INSTRUCTIONS FOR INSTALLING TELEPHONE SUBSTATION SETS

THE PENNSYLVANIA RAILROAD COMPANY

PHILADELPHIA, BALTIMORE & WASHINGTON RAILROAD COMPANY
NORTHERN CENTRAL RAILWAY COMPANY
WEST JERSEY & SEASHORE RAILROAD COMPANY

INSTRUCTIONS FOR INSTALLING TELEPHONE SUBSTATION SETS

APPROVED

S. C. LONG
GENERAL MANAGER

J. C. JOHNSON
SUPERINTENDENT TELEGRAPH

PHILADELPHIA, PA.
DECEMBER 1, 1912

INSTALLATION OF SUBSTATION SETS

These instructions apply to common battery and local battery substations. They cover the installation of protectors, telephone sets and their wiring.

If a condition arises that is not covered by these instructions, the proper authority should be consulted before proceeding with the work.

Substations are of two types: Exposed and Unexposed.

The installer shall make sure of the conditions of exposure to which the substation line wires are subject before beginning an installation, and should there be any doubt regarding the character of the protection required, the proper authority must be called upon for a decision.

EXPOSED SUBSTATIONS Protective apparatus and methods called for in these instructions must be applied at all exposed substations.

UNEXPOSED SUBSTATIONS The use of protective apparatus may be omitted on the line wires of substations served entirely by under-ground cable, where the cable is not exposed to lightning or contact with electric light or power circuits.

ENTRANCE HOLES Two separate holes, at least two and three-quarters ($2\frac{3}{4}$) inches apart, sloping downward from the inside shall be made in the building, and in case a ground wire is to be carried to the outside, a third hole shall be made two and three-quarters ($2\frac{3}{4}$) inches from either of the other holes. (See Fig. 1 A and B.) The location of the protector in the building shall be determined before these holes are made, as it is often possible to locate the holes immediately above or below the fuse terminals on the protector, thus securing the shortest length for the leading-in wires. It is advisable, whenever possible, to consult with the owner or occupant of the building regarding the location of the entrance holes.

In all cases the two holes shall be made as near as possible to the protector, and shall be started from the inside of the building.

Each entrance hole shall be bushed with a full length $\frac{5}{16}''$ porcelain tube, inserted from the outside. Each tube shall project at least $\frac{1}{8}''$ and not over $\frac{1}{2}''$ on the inside, of the building. Care must be exercised to use bits of proper size for boring holes. When necessary, wooden wedges may be used to secure the porcelain tubes in place. (See Fig. 2.)

The entrance of the wires into the building shall be made as near as practicable to a permanent ground.

When the leading-in wires are to be brought in at a window or door, it is preferable to locate such wires at the top of the casing rather than at the side or below. The leading-in wires shall not enter at the attic or roof, unless it is impossible to do otherwise.

Care should be used in locating the entrance wires to avoid their coming in contact with outside blinds or awnings.

LEADING-IN WIRES FROM A DROP LOOP OF TWO BARE WIRES When the drop loop from the pole or fixture consists of two bare wires, the wires from their terminating insulators immediately outside the building extending to the line terminals of the protector, shall be of No. 16 B. & S. gauge standard bridle wire, soldered to the end of the bare wires after they have been attached to the insulators, or combination sleeves of an approved type and proper size may be used.

A drip loop shall be left in each leading-in wire at a point immediately beneath the entrance hole as shown in Fig. 2.

Split porcelain insulators shall be used for supporting leading-in wires on the inside of the building when it is impossible to connect directly to the terminals of the protector. The leading-in wires must maintain a separation of at least two and one-half ($2\frac{1}{2}$) inches for the entire distance. It is important to make this work as sightly as possible, and, with this end in view, the wires shall be run only horizontally and vertically. (Fig. 3.)

Never allow the leading-in wires to come in contact with any part of the building.

LEADING-IN WIRES FROM TWO SINGLE OR ONE TWISTED PAIR WIRES

When the drop loop from the pole or fixture to the building consists of either two (2) single insulated or one (1) twisted pair wires, they must not be terminated outside of the building but after attaching them to the insulators on the building, they should extend into the building through the separate holes and terminate on the protector.

CONNECTING BLOCKS

At unexposed stations the leading-in wires and the inside line wires shall when practicable terminate on the binding posts of a connecting block, which shall be located as near as possible to the holes where the leading-in wires enter.

This connecting block affords a convenient place for testing the line, and also obviates the necessity of joints between the leading-in wires and the inside line wires. (See Fig. 4.)

For direct lines use the No. 7-A connecting block. For four (4) party selective lines, the No. 9-A connecting block shall be used, the third or middle post being used for the ground wire.

PROTECTORS FOR SUBSTATIONS

(A) For Common Battery Substations use the No. 58-A or No. 12-B protector.

(B) For regular Magneto Substations use the No. 12-A protector.

(C) For Magneto Substations equipped with a condenser wired in series with the ringer, the No. 58-A or No. 12-B protector may be used.

DESCRIPTION OF PROTECTORS

No. 58-A protector is made up of one No. 29 protector mounting, two No. 11-C fuses, one No. 16 porcelain protector mounting, two No. 1 protector blocks, two No. 2 protector blocks and two No. 3 micas.

The No. 12-A protector is made up of one No. 25 protector mounting, two No. 1 protector blocks, two No. 2 protector blocks, one No. 3 protector mica, two No. 12-A fuses (red).

The No. 12-B protector is made up of one No. 25 protector mounting, two No. 1 protector blocks, two No. 2 protector blocks, one No. 3 protector mica, two No. 11-D fuses (black).

INSTALLING PROTECTORS

Protectors shall be placed in the building as near as possible to the point where the leading-in wires enter. A No. 48 protector mounting (asbestos mat) shall be placed on the wall back of the No. 58 type protector. This mounting is not necessary where the No. 12 type protector is used.

Protectors shall be mounted upon the wall (never upon the ceiling or floor) so that the fuses are vertical; otherwise the dust that may collect between the protector

blocks will not fall out. The protectors shall not be exposed to water or dampness, and located so that the ground wire shall be as short and straight as possible.

Attics or dark and dusty locations should in all cases be avoided.

