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TRENCH LINE CONSTRUCTION

TRAINING PAMPHLET
No. 6-A

Signal Corps, United States Army



WAR PLANS DIVISION
July, 1918

War Department
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WAR DEPARTMENT,
WASHINGTON, July 15, 1918.

The following pamphlet, entitled "Trench Line Construction—Training Pamphlet No. 6-A," is published for the information of all concerned.

(062.1 A.G.O.)

BY ORDER OF THE SECRETARY OF WAR:

PEYTON C. MARCH,
General, Chief of Staff.

OFFICIAL:

H. P. McCAIN
The Adjutant General.

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CHAPTER I.

GENERAL FORWARD LINE COMMUNICATION.

In the great maze of communications which must be promptly and efficiently handled in military operations, the telephone affords, from many points of view, perhaps the most satisfactory communication system. It has the great advantage over the telegraph, buzzerphone, visual signaling and radio that it gives direct communication which requires no translation for interpretation, that it makes possible the transmission of much more complete and explicit information in the same or less time, and that the telephone instrument itself is very rugged and dependable. Likewise the telegraph and buzzerphone systems have great advantages over the visual signaling systems and the telephone because of their greater secrecy. However, despite their convenience and worth, the telephone and other wire systems have one serious disadvantage or deficiency. They require the use of lines between stations, and in the forward areas, these can be installed and maintained only with the greatest difficulty owing to the destructive shell fire of the enemy. But even with this handicap, the telephone and telegraph are of such great value that no efforts are spared in an endeavor to maintain the systems operative.

The area from the front line back a distance of about 6,000 yds. is shelled with such intensity that no practical method of adequately protecting the open wire lines has been developed. About the only way that the circuits can be entirely protected from shell fire is by making use of lead covered cable and burying it to a depth of 15 ft. or more. The expense of this construction is prohibitive for a system of the extent required within the 6,000 yd. zone. So a composite system of cable and open wire trench lines has been shown by experience to be about the most satisfactory wire network layout, although this is by no means free from interruption.

In each divisional sector, one main artery of wire lines is installed from rear to front, starting at division headquarters and following the "axis of communication" in as straight a line as

possible to a point approximately 1,200 yds. back of the front line. This main artery is made up of one or more lead covered cables buried to a depth of 6 ft. to 12 ft., depending on the character of the soil and proximity to points likely to draw heavy shelling from the enemy, 8 ft. being the depth most commonly used. Cables providing 40 or 50 pairs of wire are usually installed in this main cable run and are brought through terminal or test boxes installed in small dugout manholes about every 2,000 ft. The lateral circuits spreading out in both directions over the entire divisional area are lead out from these terminal boxes and they are carried in one of the three following ways:

1. **By Overhead Wire Distribution.**—This is of course the easiest way of carrying the lateral leads, but this method can be employed only where the shelling is very light, as may be the case in the zone of division headquarters.

2. **By Small Underground Cable Distribution.**—From the viewpoint of permanency and safety from shelling, this is the most satisfactory method of distribution but it cannot commonly be used because of the great amount of labor involved in its installation. It is generally used only to connect the foward end of the main cable run with the forward end of similar cables in the adjoining divisional sector. Small underground cables are also sometimes used as lateral leads to very important points where it is imperative that telephone communication be maintained without interruption even under heavy shell fire.

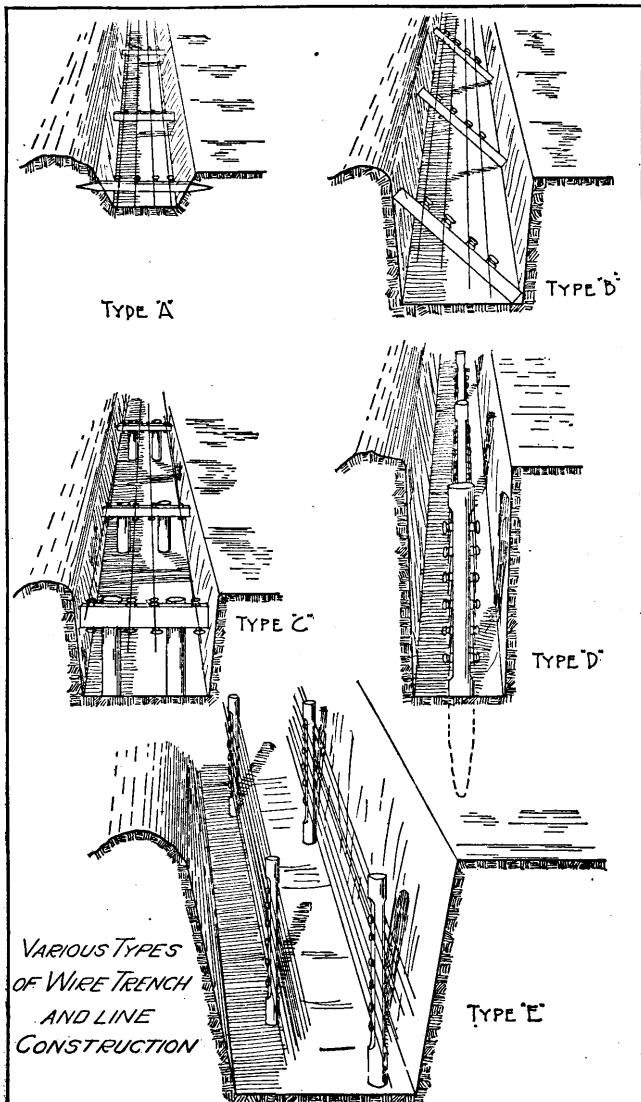
3. **By Trench Line Distribution.**—The most common method of lateral distribution employed is that of installing open wire lines below the ground level in trenches. While this method of construction does not prevent the wires from being broken by shell fire, it does afford some protection to the wires and greatly facilitates repairs because of the protection it gives the men employed in this work.

In general two kinds of trenches are employed for running wire circuits. These are, first, small trenches constructed primarily for this purpose and known as "wire trenches;" and second, trenches that are constructed primarily for other purposes, such as communicating and fire trenches.

