

SWITCHING SYSTEMS MANAGEMENT
NO. 4A/4M CROSSBAR
ASSIGNMENT PRACTICES
TRUNK DISTRIBUTION CENTERS

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1. GENERAL

1.01 The need to reduce wiring costs and floor space requirements has brought about a new concept in trunk distributing frames (TDFs). A cabling and patching arrangement known as trunk distribution centers (TDCs) has been designed for No. 4A/4M offices.

1.02 TDCs consisting of ten incoming jack panel bays and ten outgoing bays will provide full link frame to trunk cross-connect capability while reducing floor space requirements by more than one-half.

1.03 Each TDC will consist of either 20 or 24 bays of patch panels, depending upon whether standard or mini crossbar switches are used in the office. All of the TDC jack panel bays are fully equipped when installed and will accommodate a full-size machine. Jacks are provided initially for all trunks and links. This arrangement lends itself to orderly link and trunk growth on future jobs.

1.04 Cross-connects are done within a bay using a plug-ended patch cord. A 2-way trunk will require that two patch connections be made, one at the In Trunk Distribution Center (ITDC) and one at the Out Trunk Distribution Center (OTDC) (see Fig. 1). The top portion of Figure 1 shows the 4A/4M cross-connections required with TDFs and the lower portion shows the method using in and out TDCs.

2. IN AND OUT TRUNK DISTRIBUTION CENTERS

2.01 Each incoming TDC bay contains eight panels, four terminating the trunk relay equipment and four for link frame terminations. Between each of these panels and along each side of the bay are channels which will accommodate the jumper patch cords (see Fig. 2). Each relay panel can terminate 400 trunk relays and each link panel will accommodate 400 in or out link frame appearances.

2.02 The TDC bay number is the horizontal number of the link switches. If standard switches are used (horizontal 0 through 9), horizontal 0 of each switch in all frames and bays will be cabled to TDC bay 0. Each horizontal appearance on the ITDC represents two switches, one in each train. The OTDC horizontal appearance will be separate for each train. An office using miniswitches will use the same cabling arrangement, but the TDC will consist of 12 bays. Each bay will represent a horizontal (0 through 11) of the link switches.

2.03 The quantity of ITDC link and trunk panels will depend upon the size of the in link frames provided. Most machines use 400-size in links which require four link and four trunk panels

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per bay. The OTDC can be equipped with four or six trunk and link panels per bay, depending on the configuration of the out bays. If 200-size out links are provided, only four trunk and link panels need be equipped. Six will be required for 300-size links as shown in Figure 2.

2.04 Each incoming trunk panel, as shown in Figure 3, is color-coded for ease of identification. Seven leads must be connected from the incoming trunk relay to the links. A 5-connector cord is used for the yellow jacks and a 2-conductor cord is used for the blue. The panel numbering from bottom to top is 00 through 99, 100 through 199, 300 through 399, 200 through 299. The numbering is laid out in this manner to help simplify cabling at the rear of the jack panel.

2.05 On an initial job, trunks will probably be cabled to the 00 through 199 range of jacks and wiring will be run from the bottom of each panel at the rear. As trunks are added on future jobs the cabling will come in at the top rear of the panel—the 200 through 299 series will be cabled first and the 300 through 399 series will be cabled last. The same numbering scheme is applied to all in and out TDC panels.

2.06 The incoming link panels are color-coded the same as the trunk panels, as shown in Figures 4 and 5. Each panel will terminate 400 link frame appearances. The TDC bay number is the trunk link frame (TLF) horizontal number. Therefore, in bay 0, link panel 0 there will be an appearance of horizontal 0 from each switch (00 through 39) on each in link frame (00 through 39). With this arrangement adjacent panel patching is possible and any trunk can be patched to any link switch.

2.07 The height of the outgoing TDC panels shown in Figure 6 is somewhat smaller than the ITDC panels. The outgoing patch jacks use only five contacts instead of seven. The resulting space savings allow 12 panels to be mounted in each bay. The TDC bay number is also the switch horizontal for all out link appearances in a given bay. For example, *OTDC 2* would have all IT and TC out links (bay 0, 1, and 2 if equipped), switches 0 through 9, *horizontal 2* (a maximum of 2400 terminations).

2.08 An office equipped with miniswitches would be configured in the same manner except

for the number of bays. Each TDC in and out would have 12 bays (0 through 11) corresponding to the 12 horizontals on the miniswitch. The miniswitch links are cabled by switch groups which terminate on individual panels and are the equivalent of the bay or extension bay of the standard 10-level switch links.