When necessary to place protectors where they will be exposed to dust and flying particles, they shall be enclosed in a case. The case may be of wood or iron construction, provided with a hinged door and latch so as to allow for ready inspection of the protector, and shall be fastened to the wall by screws, and conveniently placed for inspection. If a wood case is used it shall have an asbestos lining. When possible, the protectors shall be mounted at least seven (7) feet from the floor. Where curtains, shades, or like combustible materials are present, the protectors shall be mounted at least six (6) inches from such combustible materials. One or more protectors may be mounted in the same case.

FUSES AND MICAS The No. 11-C fuses used with No. 58 type protectors shall be so placed that the transverse slits in the fuses shall be turned toward the surface upon which the protector is mounted.

The No. 3 micas shall be placed between the carbon blocks so that the open portion of the micas shall be directed downward. There shall be nothing between the carbon blocks but the mica separator provided for the purpose. Only one mica shall be placed between each pair of protector blocks.

The protectors shall be connected as follows:

CONNECTING WIRES TO PROTECTORS

The leading-in wires shall be connected to the fuse terminals marked "L" (the most distant terminal from the protector blocks), and the inside line wires to the other end of the fuse terminals, that is, the terminals nearest to the protector blocks. The ground wire shall be connected to the terminal marked "G".

In cases where the No. 12 protectors are used for Common Battery Substations, the No. 11-D fuse shall be used instead of the No. 12 fuse; the latter type is usually furnished with the No. 12 protectors.

Location of Telephone Sets

PORTABLE DESK SET

Place the portable desk set where it will be accessible and convenient. The location shall conform to the wishes of the user as far as possible. The bell box shall be located so that the desk-set cord can be connected directly to the terminals in the box, if possible to do this and conform with the above; otherwise a No. 5-A connecting block shall be placed so that the desk-set cord can be connected to it, and triple wire shall be run from the

bell box to the connecting block. In connecting the wires of the box and the wires of the desk-set, at the connecting block, wires of similar color shall be connected.

BELL BOX Place the bell box where it will be readily accessible for repairs, and where it will not be exposed to damage, so that the bells can be heard distinctly.

WALL SET Place the wall set so that the mouth-piece will be adapted to the height of the user. The location of the set shall, as far as possible, conform to the wishes of the user. Four (4) feet ten (10) inches to the centre of the transmitter, with its face vertical, is considered the standard height, and this height shall be used, except where the height does not conform to the wishes or height of the user.

LOCATIONS TO BE AVOIDED Substation sets shall not be located where they may be damaged by doors or movable furniture, nor over registers or radiators.

Never mount sets on damp walls or vibrating partitions. A set shall not be placed within two (2) feet of a door or window that is liable to be left open, provided it is possible to place the set in any other position. Noisy locations shall be avoided.

WIRING ON DESKS When an installation is to be made on desks, care shall be taken not to injure the desk by poor workmanship. Leave sufficient slack to prevent wires from being broken off if desk is slightly moved.

INSIDE LINE WIRES All wires on the instrument side of the protector or connecting block, except the ground wire, shall be either two or three conductor inside telephone wire, No. 19 B. & S. Gauge (T. and T. D. Specification No. 53), or standard bridle wire, No. 16 B. & S. Gauge (T. and T. D. Specification No. 26), the bridle wire to be used in damp places only.

INSTALLATION AND LOCATION OF INSIDE WIRES All inside wires shall be installed in a neat, safe and workmanlike manner; as far as possible these wires shall be concealed or placed in such a manner as will attract the least attention. When it is impossible to conceal the wires they shall be run along the door or window casing, or in the groove at top of the mop board. In no case shall the wires be carried across any open wall space at an acute angle and where wires cannot be carried straight they shall be turned at right angles. The wires shall never be run across a ceiling except when absolutely necessary.

Where it is necessary to install these wires in attics or cellars, great care shall be taken to avoid the possibility of damage from mechanical sources. Wet and damp locations shall be avoided for all inside wires.

When desks are located in rooms on ground floors and some distance from the wall and there is no space between the floor and ground for carrying the wires, without having them come in contact with the ground, or if the space available is apt to be very damp, iron conduit should be installed under the floor from the desk to the base-board or terminal box.

Where necessary to run wires in elevator shafts they shall be enclosed in iron conduit.

Where necessary to carry wires through partitions, ceilings, floors and across mop boards they shall be protected in the manner shown in Fig. 5.

PROTECTION FROM PIPES When it is necessary to cross pipes or other conducting materials the wires shall be protected by porcelain tubing or two wrappings of good insulating tape; the tubing or tape to project at least one inch each side of the pipe or other conducting material. Whenever practicable, all wires shall be run above all pipes or conducting material that it is necessary for them to cross. (See Fig. 6.)

SEPARATION FROM ELECTRIC CIRCUITS Wires may come in contact with wood moulding carrying electric circuits without extra insulation, but shall in no way be cleated or nailed to it. (See Fig. 6.)

When it is necessary to cross, within six (6) inches of any exposed electric circuit the telephone wires must be encased in porcelain tubing, circular loom or its equivalent.

This tubing shall be in one piece and shall extend from five (5) to six (6) inches on each side of the wire crossed, and shall be firmly secured so as not to slip out of

place, by taping at both ends. In no case shall there be contact between the covering of the electric circuit and the insulating tape of the telephone wires. (See Fig. 7.)

When installing wires crossing electric light or power wires, the telephone wires shall never be pulled over the other wires in such a way as to touch them.

If when running wires under a floor there is any possibility of contact with electric light or power wires, metal pipes, etc., the telephone wires must be enclosed their entire length in conduit.

Circular loom, or its equivalent may be used for this purpose.

FASTENERS FOR INSIDE WIRES All inside wires must be fastened in such a manner as not to injure their insulation. For this purpose fiber cleats, milonite nails, or porcelain insulators must be used.

On straight runs these fasteners shall be spaced approximately eighteen (18) inches apart.

STYLE OF FASTENERS For two- or three-conductor wire, either fiber cleats, Style "B," or milonite nails, Style No. 18, $\frac{1}{2}''$ or $\frac{7}{8}''$ shall be used. (See Fig. 8.)

Split porcelain insulators shall be used for supporting the ground wire. (See Fig. 9.)

