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DUTIES AND EMPLOYMENT OF THE 4th ARTILLERY SURVEY SECTION (Artillerie-Messtrupp) AND THE 49th SOUND RANGING SECTION (Schallmesstrupp).

A.—DUTIES.

The duties common to both sections comprise:—

- (a) The fixing and plotting of the enemy's artillery positions.
- (b) Assisting the artillery to register on the enemy's positions.
- (c) The preparation of a weekly report on the activity of the enemy's artillery.

In addition to the above, the Artillery Survey Section is responsible for:—

- (d) The observation of all activity on the part of the enemy which bears upon the tactical situation and the observations of the infantry and artillery.
- (e) The arrangements for giving warning of the approach of aircraft. (See Instructions of the 12th Infantry Div., dated 23/3/16.)
- (f) The preparation of sketches by means of stereo-telescopes with a view to constructing panoramas for observation posts, proposals for demands of Battery Plans, and the care and maintenance of Battery Plans which are not in use. For the execution of these duties the Sections have survey posts (*Mess-Stellen*) and artillery plan sections (*Messpläne*) at their disposal.

B.—EMPLOYMENT.

I.—4th Artillery Survey Section.

The locating of the enemy's batteries is effected by the survey posts which obtain bearings on the flashes at night by means of the *Richtkreisdiopter* ("flash-spotter"). The readings on these "flash-spotters," and the time the bearings are taken, are forwarded to the artillery plan section (*Messplan*), who plot on their plan the angle between the zero line (*Haupttrichtung*) and the enemy's battery, and thus obtain inter-sections which give the position of the enemy's batteries. These results, which are based on pure geometry, serve the *Feld-Flieger-Abteilung* as a basis for their reconnaissance flights and also serve as a basis for plotting the positions of the enemy's batteries on the map.

When registration is being carried out, the positions of the points of impact or bursts will be ascertained by the same means as are employed for locating the enemy's batteries. As the target is plotted on the plan, it is possible to obtain the position of the shots with reference to the target.

When registering with the aid of an Artillery Survey Section, this section must work entirely visually (in contrast to the Sound Ranging Section which works by sound). The 4th Artillery Survey Section can be employed for registration in the following cases:—

- (a) Ranging with percussion fuzes on targets which can be seen from at least 2 survey posts. If the target lies in a hollow and does not fulfil the above-mentioned condition, the battery must range on a visible point close to the enemy's position, if possible on a line between the battery and the target: when proceeding to fire for effect, the battery switches or increases or decreases its range as required. When ranging with time fuzes, especially with large or medium calibres, the Sound Ranging Section can frequently be successfully employed (compare the remarks under B).
- (b) Ranging with time fuzes against all targets, unless the bursts, in order that they may be observed, have to be raised so much that their position relative to the target can only be approximately determined or not determined at all.

The two following cases must be clearly distinguished:—

- (i) Ranging with time shell when it is intended to fire for effect with time shell (for instance, against cross-roads, etc.). Having regard to the effect of time shell, ranging will be carried out on the centre of the hostile position. The battery will be considered as ranged when, with the same elevation and setting of fuze, one shot is observed to fall over, one short shot, and, if possible, one shot close to the target. No correction is necessary for fire for effect.
- (ii) Ranging with time shell when fire for effect with percussion shell is intended.

In this case we can:—

- (a) Register on a point in the line of fire lying between the battery and the target and at a distance from the target corresponding to half the length of the zone covered by the burst of time shell. It is advisable, when employing this procedure, first of all to determine, by means of one or two rounds, what height of burst is necessary and sufficient for observation. Fire for effect will be opened without any correction.



- (b) Carry out the procedure described in b.(i). Before changing over to fire for effect, it is first of all necessary to give the requisite correction for fire with percussion shell.
- (iii) Ranging with time shrapnel.

The procedure in para. (ii) a. is recommended.

Procedure.

