

PLACING WIRE AND CABLE IN CONDUITS OR RACEWAYS

1.00 INTRODUCTION

This practice covers the following:

- Identification of duct and conduit systems and raceways.
- Placement of wire and cable in existing duct systems, conduits, and raceways.
- Installation of surface-mounted wiring ducts.

2.00 CONDUIT SYSTEMS

2.01 IDENTIFICATION

- Consult customer or his representative for possible conduit installation and plans of distribution.
- Check location of terminals, pull boxes, and outlet markers.
- Determine extent of system's usability.
- Determine what type of system has been installed (see Figs. 1 and 2).

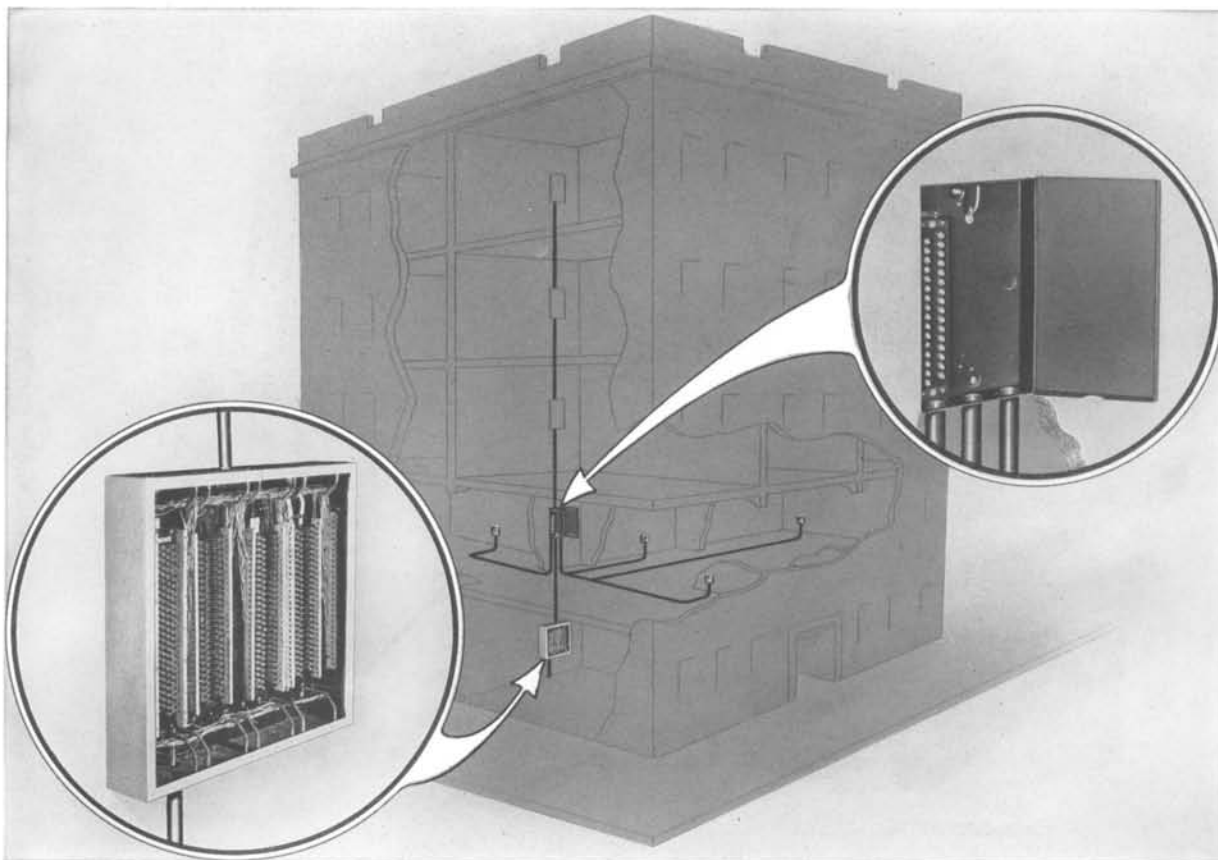


FIG. 1—APARTMENT HOUSE CONDUIT DISTRIBUTION

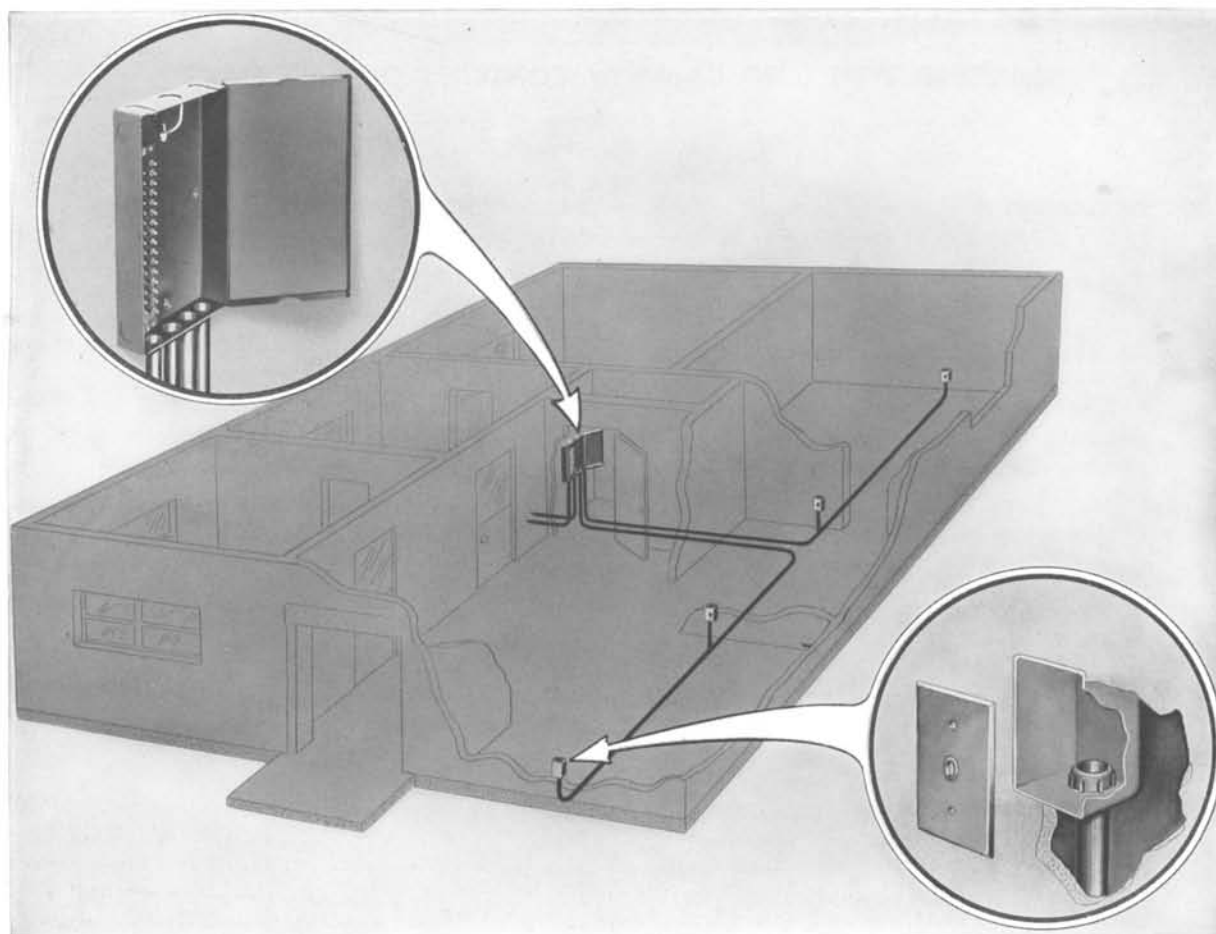


FIG. 2—SMALL OFFICE CONDUIT DISTRIBUTION

PLACING WIRE AND CABLE IN CONDUITS

2.02 Where difficulty is encountered when pulling wire or cable into conduits:

- Use a fish-wire leader to facilitate fishing.
- Apply thin film of Minerallac to wire or cable by drawing through saturated cloth pad.
