THE BELL TELEPHONE COMPANY OF CANADA
ENGINEERING DEPARTMENT

Specifications 3852 August 1923

SUBSTATION APPARATUS INSTALLATION

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SUBSTATION APPARATUS INSTALLATION

EQUIPMENT FOR COIN COLLECTOR AND PRIVATE BRANCH EXCHANGE STATIONS, OUTSIDE STATIONS, etc.

323 Transmitters **Section 1-A**

Are more efficient than the corresponding 329 and 350 transmitters by about 2 miles of No. 19 gauge cable. Use 323 transmitter in preference to other types;

(a) On long common battery and magneto loops or where other conditions make better transmission desirable.

(b) To avoid the necessity of installing local battery talking sets to improve transmission on very long common battery loops as required by supplemental instructions.

(c) In districts where it is desirable to use 323 transmitters generally as may be covered by supplemental instructions.

Use 323 transmitter at all stations where the set is connected for side tone reduction as covered in Section 32 of these specifications.

Section 1

Install desk stands and wall sets having two transmitter cords (circuit not connected to frame), No. 144 receivers and No. 323 transmitters at all new common battery and magneto installations of the following classes—

(a) Coin collector stations.

(b) Private branch exchange stations and switchboards.

(c) Stations permanently located outdoors or where exposed to corrosive fumes or in damp locations (such as may be found in subways, markets, cellars, basements, laundries, stables, chemical works, etc.). Also install waterproof desk stand and receiver cords at these stations.

(d) It is desirable that equipment with two transmitter cords and No. 144 receivers as above be installed where—

(1) There are uncovered tile or concrete floors or damp floors.

(2) Radiators or other grounded metallic objects are near.

(3) There are two desk stands or a desk stand and portable electric lamp on the same desk or table.

(4) There are metal desks in contact with cable sheaths or other grounded metal.

As these conditions exist more generally in the business districts equipment with two transmitter cords and No. 144 receivers as above should be distributed first to these districts rather than residential districts.

Except as stated in (a), (b), (c) and (d), install available equipment with standard cords, unless otherwise specified in supplemental instructions.

Stations at camps

Stations at camps may be located outdoors or in damp places. Use at all stations of these camps desk stands, wall sets and coin collectors having two transmitter cords and equipped with 144 receivers, 323, 329, 353 or 350 transmitters and waterproof cords.

LOCATING SUBSCRIBER'S SETS

General Rules — Section 2

Installer shall be guided by subscriber's wishes in locating sets in so far as they are consistent with these instructions, If subscriber's wishes cannot be followed explain the reasons therefor and if satisfactory arrangements cannot be made, installer shall consult his supervisor before proceeding with the work.

(a) Do not locate set where the users, installer, repairman or set itself would be exposed to injury.
Likely sources of hazard are:

(1) Doors, piled merchandise or other movable objects.

(2) Electric light or power wires or apparatus.

(3) Trap doors near set, stairs near set leading down, or other locations where user may be injured if he does not use care in going to or leaving the telephone.

(4) Cord extending across a passageway.

(5) Wall set, placed too close to a wall or other object on same side as receiver or generator crank.

(6) Desk stands placed on unstable tables (not telephone tables) or otherwise where they would be liable to fall.

(b) Avoid locations where dropping of receiver would injure glass show cases or similar property of subscriber.

(c) Locate set where bell will be plainly heard by the subscriber.

In some desk stand installations, the use of an extension bell may be avoided by installing the bell box in another room.

Do not install bell box in cellar (with desk stand upstairs) and avoid as far as practicable locations in closets or similar places merely for the purpose of concealing the bell box.

(d) Locate as far as possible in dry locations and on dry walls.

Do not locate so close to windows, which may be left open, that the equipment (especially the cords) will be exposed to rain or moisture.

(e) Locate as far as possible where set will not be over or near grounded metallic objects such as radiators, registers, sinks, bath tubs, steam risers, etc., or on same table or desk with portable electric lamps or near electric light fixtures.

(f) Locate as far as possible so that wiring on or under floor will not be necessary (unless provision has been made under floor for wiring).

(g) Locations where sets will be accessible for inspection and will be illuminated by daylight or artificial light are desirable.

(h) Avoid locations where set would be exposed to vibration.

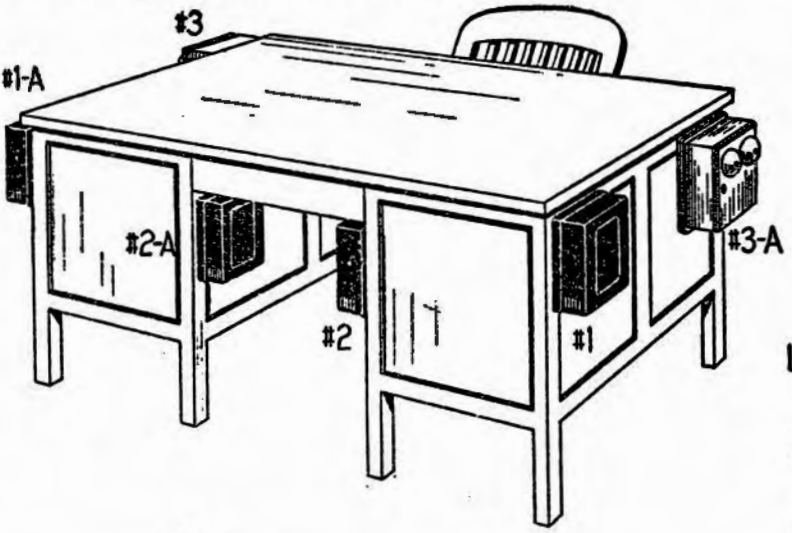
In desk stand installations, the bell box (unless equipped with relay) can be placed on a vibrating support if no other support is available and if vibration is not great enough to sound bell. If it seems necessary to place a wall or relay set on a vibrating support, installer shall consult his supervisor before doing the work.

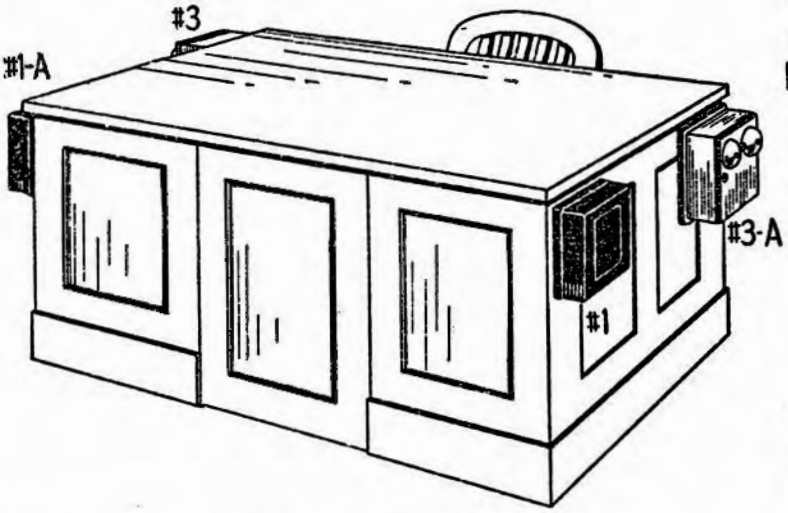
(i) Avoid locations in noisy places.

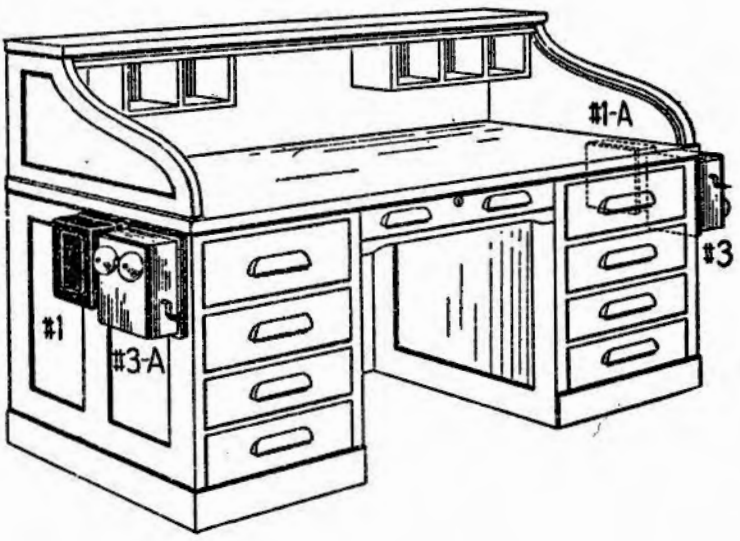
If necessary to locate equipment in such places and subscriber complains that he has difficulty in hearing, follow Sections 31 to 36.

