

SELECTION OF ROUTE FOR STATION WIRE AND CABLE

1. GENERAL

1.01 This section provides recommended guidelines for routing and installing station wiring and cable.

1.02 This section is reissued to add information on the KS-22084 TEFLON* insulated air plenum inside wiring cable and wire.

1.03 In addition to the conditions outlined in this section, certain local electrical and building codes may add further restrictions to the placement of cables in buildings. If the local codes exceed the requirements of telephone company standards, the electrical and building codes will apply. If telephone company standards exceed the requirements of the local electrical and building codes, the telephone company standards will apply.



Know the requirements of local electrical and building codes. ♦These codes and the national and regional codes are revised periodically.♦ If you have any questions, contact your local building industry consulting service (BICS).

2. UNUSUAL BUILDING ENTRANCES

2.01 *For Entrances at Metal Frame Windows and Doors:*

- (a) Do not make entrance through metal door frames.
- (b) When metal window frame is set in masonry or bricks, enter as shown in Fig. 1.
- (c) Cut slot in seam of brick as shown in Fig. 2. Be sure slot is deep enough so wire is cleared when shutter or screen is operated.

*Trademark of DuPont Co.

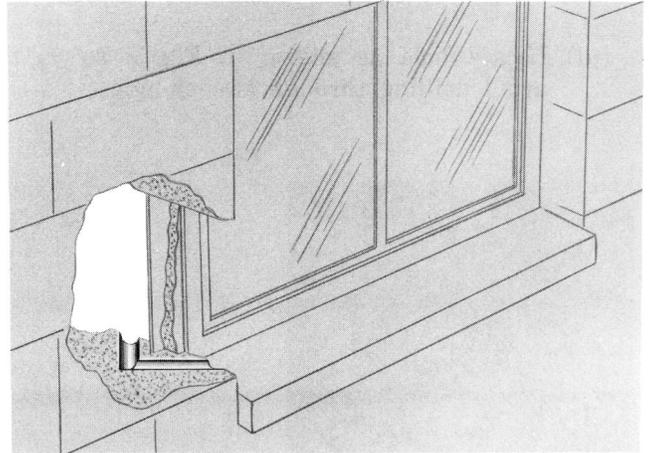


Fig. 1—Entrance at Metal Window Frame

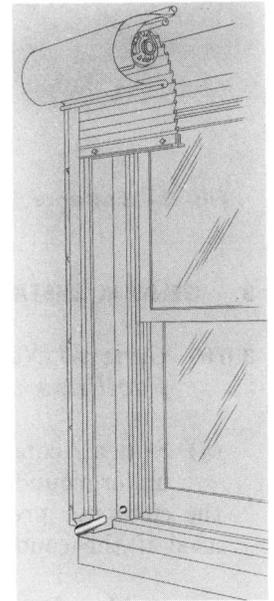
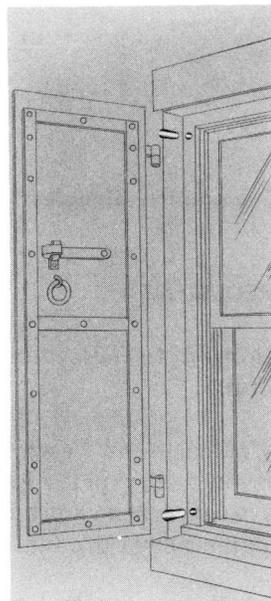


Fig. 2—Entrance at Shutter of Fire Screen

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Wires or cables shall not be placed in conduits or raceways which contain electric wires not properly separated by partitions from the space provided for telephone wires or cables.

- (d) Locate hole as shown in Fig. 3 so as to avoid drilling through two shingles.

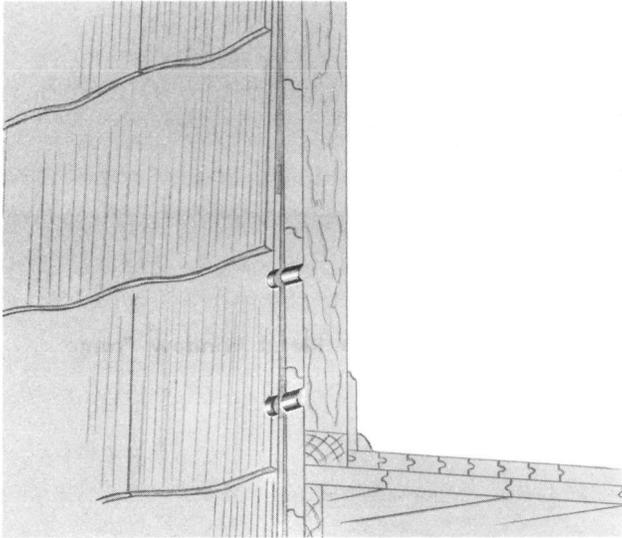


Fig. 3—Entrance Through Composition Shingles

3. GENERAL INSTALLATION REQUIREMENTS

3.01 *General Notes Pertaining to Telephone Facilities Installation:*

- (a) Seal all conduit ducts at each end between underground terminals or utility poles and the customer premises. A weatherhead may be used if the conduit terminates above ground.
- (b) Inside wire runs and outlets: A telephone outlet consists of a convenience outlet or plaster ring with a telephone cover plate and a suitable wiring channel.
 - (1) Use conduit where inside wire runs have turns or terminate through a plastered ceiling, such as in a garage.
 - (2) Pull wires may be used instead of conduit where a run is short and is vertical to

