

BELL SYSTEM PRACTICES
Station Installation and Maintenance

SECTION C24.061
Issue 1, 9-1-31
Standard

PLACING WIRE AND CABLE IN BUILDINGS

1. GENERAL

1.01 This section covers requirements to observe when placing station wire and cable, gives a brief description of the various wire distributing systems and outlines methods to employ when placing wire and cable in locations, such as:

- (a) Finished Rooms and Offices,
- (b) Cellars, Factories, Storerooms, etc.
- (c) Apartment Houses and Hotels, and
- (d) Office Buildings.

1.02 In general, make wire or cable run from telephone, protector, connecting block or cable terminal so that wire or cable is not exposed to injury and run is as short as is consistent with neat appearance.

1.03 If station is an exposed station, i.e., station requiring a protector, do not conceal wire between point of entrance and protector unless wire enters through a service conduit.

2. REQUIREMENTS

Paralleling or Crossing Wires or Metallic Objects

2.01 **General:** Where it is necessary to parallel or cross pipes or wire other than Bell Telephone wire, obtain as great a clearance as practicable consistent with length of wire or cable run and other considerations.

2.02 **Minimum Clearances:** Where a radio set is installed on the premises and it is necessary to parallel or cross the radio receiving antenna, ground wire or loud speaker extension wire, it is particularly important that the separation from such radio wires be as great as practicable. In this case some increase in length of wire or cable run is warranted to obtain a clearance of at least six inches.

2.03 Where a main station requires a protector and it is more convenient to run wire on outside of building from station side of protector, or where it is more convenient to run wire on outside of building to the extension station or extension ringer, the line wire and the interior wiring extended outside the building shall be separated by at least two inches.

2.04 Other minimum clearances are shown in Fig. 1 and Fig.

3. If the clearances shown in Fig. 1 cannot be obtained, protect wire or cable (both where crossing or paralleling pipes or foreign wire) in accordance with the methods shown in Fig. 2.

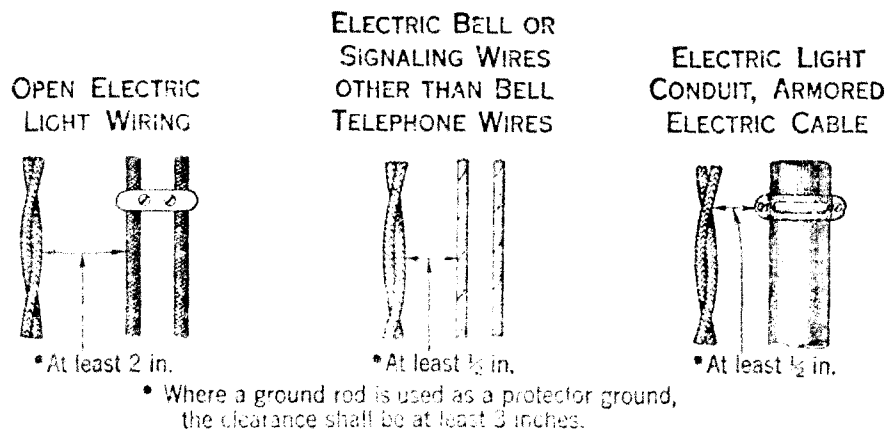


Fig. 1.

2.05 Wire or cable shall not be placed in a pipe, conduit, or compartment containing electric light or power wires, nor in the same outlet box, junction box or similar fitting or compartment unless separated from the electric light and power wires by a suitable partition, except where the power wires are introduced into an outlet box, junction box, or compartment solely for power supply to signaling equipment or for connection to remote control equipment.

2.06 Avoid wherever practicable the running of wire or cable in the same conduit, molding or other runway with signaling wires other than Bell Telephone wires. When necessary to do so, obtain approval of your supervisor. It is not necessary to add tape or other protection in such cases.

2.07 **Minimum Clearances Not Obtainable—Protection Required:** Where the clearances specified in Fig. 1 cannot be obtained, protect wire or cable as shown in Fig. 2.

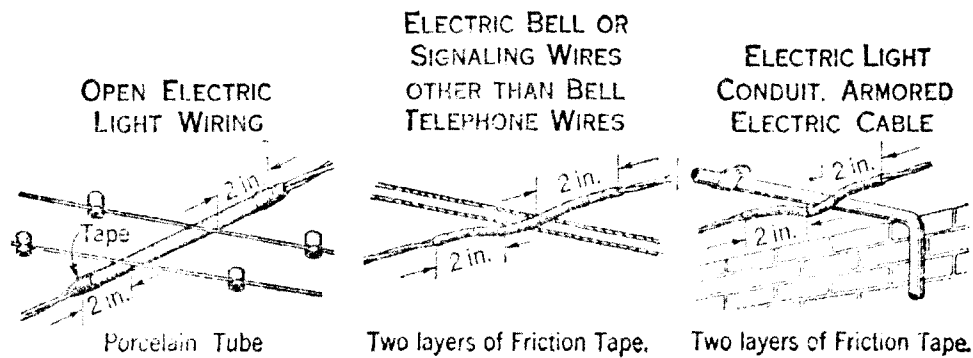


Fig. 2.

