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# TRANSLATION OF A GERMAN DOCUMENT.



MANUAL OF POSITION WARFARE FOR ALL ARMS.

PART 1a.

## GENERAL PRINCIPLES OF THE CONSTRUCTION OF FIELD POSITIONS.

*(3rd Edition: 15th August, 1917.)*

*(Cancelling the edition dated 13-11-16, which was translated and issued as S.S. 558.)*

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

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GENERAL STAFF (INTELLIGENCE),  
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## NOTE BY GENERAL STAFF.

1. The principal change in this 3rd Edition of the "General Principles of the Construction of Field Positions" is that it has been found that the defence must be conducted "not in lines but in defensive zones . . . distributed in depth" (which may amount to several kilometres) instead of, as in the previous edition, "a strongly constructed first position with plenty of depth . . . of several continuous but not parallel lines," with other similar positions behind it.

2. The defences will include:—

The *outpost zone*, to deny the enemy observation into the battle zone.

The *battle zone*, in which the really heavy hostile attack will be combated.

The *rearward zone*, to hold up an enemy who has broken through.

The battle zone and the rearward zone must be so placed that they are not liable to simultaneous artillery bombardment.

"The enemy who has broken through should eventually find himself surrounded in front and flank by fire trenches and obstacles, and it should then be possible to annihilate him by means of well hidden machine guns and trench mortars, and also by the guns told off to deal with ground inside our front line."

3. *Outpost and battle zones* are organized alike, except that in the latter the works should be more carefully constructed and more numerous. Each should consist of a "system of defensive works (not crowded together)—with gaps for counter-attack, obstacles and dug-outs . . . and, as regards the infantry position, a network of trenches (with short field of fire) composed of many continuous lines, irregularly traced 150 to 400 yards apart, with numerous communication trenches, . . . supporting points, holding on points and groups of dug-outs."

In the *rearward zones*, "simple works must suffice."

Machine guns and dug-outs form the framework of all defensive arrangements in depth, the former being placed for flanking fire so that every trench and every interval is under flanking and cross fire.

4. The sequence of work in preparing a defensive position is laid down as:—

- (i) Arrangements for bringing up material (food, railways, dumps).
- (ii) Dug-outs, flanking arrangements, observation and command posts.
- (iii) Obstacles and construction of signal communications.
- (iv) Earth works.

5. Greater stress is laid on alternative positions for guns and their use in the open with dug-outs for personnel and ammunition at suitable points; the shell-proof storage of ammunition; the organization of secure command and intelligence communications, and of arrangements for alarm.

6. The responsibility of the several staffs for the construction of the various portions of the defence is more clearly defined, *viz.*, Army and Corps for rearward positions, and divisional for the outpost and battle zones.

7. The importance of the improvement and maintenance of the road, tramway and railway systems, and of arrangements for traffic control during periods of pressure is more strongly emphasized; the necessity for correcting mistakes in siting and construction in the front zone, and the method of organizing shell hole positions are pointed out.

8. The preparations for the offensive include:—

- (a) Pushing forward of the front trenches.
- (b) Dug-outs and shelter trenches for the assault troops.
- (c) Improvement of communications.
- (d) Artillery and trench mortar positions.
- (e) Dumps.
- (f) Housing arrangements.

But, to secure surprise, "which is the most decisive factor in success," the extent of the work must be strictly limited and it must be concealed.

## I.—GENERAL PRINCIPLES

1. The construction of positions is of particular value to the *defence*.

The principal considerations as regards the defence in position warfare are—

- Economy of force,
- Diminution of one's own and increase of the enemy's losses,
- Utilization of the ground in such a way that conditions are rendered favourable to one's own troops and unfavourable to the enemy.

2. These dictate—*Distribution of the defence in depth and the conduct in general of fighting not in lines but in defensive zones.*

A defensive zone of this nature includes works for the infantry and artillery defence, for command and intelligence communications, as well as for care of the troops and for favourable conditions of life. It consists of a system of defensive works, obstacles and, particularly, dug-outs for men and ammunition, and is developed as regards the infantry defence—the infantry position—into a network of trenches composed of many continuous lines, irregularly spaced 150 to 400 yards apart, with numerous communication trenches connecting them together, with approach trenches leading rearwards and with supporting points, holding on points, and groups of dug-outs (see para. 11).

Utilizing all the natural advantages offered (villages, woods, quarries, sunken roads, etc.), the whole of the ground which the defender is to hold should be so organized for an *oblique* defence, *sector by sector*, that one or more deep fortified defensive zones are created, into which the further the enemy penetrates, the more difficulties and the more surprises will be met. The loss or abandonment of any particular part should not endanger the defence as a whole.

On maps of infantry positions, the forward limit should be clearly marked, and the depth of the complete defensive zone clearly indicated by colour or hatching.

3. Positions require careful construction. In ordinary trench warfare, continuous fire and communication trenches, good obstacles and dug-outs are sufficient to enable a position to be held on to by weak forces; in battle, also, they are indispensable for the proper preparation, shelter and supply of troops in the rearward lines, particularly when the front ones have become shell hole positions. Nothing but a well prepared position will ensure that the enemy has to waste time over preparations and to bring up more than normal forces and material.

4. Consideration of the effect of fire.—The resistance of a defensive zone cannot, however, be based solely on the strength of its organization; even one which is strong in itself must always yield in the course of time to very heavy concentrated fire of the enemy.

It is therefore most important to cause the enemy to spend his fire both in time and space. The more works, therefore, of all kinds that there are in and between the defensive zone, the more they are scattered and the less they are recognizable by the enemy's ground and air reconnaissance, the more difficult it will be for him to spot the important points, and the more concentrated his fire on them, and the more ammunition and time must be employed for the destruction of the defensive works. By this method of organization, the enemy will be deceived as to the relative positions of the various works; his fire will be mislaid and the garrison saved from the effect of his preparatory bombardment. Abundant use should be made of screens and dummy works. The inconspicuousness of all works from both ground and air becomes of decisive importance. The utmost stress must be laid on concealment from aeroplanes.

