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INSTRUCTIONS

CONCERNING

BATTLE MAPS

(Translated from the French edition of 1916)

ARMY WAR COLLEGE

MAY, 1917

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WAR DEPARTMENT,
WASHINGTON, MAY 23, 1917.

The following instructions concerning battle maps are published for the information of all concerned.

[2605615, A. G. O.]

BY ORDER OF THE SECRETARY OF WAR:

TASKER H. BLISS,
Major General, Acting Chief of Staff.

OFFICIAL:

H. P. McCAIN,
The Adjutant General.

INSTRUCTIONS CONCERNING BATTLE MAPS.

FEBRUARY 14, 1916.

Present instructions are for the purpose of defining the nature and object of the battle maps of different scales and of regulating their preparation and use in the armies.

This repeals, in so far as it concerns battle maps, properly so called, "The Instructions on the Organization of Heavy Artillery Fire and the Preparation of Battle Maps for Fire," of November 10, 1914. These instructions had laid down the first principles for the preparation of battle maps, but they had considered their use principally for artillery fire.

Experience had rapidly led to the modification and enlargement of this first idea. It has been found necessary to prepare battle maps in various scales in different forms and to give them to all branches of the service, the staffs, and the commanding officers of all grades. They have been found indispensable for the preparation and the execution of attacks. On the other hand, the uniform organization of our front has necessitated the preparation of special maps permitting the details of our own works to be shown, so that, finally, in place of a single plan, drawn up first and foremost with a particular end in view—i. e., battle map of fire—we have been led by force of circumstances to prepare various maps satisfying the best known needs. These are designated more commonly by the name "plans directeurs" (battle maps). This term applies better, in general, to their actual use and corresponds especially well to the use which has been made of them by the commanding officers in the direction of operations.

The degree of precision demanded in the battle maps, the number and variety to be furnished the armies, require that their preparation be assigned to a special unit, supplied with matériel and trained personnel. In the actual organization of armies this task can only be accomplished by surveyors and "topographical

sections" (les Groupes de Canevas de Tir et le Service Geographique de l'Armee). Nevertheless, it has been considered indispensable that the work executed by the surveyors of the Army be associated with the Army corps, and with this end in view there have been organized topographical sections of the Army corps.

Recent instructions for the surveyors and topographical sections outline their respective duties. Technical information is furnished at greater length in publications referring to the preparation and finish of battle maps that one or the other unit has to provide. However, in so far as concerns the special publications for the surveyors, it is sufficient to give a simple outline, for their experience has been great and of a technical nature; besides, more than an outline would be superfluous, for the surveyors generally are officers having the necessary knowledge and experience in these questions.

Aerial photography has a place of the first importance in tracing the enemy's position. The essential principles of photographic map making have, therefore, been presented in this instruction, but in as simple a form as possible and without going into a thorough investigation of them.

I. NATURE AND OBJECT OF BATTLE MAPS (PLANS DIRECTEURS).

Battle maps are those of large scale on which are shown enemy troops and, in certain cases, our own defensive and offensive organizations. These are made at army headquarters by the surveyors and published through the "topographical section." They have an official character and carry the same legend as the French official map. They take precedence, to the exclusion of all other documents, for all the names to be employed in orders, instructions, and reports.

1. ORDINARY BATTLE MAPS.

Battle maps showing only the trace of the enemy's troops are made, as regards scale and size, according to the following types, each of which is adapted to the particular requirements of the commander, the staffs, or of the different branches of the service.

The battle map, scale 1 to 20,000, or "battle map" properly so called, is designed especially for the use of the Artillery. It is used for designating targets and for conducting the fire, particu-

larly on the enemy's batteries. Besides, it gives the commander a map on such a scale as to give a complete idea of the general layout of the enemy's defense. Finally, it constitutes a map of the whole, into which may be combined all the maps of smaller areas but larger scale, for which it serves as a key. It permits their combination and requires that they have the same titles and conventional signs.