Locating Sets on Desks

Section 3







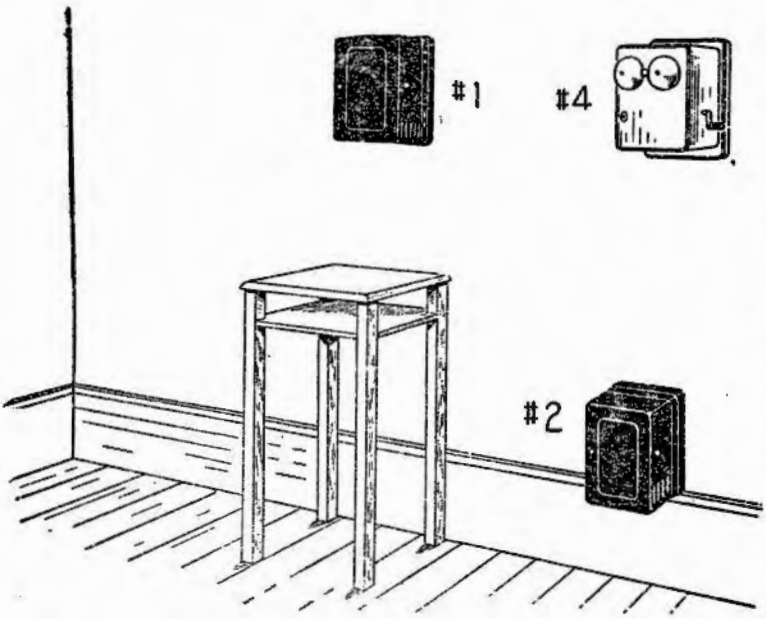
COMMON BATTERY INSTALLATIONS.

Location #1 or #1-A-If satisfactory to subscriber and other conditions are favorable #1 is preferable to #1-A as it brings the instrument on the left hand side of the desk.

Location #2 or #2-A-Use if desk is of fine workmanship or if subscriber wishes set concealed. Mount as high as practicable.
#2 is preferable to #2-A.

MAGNETO INSTALLATIONS

Location #3 or #3-A- Crank must be within reach of subscriber. Except where subscriber is left handed #3 is usually preferable to #3-A.

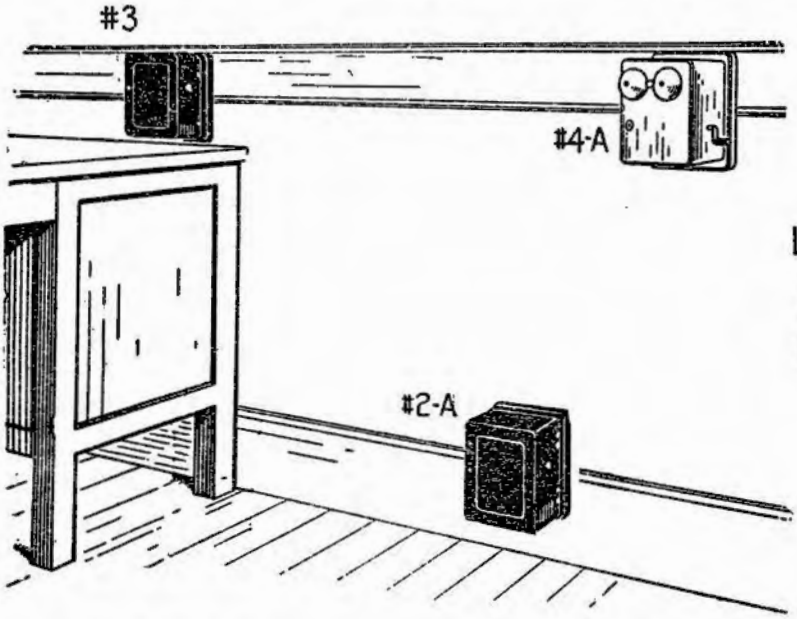


COMMON BATTERY INSTALLATIONS

Location #1-Preferable on wood walls and where wiring is concealed.

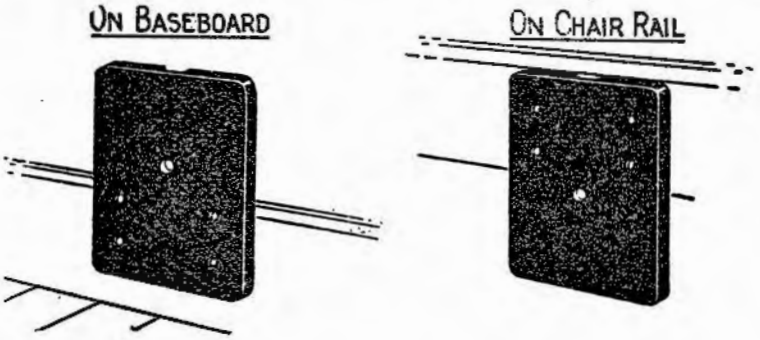
Location #2 and #2-A-Preferable when wiring is not concealed. On hollow tile, masonry, metal sheathed, and expensively finished walls #2-A is preferable to #2

Location #3-If desk is close to wall and a chair rail is available, #3 is preferable as a standard 5½ ft. cord can be used, and wiring run on chair rail.



MAGNETO INSTALLATIONS

Location #4 and #4-A-In room without chair rail #4 is desirable. In room having chair rail #4A is desirable.



Use 4 screws for fastening backboard to baseboard or chair rail.

Position of Gongs — Section 5

At common battery installations place bell boxes (having outside or inside gongs) with gongs down except where—

(a) Sets are necessarily so placed that the opening of the door would be interfered with.

(b) Sets with outside gongs are placed under desks and gongs would be liable to damage from kicking if placed down.

(c) In case of four-party selective sets, with relays, place so that relays are vertical (sets plumb) and armatures up.

(d) In case of magneto installations the position of the gongs will be dependent on position of crank.

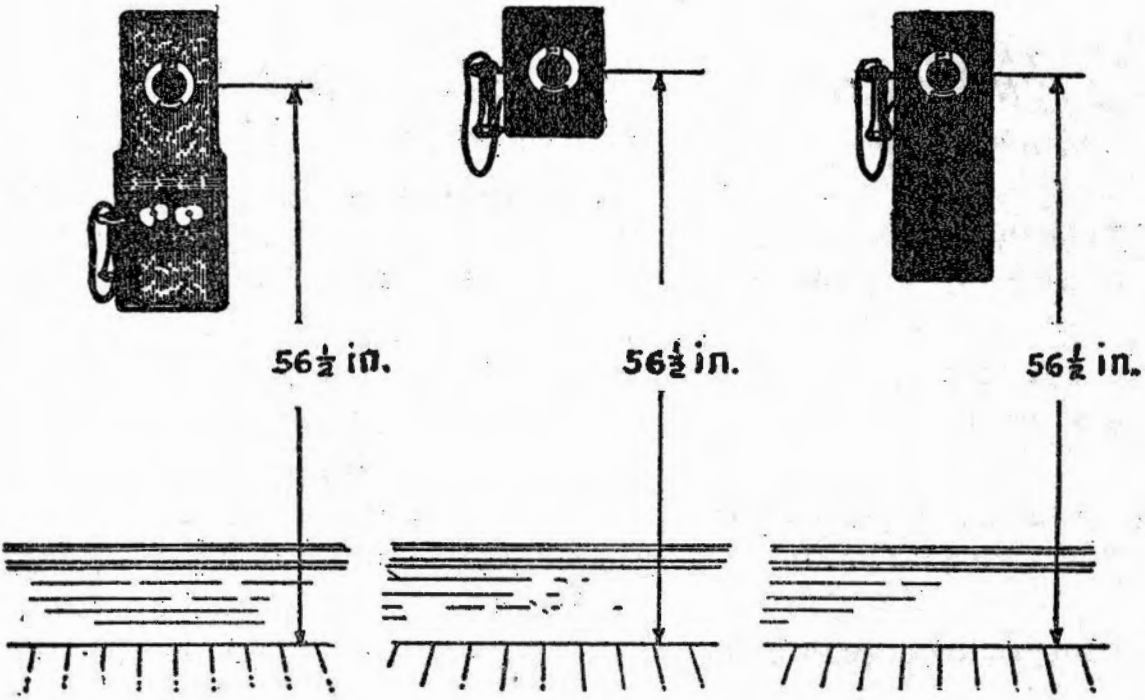
Never mount set horizontally (with gongs one above the other) as this reduces ringing efficiency.