- Remove excess lubricant from ends of wire or cable.

CAPACITY OF CONDUITS

2.03 The capacity of various conduits is listed in Tables A and B.

TABLE A
Conduit Capacity for Wire

Type of Wire		Number of Wires in Conduit			
		1/2-in. Conduit	3/4-in. Conduit	1-in. Conduit	1-1/4-in. Conduit
Jacketed Station	Paired	2	4	7	10
	Triple	2	4	7	10
	Quad	2	4	7	10
B Block	Paired	2	4	6	8
	Triple	1	3	5	7
NP Drop		1	2	4	6

TABLE B
Conduit Capacity for Cable

Number of Pairs	Number of Cables in Conduit							
	1/2-in. Conduit		3/4-in. Conduit		1-in. Conduit		1-1/4-in. Conduit	
	Lead	Inside Wire	Lead	Inside Wire	Lead	Inside Wire	Lead	Inside Wire
4		1		2		2		3
6	1	1	1	1	2	2	3	3
11		1	1	1	1	2	3	3
12				1		2		3
16			1	1	1	1	2	2
21			1	1	1	1	2	2
26			1	1	1	1	2	2
41					1	1	1	1
51					1	1	1	1
76							1	1
101							1	

3.00 STEEL AND FIBER UNDERFLOOR DUCT SYSTEMS—IDENTIFICATION

3.01 STEEL UNDERFLOOR DUCT SYSTEMS

- There are several types of steel underfloor duct systems. They may be a gridwork, an underfloor from wall, or a cellular system.