Exaggeration in the strength of particular works is harmful. When too much is demanded (e.g., too solid concrete buildings, too wide obstacles) there must be correspondingly fewer works built.

The use of labour for purposes that do not contribute to fighting ends, but merely make works look pretty or unnecessarily tidy, is forbidden.

5. The distribution of the troops.—Positions must be so constructed that they also permit of a distribution of the troops in suitable depth.

The front lines of the infantry position must be so organized and so manned with infantry and machine guns that the garrison is able to dealing with any surprise attack. The front trench will very rarely be held by ordinary trenches; in some cases they will be posts in front of it, in holes, saps and shell craters. The bulk of the garrison (including machine guns) will be sheltered in the rearward lines, in the ground between the lines, in the communication trenches and in ground adjacent.

Guns and trench mortars must also be distributed in depth outside the trenches.

6. The conduct of the fight.—As, even in the defensive, the fighting methods employed must be active and mobile, the troops must not be tied to the trenches.

This must be taken into account in the construction of the position.

The works must facilitate the cohesion, healing and supply of the troops, but must not, however, be crowded together. Command and intelligence communications and rearward communications must be particularly carefully constructed. There must be gaps between the works to permit of counter-attack. Alternative positions must be provided for all arms and also alternative command and signal arrangements.

## II.—DEFENSIVE ZONES

7. The defensive zone held in ordinary trench warfare.—In ordinary trench warfare, the front defensive arrangements of the infantry position must take into account current requirements; that is, they must meet with the smallest effective give security against surprise, and afford the garrison cover against observation and fire, and also conditions that make existence bearable (possibility of moving about, bringing up supplies, and shelter).

8. The outpost zone and the battle zone.—The situation of the front defensive zone will not always meet the demands of battle. Independently, therefore, of the location of the defensive zone held in ordinary trench warfare, the defensive zone (battle zone) in which it is intended to resist and repel really heavy attacks, must be selected in good time. This will be done without regard to abandonment of ground and solely on the considerations stated in para. 1.

Battle zones and the defensive zones of ordinary trench warfare may sometimes coincide. It is, however, preferable to utilize the latter as outpost zones and to organize them accordingly, and to select battle zones farther to the rear. In certain circumstances, it may be desirable to secure an outpost zone by fighting.

Outpost zones serve to deny the enemy observation into the ground on which the battle will actually take place, and to facilitate the construction of works and the organization of the defences in it. An outpost zone is favourably situated when it compels the enemy to throw in strong forces and to use much material to capture it, which will then not be available for the main attack. This attack should, moreover, be so delayed and hindered that it will not be possible to make the real preparations for it until after the outpost zone has been secured. In selecting the site of the outpost zone and in its development, the task it has to perform in this respect must not be overlooked.

Outpost zones and battle zones will lie, according to the ground, either immediately one behind the other and merging into each other, or there may be a larger or smaller distance between them. The former is more advantageous, so it facilitates command and the evacuation, at the proper time, of the front area.

There is no difference in principle between the organization of the outpost zone and the battle zone, except in so far as that the works in the latter should be more carefully constructed and be more numerous.

9. Rearward defensive zones.—Behind the battle zone, at least one rearward defensive zone is desirable. For this, the same general principles hold good. The distance between them should be such that a simultaneous artillery attack on both zones is impossible; it will therefore be not less than 9300 yards (5 km), measured from the front of the battle zone.

To the rearward defensive zones is allotted the task of holding up an enemy who has broken through the forward defensive zones, and the ground between them, on a broad front. Simple works must suffice in them at first.

Training grounds or practice works, made behind the front, should be so arranged, from a tactical point of view, that they can be utilized in the defensive system.

## III.—CHOICE OF DEFENSIVE ZONES.

10. The ruling factor in the choice of the general line of the positions and lines is consideration of the rearward communications, and of our own and the enemy's artillery. Field of fire is of minor importance.

The more the rearward lines the position are sheltered from the enemy's interference the easier is the maintenance of the fighting value of the troops, and their supply. If there are no natural covered communications available, plenty of approach trenches must be made.

1. Position on the Crests des Dunes



2. Example of a good reverse slope position



3. Ground on which a forward slope position is obligatory



The observation posts of the artillery, and the ground which offers artillery positions at favourable range and protected against ground and air observation, must be secured by the situation of the front infantry defensive positions. Conversely, the situation of these positions should ensure that the enemy cannot get good observation and has bad battery positions.

The most favourable position for defensive works is on reverse slopes close behind the crest line (reverse slope position). This is the best way to keep them out of sight of the enemy's ground artillery observation.

If, however, artillery observation and rearward communications make it necessary to put the front infantry line on the crest or on the forward slope (forward position), the other works must be placed farther back, in order that they at least may not be in direct view of the enemy.

It is not possible to decide on general principles whether the position on the forward or on the reverse slope is the better. The attached sketches provide some material to assist in coming to a decision in different cases.

If the slope is so steep that the defence line cannot be withdrawn behind the crest, the banking or retaining wall, such a position may be facilitated by constructing short lengths of trench on the reverse slope, and also by arranging flanking fire from guns, trench mortars, machine guns and rifles to cover every portion of the ground.

#### IV.—INFANTRY DEFENSIVE WORKS.

11. The infantry defensive system.—Infantry defensive works consist of trench systems, supporting points, holding points, simple shelters of all kinds, and groups of shelters. They will be protected by obstacles, as the situation and ground may require.