an unfinished readily accessible area, such as a basement, garage, etc. Pull wires shall be No. 14 single AWG or the equivalent.

- (3) Avoid attic runs wherever possible.
- (c) Interior wiring in buildings to provide telephone service to the occupants will be furnished, installed, and maintained by the telephone company.
- (d) Advance wiring may be provided in the following instances:
 - (1) In finished buildings, such as apartment houses, multiunit dwellings, or other living quarters, if the service installed is for 0-1 key service, keyless stations, or extensions from PBX-type service
 - (2) When service orders have been issued in advance, pending the availability of facilities to connect service.
 - (e) For further information on planning modern, built-in telephone facilities, see your local building industry consulting service.

3.02 Various points which should be considered when selecting routes for wire and cable are shown in Fig. 4 and Table A.

3.03 *Facilities to Look For:*

- (a) Existing conduits or raceways
- (b) Existing wiring or cable.

3.04 *Placement of Wiring or Cable:*

- (a) Run wire or cable horizontally or vertically in a straight line.
- (b) Use baseboards or other trim where conduit is not provided.
- (c) Make use of wooden surfaces in preference to others where possible.
- (d) Keep runs short as possible.

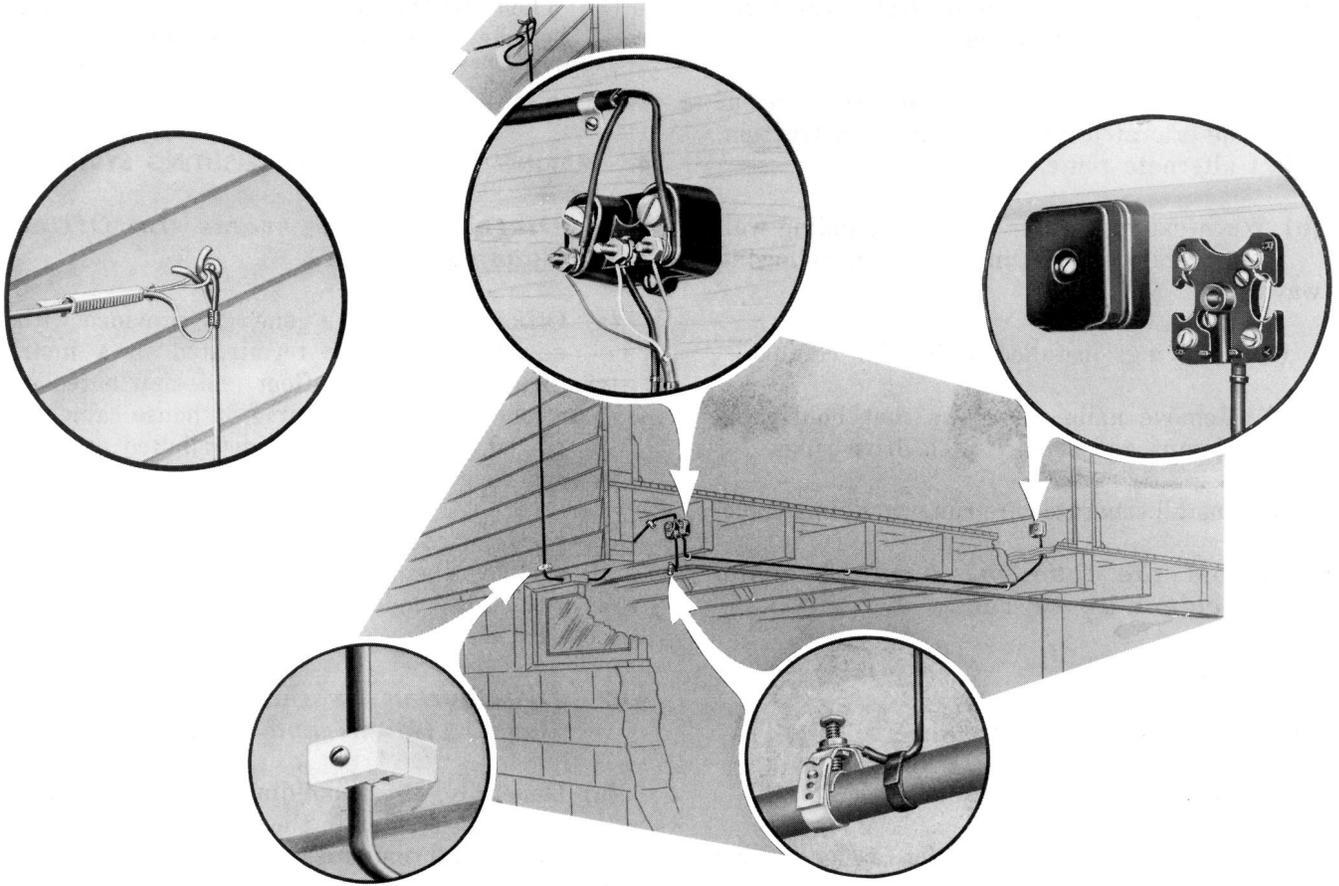


Fig. 4—Typical Wiring Routes

TABLE A
NO SERVICE ENTRANCE

TYPE OF CONSTRUCTION	POINT OF ENTRANCE				
	WOODEN WINDOW FRAME	WOODEN DOOR FRAME	FOUNDATION SILL	OUTSIDE WALL*	METAL WINDOW FRAME
Masonry or Brick	•	•			•
Wood or Stucco on Wood (basement ceiling unplastered)	•	•	•	•	
Wood or Stucco on Wood (basement ceiling plastered)	•	•		•	

* To wire direct to set or connecting block.

3.05 After location of first attachment has been determined, consider the following factors:

- (a) Locate the drop or block wire run on the building with a view to permanency, and accessibility.
- (b) On building walls finished with stucco, rigid composition shingles, brick veneer, and similar materials, locate attachments on wood trim where practicable.
- (c) Locate preferably on the rear and side walls of a building.
- (d) Place horizontal run above the reach of the public.
- (e) Do not run wires in front of signs, doors, windows, fire escapes, awnings, etc.

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- (f) Do not place wire runs on walls which are likely to be built against.
- (g) Avoid locating on intermediate structures of a deteriorated or temporary construction. Select alternate route.