2.08 Moreover, where station wire or cable crosses light or power wires and it appears that they may come within two inches of each other due to sagging or other causes, protect wire or cable as shown in Fig. 2.

2.09 Where it is necessary to cross exposed steam pipes or water pipes, protect wire or inside wiring cable as shown in Fig. 3.

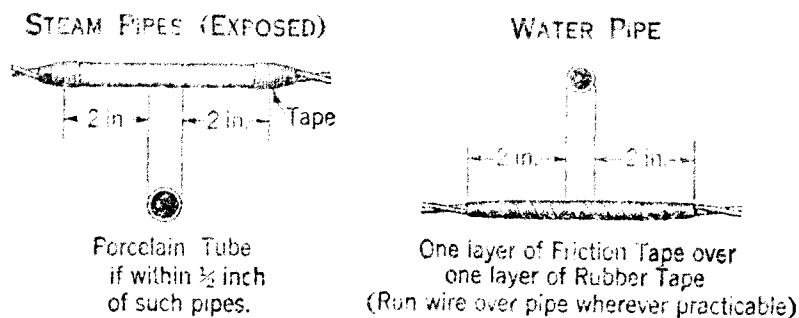


Fig. 3.

2.10 **Protection Not Required:** Taping or other protection is not required where wire or cable parallels or crosses:

- (a) Other Bell Telephone wires.
- (b) Electric light wires in wood molding.
- (c) Covered steam pipes.
- (d) Above water pipes at a distance of 1/2 inch or more.

Passing Through Entrance Hole

2.11 If entrance hole slopes upward from outside, no drip loop or tape on wire is required.

2.12 If entrance hole does not slope upward from outside, make a 1-1/2 inch drip loop (made by loop in wire), tape wire with friction tape and wedge tightly into hole or tube. Where last attachment is below entrance hole, however, no drip loop or tape on wire is required.

2.13 Where wire is run in back of a fire shutter, fire-screen or where it passes over sharp corners, protect wire with two layers of friction tape half lapped and reversed.

Passing Through Floors and Walls

2.14 **Size of Holes for Wire:** The approximate size of holes required for passing wire through floors and walls is given in the following tables:

Wires Not Taped

NUMBER OF RUNS	INSIDE WIRE		DUCT WIRE		BRIDLE WIRE	
	Pair	Triple	Pair	Triple	Pair	Triple
1	1 1/4"	1 1/4"	1 1/4"	1 1/4"	3/8"	3/8"
2	1 1/4"	3/4"	3/4"	3/8"	1/2"	1 1/2"
3	3/4"	3/8"	3/8"	1/2"	1/2"	5/8"
4	3/8"	1/2"	1/2"	1/2"	5/8"	5/8"

Wires Taped With Two Layers of Friction Tape or One Layer of Rubber Tape and One Layer of Friction Tape

NUMBER OF RUNS	INSIDE WIRE		DUCT WIRE		BRIDLE WIRE	
	Pair	Triple	Pair	Triple	Pair	Triple
1	3/8"	3/8"	3/8"	3/8"	2/8"	3/8"
2 or 3	1/2"	1 1/2"	1 1/2"	1 1/2"	1 1/2"	5/8"
4	1/2"	5/8"	1/2"	5/8"	5/8"	3/4"

2.15 **Size of Holes for Cables:** The approximate size of holes required for passing cable through walls and floors is given in the following tables:

Cable Not Taped

NUMBER OF PAIRS	U TYPE CABLE	INSIDE WIRING CABLE
4	—	1 1/4"
6	3 5/8"	3 1/8"
11	1 1/2"	3 5/8"
12	—	3 5/8"
16	1 1/2"	1 1/2"
21	3 5/8"	—
26	3 5/8"	1 1/2"

Cable Taped With Two Layers of Friction Tape or One Layer of Rubber Tape and One Layer of Friction Tape

NUMBER OF PAIRS	INSIDE WIRING CABLE
4	3 5/8"
6, 11 and 12	1 1/2"
16 and 26	3 5/8"

2.16 **Floors:** Where wire or inside wiring cable passes through floor adjacent to baseboard or wall and it is evident that wire or cable is likely to be exposed to damage from mopping, etc., protect it as shown in Fig. 4.