1. The gridwork conduit system consists of a series of parallel branch ducts with junction boxes at the intersection of cross ducts. An outlet provided with a removable cap will be found in the floor every 24 inches. (See Fig. 3.)

2. The underfloor from wall conduit system consists of a network of iron or steel 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.

3. The cellular conduit system consists of cell centers which are 6 inches apart. Therefore, the space between telephone wires is determined by the number of services other than telephone involved. That is, electric, lights, etc. In this case, services are in alternating cells with each service appearing every 12, 18, or 24 inches. Junction boxes are located in a header which crosses the cells and connects to a distributing-terminal cabinet. Outlet heads may be provided by the building people at practically any point along the ducts. (See Fig. 4.)

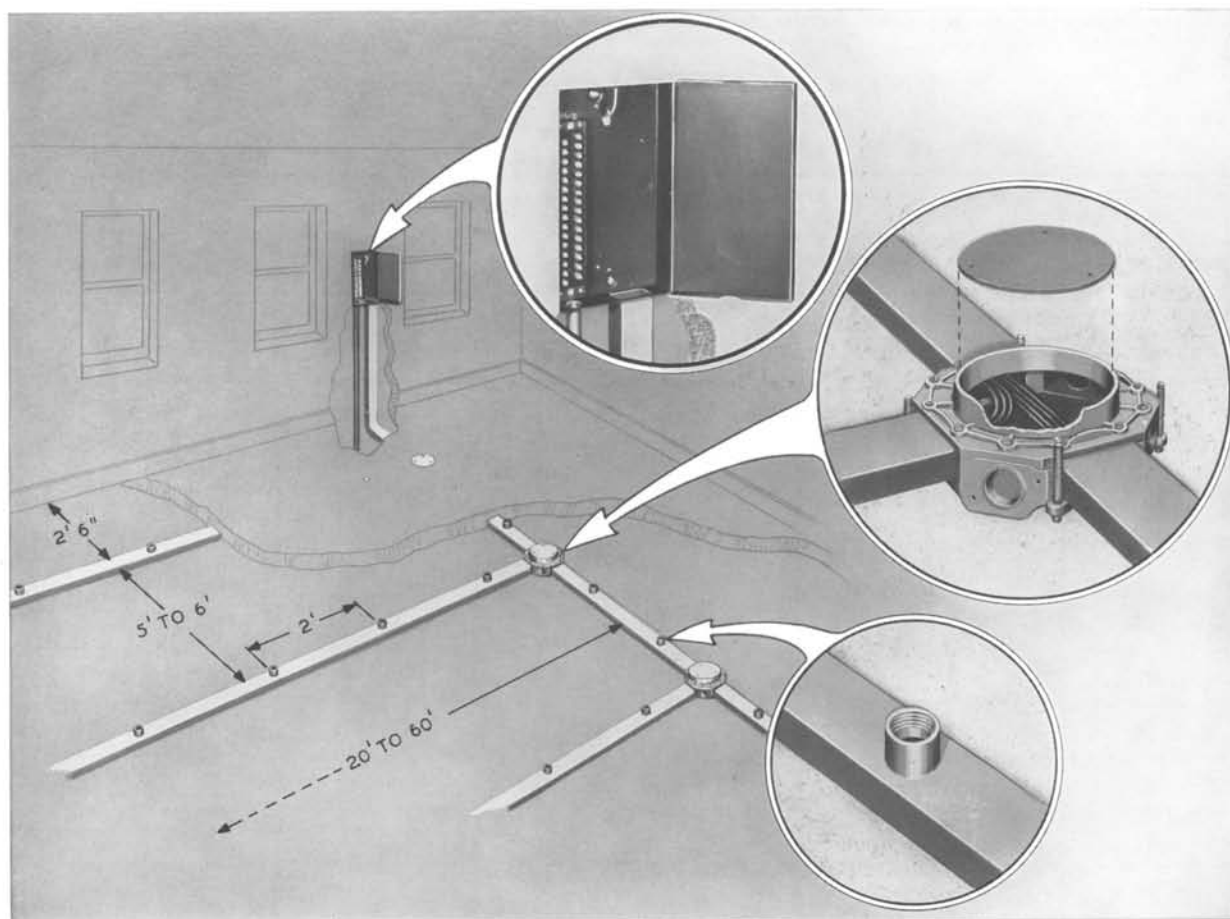


FIG. 3—STEEL GRIDWORK CONDUIT SYSTEM

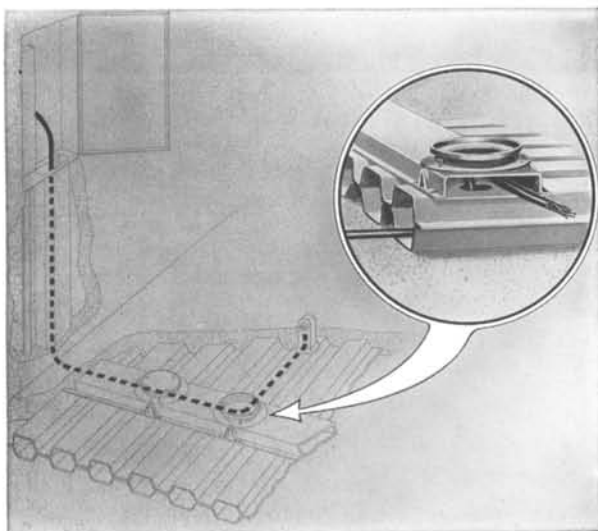


FIG. 4—CELLULAR CONDUIT SYSTEM

FIBER UNDERFLOOR DUCT SYSTEMS

3.02 When a fiber underfloor duct system is used, it will be found to be the same as the grid-work type previously described, except that outlets consisting of floor inserts or standpipes may be placed anywhere along the system by penetrating the floor and duct at the desired point.

3.03 PLACING WIRE AND CABLE IN UNDERFLOOR DUCT SYSTEMS

- A fish-wire leader may be used.
- Most new duct systems are provided with pull wires.
- In replacing wire and cable, the old conductors may be used as a pull wire.
- In certain systems, arrange for floor outlets in desired locations.

4.00 METAL AND WOOD BASEBOARD AND MOLDING RACEWAYS—IDENTIFICATION

4.01 METAL BASEBOARD RACEWAYS

- With this system, the usual baseboard has been replaced with a metal wall raceway (see Fig. 5).