Which of these two general classes of trenches is to be employed must be determined by the local conditions. In this connection it should be remembered that the stringing of wire in trenches used for other purposes is a makeshift and should be done only

where unavoidable. Wires in trenches used for other purposes are subject to the shell fire aimed at the troops in them. Moreover, the troops themselves in passing through the trenches do as much if not more damage to the wires than the shell fire. In this connection, all officers should impress upon their men the great importance of the wires in the trenches and caution them frequently to be very careful not to damage the lines in any way. In the extreme forward area where only few circuits are necessary, and where the ground is exposed or so badly cut up with traffic that the construction of another trench for wire purposes would be a source of hindrance to the movement of traffic, it is considered necessary or advisable to use the second class of trenches.

The general rule as to who shall be responsible for the construction and maintenance of lines is that each detachment will handle those lines from its own headquarters inclusive, forward to but exclusive of the next headquarters. However, in repairing a broken line, men from both stations should start out to locate and repair the break in order that the interruption to communications may be as short as possible. In these matters, the fullest measure of cooperation should exist and no one should wait for someone else to do a job when he can do it more quickly.



VARIOUS TYPES OF WIRE TRENCH AND LINE CONSTRUCTION

CHAPTER II.

WIRE TRENCH AND TRENCH LINE CONSTRUCTION.

Wire Trenches are used not only for lateral leads from the main underground cable but also for installing connecting lines between any points in the zone of heavy shelling where it is not necessary or expedient to use communicating or fire trenches, nor justifiable to use underground cable. They vary in depth and width according to the number of lines the trench is to carry and the amount of protection desired. They range from 10 in. wide x 10 in. deep to 36 in. wide x 30 in. deep. They afford considerable protection from shell fire, except a direct hit in or very close to the trench, and also avoid damage to lines, due to trench traffic.

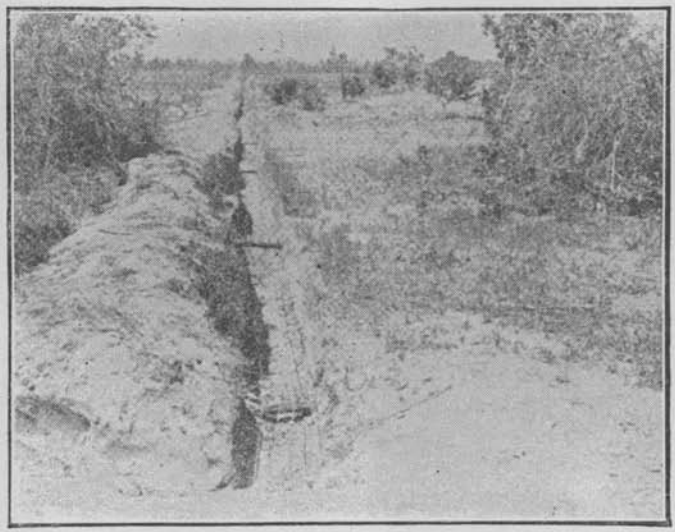
The construction employed for wire trenches in general may be divided into five types, any of which can be modified to suit local conditions. They are as follows:

Type A Construction.—This construction provides a shallow and narrow trench about 10 in. wide and 10 in. deep, which is used for carrying one or two twisted pairs. Inside the trench, at intervals of 15 or 20 ft., cross sticks are placed horizontally, projecting into the sides and about midway between the top and bottom of the trench. The wires may be fastened to these cross sticks by tying with wire or string. It is preferable, however, to place insulators on top of the sticks and tie the wires to them.

This type A trench is used where one to three circuits are required, as for example between the batteries of artillery and from a battery to its battalion. It can be constructed quite rapidly. A detail of two men should dig 35 yds. per day in good ground. The cross sticks, with the insulators nailed onto them, can be prepared under shelter in advance of the need. The objection to this type of trench is that it fills quickly with leaves, sticks and soil and is very hard to clean out on account of the difficulty of lifting the wires out of the trench.

Type B Construction.—The type B construction provides a trench about 10 in. wide and 18 in. deep in which a wooden arm 20 in. long is laid diagonally in the trench. The wires are fastened to insulators nailed to one side of the arm. These supporting arms

are spaced about 20 ft. apart. With this method of construction the arms holding the wire may be raised up at the upper end and the trench readily cleaned when necessary. This type of trench is used when it is desired to have one or two more circuits than the type A will permit. As it will accommodate four or five twisted pair lines.



Type A Wire Trench and Line Construction

Type C Construction.—With this type of construction, the trench is made about 20 in. wide and about 20 in. deep. At intervals of 15 to 20 ft., two posts are driven into the bottom of the trench and a cross arm long enough to carry five or six twisted pairs is supported on them. The wires are fastened to insulators which are attached to the cross arm. This method of construction is used where it is practical to put in a more permanent installation than that of type B. A detail of two men can dig about 25 yds. of this type of trench per day in good ground.

Type D Construction.—When more than six circuits are required, it is necessary to construct a trench about 30 in. deep x 12 in. wide at the bottom and 18 in. wide at the top. In this trench, posts

about 4 in. in diameter and 4 ft. long are driven in the bottom of the trench to a depth of 18 in. and spaced about 25 ft. apart. These posts are gained on two opposite sides from a point 5 in. below the top to a point 20 in. lower. Seven insulators are then nailed on each of the flat sides of the posts and staggered on opposite sides so that the nails will be evenly spaced and not as likely to split the pole. As many as 14 twisted pairs can be carried