An infantry position will be constructed as a trench system of several continuous lines, irregularly disposed from 150 to 400 yards one from another. The lines must be connected together by plenty of communication trenches. Communication to the rear must be established by approach trenches, and these can never be too numerous. All the trenches must be so sited to the ground that, if possible, the enemy will not be able to look into them from any side, and that it will also be difficult for him to observe them from the air. A short field of fire is sufficient. Flanking fire is particularly effective.

Between the various lines and between and behind the trench systems, every sort of defence must be prepared and utilized. For this purpose, supporting points (large, often closed, works, utilizing villages, copses, etc.) and holding on points (small trenches, shell holes, ruins of houses, copes, hedges and such like) will be useful. Supporting points and holding on points should be gradually joined together by trenches, obstacles and approach trenches, so that a new trench system will be created.

Villages, even when well prepared for defence, require too many troops and are particularly good targets for the artillery. The tendency to exaggerate the importance of villages and the elaboration of their defences for the battle in position warfare must, therefore, be counteracted (cf. Part II, para. 58 *et seq.*). Villages will, it is true, retain their importance in quiet periods for housing troops, but their position to be housing purposes is also more easily carried out than the creation of new works in the open fields; but it is advisable to be cautious as regards including localities in the defence line, so that in no case may unnecessarily strong forces be locked up in houses-to-be-fighting-places.

All works behind the first line must be so sited that they will facilitate a *recapture* of the most forward parts of the position. Switches running diagonally across the front, supporting points and holding on points must be made to prevent the enemy approaching out and rolling up the defence, and surrounding the garrison from the rear, when parts of the front line have fallen. This is particularly important near the boundaries of sectors.

The enemy who breaks through should eventually find himself surrounded in front and flank by fire trenches and obstacles, and it should then be possible to annihilate him by means of well hidden machine guns and trench mortars, and also by the guns told off to deal with ground inside our front line.

The depth of a zone prepared in this way may amount to many kilometres; its limits must not be easily recognizable.

It is desirable that certain defensive lines should be assigned for the special protection of the artillery (artillery protective line).

In woods, if the trees have not been shot down, a system of block-houses, arranged in depth and mutually flanking each other, may be preferable to a trench system.

12. The points where machine guns are to be placed, and the dug-outs, form the framework of all infantry defensive arrangements.

13. Machine guns should be arranged in depth and placed for flanking fire in such a way that every trench and every point in the intervals before and behind the front line will be flanked and cross machine gun fire, without the enemy being able to discover whence the fire comes. It is often suitable, therefore, to sit them in low-lying, well-protected places.

There should only be a few machine guns in the front line. The machine guns behind, distributed chequerwise over the ground, must, however, be able to take part in the fight in the forward defensive zone, by either direct or indirect long distance fire. They should usually be employed by sections. Alternative positions must be provided.

Some machine gun sections or groups must be so entrenched that they can be used specially for the engagement of low-flying aircraft.

14. Dug-outs should be sited in concealed positions and distributed in such a way that units can be kept together and easily supplied. Groups of dug-outs, therefore, are often convenient. Every effort should be made to accommodate the whole of the front line troops in the dug-outs except in the forward posts (see para. 15), and also the supports and reserves, if they are within range of the muzzles of the hostile artillery fire.

All means should be used to make the structures *shell-proof*, i.e., proof against continuous fire from 6" calibres; besides this, however, efforts should be made, particularly in rearward parts of a defensive zone, to make the shelters *heavy shell-proof*, i.e., proof against continuous fire from 8" calibres and heavy trench mortars, and single hits from heavier guns.

Shell-proof and heavy shell-proof cover is best secured by means of deep mine, or concrete dug-outs. The walls of the former prepared by the former prepared by concrete, or concrete, or better still, reinforced concrete dug-outs ensure that the garrison can quickly reach the shelter.

In the forward lines of the positions, great stress must be laid, in the design of the dug-outs, on rapid readiness for action; protected look-out posts of small size and not very deep (constructed of concrete, iron and timber) are suitable. Large and deep mined dug-outs in the front line are *man-traps*. They should be destroyed at once as soon as the enemy has shot away the wire.

In the interval between the lines and farther to the rear, the dug-outs may be larger (for 9 to 15 men); there is no danger in their being deep. As, however, the rear lines may become front defensive lines in the course of a fight, all lines should from the outset be provided with protected look-out posts (see para. 15). The larger the dug-outs, the more necessary is it for them to have convenient, unenclosed and well-protected exits. Underground communications between dug-outs and connections to the communication trenches are of advantage.

It is of great importance to make arrangements for the direct defence of dug-outs by constructing observation posts, machine gun emplacements, and trench blocks, and also erecting obstacles, which must not, however, betray the position of the dug-outs.

15. Observation.—Special care must be taken to ensure the possibility of observation of the foreground in front of and within the defensive zone, even under the heaviest fire, so that hostile infantry attacks may be recognised in time. This is of the utmost importance.

Close up to the enemy, even concrete observation posts cannot be relied on. They afford no certainty that the hostile assaults will be recognised in time; the construction of some of these observation posts is, therefore, necessary even in rearward areas, so that observation from the rear can be established. The existence of such observation, however, does not absolve any unit from the responsibility of ensuring its own security; this can be done in certain circumstances by observers in the open in shell holes.

16. Obstacles.—Numerous obstacles disposed over the whole depth of the defensive lines, like the muzzles of a net, are indispensable. They should be arranged irregularly in several belts, with intervals between them, and with due regard to the position of artillery and trench mortars, and in such a way that they are not easily recognizable and cause the enemy to stop at any point if they are not prepared to make sacrifices. Obstacles should be so sited that no deductions as to the position of the other defensive works can be drawn, and they do not hinder the freedom of movement of the fighting troops. Obstacles must be under observation and be protected by fire.

17. Trenches.—Particular attention should be paid that the trenches also are so adapted to the ground and soil that they are as far as possible invisible. From the same point of view, in constructing a trench position from shell holes, the trench should be as much like the crevices as possible.