3. ASSIGNMENT CONSIDERATIONS

3.01 Planning is the key item in having a well-balanced machine using adjacent TDC panel patching. To accomplish this, both the dial administrator and the traffic engineer will have to be involved in overall planning from the beginning. The traffic engineer's responsibility is to insure that each type of incoming, 2-way, and outgoing trunk has an adequate spread over all panels in each bay. Adjacent panel patching as shown in Figure 7 is desirable. By dividing the incoming bay panels into four subgroups, most assignments can be made in adjacent panels as shown in Figure 7. It will be more difficult to make assignments using short jumpers on the out TDC since the link panels represent both the IT and TC train locations. An office with 200-size out links would have two subgroups. When making an assignment the first choice is to use the shortest cord within the subgroup. The second choice could be to connect from IT 0 to trunk panel 1. Only where necessary should an assignment require using a long patch cord. Although short patch cords are the objective, the primary consideration must be to maintain a balanced machine. *However, in no case should patches be assigned crossing from bay-to-bay.*

NEW INSTALLATIONS

3.02 Preparing the necessary layout records for a new machine with TDCs will require several additional considerations. To help with this, the dial administrator should understand the methods recommended to the traffic engineer for the spreading of trunk equipment. Figures 8 and 9 show a method used for both large and miniswitch installations in the ITDC. The engineer will divide each type of incoming and 2-way trunk by 40 (large switch) and 48 (miniswitch). This will divide each type of trunk into the quantity to be assigned to each panel. As seen in Figures 8 and 9, the bays which make up the TDC are divided into 40 subgroups each. The trunks which were subdivided are then spread, by type, across all panels by starting with the first panel in group 1, to the first panel of

group 2, then group 3, then group 4, and continuing through all panels and groups.

3.03 This information may be listed in the traffic order or may have to be obtained from the Western Electric Company drawings. Figure 10 is a worksheet which can be used to transcribe this information from the prints. Figure 11 is an example of how this form could be used with the standard switches. The worksheet form is not stocked. Copies may be obtained by reproducing Figure 10. If 200-size out links are used there will be only four OTDC panels per bay and 2-way trunks should have the same in and out TDC panel assignment. If 300-size out links are used, the incoming and outgoing 2-way jack panel appearances will probably be different.

3.04 A different method of maintaining a record of trunk TDC panel assignments is to obtain a quality copy of the Western Electric Company drawings which can be cut into book-size pages for filing.

4. ASSIGNING NEW GROUPS

4.01 Dial Facilities Management Practice, Division H, Section 13c(4) is the No. 4A/4M Incoming and Outgoing Link Assignment Practice. This TDC practice is intended as a supplement to Section 13c(4) for use in those locations equipped with TDCs.

4.02 In addition to the assignment rules and procedures outlined in Section 13c(4), the following should also be observed when assigning a machine with TDCs.

- (a) Using the concept shown in Figure 7, strive for total adjacent panel assignments.
- (b) When possible, review the traffic order as far in advance of job start as feasible to insure proper spread of trunk equipments over all TDC bays and panels.
- (c) If not specified in the traffic order, be sure to obtain advance Western Electric Company drawings of link and trunk cabling to the TDC bays early enough to complete the assignments.

4.03 The sequence in which assignments for machines equipped with TDCs are completed can have a bearing on the complexity of obtaining

office balance. The recommended sequence to follow is as listed below.

(a) Prepare trunk group lists as described in Section 13c(4), Part 6. Prepare office records, entering all necessary cabled assignment locations.

(b) Having prepared all the lists in (a) above, the next step is to assign all trunks and groups to the desired in and out frames using the sweep zig-zag method discussed in Section 13c(4). Once this step is completed, fill in the frame numbers assigned on the trunk group assignment record E-3702.

(c) The next step is to assign the actual relays to each of the trunk group trunks. Using the sender link frame (SLF) assignment records and the worksheet shown in Figure 10 (location of relays on TDC panels), select the desired SLF location for proper balance, following the guidelines in Section 13c(6) while at the same time striving to limit jumpers to adjacent panels. This will probably be the trickiest part of all assignments, requiring simultaneous consideration of SLF and TLF balance and TDC relay location. When this has been completed for each group the next step is to fill in the trunk relay assignment record information, form E-4336. The following should be entered on form E-3702: the SLF location; the weighting; the TDC bay, panel, and jack; and the TLF frame, bay, switch, and horizontal locations. The bay, panel, and jack information can be obtained from Western Electric Company prints or from the form shown in Figure 11, if used. Before proceeding further, assignments should be rechecked for SLF and TLF balance. The use of the forms mentioned above should reduce the chance of double assignment.

(d) The final step is to assign the outgoing portion of the 2-way and the one-way out groups. Two-way relay equipments are, in most cases, assigned to the same incoming and outgoing TDC bay, panel, and jack locations. This is particularly true when 200-size out links are used and both in and out TDC bays have the same number of trunk panels. When 300-size out links are employed the OTDC bay will have six trunk panels. Two cabling procedures can be used. The first method is to cable only 2-way trunk equipment to the first four trunk panels. The second method is to spread the 2-way trunks

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across all six panels, making the in and out bay, panel, and jack locations different. If the second method is used, enter the assignment information in the separate ITDC and OTDC columns provided on form E-3702 and form E-4336.

(e) Complete the required information and fill in the out link assignment record. Enter this information on the trunk relay and trunk group assignment record.

(f) Complete the trunk block assignments records and enter this information on the trunk group assignment record.

4.04 To add a new group to a working office, the following sequence can be used.

(a) Examine the E-4336 relay assignment record for spare relays of the proper type.

(b) From the sender link records, select the desired spare relays. At this time review their relay locations on the TDC trunk panels to determine if adequate adjacent link frame locations are available.