- (h) When making a wire run on a building wall near cable, proceed in one of the following ways:
 - (1) Use rings installed with cable clamps.
 - (2) Remove nails or screws that hold cable clamps and replace with drive rings.
 - (3) Install separate wire run paralleling cable.

3.06 *Avoid the following locations when placing wire or cable:*

- (a) Damp locations
- (b) Locked storerooms, etc
- (c) Temporary structures
- (d) Runs that provide support for foreign objects
- (e) Excessively hot locations, steam pipes, etc
- (f) Locations where wires and cables will be subjected to abrasion.

3.07 *In explosive atmospheres, locate and install wiring as covered by specific instructions in accordance with the equipment being installed.*

3.08 *Requirements for Ground Wire Runs:*

- (a) Make runs as short as possible.
- (b) Locate wire where it is least likely to be disturbed.
- (c) Run protector ground wire exposed, except where conduit has been provided.
- (d) Do not place protector ground wire in ring runs.
- (e) Signal ground wire may be placed in rings.

- (f) When existing protector ground wire has become enclosed by a ceiling or partition, reuse if continuity can be checked and ground clamp is accessible.

4. MAKING USE OF WIRE DISTRIBUTING SYSTEMS

4.01 *Distribution Systems in Office Buildings:*

- (a) Office buildings are generally provided with an exchange cable terminated in a main terminal on the ground floor and distributed to each floor through a building or house cable, or the exchange cable may be distributed directly to each floor.
- (b) For information regarding the building conduit system, consult the plan at the main terminal or contact the building superintendent or your local BICS.

4.02 *Distribution Systems in Apartment Houses, Hotels, and Hospitals:*

- (a) Generally, these buildings provide a main terminal location in the basement or ground floor and a wall conduit system to each apartment or room.
- (b) In large buildings, there may be house cable from the main terminal to each floor with a terminal on each floor and conduits to the various apartments or rooms from the floor terminal.

5. SELECTION OF EXPOSED WIRING ROUTE

- 5.01 In general, an exposed wire route should be used only where no concealing facilities are available.

5.02 *Wiring in Finished Rooms and Offices:*

- (a) Run wires along baseboards or on door or window casings so they will be as inconspicuous as possible (Fig. 5 and 6).
- (b) Where trim cannot be followed, run wires horizontally or vertically but not diagonally.
- (c) Choose color of wire and fasteners to match or blend with color of surface where wires are attached.