The battle map, scale 1 to 10,000, is a map of greater detail, showing the traces of the enemy's trenches in such detail as can not be put on a map, scale 1 to 20,000. It is used by the commander and the staffs. It is also used by the artillery for its fire on trenches and various works, where the exact location of parts of these works can not be seen from observation points.

The battle map, scale 1 to 5,000, is a detailed sketch for use in the attack, limited to the area up to the first line of the enemy; it is intended to provide an accurate picture of the terrain on which is developed a complete representation of all the known details of the enemy's trenches. It is especially designed for use by infantry, to permit them to reconnoiter the principal points of the terrain before them, to permit their discovering and locating prominent points, to permit them to study the communications, and, besides, to recognize, mark, and identify all the essential points of the enemy's defense, the position of the trenches, works, and various obstacles; the nature and disposition of engines of defense, the organized flanks, etc. The artillery also uses this map to insure its intimate connection with the infantry, to prepare and execute its operations in accord with the infantry and its needs.

2. BATTLE MAPS SHOWING FRENCH TRENCHES.

In general, battle maps showing French trenches are made to the scale of 1 to 10,000.

Their main object is to give to the commander an accurate and complete picture of our defensive and offensive organizations. They permit intelligent consideration of their improvement and their use in various circumstances. They facilitate the preparation of orders to be given for the occupation of the different sectors and for offensive and defensive operations which may follow.

Besides, these maps serve to guide the divisions, brigades, and regiments having to come into action rapidly in sectors to which they are called, without having been able to make a preliminary reconnaissance.

It is desirable that the series of maps, scale 1 to 20,000, 1 to 10,000, and 1 to 5,000, enumerated above, be made for the whole front. The work will be conducted progressively along the following lines: The map, scale 1 to 20,000, should be prepared first. Maps 1 to 10,000 and 1 to 5,000 will be made following the order of importance of the different parts of the front. In all cases the map 1 to 5,000 should be distributed to the troops in sufficient time to be well studied and completed on the ground before carrying out the attack in which it is to be used.

II. FORM TO BE GIVEN THE DIFFERENT MAPS.

1. METHOD OF PROJECTION.

The battle maps ought to be made on the same system of projection for all the western theater of operations.

The projection adopted is that called Lambert, with which it is possible to represent on the map all the northeastern region (France, Belgium, and Germany), without sensible distortions, either in angles or in distances. (See Annex I.)

The "Bonne" method of projection, of the French official map, which some parts of the army are using temporarily, will gradually be discontinued. Near the eastern frontier the plans and maps made with this system present angular distortions reaching a value which can not be neglected in accurate artillery fire at long range. This projection could not be prolonged without inconvenience onto the western German territory.

2. QUADRANGLES.

Maps of various scales ought to be made in quadrangles of 1 square kilometer,[1] prepared in a uniform manner in conformity with the system of projection. Consequently the system of rectangular quadrilaterals which will be adopted uniformly is that which corresponds to the Lambert system of projection. The lines of the quadrangles parallel to the two axes, x and y (tangents to the parallel and meridian at the center of the projection) are plainly marked on each sheet.

3. DIMENSIONS OF THE SHEETS AND COLLECTIONS OF SHEETS.

The scale 1 to 20,000 ought to take in at least 5 kilometers of our line, so that the field and heavy artillery can record their

[1] Easily subdivided into 2 parts on the scale of 1 to 10,000; and in 5 on the scale of 1 to 5,000; sometimes into 10.

positions on it, and at least 10 kilometers of the enemy's line, so that the ordinary targets for the artillery may be shown thereon.

Besides, it may be well to extend the battle maps beyond the above limits in the enemy's line, especially in the regions where no large scale sketches exist. As far as possible the military surveyors will prepare in advance the notes of these new sheets, so as to be able to provide for their issue when desired.

The 1 to 10,000 ought to be extended to a depth of about 6 kilometers into hostile territory, in order to give a complete representation of the first and second lines. Before utilizing the same edition to show our own positions it is well to publish the maps in such quantities as are desired in our line, and, if possible, to make additional copies.