FLOORS

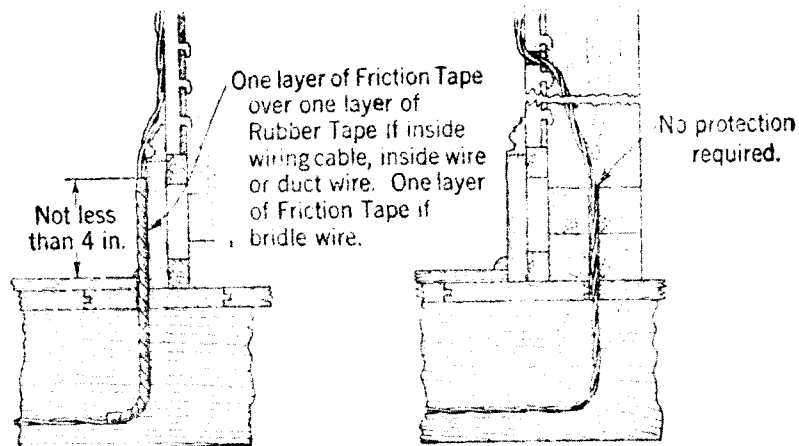


Fig. 4.

2.17 Where wire or cable passes through floor adjacent to wall or baseboard and is likely to be exposed to severe mechanical injury, protect it with pipe or conduit as shown in Fig. 5.

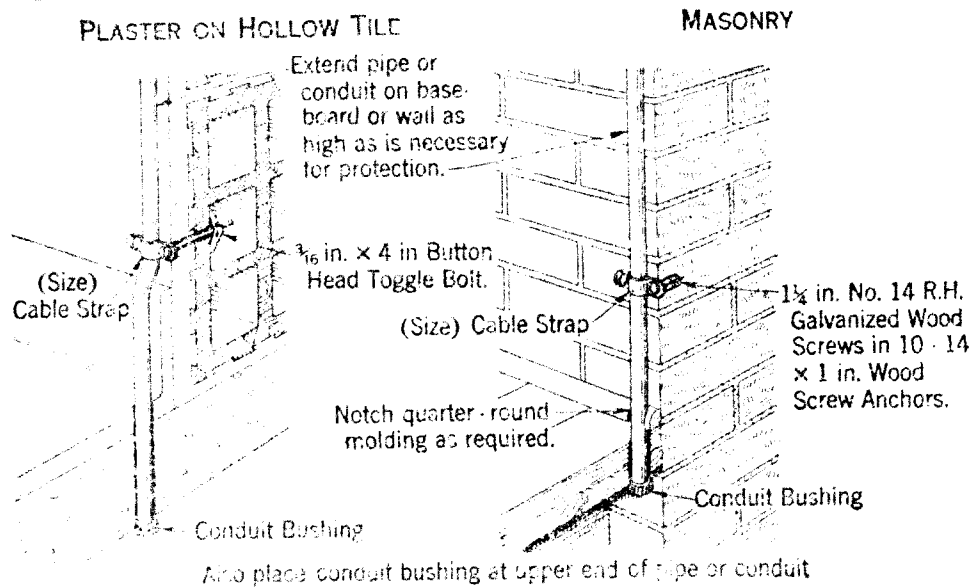


Fig. 5.

2.18 Where wire or cable passes through floor away from wall or baseboard, protect it from mechanical injury with a floor outlet or standpipe as shown in the section on "Placing Wire at Desks or Tables."

2.19 **Walls:** The following typical illustrations of wire passing through walls show where protection is or is not required. This also applies to inside wiring cable.