- The front part of the metal raceway is removable, exposing two raceways.
- The upper raceway is for electric wires, and the lower is for telephone service.
- This system is used in small floor areas where desks will be placed against the wall.

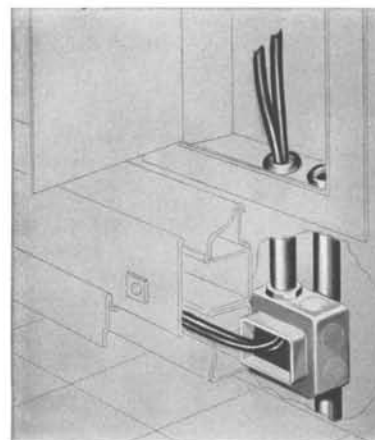


FIG. 5—METAL BASEBOARD RACEWAY

4.02 WOOD BASEBOARD RACEWAYS

- This system consists of wood baseboards with space in rear for telephone wires.
- Conduit from the floor terminal terminates in an outlet box in the rear of baseboard.

4.03 MOLDING RACEWAYS

- These raceways are of various types, such as picture moldings and large wood or metal moldings for use in halls.
- Conduits are usually placed in walls between rooms or halls.
- Conduits connect the moldings to distributing-terminal cabinets.

4.04 PLACING WIRE AND CABLE IN RACEWAYS

- Wires and cables may be laid in raceways and need not be fastened.
- The connecting conduits are usually short, and the wire or cable may be pushed through.
- Care should be exercised to avoid pinching wires or cables when replacing the front part of metal baseboard raceways.

5.00 RUBBER OVERFLOOR DUCT AND FLEXIDUCT

5.01 IDENTIFICATION

- Rubber overfloor duct and Flexiduct (shown in Fig. 6) are made of a rubber-tile stock.
- They are furnished in 3-, 5-, and 10-foot lengths.
- Rubber overfloor duct is available in black or brown.
- Flexiduct is available in black only.

- Rubber overfloor duct and Flexiduct are satisfactory for any smooth surface.
- They are attached to the surface with mineral cement, without the need of fasteners into the floor.
- Flexiduct rubber floor duct is available in two sizes.
 1. The smaller No. 1 size accommodates up to two triple-jacketed station wires.
 2. The larger No. 2 size accommodates up to one 26-pair inside wiring cable.

NOTE: ALL DUCTS AND FITTINGS AVAILABLE IN BROWN OR BLACK AND CARRY CODE NO. ESD-773579. DUCTS COME IN 3 FOOT LENGTHS.