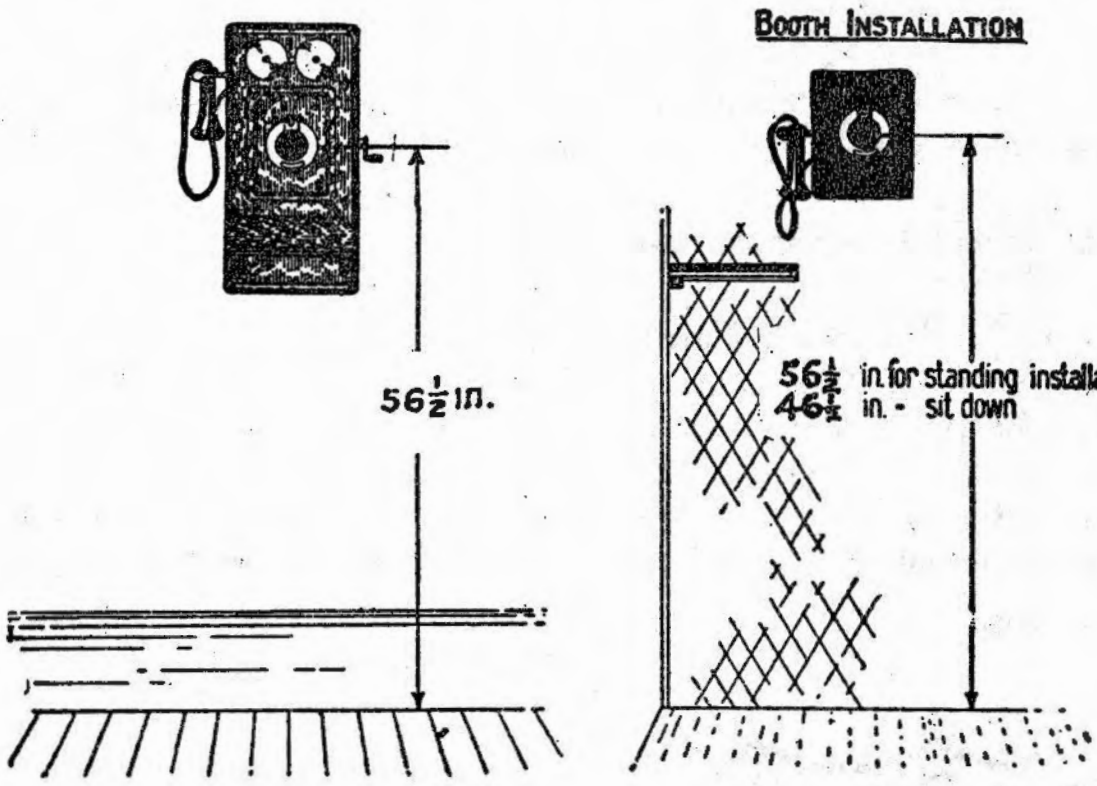
Height of Sets on Walls — Section 6

If satisfactory to subscriber mount wall sets with center of transmitter (face vertical) 56½ inches above floor. If not satisfactory place to suit subscriber.

Avoid locating wall set with writing shelf where impracticable to mount at proper height without blocking out. If impossible to place in some other location and it is impracticable to block out use set without shelf if agreeable to subscriber.

The height from floor to top of set, of some of the more commonly used wall sets, is shown below. This height gives approximately the standard height of 56½ inches to center of transmitter


56½ in.
56½ in.
56½ in.


56½ in.
BOOTH INSTALLATION
56½ in. for standing installation
46½ in. - sit down

MOUNTING SUBSCRIBER'S SETS

General — Section 7

Fasten apparatus securely so that there will be no chance of its later becoming loose. Follow carefully the methods of mounting and use of attaching devices specified. Use four (4) fasteners for each set and backboard and see that each is secure. If, however, set is placed on paneled desk, one fastener may be omitted if it would enter panel. Place other three fasteners in framing around panel.

On metal desks or solid metal two fasteners are sufficient if placed diagonally opposite each other.

If in doubt as to the construction of walls to which apparatus is to be fastened, use awl or automatic drill. Turn awl or drill when withdrawing to avoid breaking out plaster.

Use of Backboards — Section 8

Where necessary to use backboards without writing shelf, have same made locally.

Use backboards under metal sets when mounted on baseboards and chair rails, and under wood and metal sets according to Sections 10, 11 and 12.

If set must be located where formation of wall or an obstruction makes it impracticable to use the mounting holes in set, use a backboard and block out as necessary.

If wood or metal set must be placed on a damp wall, block it out from wall. Use a backboard with metal sets. For blocking out, halves of **TYPE C KNOBS** may be used.

Mounting Sets on Backboards — Section 9

Use four (4) **1¼ IN. No. 8 R. H. BLUED WOOD SCREWS.**

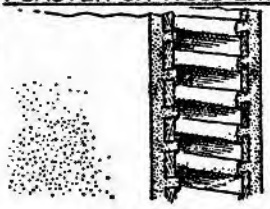
On Wood and Plaster on Wood Lath Walls — Section 10

Attach wood and metal sets without backboards. Where a writing shelf is employed a backboard may be used on these walls.

FASTENERS FOR SUBSCRIBERS SETS

HARD WOOD-1¼ IN. #8 R.H. BLUED WOOD SCREWS

SOFT WOOD-1½ IN. #8 R.H. BLUED WOOD SCREWS



FASTENERS FOR SUBSCRIBERS SETS

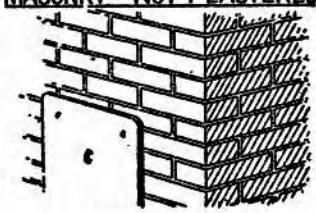
2 IN. #8 R.H. BLUED WOOD SCREWS

On plaster on wood lath all screws must enter laths or studding. If screws strike space between laths, move set if first hole can be covered—otherwise slant the screws.

If when mounting wood set it is necessary to slant screws to strike lath, rebore holes in set to permit slanting of screws.

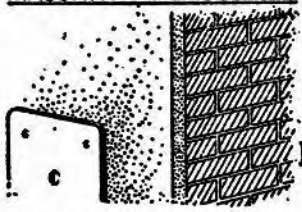
On Masonry Walls — Section 11

Use backboards under wood and metal sets.



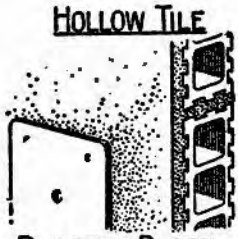
FASTENERS FOR BACKBOARDS

1½ IN. #8 R.H. BLUED WOOD SCREWS in ⅜ IN. X ¾ IN. * EXPANSION SHIELDS

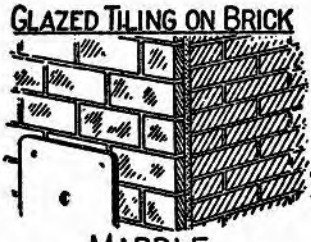


FASTENERS FOR BACKBOARDS

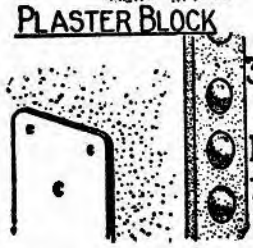
2½ IN. #8 R.H. BLUED WOOD SCREWS in ⅜ IN. X 1⅝ IN. * EXPANSION SHIELDS



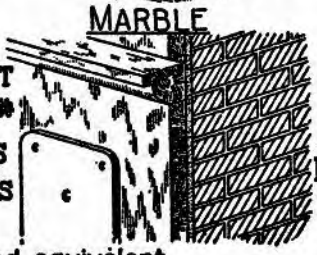
⅜ IN. X 3½ IN. R.H. TOGGLES



2½ IN. #8 R.H. BLUED WOOD SCREWS in ⅜ IN. X 1⅝ IN. * EXPANSION SHIELDS



3 IN. #14-20 F.H. BRIGHT MACHINE SCREWS in * MALLEABLE ANCHORS for #14 MACHINE SCREWS



1½ IN. #8 R.H. BLUED WOOD SCREWS in ⅜ IN. X ¾ IN. * EXPANSION SHIELDS

* Or approved equivalent

Use twist drill when making holes through plaster on masonry or hollow tile to avoid breaking out a hole larger than necessary. Then continue with stone or star drill. Use light blows on drill to avoid shelling off inner surface of tile.