(c) Select and record in link locations.

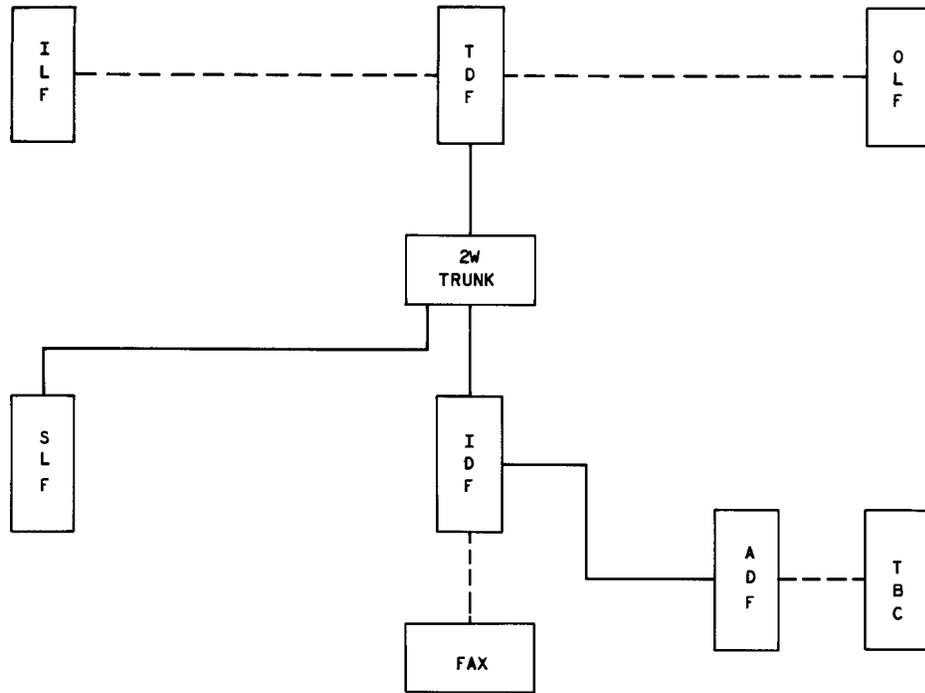
(d) Choose train.

(e) Select and record out link assignments.

(f) Make trunk block assignments.

4.05 Growth additions which involve large rearrangements may require special study and consideration when TDCs are involved. The moving of trunk groups from the old frames to newly installed ones for balance or junctor "deload" purposes may require a detailed study of TDC assignments in order to reuse an existing patch cord. If arbitrary link frame assignments are made, it may be necessary to replace a 3-foot 6-inch patch cord with a 5-foot cord in order to reach the new assignment, whereas with a little planning the same 3-foot 6-inch cord would only require having the link end moved a few inches. Another negative aspect of making rearrangements at the TDC is the wiring channel congestion. As machines reach full size, the vertical and horizontal channels become so filled with patch cord wire that it is nearly impossible to remove a patch cord.

