BOX NUMBER
UNCLASSIFIED
DATE: DEC 10 1949
CLASSIFICATION CANCELLED
AUTH: C.R. 115-50 Ch 3

CONFIDENTIAL

NOTES ON

Employment of Artillery In Trench Fighting

FROM LATEST SOURCES

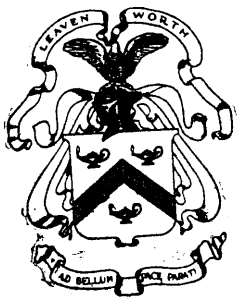
ARMY WAR COLLEGE
1917

REGRADED UNCLASSIFIED
BY AUTHORITY OF DOD DIR 5200.1R
BY Ronald Reagan
ON 18 October 2005

41932 WASHINGTON
GOVERNMENT PRINTING OFFICE
1917

UNCLASSIFIED

THE GENERAL SERVICE SCHOOLS
LIBRARY



WAR DEPARTMENT.
Document No. 594.
Office of The Adjutant General.

2

Notes on Employment of Artillery in Trench Fighting.

1. Requirements of good Artillery Position.
2. Control of Fire.
3. Notes on Battery Tactics for use when Training.
4. Communications.
5. Ammunition.
6. Details of High Explosive.
7. Hints for the use of Planetables for Artillery Work.
8. To find Position on a Planetable by Resection.

WAR DEPARTMENT,
WASHINGTON, *May 17, 1917.*

The following Notes on Employment of Artillery in Trench Fighting are published for the information of all concerned.

[2599035, 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.

99455—17

NOTES ON EMPLOYMENT OF ARTILLERY IN TRENCH FIGHTING.

1. Requirements of Good Artillery Position.

1. The requirements of a good position for guns are well known, but may briefly be summarized as follows:

(i) Clear field of fire in the required directions.

(ii) Concealment from the enemy's position and as far as possible from overhead.

(iii) Good platforms, especially for howitzers.

With regard to (ii), it may be noted that a suitable position is generally to be found along a hedge or near the fringe of a wood. It must be remembered that paths made by men passing to and fro in rear of a gun position in dry or very wet weather show up very conspicuously to an air observer. Care is therefore necessary to prevent the making and treading down of clearly defined footpaths. It is important that guns should not be very regularly placed nor at small intervals, in order to minimize the effect of enemy shelling. This precaution is generally neglected. Where possible it is recommended that guns be placed at least 30 yards apart.

2. In trench warfare the first task of a field battery will be to dispose of its guns, observation station, and communications so that its fire may at once be brought to bear on attacking Infantry in its allotted zone whether by day or night.

The battery observing station will generally be close behind the front line of trenches, often concealed in a house or building of some kind, but so placed as to gain the best view of the ground that is possible. The necessity for obtaining a view renders the actual trench as a rule unsuitable for an observing officer, since the view thereform is bound to be limited and may be only obtainable through a periscope. The observation post is as a rule occupied by the battery officers in turn, except during a battle when the battery commander will himself command from the observation station.

3. The control of fire from a distant forward observing station requires special practice. The ordinary rules for measurements by graticules for deflection or for height of burst are inapplicable. The spread and strike of the bullets will generally be visible, but the desired height of burst in feet requires careful watching.

2. Control of Fire.

1. In trench warfare fire is brought to bear on the desired object either—

(i) By means of direct observation from the observation post.

(ii) By the map.

(iii) By aid of aerial observation.

For Field Artillery (i) is the usual method.

For heavy guns and howitzers either (i), (ii), or (iii) may be used, although (ii) would rarely be employed unless previous registration had taken place.

2. With regard to (i), the chief fault that is found with Artillery fire is want of accuracy, and this is largely owing to a lack of knowledge on the part of some of our officers as to the capability of the guns. If officers are to get the best value out of their equipment, a complete knowledge of the range table is essential, and during training a close study of the range tables can not be too strongly encouraged.

3. When shooting at trenches, particularly with howitzers, accuracy is essential, but it is often not realized that the mean of the shots fired or the mean point of impact must be in the target; there must in fact be an equal number of pluses and minuses.

Owing to the risk of danger to our troops the tendency is to lengthen the range when a "short" has been observed, hence shooting is generally too long. Reports subsequent to a bombardment have frequently confirmed this.

Undoubtedly a very real loss of power results from this cause alone, and the remedy is not difficult of application.

4. The two difficulties inherent in shooting by the map are:

(i) The inaccuracy of some of the maps.