Deep and narrow trenches give very good cover, but they are not convenient for traffic, and are quickly blocked by earth if a shell falls near them. They are suitable only where it is not intended to stay long, and where bombardment by masses of heavy artillery is not probable.

As a rule, therefore, fire and communication trenches should be made deep and broad, with sides not too steep; all earth thrown up should be kept low and separated from the trenches by wide berms. The seating of trenches should be limited for the amount of labour involved is out of all proportion to the utility. Too much attention to keeping trenches neat is forbidden. The labour necessary for this would be better devoted to new work.

Special measures may have to be taken if the water-level in the country is high. Particular attention must be paid to the drainage of trenches.

To repel an assault, the infantry must use rifles and machine guns over the parapet. All trenches, even communication and approach trenches, must be arranged in suitable places for fire to the flanks, and also so that troops can climb quickly out of them (sortie ladders).

All fire, communication and approach trenches must, moreover, be accurately marked with coloured signs, and arranged, etc., so that next troops (reserves, labour units, medical personnel, etc.) may be able to find their way at any time.

18. Underground communications.—In special cases, underground communications (tunnels or subways) may be made instead of approach trenches, to facilitate traffic inside the defensive zones and to make possible even during continuous heavy bombardment, if they are used, at the same time, as assembly places for the reserves; they must be provided with numerous exits and shafts for ventilation purposes. In the neighbourhood of the front line, subways should be regarded in the same way as deep mined dug-outs (see para. 14).



## V.—EMPLACEMENTS FOR ARTILLERY AND TRENCH MORTARS.

19. The artillery requires good shelters, suitable to the ground, for ammunition, men and guns, and also for command and observation posts, and the signal communications. The whole tactical distribution of the artillery must be organized in a considerable depth.

Most important of all is the construction of numerous dug-outs for the shell-proof accommodation of ammunition. It is forbidden to store too much ammunition in one place. The dug-outs must, therefore, be scattered. Shell-proof ammunition shelters are also desirable in the neighbourhood of positions for reinforcing batteries and of alternative positions, and also for any positions which may be occupied from time to time by batteries or guns shifting from place to place, without any previous preparations having been made.

Similarly, shell-proof and heavy shell-proof dug-outs for the personnel are required next.

The emplacements themselves must be inconspicuous, with irregular intervals between the guns. They must be carefully masked and camouflaged.

In battle, and for special tasks, it is not always necessary that the alternative positions should have been prepared in advance. In many cases, the only preparation required is the survey of the battery positions and the inconspicuous arrangement of dug-outs for ammunition and personnel. Well-built gun emplacements are easily and quickly reconstructed.

The ground observation posts, which should be prepared in sufficient number, must be particularly well hidden and made as far as possible heavy shell-proof. A large number in one place is to be avoided. Observation posts in the infantry line, or close to it, are generally destroyed before they are of any use. The most important observation posts must, therefore, be so far back that they are not exposed to fire directed on the front position.

Preparations for bringing artillery reinforcements into line should be made; the most important work is the provision of command posts and observing stations. The alternative positions can be utilized for the purpose.

For command posts, see para. 21, for signal communications, para. 23.

Every battery, and also command and observation posts, must be organized inconspicuously for close defence.

20. Trench mortars.—Similar arrangements to those for the artillery are required for trench mortars. The manner in which they are distributed corresponds to that of the machine guns, *i.e.*, chequerwise and scattered. Their organization in groups should, however, be made as easy as possible. Places that will probably be heavily shelled must be avoided. Inconspicuous alternative positions are of particular importance.

The light *Mineuswerfer* employed to repel an assault must be dug in so far to the rear that they escape hostile artillery fire directed against the front part of the defensive zone.

On the other hand, the *Mineuswerfer* (especially medium or heavy), which are intended to destroy the enemy's works, must be brought up so far to the front that their targets are at favourable ranges.

To construct shell-proof and heavy shell-proof emplacements for trench mortars, takes up a very great amount when the trench mortars open fire, the emplacements will generally be quickly located by the enemy and destroyed. The construction of several, even if they are weaker emplacements (often in the open) is, therefore, preferable to that of a smaller number of strong ones.

The principal protection against hostile artillery fire is to be found in mobility.

## VI.—OTHER WORKS.

21. Command posts must be located in shell-proof, or better still heavy shell-proof dug-outs. They must be so situated that the commanders have an uninterrupted view forward, rearward, and to the flanks to the next command posts, and over the country round, or at least can keep up communication by means of messengers.

Attention should be paid to the accommodation of special reporting detachments and assault troops in the neighbourhood of the command posts.

22. Observatories for the observation officers of higher staffs are to be pushed forward to suitable points.

23. The organization of command and intelligence communications and of the arrangements for giving the alarm requires carefully considered measures.

Numerous telephone systems are required. Open cable trenches, too deep, have proved most reliable for the leads. The exchanges should, if possible, be in heavy shell-proof dug-outs.

In addition, special dug-outs (usually close to headquarters) are necessary for wireless, for both land and air service, and for signal and power buzzer communication. (See also "Manual of Position Warfare," Part 8.)

24. Road, tramway and railway systems.—The improvement of the road and railway systems for the transportation of ammunition, supplies, engineer material, etc., is of exceptional importance in the construction of positions.

The traffic system for the periods of greatest pressure must be prepared in good time. Standard gauge and narrow gauge railways, field railways and tramways, with sufficient unloading stations, must be got up as close as possible to the most forward positions of all arms. The roads must be numerous, separate ones for up and down traffic are desirable.

For roads that are under fire, deviations should be provided. Plenty of sign-posts is an essential feature in facilitating traffic and preventing blocks.

Continuous inspection of the state of the roads and railways, and the collection of repair material beforehand, are indispensable. If insignificant damage is not dealt with at once, it often develops into irreparable harm.