The 1 to 5,000 map is extended about 2 or 3 kilometers into hostile territory, so as to give the infantry all the details which concern them directly. It extends 500 meters or 1 kilometer into our lines, so as to contain bench marks indispensable for the use of the map on the ground.

In dividing a given front among different sheets of the same scale no account is taken of the temporary dispositions of the large units on this front. It is necessary to draw up a general scheme, called "plan d'assemblage," taking account of the divisions of the maps adopted by the neighboring troops and laying out the adjacent sheets so as to overlap as little as possible.

In the same army the sheets to different scales may be very advantageously limited by the same lateral lines or subdivided regularly between these lines.

To avoid difficulty in printing, the dimensions of the sheets ought not to exceed 1.02 by 0.70 meters.

4. TITLES AND LEGENDS.

Each sheet receives a serial number and a title; this title is the name of the locality said to be the most important in the vicinity.

A date is likewise placed thereon; this date is that when the last data was obtained for the map.

The designation "Groupe de Canevas de Tir" (Department of Military Surveyors) is placed on each map, but the number of the army ought not to appear.

A legend showing the method of estimating the enemy's organization (trenches, batteries, etc.) should appear, as well as the

conventional signs of the geodetic points whose use is of prime importance in artillery fire.

Arrows showing true and magnetic north are shown in a conspicuous place, with an indication in degrees and tenths of degrees of the angles which these directions make with the lines of the quadrilateral parallel to the meridian of origin (Y axis).

The system of projection is indicated on each sheet (Lambert, principally).

Finally, a graphical scale is placed on each sheet.

5. DETAILS TO BE REPRESENTED.

Battle maps show the topography, represent the enemy's positions, and, if convenient, the French positions.

Planimetry is represented in black, the form of the terrain is shown by contours in brown; however, in some maps obtained from single-color editions of accurate maps of large scale, contours are also given in black. German positions are shown in blue, French in red.

Each of the details represented has a special sign, as indicated below in the paragraph "Conventional signs."

Planimetry comprises all the details ordinarily shown on charts and maps of large scale—geodetic points, railways, highways, roads and paths, water courses, buildings, houses, bridges, woods, gardens, etc. In some cases, especially for the scale 1 to 10,000 and 1 to 5,000, there can be shown only the distinctive features which can be used for observation and artillery fire. The military railways constructed along the front to supply our positions ought not to appear on ordinary maps.

The contour interval is 10 meters on the 1 to 20,000 map and 5 meters on the 1 to 10,000 and 1 to 5,000 maps. At times this rule may be modified, either in very level or in very broken country.[1]

The figures on the General Staff map should be reported even if they are known to be erroneous. This is very often important,

[1] This representation of the relief by the contours is accurate for parts of the front which have been mapped in time of peace to large scale. On the other hand, it has only an approximate value for territory which has been mapped only to small scale. It will be convenient to indicate on each map the source and reliability of the contours reproduced. The elevations from the French official map should be shown, even if they are known to be erroneous, this indication very often being of importance from the usage which has become established in the army of thus designating the corresponding points of the ground.

owing to the custom which may have grown up in the different corps of designating by those figures the corresponding points of the terrain.

The German positions to be represented on the maps are: Trenches, approaches, and various works; wire, machine guns, bomb-throwing apparatus, and engines of defense of every nature; batteries, munition depots, observing stations, camps, bivouacs, shelters, railroads, highways, and new paths used by the enemy for the supply, evacuation, or movement of troops, etc. However, all these numerous details can not be completely shown on maps of different scales. They should be selected according to their importance and the special use for which each of the maps is particularly intended, so that they may always be easily read. In general, it will be convenient to represent—

1 to 20,000: Details of the enemy's positions up to a limit compatible with clearness; trenches, shelter, approaches, important paths, railroads, principal camps, batteries, with their numbers.

1 to 10,000: All that appears on the 1 to 20,000 scale, but in greater detail. In addition, there is shown wire at least to the second line, paths in detail, their points of crossing trenches and approaches.