A. 4A/4M WITH CROSS-CONNECTIONS AT TDF



B. 4A/4M WITH TDF

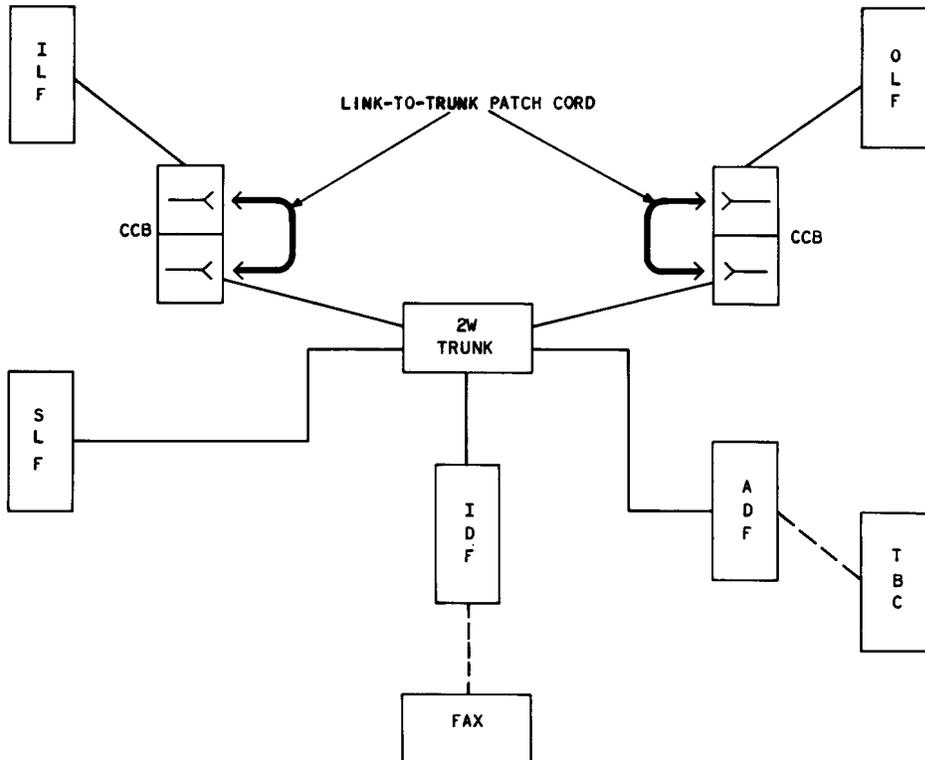


Fig. 1—4A/4M Cross-Connections Required With TDFs and TDCs

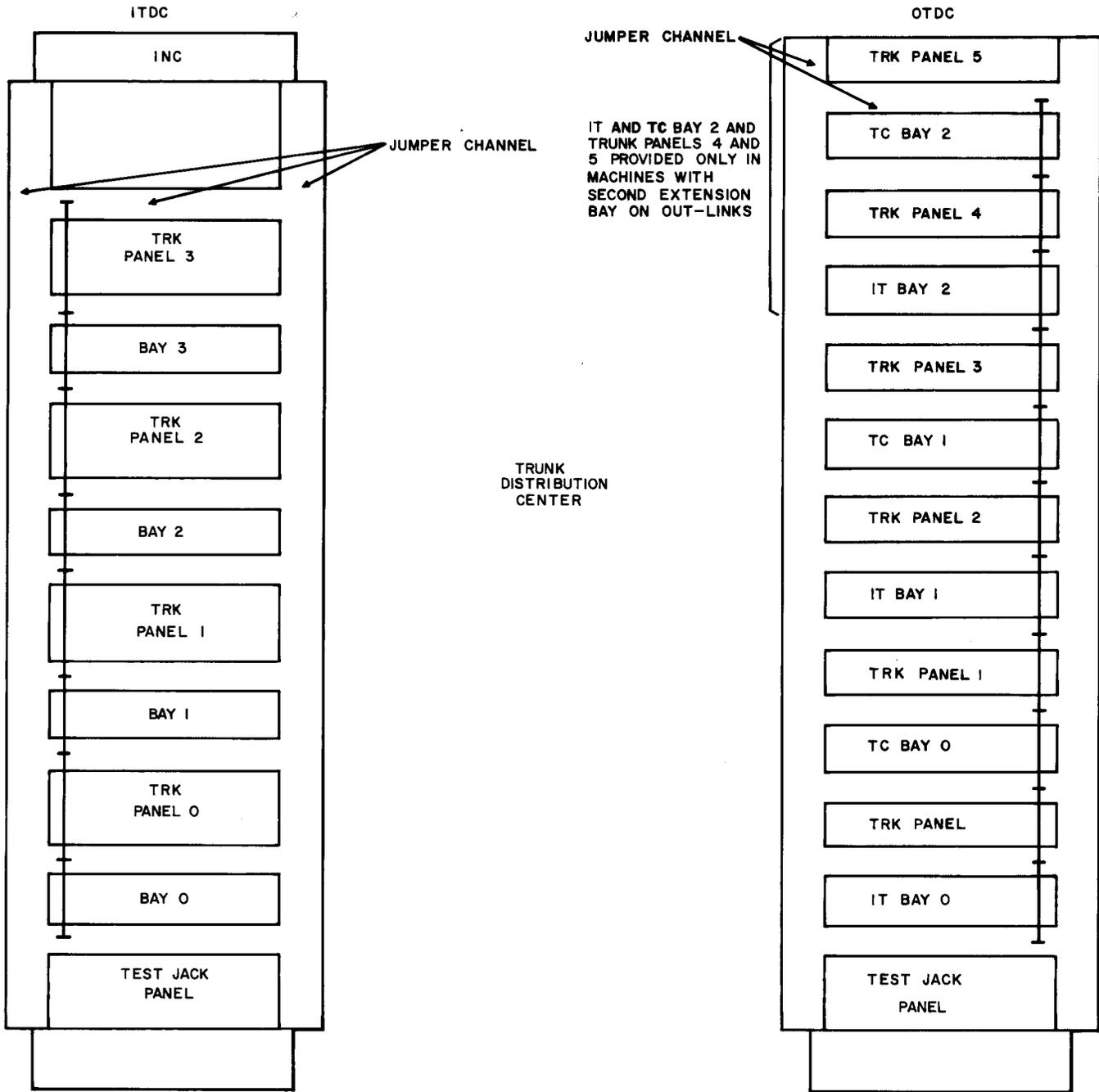
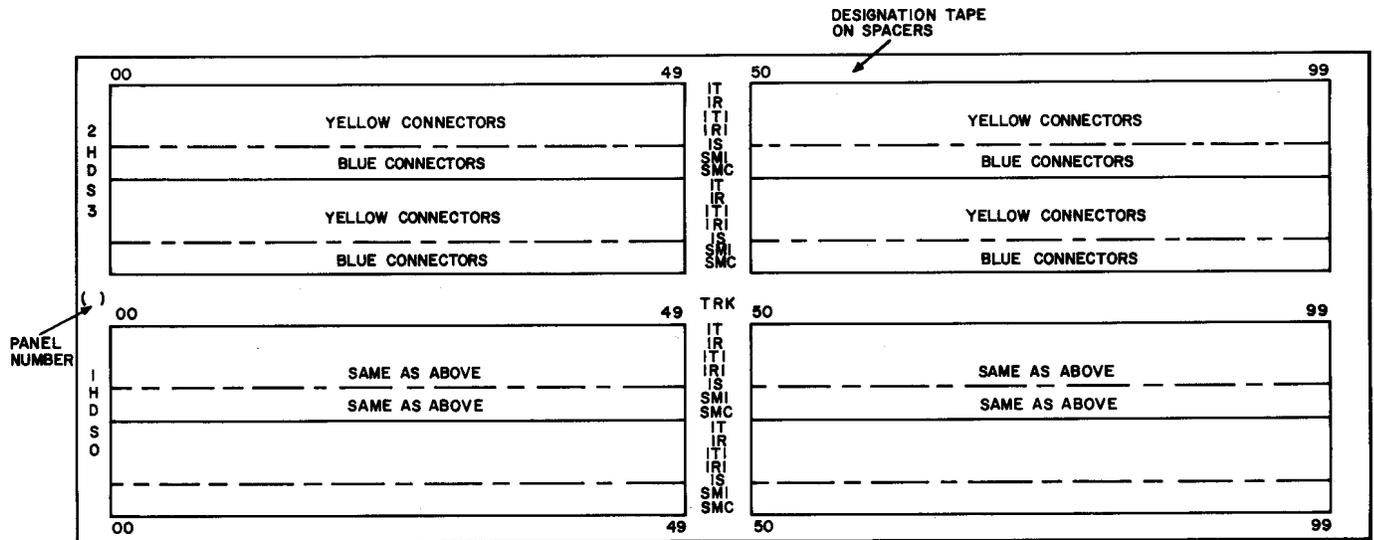


