op., under date of Aug. 30, 1917. From British G. H. Q. Summary, Jan. 20, 1918.)

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1. Our methods of conducting an elastic defense, by distributing our forces in depth and fighting in a defensive zone organized in depth, are known both to the French and English. They have found no means of defeating it, and their great attacks, intended to break through, have failed in face of it. They now appear to attack with limited objectives, and by piecemeal battering, carried out, however, with a considerable expenditure of force, attempt to wear us down, to inflict losses on us, and gradually to press us back. We must, nevertheless, reckon with the possibility of their making a renewed attempt, at one or several points, to attain their final aim, namely, to break through on a large scale.

Our system of defense will also be able to cope with these tactics most successfully, if, in accordance with the experiences gained on all the battlefields of the western front, the divisions employ their three regiments in line, side by side, within the relatively narrow divisional sectors, and distribute them in considerable depth. In this case the actual divisions in line will usually be able to repulse attacks with limited objectives by means of their own troops, without the assistance of elements of the counter-attack division. They must, at any rate, make an effort to do so. In any case it will be very exceptional for the whole of the counter-attack division to be employed.

Holding a divisional sector with two regiments in line and a counter-attack regiment in rear increases the difficulties of command in battle to a considerable extent, owing to the sectors held by the regiments in line being usually too broad, and also on

account of the fusion of units which quickly occurs during a hostile attack.

2. With regard to artillery tactics, the engagement of the enemy's artillery with observed destructive fire remains as before the chief method of affording relief to our infantry, and thus, indirectly, of depriving the enemy's infantry attack of its prospects of success. It thus forms the most effective support for the infantry, although they do not, for the most part, fully appreciate its value, and counter-battery work must be continued up to the moment of the assault. In addition, the enemy's infantry must be kept constantly under observation in order that their preparations for the attack and, in particular, the advance and assembly of the assaulting troops may be detected in time. This is difficult, since only a relatively small number of troops are engaged in these limited attacks, but it can not be dispensed with. It is essential for short but heavy bursts of annihilating fire to be opened immediately on all targets thus observed. This does not mean that bursts of fire should be opened on certain defined areas, either according to some set scheme, or in response to visual signals. On the contrary, such fire must be controlled both as regards time and space, in accordance with the observed movements of the enemy. For this it is necessary that there should be very intimate and rapid cooperation between all units engaged on observation (especially aeroplane and balloon observers) and the artillery, and also that artillery commanders should make very quick decisions.

The more effective annihilating fire is the more can barrage fire be dispensed with. In the case of the latter (in contrast to the procedure with annihilating fire) efforts must continually be made to insure that fire is automatically opened in response to visual signals; that barrages are put down with as few gaps as possible; and that the barrage is kept as close to our front line as our artillery material will allow. An essential condition in this respect for all artillery units is the accurate determination of the position of the front line by every possible method; this must be continually checked by mutual cooperation between the two arms.

3. The "forward zone" must not be considered merely as the foreground of a defensive system. It is an integral part of the defense, and its front line must be held until orders to evacuate the whole zone are given by the higher command. This front

line must be very clearly defined for the troops, particularly in view of the arrangements for barrage fire.

4. It is urgently necessary that all command posts should be so chosen that observation from them is possible over their own battle area, or at least over a section of it. In the case of divisions this principle is limited by the necessity of always maintaining communications intact, both with the group and the neighboring divisions, etc., and of keeping the general system of communications working as far as possible. In the case of command posts of lower formations this consideration must, however, give way to that of the possibility of actual observation of the progress of the fighting.

5. The general distribution and grouping of the artillery of divisions in line and the correct employment of such artillery must be the subject of clear orders issued by army and group headquarters. Divisions must put these orders into force and supplement them where necessary in accordance with the situation. Only thus is it possible to insure that the whole fighting power of the artillery is employed to the fullest extent in accordance with the requirements of the general situation, which can only be fully appreciated at group or army headquarters; this applies especially to the concentration of the artillery against decisive points.

6. High ground has not always the same importance in a battle on a large scale as is attached to it in quiet times. We have been unable to make up our minds to evacuate unfavorable positions on high ground; we have endeavored to improve them by fighting, and to hold them; if in spite of these efforts they were lost, we found suddenly that we could do without them. It was then clearly seen that, in the battle on a large scale, it was very difficult for the enemy's attacking waves to descend to lower ground from the heights we had lost, and that this gave us far more favorable conditions for fighting than the positions on the heights could have done. Other favorable positions on high ground, such as the Chemin des Dames Ridge, acquired great importance, mainly, of course, because in this case it was possible at the right time to pass successfully from the defensive to the offensive.

Essential considerations, when weighing the advantages of positions on heights, are whether they have a certain depth and whether they are exposed to an enveloping or flanking

movement. Narrow ridges draw fire and are difficult to hold, as they can not be organized in depth.

It is a difficult task for the higher command to estimate correctly the importance of high ground for the conduct of a battle on a large scale, and to make decisions in such cases unflinchingly, even during the actual progress of a battle.

(Signed) LUDENDORFF.

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