(ii) The correction for the day.

5. It is sometimes difficult to locate the exact position of the battery on the map, since roads and other features are not always shown correctly in the French maps, but it can be

ascertained by resection (see sec. 7). This method should be understood by all officers. Indeed, map reading and identification of points on the map are of the greatest importance and should be constantly practiced.

The correction for the day is much too often ignored. Heavy batteries take it into account more often than field batteries, and for the former it is admittedly of more importance. When shooting by the map it is imperative that all the variables should be considered—barometer, thermometer, temperature of the charge, and wind are all important. Heavy batteries have been supplied with special slide rules, which enable the corrections to be readily ascertained. Batteries of horse and field artillery are supplied with cards which show the corrections necessary at the different ranges. These must never be ignored if shooting by the map is to lead to anything but a waste of ammunition, whilst at the same time the careful application of the figures provided may give a new power to guns never contemplated before.

6. Aerial observation is now very largely used for heavy guns and howitzers, to a less degree also for field guns and howitzers. To obtain good results batteries must constantly practice the drill. Time is of great importance to the observer, and mistakes, owing to an imperfect knowledge of the system or to a want of practice by officers and observers, signallers, etc., lead sometimes to serious trouble. These can be obviated by drill, and drill must be perfected. An accurate knowledge by all officers of the "Instructions regarding the cooperation of aeroplanes with other arms" is of the first importance, and should be acquired before joining the force in France.

3. Notes on Battery Tactics for Use When Training. F. A. T. Chapter IX.

Sec. 198. On first coming into action the safest method of obtaining the line is by means of the compass, although if a good aiming point is available and its position on the map is known to be accurate, the line may be satisfactorily obtained by the map.

When guns have been properly dug in the layers are unable to see all round over the sight and often can only see to the front through a small arc to right and left of the center line. In such cases aiming posts are planted in the zero line and guns

laid on them, either by day or night, instead of on an aiming point. Incidentally it has been found that the No. 7 dial sight is not in such circumstances essential; posts may be put out as required right or left of the zero line and laid on over the open sights. This is the method adopted in batteries that have no No. 7 dial sights.

SEC. 208.—When ranging with H.E. from a howitzer on an enemy trench made in close proximity to our own trenches, it is advisable to use pairs of rounds and to take the means of each pair rather than base any correction on the observation of a single round. Neglect of this precaution has frequently been the cause of trouble, e. g., the dropping of shell into our own trenches.

The use of the proper projectile for field batteries is also a point that now requires consideration. High explosive with ricochet effect may be very effective against troops in the open or guns in action, and is of special value when used in combination with shrapnel for "barrages," or shelling communication trenches, roads, or areas. A combination of shrapnel and high explosive from guns may often be preferable to shrapnel alone. For the destruction of parapets high explosive with delay is effective; shrapnel is of course useless. For the destruction of observing stations and all buildings high explosive from guns is best. Howitzers should not be used for this purpose owing to the difficulty of obtaining hits on vertical targets. Steep angles of descent are not conducive to accuracy—a fact also to be borne in mind when selecting the charge for the howitzer. For very close shooting or specially accurate work it is an advantage to lay by means of the field clinometer if time admits. Detachments must remember the play in the gears when adjusting sights and take special care to see that the gears are always operated in the same way to reach the zero point.

SEC. 219. "Registering," as distinct from the original meaning of the term, is now applied to ranging by trial shots on various objects with a view to being able on some future occasion to open an immediate and effective fire. What is frequently overlooked is the necessity for the application of corrections for the error of the day. On this account, when range and corrector have been found it is advisable to enter in the record the real range and the corrector that would have been necessary under

normal conditions. This will generally necessitate a small calculation.

During trench warfare, as soon as a battery is in action, after making arrangements to cover its defensive front, it is required to "shoot itself in." This process consists mainly in what is termed "registering" its specially allotted areas; these areas may be map squares on the large-scale map. Information required in this process of registering will be found by calculation as far as possible, the ammunition allotted being used to verify the figures thus obtained.

4. Communications.

A unit which takes over an area from another will obtain all the information possible from the latter, together with diagrams, panoramas, and all details concerning targets and the enemy front. Similarly, full instructions concerning communications will be left by the outgoing troops, care being taken that the cable which is left may be readily identified. Confusion often follows on a change of units owing to insufficient information being available in a convenient form for passing on to the new troops. It is the duty of battery and brigade commanders to insure that they are ready from the first occupation of a new area to hand on all detailed information necessary to obtain a continuous smooth working of the artillery action and support whatever changes take place. The pamphlets [1] regarding communications issued by the general staff at general headquarters in France, under the heading of "Signal Service," should be carefully studied by units during training.