1 to 5,000: All the details that it has been possible to obtain through the study and interpretation of photographs, as well as all the details gathered together by the infantry in the first-line trenches or by the artillery in their advanced observing stations. This document is most complete concerning the first-line enemy trenches. Its scale permits not only the representation of numerous details concerning the enemy's organization (wire complete, chevaux de frise, machine guns, bomb-throwing apparatus, shelter for the personnel or munitions, etc.), but also the addition of a text giving all the additional details of a nature to interest the infantry and for which a conventional sign can not be employed conveniently (zone of fire of the enemy, nature of terrain, value of various obstacles, etc.).

The French positions to be represented on the battle maps of various scales are indicated below:

1. On ordinary battle maps, scale 1 to 20,000 and 1 to 10,000, are placed the advanced line of the French trenches. Their

shape accurately placed, is given with all detail compatible with the scale.

On the maps and sketches, scale 1 to 5,000, are also placed the outline of the trenches in the first line; it is shown there in great detail. To conveniently use these maps in practice, the infantry needs a number of points of reference so that they may orient themselves accurately.

Where the trace of the advanced line, because of its uniformity, does not offer a sufficient number of easily distinguished points, quickly identified by an observer placed in the same trench (salients, reentrants, characteristic changes of direction, etc.), they should either mark certain ends of approaches with their names, or, preferably, show on the maps the position of a certain number of points of reference conveniently chosen in the trenches of the first line or in the neighboring trenches or in the approaches leading into them; in order that they may be very easily found by anyone, these points are marked in the trenches by sign boards and arrows giving the directions.[1]

2. The following details are shown on maps, scale 1 to 10,000, showing French trenches:

Trenches and approaches in detail,
Various special works,
Military railways,

as well as all the names and numbers used to designate them in the sectors.

In any case, maps as published ought to contain neither information as to the armament (machine-gun batteries), nor as to wire or other obstacles, nor as to the organization of the command (post of commanding officer, telephone centrals), nor as to order in battle formation of the troops occupying the sector. All this data is to be added in person by each holder of the map for the part concerning him and on his own responsibility. (See Annex II.)

The above details concerning the 1 to 10,000 map, showing French trenches, apply also to the 1 to 20,000 in the case where the military surveyors would be brought up to make provisional maps of this nature on a scale of 1 to 20,000. (Especially for positions organized in rear.)

[1] Naturally, they ought never to be placed near important points of our position, such as: Machine-gun emplacements, trench mortars, commanding officers' posts, telephone boxes, etc.

6. NAMES AND TITLES—NUMBERING OF OBJECTIVES.

Experience in actual warfare has shown that, to obtain the best possible conditions for the use of the battle maps on the ground, it is well to give names and designations in great detail.

All the important details of planimetry or of relief (woods, valleys, etc.) should receive names, especially in enemy lines. The names adopted are those of the French official map, or from some other public map, or even new names given in the sectors and in current usage; finally, if necessary, arbitrary names are given.

When the woods are so numerous that it is impossible to give all of them names, they may be designated by a number of two figures, or by a letter (indicating the locality), followed by a number of two figures. Example: K 25.

The various details of the enemy's position receive names or numbers. In addition to those already in use, it is necessary to adopt arbitrary names. Thus the important trenches and approaches receive the names borrowed from the German vocabulary (geographical names, for example). Besides, the important points of the trenches are designated by numbers of three conventional figures or by numbers of four figures corresponding to their hectometric coordinates (coordinates in units of 100 meters), or by a combination of these two processes.[1]

In case the numeration by four figures is used, the designation should indicate a definite point of the terrain (the junction of an approach and of a trench, for example) and not a portion of the line nor a contour.

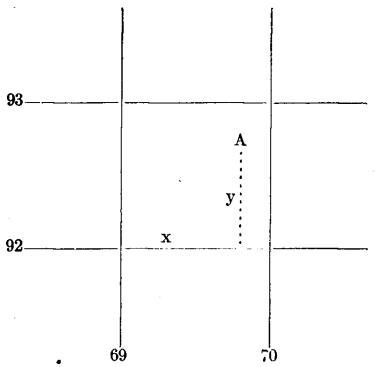
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[1] In exceptional cases the designation of certain important points of the enemy's trenches by letters, used in certain sectors, may be continued for the present if this name is in common usage among the troops.