Use 11/32 inch twist drill for drilling holes in marble and through glazed tiling—using the star drill on brick under tiling.

Place expansion shields flush with face of marble, tile and plaster on masonry.

On Metal Sheathed and Metal Lathed Walls and on Solid Metal — Section 12

Attach wood sets without backboards except sets fastened—

(a) To brick walls having metal sheath directly over brick.

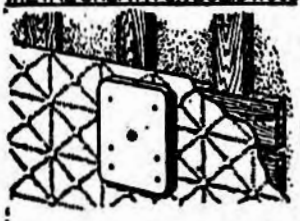
(b) To metal lath walls.

Where writing shelf is employed a backboard may be used under wood sets on all metal sheathed and metal lathed walls and on solid metal.

Use backboards under metal sets on metal sheathed and lathed walls and on solid metal. See that backboard fasteners are not in contact with the metal sets or the screws attaching the sets to backboards (so that sets will be insulated from the metal walls). Except as otherwise specified in Section 7 use four (4) fasteners.

FASTENERS FOR BACKBOARDS AND SUBSCRIBERS SETS

METAL SHEATH ON SOLID WOOD



1½ IN. #8 R.H. BLUED WOOD SCREWS

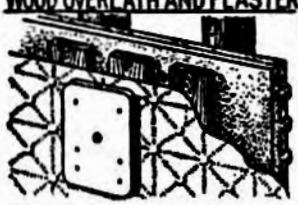
Do not use backboard with wood sets.

METAL SHEATH ON FURRING OVER BRICK

1½ IN. #8 R.H. BLUED WOOD SCREWS

Bore 4 holes in backboard so that screws will enter furring.

METAL SHEATH ON ⅞ IN. SOLID WOOD OVER LATH AND PLASTER



1½ IN. #8 R.H. BLUED WOOD SCREWS

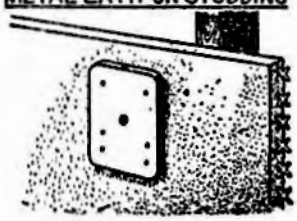
Do not use backboard with wood sets.

METAL SHEATH ON ⅞ IN. FURRING OVER LATH AND PLASTER

2 IN. #8 R.H. BLUED WOOD SCREWS

Do not use backboard with wood sets.

METAL LATH ON STUDDING



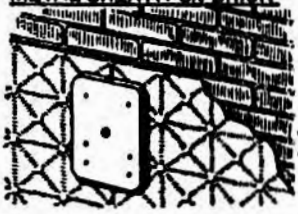
⅛ IN. X 3½ IN. R.H. TOGGLES

METAL LATH UNDER GLAZED TILING

⅛ IN. X 3½ IN. R.H. TOGGLES

FASTENERS FOR BACKBOARDS AND SUBSCRIBERS SETS

METAL SHEATH ON BRICK



1½ IN. #8 R.H. BLUED WOOD SCREWS

⅜ IN. X ¾ IN. * EXPANSION SHIELDS

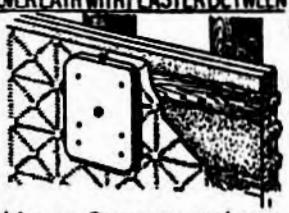
Place shields flush with face of brick.

METAL SHEATH ON FURRING OVER BRICK WITH PLASTER BETWEEN

1½ IN. #8 R.H. BLUED WOOD SCREWS

Bore 4 holes in backboard so that screws will enter furring.

METAL SHEATH ON ⅞ IN. FURRING OVER LATH WITH PLASTER BETWEEN



2 IN. #8 R.H. BLUED WOOD SCREWS

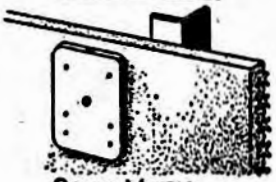
Do not use backboard with wood sets.

METAL SHEATH ON LATH AND PLASTER

2 IN. #8 R.H. BLUED WOOD SCREWS

Do not use backboard with wood sets.

METAL LATH ON METAL FRAMEWORK



⅛ IN. X 3½ IN. R.H. TOGGLES

SOLID METAL AND METAL DESKS

Use (2) 1 IN. #10-24 F.H. BRIGHT MACHINE SCREWS placed opposite each other.

Do not use backboard with wood sets.

* Or approved equivalent

On glazed tiling over metal lath use 11/32 inch twist drill for drilling holes through glazed tiling. Then enlarge holes using ⅝ inch twist drill.

In solid metal use *23 STRAIGHT SHANK TWIST DRILL. Then tap holes with *10-24 MACHINE SCREW PLUG TAP.

Sets in Booths **Section 13**

Attach wood and metal sets without backboards in booths (including booths with metal sheathing).

LOCATING AND MOUNTING #7 COIN COLLECTORS

Section 14

(a) Locate collector where it will be convenient for subscriber in depositing coins.

(b) At installations where desk stands are used, locate, if possible, so that desk stands will be placed on a table or other stable support, and as far as possible so that the desk stands cannot be placed in contact with radiators or any other grounded metal.
Avoid locations where desk stand would be liable to be placed on top of collector (as in such case stand may be damaged by falling).

(c) Do not locate in angle of walls where coin chute would not be accessible for maintenance.

Attach to backboards and subscriber's sets with 1 INCH *8-32 R. H. MACHINE SCREWS AND NUTS or 3/4 INCH x 3/16 INCH CARRIAGE BOLTS AND NUTS.

When mounting collectors alone or with associated bell box directly on walls (including booth walls) use a backboard.

Attach backboard to walls according to Sections 10, 11 and 12.

POSTPAYMENT COIN COLLECTORS

Section 15

In general the locating of and the methods of mounting on subscriber's sets, walls, etc., shall be same as *7 coin collectors. This does not apply to *50 coin collectors.

TRANSMITTER BATTERIES

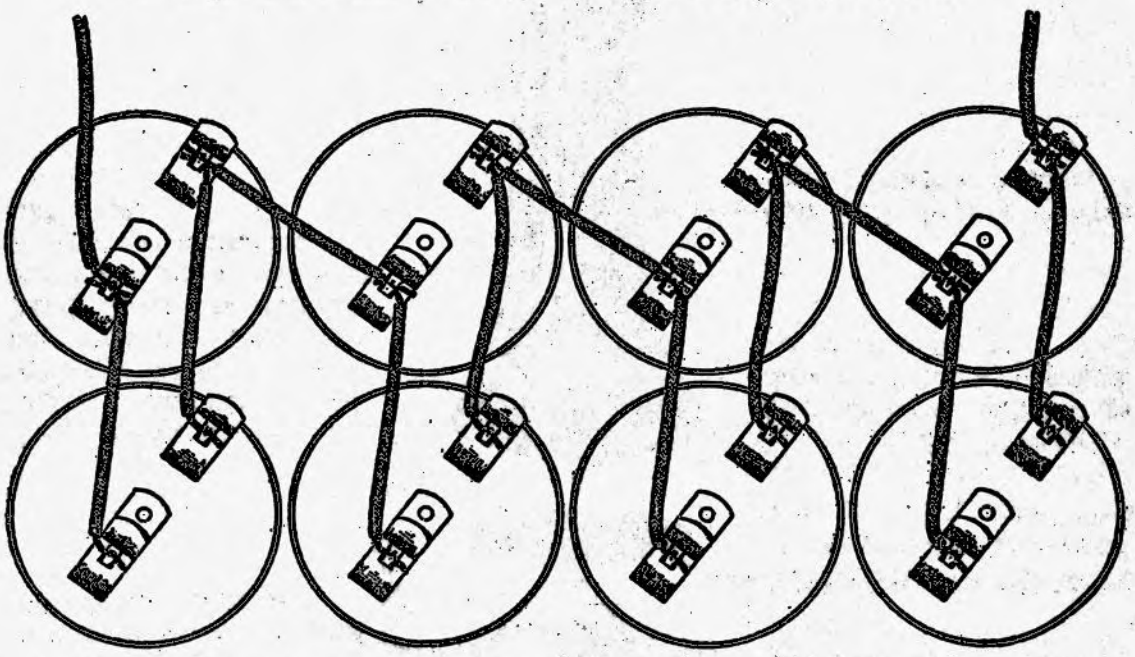
Section 16

At each magneto station and each local battery station on common battery lines install three new dry cells for the transmitter battery with the following exceptions:

(a) At stations on long distance loops install 4 cells.