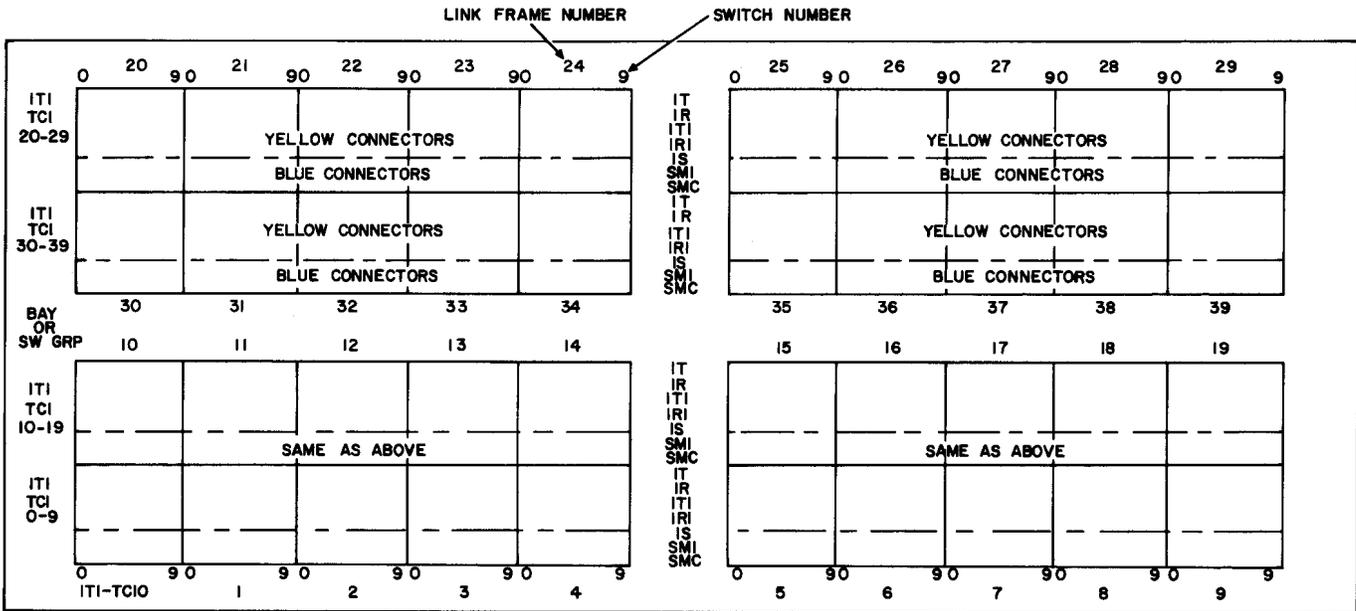
Fig. 2—TBC Bays



400 TRUNKS (4 ROWS - 100 PER ROW)
EACH ROW RESIDES IN 2 QUADRANTS

Fig. 3—Incoming Trunk Panel

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NOTE:
HORIZONTAL NUMBER IS THE SAME AS THE TRUNK DISTRIBUTION BAY NUMBER