The notation by three figures, being entirely conventional, ought to be, as far as possible, applied according to a certain law, so as to permit the military surveyors to give a number easily to each new element without running a risk of repetition and to facilitate as well the finding of the place thus designated by possessors of maps. For example, in the first line numbers beginning with 3 or 4 may be adopted; in the intermediate lines, those beginning with 5 or 6; in the second line, those beginning with 7 and 8; in the third line, those beginning with 9 or 0. In each trench which is parallel or perpendicular to the front there may be used, in addition, a second digit equal to the corresponding kilometric coordinate, either abscissa or ordinate.

All the enemy batteries and all ridges corresponding to possible emplacements for batteries receive a number in hectometric coordinates.

Example:



Point A: Metric coordinates, x=69,740; y=92.590.
Hectometric coordinates (complete), x=69.7; y=92.6.
Hectometric coordinates (abbreviated), 97.26.

The number written on the directing map is 97.26.

It is a general rule that all the names and numbers shown on the battle maps, scale 1 to 20,000, also appear on the maps, scale 1 to 10,000 and 1 to 5,000, and that all those shown on the maps, scale 1 to 10,000, also appear on the maps, 1 to 5,000; the names written on the maps, scales 1 to 20,000 and 1 to 10,000, being selected, according to the scale, in order of their importance.

REMARKS.—The battle maps having an official character, with the same title as the French official map, the new names or designations introduced by the topographical section in their corrections of battle maps, or by the other services in their special publications, do not become official until after they have been adopted by the military surveyors and placed on the map published under their direction.[1]

7. CONVENTIONAL SIGNS.

(*a*) *Cartographic conventional signs.*—The cartographic details, properly so called, are shown in the table of conventional signs inserted in Annex II.

[1] This precaution is necessary to avoid confusion which might be produced between neighboring large units.

At times, in the battle maps derived from the battle maps of strongholds or from maps of large scale reduced to 1 to 20,000, the conventional signs are those of the original document, if the drawing can not be reproduced by the military surveyors.

(*b*) *Conventional signs for French and German positions.*—Annex II also shows the conventional signs adopted to represent French and German positions. The conventional signs shown in print on the battle maps, especially on maps showing French trenches, are only a part of those signs in current use. Numerous complementary signs, of a secret nature for the most part, have to be added by hand to the maps in the field. These conventional signs are given in the annex mentioned above.

III. PREPARATION AND FINISHING OF THE PLANS.

The military surveyors are charged with the preparation and the reproduction of the battle maps to the various scales necessary in the army. They finish up the new editions, in whole or in part. They are also kept up to date under the technical direction of the military surveyors in the army corps. This work is performed by the "topographical section of the second bureau," which publishes, for this purpose, documents called "Rectificatifs" (corrections or changes), indicating all the changes or additions which should be applied to the last edition of each map in use.

REMARKS.—With the exception of the military surveyors and the topographical sections, no service has authority to prepare or distribute papers bearing the name of maps or plans and which may be considered as changes to the battle maps or as new editions of these maps replacing the old.

1. WORK OF THE MILITARY SURVEYORS.

The principal duties relating to the preparation of battle maps incumbent on the military surveyors are:

The performance in the field of the necessary triangulations to constitute or complete the survey as a whole, running a primary base which serves to locate the whole in place (they assemble also the sketches, fragments of maps, and plans which may be utilized to construct the planimetric and altimetric basis of the maps).

Examining and coordinating all the documents, both cartographic and topographic, which may be used (maps, existing plans, cadastral maps, etc.).

Making topographical sketches and various resections to perfect the battle maps in the places known to be defective, causing the revision of localities which have undergone modification, and assuring the placing, orientation, and reduction to proper scale of the maps and plans used and of the photographic maps or various sketches of our own or enemy positions.

The reduction of aerial photographs taken by the Aviation Service.