(b) Where transmission requirements are exceptional at other stations because of their long loops or an unusual amount of long distance business, 4 cells may be installed on approval of Superintendent of Plant or his representatives.

(c) If the maintenance on 4 cells is excessive at stations on long distance loops or other stations, due to exceptionally long talking periods, 4 additional cells connected in parallel (as below) with the first 4 cells may be installed on approval of Superintendent of Plant or his representatives.



If set is not arranged to hold dry cells use a battery box located as close as practicable to set without being too conspicuous.

Attach battery box to wall or other support where box and wires to it will not be disturbed. If placed under desks mount where it will not be struck with feet or cleaning tools. Do not locate in very damp or unusually hot places such as over stoves, furnaces, radiators, etc.

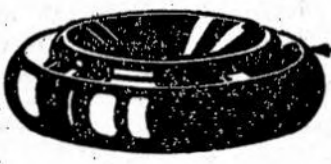
Place cells in set or battery box in vertical position and separate from each other as much as possible.

Leave sufficient slack wire in battery box so that cells may be lifted out for inspection.

RECEIVERS

Section 17

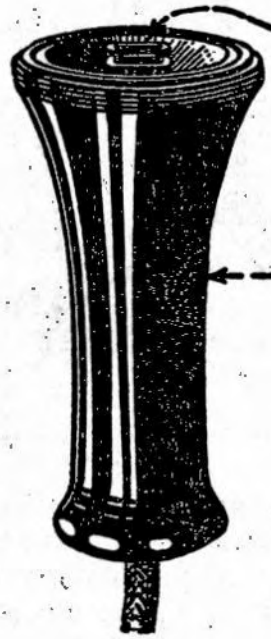
Never use cap of #122 receiver on #144 receiver. The cap of #144 receiver has extra threads to prevent loosening. New caps are marked #1370 on inside.



Code #1370 - Replace with new cap if broken or defective. May also be used on #122 receiver.

Code #1003 - Used on both #144 and #122 receivers. Keep black side out. Do not use if rusty, dented or bent.

Pole pieces are covered with lacquer (usually red). Do not remove or damage as rusting may result and cause loss in efficiency. Do not draw diaphragm across pole pieces or allow edge of diaphragm to come in contact with them.



Remove any dust or particles from pole pieces (with clean dry cloth or soft brush) to prevent loss in efficiency.

Code #1371 - Replace with new shell if broken or defective.

NUMBER PLATES

Section 18

Unless otherwise specified in supplemental instructions attach to the transmitter a number plate giving :

(a) The name of the Central Office to which the station is connected and—

(b) The "Line Number" and "Station" designation.
This does not apply to coin collectors or subscribers' sets which are equipped with special instruction cards.

CORDS

Length to Use — Section 19

Install five and one-half (5½) foot desk stand cords except where specific instructions are received to install longer cords. The need for longer cords can often be avoided by installing a connecting block and extending triple wire from subscriber's set to block. A standard 5½ foot cord should then be used to connect desk stand to block.

Waterproof Cords — Section 20

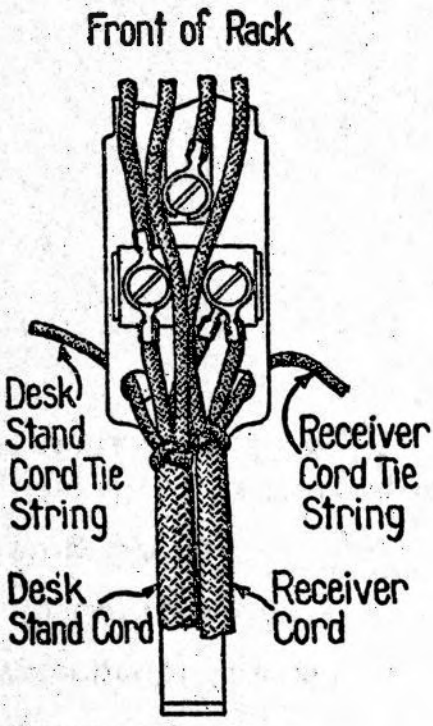
Install these cords according to (c), Section 1.

Tying Cords — Section 21

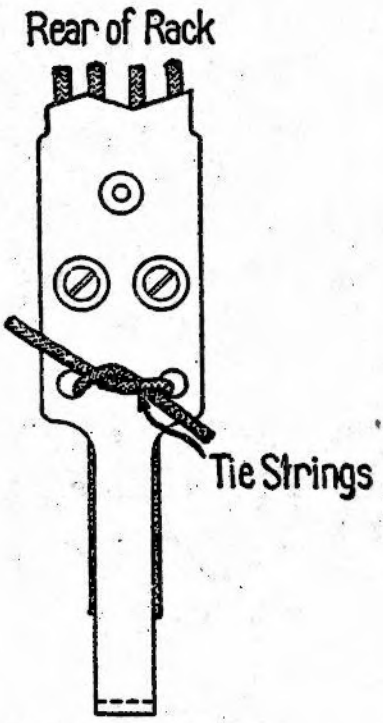
Tie all cords to relieve connections from strain as shown in Sections 22 to 27.

Tying Cords to Desk Stands

Section 22

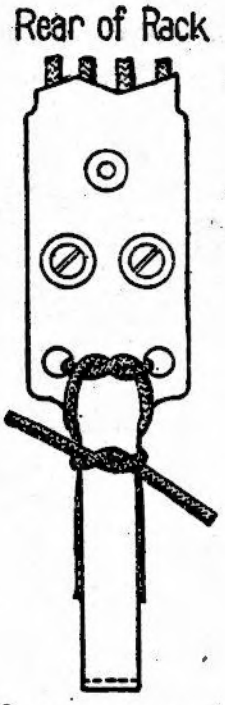


Pass tie strings through holes.

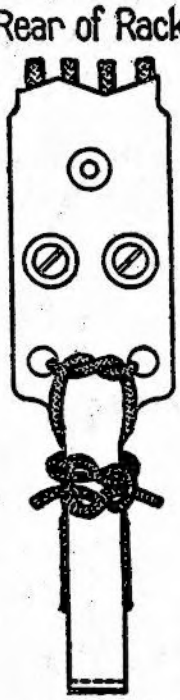


Pull tie strings through holes. Pull knot up tight.

Lash cords firmly to rack.