A Type B Trench and Two Type D Trenches Joining In a Type E Trench

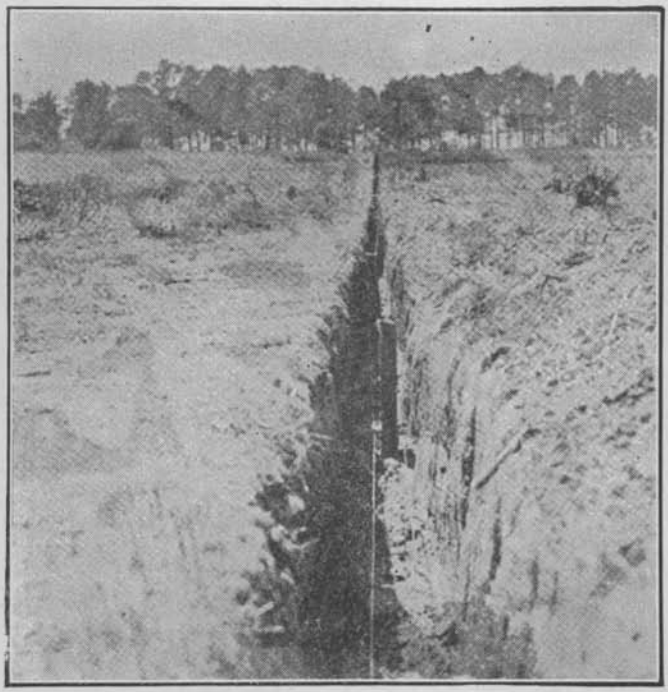
in this type of wire trench. A detail of two men can prepare about 100 posts per day and a detail of two men can dig about 25 yds. of this type of trench per day in good ground.

Type E Construction.—While the type D construction can carry as high as 14 twisted pairs, it is better practice when the number required exceeds 10, to construct a type E wire trench which is similar to the former but wider. This trench is made 3 ft. wide at the top, 2 ft. wide at the bottom and 30 in. deep. Two parallel lines of the type D trench wiring can be installed if desired. This wire trench will serve to carry from 10 to 20 twisted pairs and it has a maximum capacity of 28 pairs. A detail of two men can dig about 15 yds. of this trench per day in good ground.

METHOD OF CONSTRUCTING WIRE TRENCHES

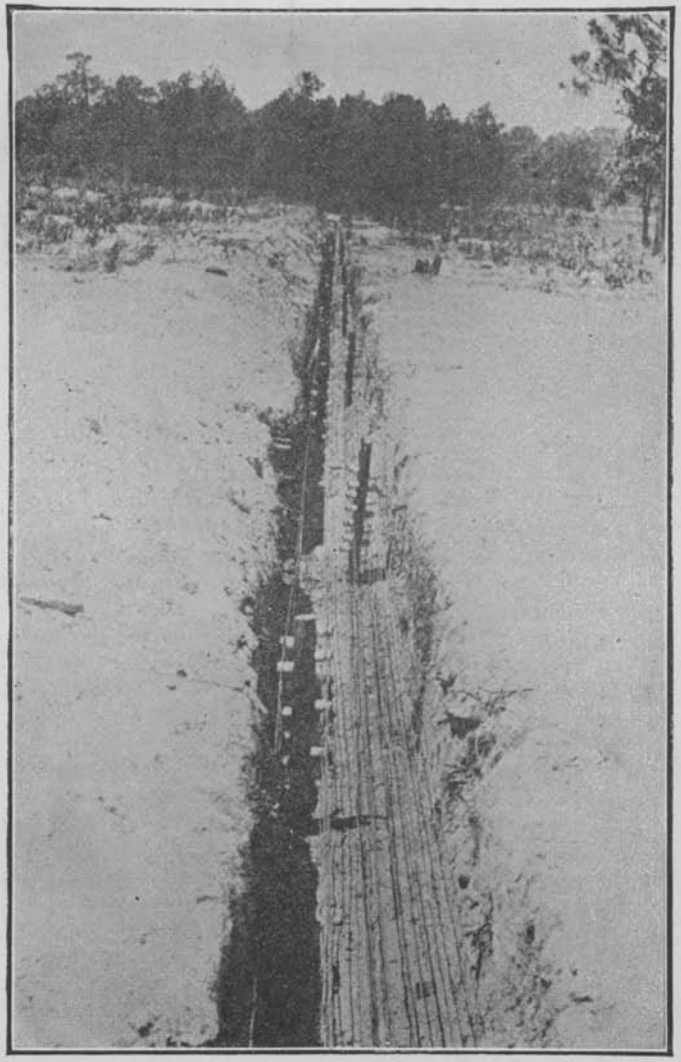
The routing of the wire trenches should be carefully determined through reconnaissance of the ground and study of the map of the

sector, so that they will be as easily constructed and as well protected as possible. This study is usually made by an officer, assisted by the non-commissioned officer who will be in charge of the construction work. The route selected should be as straight as is consistent with the necessity to avoid obstructions and



Type D Wire Trench and Line Construction, Showing Installation of First Lines at Bottom

points where there is likely to be heavy shelling. The best route is not necessarily the shortest one. For example, the circuits which run to units in the same general direction should not immediately branch out to their various destinations, but instead, should be kept together in a trunk line as far as possible. In fact, the saving of material and labor resulting, will often warrant



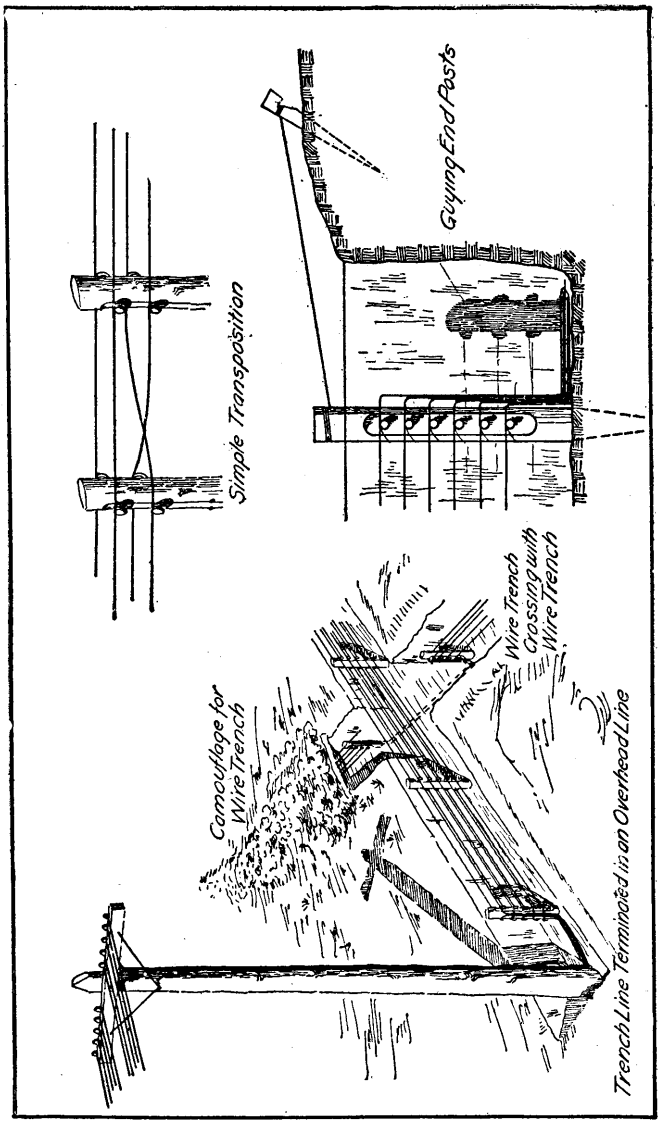
Type E Wire Trench and Line Construction, Showing Staggered Post Location