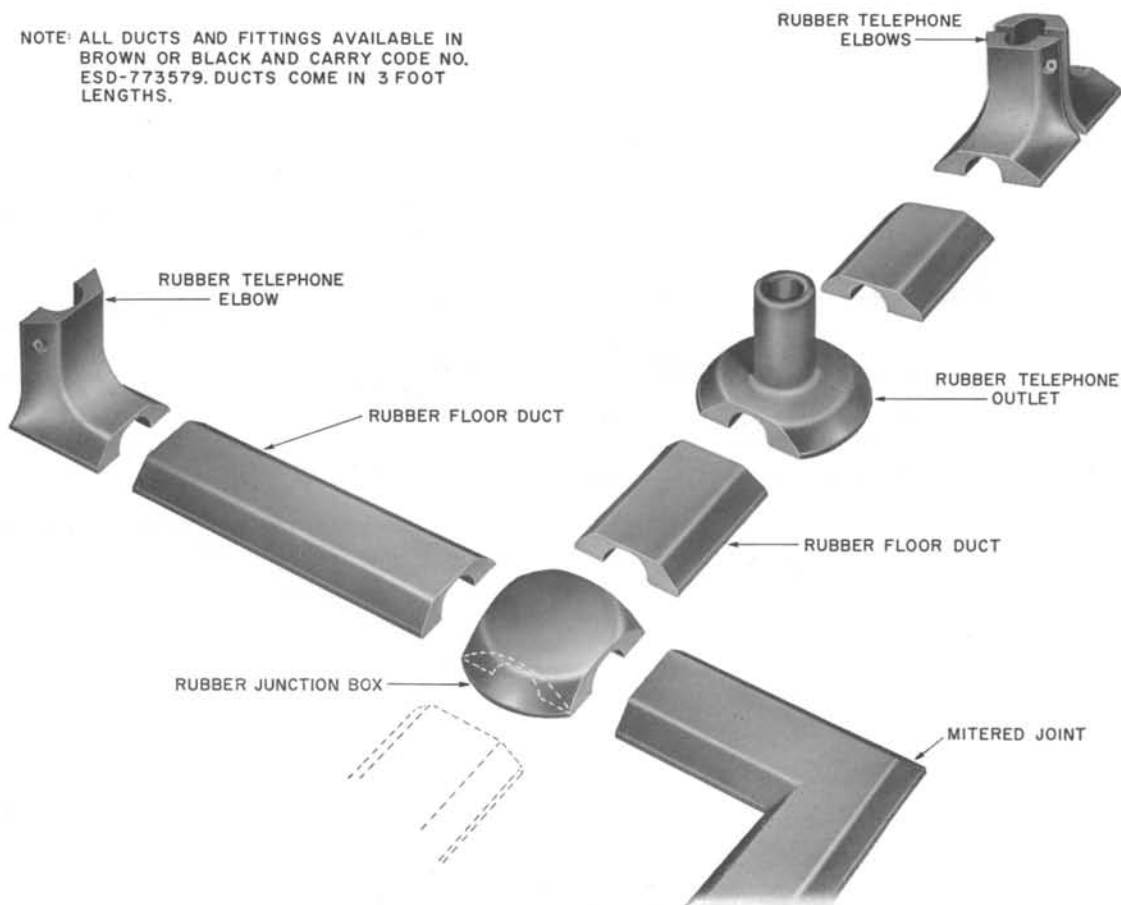


FIG. 6—RUBBER DUCT

5.02 CAPACITY OF CHANNEL IN RUBBER OVERFLOOR DUCT (NOT FLEXIDUCT)

- The channel in rubber duct will accommodate the following:
 1. Eight paired station wires.
 2. Six triple station wires.
 3. Five quad station wires.
 4. Two 12-pair inside wiring cables.
 5. One 26-pair inside wiring cable.
- The channel will hold any group of wires which does not exceed 3/4 inch in diameter and which is held together with bands of friction tape spaced at one-foot intervals.

5.03 INSTALLATION

- Rubber duct and fittings may be cut with a saw.
- Select the proper fittings and duct lengths for the job and proceed as follows:
 1. Arrange equipment on the floor in desired sequence.
 2. Match up joints of ducts and fittings; trim for proper fit if necessary.
 3. Outline the duct and fitting locations on the floor with a pencil.
 4. Lay duct and fittings aside in proper sequence.
- The floor area outlined with pencil should be cleaned so that it is entirely free of wax, dirt, and grease.
- Materials that may be used in cleaning the floor surface are:
 1. Trichloroethylene — **Ventilate room and avoid inhaling fumes.**
 2. Scouring Powders—Require use of water; floor dries slowly and causes water-soluble cement to set much more slowly.
- After the floor has been cleaned, apply cement to the duct and fittings.
- Apply an even layer of cement on all surfaces of the duct and fittings that contact the floor.