25. Dummy defences and screens (see para. 4) are very valuable for misleading the enemy. The troops must be trained to take every opportunity of erecting them. The intention of misleading should not, however, be too obvious.

26. The improvement of the conditions of living of the troops belongs in a general way only to the construction of positions. Its importance in relation to the maintenance of the health and moral of the men must not be underestimated.

The matters in question are—Erection of huts, protection against cold and the results of heavy rain, details of provisions, improvement of the roads by which supplies and stores are brought up, etc.

## VII.—EXECUTION OF THE CONSTRUCTION OF POSITIONS.

27. Constructional plans.—In the construction of positions, the decisive factors in securing good results are careful planning of work and the suitable distribution of the men and material available. If these are neglected, very slow progress will be made in spite of a large expenditure of stores and time. If attention is paid to them, good and numerous works will appear in an extraordinarily short time.

For all construction of positions, therefore, after careful reconnaissance and calculations, comprehensive plans of the work to be undertaken, covering a considerable period ahead, must be prepared. In doing so, however, an immoderate use of paper work is to be avoided. Sudden changes in constructional plans that have been settled, and also sudden removal of the labour employed, always lead to very material delays and reduction of the work done.

Should the officers in charge of the work be changed, the newcomers must not be permitted to introduce their own tactical ideas into the work if they happen to differ from those of their predecessors.

28. Geologists.—In good time, before beginning the work of construction, the geologists attached to the survey sections should be consulted. In many cases they can effect considerable economy of labour. The most important points for their activity as regards the troops in the selection of suitable strata for work (*e.g.*, in dug-out construction) are the discovery of building materials (*e.g.*, gravel), and assistance in drainage and provision of water.

Surveys must also be carried out in good time, as well as the preparation and production of numerous maps and sketches for all arms.

29. Supervision of the work.—On principle, the staffs of tactical formations (Armies, Corps and Divisions) are in charge of the construction of positions. For works that are not carried out by the fighting troops (rearward defensive zones), special construction staffs are desirable; they should be well provided with personnel so that the technical distribution and supervision of the labour allotted is possible. In places also where the troops are often relieved, it is desirable to have local officers permanently in charge, in order to ensure continuity of work (*e.g.*, in the construction of groups of dug-outs on battle fronts).

30. Formations charged with the work.—The front and very often the second defensive zone also, so far as it lies within range of the mass of the enemy's fire, must be actually built by the fighting troops, with the assistance of reserves (pioneers, Landsturm) and special labour troops (labour battalions). The division occupying the front zone is generally placed in charge of the work (*see*, however, para. 29).

Further to the rear, the Army or Corps staff takes charge. For the execution of the work, only labour formations will as a rule be available; important fronts they will be superintended and assisted by reserves and pioneers, Landwehr and Landsturm. The troops in front must be kept informed of the progress of the work.

31. Construction of positions during a battle.—Mistakes in siting and construction will often be found in the front zone, if it has been captured and the defences have been prepared in action. These mistakes must be remedied by suitable work in quiet times.

During heavy fighting, the front zone rapidly becomes a shell-hole position. Attempts at reconstruction during the battle are, as a rule, useless. There is nothing to be done during heavy fighting but to work exclusively on the rearward positions. After the fighting has died down, either dug-outs and obstacles may gradually be made in the cratered area and the shell holes unobtrusively covered up by communication and fire trenches, or, as this work is very troublesome and always makes very slow progress, labour and material may, even after the conclusion of the fight, be employed only further in rear. In the latter case, the surrender of the cratered area, should heavy fighting be renewed, must be reckoned with. In making the



decision, general principles only, particularly those in para. 1 and para. 7 *et seq.*, should be taken into account. *An early decision must be come to, so that fighting power, labour and material may not be expended in vain.*

**32. Sequence of work.**—The construction of any position is begun—after the plans have been settled, *see para. 27*—by making every arrangement to ensure the bringing up of engineer material and other matters required. The improvement of the road and railway system is an essential condition; dumps to provide for the sudden large demands should also be accumulated, and the housing of the troops improved in good time.

*As regards the actual constructions, dug-outs, flanking arrangements, observation and command posts are the most important. Then come obstacles and the construction of signal communications. The actual earth works come last. If trenches are not constantly maintained in good condition, for which large working parties are required, they rapidly fall into decay. The construction of the actual earth works must, therefore, be omitted either wholly or partially in rearward defensive zones, and frequently also in the rearward parts of the battle zones.*

In constructing positions, attention must be paid to the *seasonal changes*. Approach trenches should, for instance, not be run along the bottoms of valleys, on account of the water, but along the sides; drainage arrangements should be laid out during the dry season of the year; the fitting up of stoves should be attended to in good time.

### VIII.—PREPARATIONS FOR ATTACK.

**33.** The preparations for the offensive must also include the construction of field works based on a definite plan.

These preparations include:—

(a) Pushing forward of the front trenches to within assaulting distance; removal of obstacles and marking of lanes.

(b) Construction of numerous dug-outs and shelter trenches for the attacking troops and their reserves.

(c) Excavation of numerous communication trenches right up to the front line. Increase of traffic and signal facilities.

(d) Construction of artillery and trench mortar positions for the deployment of guns and trench mortars. Preparation for shifting these weapons to the front line.

(e) Formation of dumps for ammunition, trench stores, and supplies; enlargement of engineer dumps.

(f) Comprehensive schemes for housing and providing for the troops, road building, extension of the standard gauge and field railways and tramways.

The details will vary in different cases (ground positions already constructed, strength and activity of the enemy and our own troops). In order to secure surprise, which is the most decisive factor in success, the extent of the work must be strictly limited and every effort made to conceal it.

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GENERAL PRINCIPLES OF THE CONSTRUCTION OF FIELD POSITIONS

(Translation of a German Document.)