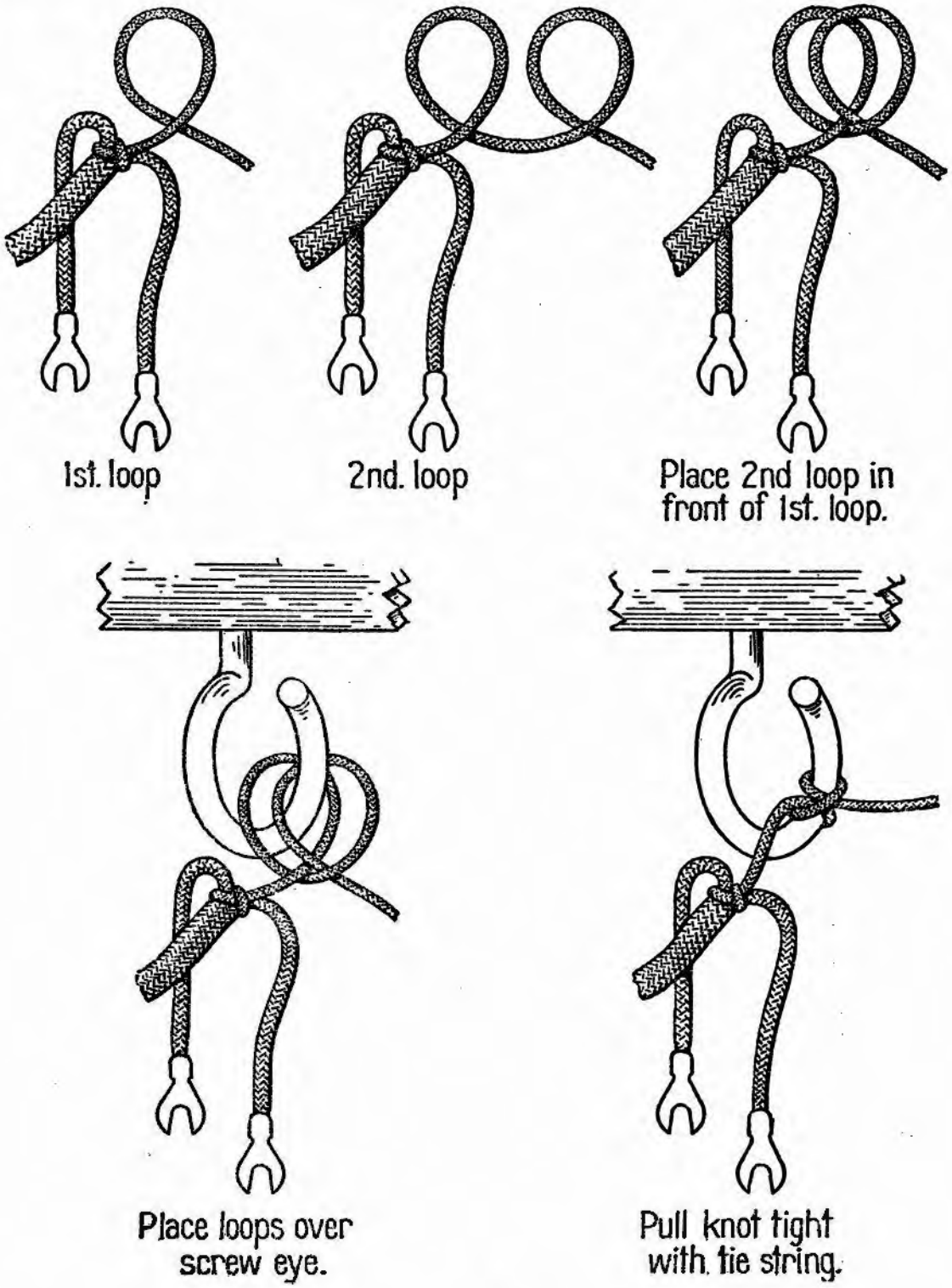


Make square knot Pull knot up tight.



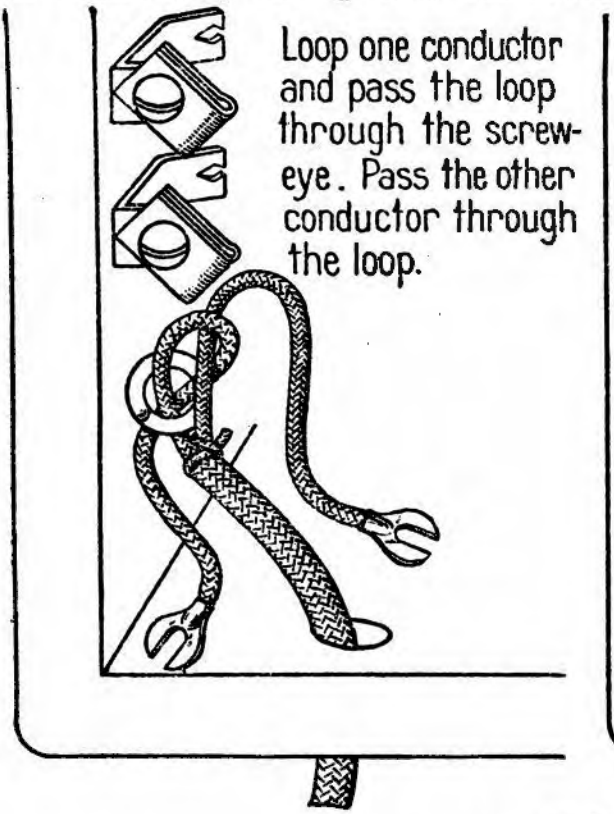
To complete tie pull ends tight.

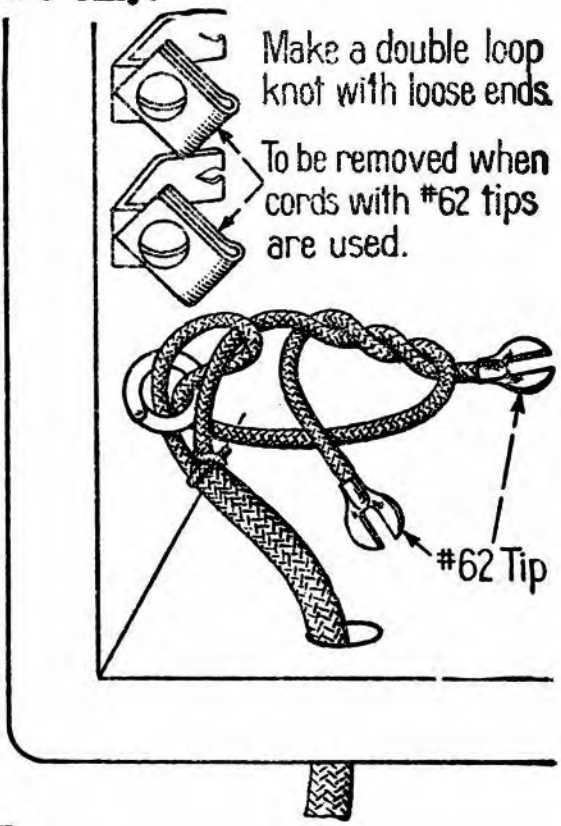
A receiver cord tied in set is shown. Tie desk stand cords in same way.