TRACER WIRES Use the red tracer wire of a twisted pair for the live side of the pair. When triple wire is used, use the red tracer wire for the live side, the green

tracer wire for the mate side of the circuit, and the yellow tracer wire for the ground connection.

SPLICING Where necessary, the inside wires may be spliced, and when this is done the joint shall be soldered. Use only resin as a flux for the solder; never use soldering pastes or compounds, chloride of zinc, salammoniac or other acid fluxes. The joint shall be carefully wrapped with reversed layers of friction tape, the thickness of the wrappings being at least as great as that of the insulation on the wire. Where twisted pairs or three-conductor wire is spliced, space the joints at least four (4) inches apart. In all cases corresponding wires shall be spliced, that is, the wires with markers of the same color spliced together. Care shall be taken to locate joints so they will not be unsightly. The splices shall be made in the manner as shown in Fig. 10.

RESERVE WIRE Leave three or four inches of reserve wire at the telephone set if it can be stored inside of the set. Leave reserve wire at other apparatus, protector connecting block, etc. In such cases dead-end the wire on a cleat, the slack being left between the cleat and the apparatus.

GROUND WIRE Run standard No. 14 B. & S. gauge ground wire (T. and T. D. Specifications No. 52) from the protector as directly and with as few bends as possible to the ground connection; never make any spirals, coils, knots or sharp bends in the ground wire. The ground wire shall therefore not be coiled around a cleat or fastener, and shall never be one of a twisted type except for party line stations where no protector is provided. The ground wire shall never be enclosed in an iron pipe. If it is necessary

to protect this wire from mechanical injury, it shall be fastened to porcelain insulators and protected by wooden moulding, sufficiently large so as not to come into contact with the wire, or it may be enclosed in flexible non-metallic conduit, such as circular loom or its equivalent.

EARTH OR GROUND CONNECTIONS The ground connection shall be made to a water pipe connected to the street mains and in service, and to the earth or street side of water meter if a meter is installed, or to a standard ground rod driven into permanently moist earth. In every case the connections shall be as near as possible to the earth, considering an economical use of wire. Steam, hot-water or gas pipes must not be used for a protector ground connection.

CONNECTING GROUND WIRE TO WATER PIPES When the ground wire is attached to a water pipe, the pipe shall be thoroughly cleaned by filing or scraping, and a ground clamp attached in the manner as shown in Fig. 11. The method of attaching the ground wire to this clamp is also shown in Fig. 11.

GROUND ROD Use a standard ground rod (T. and T. D. Specification No. 29) when water pipes are not available. Drive the ground rod so that the connection with the ground wire can be made electrically and mechanically perfect. At least six (6) inches of the rod shall project above the ground.

Use standard 5-foot ground rod for all substation installations except where conditions require a 7-foot ground rod.

CONNECTING GROUND WIRE TO GROUND ROD

When the ground wire is connected to the end of the wire attached to the ground rod, it shall be done by either method shown in Figs. 12 and 13. Ground clamps shall not be used for this purpose.

Where a seven (7) foot ground rod is used, with a No. 6 B. & S. ground wire, a No. 8 double tube copper sleeve shall be used.

When a No. 14 B. & S. ground wire is connected with a seven (7) foot ground rod, it shall be done in accordance with Fig. 12.

AUXILIARY SETS AND EXTENSION BELLS

An auxiliary set, extension bell or any electro-magnet forming part of the circuit, shall be connected to the circuit so as to be protected by the same protector as is used for the substation set with which it is associated, and all wiring shall be done in accordance with the instructions for the wiring of the main telephone set.

In case it is necessary to run any part of the substation wiring, other than the ground wire outside of or between buildings, standard bridle wire shall be used, if the span is less than seventy-five (75) feet. If the span exceeds seventy-five (75) feet, outside distributing wire shall be used.

LOCATING BATTERIES FOR MAGNETO SETS

When installing magneto desk sets the batteries shall be placed in a box made especially for this purpose, and placed under the desk, or in some place out of the way where the batteries will be

free from dampness. A No. 1-A battery box as furnished by the Telephone Company or a battery box made in accordance with Fig. 14 may be used. When installing magneto wall sets that are not equipped with battery boxes, the boxes mentioned above shall be used. They shall not be located in damp nor unusually hot places such as near stoves, furnaces or radiators. They should be as near as possible to the set and readily accessible for inspection.

CARE OF DESK-SET CORD

To prevent the desk-set cord from damage by contact with ink or water when installed on desks or tables, it shall be so arranged that the cord may be weighted and the slack taken up under the desk or table. A No. 116 cord weight shall be used for this purpose.

A rubber bushing shall be used in the hole to prevent injury to the cord.

SIDING OR OUT-LYING TELEPHONES

Out-lying telephones placed in shelter boxes or booths and located at sidings, switches, signal bridges, etc., having exposed line wires, shall be protected as follows:

The shelter boxes or booths shall be equipped with an automatic switch (T. and T. D. Specification No. 57) so arranged that when the door of the box or booth is closed the switch will be automatically opened.

A No. 58-A protector mounted inside the box or booth shall be provided and the switch connected in such a way that the line wires will be disconnected from

the protector, when the switch is opened. The switch to be automatically closed when the door of the box or booth is opened. Special care should be taken to insure a good ground connection for these protectors.

In order to avoid severe shocks so far as possible, a substantial wood platform shall be erected where shelter boxes are used. This platform shall be raised at least 8″ from the ground and supported on brick, stone, cement or wooden posts. The wood work to have two good coats of water-proof paint.

Where booths are used, the floor of the booth shall be clear of the ground so that the floor will remain dry at all times.

The same care shall be taken and the same methods pursued, in the wiring of these outlying telephones as is specified for telephones located in buildings.

Particular attention shall be given to the proper height of these telephones from the floor or platform.

It is desirable when possible to mount shelter boxes on posts placed specially for this purpose rather than to attach shelter boxes to poles.

See M. W. Drawing No. 61980 for Telephone Booth, and M. W. Drawing No. 61981 for Telephone Shelter Box.