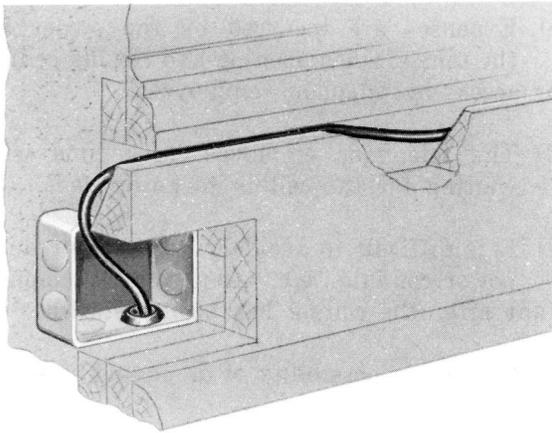


Fig. 5—Wiring From Conduit to Baseboards

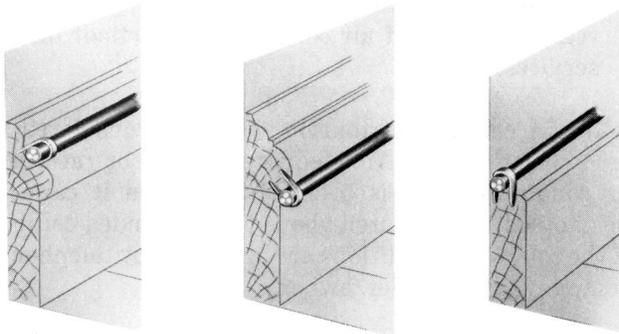


Fig. 6—Wiring to Baseboards

5.03 Wiring in Cellars, Factories, Storerooms, etc:

- (a) Place wire and cable where they will be least likely to be broken or detached. Provide protection if necessary.
- (b) Consider the shortest, most direct right-angle route unless otherwise specified.
- (c) Select a wire route which will be safe and accessible.
- (d) Follow the ceiling line rather than baseboard in heavily traveled passageways.
- (e) If necessary to follow chair rails, use the underside.

- (f) When possible, follow joists.
- (g) If necessary to span joists, run wiring not more than 3 inches from wall (Fig. 7).

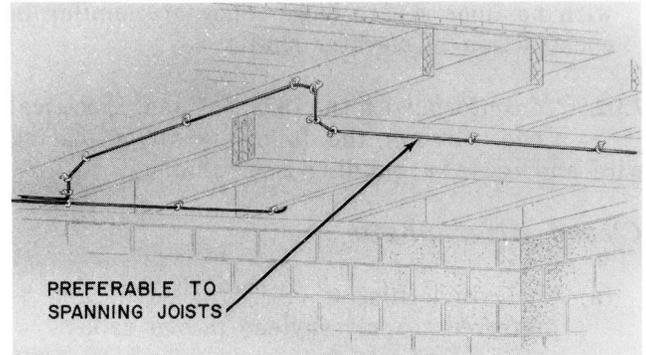


Fig. 7—Spanning Joist

6. USING CONCEALED AND OVERFLOOR CONDUITS

6.01 Consider the following factors when using conduits:

- (a) Whenever conduit is provided for telephone wires and it meets the prescribed specifications, it should be used.
- (b) Check to be sure conduit does not contain electrical wires not associated with telephone equipment. If it does, follow local instructions.
- (c) Consult the building people before extending wiring beyond the provided system.
- (d) When necessary to provide wiring through concrete floors or similar construction from floor to floor and conduit is not provided, inspect premises for pipes through floor which may be provided for such use.

7. PLACING STATION WIRE AND CABLE IN BUILDING RISER SHAFTS

7.01 Building riser shafts are generally of two types:

- (a) **Closed riser shafts** consist of a series of closets, aligned vertically one above the other, usually beginning in the basement and

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extending throughout the height of the building. The closets are interconnected by a cable slot or pipe sleeves through the floors.

(b) **Open riser shafts** usually extend from the basement to the roof of the building with no floor separations. They are similar in construction to elevator shafts.

7.02 To conform with the 1978 National Electrical Code, observe the following when placing wire and cable in building riser shafts:

Closed Riser Shafts

(a) ♦Polyvinyl chloride (PVC) jacketed cable is preferred to polyethylene jacketed cable.

(b) Polyethylene jacketed cable may be used in fireproof shafts having fire stops at each floor. See Section 760-630-410 for fire stop information.

Note: Fire stops are provided by the customer or building owner.

(c) If Bell System standard PVC insulated and jacketed H station wire and D inside wiring cable are placed, fire stops are not required.♦

Open Riser Shafts

(d) The use of polyethylene sheath cable is restricted unless it is enclosed in a noncombustible conduit.

(e) ♦Bell System standard PVC insulated and jacketed H station wire and D inside wiring cable may be placed with no restrictions.♦

8. USE OF AREA ABOVE SUSPENDED CEILINGS

8.01 It is not recommended to use the area above a suspended ceiling for concealing telephone plant. Avoid it whenever possible because of the following disadvantages:

(a) The necessity of working on ladders over desks or other objects creates a safety hazard.