Fig. 4—Incoming Link Panel

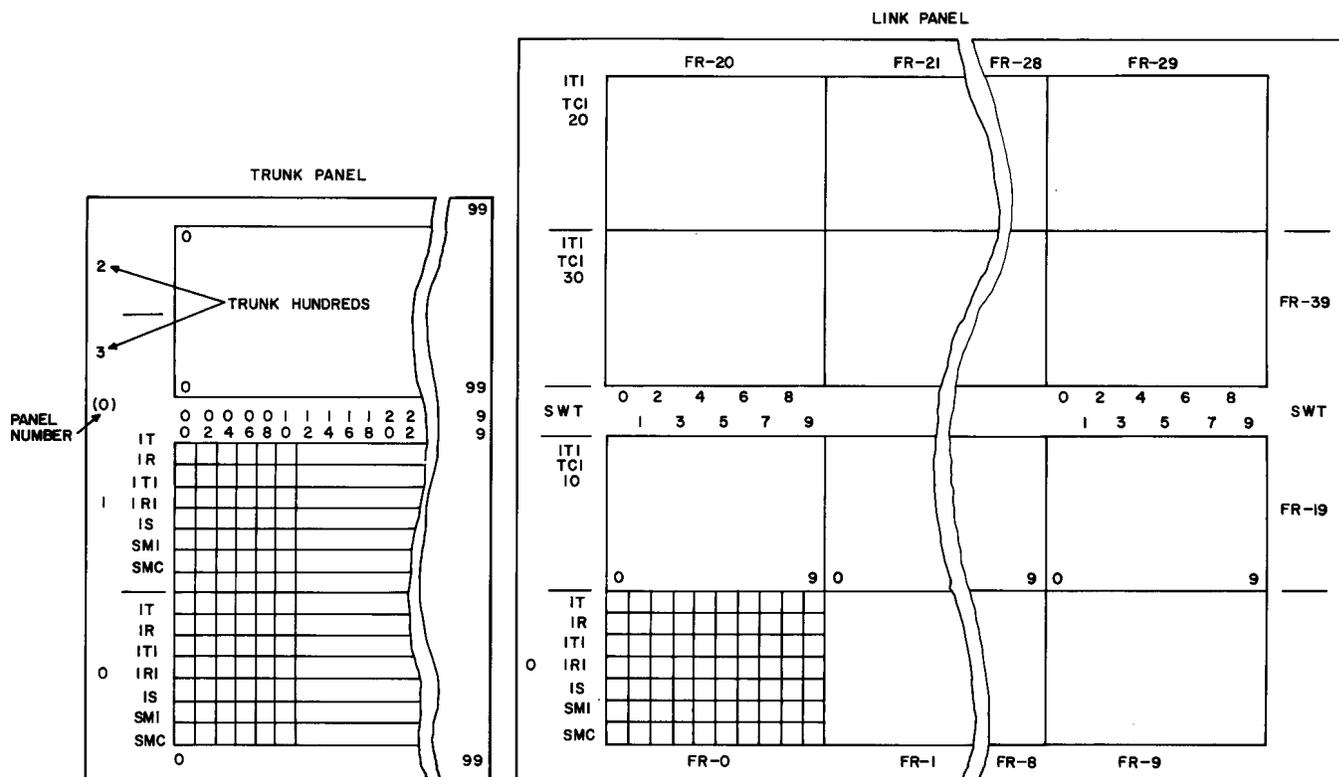


Fig. 5—Typical ITDC Bay Panel Layout

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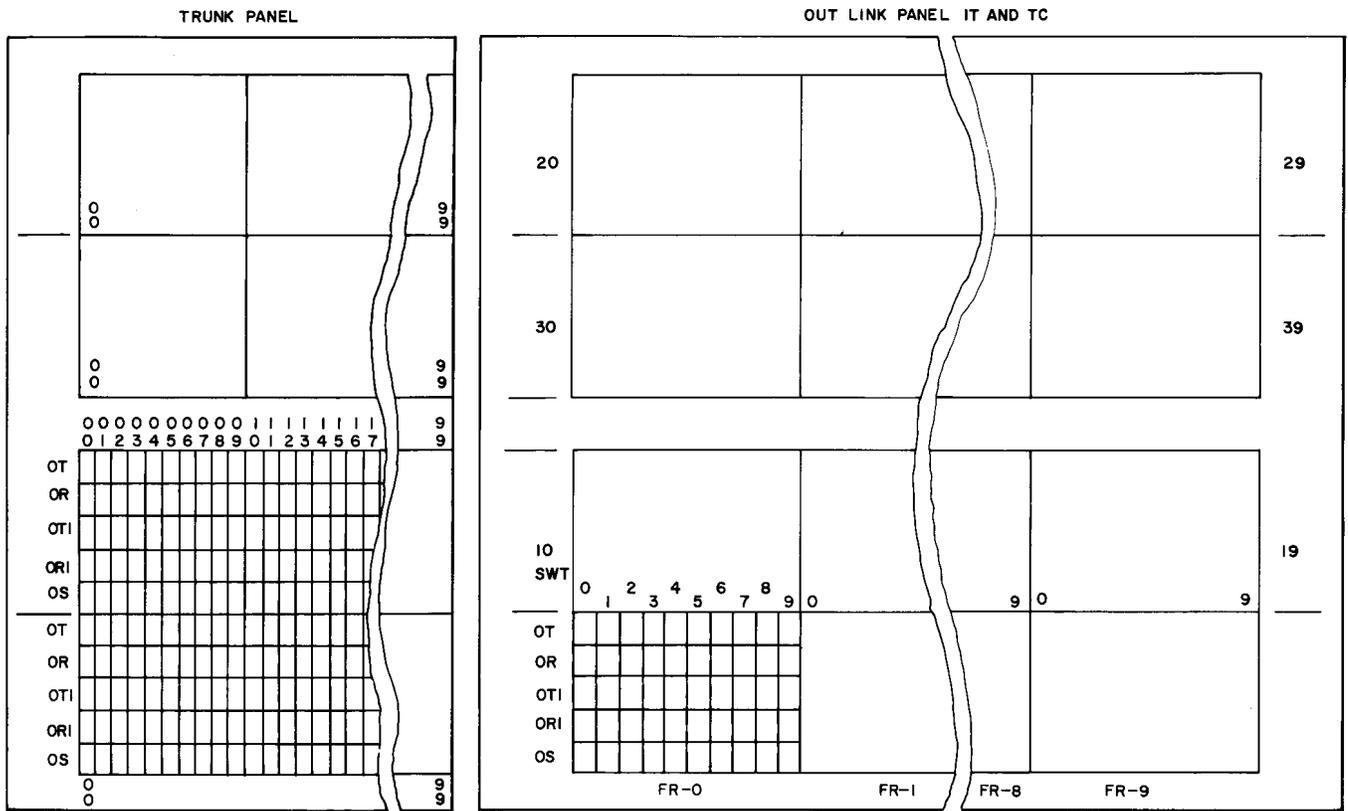


