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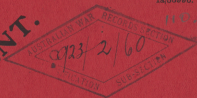
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MANUAL OF POSITION WARFARE FOR ALL ARMS.

PART 14 (Provisional).

THE ATTACK IN POSITION WARFARE.

1st January, 1918.

(With Amendments dated 26-1-18 and 27-7-18.)

ISSUED BY THE CHIEF OF THE GENERAL STAFF OF THE FIELD ARMY.

N.B.—The original is marked:—

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GENERAL STAFF (INTELLIGENCE),

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THE ATTACK IN POSITION WARFARE.

A. INTRODUCTION.

1. This manual treats of the attack in position warfare with a limited objective and the offensive battle leading from position warfare to the break-through.

The manual equally applies to the methodical counter-attack in the defensive battle. The immediate counter-attack, on the other hand, being an affair of minor tactics, is not dealt with here.

B. GENERAL PRINCIPLES.

2. Education of the troops in that spirit of bold attack and will to conquer, with which we entered the present war, is the first guarantee of success.

The instructions for commanders and troops for the attack cannot be too minute or thorough. Formations that are going to take part must have rehearsal in the defensive battle, specially constructed for the purpose; the smallest details must be practised. It is particularly important that the troops who are to be used in an offensive should be rested and kept fit until the moment of attack.

Thorough knowledge of the effect of the arms employed, and the capabilities of the various means of warfare, such as trench mortars, artillery and ammunition, as well as of the modern means of communication, is indispensable.

The principles of training are laid down in the new manuals (compare C.G.S. of the Field Army, No. 11, 25, 44, 47, dated 14.1.18) and in special instructions.

3. Command.—The attack, no less than the defence, requires that the troops should be really commanded and that careful and detailed instructions are given to ensure the co-operation of all arms in a particular sector, and with the troops of neighbouring sectors; and that the objectives are clearly defined. On the other hand, every attack offers an opportunity for independent decision and action even down to the private soldier.

The art of conducting an attack consists in a clear appreciation of the enemy's defensive dispositions and their tactical influence on the execution of the attack, in careful preparation, clear instructions and consistent direction.

The offensive battle requires, finally, complete mastery of the art of moving large masses of troops in a narrow space and of supplying them with all that they require.

For military success the influence of commanders of all ranks and all arms is the decisive factor. It is properly used when scope for independent action and initiative is left even to the private soldier and the exercise of these qualities is required. This is one of the basic principles of the manual.

There is, however, a limit to the possibilities of commanding and supplying large masses of troops concentrated in a narrow space. Too close concentration produces congestion. Careful reflection, practical imagination and personal experience will give the Higher Command some idea of the actual conditions that will arise (cf. para. 6, last sub-para. but five).

4. Liaison.—The maintenance of close liaison between all arms and all commanders from the front to the rear, from the rear to the front, and the flanks, is indispensable. It ensures the methodical progress of the attack and prevents surprises, especially from the flanks. Where liaison is good, the Higher Command is always in a position to take measures to out any emergency, and at the right moment.

5. Centre of gravity of attack.—Every attack must have a centre of gravity. On this must be calculated the grouping of the forces, the breadth of front (para. 12), the concentration of artillery, trench mortars and other means of warfare, and the assembly and engagement of reserves.

6. Various kinds of offensives.—The objective, purpose and conduct of an attack will vary according to its extent and depth. In addition to inflicting losses on the enemy, attacks with limited objective may be undertaken to improve the position, to relieve the main battle fronts, to mystify and mislead the enemy, or to obtain information. If it is intended that the objective should be permanently held, it should offer more favorable conditions for defence than the "departure" trench. The object of an attack may, however, be frequently attained when a withdrawal is subsequently made to the "departure" trench. Limited attacks should, as a rule, be carried out in one continuous thrust until the objective is attained.

The offensive battle is an effort to obtain a tactical penetration and the ultimate development therefrom of a strategical break-through. In the latter case it works up to the battle for a break-through, which aims at compelling open warfare. When it becomes possible for the Higher Command to have this important objective in view, all measures for its attainment must from the very first be set in motion.

From the moment of penetration, the attacker will have to reckon with fresh troops being continually put in by the enemy and with hostile counter-attacks. It is in this way that the break-through battle acquires its special characteristics:—

Penetration of the enemy's position with the furthest possible stroke.
Firmness in consolidating gains and in meeting the enemy's counter-strokes and counter-attacks.
Bringing up the mass of artillery and fresh infantry.

New attacks and the counter-measures taken by the enemy. &c.
The break-through battle consists of "denouing" the series of hostile positions for the most part in the face of heavy offensive opposition by the enemy. It must be carried through rapidly and in depth.

*NOTE.—Throughout this translation, the portions of the text marked with a black line are the Amendments issued by the C.G.S. of the Field Army on 26.1.18.—G.S.I.

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The first penetration is comparatively easy. The difficulty lies in maintaining the vigor of the attack. The enemy must not be allowed to recover from his surprise. His counter-measures must be rendered useless by the rapid progress of the attack. It is a question of taking rapid action with the consciousness that protection of flanks and rear, as well as support from artillery, will be provided from behind.

The danger of slackening in the force of attack is great. Fresh efforts must be overcome by the energy of commanders well forward in the line and by the dead centre.

Here, less emphasis is to be made than on the intensity of artillery and infantry fire. Too numerous objectives are a hindrance to themselves and add to the difficulties of command and supply. All depends on rapid and independent tactical action within the general scheme and on brevity of the attack.

The vital point in the conduct of the attack lies in steady co-operation between the assaulting infantry and the artillery.

Artillery and trench mortars are indispensable for breaking the resistance of the enemy, even while the attack is in progress. By skillful and rapid action, they must put the machine guns to the sword and the enemy's trench mortar batteries to flight. The infantry that is first required but renewed artillery preparation.

When the attack has passed on beyond the range of the mass of our guns, the rapid pushing forward of the artillery from the accompanying artillery (or trench mortars) is necessary to secure the success of the attack. This idea is frequently recurring in the manual.

After the first penetration, the assault must be maintained by the use of trench mortars) or even machine gun fire—these make the enemy keep his head down—are often sufficient as a renewal of the fire preparation. The stronger the resistance, the more the concentrated fire of numerous pieces, particularly heavy ones, is required. The more powerful artillery, with a good supply of ammunition, that accompanies the advance, the easier will it be possible to keep the attack going.

The infantry, on the other hand, should be put in sparingly. Distribution in depth must always be maintained, or, as it should be temporarily lost during an attack, it should always be restored, and, as far as possible, by pushing forward from the most advanced units.

7. Surprise.—The greatest success in war are to be looked for from measures for which the enemy is least prepared. Therefore, in all offensive actions, surprise of the enemy is of decisive importance.

To secure this is necessary: strictest secrecy regarding intentions, execution of preparatory measures as inconspicuously as possible, restriction of new works to the indispensable minimum, simulation of intended attack or actual attacks in other sectors, and variations in the details of the attack. In these matters the official manual allows sufficient latitude. It is the business of all commanders to make the proper use of the methods available.

Complete surprise is rarely attainable, not is it necessary. In important attacks, by skillful mystification and deception at other points, it will generally be possible to secure that the enemy of an attack. As a rule, the hour of the infantry assault will at best be a surprise to him. This at any rate will be some advantage to the attacker.

8. Flanking attack. The great advantage of flanking action, even with small forces, especially of artillery and machine guns, has been repeatedly shown in all offensive operations. Flanking movements, therefore, should continue to be methodically planned. Strong defensive works should not be neglected, but from the flanks and rear.

In the break-through battle, the tactical surrounding of whole sectors of a position should be aimed at in the preliminary dispositions for the battle.

9. Study of the ground.—All commanders should be thoroughly instructed in the tactical evaluation of positions and natural features of the ground. The study of the field of battle and its tactical significance cannot be too careful; it is the necessary preliminary to that working out of tactical details which is indispensable for the mounting and successful execution of all attacks.

The fight for commanding positions, which has lost its importance in position warfare, will come all the more prominently to the fore the more battles assume the character of the war of movement.

10. Importance of the above principles.—If the principles here briefly laid down receive due attention, we shall be victorious in attack on the Western front also.

C. EFFECTIVE REQUIREMENTS; PREPARATION IN GENERAL.

11. Preliminary estimate.—At the very beginning of the contemplation of the attack, the necessary conditions for a preliminary calculation of requirements in the means of attack, especially in artillery, trench mortars and ammunition (para. 18). If they cannot be made available, the objective must be inordinately modified. An attack with inadequate means invariably fails, entails undue expenditure of blood and is a flagrant mistake in command.

In estimating requirements, the expected resistance of the enemy must be taken into account. The maximum numbers are only to be employed in cases where a strongly fortified position with a numerous garrison is being attacked. Where surprise is aimed at and there is any probability of succeeding, only partially weaker forces will be sufficient.

The principle that on no account should an attack be carried out with insufficient forces must not lead to the adoption of exaggerated factors of safety. In order to avoid any unduly large concentrations, the maximum number of effect required should not be a trust be exceeded (cf. the last concentrations, para. 23 and the last 5-6 para. 6).

12. Frontages.—In attacks of considerable depth, a thrust with one or the same formation (division) continued until its strength is used up, is preferable to successive attacks with fresh formations. Accordingly, the front of attack should be so chosen that a formation may be capable, without interruption, of attacking the enemy's attack for a long period and of taking it away through the whole depth of the enemy's trenches without a pause.

The idea that, in a break-through, a division which takes part in the first attack will be relieved on the first or second day, or, in a matter of weeks, should be strongly discouraged.

If the attack has been properly prepared and the artillery pushed on in good time, the attack should succeed without too many casualties. After the first attack, therefore, an attacking division should have sufficient fighting strength for the moment. The further advance will depend more upon putting in an adequate and powerful reserve of trench infantry (see para. 6).

A change of status at this time would affect the continuity and coherence of command injuriously and render it extremely undesirable.

The width of the front of attack, however, must not be made too narrow on the grounds of facilitating unity of command. Where it is merely a question of seizing an enemy's front line system of trenches and of pushing our way over it as much as 2,500 yards will do. However, it is intended to penetrate an enemy's position in depth, narrower divisions front must be allotted; they can hardly be reduced below 2,500 yards.