When ranging with the 4th Artillery Survey Section, the following procedure has been found by experience to be suitable:—

- (i) One shot only will be fired at a time, and its position relative to the target will be determined by the Artillery Plan Section (*Messplan*) and reported to the battery commander.
- (ii) Each round will be reported to the Survey Section by the word *abgefeuert* (fired).
- (iii) The orders issued by the battery commander will be reported to the Survey Section, as these orders, in conjunction with the plotting of the fall of the shots, enable an opinion to be formed of the errors in range and direction, as well as of the effect of atmospheric conditions.
- (iv) Before firing begins, watches must be synchronized.

II.—49th Sound Ranging Section.

The Sound Ranging Section possesses the advantage that ranging can be carried out at all hours of the day and night. The method of procedure is secret; it is based on differences of time and the measurements are accurate to between .02 and .04 of a second. The method cannot be employed when the wind is too strong, or in cases where other sounds prevent the recording of a *particular sound*. Consequently the employment of the Sound Ranging Section is of most use in locating and firing on hostile batteries when the general tactical conditions are quiet. On this account, ranging is best carried out when as few as possible reports of our own and the enemy's guns disturb the sound waves from the shell burst which it is desired to measure, for instance, in foggy weather and in the evening or early morning, when it is usually quiet. A wind of more than 16'4 feet per second renders it impossible to carry out registration, as does also a North wind in our present position. It is far easier to determine the position of a hostile battery in action, when the wind is unfavourable, than it is to range on that battery. Consequently, it frequently happens that the Sound Ranging Section reports a battery as being in action, but is unable to carry out registration. In such a case, registration must be carried out by means of aeroplane or balloon observation.

Ranging.

For ranging purposes it has been found best to fire 3 rounds (percussion only) at intervals of 1½ to 2 minutes. Ranging can only be carried out with batteries of the larger calibres (15-cm. Heavy Field Howitzer, 10-cm. Gun, 21-cm. Mortar and, if necessary, 10'5-cm. Light Field Howitzer) and ammunition which gives a powerful burst (with the Heavy Field Howitzer, the 1912 not the 1914 Pattern Shell; with the Light Field Howitzer, the Long Shell).

In order to check whether the observers at the beginning of the ranging (rounds 1—3) are really measuring the reports of the shell bursts, it has been found advantageous to fire rounds 4—6 without giving any correction; if the measurements are correct, the measurements of latter will coincide with those of rounds 1—3.

Method of Utilizing the Measurements.

After every 3 rounds, the measurements obtained by the Sound Ranging Posts (*Beobachtungsstellen*) will be worked out mathematically at the Sound Ranging Central Station (*Schallmesszentrale*), with minute accuracy in corrections for wind and temperature. These latter will be measured at the special station at Hôpital-Ferme and at the Sound Ranging Posts themselves.

The position of the shots is then reported by the Sound Ranging Central Station to the battery concerned, the battery makes the necessary corrections, the next 3 rounds are fired and so on, until the target is accurately ranged on.

The Sound Ranging Section will only range on hostile batteries which are known for certain by the Section, and not on landmarks taken off the map, such as cross-roads. When, for instance, satisfactory (*i.e.*, always the same) results are repeatedly obtained, it is certain that there is a source of sound (a battery) at the point in question.

(Signed) WEIGELT, LIEUT., (Signed) KOMITZKY, LIEUT.,
O.C., 4th ARTILLERY SURVEY SECTION. O.C., 49th SOUND RANGING SECTION.

12th Field Artillery Brigade.

Reproduction sanctioned.

(Signed) FREIHERR V. STEINACKER.

[End of Translation.]

NOTE BY GENERAL STAFF, INTELLIGENCE, GENERAL HEADQUARTERS.

This document is of the utmost importance. It shows that the German Field Survey Sections are employed not only to locate hostile targets, but also to register with their own artillery. Apparently sound ranging registration is also carried out by night.

In other respects the work done by the German Field Survey Sections appears to be analagous to that carried out by our own Field Survey Companies.