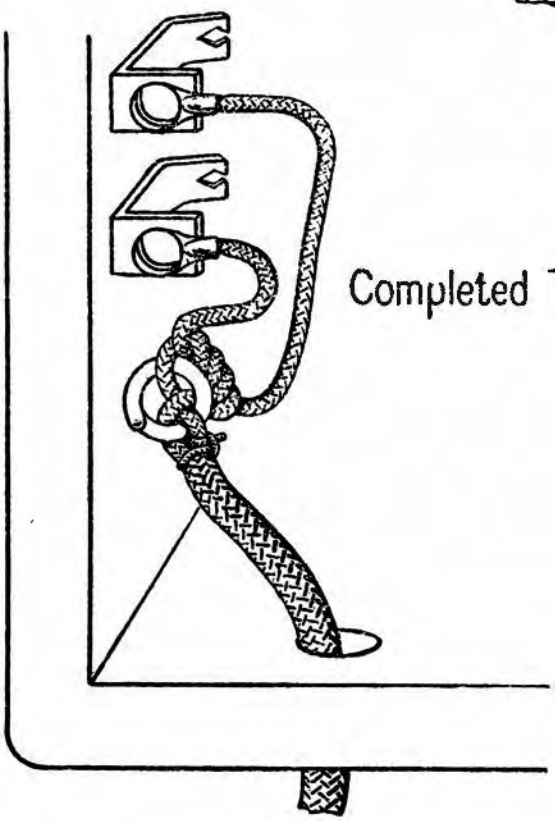


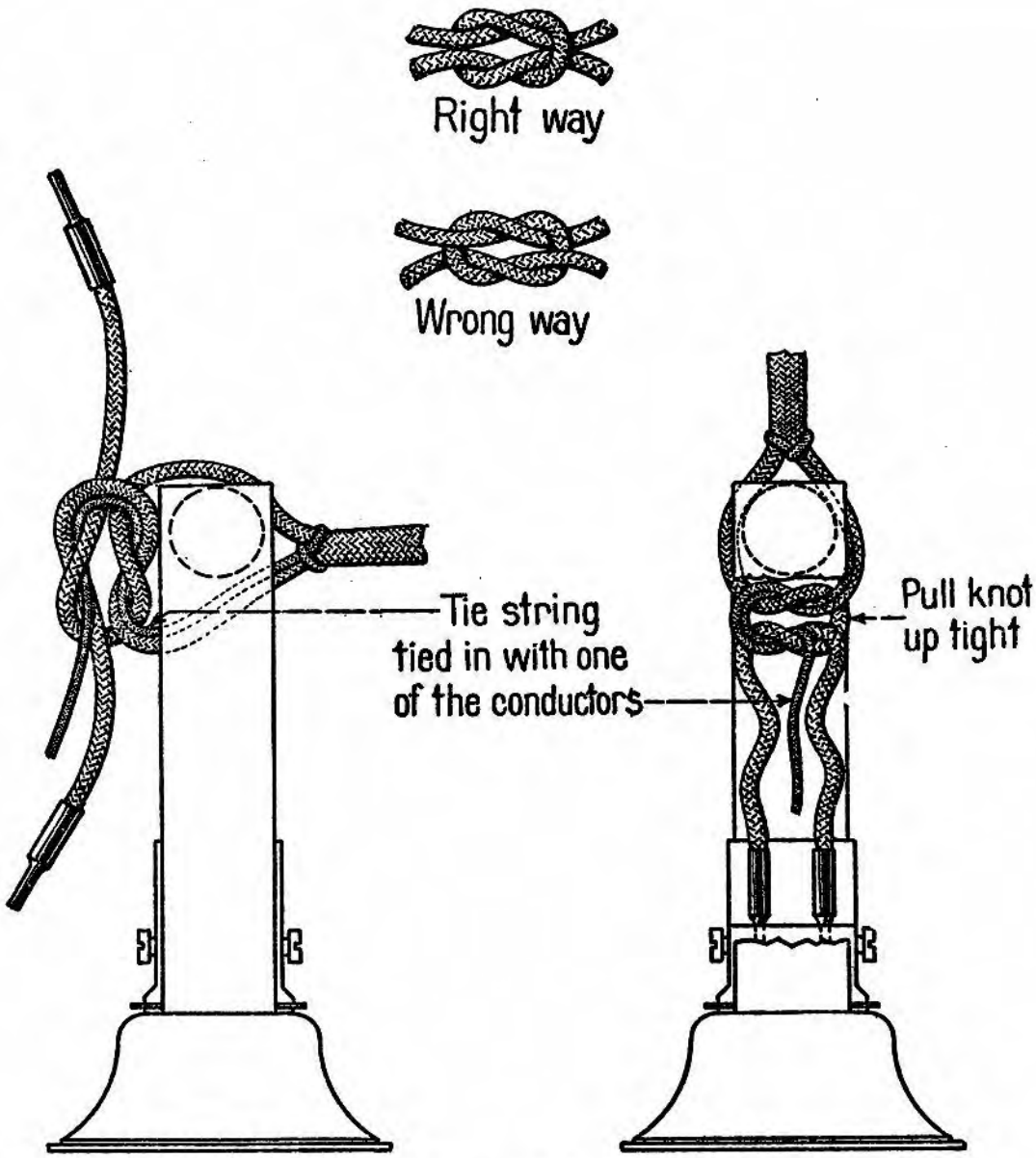
Tying Desk Stand and Receiver Cords to Sets— Cords without Tie-Strings **Section 24**

A receiver cord tied in set is shown. Tie desk stand cords in same way using two conductors only.







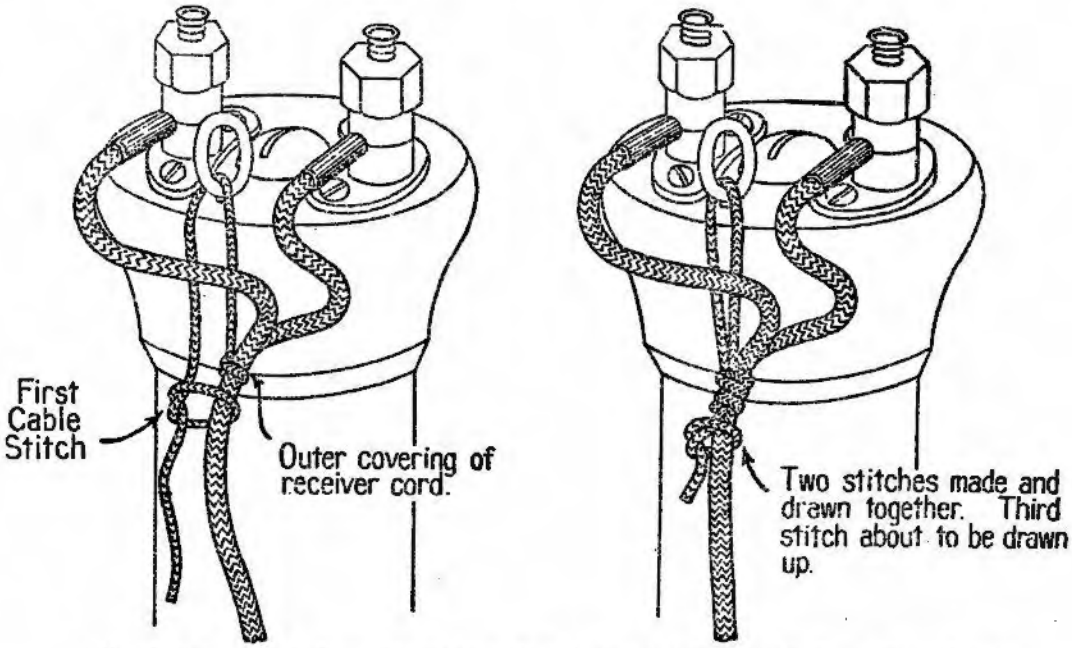


Pass one conductor on one side of heel piece and pass the other conductor together with the tie string on the other side of the heel piece. Tie with square knot, see right way, turn knot between limbs of magnet and insert tips in binding posts.

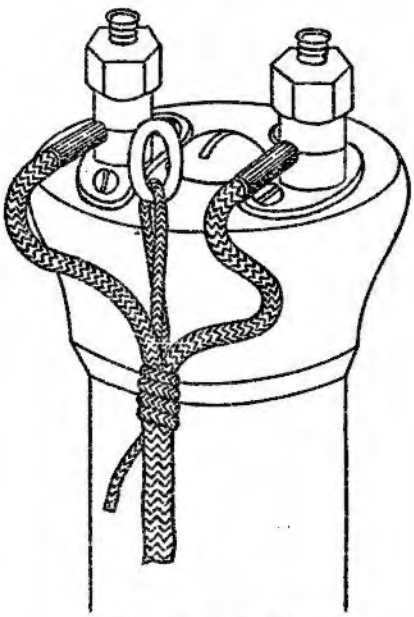
Cord ends should be 4½ inches long. If less, the braid over the two conductors should be drawn back.

Tying Cords to *122 Receivers— Cords with Tie-Strings

Section 26

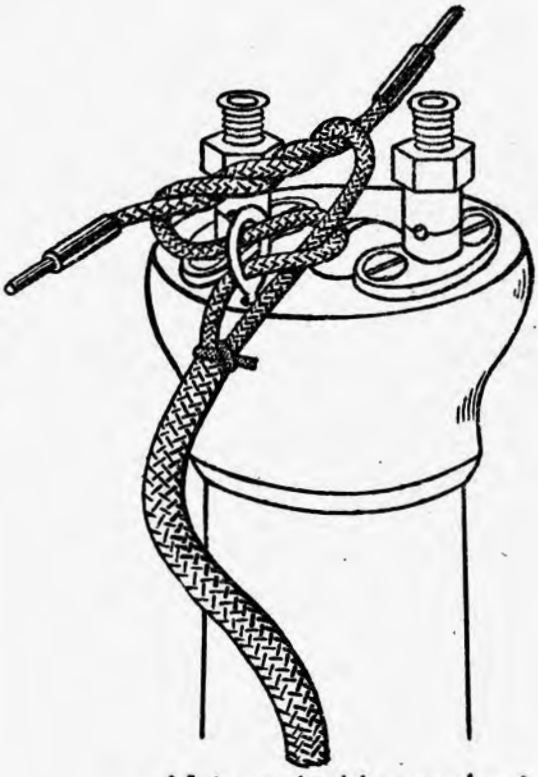


Pass tie string through screw eye, from right to left, to within about one inch of the outer covering of receiver cord. Make three cable stitches and draw them up close together.



Completed Tie

Loop one conductor and pass the loop through the screw eye. Pass the other conductor through the loop.



Make a double loop knot

Pull conductors tight and connect tips to binding posts.

EXTENSION RINGERS (LOUD RINGING BELLS)

Section 28

If necessary to install (for permanent use) outside of building where it will be exposed to snow and sleet, use standard shelter backboard.

GONGS WITH DISTINCTIVE TONES

Section 29

Where two or more telephones are placed near together so that users cannot distinguish which bell rings, gongs with distinctive tones, should be installed.

KEYS

Section 30

Keys for silencing ringers and other special purposes may interfere with subscribers' service if not properly operated. Where keys are installed explain proper operation to subscriber.