(b) The employees of the tenant lose working time while the telephone employee works over their desks to install, maintain, rearrange, and remove telephone plant.

(c) Expenses are incurred by the owner and the tenant when opening and closing ceilings for access by telephone employees.

(d) The telephone employee loses time while waiting for the ceiling to be opened.

(e) It is difficult to avoid low beams, air ducts, power conduits, etc, when placing telephone plant after the ceiling has been installed.

(f) There is a possibility of damaging or soiling ceilings.

(g) There is a possibility of telephone cables picking up interference from induction and causing noise in working circuits.

(h) There is a possibility of having to rearrange telephone cables due to the addition or rearrangement of air conditioning ducts or other services.

8.02 A ceiling distribution system is considered a last choice. An adequate underfloor raceway or conduit system is preferable. When it cannot be avoided, use the area above the suspended ceiling if the following conditions are agreed on by telephone company and builder/owner.

(a) The area above a suspended ceiling is to be used only for telephone service on the same floor so that the **occupants** of one floor are not disturbed by telephone work for the **occupants** of another floor.

(b) Whenever access is required, the ceiling shall be opened and closed by the building owner or subscriber.

(c) ♦Polyethylene jacketed cables and groups of D station wires require conduit.♦

(d) Areas with solid or interlocking suspended ceilings require conduit.

(e) Clear working space for placing wires and cables must be available and not blocked by vent ducts, pipes, supports, or other equipment.

(f) Opening of fire walls to permit the passage of telephone wire and cable shall be completed and fire stopped by the building owner or the subscriber.

- (g) Telephone terminals properly sized and spaced to keep wire or cable runs to a maximum of 150 feet are required.
- (h) Suitable supporting structures of the type(s) outlined in Part 9 (Supporting Structures) must be provided to support inside wires and station cables. Such supporting structures shall be placed by the building owner or subscriber.
- (i) Whenever possible, avoid disturbing other tenants on the same floor where telephone service is being installed.
- (j) No deviations from the preceding conditions shall be made without prior review by your local engineering department.

8.03 Because of the high flame spread characteristics of polyethylene cable and the high smoke characteristics of PVC cable, the 1978 National Electrical Code prohibits their use above suspended ceilings used as return air plenums. The KS-22084 TEFLON insulated cable (low flame and low smoke characteristics) is approved for cable installations in these areas. The following precautions should be considered when using this cable:

- (a) Consult the BICS in your area to make sure local building codes allow this type of cable installations in air return plenums.
- (b) The KS-22084 cable is not provided in a shielded version and, therefore, should not be used where possible crosstalk conditions could occur.
- (c) The KS-22084 cable is similar to PVC inside wire cable and can be installed and connected in the same manner and with the same hardware. However, because of the creep characteristics of the TEFLON jacket, the cable **must not be stapled**.

8.04 The KS-22084 cable is provided to solve a particular problem. It must be placed in suspended ceilings which are used as air return plenums but where no conduit is provided. This cable is not intended to replace PVC inside wiring cable or to replace conduit systems.

8.05 Refer to Section 461-200-100 for ordering information for the KS-22084 TEFLON cable.♦

9. SUPPORTING STRUCTURES ABOVE FALSE CEILINGS

9.01 Make every attempt to secure the following type(s) of supporting structure(s) when placing inside wires or station cables above suspended ceilings:

- (a) Conduit
- (b) Cable trays
- (c) J-hooks
- (d) Wire loops.

9.02 If none of these types of supporting structures can be obtained, inside wires or station cables can be placed directly on the main runners and/or cross runners (T-bars) of the false ceiling hardware, provided the conditions in paragraphs 9.03 through 9.07 are adhered to.

9.03 Inside wires and station cables that do not exceed a total of 500 pairs within a 4-foot section of the ceiling may be placed directly on the ceiling runners if the supporting structure(s) outlined in paragraph 9.01 cannot be obtained. Cable runs supported on the ceiling hardware should be placed as close as possible to the hangar wires.

9.04 Major runs of inside wires and station cables should be placed in the type(s) of supporting structures mentioned in paragraph 9.01 in **new buildings** or sections of existing buildings that have been **completely renovated**.

Note: A major run is a run that could ultimately exceed any combination of 500 total pairs.

9.05 **In existing buildings**, additional cables should not be added to any run supported on the ceiling runners if the combination of new and existing wires and cables will exceed 500 pairs within a 4-foot section of the ceiling. If the combination of new and existing wires and cables exceeds this limit, a route along another row of hangar wires should be selected.

9.06 Exercise care when working in false ceiling spaces to avoid distorting or damaging the ceiling.

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9.07 Avoid blocking access tile in "limited access" type ceiling. Also avoid placing cables on or against any light fixtures.

10. TELEPHONE ZONES

10.01 The floor area to be served shall be divided into telephone zones consisting of not more than 400 to 600 square feet (between four adjacent columns).

