

PREPARATORY OPERATIONS  
PLANNING THE RUNNING SEQUENCE

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1. <u>GENERAL</u>	(c) Completion of the cabling by frames when performing methods are to be used so as to permit an early start of the performing operations.
1.1 <u>Scope of Section</u>	(d) Completion of cabling by groups of equipment as required by the test schedule. For example, completion of cabling and wiring operations on marker multiple.
1.11 This section covers those details involved in the planning of the running sequence for running cable.	(e) Arrangement of cables which will permit the installation of ultimate equipment.
2. <u>PLANNING CABLE OPERATIONS</u>	(f) Uniform arrangement of cables on clipped runs.
2.1 <u>Coordination of Planning and Sequence of Installing</u>	(g) Full cable clip capacity on clipped runs.
2.11 Coordinate the planning and sequence of installing operations, especially where the cable is to be run by different groups of installers. It is desirable that all those concerned agree on a practical and economical sequence of running the groups of cables.	(h) Full rack capacity on sewn runs.
2.12 Plan for the placing of anchor clips and starting stitch before runs are pulled in.	2.14 No deviations shall be made in the routing of cables as shown in the cabling specification without the approval of the Equipment Engineers. The cable routes shown are not always the shortest distance between two equipment points and are established as indicated for the definite purpose of providing for future growth and to prevent excessive pileups of the cables at intersections. Dual cable routes are used in some cases to minimize service reaction to localized
2.13 Cabling should be planned to permit: (a) Running the greatest amount of cable at the same time without interference between cabling crews. Avoid interference between cabling crews installing switchboard and power cable. (b) Completion of cabling in time so that subsequent wiring operations will not be delayed.	

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troubles such as fire, etc. and no change shall be made in these routes. Formed cable lengths provide for a specific route and if this route is changed by the installer, the cables may be too short or too long. It is also important that no deviation shall be made in the arrangement of cables shown in "regular" and "semi-regular" runs without the approval of the Equipment Engineers. If an obstruction or some other condition prevents following the cable route indicated in the specification or arrangement shown on the cabling plan drawing, a JIM giving full particulars shall be forwarded to the Equipment Engineers, through the Field Service Organization, requesting the proper procedure to be followed.

2.15 To eliminate duplicated or missed cable runs, it is recommended that cable run numbers on the installers cable running list be checked at the time the cables are being run.

2.16 On large jobs a Cable Running and Tag Storing board as covered in Section 150 may be used to provide cable running information and other data relative to cabling operations.

2.17 When a condition is noted which will make the future installation of cables difficult at any location, mark a copy of the job cabling plan drawing to indicate the condition found and forward the marked drawing to the Field Service Organization, when the job is completed.

## 2.2 Method of Establishing Cable Groups

2.21 Arrange bulk cable runs, listed in the Installer's Cable Running List, into groups which can be economically run and secured at one time.

2.211 On jobs where preforming methods are to be applied, set up the cable within the groups in a sequence that will permit the start of forming operations on individual frames before the completion of all cabling operations on the associated frame group.

2.212 When the equipment is on more than one floor, arrange the cables in groups using the same cable hole or slot so that a sequence may be followed that will minimize the possibility of interference between cabling crews.

2.2 Assign an identifying letter to each group of cables; thus "A" may identify all cables between fuse panel and switchboard and "B" the cables between relay rack and IDF.

2.23 Plot the actual route of these groups on the cable rack plan drawings, drawing a line representing the group through the various cross-sections and following the course of the cable rack between the terminating points. Mark these lines with the identifying letter of the group for cross-reference to the installer's rearranged running list.

NOTE: Routing directions specified for cables may not always be the shortest route for running the cables.

2.24 To aid assuring the correct location for terminating cable ends, mark the cable numbers (shown on cross-section views) at the location of the apparatus on the equipment drawing.

2.25 After the route of all the groups of cables has been plotted, the installer is in a position to analyze the cabling operation, plan the sequence of running the cable groups as outlined below and assign certain groups to be run without congestion and interference.

2.26 Plan to run "P" wire after the cables are in place but before the cables are secured to include the wire under the last row of clips, or last stitches of twine.