With reference to the statements made in the last portion of para. 6, even with present strengths, the width of a divisional sector should not be less than 2,500 yards for divisions of 3 infantry regiments and 1 trench mortar battery. If such facilities can be secured, the bringing up of reserves and supplies. Giving all divisions the same fixed width is to be avoided.

In attacks on a large scale, fresh formations will be held close up in readiness so that they can be thrown in at once as the attack progresses. Their task is to extend the successes already obtained (cf. para. 6, last sub-paragraph but five).

Second line divisions should not be thrown into the battle prematurely. There is a danger of this when the commander of the front line division has, from the first, both divisions at his disposal.

The second line divisions must remain for a long time under the control of the Corps Commander, whose place must be well forward if he is to command properly. They should be brought up in the same way as reserves used to be, to be put on at the points where the attack is proceeding well. For this purpose, in view of the fan-shaped extension of the attack, they will usually be intercalated between other divisions and will not, except in special cases, be employed to relieve divisions in line.

Like all tactical reserves, second line divisions must be kept close at hand by the Corps Commander, so that they can be put in at the right moment.

The task of the Higher Command is not ended with the initiation of the attack. It must direct the battle into the course that it desires, without, however, interfering too much in details. For this purpose, it must have control of reserves which it can put in as required. It is only thus that a preliminary success can be developed into an important victory.

The protection of the flanks should be entrusted to forces especially detailed for the purpose.

13. Considerations of supply.—The necessary conditions for the development of an initial success to a strategic break-through, that is strong forces of infantry and a large number of light and heavy guns are able to push on without a pause and that there is no hitch in the sending up of ammunition and other supplies. Adequate mobile ammunition supply columns, labour companies, etc., are, therefore, necessary. Requirements of this nature, just as the number of fighting troops necessary, must be considered in forming the plan.

14. Preparations.—Every attack requires more or less extensive preparations. These more important the attack, the earlier these are taken in hand.

The first step in the preparations is the requirements in troops of all arms, ammunition, equipment and all kinds of stores. It must be based on a definition of the scope of the attack and of the target sectors for guns and trench mortars.

The following list of preparatory measures will serve as a guide:—

- Reinforcement of all existing staffs and administrative authorities (officials), including those on the lines of communication.
- Sending forward of staffs and parties of the formations to be employed in the attack. (Group (Corp) and divisional headquarters, administrative authorities, special units, etc.)
- Sending forward of signal units and the necessary transport and labour units for the supply of material, etc.
- Working out of the whole scheme of operations and supply, commencement of provision of supply of material, stores, etc.
- The gradual clothing of this "skeleton deployment" by sending forward subordinate staffs and material advance parties to secure the ground.
- Moving up of the mass of ammunition and supply columns and material and stores.
- Deployment of the fighting troops (artillery and trench mortars) first.

Where a break-through is to be attempted, the contingents of special units necessary for its exploitation (ammunition and supply columns, road construction companies, rail and transport troops, labour companies) are very numerous.

15. Further detailed preparations.—Among other details, attention must be paid to:—

- Settlement of the chain of command.
- Organization of artillery and trench mortars, siting and construction of command and observation posts and of battery and trench mortar positions; formation of ammunition columns.
- Reinforcement of the signal service and communications.
- Organization of the maintenance of the assaulting troops, command posts, lines of approach, places of assembly, objectives in detail.
- Assembly of engineer and other material in numerous small depots well forward, and of waggons and other vehicles to assist other arms in overcoming obstacles and consolidating captured positions.

- (f) Reinforcement of air forces (aircraft, balloons, anti-aircraft guns).
- (g) Production and issue of maps.
- (h) Improvement of rearward communications, roads, railways, dumps, &c.; provision for the protection of railways.
- (i) Bilets, rations, water supply; the latter is especially important immediately after the attack.
- (j) Assembly of simple reserves of artillery material (guns of every calibre, gun carriages, spare parts), an increased number of repair shops, with advanced auxiliary shops for fitting spare parts and executing small repairs.
- (k) Medical arrangements.

The importance of all preparations connected with replenishment of stores and supplies of all kinds must not be underestimated.

18. Necessity for secrecy.—It is an essential condition of success that the intention of attacking should be kept secret and that the preparatory work should be concealed from hostile air reconnaissance and ground observation.

It may be expected that the purpose of concealment of the intention, even from our own troops, to give out that the preparations are being made in view of a threatened hostile attack and to use a code name for the preparatory work which will not excite attention. This secrecy towards our own troops must not lead to their being instructed too late or insufficiently as regards their tasks.

When the preparations for an attack are spread over several weeks, it will be necessary to bind all officers entrusted with work connected with it to special secrecy, to have all the correspondence dealt with by officers only, to prohibit telephone conversations and telegraphing otherwise than in code, to supervise the administrative services (officials) cooperating in the work and from time to time to examine the post. The use of motor cars by the numerous staffs occupied in reconnaissance work also requires regulating.

Sufficient camouflage from ground and air observation must be ensured before new works are put in hand; this especially applies to the hutted and tent camps and the enlargement or installation of dumps, parks and aerodromes. Transport must not be brought up and parked on arrival in the regulation manner in the open, but must be drawn up under cover.

All movements of troops will be carried out when the light is too poor for observation or under cover of darkness without the use of lights; captive balloons will be sent up at night so that this is carried out.

The construction of ammunition dumps in the battery positions will be carried out before the artillery and trench mortars are brought up; it is advisable to obliterate the tracks behind the last vehicles by means of barrows, etc.

The infantry will not be the most part be brought up to their positions of readiness until the last night before the attack.

As soon as our troops are informed of the intended attack, all raids should cease. As regards the operations as a whole, it will be advisable to assign the duty of seeing that secrecy is observed to selected officers of the higher staffs.

19. Extent of preparations.—Good preparations take time. Too great haste enlarges the number and results in heavy casualties. On the other hand, preparations should be confined to what is strictly necessary, with the object of obtaining a surprise and avoiding losses, expenditure of men and material. Much must be done without for the sake of effecting surprise. The other hand, preparations which can be carried out free from the enemy's observation must be all the more thorough.

18. Requirements after a successful attack.—After a successful attack, a high degree of activity will be required in the hours immediately following. This must be taken into account in calculating requirements in men, ammunition and stores.

D. HIGHER COMMAND: ORGANIZATION OF COMMAND.

19. Higher Command.—According to the number of troops engaged, the direction of the attack is taken over by the commander of a Group of Armies, an Army, a Corps or a Division.

Even in the case of limited objectives and small infantry forces, direction by a division is desirable, as this facilitates the action of the necessary forces and means at its disposal for the proper conduct of the fight as a combined operation, especially in the concentration and direction of artillery fire and the co-operation of all arms.

Even in separate attacks, the division is the battle unit. Special tactical channels, short-circuiting the division, are prejudicial to co-operation.

20. Subordinate commanders.—The attacker has the start in the attack. He has it in his power to assign subordinate commands that will be taken by the battle, at least to his earlier stages, down to the smallest detail. He should make full use of this advantage. The limitation of the independence of the subordinate commanders that results from this cannot be avoided.

On the other hand, full play must be left to independence in co-operation.

21. A plan of attack must next be drafted, laying down the general lines of the projected course of the fighting. In particular, the action of the artillery and trench mortars and the arrangement of the replenishment of ammunition and supplies require to be worked out as a whole from the outset.

In important attacks, a receipt of the plan of attack drafted by the Higher Command, subordinate commanders of formations, down to and including divisions, submit drafts of orders for the infantry attack and for the deployment and action of the artillery, &c., based on local reconnaissance.

The attack orders in their issued, which settles the action of all arms on the whole front as a combined operation, especially in regard to time, and thus definitely fixes the limits of time

and space for the whole attack. This is necessary, as all arms must co-operate exactly to the minute on the whole front.

22. Fresh formations for the attack.—It is generally necessary because of attacks on a large scale to put fresh formations into the line. This should be concealed from the enemy as long as possible. The order and time of the arrival of these troops, and their instruction in the nature of the ground, by means of practice trenches and lectures, conferences, sketches, &c., will be carefully arranged in the light of the conditions of the ground where the attack is to be made, and their form and natural cover on a greatly reduced scale (say 1/500), made in a back area, may be useful.

23. Second and third line troops must be assembled at the proper time for reliefs and for feeding the attack. The intention to attack must not be revealed to the enemy by premature marching orders or by troops on the battle front.

24. Employment of reserves.—Even in an attack which it has been possible to plan methodically beforehand in all its details, the Higher Command must come to an early decision as to the employment of reserves, and generally on imperfect information. Any weakening of the front line, enemy and any advantages gained or losses foreseen and rapidly exploited.

The Higher Command must aim at directing the course of the battle to its wishes by the use of reserves. Their employment is most effective where the attack is gaining ground most quickly; this is also the best method of assisting those parts of the line which are only advancing slowly or are being held off. If the enemy is preparing to make heavy counter-attacks, it is most important to realize whether their effect may be counteracted by carrying the attack forward at other points, or whether direct support should be given to certain parts of our line.

From the beginning of the attack, the Higher Command must be kept by its reserves well forward. At the same time, any overloading of lines of communication which might lead to their being blocked should be avoided. It is of first importance that the fire power of the fighting troops should be maintained by the uninterrupted and rapid supply of ammunition.

It is an important duty of all commanders to see that this is the case in their area. Notwithstanding this, the higher commands should relieve as far as possible to the largest extent as possible from having to occupy themselves with replenishment of ammunition and stores. This especially applies to Corps staffs.

25. Command posts.—In the case of attacks with far distant objectives, corresponding command posts for subordinate commanders will be chosen and those that lie within our own lines will be constructed in advance.

The same principles as in the defensive battle apply to headquarters of Corps and divisions; their command posts, however, will be established well forward for the attack, in order to avoid a change during the battle as long as possible; but arrangements for this change must be made beforehand. Above all, communication between the division and its artillery must be permanently assured.

Good communication between the command posts of neighbouring divisions and between first and second line divisions is of the greatest importance.

It is desirable that higher staffs, from divisions upwards, should have observatories at their disposal.

Artillery commanders will, as a rule, have special observation posts with as wide a view as possible, from which they will receive reports direct.