Finally, the graphical compilation of all the details connected with the trace and nature of the enemy's positions gathered together by the two bureaus of the Army corps and of the Army.

These technical duties are carried out in the military survey department by common methods of geodesy, topography, and cartography adapted to the special conditions in which the work is to be done.

2. WORK OF THE TOPOGRAPHICAL SECTIONS OF THE ARMY CORPS.

These duties are enumerated in the Manual on the Organization of the Topographical Sections (Dec. 25, 1915).

The topographical sections are not charged with the fundamental duties of preparing the maps; these duties are left to the military surveyors of the Army corps. Their principal duty is the preparation of sketches and partial changes to the battle maps, the foundations of these maps, enlarged if necessary, being used without modification in most cases.

As far as possible, the topographical section of the Army corps especially endeavors to improve and bring up to date the largest scale maps, 1 to 5,000, used by the Infantry.

Annex III shows the nature and method of execution of the principal topographic and cartographic duties which the topographical section may have to perform. This annex also furnishes a brief outline on photographic reduction and interpretation of photographs. In addition, it gives a list of material supplied the section by the military surveyors of the Army.

IV. PUBLICATION, DISTRIBUTION, PRECAUTIONARY MEASURES, CONSERVATION, AND DESTRUCTION OF THE MAPS.

[As corrected by changes dated January 30, 1917.]

(a) PRINTING AND DISTRIBUTION.

In general, the battle maps and sketches prepared by the military survey department are reproduced by the geographical

service of the Army, which has charge of the publication of all plans and maps for the armies. The requisitions forwarded to the geographical service are based on allowances determined in such a manner as to satisfy most of their needs, always avoiding any surplus which would necessitate a waste of time, labor, and necessary materials.

The military survey department furnishes the topographical section all copies they require. They furnish further supplies of maps and plans on demand.

The distribution is made by the topographical section of the Army corps on the following basis:

Maps to the scale 1 to 20,000[1] (showing German trenches only)—

To the Infantry: Down to and including battalion commanders.

To the Artillery: Down to and including battery commanders.

Maps to the scale 1 to 10,000 (showing French trenches)—

To the Infantry: Down to and including battalion commanders.

To the Artillery: Down to and including group commanders (group includes 2, 3, or 4 batteries).

Maps to the scale 1 to 10,000 (without French trenches)—

To the Infantry: Company commanders.

To the Artillery: Battery commanders.

Maps to the scale 1 to 5,000—

To the Infantry: During period when no attack is contemplated, down to and including company commanders. During the period of attack, down to and including chiefs of half platoons.

To the Artillery: Down to and including battery commanders.

In case of an advance which will take the Infantry beyond the zone included in the 1 to 5,000 map, the 1 to 10,000 maps are distributed to them. These maps are brought up to date with all the available details concerning the successive lines of the enemy.

The staffs and the Engineers receive such copies of the various maps as their studies and work require.

[1] The battle maps showing French trenches should only be made to the scale 1 to 10,000. Maps of this kind, scale 1 to 20,000, should be made only under exceptional circumstances and for particular reasons.

(b) PRECAUTIONARY MEASURES—CONSERVATION AND DESTRUCTION OF MAPS.

All obsolete battle maps and sketches are burned by their owners.

The supplies of the topographical section which are not used are returned to the department of military surveyors.

All battle maps should be considered confidential. Every precaution should be taken that they are not lost and that they do not fall into the hands of the enemy.

It is well to state that, in fact, even ordinary maps without French trenches—

1. Give the enemy the amount of information which we have concerning their positions;

2. Very often give them exact information of the topography in rear of our lines (geodetic signs, exact location of roads, paths, railways, outlines of woods, the shape and improvements of the ground, etc.).

These details would be most valuable to them in making accurate photographic reductions and in improving the accuracy of their artillery fire on our lines.

As far as maps to the scale of 1 to 10,000 showing French trenches are concerned, these are absolutely confidential. All the copies should be numbered and issues registered by the topographical section of the army corps.

They are kept in the staff offices and the posts of commanding officers and should not in any case be taken to the trenches of the first line.