the installation of a switchboard at the point of separation. This may save several circuits in the trunk line. The trenches should never be constructed immediately at the sides of roads. Junctions of roads especially should be avoided. The relation of the profile of the ground to the problem of transporting the necessary line material should be considered in choosing the route. Wherever possible, the trench lines should run through woods in order to obscure them from aerial observation. Ordinarily, it is unnecessary to conceal wire trenches as there are so many trenches running through the shelled area that those used for communication purposes are not likely to attract any unusual attention from the enemy aerial observer. Both ends of the trench, however, must be carefully camouflaged.

When the route has been determined, it is staked out with small wooden pegs placed about 10 yds. apart. If the trench is to be dug at night it should be outlined during the day in such a way that the route can be readily followed at night. In determining the type of wire trench to be constructed the need for additional lines should be anticipated and the general principle of carrying as many circuits as possible in one route followed. If the trench runs through a wooded area, where it is likely to fill up quickly with leaves, the type of construction which will facilitate cleaning out, should be used.

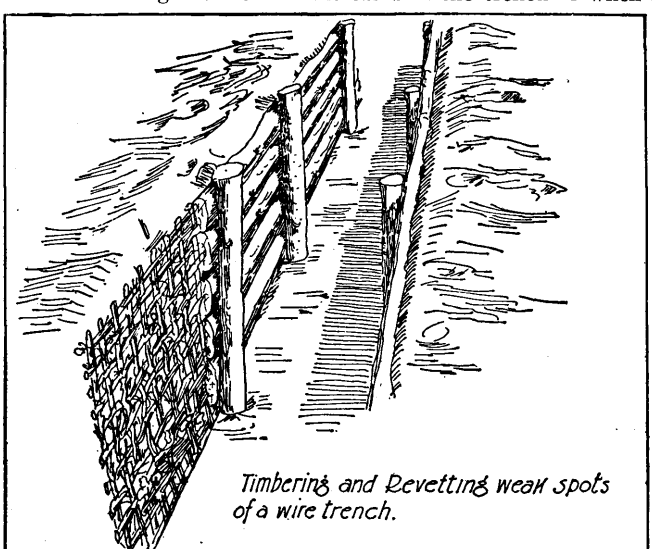
When the actual construction of the trench begins, the workers are divided into groups of two men each and one man equipped with a pick and the other with a shovel. A liberal number of workmen should be asked for in order to complete the job as quickly as possible. When the number of men exceeds 50 an officer should be present. If there is a scarcity of tools so that only a few men can be used at a time and these must consequently work harder in order to complete the job by the specified time, reliefs for the men on frequent shifts will be necessary. In localities subject to shelling, the work is done by dividing the men in small groups and separating the groups along the line of the trench in order to minimize losses.

Where the visibility of the freshly dug soil is great, as for example with clay, the ditch should be obscured by using branches or a camouflage of canvas made up in advance. After the ditch has been finished, walking along the edge should be avoided in order to prevent the dirt from sliding back into the trench. In soft crumbly ground, the dirt can be kept from sliding by sloping


Guying End Posts
Simple Transposition
Camouflage for Wire Trench
Wire Trench Crossing with Wire Trench
Trench Line Terminated in an Overhead Line

the sides toward the top, and if necessary by timbering or revetting the weak spots. The work will generally be completed more quickly if it is laid out in tasks divided equally between the groups of men detailed. No more work should be started than can be completed with the men available. The speed of construction of the trench depends upon the care with which the route is selected, upon the organization and discipline of the digging squad and upon their devotion to duty.

The required trench posts should be prepared as described and distributed along the trench. At turns in the trench or when a



Timbering and Revetting weak spots of a wire trench.

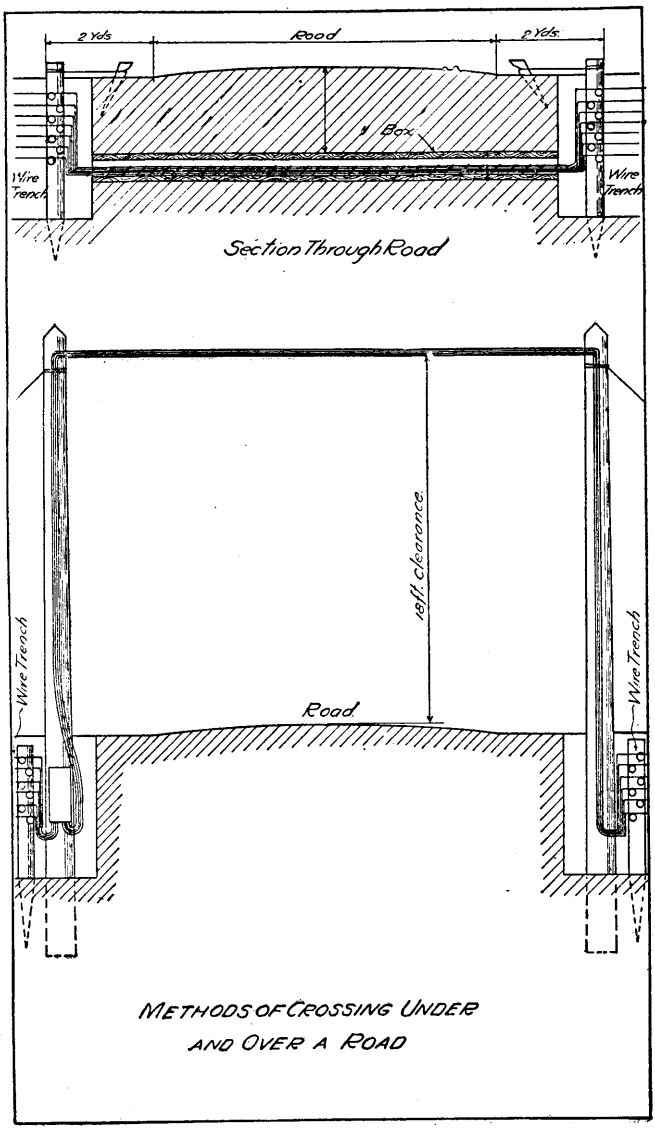
crossing with other trenches is made, etc., the posts must be placed closer together. The end posts should be slightly higher than the trench so that they can be guyed from the outside if necessary. When the posts have been set in the ground, the bottom wire should be the first one installed. It should be placed about 6 in. above the bottom of the trench. The wires are fastened to the insulators in the ordinary manner, but allowing a rather liberal amount of sag. If stretched too tightly, they will loosen the posts and will also break more quickly from concussion if a shell should burst near them.