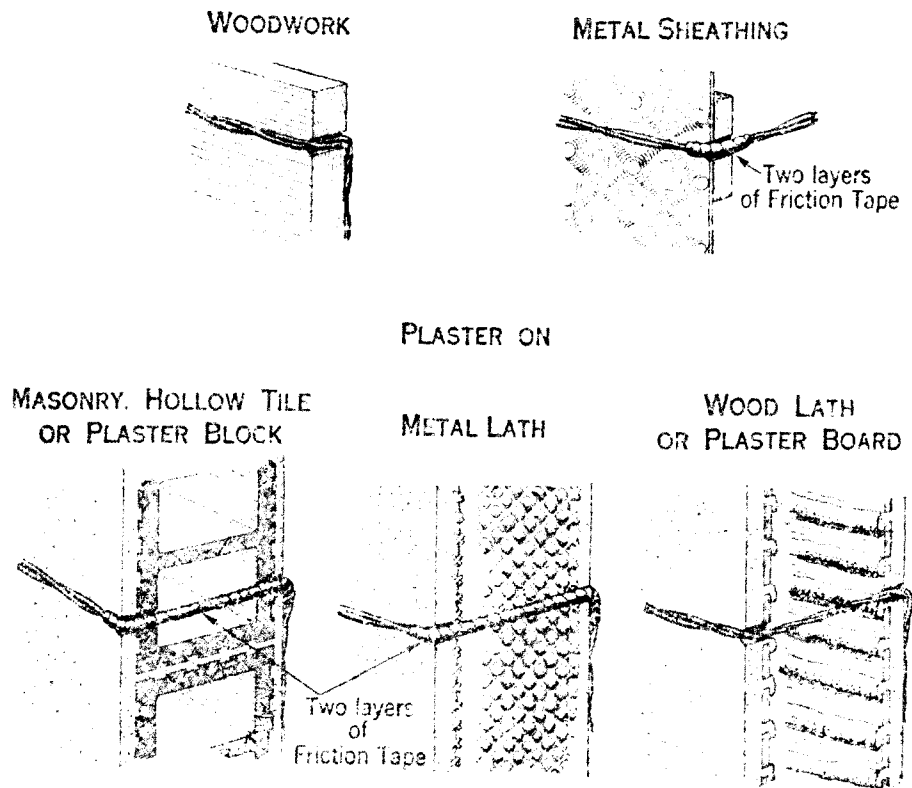


Fig. 6.

3. WIRE DISTRIBUTING SYSTEMS

Office Buildings

3.01 **General:** Office buildings are generally provided with an exchange cable which is terminated in accordance with one of the following methods:

- (a) Part of exchange cable direct to terminals on each floor and part to a cross-connecting cable terminal or frame.
- (b) All of exchange cable direct to floors.
- (c) In a cross-connecting cable terminal or frame. The exchange cable pairs are then cross-connected to pairs in building (or house) cables which are bridged to terminals on each floor.

3.02 If there is any question with regard to the type of wire distributing system in the building, refer to the plan at cross-connecting cable terminal or frame or to building superintendent.

3.03 Modern office buildings may have one of the following systems for wire distribution:

- (a) Steel Underfloor Duct System.
- (b) Fibre Underfloor Duct System.
- (c) Conduit Underfloor and Wall System.
- (d) Metal Base Raceways.
- (e) Wood Base Raceways.
- (f) Molding Raceways.

3.04 The telephone outlets for the various types of wire distributing systems are part of the permanent installation, and as such are furnished, installed and maintained by the building. If subsequently abandoned, the building should replace standpipes with screw plugs to close the openings.

3.05 **Steel Underfloor Duct System:** This system consists of a gridwork of steel ducts connected to distributing terminal cabinets. The ducts are laid in parallel branches with junction boxes at intersection of cross ducts. Outlets in the floor are generally provided every 24 inches. The outlets have a cap that is removed when outlet is used.

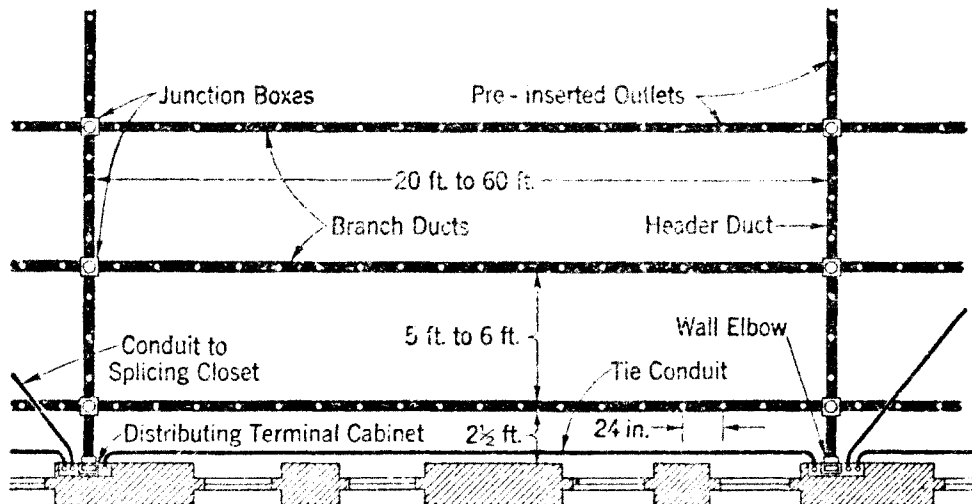


Fig. 7.

3.06 **Fibre Underfloor Duct System:** This system consists of a gridwork of fibre ducts connected to distributing terminal cabinets by means of conduits or wall elbows. The ducts are laid in parallel branches with junction boxes at the intersection of cross ducts. Outlets for telephones consisting of floor inserts and standpipes may be placed anywhere along this gridwork by penetrating the floor and duct at the desired point.