If it is essential that the owners of the maps on the scale of 1 to 5,000 mark on the copies used for the first line certain details of our position, these notations should be limited to an absolute minimum and be represented in such a way that the maps thus marked can not be used at all by the enemy if they should fall into their hands. (See paragraph 7, b, above.)

V. ADJUSTMENT BETWEEN THE MAPS OF NEIGHBORING ARMIES.

Along the lines separating two armies it is essential that the departments of military surveyors of the armies whose battle maps are to be adjusted, or are to contain a common part, take the proper steps that their sheets fit exactly in prolongation, or that their common parts are identical.

To this end the neighboring departments of military surveyors of the armies limit their work to an arbitrary line of demarcation along which the cartographic adjustment is completed, and from each side of which the preparation of the map and the duty of keeping it up to date fall upon the army directly concerned. For the parts immediately on each side of this line it is necessary to reproduce the map of the neighboring army.

The line of demarcation which is chosen should always be a very distinct one; for example, the edge of the kilometric quadrangle near the line separating the sectors occupied by the two armies.

The titles, names, and numbers of a conventional nature used by each army in its own zone should be reproduced by the neighboring army.

All the details or data (topographical elevations, geodetic points, photographs, etc.) obtained by one army in the zone of the neighboring army should be communicated without delay to the department of military survey of that army to permit their use on the plans of that army.

When an army prepares a new edition of a map there is forwarded to the neighboring army a map or tracing, brought up to date, of the zone which concerns them; which map or tracing reproduces this document completely. When the edition is published several copies of the new edition are also forwarded.

Besides the above remarks, relating to the adoption of a line of demarcation separating the zones in which each of the departments of military surveying have to prepare the battle maps, it is well, as far as possible, to adopt certain similar provisions concerning the termination of the maps as published. The natural tendency of each army is to overlap the outer plans of the zone very largely on that of the neighboring army. It is of great importance to avoid covering the areas twice, especially because of the excessive work which thus devolves upon the department of military surveyors when the sectors are changed. In this case certain maps are duplicated, and it becomes necessary to go over nearly all the lines of division of the maps of the army, involving a great loss of time.

The best procedure is for an army to establish once, for all time, its schedule of assemblage by agreement with the neighboring army, and in such a way that their maps may be joined; this line of division may or may not be along the line of demarcation adopted. The neighboring corps of the two armies

then make use of the same map. This common map of the two armies is published according to an agreement between the two departments of military surveyors of the neighboring armies so as to best serve the needs of those concerned.

VI. SPECIAL MAPS AND PLANS.[1]

Besides the ordinary types of battle maps enumerated above, it may be desirable to draw up schematic drawings and special maps to a large scale designed for special purposes:

1. Map on the scale of 1 to 50,000, showing the lines of communication of the front. This is a schematic map indicating the safety of the highways, roads, paths, military railways, and all details which are of particular importance in the movement and the stationing of troops, their supply in food and munitions, and evacuations. This document is of a confidential nature.

2. Map on the scale of 1 to 50,000, showing German positions. This map indicates schematically the different lines of the enemy's trenches, his bivouacs, his distribution points, lines of communication most used, military railways, the organization of his command, etc. It is for the purpose of giving the commander a general idea of the disposition of the enemy and of his general plan of defense. It is drawn up with the aid of details furnished by the second bureau of the army and of the neighboring armies.

3. Various maps to the scale of 1 to 50,000. These are such as schematic maps indicating the defiladed zones, maps of telephone systems, etc.

4. Special plans of our works of defense. These plans, to very large scale (1 to 2,500 and 1 to 1,000), can show the trace of certain important details of the first-line trenches, special details of our organization, of our sap works and mines, strong points, particular parts of our second lines, railways, etc.

These works are executed either by reduction to a very large scale, or by sketches on the ground, and even by special topographical mapping done under the direction of the department of military surveyors. They are generally made by the topographical section of the Army corps or by Engineer officers.