5. Ammunition.

1. Since the commencement of the war many changes have taken place with regard to equipment, and most of these are recorded in list of changes in war material. Information is, however, difficult to extract in this form, and a few notes are therefore made under this heading. The value of high-explosive shells as compared with shrapnel is one of the big lessons of the war, and provision of equipment has had to conform to the new needs.

[1] (1) Signal Communication Within a Division When Holding a Defensive Line; (2) Notes on Field Telephone Work.

Horse and field guns will shortly carry 50 per cent of both shrapnel and high explosive.

Field howitzers, 80 per cent high explosive.

Heavy artillery, viz, 60-pounders and 4.7, have 50 per cent high explosive.

All heavy howitzers and heavy siege guns carry high explosive only, with the exception of the 6-inch guns, which will shortly be equipped with a proportion of shrapnel.

2. Study of the value, power, and properties of high-explosive shell has thus acquired a new importance for all artillery officers, no matter in which branch they may have been trained. Information on the subject is to be obtained from the text-book of ammunition, with which all ranks should endeavor to become familiar; but it must be realized that an officer must not rest content because he is acquainted with the details and intricacies of one nature of artillery and one equipment. Technical information is of the utmost value in war, and individuals can never foresee what the chances of war will require of them.

6. Details of High Explosive.

1. High-explosive shells are filled with lyddite, T.N.T., or amatol, the heavier and field-gun shells with one of the two latter. The detonating effect of all three is about the same, but there is much more smoke from lyddite than from the other two, whether the shell detonates or explodes. With detonation the smoke of all three is black, but in the case of T.N.T. or amatol it is tinged with gray and less dense than that of lyddite. When lyddite explodes the smoke is thick and yellow, but with the other two substances the smoke is thin and grayish.

2. The fuzes used with high explosive vary somewhat with the equipments.

The fuzes usually supplied for the 13 and 18 pounders are the No. 100 fuze with a gaine[1] with a delay of .04 seconds, or the ordinary time fuze, viz, No. 80 or No. 85 with a gaine. The advantage of the delay is to obtain ricochet effect after graze and greater penetration with steep angles of descent in attacking deep dugouts, etc. With these equipments, therefore, the high explosive may be used either to act on percussion, in the

[1] Gaine, which is the French for container, is merely an extension of the fuze provided to hold the exploding composition.

air after graze, or in the air similarly to shrapnel. The last named is seldom used.

For other guns and howitzers the fuzes used are No. 17, No. 44, or No. 100, the first two being D.A. fuzes and the third a graze fuze.

Not many No. 17 are issued. It is a complicated fuze, but detonates the shell of the larger natures satisfactorily. Nos. 44 and 100 are issued in larger numbers. These are fairly reliable fuzes, but give occasional blinds.

3. Cordite as a propellant is now to a great extent replaced by nitrocellulose and ballistite, the latter being used with howitzers and the former for guns.

Cordite is easily distinguished from nitrocellulose or ballistite, and is always made up in sticks; ballistite is usually in small flakes and nitrocellulose in the form of perforated pellets or tubes.

Charges are now usually "adjusted." This means that when cartridges are made up they are adjusted to give a standard muzzle velocity irrespective of the lot or manufacture.

Where cartridges are not marked A.C. (adjusted charge) it is important that the various lots should be kept separate as far as possible.

A "lot" of cordite is a quantity of 1,000 pounds manufactured all under exactly similar conditions.

7. Hints for the Use of Planetables for Artillery Work.

1. If the point at which the planetable is situated can be accurately identified, orient the planetable by aligning on some distant visible point. Always check the orientation by aligning the sight vane on another point on the map and seeing if that point can be picked up.

2. If no points by which the planetable can be oriented are visible, the planetable must be set up by compass. This can be done quite accurately if the error of the compass is known. and this is best ascertained by taking a bearing (by means of the sight vane) on the North Star at a time when the pointers of the Great Bear are directly above or below it. A line drawn along the sight vane will then be true north and south, and the error of the compass can be ascertained by placing it along this line.

3. When the position of the planetable is not known it must be found by resection, and for this three known points must be visible. (See sec. 8.)