26. Every change of command post requires previous preparation. Riding horses or motor cars should be ready in time. After the command posts have been moved forward, the accommodation thus left vacant becomes available for regulating the replenishment of ammunition and stores before the break-through develops. It is important to see how far this more does it become the duty of superior commanders to get well forward, often on horseback.

E. RECONNAISSANCE; MAPS; TRANSMISSION OF INFORMATION.

27. The commander of the attack will examine the results already obtained by reconnaissance of the front of attack and give instruction for completing them by photographic and other methods of air reconnaissance, observation of the enemy's wireless and telephone activity, reconnaissance raids, deserters' statements, etc. He will see that the service of information suffers no interruption or disturbance, and that the staffs are kept up to date as to changes in the organization of command consequent on the introduction of new staffs.

28. Reconnaissance before the attack.—During the period of preparation, it is important to ascertain the following:—The enemy's relief and withdrawal times; his daily habits; the strength, nature and distribution of the infantry, machine guns, artillery, trench mortars and reserves; the enemy's position in fullest detail; occupied and unoccupied positions; dummy positions; routes of assembly; places of assembly; ammunition dumps; routes of supply, field tramways, etc. and the nature of the ground in front of, within and behind the enemy's front line. Observations, insignificant when taken singly, often yield valuable results when taken together. The facts thus ascertained are the basis-work of the preparations for the attack.

Continual checking of any changes that take place will ultimately produce a fairly accurate picture of the enemy's defence, the distribution of troops and activities. The correct appreciation of individual vehicles from the point of view of their value to the enemy and their effect on the success of the attack is especially important. On these data, the most important of objectives and routes of attack in detail, and the distribution of targets for artillery and trench mortars.

The reconnaissance of the enemy's back areas is of the greatest importance for the detailed allotment of targets. The organization of the enemy's defence (observers' detachment and command posts, communications, assembly points and the lines of approach of reserves) will be mainly located by means of aerial photographic reconnaissance. Our own reconnaissance of the enemy's organization must be broken up and demolished (by smoke clouds and gas pellets), so that any real command of the defence by the enemy will be rendered impossible (cf. para. 41).

29. Reconnaissance during the attack.—During the attack, the greatest efforts should be made to prevent failure in the service of information and loss of touch with the enemy. Of special importance are the location of the enemy's first line troops, any movements indicating withdrawal, assembly for counter-attacks, as well as the deployment, movements, shifting or assembly of the enemy's reserves and artillery.

30. Maps, sketches and photographs.—Good maps and sketches clearly showing as fully as possible should be distributed for the attack. Artillery and aviators must have the maps used by the infantry at their disposal, in addition to their own special maps.

Some maps may be expected to fall into the hands of the enemy. For this reason, only the front portions of our line should be reproduced; objectives, battle sectors, fire zones and other lines which might give indications as to our intentions should not be printed on them. There is no objection to subordinate commanders putting in by hand the lines which are most important to them.

A sufficient number of maps and sketches must be available to supply all arms down to platoon commanders at least. Reproductions of aeroplane photographs of the enemy's positions and of the ground of attack assist the men to understand their task in the battle.

31. Meteorological service.—The final determination of the time of attack is mainly dependent on the weather. It is in relation to the use of gas, visibility, effect on artillery, practicability of roads in wet and dry weather). The meteorological service, therefore, should be consulted at an early date.

An attack cannot be completely independent of weather conditions. Preparations, artillery action (even with H.E. shell), the advance of all arms in the attack and the pushing up of ammunition, stores and supplies are seriously influenced by the weather. The weather has forced us to postpone many important attacks (e.g., at VERDUN in February, 1916, in Rumania in November, 1916, in Riga in August, 1917, in Italy in October, 1917). These experiences will always make it necessary to take the possibility of a sudden change in the weather into account. The entire success of an artificially timed sequence of attacks can never, therefore, be relied on with certainty.

32. Communication between the troops and the staffs.—Transmission of information is of equal importance to its collecting.

Every body of troops must always be endeavoring to inform the Higher Command quickly of its position, in order to provide a basis for any action that may be necessary.

In important attacks, it is necessary to special instructions as to time and place for reporting should be given by the Higher Command.

Times will be fixed at which every headquarters must report without fail. Apart from special circumstances, these will be when certain objectives have been reached, when certain lines are passed, when artillery ranges must be considerably altered, etc.

Instructions as to place dealt with the distribution of the report centers, particularly when these and the command posts are to be moved forward at fixed times in the course of the battle. It is the business of the headquarters which establish report centres to arrange that communication with the rear of safe routes of transmission.

Points where aviators are to drop messages must be settled in good time.

Staffs must not, however, rely on always receiving timely information from the troops. They must endeavor by means of their own (by personal observation, specially detailed aviators, officers sent out for purpose, cavalry and infantry patrols, observing officers, runners) to obtain a clear view of the situation in their own and the neighbouring sectors. In the narrow battle sectors now in vogue, close co-operation between neighbouring sectors is of the very greatest importance (para. 4).

33. Inter-communication between artillery, trench mortars and infantry, and between neighbouring units is equally important. It is the duty of the infantry, or instance, to keep the artillery continuously informed of the situation in the battle, just as much as it is that of the artillery immediately to convey to the infantry what they have ascertained on the battlefield. Neighboring staffs and units in the line must maintain the closest liaison and pass information one to the other without interruption.

Between artillery and infantry, for instance, this liaison can be maintained by an exchange of intelligence or liaison officers; between smaller bodies, liaison patrols, generally commanded by non-commissioned officers, will be sufficient.

34. Careful maintenance of the information and inter-communication services has an important influence on the success of an attack, and a decisive influence on the first measures taken after the assault.

P. THE VARIOUS ARMS.

I. ARTILLERY AND TRENCH MORTARS.

35. The artillery preparation for the attack will vary in character; it is dependent on the nature of the battle, of the kind of the projected attack, the strength of the enemy's means of defense and the degree of surprise intended.

A complete abandonment of artillery preparation is only permissible in exceptional cases. Against a watching position there is small prospect of success by this means.

In minor and medium operations, an artillery preparation lasting a few minutes has been found useful. Notes regarding this are given in "The mounting of minor offensive operations in the Valley Group (May and June, 1917)." (Para. 10.)

The crippling of the enemy's artillery and the practical destruction of his defenses can only be effected by an artillery preparation lasting several hours.

36. Battle tasks.—In attacks during position warfare, the following are the usual battle tasks of the artillery in co-operation with trench mortars:—

- (a) The engagement and neutralization of the enemy's artillery and trench mortars.
- (b) Neutralization of the enemy's trench garrisons and trench mortars, and the enemy's positions in preparation for an assault.
- (c) Bombardment of reserves and rearward communications, observation and command posts, parks, railroads, and traffic and ammunition supply in the rear of the objective.
- (d) Support of the infantry attack by a creeping barrage.
- (e) Accompaniment of the infantry attack with "infantry guns" and field artillery, with the object of breaking down local resistance by shelling at close range over open sight.
- (f) Protection of the infantry by means of a protective barrage after the attainment of the objective.
- (g) Repulse of hostile counter-attacks, keeping back of advancing reserves.

37. The organization of the artillery will follow the lines laid down for the defense (cf. Part 8 of the "Manual of Position Warfare for all Arms" and the "Manual of Artillery Tactics"). It is indispensable that the details be controlled by division, Corps and Army staffs should include also the artillery. It is often unavoidable that they may have to interfere in matters of detail (cf. para. 19, 20).

As a guide to the number of batteries required for an attack and the expenditure of ammunition, see the "Manual of Artillery Tactics". The requirements must be estimated with particular care; they will vary according to the nature of the proposed method of conducting the battle (para. 35).

Regarding calculation of requirements, compare para. 11.

38. Trench mortars, which are compare para. 11. are, exceptionally well fitted for bombarding trenches in preparation for an assault and engaging the enemy's trench mortars.

The whole of the trench mortars of the trench mortar battalions and companies form, during an attack, a constituent part of the attacking artillery. They will be placed as a whole, or by sectors, under trench mortar commanders, who will be under the orders of artillery commanders and incorporated as groups into the organization of the attacking artillery. Even the light *Minerve* of the infantry may be temporarily incorporated with the attacking artillery in order to secure unity of artillery preparation (cf. Part 7 of the "Manual of Position Warfare for all Arms").

In a deep break-through attack, each infantry battalion will usually take with it 2 light "Minerve" provided with teams. In addition, a *heavy trench mortar* company of 4 to 6 medium "Minerve" with 2 or 3 ammunition carts for each mortar will be formed from the divisional trench mortar company. This company is a divisional unit. All the other trench mortars will remain at first in their original positions and will gradually be collected later on.

When an advance is made, the light *Minerve* of the infantry, which should be made mobile, remain at the disposal of the infantry and are, in the event of the termination of the preparatory bombardment of the enemy's trenches, the medium and heavy *Minerve* should be made available for new tasks as possible, provided with teams.

39. Neutralization of the enemy's artillery (para. 38a), at any rate during the actual assault, is one of the most important of the artillery preparations for the attack. The deeper the attack is to press forward into the enemy's positions, the more completely and finally must this task be performed. Any conspicuous increase in the intensity of artillery fire before the day of attack is generally inadvisable, as it will prematurely arouse the attention of the enemy.

If the enemy's batteries are not very strong and their positions are known, the engagement of each hostile battery singly on the day of the attack with *D.E. fire* can be entrusted to certain of our batteries, other batteries being held in positions in observation, to engage any new hostile batteries that may appear.

This system requires a very large number of guns and good observation. A complete neutralization of the enemy's artillery is not thus attainable.

As a preparation for the attack, therefore, bombardment with gas on a large scale is decidedly preferable to engaging the enemy's batteries singly. When the possibility of subsequently passing the "gassed" ground must not be left out of consideration. The particular characteristics of gas used must be taken into account (cf. "Gas Bombardment by Artillery," I. 12-17). In certain circumstances, a portion of the enemy's batteries included in the objective of the attack will be shelled with H.E.

In addition to the batteries required for gas bombardment, other batteries (with gas or H.E. shells) will be held in positions in observation for engaging especially troublesome batteries and any that suddenly become active, not having been successfully "gassed." If the gas bombardment takes effect at night or in the early morning, it is not very easy to see, and, consequently, later, it is advisable to bombard the most dangerous batteries with gas again just before the attack.