10.02 To feed the telephone zone, the building will usually have a continuous length of 2-inch conduit in the ceiling space, properly supported to permit the pulling-in of cables. This conduit should extend from the nearest telephone terminal or apparatus closet and left open-ended at the midpoint of each telephone zone as illustrated in Fig. 8.

10.03 For floor areas where the 2-inch conduit to the telephone zones is not available and where a number of inside wiring cables are to be placed loosely in the ceiling, adequate open-top cable supports (J-hooks) are required. These cable supports should be located on 5-foot centers and must be provided by the building owner to avoid damage to the ceilings because of cable weight.

11. WIRING METHOD, CEILING TO DESK LOCATION

UTILITY COLUMN

11.01 A utility column is a post placed between the ceiling and floor in conjunction with the ceiling distribution system as shown in Fig. 9. It is used for the concealment of communications wiring from the ceiling to the desk. It can also be used as an extension of electrical outlets for the same purpose.

11.02 The utility column is a commercial product and if used must be supplied and installed by the customer. These utility columns must have been approved for Bell System use.

11.03 Interconnection with customer-owned wiring in utility columns is *not* permitted.

11.04 The utility columns should be attached, or supported, by the main "T" rails in the ceiling as shown in Fig. 10. It is not recommended that these columns be attached to the transverse or cross rails unless these rails are rigidly anchored to the main "T" rails.

11.05 Usually when the utility columns are being placed or have been placed, they are subjected to being slightly shifted. Such movement invariably causes the "T" rail to become warped, marred or bent. Excessive bending of rails may cause tile to fall down.

12. USE OF WALLS OR PARTITIONS

12.01 The following conditions apply if hollow core walls or partitions are used for concealing telephone wire and cables:

- (a) The hollow core walls or partitions must be clear and unobstructed.
- (b) Opening of walls and partitions and the installation of outlet boxes are the responsibility of the building owner or subscriber.
- (c) A pull wire is required from all outlet boxes to the approved supporting structure above the suspended ceiling.
- (d) Use only vertical pull wire runs. If bends or horizontal runs are necessary, conduit is required.

Note: Fulfilling the above items shall not be at the expense of the telephone company.

12.02 If fire blocks, sound deadening materials, or insulation is used in the construction of walls or partitions, conduit must be run from the outlet to the approved supporting structures above the suspended ceiling.

12.03 Telephone employees shall not fish walls or partitions in commercial buildings.

12.04 Where it is planned to use walls or partitions to conceal inside wiring cables down from ceilings, a minimum of 1-1/2 inch diameter space is required to permit the connector end of the cable to pass from the top of the wall to the outlet box above floor.

12.05 The following are recommended:

- (a) A 1-1/2 inch conduit in wall or partition to outlet box (Fig. 11)
- (b) A 1-1/2 inch square clear space between partition sections with snap-in panel or cover (Fig. 12).