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[1] It is important, to avoid useless cartographic work, to reduce to a minimum the number of special maps which the department of military surveyors has to publish. It is therefore often possible to place on the same sheet details of different kinds. In all cases the distribution of these special documents should be limited to the authorities actually interested. Changes dated Jan. 30, 1917.

5. Special sketches of artillery targets (stations, emplacements for pieces of long range). It is important, in certain cases, to draw up sketches of the zone surrounding certain important targets in preparation for local action and to facilitate the regulation of artillery fire (plans of stations, of certain localities, necessary crossings, bivouacs, and cantonments, and large-caliber enemy batteries, etc.).

These maps or sketches to a very large scale (1 to 2,500, 1 to 5,000, 1 to 10,000), combined with cadastral maps or special plans which may exist in the hands of private organizations (railways, bridges, and highways, etc.).

They are completed with the aid of various details, and especially with the aid of aerial photographs.

In certain very important parts, boundaries of cultivation are shown (stubble fields, brush wood, stumps, fields, all variously colored), clearly distinguished on the surface of the ground and capable of being used as a mark by the aerial observer of artillery fire, furnishing him an exact basis for determining the amount of error in successive shots.

This map could be completed by a system of quadrangles and numbering known between the battery and the aviator observing the fire. If the regulation must be made with the aid of observation posts on the ground, the sketch may contain an angular division formed by a sheaf of lines corresponding to the measurements taken from the observation points and the battery directing the fire.

VII. PROVISIONS RELATIVE TO OPEN WARFARE.

1. OPEN WARFARE, PROPERLY SO CALLED.

In open warfare it is naturally impossible to make battle maps in a true sense; besides, they would not serve any purpose. Maps to the scale of 1 to 50,000 are distributed to the army corps by the topographical section on the following basis:

In the infantry, down to and including the battalion commanders.

In the artillery, down to and including battery commanders.

These maps are specially used for the designation of objectives in the same way as battle maps.

It may be necessary, in addition, to have recourse to sketches on a large scale (1 to 20,000, 1 to 10,000, 1 to 5,000) to show local dispositions revealed in photographs or otherwise.

These sketches are adjusted by the topographical section, who use enlargements of the map for this purpose, and are distributed according to the number desired.

In addition, maps of larger scale than 1 to 5,000 may be distributed to the staff, and especially to the artillery to aid in accurate fire, particularly on strong points organized by the enemy.

Annex V indicates the nature and the value of the various maps published for the various parts of French, Belgian, or German territory.

2. PERIODS WHEN HELD TEMPORARILY IN ONE POSITION.

In the course of open warfare the department of military surveyors should take all measures to be ready to draw up battle maps or parts of the front which may become temporarily fixed in place, so that a minimum of time will be necessary for this work. The first plan to be prepared is that on a scale of 1 to 20,000, which the artillery need in fire regulation.

On arriving in a new locality, and without awaiting a definite halt in the operations, a provisional map should be prepared, taking advantage of the most rapid processes.

In obtaining a cartographic base for these plans we should always avoid a rough enlargement of existing maps, because of errors in their construction, shrinkage or movements of paper, and even errors derived from the system of projection.

Enlargements of existing maps will not be used except in the case of fragments assembled and put in place by means of geodetic points; where the points may be in insufficient numbers a considerable number of critical points should be chosen to remedy this shortage, and their geographical coordinates measured on the plans and provisionally adopted.

In order to obtain uniformity in the execution of this work, the department of military surveyors will have to take the following preparatory measures:

Gather together reports on triangulations of the territory in which the army will have to operate, with a description of the geodetic points and the value of their coordinates.

Assemble in advance all the papers, such as maps and plans existing for these territories.

Look up in place and gather together systematically all the large-scale maps of towns or districts (cadastral maps, maps of villages, railways, bodies of water, and forests, etc.).

Finally, when the time comes, make the necessary reconnaissance on the ground to check the values of these documents, and fill in without delay the existing network of geodetic points, and, if necessary, the topographical features. These details, if necessary, will be performed in a manner indicated in Annex VI.

(Signed) J: JOFFRE.