Material and Apparatus

The following is a summary of material and apparatus mentioned in these instructions, and in order that uniformity may obtain when making requisition for such material and apparatus, the instructions for wording requisitions as indicated in the instructions accompanying T. and T. D. Specifications should be followed:

WIRE FOR INSIDE USE

No. 19 B. & S. gauge (T. and T. D. Spec. No. 53).

No. 14 B. & S. gauge, ground wire (T. and T. D. Spec. No. 52).

No. 16 B. & S. gauge, bridle wire (T. and T. D. Spec. No. 26).

WIRE FOR OUTSIDE USE

To be used for loops, between poles and buildings, telephone shelter boxes and booths.

No. 14 B. & S. gauge, outside distributing wire (T. and T. D. Spec. No. 25).

No. 14 B. & S. gauge, ground wire (T. and T. D. Spec. No. 52).

DOUBLE TUBE COPPER SLEEVES

Style No. 8 (T. and T. D. Spec. No. 37).

Style No. 9/14 (Supplement to T. and T. D. Spec. No. 37).

FASTENERS

Fiber cleats, style B. (T. and T. D. Spec. No. 60).

Milonite nails, style No. 18, either ½″ or ⅞″ (T. and T. D. Spec. No. 61).

Split porcelain insulators (T. and T. D. Spec. No. 62).

PROTECTORS

No. 58-A
No. 12-A } (T. and T. D. Spec. No. 63).
No. 12-B

PROTECTORS PARTS

The No. 58-A protector consists of:

- One No. 29 protector mounting.
- One No. 16 protector mounting (porcelain block away from cut out).
- Two Nos. 1 and 2 protector blocks.
- Two No. 3 protector micas.
- Two No. 11-C protector fuses.

The No. 12-A protector consists of:
One No. 25 protector mounting.
Two No. 1 protector blocks.
Two No. 2 protector blocks.
One No. 3 protector mica.
Two No. 12-A fuses (red).

The No. 12-B protector consists of:
One No. 25 protector mounting.
Two No. 1 protector blocks.
Two No. 2 protector blocks.
One No. 3 protector mica.
Two No. 11-D fuses (black).

ASBESTOS MAT No. 48, protector mounting (T. and T. D. Spec. No. 64).

CONNECTING BLOCKS No. 5-A Connecting block, No. 7-A Connecting block, No. 9-A Connecting block } (T. and T. D. Spec. No. 65).

CORD WEIGHTS No. 116 cord weights (T. and T. D. Spec. No. 66).

GROUND RODS Ground rods (T. and T. D. Spec. No. 29).

GROUND CLAMPS Ground clamps (T. and T. D. Spec. No. 67).

BUSHINGS Hard rubber socket bushings, $\frac{3}{8}$" (T. and T. D. Spec. No. 68).

Porcelain tubes $\frac{5}{16}$" x $\frac{9}{16}$" x 6" ..... $\frac{1}{2}$" x $\frac{13}{16}$" x 6"
Porcelain tubes $\frac{5}{16}$" x $\frac{9}{16}$" x 8" ..... $\frac{1}{2}$" x $\frac{13}{16}$" x 8"
Porcelain tubes $\frac{5}{16}$" x $\frac{9}{16}$" x 10" ..... $\frac{1}{2}$" x $\frac{13}{16}$" x 10"
Porcelain tubes $\frac{5}{16}$" x $\frac{9}{16}$" x 12" ..... $\frac{1}{2}$" x $\frac{13}{16}$" x 12"
Porcelain tubes $\frac{5}{16}$" x $\frac{9}{16}$" x 14" ..... $\frac{1}{2}$" x $\frac{13}{16}$" x 14"
Porcelain tubes $\frac{5}{16}$" x $\frac{9}{16}$" x 16" ..... $\frac{1}{2}$" x $\frac{13}{16}$" x 16"
Porcelain tubes $\frac{5}{16}$" x $\frac{9}{16}$" x 18" ..... $\frac{1}{2}$" x $\frac{13}{16}$" x 18"

(T. and T. D. Spec. No. 69).

CIRCULAR LOOM NOTE:—Any flexible tubing similar in structure and approved by the National Board of Fire Underwriters will be accepted as an equivalent for Circular loom (T. and T. D. Spec. No. 70).

INDEX.

	PAGE
Asbestos Mats	21
Auxiliary Sets and Extension Bells	16
Bell Box	10
Bushings	22
Care of Desk Set Cords	17
Circular Loom	22
Connecting Blocks (Terminating Wires on)	6
Connecting Blocks (Use of)	21
Connecting Ground Wire to Ground Rod	16
Connecting Ground Wire to Water Pipes	15
Connecting Wires to Protectors	9
Cord Weights	22
Description of Protectors	7
Double Tube Copper Sleeves	20
Earth or Ground Connections	15
Entrance Holes	4
Exposed Substations	3
Fasteners	20

	Page
Fasteners for Inside Wires	13
Fuses and Micas	8
Ground Clamps	22
Ground Rod (Description of)	22
Ground Rod (Installing of)	15
Ground Wire	14
Inside Line Wires	11
Installation and Location of Inside Wires	11
Installation of Substation Sets	3
Installing Protectors	7
Leading-in Wires from a Drop Loop of Two Bare Wires	5
Leading-in Wires from Two Single or One Twisted Pair Wires	6
Leading-in Wires to Connecting Block	6
Leading-in Wires to Protector	9
Locating Batteries for Magneto Sets	16
Location of Telephone Sets	9
Locations to be Avoided	10
Material and Apparatus	19
Method of Crossing Electric Light and Power Wires	12

PAGE

Method of Passing Through Floors, and Crossing Electric Light Moulding, Water or Gas Pipes 12
No. 12 Protector (Fuses for use with) 9
Portable Desk Set 9
Protectors for Substations 6
Protection from Pipes 12
Protectors and their Parts 20
Reserve Wire 14
Separation from Electric Circuits 12
Siding or Out-lying Telephones 17
Splicing 14
Style of Fasteners 13
Tracer Wires 13
Unexposed Substations 3
Wall Set (Height from Floor) 10
Wire for Inside Use 19
Wire for Outside Use 19
Wiring on Desks 10