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N.B.—The original is marked  
"NOT TO BE TAKEN INTO THE FRONT LINE."  
"SECRET"

MANUAL OF POSITION WARFARE FOR ALL ARMS.

Part Ia.

GENERAL PRINCIPLES OF THE  
CONSTRUCTION OF FIELD POSITIONS

(Allgemeines über Stellungsbau.)

13th November, 1916.

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GENERAL STAFF (INTELLIGENCE),  
GENERAL HEADQUARTERS,  
6th May, 1917.

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## GENERAL PRINCIPLES OF THE CONSTRUCTION OF FIELD POSITIONS.

1. Field positions when constructed afford considerable advantages to the defence. The important points to be borne in mind by the defence in a war of positions are:—

Economy of forces.

Diminution of losses and increase of enemy losses.

Utilization of the ground so that conditions favourable for combat are obtained, while they are made unfavourable to the enemy.

It is a ruling principle that the ground to be held must be fortified in such a way that an obstinate defence by sectors is obtained, and to such a depth that the loss of, or withdrawal from parts of the position does not endanger it as a whole. Full use must be made of any natural advantages (villages, woods, quarries, outcrops).

2. A strongly constructed first position with plenty of depth must be formed close up to the enemy.

It consists of a trench system of several continuities but not parallel lines, at 100 to 200 yards distance one from another. The lines are to be connected by an ample number of communication trenches. Communication rearwards is ensured by approach trenches, which can never be too numerous. All the above trenches are to be so adapted to the ground, that, as far as possible, the enemy cannot see into them from anywhere. A short field of fire is sufficient.

Behind the first position at least one rearward position should be prepared. The same general principles hold good for this. It should be at such a distance from the first position that a simultaneous artillery attack on both is not possible. The distance will, therefore, vary from 2½ to 4½ miles.

The function of the rearward positions is to stop an enemy who has broken through the front position and the intervening ground on a broad front. In these positions, fewer lines of trenches than in the first will suffice.

Between the various lines of each position, between the positions and behind the rearmost position, every suitable spot must be utilized for defence and be prepared beforehand for this purpose. Such places are called strong points (large defended areas including villages, coves, etc. which may often be closed) and 'holding on' points (small trenches, craters, ruins of houses, thickets, hedges and such like); the strong points should, if possible, be gradually joined up by fire trenches, obstacles, and approach trenches, to create new lines and so form a broad fortified zone. In woods, blockhouses may be useful.

It may be found convenient to allot some of these lines for the special protection of the artillery.

If no natural covered ways are available, the construction of approaches to the position from the rear is essential for the maintenance of the fighting force at its proper strength.

Training grounds and works dug for training behind the line should be laid out in accordance with the tactical situation, so that they can be absorbed into the general system.

3. To render reconnaissance by the enemy difficult and to lead him into error, thus forcing him to a wasteful expenditure of trench mortar and artillery ammunition, it is advantageous to scatter over the country a large number of defences (including dummy defences) that are not easy to recognise.

4. The number and strength of the defences of the positions, lines and strong points depend on the degree of danger threatened and the working parties available.

The first position, and the defences of the ground between it and the second, should be constructed by the garrison allotted to the sector and its reserve, that is, by the troops themselves and the labour units attached to them; the rearward positions by other reserves and labour units, under special superintendence detailed permanently to the area and independent of the fighting troops.

The improvement of the positions must be carried on uninterruptedly, even during a battle. The fighting troops in front must be kept constantly informed of the state of the rearward positions behind them.

5. The ruling factors in deciding on the general lie of the positions are the rearward communications, and the observation facilities for our own and the enemy's artillery. Field of fire is of minor importance (see para. 2).

The more the roads leading into the position are sheltered from the fire of the enemy, the easier is the maintenance of the fighting value of the troops and their supply.

The front infantry fighting position must be sited with a view to protection of the artillery observation posts and also any ground which offers sheltered artillery positions with suitable range, well protected against air observation.

### NOTE BY GENERAL STAFF.

1. The new and entirely re-written edition of the introductory remarks on the construction of positions, though containing nothing not already known, is a concise statement of the present German principles of position warfare.

2. The new features in the text are:—

(a) Great insistence is laid on organizing in depth, and in addition to constructing several continuous lines, occupying and preparing every suitable spot between and behind them that can be utilized for defence, from a village to a shell hole or hedge. Among these localities a number of dummy defences are to be scattered, to mislead the enemy's artillery and cause a useless expenditure of ammunition.

(b) Small covered posts, but no deep dug-outs, are permitted in the front line. All lines are to have such posts, and in the case of a rear line becoming a front line, the deep dug-outs are to be evacuated.

(c) Subways receive commendation.

(d) A special paragraph is devoted to preparations for attack from a position.

(e) A distinction is drawn between shell-proof (*schussicher*) and bomb-proof (*bombensicher*). See para. 11.



The most favourable position for a defensive line is on a reverse slope, close behind the crest line with only a short field of fire. This is the best way to keep it out of sight of the enemy's ground artillery observation.

If the front infantry line must be put on the forward slope in order to secure artillery observation, the 2nd and 3rd lines of the first trench system must be kept back, in order to shelter these lines at least from the direct view of the enemy.

If the slope is so steep that the defence lines cannot be withdrawn behind the crest, the holding or recapture of such positions must be facilitated by constructing short lengths of trench on the reverse slope, and also by arranging flanks to cover every position of this ground.

In laying out lines of defence, the flanking effect of our own artillery must be taken into account.

6. Machine gun positions and dug-outs form the framework of all infantry fighting lines. A hundred yards or less is sufficient frontal field of fire. Machine guns should be in concealed emplacements; they must outflank the obstacles, the space in front of the obstacles, and the ground between different lines and positions, from higher ground if possible. They must therefore be scattered. The few guns used in the front line must endeavour to increase their power by mobility.

Some machine guns of the back line must be able to deal with low-flying aeroplanes.