- Experience will indicate the number of parts on which to apply the cement at one time.
- Lay parts aside until the cement becomes tacky.
- Lay wires or cables along proposed route while cement is becoming tacky.
- In laying prepared duct and fittings, proceed as follows:
 1. If elbow is used, screw it to baseboard and cement it to floor. (Where marble or like surfaces are encountered, cement elbow to baseboard and floor.)
 2. Butt first section of duct to elbow.
 3. Lay duct over wire or cables.
 4. Press duct firmly to floor surface. (Excessive force exerted on center of duct will cause edges to rise.) A short length of wood about 2 feet long and 2 or 3 inches wide will be of assistance at this stage.
 5. Check penciled outline to be sure duct is properly located.
- When cables or wires leave an outlet, secure them to avoid excessive pull on the outlet.
- After duct run and fittings are in place, proceed as follows:
 1. Remove excess cement, before it sets, with a screw driver or a cloth dampened with solvent.
 2. Place weights on duct until cement sets.
 3. Cement should be set within 1 hour.

REMOVAL

- 5.04** Proceed as follows when removing duct or fittings:
1. Loosen one end of duct with chisel or similar tool.
 2. Pull directly upward on duct.
 3. Remove fittings in similar fashion.
 4. Duct and fittings may be re-used.
 5. Remove cement remaining on floor with a cloth dampened with solvent.

6.00 METAL OVERFLOOR DUCT

6.01 GENERAL

- Consult supervisor on proposed extensive systems.
- Obtain customer's permission.
- Use overfloor ducts only where underfloor ducts are nonexistent and desks are located away from the wall.
- Select least traveled routes.

6.02 IDENTIFICATION AND USE

- There are two types of metal overfloor ducts in general use; they are known as Wiremold and Florduct (see Fig. 7).
- Wiremold overfloor ducts and fittings are interchangeable with Florduct and associated fittings by using the 1599 and 2699 interconnecting fittings as shown in Fig. 8.
- Wiremold overfloor ducts and fittings or Florduct and associated fittings should be ordered in accordance with local instructions.
- Table C illustrates duct size and capacity.