Fig. 6—Typical OTDC Bay Panel Layout

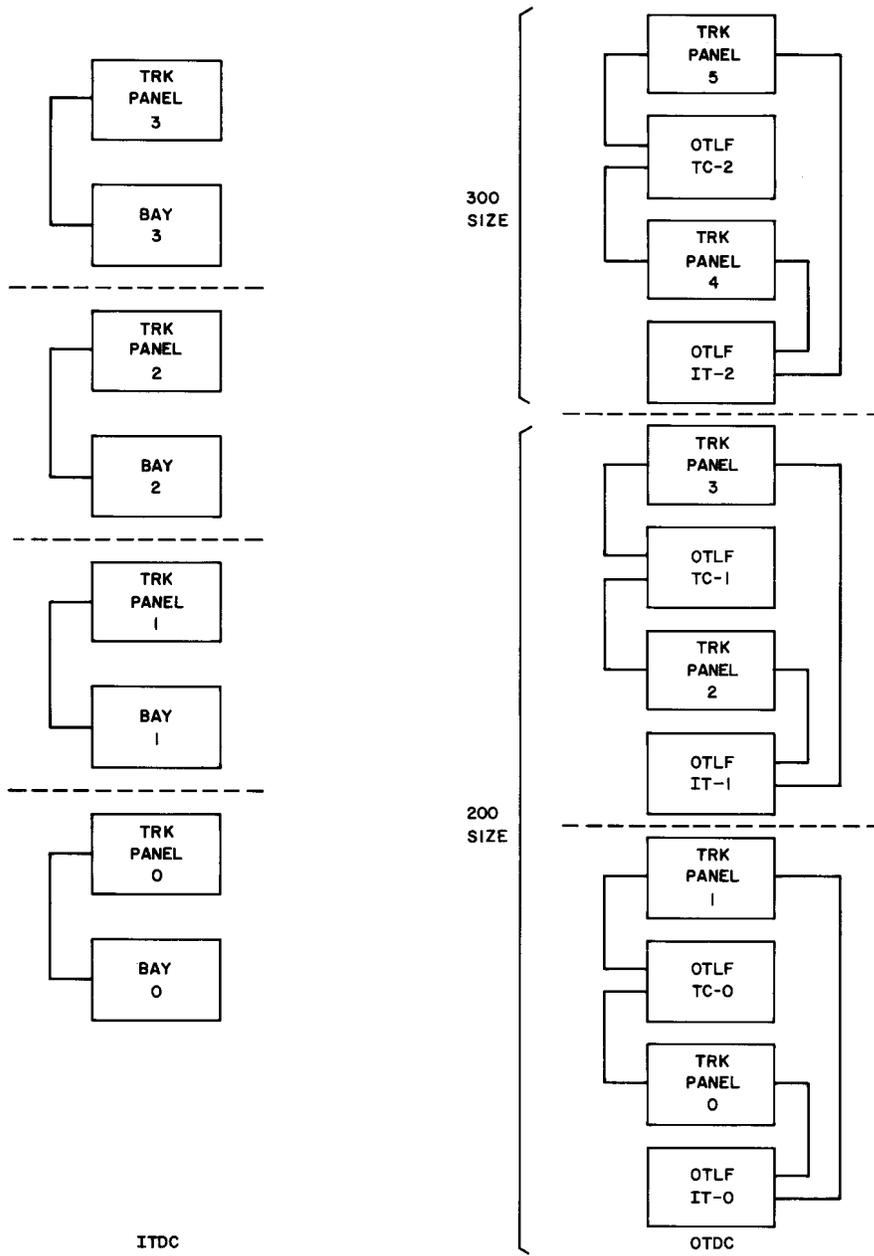


Fig. 7—In Link and Out Link Short Jumper Subgrouping

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	TRK PANEL GRP 1			TRK PANEL GRP 2			TRK PANEL GRP 3			TRK PANEL GRP 4		
TRK PANEL 3	4TH	8TH	12TH									
SW GRP 3												
TRK PANEL 2	3RD	7TH	11TH									
SW GRP 2												
TRK PANEL 1	2ND	6TH	10TH									
SW GRP 1												
TRK PANEL 0	1ST	5TH	9TH									
SW GRP 0												
	ITDB0	1	2	3	4	5	6	7	8	9	10	ITDB11