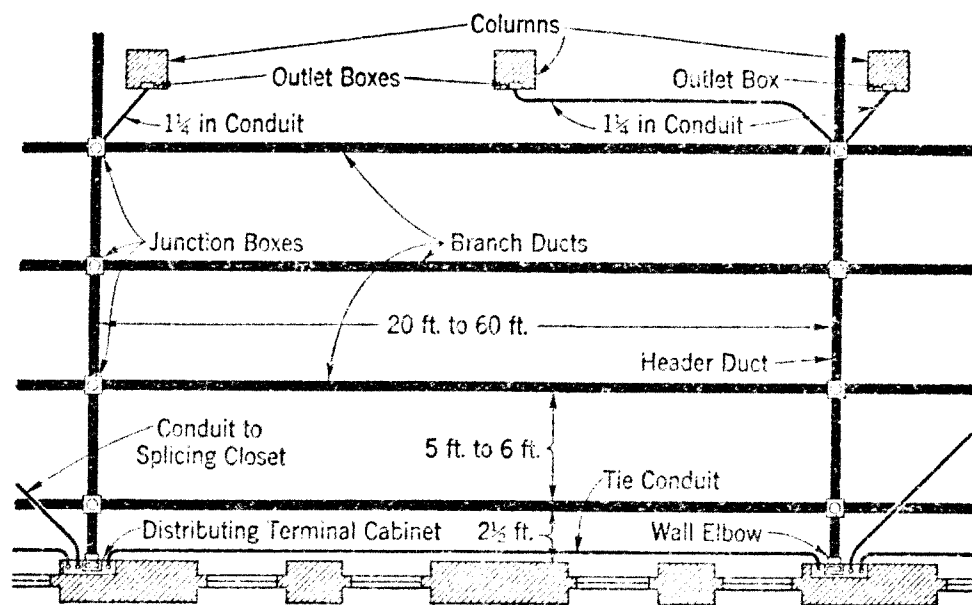


Fig. 8.

3.07 Conduits Underfloor from Wall: This system of distribution consists of a network of iron conduits extending from distributing terminal cabinets or splicing closets through the floor to the walls or columns of the building or to outlets in the floor.

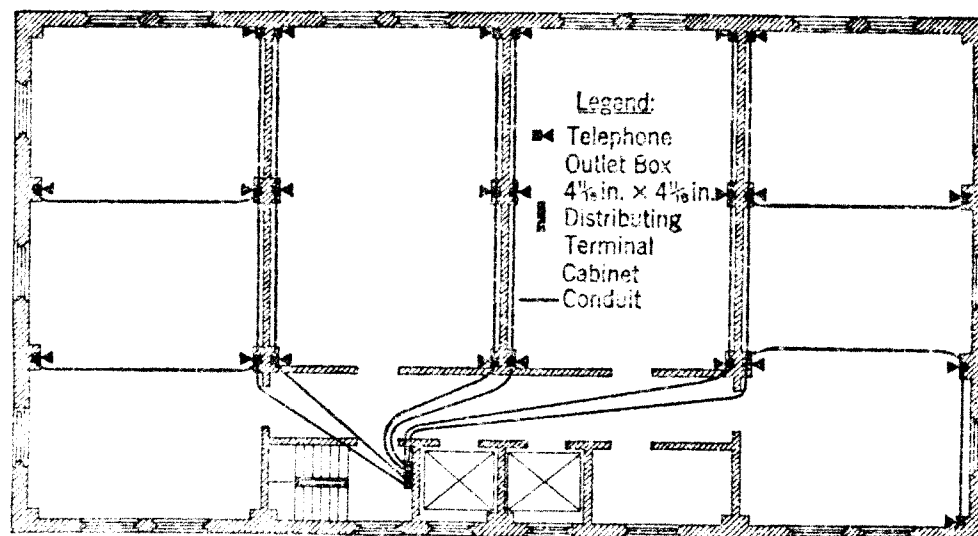


Fig. 9.

3.08 Metal Base Raceways: With this system a metal wall raceway takes the place of the usual baseboard. The front part is removable, exposing two raceways, the upper one for branch electric light wires and the lower one for telephone wires. This type of raceway is used principally in small floor areas where it is probable that desks will be placed against the walls.