4. When taking bearings for artillery fire from the map it should be noted that the sides of a map are not always true north and south. The true north and south lines are those of the meridians, which will be found marked and numbered along the north and south edges of the Belgian 1/40,000 (the colored map) and 1/20,000 (the map with very close contours, 1 meter interval).

On the 1/40,000 map meridian lines will be found drawn across the map at regular intervals; on the 1/20,000 they are not so drawn, but the lines can be picked up readily by the figures; thus 1 degree 26 minutes on the north edge corresponds with 1 degree 26 minutes on the south, and the line joining the two marks is the meridian line, and is true north and south.

The east and west edges of the Lille 1/20,000 sheets may be taken as true north and south. The Lille series consists of 6 sheets, of which the three western, Nos. 1, 3, and 5, are at present in use.

8. To Find Position on a Planetable by Resection.

1. The method is as follows:

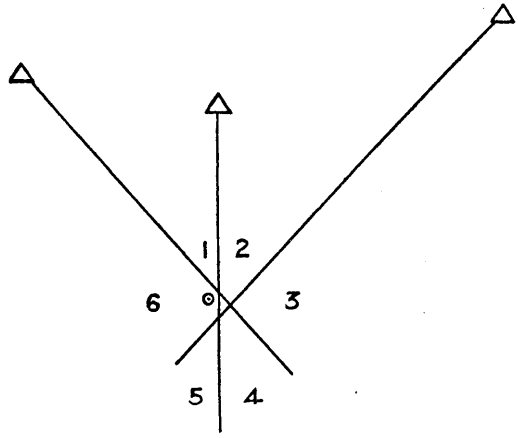
Set up the planetable at any point from which three previously fixed points can be seen. Orient the table by compass, and from the three fixed points draw back rays. If these three rays pass through a point, this point is the required position. If they do not pass through a point, the rays will form a small triangle called the "triangle of error." The true position is now to be determined by the following rules:

(i) If the "triangle of error" is inside the triangle formed by the three fixed points, the position is inside the triangle of error; and if outside, the position is outside the triangle of error.

(ii) In the latter case the position will be such that it is either to the left of all the rays when facing the fixed points, or to the right of them all. Of the six sectors formed by the rays, there are only two in which this condition can be fulfilled.

(iii) Finally, the exact position is determined by the condition that its distances from the rays must be proportional to the lengths of the rays, i. e., the position on the sketch must be nearest to that side of the triangle formed by the shortest ray, and farthest from that formed by the longest ray.

FIG. 1.



In figure 1, for instance:

By condition (i) the point must be outside the triangle of error.

By condition (ii) the point must be in sector 6 or in sector 3.

By condition (iii) the point must be in sector 6,[1] since the distances from it to the rays must be proportional to the lengths of the rays, and by estimation it will be where shown.

2. Having thus determined the position, place the sight rule along the line joining it and the most distant of the points used; set the sight rule on the point by revolving the planetable; clamp and test on the other two points. If there is still an error (which should, however, be much smaller), go through the process again.

[1] To make this clear, take a point anywhere in sector 3. It will be seen that it lies nearer to at least one of the long rays than to the shortest ray, and condition (iii) would not be fulfilled.

3. The best position is inside the triangle formed by the three fixed points, of which two are near and one is distant. Accuracy of position is insured by two points being near; accuracy of setting is insured by aligning on the distant point. Generally fix from near points. Set by a distant point.

4. When there are a number of points, any three of which may be used for resection purposes, recollect in choosing the point to be used that—

(i) When the three points chosen, and the observer's position lies on or near the circumference of a circle, the accurate determination of the observer's position is not possible by this method.

(ii) The three points chosen should be such that the rays from them do not intersect at acute angles, and thereby make a badly shaped triangle of error.

(iii) Choose points which are most accurately fixed on the sketch (e. g., those of the base or directly fixed from the base). It will have been noticed that the compass is only used to orient the planetable approximately, and that the final fixing does not at all depend on the compass. It is important that this should be remembered.

5. Two useful methods, which can often be adopted with good results, should be noted:

(i) If the observer can place himself anywhere on a line prolonged through two points previously fixed, he can set his board by them and fix his position on this line by resecting from any third fixed point which gives a good angle of intersection.

(ii) If on setting up at any point C it is noticed that a ray to some other useful point D has been omitted when at a previous station A, draw a single ray to D from C. Then go to D and use this ray to set the table. Resect from A by pivoting the sight vane about the point A and drawing a ray backward from A till it cuts the ray D C. The intersection of these rays is the position of D.