## 2.3 Establishing Order of Installing Cable Groups

2.31 Establish the sequence in which the groups of cables are to be installed and consider the following points.

2.311 Select a group of cables which will cover the greatest lengths and widths of a given cable rack and will result in a good appearing bottom layer and form a foundation for the remaining layers. Formed cables and cables of regular runs are ordinarily placed on the cable rack first when the run also contains runs of miscellaneous bulk cable. This prevents using the small amount of slack left in these cables for running over any high spots in the cable runs.

2.312 Plan arrangements at intersections and cross-overs so as to avoid high pileups. Do not omit corner brackets without approval of Equipment Engineer.

2.32 Establish the order in which cables composing each group are to be installed and consider the following points.

2.321 The order in which the cables of a regular run are to be installed are shown in the cross-sectional views of these runs.

2.322 A formation which will permit fanning the cables at a terminating point with the least possible amount of twisting and fanning.

2.323 An arrangement so as to obtain the maximum advantage of the adjustable flat clip, when used, thereby eliminating unnecessary clipping.

2.324 A uniform cable job with a minimum number of crosses.

2.4 Permissible Switchboard Cable Pileup

2.41 The permissible switchboard cable pileup on ladder type cable rack for the normal and maximum spacing of supports is given in the following table:

Width of Cable Rack	<u>Switchboard Cable Pileup</u>	
	<u>Supports on 5 Ft. Centers</u>	<u>Supports on 6 Ft. Centers</u>
5" to 2' 1" Inclusive	12"	10"
2' 6"	10"	7"

NOTE: The maximum cable pileup for a cable run, in general, is limited by good cabling practice to a height not exceeding the width of the run on cable racks 12 inches or less in width and values given in the above table for wider racks.

2.411 Cable pileup on bar type cable racks is limited by the length of the vertical bars (horns) or by P-30A018 sleeves when vertical bars are equipped with sleeves.

3. METHOD OF SORTING CABLE TAGS

3.1 Cable Tags Sorted By Routes

3.11 Cable tags should be sorted by the routes shown in the Route Section of the tags. (Refer to Section 150.)

3.12 The No. 5 Crossbar System uses the Limited Routing Plan. Under this plan, cable routing information for the majority of cables is covered by an installer's note in the cable specifications and omitted from the Route column and Route section of cable specifications and shop printed tags respectively.

3.121 Determine the specific routes of affected cables (cable rack paths such as 1A, 5, 1H) from the note in the cable specification and the job cable rack plan drawing.

3.2 Cable Groups

3.21 One path cable tags (1A, 2A, etc.) should be separated from more-than-one path cable tags and stored in a designated location. This location which may be in the form of a hook or a similar device, should be clearly marked for one path cable tags. Similarly, areas should be set aside for more-than-one path cable tags (1A, 5, 1H, etc.) which do not pass through cable holes and for those which do pass through holes (1E, 2, 1D, X3, 2A).

3.3 Bulk Wire

3.31 Cable tags for bulk wire should be stored in the same manner as cable groups. However, the routing information for bulk wire (bulk wire ordered as items 1 to 8 in cable specs.) may not be furnished in the cabling specifications so it may be necessary to use other means to obtain path information for tag sorting purposes.

3.4 Cable Groups - Miscellaneous

3.41 Cables or bulk wire for these cable groups are for miscellaneous runs such as cables to HMDF and VMDF from frames on the same floor (except line link cables), jack box multiple cables, cables to traffic register cabinets in operating room, cables to perforator cabinets, etc., are sorted in the same manner.

4. RUNNING CABLE AND BULK WIRE4.1 Method of Running Cables and Bulk Wire

4.11 Run and secure switchboard cable and bulk wire on cable racks in accordance with the methods and requirements covered in the 200 and 300 Series of this handbook.

5. RUNNING FORMED SWITCHBOARD CABLE5.1 General Procedure

5.11 Run the cable toward the termination of the unformed end, wherever possible to avoid injury to the form. When the termination of the formed end is one or more floors below the termination of the unformed end, place canvas protection around form, securing it with approved twine, and run the formed end first.

NOTE: The formed end shall not be cut off except in extreme cases and only after approval is given by the responsible Area Supervisor.

No arrows due to extensive revisions.

Engineering Planning Manager  
(Installation)

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