It will frequently happen that the gas bombardment and preparation for assault will not take place at the same time. In that case, it is not desirable to allot targets in the preliminary bombardment to batteries which have been engaged in the gas bombardment, as this would entail great strain on them. If necessary, however, it is entirely possible to engage the same targets.

40. Preparatory bombardment of the trenches.—The following principles are applicable to neutralization of trench garrisons and to bombardment preparatory to assault (para. 36d):—

(a) The objective is divided into *target sectors* for each battery. The target sectors cover all systems of defense works which are to be destroyed, especially fire and communication trenches, dugouts, wire entanglements, command posts, machine gun emplacements, &c.

With regard to the size of the target sectors, experience has shown that three should be laid out for every 100 metres of trench. Batteries, including howitzer batteries, should be allocated equally. If flanking fire is possible, field guns will often be used. The fire of the heavy and super-heavy artillery should be concentrated on the most solidly constructed defences (command posts, dugouts, banking arrangements and machine gun emplacements) and on the most important points for penetration. In this case target sectors should, in certain circumstances, be made narrower (cf. Manual of Artillery, para. 100).

The nearest assault batteries generally be allocated to the trench mortars. Their destructive action is fully sufficient without assistance. Owing to the lesser dispersion of their fire, bombardment by them can generally be carried out in a shorter period than with artillery. Where, however, there is a danger of their causing fire prematurely owing to difficulties of ammunition supply and insufficient cover, it may be necessary in exceptional cases for the trench mortar target sectors to be double-banked with artillery (cf. Part 7 of the "Manual of Position Warfare for All Arms").

(b) The destruction of trenches and other defence works is not alone sufficient preparation for an assault, as the enemy will be able to take refuge in areas of level ground, especially in crested areas. The ground between trench lines must also be taken under effective fire.

Ground in the vicinity of the trenches will come sufficiently under fire as a consequence of the dispersion of the fire of bombarding batteries. Special batteries must be used for ground not thus brought under fire. Generally speaking, field guns will suffice for this; the 216 mm. gun is particularly suitable for this purpose.

The enemy must also be prevented from evading fire by moving forward. The fire necessary for this must be available close up to our trenches and may therefore be properly entrusted to trench mortars and gun batteries firing obliquely.

(c) It is always necessary to bombard also portions of the enemy's position which it is not intended to take, but which are so near to the objective that the infantry and machine gun from them may increase the difficulties of the attack. Too sharp a fire boundary, moreover, would indicate in advance to the enemy the exact width of the projected attack, and thereby facilitate defensive measures and the assembly of troops for the counter-attack. The area covered by the artillery preparation must, therefore, be wider than the actual objective (regarding mystification by activity at more distant points, cf. para. 7).

(d) Bombardment with gun may be effectively used to supplement shelling with H.E., so far as this can be done without endangering our advancing troops. Whether it is possible to rely solely upon gun bombardment to prepare the whole, or parts, of the objective for the assault, depends on the weather and local conditions and must be decided according to each particular case.

Special attention will be paid to the possibility of using trench mortar gun shell and gas projectors at the actual point of attack, or at other points in order to divert attention from it.

(e) The employment of smoke screens over adjacent fronts, artillery observation posts, or even the points to be penetrated may be a matter for consideration.

(f) The alignment of target sectors which are to be prepared for an assault is made primarily in view of the material effect desired, due regard being paid to the necessary concealment of intentions. Great consideration should, however, be given to the moral effect. It may require great concentration of effort to employ the same preparation bombardment (one to two hours and less) the destruction of all the enemy's fire trenches, etc., would necessitate the employment of unlimited masses of batteries.

The moral effect of trench mortars is especially great. Consideration of moral effect will also lead to flanking fire being invariably preferred.

All kinds of false ideas prevail regarding artillery preparation for assault.

The manual requires an average one howitzer battery for the destruction of about 100 metres of trench. Naturally, accuracy of fire (the nature of gun and ammunition, observation, weather, conditions of the ground) and the quantity of ammunition fired (and thus principally, rapidity of fire and length of bombardment) also play an essential part. The complete destruction of a trench 100 metres long by one battery is on a large scale generally a very good performance. Hence, it is not to be expected that an artillery preparation (one to two hours and less) the destruction of all the enemy's fire trenches, etc., would necessitate the employment of unlimited masses of batteries.

Such complete destruction, however, is not necessary. If the trenches are destroyed, the enemy will occupy the cratered area. It may suffice if the most important works (banking trenches, the intersection of communication trenches, observation posts, etc.) are destroyed. The weaker the garrison and the more surprise may be relied on, the lighter will be the task of destruction, pure and simple.

The bombardment of the interesting ground also (para. 46) must annihilate all living resistance. It is solely intended to cause loss to the enemy, to make him keep his head down and to shake his moral. It is further intended to deprive him of the power of observation and communication, so that he is not misled by the movement of the infantry. The attack should, thrown into confusion and, having lost touch with his commander, may become incapable of the necessary determination to ensure energetic resistance.

Moral effect will therefore be particularly aimed at, especially if the artillery preparation is brief (cf. para. 40) and pass off, but as one taking full advantage of it. It will rarely happen that the infantry will be entirely spared thereby from hand to hand fighting. This will, however, be light if the infantry works a really determined attack and presses forward so rapidly that the leading men reach the defenders simultaneously with the last rounds from their own guns (cf. para. 20).

41. The bombardment of command and observation posts, rearward railways and communications, places of assembly, ammunition dumps and captive balloons (para. 36c) must be carefully thought out. A considerable disturbance of the enemy's whole system of command (transmission of orders, planning forward of reserves, etc.) can be thus occasioned. This fire must not be rigidly regular (as the enemy will find out during the course of the battle when and where are the quiet times and places. Batteries for engaging fleeing targets should be held in readiness. Gas shells in particular are effective.

42. Registration.—The first condition of a successful bombardment, and consequently of a successful attack, is careful registration by all batteries, especially by those which will prepare the assault. The artillery can and must fire with the certainty of clockwork.

Every battery will be required to register on each of its targets, even on those allotted to it when fire is not intended. This will be best regulated by a special order, which will be issued at the time and places for registration among the batteries so as to exclude any chance of mutual interference.

It is advisable to register with trench mortars, also, but not until the assault has begun, as otherwise their firing will betray their presence prematurely and expose them to destruction. Their appearance in large numbers will indicate to the enemy the intention to attack. The time and targets for registration must be arranged with the artillery with great exactitude.

All means of observation must be most carefully utilized for registration. It is desirable to check the fall of the rounds, making due allowance for the error of the day, immediately before opening fire for effect.

Registration on battle fronts can be easily carried out without exciting noise. On fronts otherwise quiet, an attempt may be made to get it out over a longer period of time and give it the appearance of harassing fire. If our battery positions are too exposed for this and too numerous, registration must be compressed into the shortest possible time in order to prevent the enemy from prematurely becoming aware of the approaching attack. The preliminary registration of trench mortars may often be almost entirely omitted. Even should the enemy be made aware of the projected attack by this accelerated method of registration, compared with inadequate registration it will be the lesser of the two evils. Mystification of the enemy by registration by aeroplane and wireless at another place must always be attempted (cf. para. 7).

Accurate registration can be considerably accelerated and, in part, replaced by observation behind the front (collimation, plotting of battery emplacements and targets on the map, calculation of the allowance for the error of the day, ascertainment of the "time" from guns aimed in position). This means a considerable simplification of the artillery preparations which are likely to attract the enemy's attention, and thus facilitates surprise. Experiments in this direction are now being undertaken and the results will be communicated in due course.

43. Preparation for the assault is generally carried out in daylight. In an circumstances can destructive fire carried out at night be relied on to have its full effect.

Accuracy of fire is more effective than too rapid fire (but cf. para. 41). The best results are generally obtained by steady firing with observation if possible. The increase of fire to its highest intensity (drawdown) from time to time is necessary, however, in order to deceive the enemy as to the moral effect of the assault.

In any circumstances, however, too great a strain on men and material must be avoided. It is necessary to give attention during the bombardment to changing atmospheric conditions.

Efforts in the fire zone to deceive the enemy to deceive the enemy to deceive the enemy must be carried out on our own men and material and to provide an opportunity for carefully observing the effect of fire aimed.

Repeating fire with a sudden burst may cause the enemy considerable losses.

Lengthening the range exactly as will be done in the real attack, is often a good means of concealing the time of the real attack from the enemy.

In any case, nothing in the action of the artillery should inform the enemy of the moment of attack, as even a slight delay in the opening of the enemy's barrage is a great gain. Generally speaking, the attack will be best attained by irregularity in the time, place and rate of fire. The changes will be regulated by definite orders.

44. Duration of artillery preparation.—As far as this can be carried out with regard to the position mentioned in the preceding paragraph, the preparation should be in accordance with para. 36 a-c however, it should be concentrated in relation to time and space in order to increase the surprise effect.

In certain circumstances, however, individual targets must be demolished by destructive fire before the artillery preparation proper begins. The artillery preparation may then, as an exceptional case, last even longer. The duration of the actual attack may be prolonged from a few minutes to several hours at most. Drum-fire lasting several days must not be employed.

45. The creeping barrage (para. 36d) in front of the attack will be formed by the largest possible number of batteries, so that it may possess the necessary depth. The extent to which Plus Cross ammunition can be used for this purpose depends on local circumstances.

In order to cause the advance of the infantry, the attack consists of the creeping barrage and the artillery fire. It is advisable, in order to lessen the danger from splinters, to fire the last rounds of the artillery passively, and to fire the attack with the infantry, if this is available, or to finish by firing of the mortar rounds from trench mortars. Troops must be advanced behind a safe barrage.

The lifting of the fire takes place by "bounds", of which the times and length are regulated in the attack orders. The length depends on the ground, the nature of the country and the probable duration of the attack. The rate of progress of the barrage must be so calculated that the advance of the infantry, the attack consists of the creeping barrage and the artillery fire. In order to bring the infantry advance, in attacks with distant objectives, into touch with the progress of the creeping barrage, the fire barrage against the enemy must be continued. However, it may be advisable to fix certain lines on which the barrage will halt. Lengthening

of the range will only begin again when the infantry asks for it by means of an agreed signal. The advance of the infantry must be as accurate as checked by a proceeding of this kind.