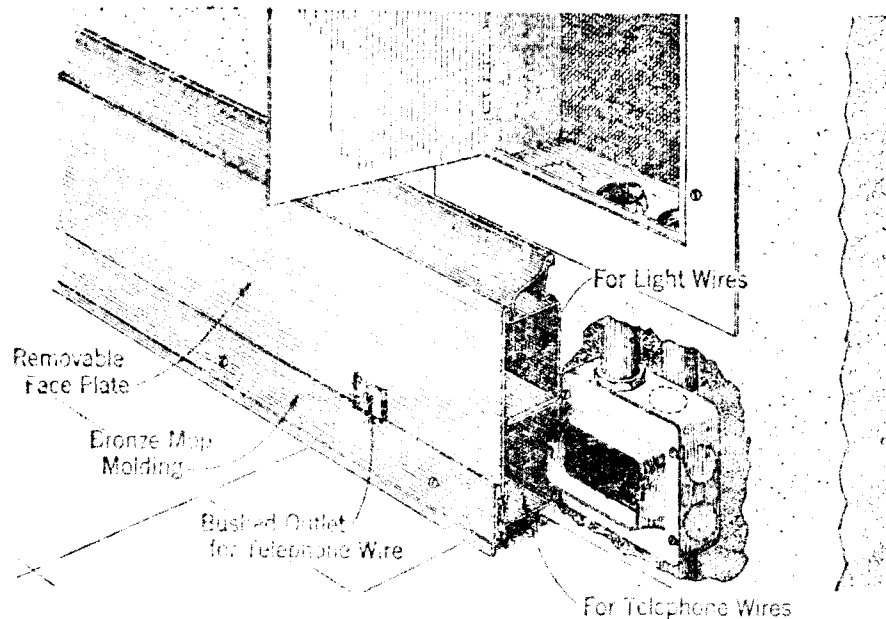


Fig. 10.

3.09 Wood Base Raceways: This system of distribution consists of wood baseboards with space in rear for telephone wires. Conduit from the floor terminal terminates in an outlet box in rear of baseboard. A brass plate covers the opening at the outlet box. A typical raceway of this type is shown in Fig. 11.

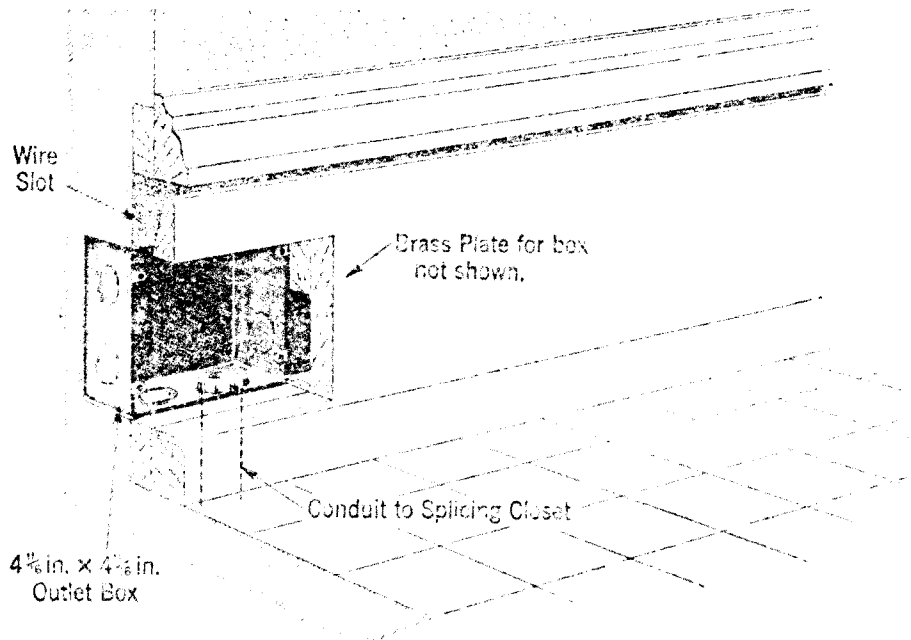


Fig. 11.

3.10 Molding Raceways: These raceways are of various types such as picture molding for small rooms, or large metal or wood molding with greater capacity for use in halls. Conduits are placed in walls between rooms or halls. Conduits connect the moldings to distributing terminal cabinets.

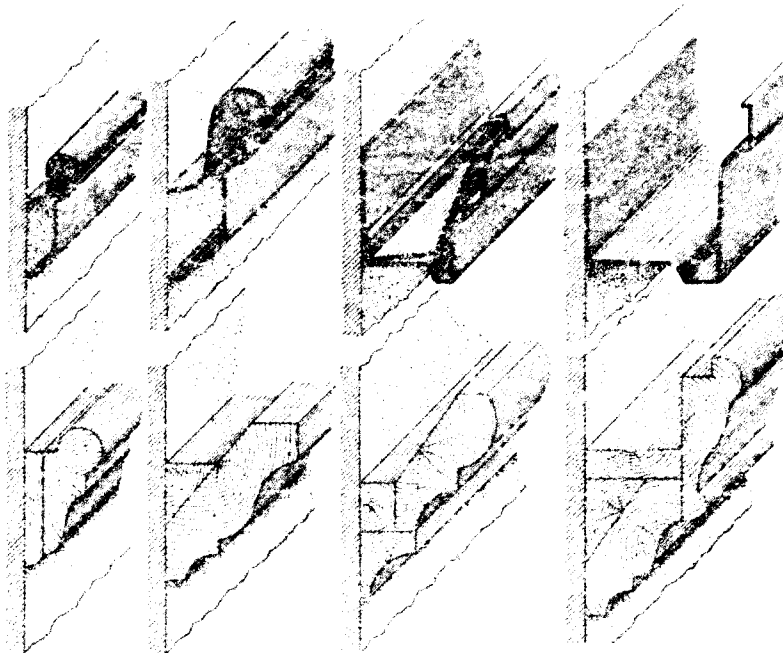


Fig. 12.