LIST OF DIAGRAMS

			PAGE
Fig.	1	Entrance holes and wiring to protectors	28–29
"	2	Porcelain tube wedged in entrance hole, drip loop	30
"	3	Supporting leading-in wires on split porcelain insulators	31
"	4	No. 9-A connecting block and cover	32
"	5	Carrying wires through floors, across mop boards, etc.	33
"	6	Carrying wires across pipes, electric circuit	34
"	7	Crossing exposed electric circuits	35
"	8	Fibre cleat, style B, Milonite nail, style No. 18	36
"	9	Split porcelain insulator	37
"	10	Splicing one-, two- or three-conductor wire	38
"	11	Attaching ground wire and clamp to water pipe	39
"	12	Attaching ground wire to ground rod, by soldering	40
"	13	Attaching ground wire to ground rod, by sleeve	41
"	14	Battery box (3 or 6 cells)	42

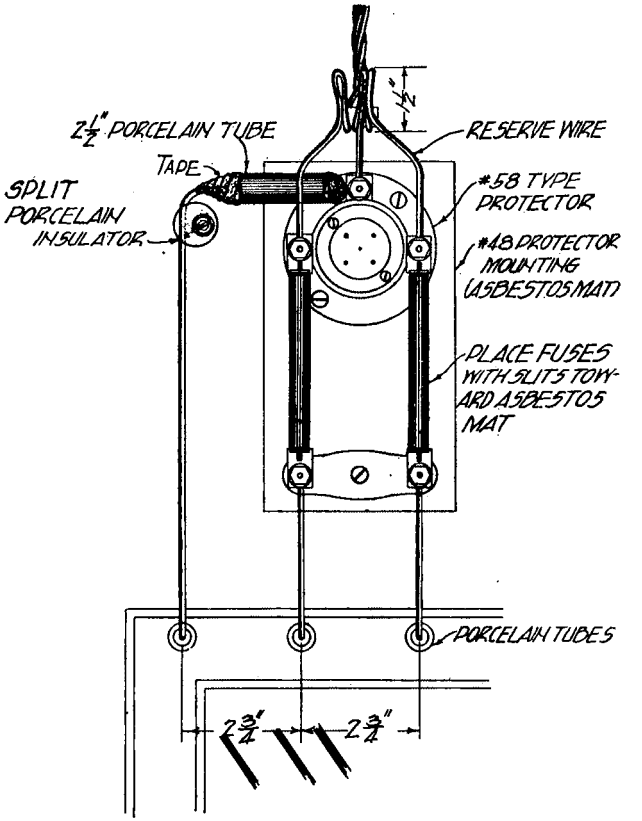


FIGURE 1-A

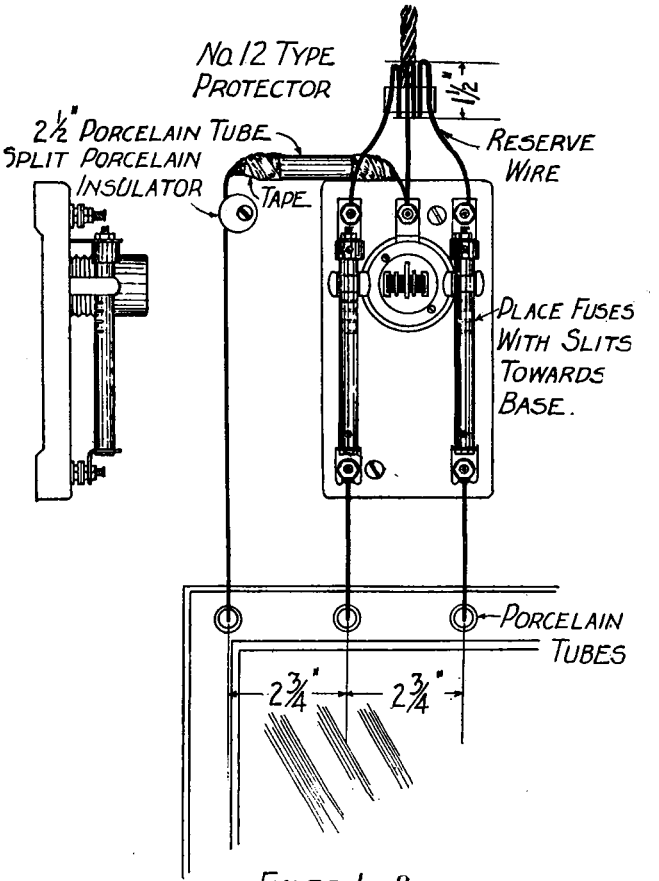


Figure 1-B

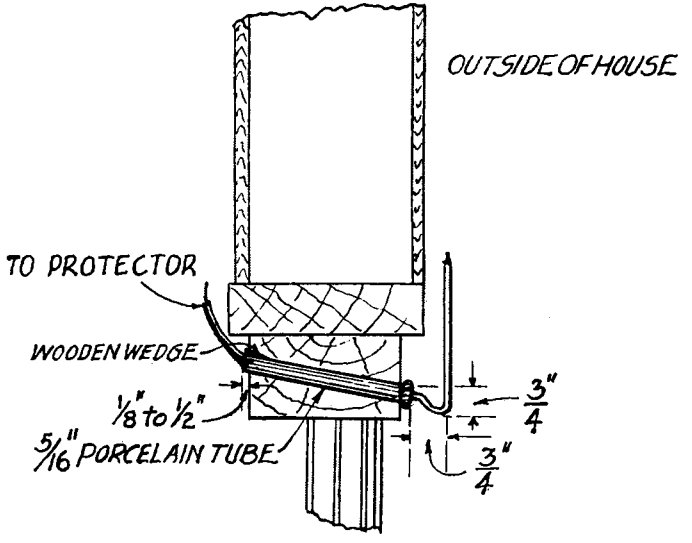


FIGURE 2

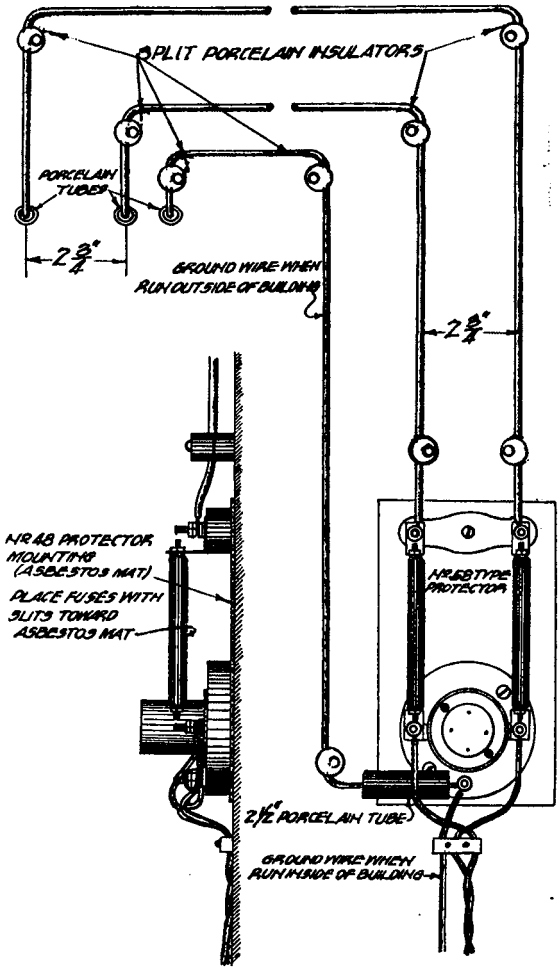


FIGURE 3

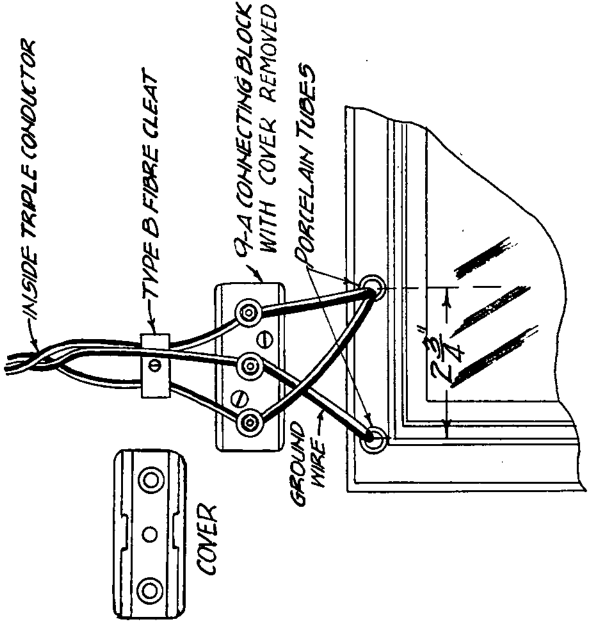


FIGURE 4.

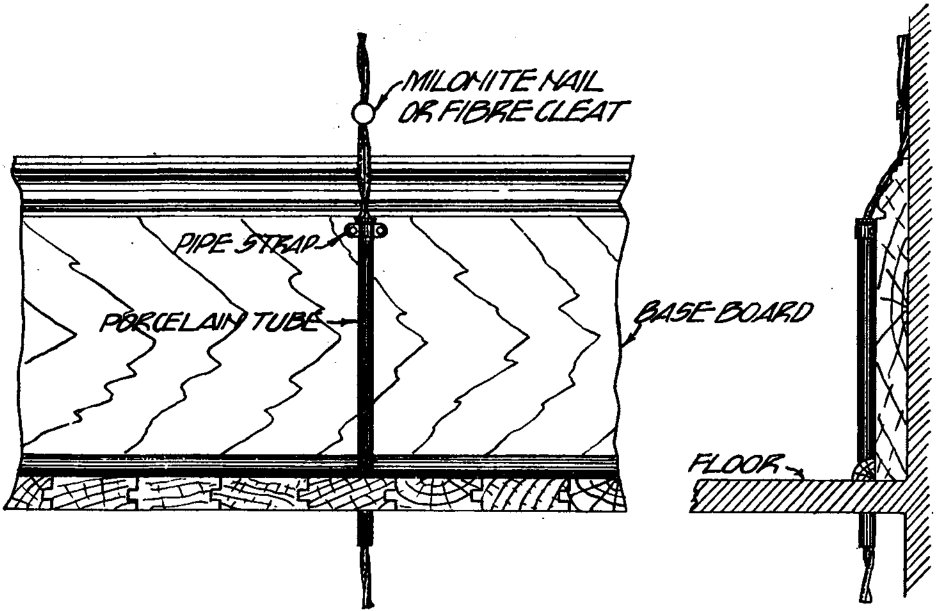


FIGURE 5

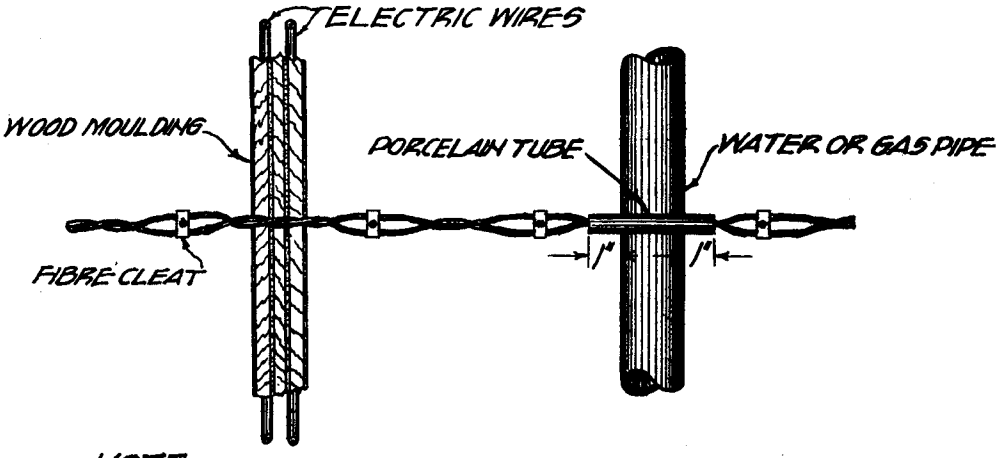

ELECTRIC WIRES
WOOD MOULDING
PORCELAIN TUBE
WATER OR GAS PIPE
FIBRE CLEAT
1"
1"
NOTE—
TELEPHONE WIRES TO BE ABOVE
PIPES WHEN PRACTICABLE.