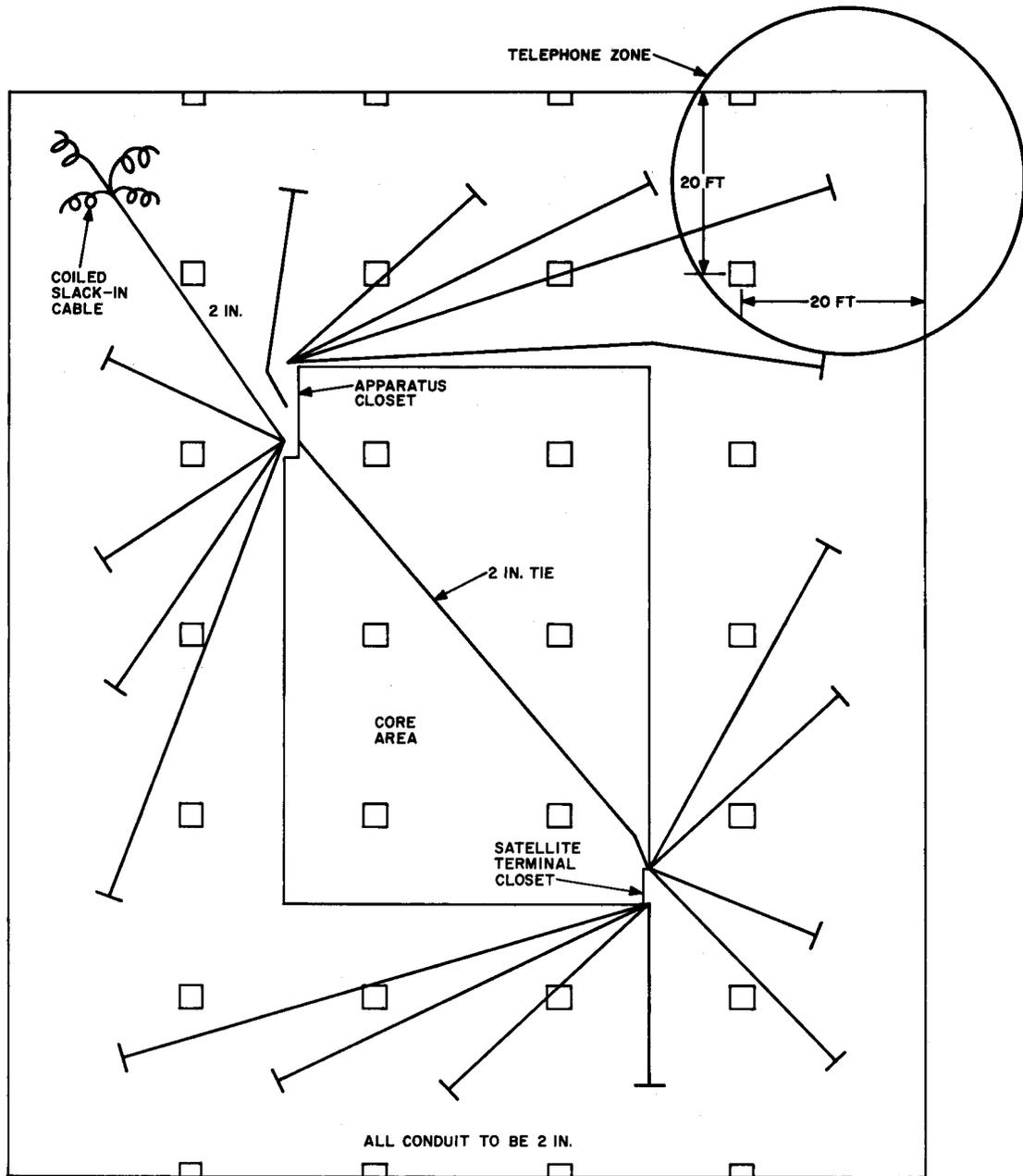


Fig. 8—Typical Ceiling Distribution System Using Conduit to Telephone Zones

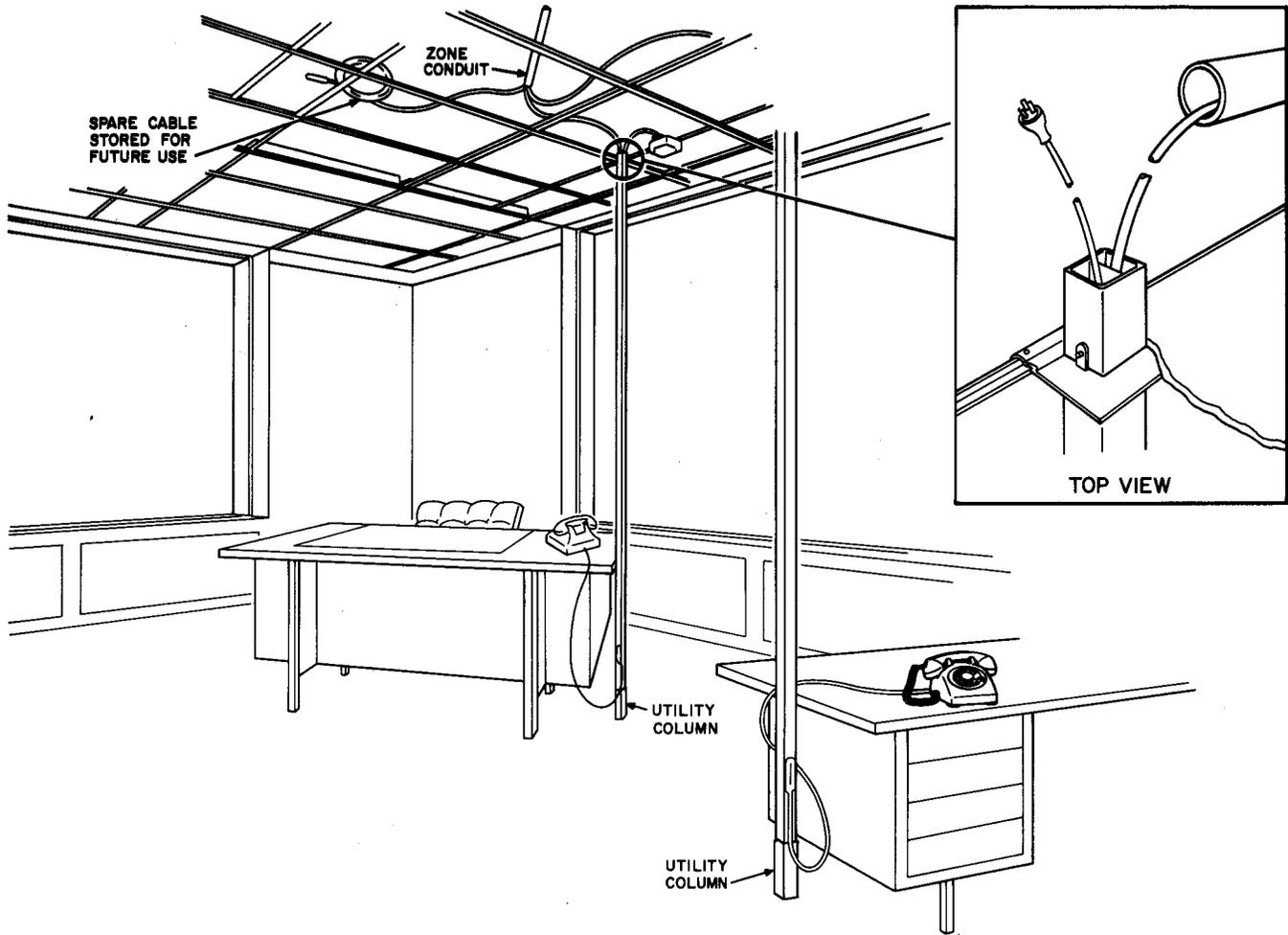


Fig. 9—Wiring Method With Utility Columns