Fig. 8—Small Switch Link Frame

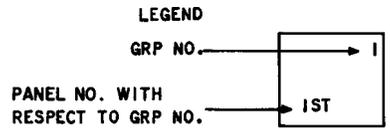
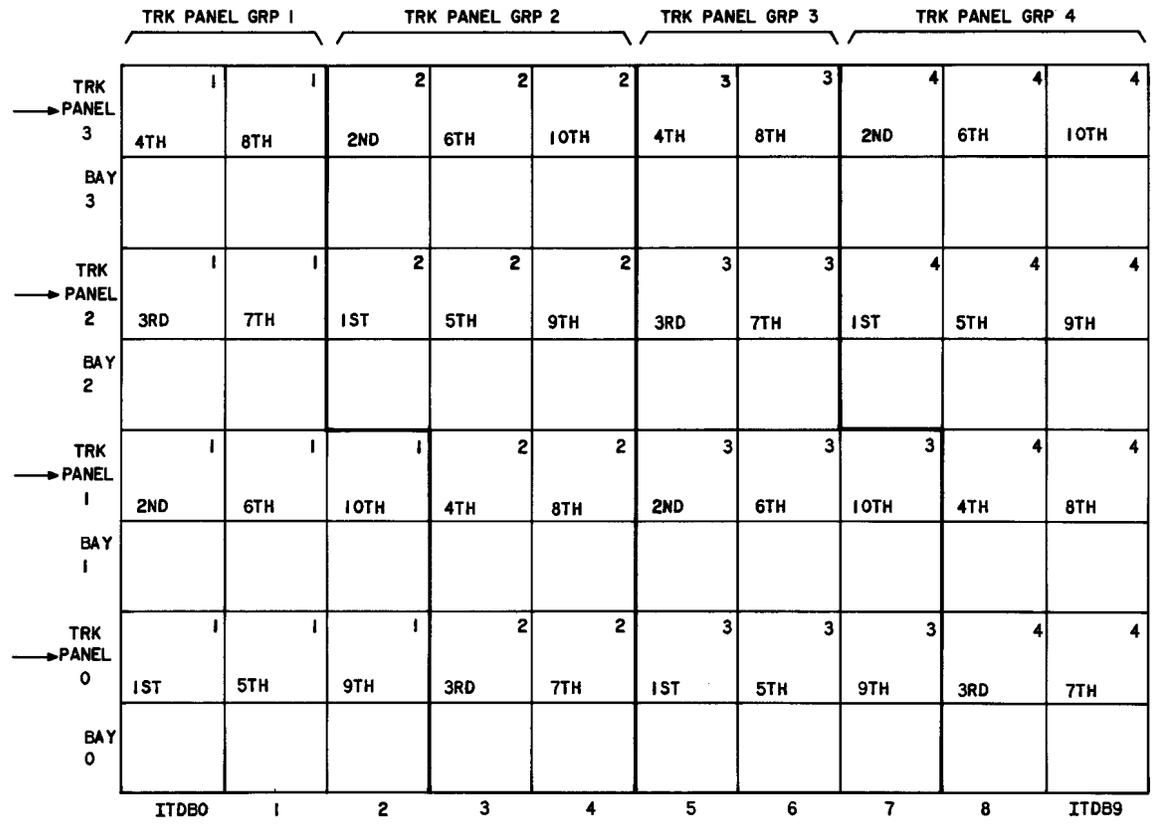


Fig. 9—Large Switch Link Frame

TRUNK TYPE 11H (STANDARD SWITCH)

BAY 0	PANEL	BAY 1	PANEL	BAY 2	PANEL
	0 0-09		0 160-169		0 320-329
	1 40-49		1 200-209		1 360-369
	2 80-89		2 240-249		2 10-19
	3 120-129		3 280-289		3 50-59
BAY 3	0 90-99	BAY 4	0 250-259	BAY 5	0 20-29
	1 130-139		1 290-299		1 60-69
	2 170-179		2 330-339		2 100-109
	3 210-219		3 370-379		3 140-149
BAY 6	0 180-189	BAY 7	0 340-349	BAY 8	0 110-119
	1 220-229		1 380-389		1 150-159
	2 260-269		2 30-39		2 190-199
	3 300-309		3 70-79		3 230-239
BAY 9	0 270-279	BAY 10	0	BAY 11	0
	1 310-319				
	2 350-359				
	3 390-399				

Fig. 11—Example of a Completed Worksheet for Recording Location of Relays on TDC Panels