The artillery must also be in a position to protect the infantry by shortening its fire in case of any temporary reverse.

If certain areas (strong points, villages, woods) are not to be dealt with by frontal attack, but surrounded after a breakthrough has been effected in neighboring sectors, artillery fire will be continued to cover the assault, particularly on these points, and will be switched to a flank or to the rear at carefully fixed hours, or on a previously arranged signal. In certain circumstances, a concentration on the interior of the area to be assaulted will be necessary before fire is withdrawn.

Misconceptions exist regarding the creeping barrage.

(a) Batteries concerned.

Of all the batteries available for the attack, the *heaviest batteries* held ready to accompany the infantry (para. 47) cannot be counted upon for the barrage. Batteries in readiness to engage fleeting targets (para. 48) are excluded. Batteries in position to support the infantry, and the engagement of the enemy's artillery (para. 39) and of the targets mentioned in para. 41, as well as of strong points and areas which will not be subjected to frontal attack (para. 45, sub-para. 6) must be continued with the infantry attack as long as forward. *These batteries which are not concerned with the important targets above mentioned are thus available for the barrage.*

Of these batteries, 21-cm. mortars and heavy field howitzers are the *least suitable*, as the shell splatters by too far. Light and heavy field howitzer fire can be put close in front of our own infantry while it is under cover, but a greater distance must intervene when the infantry is advancing. Infantry cannot follow close behind a barrage of mortar and heavy field howitzer fire. They can and must keep close up to the fire of field guns and light field howitzers.

(b) Constitution of the creeping barrage.

Even if one battery is allowed for every 40 meters of front or less and the batteries in action are pushed well forward, the barrage, as a consequence of natural dispersion increased by bad shooting and owing to the necessity of the heavy artillery shooting well forward, will not constitute a thick wall, but will cover the zone of attack to a depth of about 100 meters.

The barrage besides must not be of the same theoretical density throughout. The fire, especially that of the heavy artillery, should have a greater lateral density on important points. The greater the range, the deeper will be the barrage. As the advance proceeds, an increasing number of batteries will gradually be unable to fire, until finally the sole artillery support will be furnished by the remaining batteries (and trench mortars) and the light and heavy batteries selected for rapid change of position. It is then no longer possible to form a solid barrage without considerable loss of time. *Direct artillery preparation by artillery and trench mortar fire, concentrated on the points where it is desired to penetrate and as far as possible observed, will have to be used, just as in open warfare, and will generally be sufficient.*

(c) Execution of the barrage.

The barrage will be set up properly unless precise orders are given beforehand. It should begin at the moment of the infantry assault, and should be lifted by bounds (200 to 400 meters, or more) from the targets nearest our own infantry as this infantry moves forward. The lifting of the fire of the heavy batteries will be carried out according to a special scheme in some cases (longer bounds, a greater distance from the infantry, concentration on important points).

The barrage is either carried out according to a *time scheme*, or an attempt is made to control its advance by visual signals. The latter is preferable and must, therefore, always be attempted. *The raising and setting of the barrage must not be dependent on the barrage, but vice versa, whereas the dusk of the infantry will be checked by the night curtain of fire.* The possibility of aiming this will depend on observation and the rapid transmission of signals and orders. It will seldom be feasible to depend on these alone. The order to put up a barrage should, therefore, generally be so given that the barrage is carried out according to a fixed programme, unless a change in circumstances makes this impossible.

When the barrage is carried out according to a programme, it should be given a *speed* at the commencement, and in any country, of about a minute, and later, or in difficult country, a maximum of 2 minutes for every 100 meters. The guiding principle is that the advance of the infantry should not be checked by too slow an advance of the barrage, but, on the other hand, that the infantry must keep close up behind the barrage (cf. para. 40, last sentence and para. 60, last subpara.).

The artillery preparation proper will be carried out by the previous artillery bombardment (para. 40), the creeping barrage being merely an extension of this. The lifting of the barrage and the objectives are reached (according to circumstances lasting longer at certain lines, e.g., rearward positions) which must be prepared for assault by renewed artillery bombardment, (para. 45, 4th subpara.) and then the assault is made as a rule by the infantry (cf. para. 48).

If the infantry fails to reach its objective, there will be an absolutely useless expenditure of ammunition. On the other hand, the advance of the infantry may require a more rapid movement of the barrage.

It will be necessary to arrange a few signals beforehand for such cases, e.g., "Barrage halt!" and "Barrage forward!" Whilst the barrage halts, the fire must be regulated as far as possible by ground and air observation (with correction for daily error).

(d) Experiments.

Further experiments in the effectiveness and nature of the barrage arrangements (e.g., length of bounds) are still in progress. The possibility of employing gas (Blue Cross) is also being tested.

(g) General remarks.

A warning is necessary against expecting too much of the barrage. Fire at definite targets with observation will always prove superior to a barrage, which will always remain to a certain degree inelastic and unadaptable, however skilfully handled. Its effectiveness is dependent on succeeding, contrary to British practice, in making the barrage depend on the infantry, and in training our infantry to keep immediately behind the barrage in spite of loss from strong "shorts" in the infantry from our own shell splinters (cf. para. 60, last subpara.).

46. Artillery liaison officers, whose duty is to secure communication with their own arm by all possible means, and who must be specially equipped for this, should be attached at an early date to infantry units so that they and the infantry may become accustomed to work together, they accompany the infantry assault. Their work is of the utmost importance for the co-operation of the two arms.

Attention must especially be drawn to the fact that the main thing is for the artillery to be able to see. The work of artillery liaison officers and other artillery observers who accompany the first line troops with means of communication, as well as air observers, is on this account of extreme importance.

Artillery balloons and aeroplanes should be brought up rapidly to the attack progresses.

A mobile unit of artillery reserve batteries is especially indicated.

47. Batteries for the close support of the infantry.—The employment of batteries of "infantry" guns and howitzers firing at close ranges over open sights in the attack (para. 36e) is extraordinarily effective. These batteries are placed in position under cover and do not open fire until shortly before the attack, or even after the infantry has begun to advance.

Attacks of considerable depth are accompanied also by horsed batteries, guns and trench mortars placed under the orders of the infantry regiments. They are intended to engage infantry, flanking defenses, machine guns, and tanks, directly at close range, and to repel the enemy's flank-strikes. These batteries must be well trained to practice with the infantry. It is advisable to equip each gun of these batteries beforehand with two ammunition wagons, as it is not in this case a question of the number of guns but of replenishment of ammunition. The employment of gas will be found useful.

48. Protective barrage.—When the objective of the attack has been reached, the creeping barrage will be continued as a protective barrage in front of it (para. 36f). The slackening of the fire here and its gradual cessation must be regulated by special orders. Fire must not cease too soon and must be ready to open again at any moment by prearranged signal.

49. Employment of surplus batteries.—During the attack, any batteries whose tasks may be completed will take over the engagement of troublesome hostile batteries or hold themselves ready to repel counterattacks and engage fleeting targets (para. 36g).

50. General artillery considerations.—In ordinary attacks, the depth of the attack is limited by the range of the mass of artillery in position.

In deep attacks, with a breakthrough as their objective, special preparation must be made for moving forward all the mobile artillery and trench mortars, with a sufficient supply of ammunition. This is one of the essential conditions of success in the breakthrough battle.

First, a sufficient number of light batteries and trench mortars, which are provided with teams and accompany the infantry attack to support it at close quarters, must be available (para. 47).

The strong force of artillery, especially heavy artillery, will follow in succession, and be ready, where resistance is met with, to open a way for the infantry by short bursts of shelling concentrated on the points to be penetrated, or to repel hostile counter-attacks. The infantry must never be without strong artillery support (cf. para. 6).

The moving forward of artillery and trench mortars is an extraordinarily difficult matter and requires a great deal of preparation, which may be organized in the following manner:

Within our own camp, careful preparation will facilitate the operations (reconnaissance, arrangement and assignment of positions, approach routes, communications, etc.). The attack and command posts, dumping of ammunition, the attachment of engineers to assist in overcoming obstacles, prepared by the ground force.

In the further course of the breakthrough battle, however, a bold spirit of initiative can alone lead to success. Every minute gained strengthens the enemy; the more so, the greater his initial surprise was. Order, liaison, working for the goal which has been combined with drive, are at no time more important for the artillery than in such situations. *Matters to lay stress on are—*despatch of the battery commander accurately informed on the battle situation and the topography of the ground; observation; rapid co-operation with the infantry and air forces on adequate supply of ammunition which is sent up at the right time and to the right place. One of the principal conditions of success is the close liaison of the artillery and air forces; artillery in these matters. But complete success can only be obtained by the intelligent and independent action of all ranks of artillery commanders.

The position of the whole of the mobile artillery and trench mortars has a decisive influence on the success in bringing up the artillery.

The difficulties are—

(a) The ground, which will be devastated by fire and full of trenches, obstacles and mines.

(b) The danger of blocks, if there is too much traffic from front to rear and vice versa.

(c) The small number and indifferent quality of our horse.

It is therefore necessary to provide the artillery with the material and parts of engineers; to ensure rapid road construction and strict traffic control; and to limit the total of guns and trench mortars which are brought up. In setting this up, it must not be overlooked that guns and trench mortars are useless in battle without ammunition. Artillery horses (especially

those of the ammunition columns) which are standing idle should be made use of as extra horses for other guns or ammunition wagons, or taken forward as spare. All guns, especially those it is intended to push forward, must have their limbers and ammunition wagons loaded and hosed before the attack begins, and these must not be drawn upon during the artillery preparation.

In deep attacks, the following should be brought up as quickly as possible:—

- (a) *The accompanying infantry (para. 47 and para. 48) which should endeavor to open fire at close range over open sights and always to keep abreast of the infantry.*—As a general rule, an infantry regiment should have 1 field battery of the divisional field artillery regiment and the 6 light *Minesweeper* of the infantry.
- (b) *Additional light and heavy artillery for the tanks laid down in para. 50, 4th sub-para.*—As a rule, a division should have, first, the remainder of the divisional field artillery regiment and a heavy artillery battalion permanently attached, secondly, the divisional trench mortar company, finally, four heavy and light artillery, in about equal proportions. For this, 21-cm. mortars and 10-cm. guns are specially valuable. With sufficient extra horses and support from engineers and infantry, they are sufficiently mobile even in difficult country. A few shells from a 21-cm. mortar will often break down hostile resistance against which field guns are powerless.
51. **Artillery defense.**—If the objective is to be held for any time (para. 6, sub-para. 2) the artillery defense must be rapidly organized.