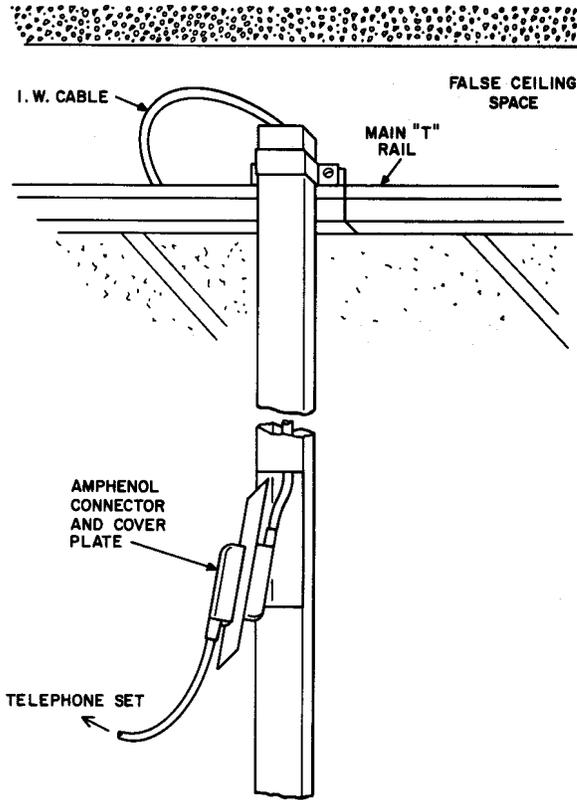


Fig. 10—Utility Column Installation

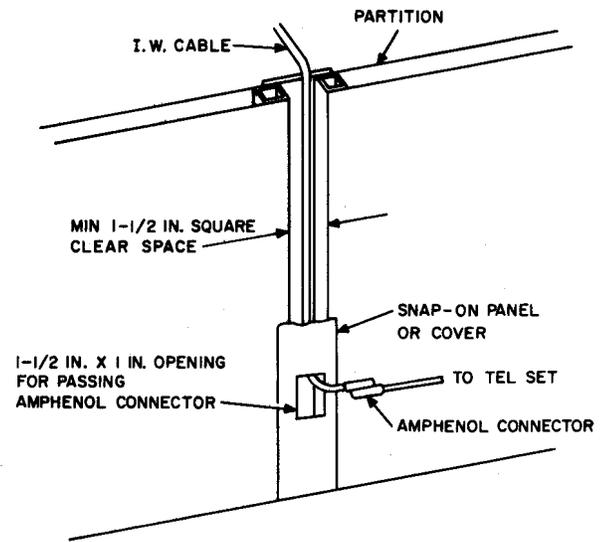


Fig. 12—Partition Design

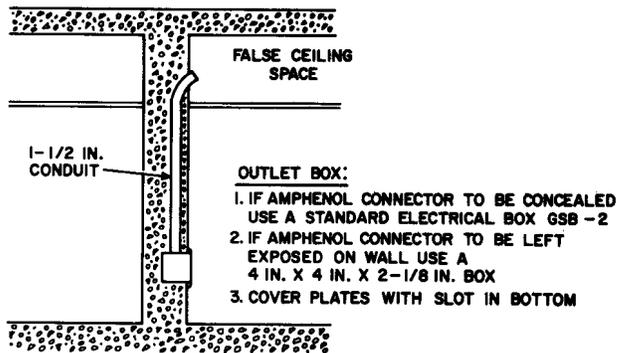


Fig. 11—Conduit in Wall