**Dug-outs** (see para 11) must be sited and ordered as to concealment so that they may escape effective artillery fire, thus maintaining the fighting force of the inmates. The lay-out of the trenches and obstacles is governed by the sites for flanking machine guns and the position of the dug-outs.

7. The retaining power of a position must not depend solely on the strength of the first line, for this will always be partially sooner or later to intense bombardment. The rearward defences, however, can be exposed without harm from the effects of hostile fire.

**In distributing the troops and laying out the position, the following must be taken into account:**

The first line must be constructed in such a manner, and provided with infantry and machine guns on such a scale that the garrison is equal to dealing with any surprise attacks.

The bulk of the garrison (including machine guns) must be accommodated in the rearward lines in the ground between the lines, in the communication trenches, and in the country behind the first position.

Similarly, the strength of construction employed in the rearward lines, and particularly of the emplacements, dug-outs, etc., must be appreciably greater than in the front line. All defences behind the first line must be sited to facilitate an eventual recapture of the forward parts of the position. Cross switches, strong points and "holding on" points must be arranged to prevent the enemy spreading out, rolling up the defence and surrounding the garrison from the rear, even though parts of the front line have been lost. This is particularly important near the boundaries of sectors. The enemy who has broken through must eventually find himself encircled on front and flank by fire trenches and obstacles, and then it should be possible to annihilate him with well hidden machine guns. (See paras. 2 and 4.)

8. Deep rear trenches give very good cover; but they are not convenient for traffic and are quickly blocked by earth falling in. They are suitable only where it is not intended to stay long, and where bombardment by heavy artillery in great strength is not probable.

As a rule, therefore, fire and communication trenches should be made deep and broad, with sides not too steep; all earth thrown up should be kept low, and separated from the trenches by wide berms. The siting of trenches should be limited, for the amount of labour involved is out of all proportion to the utility. Too much attention to keeping trenches neat and tidy is forbidden; heavy machinery devoted to new work. If the water level in the country is high, special measures to deal with it may be necessary. Great attention must be paid to the drainage of trenches.

Communication and approach trenches should be prepared at suitable places for flank defence; leaders should be arranged to ensure that the fire step can be quickly manned, and the defences should be strengthened by the use of obstacles.

All fire, communication and approach trenches should be carefully marked with coloured sign boards, sign posts, flags, etc., so that troops (reserves, labour, and medical personnel, etc.) unacquainted with them may be able to find their way about at any time.

9. Special care must be taken to ensure the fire step, so that hostile infantry attacks may be recognised in time.

Observers in the open in the front line quickly become casualties; close up to the enemy even concrete observation posts cannot be relied on to resist; they afford no certainty that a hostile assault will be recognised in time: some observation posts must, therefore, be constructed on the ground behind the front line.

10. To repel an assault the infantry must use rifles, machine guns and automatic rifles over the parapet. The shorter the distance from the enemy, the less will be the value obtained from machine guns placed in the front line.

11. Splinter-proof constructions have proved actually harmful. They are not only fail to give protection, but block the trenches with their debris.

Every means must be used to provide shell-proof shelter, that is, protection from continuous shelling by 6-inch guns; cover and above this, every effort must be made, particularly in rearward lines, to secure bomb-proof shelter, that is, protection from continuous shelling by 8-inch calibres and heavy trench mortars, and single hits by heavier guns.

Shell-proof and bomb-proof protection is best obtained by deep mined dug-outs or concrete constructions. The former have the objection that their very depth prevents the garrison getting out rapidly, and they are noisy, or, better still, reinforced concrete shelters ensure that the inmates can get into action quickly.

In building dug-outs in the front lines of positions, the main point to be borne in mind is that the garrison, which should be kept small, should be able to reach the fire step (see para 7); protected posts for a few men, and not very deep (constructed of concrete, iron and baulks) are suitable.

In the rearward lines, in communication trenches, and in the ground between the lines, the dug-outs must have larger capacity (1 to 2 groups, i.e. 8 to 18 men), and there is no danger in making them deep. As any line may in the course of fighting become the front line, all lines should from the outset be provided with protected posts. The larger the dug-outs, the more necessary it is for them to have convenient, concealed and well protected exits. Underground communications between dug-outs and connections to the communication trenches are of advantage.

It is of great importance to make arrangements for the immediate defence of the dug-outs by constructing observation posts, machine gun emplacements and trench blocks, and also by erecting obstacles.

On quiet fronts if time is available, larger dug-outs may be constructed even in the front lines, as they contribute to the comfort of the garrison. They must not, however, be used in battle or under intense bombardment, as no reliance can be placed on the garrison getting out quickly.

12. Where the ground permits, underground communications (subways) can be constructed. They facilitate traffic to the positions and the various lines, and allow it to be carried on even under continuous heavy bombardment. They are valuable as places of assembly for reserves.

13. Reliable obstacles must be provided for every line, switch, strong point, and "holding on" point. As they may be exposed by heavy artillery and trench mortar fire they should not be laid out in regular lines, and should be erected in several belts with spaces between. The obstacles of the back lines should be so arranged that counter-attacks across the open are still possible.

14. The artillery must be placed at suitable ranges from the enemy, having regard to its tasks in battle. It must be able to fire well into the enemy's ground. The long range of our guns ought not to lead to the artillery being placed too far to the rear. On the other hand, batteries should not be placed in positions which are in the zone of fire directed on the infantry. Cover, well adapted to the ground and, particularly, shell-proof and bomb-proof shelters for the detachments and ammunition are necessary.

Battery positions must be irregularly situated with irregular intervals between the guns. The guns must be masked or be in concrete emplacements. Shell-proof and bomb-proof shelters for detachments and ammunition are necessary. Every battery must be organized for close range defence. Obstacles, which must not disclose the position of the battery in situ, must be provided. Alternative positions are necessary.