The same applies to objectives reached in different phases of the break-through battle. Hostile counter-attacks must always be countered upon.

52. **Ammunition must not be spared.**—Since, however, the preparations will be all the more extensive and therefore the chances of a successful surprise endangered, the greater the amount of ammunition dumped, all excess in this direction should be avoided. Every battery must have at its disposal, before the attack begins, an ammunition required for the whole attack. Provision must be made against any deficiencies.

The decisive importance of a sufficient supply of ammunition on a change of position, especially in the break-through, has been specially emphasized in paras. 6 and 50. A large number of ammunition columns (guns with gas shell) are indispensable. In spite of this, however, the provision of ammunition becomes more and more difficult the further the attack is pressed forward. Economy at the right place is therefore a necessity. *Mistakes in this respect cannot fail to bring the attack to a standstill.*

II. INFANTRY.

53. **Factors of success.**—*In the success of the infantry attack, the numbers of infantry employed is not the decisive factor, but their fighting power (which depends on rest, training and equipment), the care taken in preparation and the skill of officers and men, combined with rapid and decided action.*

54. **Strength.**—The strength necessary for the attack depends on:—

- (a) The distance of the objective.
- (b) The artillery preparation and support during the assault, as well as on the strength of the enemy's position and its garrison.
- (c) The possibilities and manner of assembly of the troops for the attack.
- (d) The equipment of the attacking guns, flame projectors, trench mortars of our own infantry.

As regards (a), *the nature of the objective lies the weaker may be*, as a general rule, the attacking infantry. *In deep attacks distribution in depth is necessary, in order to provide assistance at particular points, to check reserves, to close gaps which may arise and to protect threatened flanks.*

As regards (b), assaulting infantry must, especially in deep attacks, possess sufficient fighting strength from the outset, in order to be able to break down any unforeseen resistance and the opposition which will become stronger and stronger as the attack progresses. Nevertheless, fighting strength is not expressed only in terms of the number of men with rifles and of bombers, but also in terms of the number of machine guns, flame projectors, etc.

As regards (c), the possibilities and manner of assembly of the attacking infantry and the choice of approach routes have a decisive influence on the mounting and course of the attack. Assembly points should be chosen so that the troops in readiness shall be as much as possible withdrawn from artillery fire and that favorable approach routes and lines of attack shall be available.

If the attack is conducted from carefully constructed, permanent positions, the assembly will be possible in the trenches, and partly even in dug-outs. As a rule, troops use dug-outs dug out, shall enter them as natural cover is sufficient. Even in crater areas, an attempt should at least be made by joining up the craters, to enable subordinate commanders to inspect the assembly, to supervise the men and to get orders to them.

The shorter the time necessary for the assembly must be avoided. It is of the greatest importance to be recognized as preparing for the attack. It is of the greatest importance to reconnoiter the assembly from air observation.

The difficulties in the way of carrying out the assembly without the enemy noticing it, and of effecting a surprise attack, increase with the number of troops to be assembled. Endeavors should therefore be made to carry it out as well as possible, the smaller will be the possible. The shorter the time necessary for the attack has to pass, the smaller will be the effectiveness required.

The assembly will be in close formation or more or less distributed in depth, according to local conditions. In the first case, the troops do not open out until the advance begins. In particularly favorable circumstances, the assembly may be carried out close in front of the zone of the enemy's barrage fire.

The assembly of the attacking infantry is the crisis of the attack. Of especial importance is the strict limitation of its numbers to what is necessary, and avoidance of too extensive concentrations, which make cover for bringing up and assembly very difficult, endanger the chance of a surprise and may incidentally lead to unnecessary losses in the attack.

If the whole of the assembly position lies forward of the enemy's barrage zone, distribution in depth must be gained by retreating the advance. Otherwise, the infantry will be used up too rapidly without any reserve (cf. para. 6, last subpara.).

Similarly, the detaching of reserves in the course of the attack is of very great value (compare para. 6), but only one and para. 6.

As regards (d), machine guns are not auxiliary weapons but just as much the principal weapon of the infantry as their rifles. Nevertheless, at the present time in break-through attacks, in view of their fighting strength, they are used only in exceptional cases (one or two light machine guns (and one in reserve), and machine gun companies only 6 heavy machine guns (and 3 in reserve)).

Regarding bringing up the light "Minesweeper," see para. 38, 3rd sub-para.

"Grenade-carryer" will be kept in the departure position during break-through attacks. Their detachments, the vehicles of the light *Minesweeper* of the infantry which remain behind, will join in the attack as riflemen.

55. **Time of the attack.**—The determination of the right moment to attack is most important; it depends essentially on considerations connected with the artillery.

If the enemy has a considerable force of battle artillery, the position of the enemy's artillery to our fire for effect will generally render the moving up and regular assembly of ours impossible. An occupation of the assault position by day, also, is only possible in exceptionally favorable country, and when the enemy ground and air observation is out of the question; it is, however, generally impossible to foresee whether the weather will prevent enemy air observation.

It follows, therefore, that the moving up into the assault position will take place, as a rule, on the night before the attack. It will proceed all the more smoothly and surely the less the enemy is expecting an attack, and the smaller the number of assault troops employed.

If our own artillery does not require very much time for its fire for effect, it will be as well not to begin this until the morning after the infantry has moved up and to carry out the assault during the course of the day.

If the fire for effect by the artillery should, as an exceptional case, take more than one day, our own trenches should at first be quite weakly held. The assault position must then be occupied during the night before the assault. More or less heavy hostile fire must be put up with it.

It might, therefore, seem best to carry out the assault early the following morning. But experience shows that an enemy who has been bombarded during the day will, in spite of harassing fire and gas-shelling, bring up reserves and, particularly, fresh machine guns into the position during the night, will repair the position temporarily, and will be specially on the alert in the sufficiently intense fire. As a rule, therefore, fire for effect adjusted to the weather conditions, and sufficiently intense to prevent the enemy from fresh effective, must precede the assault on the actual day of the attack.

In minor attacks, besides the possibility of the assembly, the manner in which the captured position is to be consolidated governs the choice of the hour of the attack and the capture for the exploitation of a preliminary success, if the first assault takes place in the early hours of the morning.

It is, however, a general principle that all hard and fast rules for the hour of attack are wrong. The time and therefore, be changed, in order to keep the enemy in continual apprehension of an attack. This is and is a possibility if the assault detachments, if too unfavourable, as good infantry, well trained with preserved food and drink, should be able to remain for a long time in a fighting position. Here and fit for fight, throughout our own artillery fire for effect and the enemy's position.

56. **Attack formations.**—The infantry will attack on the lines laid down in their training manual ("Manual of Infantry Training in War," 1918). The peculiar nature of the objective necessitates the attack being generally led by assault detachments. Orders must be made to form these assault detachments from groups of riflemen, which will be reinforced or formed *ad hoc*.

Whether it is better to employ waves formed of lines of skirmishers or waves of assault detachments, or a combination of both, must be decided according to each particular case.

Allotment of definite tasks.—Definite tasks must be allotted to the waves of rifle skirmishers or assault detachments at the position of assembly, such as the capture of definite portions of the hostile position, machine gun nests, dug-outs, etc., or change of direction to another engagement, such as flanks, mopping up of the rear.

The allotment of machine guns to the first troops must receive most careful attention. ("Manual of Infantry Training in War," 1918, para. 70). As the equipment of units with machine gun progress, the greater must be the care taken to ensure that the cooperation in the attack between such infantry group and the machine gun allotted to it.

"Manual of Infantry Training in War," 1918, para. 171). Numerous machine guns must be attached from the very first to the assault detachments, in order that they should be able to fire as they are available to cover the advance of the riflemen and bombers by keeping down the fire from hostile nests, or to repulse the counter-attacks. Other machine guns will be at first posted in the neighbourhood of the jumping-off position, in order to be able to fire as they are available to cover the advance of the machine guns with the first line infantry, and others should follow, so that the objective, there may be a sufficient number of machine guns ready in the front line and distributed in depth to repulse counter-attacks. ("Manual of Infantry Training in War," 1918, para. 256.) Anti-aircraft measures must also be taken into account.

Similarly, *trench mortars* must be made as mobile as possible and brought forward. Their fire at short range is a highly effective support, both when the attack threatens to come to a standstill and for the repulse of counter-attacks.

With regard to accompanying infantry with single guns at batteries, compare para. 47.

Flame projectors may be very usefully employed in breaking down local resistance, clearing out dug-outs and caves, and similar tasks. It is not advisable, however, to allow them to open fire at the point of attack itself at the moment that the attack begins, as this would draw the enemy's attention to the main element of the attack and to the point of its passage.

58. Communications and supplies.—*Parties for communication purposes, and carrying parties for food, ration, engineer stores, etc.* must be regularly detailed.

The infantry ammunition supply, especially machine gun ammunition on belts is particularly important; the ammunition supply for trench mortars also requires to be suitably regulated.

59. Passage of enemy's barrage.—*The commencement of the attack must be a surprise, and as a rule must take place simultaneously on a wide front with very careful timing. The probable zone of the enemy's barrage must be passed over at the quickest pace. It may be expected with certainty that the first waves will encounter the enemy's barrage. The first waves should frequently, therefore, be made relatively thick, and it must gain the distribution in depth indispensable in the attack as it advances (cf. para. 58c).*

Wave and reserves advancing later from a greater depth will have more difficulty in passing through the hostile barrage, as in the meanwhile it will have become more intense. They will endeavour to profit by gaps, areas which are less heavily shelled and moments when the fire slackens. *Troops that are best on attacking will not let themselves be held up long by a barrage. Rapid and determined action will often bring them through successfully with extraordinarily few casualties.*

60. Method of carrying out the attack.—*In the assault, it is most important to exploit to the full the effects of the artillery preparation and support. The assaulting infantry must be in the enemy's position simultaneously with the last rounds from their artillery and trench mortars, and during the further course of the attack must follow immediately behind their own barrage, so that the enemy has no time to come out of the dug-outs that may still be intact, or to prepare for action in any other way.*

Besides making full use of the weapons at their disposal and exploiting the enemy's known weaknesses, the troops must have dash if an assault is to be successful. Success is gained by determined and reckless drive and initiative on the part of every individual man. A check in the attack at one place must not spread to the whole line; infantry which pushes well forward will envelop the parties of the enemy which are standing fast, will creep between aside and pass the way for the advance of any of their own detachments which have been held up. Hesitation leads to failure.