FIGURE 6

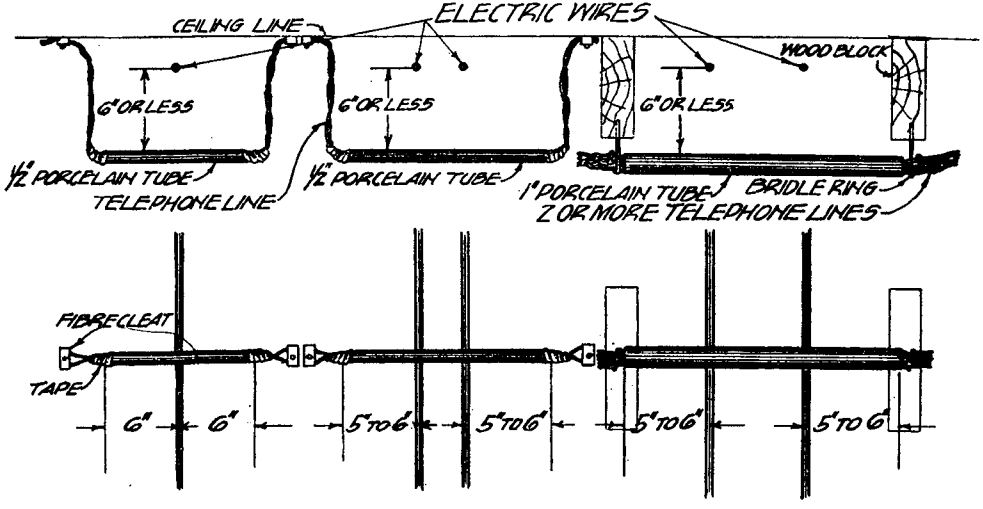


FIGURE 7

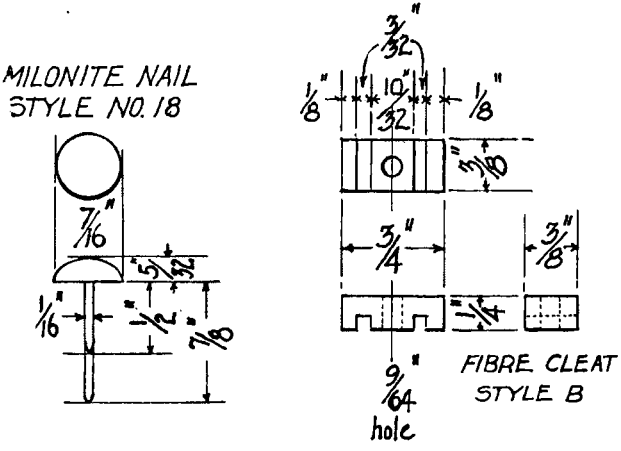


FIGURE 8

SPLIT PORCELAIN INSULATOR.

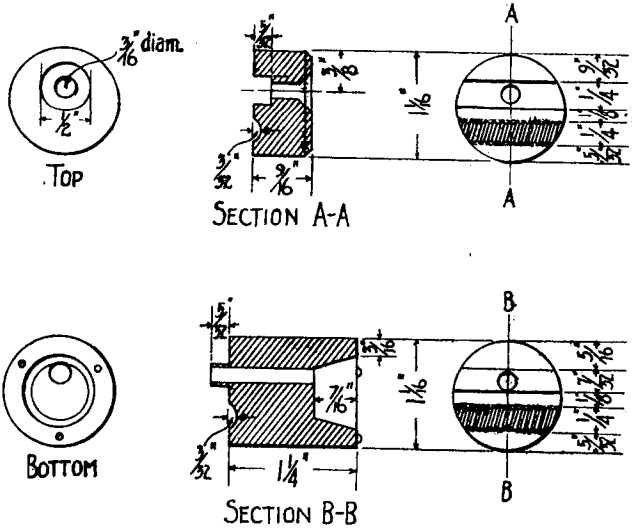


FIG. 9

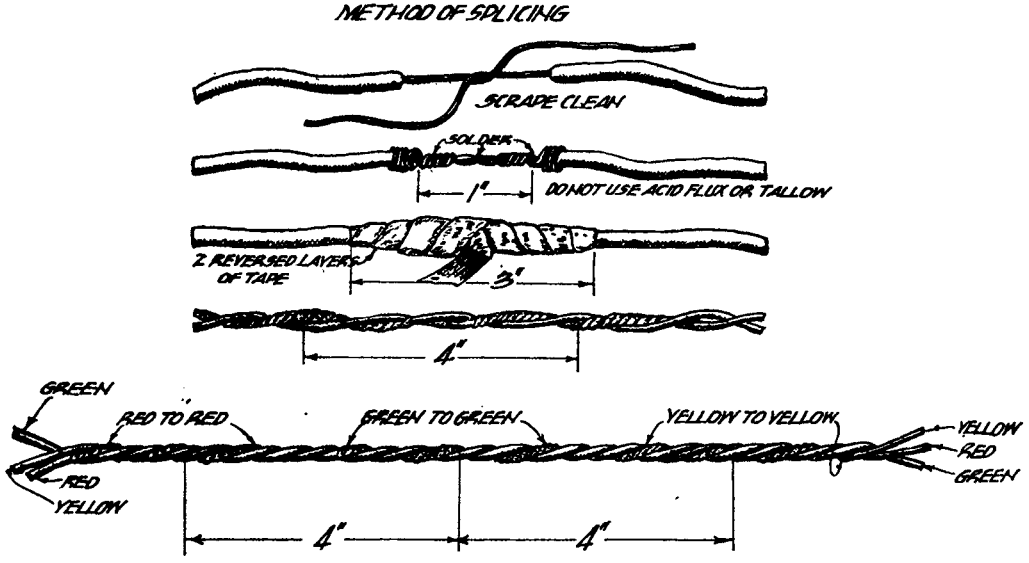
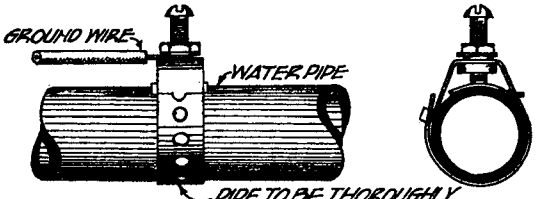