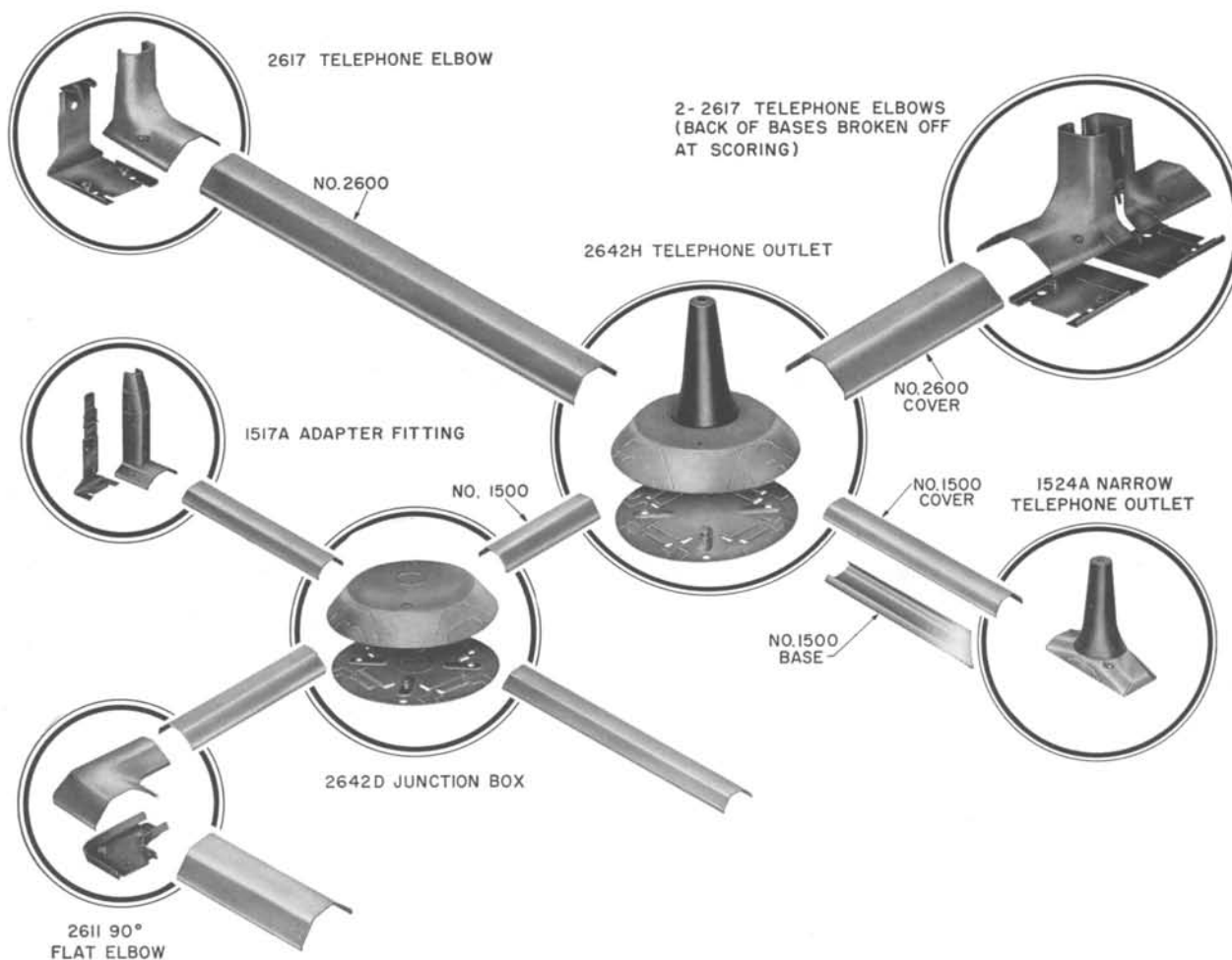


FIG. 7—TYPICAL METAL OVERFLOOR DUCT LAYOUT

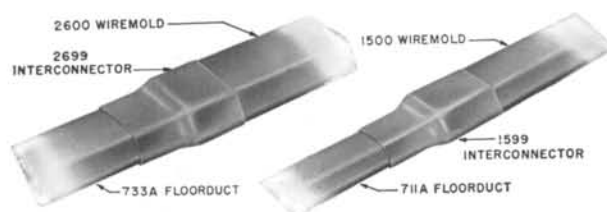


FIG. 8—INTERCONNECTORS

TABLE C

Wiremold	<p>NO. 1500</p>	<ul style="list-style-type: none"> • In 5- and 10-foot lengths. • Will hold: <ol style="list-style-type: none"> 1. Six paired station wires 2. Four triple station wires.
	<p>NO. 2600</p>	<ul style="list-style-type: none"> • In 5- and 10-foot lengths. • Will hold: <ol style="list-style-type: none"> 1. Two 26-pair inside wiring cables.
Florduct	<p>NO. 711-A</p>	<ul style="list-style-type: none"> • In 5-foot lengths. • Will hold: <ol style="list-style-type: none"> 1. Five paired station wires. 2. Four triple station wires.
	<p>NO. 733-A</p>	<ul style="list-style-type: none"> • In 5-foot lengths. • Will hold: <ol style="list-style-type: none"> 1. Two 26-pair inside wiring cables.

- Certain fittings may be used on both the small and large size metal overfloor ducts (see Table D).

TABLE D

Type of Conduit	Associated Fittings	Raceways			
		No. 711-A	No. 733-A	No. 1500	No. 2600
Florduct	766BA Outlet Extension Cap	•	•		
	750A Service Fitting	•	•		
	750BA Service Fitting	•	•		
	750TA Service Fitting	•	•		
	751A Service Fitting	•	•		
Wiremold	1599 Interconnecting Fitting			•	•
	2699 Interconnecting Fitting			•	•
	2642D Junction Box			•	•
	1524A Telephone Outlet			•	
	1542 Telephone Outlet			•	
	1546 Telephone Outlet			•	
	2642 Telephone Outlet				•
	2642H Telephone Outlet			•	•
	2617 Telephone Elbow				•

6.03 INSTALLATION

- Metal overfloor ducts may be cut to desired length with a hack saw equipped with a fine-toothed blade. Rough edges of cut should be smoothed with a file.

- See Table E for Florduct or Wiremold fasteners.

TABLE E

Surface	Fasteners
Wood	3/4-in., No. 8 FH Bright Wood Screws.
Masonry or Cement	3/4-in., No. 8 FH Bright Wood Screws in 6-8 by 3/4-in. Screw Anchors or 3/16-in. by 7/8-in. Hammer Drive Anchors.

- Using long nosed pliers, twist fitting at points A, B, and C to remove twistout (see Fig. 9).



FIG. 9—FLOOR OUTLET

- Remove smallest twistout that will fit duct.
 - Fasten base of floor outlet to floor.
 - Check for line-ups of screw holes in cover and base inserts.
 - Be sure twistout has been removed on desired side of cover.
 - When using Wiremold or Florduct, flare ends to prevent abrasion and insert them into tongue of floor outlet (see Fig. 10).
1. Fasten base of metal overfloor duct to floor.
 2. Place wires or cables in metal overfloor duct.
 3. If distance between floor outlets exceeds 5 feet, use fiber retaining clips to hold wires or cables.