The battle sectors are best arranged when the front wave can attack straight to the front. Boundaries should be formed by conspicuous points and lines on the ground, e.g., roads, railways, edges of woods.

Within the battle sectors the attacks must not be carried out uniformly. Strong points, villages and woods must be neutralized in certain circumstances by means of smoke pots. The troops should pass them and, distributed in depth, attack the points which appear likely to offer the least resistance. Rearward waves will capture the strong points, etc., by envelopment.

In order to compel the rapid surrender of nests and strong points which the leading waves have overrun, it may be advisable to detail special mixed detachments—if necessary composed of all arms—under energetic leaders, to deal with them.

The leading infantry should avoid all halts which are not absolutely necessary. The front line is frequently weakened more rapidly by men falling out to rummage through the enemy's dumps, trunks and baggage in search of food, etc., than by the enemy's fire and by exhaustion of the troops. Such rummaging is unnecessary. Men shirking and looting must be got hold of by parties from their own regiments and brought on immediately (cf. para. 109).

Attacks conducted on the principle of rolling up the defence by working along the trenches are only advisable in small unimportant operations and minor enterprises, which are more of the nature of retaliation and raids, and have not been preceded by an effective fire preparation for assault.

The smaller the attack and the nearer the objective, the more minutely must the routes to be followed by the attacking infantry be marked out and the details of the operation laid down. The deeper and more important the attack, the more frequently the situations occur in which a decision will be brought about by the independent action of individual small detachments or groups, provided this action properly conforms to the spirit of the whole operation. In this way, small advantages gained may be turned into a decisive success. The commander of all directions gives and measures takes no account of ensuring that the commander's ideas are carried out. Every man must be trained to keep continuously in touch with the commander of his assault detachment as well as even for an instant lose sight of cooperation with the unit to which he belongs and the neighbouring detachment, as well as with other arms. Signals by means of flares (also flame projectors) should be carefully arranged.

When sections or assault detachments broken up in the attack get bunched together in the enemy's defence, equipment must be made, as soon as the situation permits, and in order to avoid being surprised in a formation unsuited to fighting, to extend them in regular lines of skirmishers, as laid down in the "Manual of Infantry for the World War," 1918, to detail a reserve and flank guards, and to send out patrols to the front and flank.

The principle that in the attack the infantry must advance into their own artillery and trench mortar fire, which was so successfully taught in the assault battalions, must become general among all infantry. It requires reckless pluck and high moral, as occasional casualties from their own artillery fire must be put up with. Ify such an advance, on the other hand, close fighting with the enemy's infantry and its machine guns will be made easier. The total casualties will, therefore, be considerably less. The infantry must be taught by every means to understand this, and to be prepared for it. *The energy of the infantry and its success essentially depend upon it (cf. also para. 40, last sub-para., and para. 45 (c)).*

61. Necessity for keeping troops in hand.—*In the plan of an attack, good troops often overcome the objective. A quick grasp of the situation often secures success which would otherwise only be won by renewed preparation. Troops pressing forward. Therefore, should not be held too much in hand. In a break-through on a large scale, particularly, the best decision is also the most prompt.*

On the other hand, reserves are easily occasioned by merely rushing on without consideration. It is therefore of decisive importance that the troops should not get out of hand during the attack and that the cooperation of all arms should always be assured.

62. Consolidation of the objective.—*On reaching the objective of the attack, preparations for defence must be made as rapidly as possible (distribution in depth, cooperation with other arms, communication, communications, junctions, provision of ammunition, rations, medical service, improvement of position).*

A state of sufficient readiness to resist an immediate counter-attack, generally feebly led by other arms, can be attained in a few minutes. The measures required for this must be prepared before the attack. Even if an attack is to be carried further, the first objectives attained must be consolidated in order to avoid the possibility of a reverse owing to insufficient or deliberate counter-attacks.

63. Necessity for relief.—*It is a matter of experience that infantry generally suffers less in the attack than in the subsequent bombardment and counter-attacks. The Higher Command must, therefore, make timely provision for the relief of the infantry, or the continuation of the attack, by new formations.*

Regarding reliefs in a deep breakthrough, compare para. 12, 2nd-4th sub-para.

64. Action if portions of the attacking troops are held up.—*An assault which fails can, as a rule, be renewed only after a further fire preparation. The fact that some portions have not been able to get forward must not hinder the further pressure of the whole. If isolated elements only cannot advance, support on the flanks from neighbouring bodies of troops and a short preparation by machine guns, light trench mortars and the guns accompanying the infantry will often be sufficient to enable them to get on.*

65. Employment of reserves.—*Especially circumspection, tactical knowledge and decision must be demanded from the commanders of reserves.*

The Higher Command will, in many cases, be in a position to make its influence felt at the right time, especially if its activity increases with the progress of the assault. In such cases, independent and self-initiated action on the part of subordinate commanders is important.

The main consideration in putting in the reserves must be that in no circumstances must the attack be allowed to come to a standstill.

III. CAVALRY.

66. Cavalry.—*During the attack, all staff down to and including battalions and artillery detachments must be provided with despatch riders and mounted scouts. The more the attack becomes transformed into a wave movement, the more cavalry must be allotted to formations for reconnaissance and despatch carrying.*

IV. ENGINEERS.

67. Mining.—*As preliminary to an attack, mines are often fired. If the explosion takes place completely, it will not only neutralize the attack, but it may inflict considerable loss on the enemy. Mines have, moreover, an important moral effect and facilitate the first rush forward. They demand, however, very tedious preliminary work and a considerable amount of labour; their effect does not reach far back. If the enemy does think that mining is going on, he will endeavour to make it success doubtful by counter-mining.*

68. Further tasks allotted to the engineers in the attack are the demolition of our own obstacles and the removal of those placed by the enemy, the blowing up of defended temporary bridges and works, cables and cellars, if the resistance cannot be broken by flame projectors and the boxes thereof preserved for our own use. They have also to construct temporary bridges for the passage of troops. For the purpose of passage, detachments of engineers should be detailed and provided with the necessary material. They should be partly equipped with tools and specially used for back work.

69. Facilitating the advance of the artillery.—*In deep attacks, in which the artillery is moved forward (cf. paras. 47 and 50), it is of decisive importance, and on the course of the battle it may even be the determining factor, that the artillery should be able to act out at attacking detachments. Preparations must be made within our own positions, or on the trenches and passing through the wire, and troops placed ready for work. Special engineers must be detailed to work in the area that is to be captured and they will advance at the same time as the assault troops.*

70. In attacks with limited objective, the engineers will be mainly employed on the support of the other arms in consolidating the positions taken and especially on bringing up material and ensuring correct communications. If required, additional labour must be allotted to the engineers.

89. Action against enemy's contact patrols.—As soon as our own fire becomes heavy there is generally a considerable increase in the activity of the hostile infantry aeroplanes. It is the duty of the machine gun and anti-aircraft batteries to best them off, as a barrage of pursuit machines is impossible at so low an altitude. It is advisable to push anti-aircraft batteries well forward; they should not open fire until the beginning of the attack.

90. Patrolling the line.—During the artillery and trench mortar preparation, small formations of crews must remain above the lines and prevent every attempt of single machines or larger parties to fly over our front. They must fly at 2 or 3 levels according to the weather. Small formations, flights or whole squadrons, must occasionally move to hostile machines on the other side of the lines and bring them down. Care must be taken, however, that our air forces are not used up before the attack begins.

91. Bombing squadrons must be sent out during the artillery preparation against railway stations, communication dumps and aerodromes in turn. During the night and on the morning before the attack, the most important objectives are the enemy's aerodromes. Attacks on trains on open sections of line—carried out at very low altitudes—may also be successful. Only high-flying scouts must have important results. Attacks on hostile headquarters may cause dislocation in the conduct of operations by the destruction of telephone circuits.

92. Artillery aeroplanes, besides reconnoitering targets, must not be employed solely for the registration of single batteries. They are particularly adapted by their mobility and wide field of observation to check periodically, during short flights, a whole series of spots for effect, and to ensure that there are no gaps in the fire. A temporary increase in the altitude of the aeroplanes is necessary when dense smoke impairs visibility for other means of observation.

The effect of the fire should be tested during intervals in the firing (cf. para. 43).

93. Action immediately before the assault.—Our own air activity should be in no circumstances conspicuously intense shortly before the assault. It is even better that most of the low-flying machines should turn off to the flanks or run a few minutes before it takes place. Only high-flying scouts must remain over the enemy's lines shortly before the assault, in order to keep down the enemy's air observation. It must be arranged by definite orders that nothing in the air shall give a hint of the impending attack.

94. The moment of the assault is the most critical for the engagement of aircraft units. The machines must not betray the beginning of the assault by their presence, nor must they appear until the enemy's barrage has opened. But on the other hand, they must take part in the infantry battle with machine gun fire, hand grenades and bombs, and engage the hostile artillery and air forces.

These results can only be obtained by means of detailed instructions in the orders for the attack as to their activity, and by the most absolute punctuality in their engagement in the battle.

95. Battle formations must attack first; they will be held in readiness on conveniently situated aerodromes or advanced landing grounds. They must attack at the right moment and be used efficiently. The first to be sent to the enemy's front, at the same time, must be able to attack punctually to the point. In certain circumstances, it is recommended that the time of flight be ascertained for single machines on the day of the attack, so that the strength of the wind may speed all calculations.

All offensive flights which are available during the infantry battle, and also reconnaissance flights which are practicable, must be put in the battle flights to engage ground targets. The greater the forces released for this purpose, the greater will be the moral effect produced on the enemy. Air observation for the artillery and the Higher Command, however, must not be allowed to suffer.

Battle flights must not direct their attacks only on the enemy's front line; they should also seek suitable targets farther to the rear, e.g., on the communications, railways, marshes in readiness or straggling traffic on the roads chiefly used by the enemy for bringing up reinforcements and supplies.