FIGURE 10



IN PLACING THE GROUND CLAMP PROCEED AS FOLLOWS:

1. SET BACK THE SCREW SO THAT IT IS FLUSH WITH THE NUT. AFTER THE PIPE HAS BEEN THOROUGHLY CLEANED, PLACE THE GROUND CLAMP ON THE PIPE, BENDING THE STRAP SHARPLY AT POINTS A—No 1.
2. STRETCH THE BAND AROUND THE PIPE AS TIGHTLY AS POSSIBLE AND SLIP THE PIN INTO THE HOLE THAT WILL MAKE THE BAND AS SHORT AS POSSIBLE—No 2.
3. SEE THAT THE SCREW POINTS DIRECTLY TOWARD THE CENTER OF THE PIPE AND THEN TIGHTEN. PLACE GROUND WIRE AND TIGHTEN LOCK NUT. BREAK OFF EXCESS STRAP—No 3.

NOTE—

IF THE BAND IS NOT MADE AS SHORT AS POSSIBLE, THE RESULT IS APT TO BE AS SHOWN IN No 4.

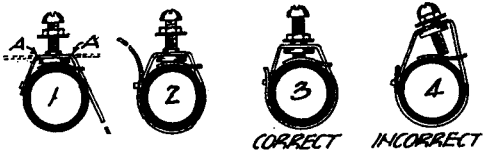


FIGURE 11

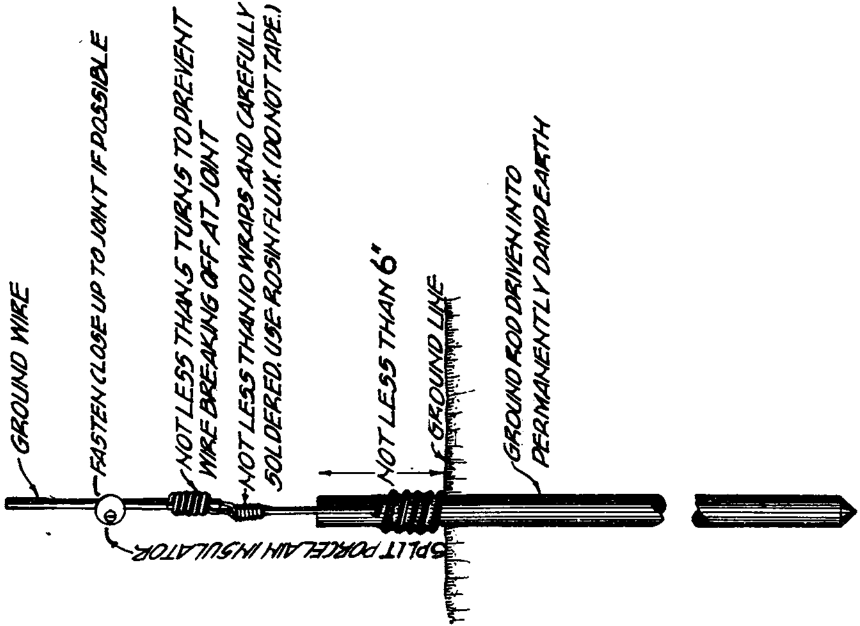


FIGURE 12

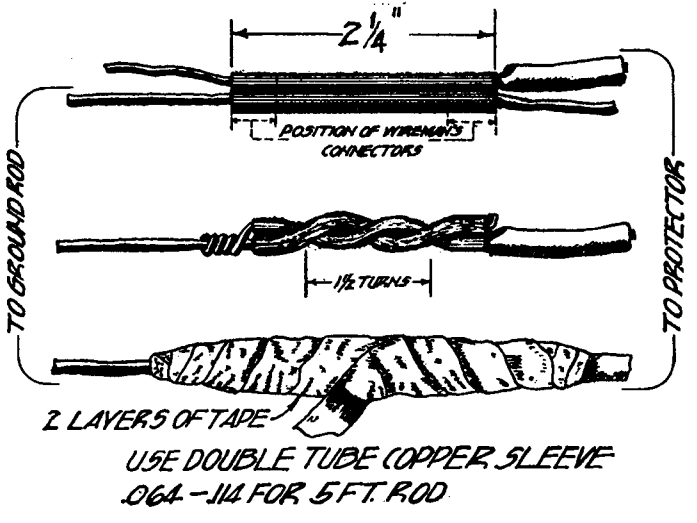
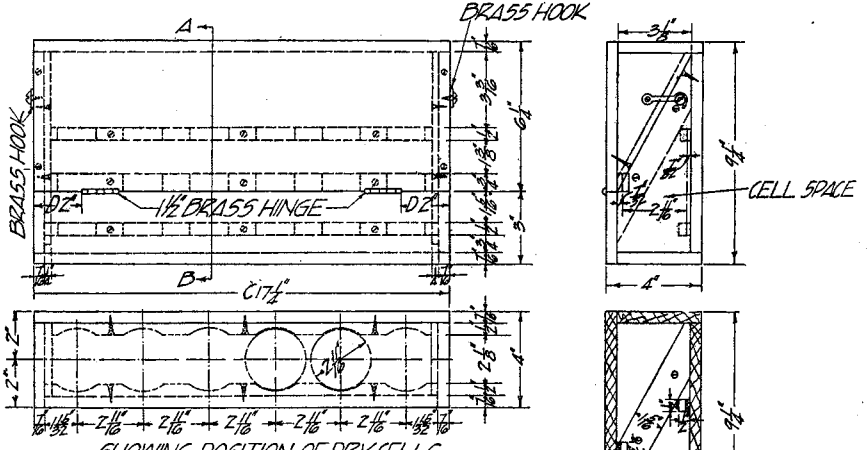


FIGURE 13



NOTE—
BOX TO BE MADE OF SOFT WOOD
STAINED TO MATCH MAHOGANY
ALTER LETTER DIM. THUS. ALL OTHER DIM. MAINTAINED
FOR 3-CELL BOX, C - 9 7/16", D - 1"
FOR 6-CELL BOX, DIMENSIONS AS SHOWN

FIGURE 14