FIG. 10—BASE OF FLOOR OUTLET

- When using Wiremold or Florduct, cut small size covers $\frac{3}{8}$ inch shorter and large size covers $\frac{5}{8}$ inch shorter than their bases (see Fig. 11).

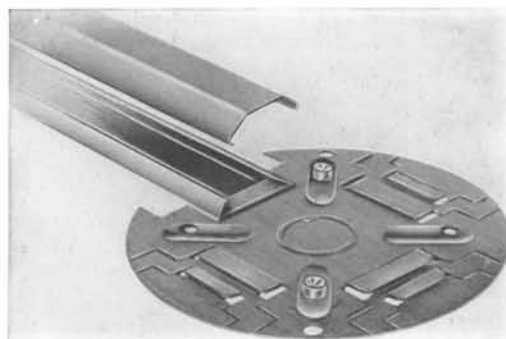


FIG. 11—BASE OF FITTING WITH COVER

- Snap metal overfloor duct cover in place by placing it directly over base; then apply pressure, starting at one end.
- Screw covers on floor outlets.
- When using 751A and 739A Florduct outlets, attach to the duct in the following manner (see Figs. 12 and 13).

1. Place floor outlet in position and center punch metal overfloor duct through holes.
2. Drill No. 30 holes through metal overfloor duct cover and flange of base.
3. Attach floor outlet with No. 8 self-tapping screws.

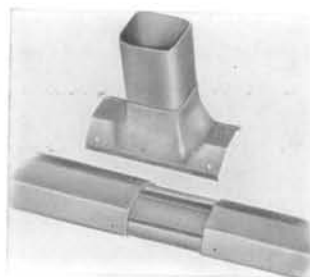
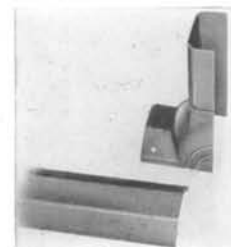


FIG. 12—INTERMEDIATE OUTLET

FIG. 13—END OR WALL OUTLET



- Fig. 14 shows the assembly of 1546T telephone outlet which is used with the 47B or 44-type connecting block.

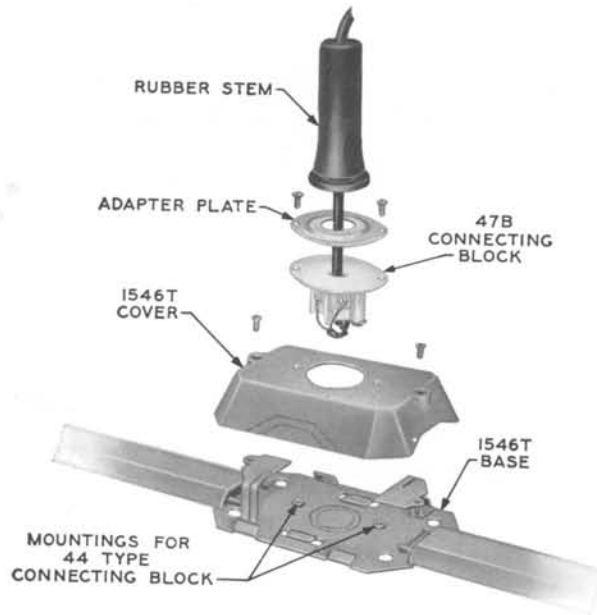


FIG. 14—1546T TELEPHONE OUTLET

- When the length of the run requires that the Wiremold or Florduct be spliced, the covers should be overlapped (see Fig. 15).

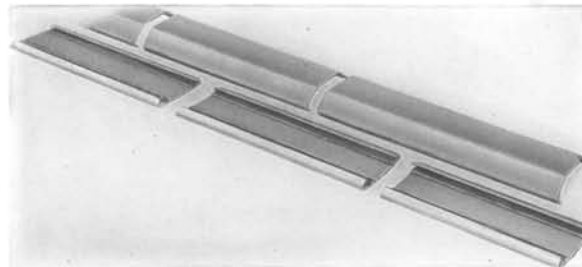


FIG. 15—OVERLAPPING METAL OVERFLOOR DUCT

6.04 REMOVING METAL OVERFLOOR DUCTS

- Metal overfloor duct covers may be removed by inserting a screw driver under one end, between cover and base, and prying upward.
- Work another screw driver about 6 inches away as another pry, and lift cover off progressively (see Fig. 16).



FIG. 16—REMOVING METAL OVERFLOOR DUCT COVER

7.00 SEALED CONDUIT

Description and installation of sealed conduit for use with service in hazardous locations is covered in the C section of Bell System Practices covering telephone sets for explosive atmospheres.