Apartment Houses and Hotels

3.11 In apartment houses and hotels where a system of wire distribution is provided, it is generally in accordance with one of the following methods:

- (a) Conduits run to each apartment from distributing terminal cabinets at central locations on each floor, and a larger conduit run from these cabinets to the cross-connecting cable terminal or frame.
- (b) A number of riser conduits from a cross-connecting cable terminal or distributing terminal cabinet to outlets in each apartment.

3.12 Where conditions warrant, house cables are run from a cross-connecting cable terminal to distributing terminal cabinets. Moreover, the wires which are run initially through conduits are permanently terminated both at connecting blocks or outlets in the apartments and at the distributing terminal cabinet or cross-connecting cable terminal.

3.13 In party-line districts, extra connecting blocks may be provided in cross-connecting cable terminals to permit the strapping together of binding posts. One cross-connection is placed from each group of binding posts to an exchange cable pair and the house cable pair or wires from the apartments are connected to the terminals of the strapped blocks.

Private Residences

3.14 In modern homes conduit is being provided, usually from a protector cabinet in the basement to outlets on first and second floors.

4. METHOD

General

4.01 Where house cable records are maintained at cross-connecting cable terminals or frames, or distributing terminals, make entry of pair and room or apartment number in house cable record.

Finished Rooms and Offices

4.02 In finished rooms and offices run wires where they will be as inconspicuous as practicable. Use conduits, under-floor duct systems, moldings or raceways where such provisions are available. Where such provisions are not available, run wires along baseboards, on top of picture moldings, or on door or window casings so that they will be as inconspicuous as possible. Where trim cannot be followed, run wires horizontally or vertically and not diagonally. Avoid running wires across finished ceilings except in finished basements where satisfactory to subscriber.

Apartment Houses

4.03 **Conduits Provided:** Where wiring has been run from a distributing terminal to a connecting block or outlet at the baseboard in the apartment, run wire from telephone to connecting block or outlet as outlined in Paragraph 4.02 and then cross-connect at the terminal's for this apartment to the assigned exchange-cable pair in the cross-connecting cable terminal.

4.04 **No Conduits Provided:** Where no conduits are provided, run wires through partitions or from closet to closet where closets are above one another.

4.05 Where there is no other wire run available, use dumbwaiter shafts, provided there are no local regulations against their use.

Caution: Do not utilize elevator shafts for wire or cable runs or enter such shafts.

4.06 Arrange to have dumbwaiter securely blocked out of service while working in shaft, obtaining permission from some authorized person.

4.07 Place wiring in dumbwaiter shaft only under the personal supervision of the foreman or someone designated by him.

4.08 Wire dumbwaiter shafts for the ultimate number of lines. In certain localities, a few pairs of wires may be desirable.

4.09 Make up a hand-made cable of duct wire with friction tape, leaving about 1/2 inch between turns. If two-inch tape is used, leave no space between turns. Drop a wire from top of shaft and mark entrance location for each floor with tape. Remove wire to some convenient location to make up cable, dropping off sufficient wires for each floor.

4.10 Tag each wire with a permanent tag at the terminal end.

4.11 Place hand-made cable in corner of shaft where it will not be subject to contact with ropes or counterweights; at the same time observing the paralleling and clearance requirements outlined in Part 2. Avoid crossing shaft where practicable, but if necessary channel out shaft so that wire will be protected from mechanical injury.

4.12 Install all fasteners from openings of shaft.

Caution: Never enter dumbwaiter shafts or ride dumbwaiters.

4.13 Where practicable connect wires for each apartment to a connecting block in apartment at point where wires are brought through wall. Where spare pairs are placed, turn them back at entrance and tape against cable. Protect cable where it leaves the bottom of shaft with several layers of friction tape.

Office Buildings

4.14 Where building is not provided with one of the wire distributing systems mentioned in Part 3, run wire in accordance with the method outlined for "Finished Rooms and Offices," Part 4.

4.15 Where a wire distributing system is provided, fish the wire through it if an underfloor duct or conduit system. Fishing is not always required for metal or wood base raceways and molding raceways. It may be easier, however, to fish certain types of base raceways.

Cellars, Factories, Storerooms, Etc.