Trench lines are terminated either by running the trench directly into a terminal station, by connecting to an overhead system or to an underground cable outlet box. Care must be taken to camouflage a wire trench for 100 yds. before its termination, in order to prevent airplane photographs from plainly showing the location of a unit's headquarters, the important test points, etc. When a trench line is terminated in an overhead system, the wires should leave the trench tied together in cable form. In this manner they are run up the side of the pole and distributed.

Trench lines can be terminated in the main buried cable only by being brought into the nearest test box of the cable. In so terminating, the wire trench should not be brought directly up to the box, even though carefully camouflaged. It is much safer to run the wires into a short length of buried lead cable and then into the main cable test box.

METHODS OF CARRYING TRENCH LINES ACROSS A ROAD

When it is necessary to cross a road with a wire trench, the best procedure is to dig a trench across the road and put the lines in a wooden, clay, or iron conduit, filling in above it. If practicable, but half the road should be dug up at a time in order not to interfere with traffic. The conduit need be buried only deep enough to protect it from road traffic and no other effort need be made to provide protection from shell fire. If no conduit is available, single pair lead covered cable may be used for crossing underneath the road, splicing it to a twisted pair on each side of the road. It is not desirable, however, to do this. If the wires are new and the insulation in good condition, the lines can be tied together at close intervals and laid directly in the trench and protected by sand bags. When this is done, it will usually be necessary to dig a small well at either side of the road and fill it with stones to provide drainage for water seeping through the surface of the road, and which might lie in the bottom of the trench and rapidly destroy the insulation. In order to assure proper drainage the bottom of the trench under the center of the road should be 3 or 4 in. higher than the bottom of the trench at the sides of the road. If the conditions of the ground and the traffic make it impractical to go under the road, the wires may be bound together in cable form and carried overhead on poles. In attaching the wires to these poles, marlin should be used and

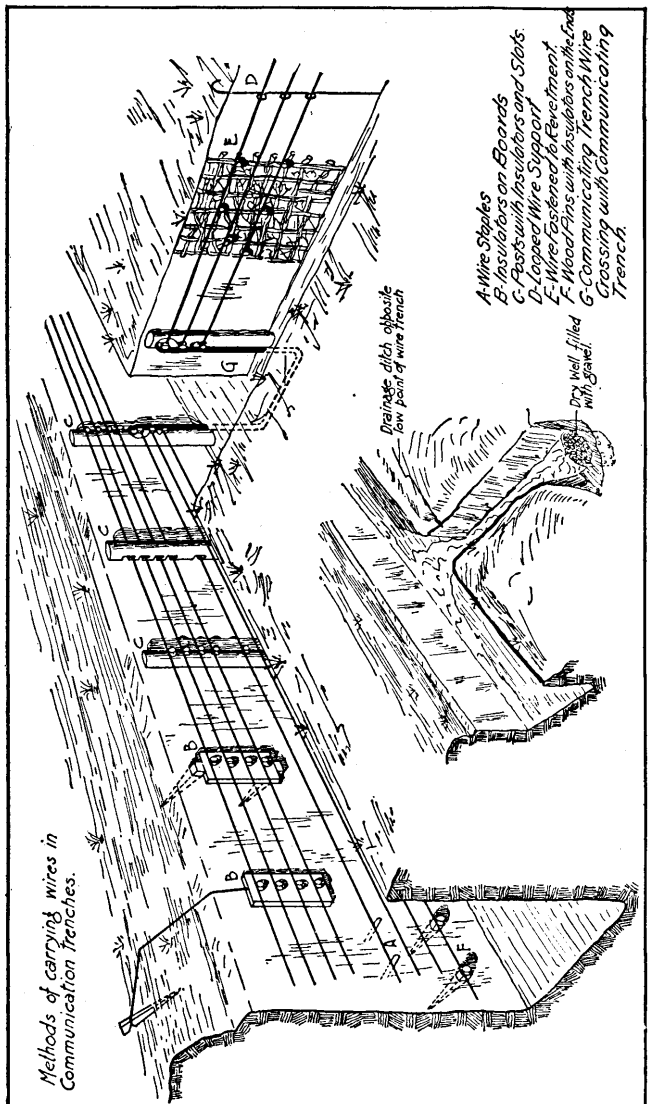


METHODS OF CROSSING UNDER AND OVER A ROAD

the wire itself should not be noosed or hitched around the pole. On one side of the road all the wires should be brought into a terminal box and properly tagged. French law requires a road clearance of 15 ft. for lanes and side roads and 18 ft. on main roads.

DRAINAGE OF WIRE TRENCHES

In constructing any type of wire trench, provision must be made for proper drainage. This can be accomplished by digging ditches or saps leading off from the trench at the low places. If the ground should be of such nature that proper drainage is not possible, some other route must be sought, for the wires in the trench will be made useless if the trench fills with water.