Do not install keys for silencing ringers at four-party selective stations. In some districts keys are not installed to silence ringers at two-party selective stations. In these districts supplemental instructions will be issued.

Mount keys within easy reach of the user.

At prepayment coin collector stations do not install keys which would remove collector from control of the Central Office operator or connect ground to the line.

EQUIPMENT FOR NOISY PLACES

General — Section 31

If telephone is located in a noisy place subscriber may have difficulty in hearing due to—

(a) Noise reproduced in receiver by the transmitter (called side tone);

(b) The effect of noise directly on ear;

(c) By both (a) and (b).

Noisy conditions are most likely to be found in factories, in large offices where there are many people, near elevated or other railroads or noisy streets, etc.

On complaint of subscriber, noise may be reduced or overcome according to Sections 32 to 37.

NOTE: Noisy instrument may be caused by receiver diaphragm touching pole pieces. Make sure noise is not due to this cause before making other changes.

Common Battery Stations
Side Tone Reduction — Section 32

The volume of side tone with the 323 transmitter is greater than with other transmitters now standard. At all stations to which loop resistance is less than 90 ohms and at which 323 transmitters are installed, connect subscriber's set for side tone reduction.

At stations to which loop resistance is more than 90 ohms, side tone is less than on loops under 90 ohms, and it should seldom be necessary to connect set for side tone reduction.

Should subscriber complain of side tone:

(a) Suggest that subscriber eliminate the side tone by holding palm of hand over mouth-piece while listening.

(b) If (a) is not satisfactory to subscriber, and loop resistance is less than 180 ohms, connect set for side tone reduction, if sure complaint is due to side tone, and install 323 transmitter.

(c) If loop resistance is over 180 ohms do not connect set for side tone reduction without approval of Superintendent of Plant or his representatives on account of loss in transmission.

Except on complaint do not change existing stations where 323 transmitters or side tone reduction circuit are already installed.

Loop resistance is resistance from main frame in office where line terminates to cable terminal nearest subscriber's station or subscriber's set with line terminals of set short-circuited. In the case of P.B.X. stations loop resistance shall be as specified in Notes, (1), (2) and (3). Should there be any question as to loop resistance, call the Wire Chief.

Note (1) Where P.B.X. stations receive current supply for talking (on trunk connections) over the P.B.X. trunk, the resistance of P.B.X. trunk shall be considered the loop resistance to the P.B.X. stations. Stations outside of building in which P.B.X. is located shall not be connected for side tone reduction except on complaint of subcriber.

Note (2) Where P.B.X. stations receive current supply for talking (on trunk connections) from local P.B.X. battery only (22 volts or more) or central office battery feed only, resistance from P.B.X. board to the stations shall be considered the loop resistance.

Note (3) Where P.B.X. stations receive paralled current supply for talking (on trunk connections) both from central office battery over the P.B.X. battery or central office battery feed treat as in (1).

Any case not covered by Notes (1), (2) and (3) shall be covered by supplemental instructions.

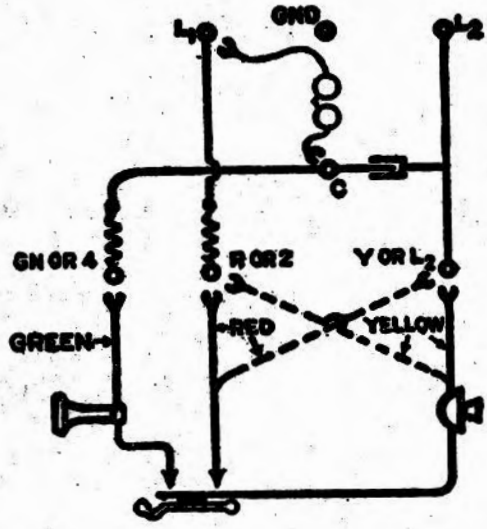
Orders for new installations will be marked "Over 90 ohms" or "Under 90 ohms." In the case of all P.B.X. stations this will be resistance of P.B.X. trunk. The installer at installations covered by Note (2) shall be governed, however, by the resistance from the P.B.X. board to the station.

To connect set for side tone reduction at individual and party line stations:

Reverse yellow and red cord conductors or wires at bell box and install 144 receiver and 323 transmitter. If desk stand is located where subscriber's feet rest on a grounded surface (such as damp floor, title floor etc.) when using the telephone, install desk stand with two transmitter cords.

In wall sets reverse wires which correspond to red and yellow conductors of desk stand cords and install 323 transmitter. In some old type sets these wires are soldered to terminals and later type sets should be substituted.

Where side tone reduction is used, attach small linen tag marked "Side Tone Reduction" to screw eye inside set.



To install side tone reduction circuit connect Red and Yellow cord conductors or wires as shown by dotted lines.

Wall sets with outside gongs have Yellow and Green wires in place of Red and Yellow wires.

If subscriber requests cutout button and complaint is found to be due to side tone :

(a) Advise subscriber that difficulty may be remedied by a change in circuit and connect set for side tone reduction if loop is not over 180 ohms.

(b) If second request is received Wire Chief shall follow Section 34 of these Specifications.

In case difficulty in hearing is due to noise directly on ear, proceed as follows:

(a) Advise subscriber that an auxiliary receiver (for which an additional charge is made) will improve his hearing when used in conjunction with regular receiver.

(b) That in case auxiliary receiver is used alone there will be a serious reduction in hearing.

(c) If subscriber desires an auxiliary receiver refer matter to Commercial Department in accordance with routine covering requests for additional equipment.

Connect auxiliary receiver by standard receiver cord to same terminals of desk stand or subscriber's set as regular receiver. Equip exposed cord tips connected to auxiliary receivers with ***76 CORD TIPS** (semi-hard rubber).

NOTE: Auxiliary receivers may be installed to improve hearing or for a second party to listen in, at stations not specially subject to noise, (at the additional charge) if requested by subscriber. If to improve hearing, hand type auxiliary receiver should not be installed with cutout button desk stand, as the auxiliary receiver and cutout button cannot be used at same time.

Transmitter Cutout Button Section 34

Where the total loop resistance from main frame to station is over 90 ohms there should not be much difficulty in hearing due to side tone. On complaint of subscriber:

(a) Determine if possible whether trouble is caused by side tone or noise directly on subscriber's ear.

(b) In case of side tone, install set having transmitter cutout button if approved by installers or repairman's supervisor.

Should request for cutout button be received from subscriber having set connected for side tone reduction refer matter to Wire Chief. If request is due to noise directly on subscriber's ear, Wire Chief shall explain that auxiliary receiver will best eliminate the trouble. If auxiliary receiver is not satisfactory to subscriber, and in Wire Chief's judgment a cutout button is required, an order shall be issued to install set with cutout button.

NOTE: If subscriber desires cutout button for purpose of preventing a person at other end of an established connection overhearing private conversation between subscriber and others near him, a desk stand with cutout button may be installed on approval of installer's or repairman's supervisor

Magneto Stations **Section 35**

Auxiliary Receiver

Difficulty in hearing due to noise is less likely to be encountered in magneto districts. On complaint of subscriber install auxiliary receiver under same conditions as for common battery stations.

Requests Received by Commercial Department

Section 36

All requests, except specific requests for auxiliary receivers, received by Commercial Department for substation equipment to improve hearing on account of noise, shall be referred to Plant Department in the routine manner and subscriber advised that matter will be investigated.

TESTS AND ADJUSTMENTS

Before completing installation make the following tests and adjustments.

Switchhook Contacts **Section 37**

With receiver to ear operate switchhook to see that contacts close and open circuit.

On common battery lines test with Central Office to see that operation of switchhook flashes line signal.

Transmitting and Receiving **Section 38**

Test with Central Office to see that transmitting and receiving is satisfactory.

Ringing **Section 39**

Ringers and loud ringing bells should have standard air gap adjustments when received from Western Electric Company or storeroom. It will not, in general, be necessary to check these adjustments on new installations.

Check and make following adjustments according to ADJUSTMENT OF SUBSTATION APPARATUS.

On New Installations—

(1) Check gong adjustment of ringers and loud ringing bells, and if necessary adjust gongs.

(2) Adjust biasing spring (if present) of ringers and loud ringing bells.

(3) Test apparatus with central office ringing current. If apparatus does not operate satisfactorily check all adjustments and if necessary adjust.

On removals where apparatus is reused without going through storeroom check all adjustments and if necessary adjust.

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