Ground observation posts must be particularly carefully hidden, and of bomb-proof construction. Observation posts in the infantry line or close to it are generally destroyed before they are of any value. The most important observation posts must, therefore, be so far back that they are not exposed to fire directed on the front position. Reserve and emergency observation posts are to be provided in ample number.

Preliminary measures for the deployment of artillery reinforcements must be taken; command and observation posts should receive attention first. The alternative positions can be utilized.

15. Trench mortars should be provided with accommodation similar to that of the artillery (fire positions, observation posts, cover for detachments, ammunition stores constructions).

It is not desirable to site emplacements actually in an infantry fire position.

The light *Misenerfer* should be used to repel an assault to avoid being dug in so far back that they are not exposed to hostile artillery fire directed on the first position.

On the other hand, the *Misenerfer* (for preference medium or heavy) detailed to deal with the enemy's defences, must be so well up that they are within favourable range of their targets.

\*For definition see para 11.



Shell-proof and bomb-proof emplacements for trench mortars take an excessively long time to construct. Moreover, directly they are used, they are detected by the enemy and destroyed. The construction of a large number of weak emplacements (alternative positions) is, therefore, preferable to a small number of strong ones. Security against hostile artillery is mainly to be found in mobility (change of position).

The employment of medium and heavy *Mineenferer* is easier if they are sited for long range use.

16. Particular attention is to be paid to the proper storage of all kinds of ammunition. Small arms ammunition and hand grenades, for which wooden boxes and tin cases protected against damp are provided, are to be stored in recesses in the front side of the trenches or other protected places in the fire position. Artillery and trench mortar ammunition (trenches or other protected places) is, if possible on steep reverse slopes, cartridges and shells in separate chambers. Too much ammunition should not be stored in one place, it is better divided between a number of ammunition dug-outs. Ammunition should never be kept in the open in the immediate vicinity of guns or trench mortars.

17. The battle headquarters of sector and sub-sector commanders are to be located in shell-proof or, better, bomb-proof buildings. They must be so situated that the commanders have an uninterrupted view forward, backward and to the flanks to the next command post, and over the country, or at least can keep up communication by means of messengers.

A sufficient number of observatories for the observation offices of the higher staffs are to be pushed forward to suitable points.

18. The arrangements for the circulation of information between the front and the higher command posts require careful consideration.

Numerous telephone lines are necessary. The artillery circuits must be quite separate from others. Communication to the long range guns is to be provided, so that their fire co-operation is possible.

Open cable trenches have proved to be the best. The maintenance of communication over wires, nevertheless, cannot be depended on with any certainty. The employment of other means (lamps, projectors, dars, wireless and other signal apparatus, pigeons, etc.) must, therefore, be thoroughly and comprehensively taken in hand. The introduction of trench wireless sets has made the construction of special dug-outs necessary at the command posts of battalions and higher formations.

Reconnaissance should be made to ascertain where visual signalling communication can be employed.

Special attention should be devoted to the arrangement of a system of communicating information of air attacks.

Alarm signals (bells, gongs, sirens, etc.) have proved very useful for alarming garrisons. Alarm arrangements depending upon wires have generally been shot away before they could be of use.

19. Dummy defences and screens are very valuable for misleading the enemy. They must, however, be constructed so that the intention of misleading is not immediately apparent.

20. Although the improvement of the conditions of living of the troops is connected with the construction of positions in a general way only, its importance in relation to the maintenance of health and the moral of the man, should not be under-estimated.

The matters in question are:—erection of huts, provision of water, improvement and increase in number of roads, construction of bridges and tracks.

21. The construction of light railways and tramways for the transportation of ammunition, supplies, building materials, etc., to the most forward dumps is specially urgent. Only with such assistance can the troops be provided with what they require. Horses transported by itself is insufficient.

22. Should it happen that new positions must be created under fire during a battle, the immediate necessity is a first line with an obstacle, to be held by a small garrison, and cover for supporting troops and reserves, which should be kept close to the line. Distribution in depth, as in the deliberate construction of a position, is desirable.

The order in which work should be done on a new position beyond range of the enemy's fire is as in para. 23.

23. The construction and maintenance of extensive positions require a great deal of labour. On back lines and positions, therefore, on account of the want of this, it will often be necessary to be contented with marking out the trenches and the trace of the wire system behind the position, and with constructing the framework only of the position—first, the flanking arrangements and the dug-outs, next the observation and command posts and the obstacles, and then the ammunition depôts, drainage system, etc. The actual digging of the fire and communication trenches must often be wholly or partially postponed.

Positions that are not looked after from time to time fall rapidly into decay.

New positions must be constructed on definite plans after careful reconnaissance, and old ones renovated on the lines given above. A good output of work depends on skilled supervision and well organized distribution of the working parties. In laying out and constructing positions, the wet season must be taken into account, e.g., approach trenches in valleys should be taken along the side and not down the bottom; the drainage system should be elaborated in good time during the dry season.

24. Preparations for an attack must include the construction of a well organized and extensive system of positions.

These preparations comprise:—

(a) Pushing forward of the front trenches to within assaulting distance; removal of obstacles and marking of lines.

(b) Construction of numerous dug-outs and shelter trenches for the attacking troops and their reserves.

(c) Excavation of numerous communication trenches right up to the front line.

(d) Increase of traffic and signal facilities.

(e) Construction of artillery and trench mortar positions for the deployment of guns and trench mortars. Preparation for shifting these weapons to the front line.

(f) Formation of dumps for ammunition, trench stores, and supplies; enlargement of engineer dumps.

(g) Comprehensive schemes for housing and providing for the troops, road building, extensions of the normal gages and light railways and tramways.

Details will vary with circumstances (ground, available positions, strength and activity of the enemy and of our own troops).

(Signed) v. STEIN.

BRUXELLES, November, 1916.

War Ministry.

\* For definition see para. 11.