Central command must ensure that, when battle flights are put in, dispersion of force is avoided, and that the great effect of a number of machines co-operating at points of decisive importance in the battle is fully developed (cf. Part 2 of the "Manual of Position Warfare").

96. Pursuit flights should appear at the same time as battle flights, about 100 yds., pushing forward over the line, to destroy the enemy over his own ground and to prevent his reconnoissances from establishing the main direction of our attack.

Strong forces must see to it that the enemy's air activity is not so great as to prevent us from making his attacks and reconnoissances with the sun at his back, the flank next the sun is especially in danger, and the strongest forces, well schooled in height, should be placed there.

It is desirable to divide the air above the battlefield into several sectors slightly overlapping. In the attack orders each flight or chain should be allotted a fairly wide sector and a certain altitude, which may vary according to the circumstances and special needs, especially to carry out rapid attacks on hostile formations which must be dealt with outside the area allotted.

The overlapping portions of sectors should include the vital points of the battlefield, in order that the air forces may be particularly strong there. At heights above 15,000 feet, the use of aircraft in the manner described above becomes necessary when the front of attack is very wide; forces working at great heights must not be dispersed, as they generally have an engine stronger formations which are endeavouring to penetrate into the back area.

By adopting the method of alternate sectors, it is possible to avoid the disadvantages of an excess of strength over certain localities with a resultant weakness at others. Compare Part 13 of the "Manual of Position Warfare".

97. The infantry aeroplanes (contact patrol machines) should appear a few minutes after the commencement of the assault; they should allow the forward movement of the infantry; report any interruptions of its methodical progress, especially noting strong points which remain unoccupied and require a renewed artillery preparation; and call for identification of the front line as soon as the objective is reached. The demands for contact patrol signals are always unsuccessful and make the infantry uneasy; these must be given, if to settle in the new positions and overcome the resistance of small hostile detachments. When an infantry aeroplane has observed that the objective is reached, it should make a contact report at once by wireless the points attained. Doubtful points must be reported as such and subsequently cleared up by machine reconnoissance. To supplement reports, sketches should subsequently be made and dropped.

In the case of an attack with distant objectives, the front lines must be fired in the course of the attack during the intervals when the barrage halts, as mentioned in para. 45. In no circumstances, however, should the attack be checked for this purpose.

Besides following the advance, the infantry aeroplanes must watch the general activity of the enemy, in order that they may give definite orders for counterattacks and supply dumps, and also for artillery fire at the proper time.

98. Bombing attacks on hostile aerodromes are especially effective during and shortly after the attack, as the aerodromes disclosed by the engagement of the enemy's air forces and supply dumps may partly prevent it, whereas attacks on camps and ammunition dumps are of less importance at the moment. On the other hand, bombing and machine gun attacks on batteries in action or against reserves may seriously hinder the enemy's action.

99. Action of artillery aeroplanes after the assault.—Only the artillery aeroplanes remain continuously over the battlefield before, during and after the assault.

Their action in the battle is concerned less with obtaining a large number of observations at the moment of the assault than with the uninterrupted watching of our own and the enemy's activity during the whole battle, and with rapid and freely reporting to our batteries concerned. It is of the greatest importance to report the hostile batteries which are most active, batteries successfully engaged, well and badly directed fire, good targets which are not fired on, etc. The artillery aeroplanes must be given definite orders for such observation, which they must carry out in addition to general supervision of the battlefield. They must know exactly what orders have been given to their own artillery, so that they may suit their action to the course of the battle. Their work will only be successful if they have been thoughtfully instructed.

100. Balloons.—The work of the artillery airman will be supplemented by the use of balloons which, if sent forward early, will furnish exceptionally valuable reports to the commander of the troops and to the artillery. They may be sent forward immediately before or after the first attack with comparatively little danger, as the hostile artillery will be kept engaged in other tasks.

101. Action of battle and pursuit flights after the assault.—After the assault, battle flights must be in readiness for action again as soon as possible, so that they can be used against counter-attacks.

Renewed attacks on balloons may be useful.

As regards the further employment of pursuit flights, it must be remembered that the enemy will not know the time of the assault and, therefore, will not at first have a strong force of aircraft over the battlefield. On the other hand, as the assault progresses, the enemy will send up all his available strength, in order to gain supremacy in the air. A considerable increase in the enemy's strength will, therefore, have to be reckoned with during the period extending from half an hour to 1½ hours after the assault. Fresh pursuit flights must therefore be put in about 3 of an hour after the attack, so that the attacker may also have his greatest strength in strength in strength at this time.

102. Action in a break-through battle.—If the attack develops into a break-through battle and the artillery advances, the same tasks fall to the various aircraft formations as in the advance and in the battle as are laid down above. The order for them to move forward must be given at the right time.

G. REARGUARD COMMUNICATIONS.

103. Importance of rearguard communications.—The greater the scale of the attack, the more do careful maintenance and allotment of road and railway communications, and the employment of large quantities of men and quantity of materials for the supply of the Army and for work of all kinds form an essential part of the preparation. When rearguard communications fail, especially when ammunition cannot be got up, reserves endangering the main battle are wholly operative and are ineffective.

104. Rearguard roads and railways must be equal to meeting the demands of the most intense traffic. They should be allotted at an early stage to Corps and divisions. Extension arrangements must be made at railheads to be able to deal with all possible requirements for unloading and transshipment. For this, and for issues at the dumps, the necessary staffs must be made available. Careful regulations must be made for traffic control at all dumps.

On narrow roads, in the zone nearest the front, the construction and marking of passing-places, and of diversion roads round villages, and the erection of conspicuous sign-posts are necessary conditions for the free working of traffic. It will frequently be necessary to order that certain roads must be used in one direction only.

During the last few weeks before the attack, all increased activity in construction of rail ways and roads which fall to become available for the use of the Army must be devoted from.

105. Ammunition and supply columns must be destined from the commencement of a division part in for an attack in ammunition and supply columns depend mainly on facilities for traffic, the condition of the battlefield, the nature and the direction of the attack. In deep attacks for a break-through, the requirements of a division may generally be taken at 3 or 4 ammunition columns (in addition

to the light ammunition columns and the battery columns), 3 or 4 supply columns, 3 or 4 motor transport columns and one field bakery column. Mobile engineer park, and bridging trains as required, should also be attached. Only a portion of these columns should be placed immediately under the orders of the division (see para. 24).

106. Labour troops.—The allotment of labour (Landsturm or labour companies) should be on a liberal scale, as the fighting troops must be exempt from leading detachments for special work.

107. Traffic control.—In deep attacks, each division in the front line should, where possible, have allotted to it *one through road, running well into the enemy's line*, and it should be responsible for its traffic control. The bringing up of its artillery and columns cannot be too carefully arranged beforehand, if it is to be carried out without a hitch.

If a second division is brought up afterwards in the same battle sector, Corps staffs must give special directions to ensure that there is no disturbance in the traffic of the division in line. It is often necessary to promissory and mark out cross-country tracks. *Overcrowding of roads, especially at narrow places, bridges, &c., leads to blocks and costly, therefore, to a breakdown in supply. The closest attention must be paid to preventing anything that is not indispensable being taken forward.*

108. Labour for constructing roads, etc., in captured territory.—In order to effect the junction between our own road and railway system and that of the enemy, a considerable number of labour companies should be held in readiness in addition to road construction and railway troops. Road and railway material should be dumped well forward at an early period, and screened from air observation.

109. Police arrangements.—Before, during and after an important attack, it is necessary for Corps and divisional staffs to issue complete *police regulations* for traffic control behind the line and for supervision of stragglers. For both these purposes, a considerable reinforcement of the military police is necessary. They should be provided with distinctive badges.

Roads should be placed under the supervision of energetic commandants, who require sufficient personnel to control traffic and maintain strict march discipline on the road (especially at narrow places, bridges, cross-roads, in villages, &c.). Mounted officers, non-commissioned officers and men, as well as cyclist units, are specially suitable for this work. Occasionally it will be necessary to employ strong detachments (Landsturm) to clear roads that are blocked. Supervision should be very strict after dark. Commanders of transport, who should have a sufficient number of mounted men to keep up communication with the front, must take care that there shall not even be a temporary block in the traffic anywhere. Halting columns must clear off the road and must not be allowed to stay in defiles. Hard roads should be allotted principally to wheeled traffic.

For the control of men coming back singly from the front, it is advisable to institute a *barrier line with sentries* (preferably along an existing line of obstacles) and to move this forward as the attack progresses. *Dug-outs in trenches captured from the enemy, cellars, farms, &c., should be frequently searched for stragglers.* It will be necessary to form collecting stations for stragglers and information centres.

110. For ammunition supply, see paras. 52 and 58. Ammunition staffs at each headquarters are generally indispensable.

111. Food supply.—Arrangement must be made from time to time for the issue of iron rations for men and animals.

During the first few days after a successful break-through, there will be little difficulty about supply. Troops will live on the enemy's stores. For later requirements, *supply columns* should be sent forward in good time, after the ammunition and engineer store columns.

Arrangements for sending forward *drinking water* must be made if necessary.

A *supplementary issue of forage* must be made in good time for the horses of the units which have taken part in a break-through.

Large stores of supplies captured from the enemy must at once be placed under guard and employed for general use.

112. Medical arrangements.—Execution of *casualty clearing stations* near the front, enlargement of *collecting stations*, bringing up *Army reserve companies, Army field ambulances, sector ambulance columns and ambulance trains* must be taken in hand as early as the importance of the attack requires. All units should be informed that columns and trains returning empty must, as a primary duty, take back wounded. *The number of dressing stations in dug-outs in our own forward area* must be increased and their positions made known to the troops.

113. Evacuation of prisoners and clearing the battlefield.—Fighting troops must not be burdened with the duty of evacuating prisoners and clearing up the battlefield. For the former duty, any available companies and Landwehr and Landsturm units, and for the latter, divisional salvage companies should be detailed at the proper moment.

FINAL REMARKS.

The great attack for a break-through requires that commanders and troops should free themselves from habits and customs of trench warfare. Methods of warfare and tactics have changed in detail. But the great military principles which formed the backbone of our military training in peace time and to which we owe all our great successes of the war, are still the old ones. Where they may have been forgotten, they must be again aroused.

(Signed) LUDENDORFF.