Methods of carrying wires in Communication Trenches.
A-Wire Staples
B-Insulators on Boards
C-Posts with Insulators and Slots.
D-Looped Wire Support
E-Wire fastened to Pavement.
F-Wood Pins with Insulators on the End
G-Communicating Trench Wire Crossing with Communicating Trench.
Drainage ditch opposite low point of wire trench
Dry Well filled with gravel.

CHAPTER III.

LINE CONSTRUCTION IN COMMUNICATING AND FIRE TRENCHES

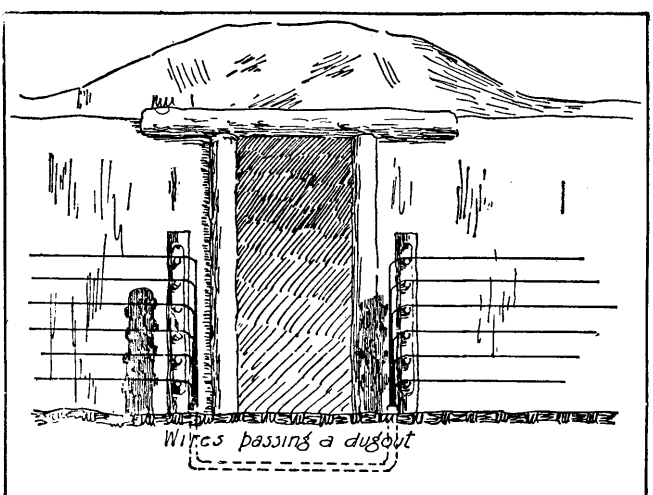
Communicating and fire trenches are not dug for the use of the Signal Corps, but because of the crowded condition of the front line territory and the danger and difficulty of constructing trenches, the Signal Corps has been given permission to use these trenches for a limited number of lines—not to exceed six circuits. This number is sufficient to enable all telephone and buzzerphone communications to be taken care of. Owing to the amount of traffic, fire and communicating trenches are not satisfactory for permanent use and should be used only for temporary lines except in the extreme front where no other method is practical. From the regiment forward, the use of communicating and fire trenches for telephone and buzzerphone lines is not only permissable but generally necessary. The six circuits allowed are quickly installed and easily maintained, the personnel performing the work under shelter.

The trenches in which wires are strung should be carefully chosen. For example, trenches which may soon be abandoned or which go through an area under constant shell fire should be avoided if possible. It can be ascertained which trenches are to be kept open at all hazards and these trenches selected, provided they are well constructed. Evacuation, support and traffic trenches should be avoided if possible. Strong points and machine gun emplacements also should be avoided as they are targets for shelling. Before beginning the installation of a new line, the shortest and best route is determined upon by an officer. The length should be estimated and the proper amount of material obtained in advance. The route should then be marked off on the map and this turned over to the officer or non-commissioned officer given charge of the construction work.

As a general rule, the lines must be kept on the side of the trench nearest the enemy and as near the wall as possible. The near side of the trench presents little advantage in the way of protection from shell fire, but this practice should not be adhered to when other conditions make it more desirable to use the other side.

This is true especially in narrow fire trenches where the increased protection would be more than outweighed by the danger of breakage resulting from the men working and firing on this side of the trench. Under such conditions it is better practice to place the wires upon the rear wall of the trench.

In cases where it is absolutely necessary to run more than six circuits in a communicating trench, it usually will be found necessary to wire both sides of the trench. When this is the case it is best to place all wires belonging to the infantry on one side of the trench and those belonging to the artillery upon the opposite side.



When passing the doors of dugouts or shelters in the side of the trench, the wires should be laid under the door and not run above it. Where the sill is well made of timber, the wires may be laid underneath it and protected by sand bags. Where there is no such sill, the wires should be buried to a depth of 5 or 6 in. Where the lines cross other trenches they should be carried underground, in iron pipe if this is available; otherwise, they should be laid in a small cross ditch and protected by sand bags.

Trench lines should not be fastened too close to the top of the trenches for they are likely to be damaged by the sides caving

in during wet weather. If fastened too low, they are likely to come in contact with water in the bottom of the trench, and to be cut and broken by trench traffic. Wires placed at heights between 10 and 30 in. from the duck boards or bottom of the trench are in the best position and least subject to interruption from these causes.

METHODS OF SUPPORTING TRENCH LINES

After the route of a trench line has been selected, the next question to be decided is the method of construction to be used to obtain the desired results. The results desired are:

1. Good transmission.
2. Best possible protection from traffic and shelling.
3. Easiest and quickest installation.
4. Smallest possible expenditure of material.

There are several approved methods of supporting lines in trenches, as shown in the following paragraphs. In attaching wires to the insulators or other supports, the greatest care should be taken not to injure the insulation. Wherever the insulation becomes broken or defective, a leak to ground will probably develop. Such leaks greatly aid the listening-in work of the enemy.

Wire Staples.—Wires may be fastened to the side of a trench by staples made of stiff wire and about 12 in. long. These staples are placed over the wire and driven into the earth as far as possible so that the wire is drawn closely to the side of the trench and held firmly in place. A small pad of burlap, tar paper, felt or any insulating material should be placed over the wire where the head of the staple presses against it in order to reinforce the insulation at that point. The staples may be spaced anywhere from 6 to 10 ft. apart, but should be close enough to each other to hold the wire closely to the wall of the trench at all points.

The advantages of this system of supporting the wires are ease in preparing the staples, ease and quickness of installation and the closeness with which the wire is held against the side of the trench, protecting it from traffic. In trenches having very solid walls, a small groove may be cut in the side wall deep enough to take the wires, thus affording them further protection. Care must be taken to make this groove shallow, for any considerable undercutting in the side of the trench soon results in a cave-in.

The disadvantage of this system is that the staples form a very good ground connection in case the insulation on the wire becomes faulty. With a heavily insulated wire, however, and reasonable care in construction and inspection, this disadvantage is largely overcome and does not outweigh the advantages.

Insulators on Boards Fastened to the Side of the Trench.—Another method of supporting wires in a trench is to fasten boards, on which the desired number of insulators have been mounted, to the side of the trench by means of rods or staples long enough to get a firm grip in the soil. The wires are then tied on these insulators in the usual way.