4.16 In such locations, run wires:

- (a) Where least likely to be broken or detached.
- (b) The shortest and most direct right-angled route unless otherwise specified.
- (c) Where they will not interfere with the operation of doors or windows, and
- (d) Where installers and repairmen would not be subject to injury from:
 - (1) Electric light or power wires or power apparatus.
 - (2) Moving machinery or belts, and
 - (3) Elevators or dumbwaiters.

4.17 Where necessary to run wires where they would be subject to mechanical injury from passing trucks, etc., follow the ceiling line rather than the baseboard.

4.18 Where practicable, avoid placing wire on chair rails. Where it is necessary to place wire along chair rails, run wire along the under side of them.

4.19 Where practicable, avoid wet or damp places such as:

- (a) Cellars or basements where there are no windows or other means of ventilation.
- (b) Cellars or basements along a waterfront or in a marshy district.
- (c) Cellars where root crops, etc., are stored in winter.
- (d) Locations in the vicinity of laundry tubs, and
- (e) Walls and ceilings that are always damp.

4.20 Spanning open spaces, as from beam to beam, is not desirable unless the wire will be free from mechanical injury. Spanning should be avoided where boxes, trunks, etc., are likely to be stored, or in the neighborhood of work benches. Moreover, do not run wires on or across open stairs such as are generally found in cellars. Figs. 13 and 14 show typical methods of running wires in cellars.

CELLAR WITH LATH AND PLASTER CEILING

Where general appearance of cellar is such that it would not be objectional, wire may be run diagonally on plastered ceiling to obtain short run.

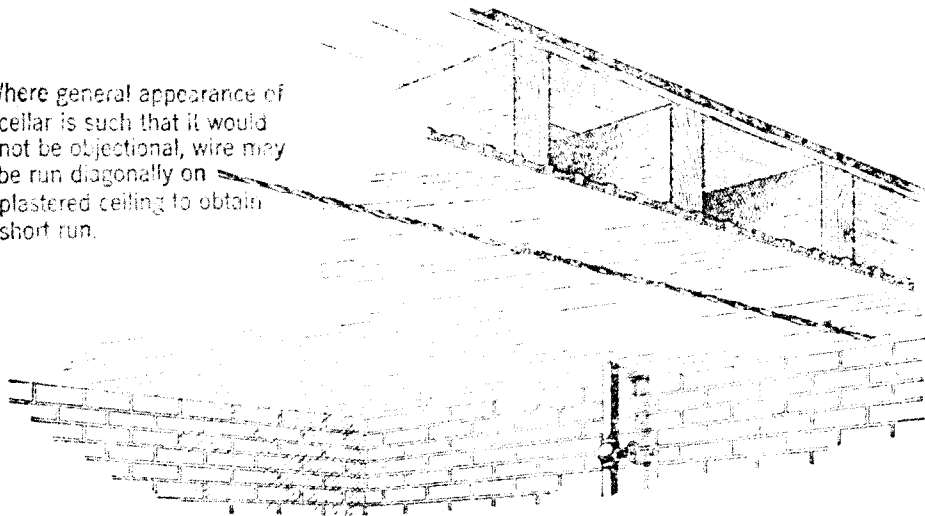


Fig. 13.

CELLAR WITHOUT LATH AND PLASTER CEILING

Where spanning joists, run wire not more than 3 inches from wall.

Preferable to spanning joists

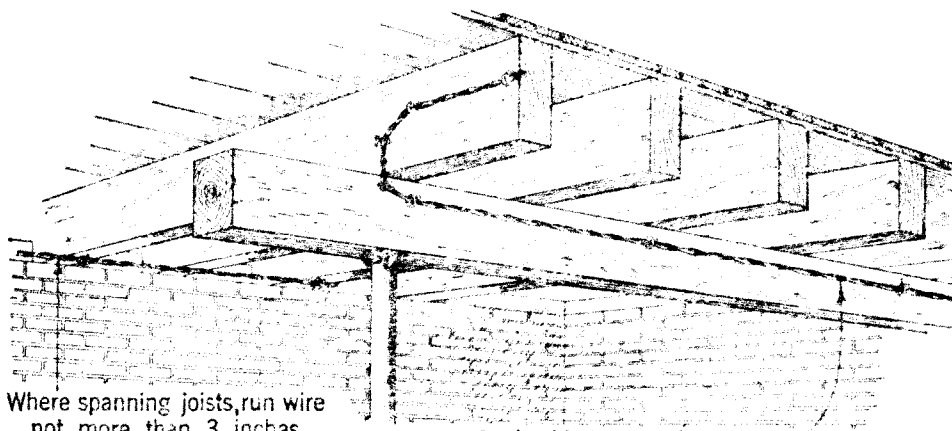


Fig. 14.