This is an excellent method, providing the ground is of a firm clay-like nature, which permits the boards to be held firmly in place. It has the disadvantage of holding the wires at a distance of 2 or 3 in. from the side of the trench, thus making it somewhat exposed to injury. The advantages of this system are the ease and quickness of construction and maintenance. With old wire or with wire having an inferior grade of insulation, this method is more desirable than the use of staples, since the latter brings the wires in direct contact with the earth. In communicating trenches which are not kept in good condition, or where the sides are likely to slide or cave in, the same type of small board may be used, but instead of being pinned to the side of the trench it can be hung by a wire brought up over the edge of the trench and attached to a stake driven at a point sufficiently far from the edge of the trench to be beyond the line of ordinary cave-in. With this construction it is possible to avoid breaks in wires resulting from cave-ins. However, it is unsatisfactory from all other viewpoints as the wires are extremely loose and may be easily torn away from the side of the trench.

Small Wooden Stakes with Insulators Attached to the End.—A third method of supporting trench lines is to drive wooden stakes or pegs, 6 to 8 in. long and 1 or 2 in. in diameter, into the trench wall and nail insulators to the exposed ends. These pegs should be driven in until practically flush with the wall of the trench before the insulators are attached. This construction provides more protection than the staple method, yet holds the wires fairly close to the side of the trench. The pegs should be placed close enough so that the wire will follow closely the line of the trench wall, special care being taken to secure the wires snugly in any corners or turns of the trench.

Posts with Slots or Insulators.—Posts about 6 ft. in length and 3 to 4 in. in diameter, may be used to support wires in communicating trenches. These posts should be driven as firmly as possible into the ground and set close to the side of the trench. They may be countersunk into the trench wall to one-half their thickness where this is practical. The wires are attached to the posts by means of insulators or by merely cutting narrow slots in the side of the post into which the wire is laid. This gives a strong construction and requires but a small amount of upkeep. It has the disadvantage of requiring considerable time and labor for its installation. It has the additional disadvantage that it holds the wires far enough from the side of the trench to subject them to more breakage by traffic. In a straight trench these poles should be spaced a distance of 25 ft. apart. In a winding trench, they should be placed much closer, it being necessary for one to be at every corner or change of direction. In large communicating trenches where the placing of wire posts does not take up too much of the space available for traffic, and where the number of circuits required is large, this method is very satisfactory. For narrow communicating trenches or for fire trenches, it is not a satisfactory construction unless careful countersinking of the posts is resorted to.

Looped Wire Supports.—Where the walls of a trench are in good condition, wires may be supported on the sides by means of looped wire supports. These are made of No. 9 or heavier galvanized iron wire. The necessary number of loops in them is made by twisting the wire about a hammer handle or some round form. The loops thus made should be spaced about $2\frac{1}{2}$ in. apart on the wire. After the loops are completed, one end of the support wire is attached to a stake driven in the bottom of the trench and the other end is carried up out of the trench and attached to a stake driven into the solid ground a foot or two from the edge of the trench. The wire support should be drawn as tightly as possible so that it will lie closely to the side of the trench, with the loops parallel to the wall. In attaching the line wires, they are not run through the loops but are simply pressed down into them and the loops closed with a pair of pliers, merely tight enough to hold the wires in place. They can then be easily removed when necessary.

Wire Fastened to Brush Revetment.—In trenches which are well revetted satisfactory results may be obtained by tying the

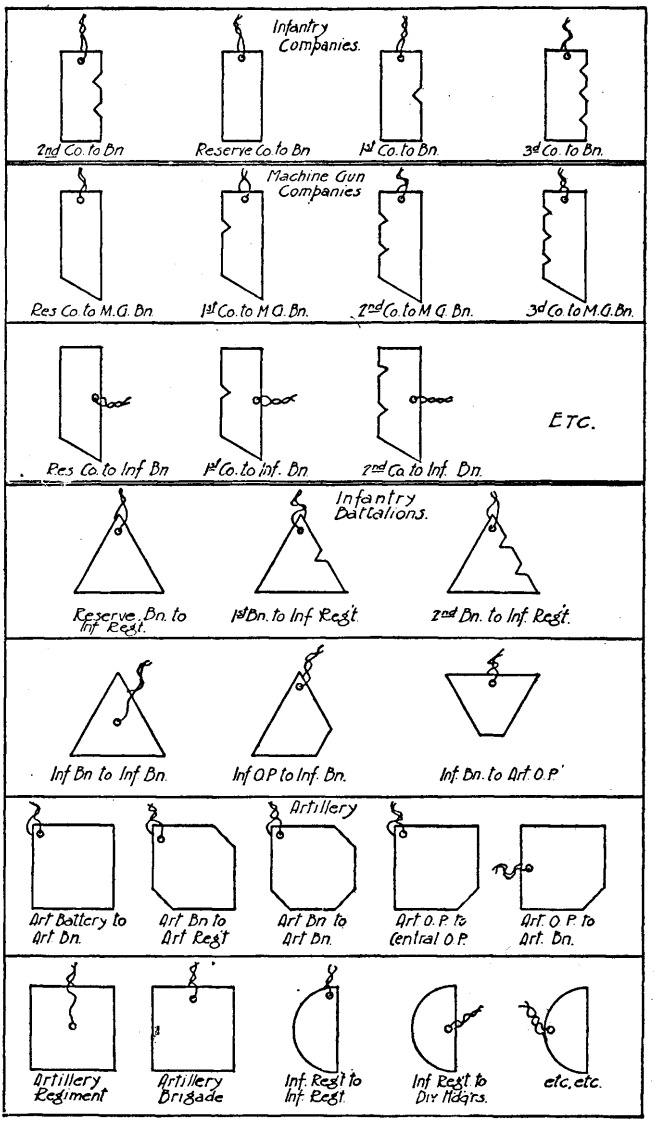
wires to the revetment or attaching them to insulators placed on the revetment posts. This is a quick method of installation, the consumption of material is small and the system is easily kept in working order. The wire must be brought carefully into the corners of the trench and tied as closely as possible against the revetment.

TRANSPOSITIONS IN TRENCH LINES

It is required that twisted pair be used within 3,000 yds. of the enemy's front line in order to minimize the possibility of the enemy picking up information with his listening-in service. A minimum of 5,000 yds. is better. Even back of this area twisted pairs should still be used in trenches although it may occasionally be necessary to run a circuit of single conductor wire. When this is done, it will be necessary to overcome the self-induction that occurs when long wire lines are run parallel to each other by transposing the wires of the several circuits. While in permanent overhead construction with a large number of circuits, it is necessary that an elaborate transposition scheme be worked out for all the wires considered as a whole, in trench line construction where the circuits are few in number, it will be found that transposition of the wires of each circuit with reference to the others every 1,000 ft. or 1,500 ft., will reduce the induction and resulting cross-talk to an inconsequential amount.

EMERGENCY CIRCUITS

Signalmen should be familiar with emergency ways of establishing telephone communication when the regular lines are put out of commission. If the telephone system has been well laid out, it will always be possible to establish communication between any two important points by a roundabout route using lateral lines to switchboards of other similar units and working through them. The different possibilties or combinations of paths around fictitious points of trouble should be sought out in anticipation of the need.



Scheme No. 1 for Tagging Trench Lines

CHAPTER IV.

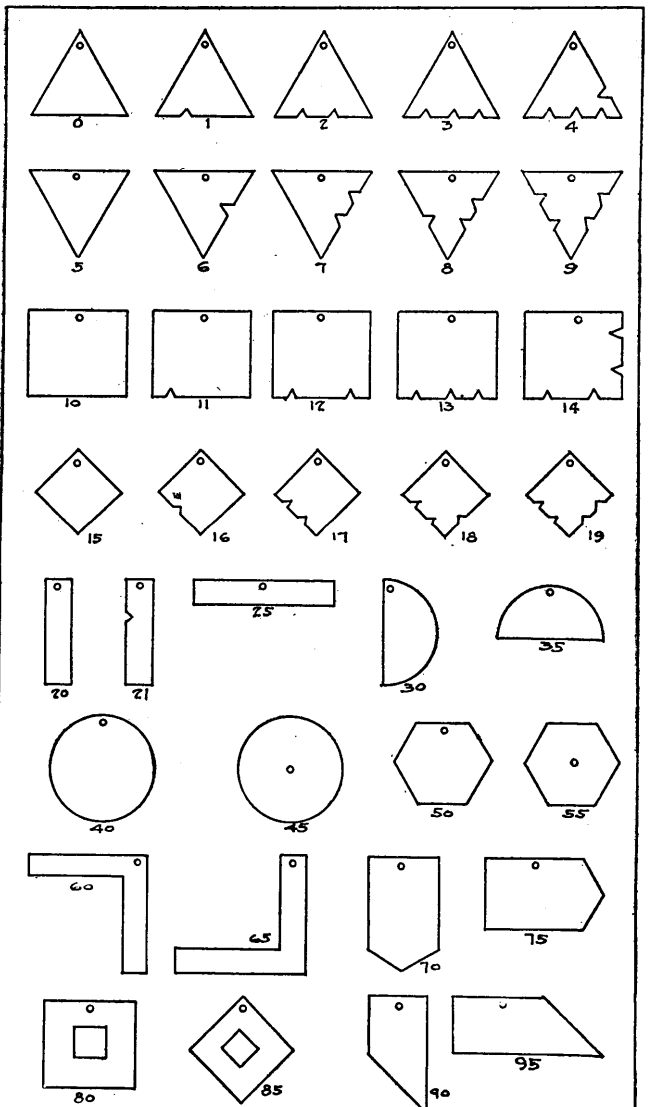
TAGGING TRENCH LINES

All circuits in the divisional area should be marked to show their use. Marking of lines is accomplished by means of small tags made of thin wood or fibre and having various shapes. They should be attached to each circuit at frequent intervals. These tags should clearly indicate the origin and destination of the circuit to which they are attached. This information can be supplied by varying the shape of the tag, the location of the tying wire or string on the tag, and by making one or more notches along the edges of the tag. Using these three variants, it is possible to give the desired designation in such form that the linemen have no trouble in locating or identifying a circuit, even on the darkest night, simply by feeling of the tag.

All tags must be kept up to date and correspond to the most recent assignment of circuits. A line completed but unassigned should be so marked, and no line should be left untagged. In trench wiring the tags should not be more than 50 yds. apart, even on direct routes. Where test boxes or junction boxes occur, lines should be tagged on both sides of the boxes and near enough to them so that the linemen will have no difficulty in tracing lines. Tags should be placed both inside and outside of all stations. Tags should be securely tied or wired to the circuit, but if wire is used in doing this, it should not be drawn tight enough to injure the insulation of the line. Circuits should be tagged whenever they enter or leave the ground and at the junction of a trench route with an overhead route. This applies to a short road crossing as well as to a long buried route.

No standard scheme of tagging trench lines has yet been adopted by the American Expeditionary Forces. At present it is the duty of the division signal officer to work out the code of tags for use within his division. The two following schemes are given simply as suggestions, they being based on codes which have been used satisfactorily.

Scheme 1.—In this system, the tags correspond in shape where possible to the shape of the identification panel of the various units connected. Lines between units use the tag of the



Scheme No. 2 for Tagging Trench Lines

higher unit. On lines between the artillery and the infantry, the tag of the infantry is used; between the machine gun battalions and the infantry or artillery the tags of the machine gun battalions are used.

Scheme 2.—This system of tags makes use of the three variants employed in the first system, but instead of the tags indicating the lines directly, they are used to make a series of numbers from one to one hundred, or more if necessary, and these numbers are assigned to the various units within the division. There is a different shaped tag for each group of ten numbers, the first five numbers being indicated by one to five notches made on the tag when it is tied at one corner and the other five numbers by one to five notches when the tag is tied at the center of one side. This avoids the necessity to make a large number of notches, which would complicate the work of the linemen in finding a particular circuit by touch. The corresponding units within different regiments which are not adjoining, may have the same numbers assigned to them if it is certain that there is no possibility of conflict. For example, the first battalion of the first regiment may be assigned numbers from one to ten, while the first battalion of the fourth regiment may be assigned these same numbers.

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TRENCH LINE CONSTRUCTION

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