DISTRICT JUNCTOR GROUPING FRAME EQUIPMENT DESIGN REQUIREMENTS NO. 1 CROSSBAR SYSTEM

1. GENERAL

Scope

1.01 This specification, together with the supplementary information listed herein, covers the equipment design requirements for a district junctor grouping frame for No. 1 crossbar offices. Equipment included in this specification may be ordered by specifying the code and group numbers covered in part 4.

1.02 This section is reissued to incorporate previous appendix changes.

Description

1.03 The frame, a double sided distributing frame, furnishes a flexible means of connecting district junctors to the verticals of secondary switches on line link frames as required to meet varying traffic conditions. Together with direct cabling between the line link frames themselves, it provides a means of multipling the line link secondary switch verticals to form various combinations, each associated with a group of 20 district junctors.

1.04 The frame should be located as near as possible to both the line link and district junctor frames. Due to the heavier cabling to the line link frames it will be desirable to place the grouping frame nearer the line link frames.

1.05 The frame specifications are as follows:

Height	11'-6"
Width	2'-4" (3'-3" between guard rails)
Spacing of Verticals	6-1/2"
Spacing of Shelves	8"
No. of Terminal Strips and Capacity in Circuits per Vertical	15TS 300 Circuits
No. of Terminal Strips and Capacity in Circuits per Bay	15TS 150 Circuits
Support of Frame	Low type auxiliary framing as used for crossbar frames at an approximate height of 11'-7" from floor
Frame Growth	The frame may grow in either direction lengthwise

1.06 No jack mountings are used on the frame. Connecting blocks providing battery and ground are furnished for testing purposes.

Subdivision of Equipment

ED-91252-01 — Assembly

ED-91253-01 — End Guard

2. SUPPLEMENTARY INFORMATION

816-000-000 — No. 1 Crossbar System Index

J25552 (816-017-150) — Frame Lighting and Appliance Outlets

Floor Plan Data — Section 9.4 — Sheet 3

3. DRAWINGS

ED-25255-01 — Equipment

ED-25256-01 — Switchboard Cabling

ED-25257-01 — Typical Distributing Diagram

ED-90046-01 — Mounting of 38 Type Connecting Block

ED-91252-01 — Assembly

ED-91253-01 — End Guards

SD-90122-01 — 33 Type Connecting Block Circuit

4. EQUIPMENT

ED-91252-01 — Assembly

Group 1 — Unit of 1 vertical

Group 2 — Unit of 2 verticals

Group 3 — Unit of 3 verticals

Group 5 — Unit of 5 verticals

Group 10 — Unit of 10 verticals

Group 11 — Unit of 11 verticals

Group 50 — Set of distributing rings and junction details between units

ED-91253-01 — End Guards

Group 1 — End guard for right end of frame

Group 2 — End guard for left end of frame

Note

A. An end guard shall be furnished at each end of the frame except at an end which is 8″ or less from a column or other obstruction.

5. GENERAL NOTES

Distribution of District Junctors to Line Link Frames

Method of Cabling Line Link Appearances

5.01 The district junctor grouping frame provides a means of multipling the various groups of district junctors to the verticals of secondary switches on a number of line link frames. In general, the multipling is done partly at the grouping frame, and partly by direct cabling between the line link frames themselves. The direct multipling is done in combinations of 2 or 3 line link frames, secondary switches on 2 or 3 frames being multipled together and one end of the combination cabled to a terminal strip on the vertical side of the grouping frame. In addition, certain secondary switches are cabled individually to the grouping frame. These will be referred to as "single appearances". At the grouping frame, the combinations and single appearances are cross connected, by means of jumper cables, to groups of district junctors which appear on the horizontal side of the grouping frame.

5.02 The terminal strips on the vertical side of the grouping frame thus represent one, two or three "appearances" of the various district junctor groups on the line link frames. By means of jumper cables, any group of district junctors may be distributed over and made to appear on the secondary switches of 2, 3, 4, 5, 6, or 7 line link frames in accordance with a pattern determined by the traffic conditions for each particular job.

5.03 There are certain instances in which cabling between line link frames will not be used, all secondary switches of a group of line link frames being cabled directly to the district junctor grouping frame. In general, on initial installation, a group of three or less line link frames served by the same district junctors will be treated in this manner, regardless of their class of service or the nature of the multiples required. It may also be advantageous to use this method for small groups of frames on additions where new district junctors are not added at the same time as line link frames. In general, when new line link frames are to be added to an existing distribution pattern, it is intended that there shall be as much direct cabling between their secondary switch appearances as possible. However, there shall be no direct cabling between appearances on the new frames and appearances on existing frames. Therefore, the new frames shall be cabled in accordance with one of the following plans, whichever is applicable to the job condition and results in the maximum direct cabling between line link secondary switch appearances.

(a) Cable the new frames of the addition in accordance with one of the patterns illustrated by Figs. 4 to 10 of ED-25257-01.

(b) Cable the new frames so they form with the existing frames a complete pattern per Fig. 1 or 4 to 11 of ED-25257-01; the new frames being cabled to each other and to the grouping frames as though they had originally been included as the highest numbered frames in the pattern.

Requirements and Objectives

5.04 *New Offices:* The factors which should be considered in associating district junctors with line link frames for new offices are as follows:

(a) The number of line link frames to which a given group of 20 district junctors should be multipled will be determined by the

ratio of originating to terminating traffic on the line link frames. Where the originating traffic is the higher, more district junctors will be furnished and each group multipled to a smaller number of line link frames. Where the terminating traffic is the higher, less district junctors will be required and each group will be multipled to a larger number of line link frames. For a given job, the number of times each group of 20 junctors should appear on line link frames equals the number of line link appearances (pairs of secondary switches) divided by the total number of district junctor groups (20 junctors each) available for the associated class of service. Where this quotient is not a whole number, some of the district junctor groups must be multipled to one more line link frame than others, and the remainder indicates the number of district junctor groups which must be multipled the higher number of times.

(b) Rearrangements in the association of district junctors, with respect to line link frames, will be necessary due to traffic changes or additions to the office. It is a fundamental requirement that these changes be made at the grouping frame rather than in the cabling between line link frames. The cabling patterns which are recommended for various size jobs are designed to facilitate these rearrangements. However, in assigning district junctors to the various patterns, it is imperative that full consideration be given to providing as much flexibility as posssible for future changes.

(c) The line link control circuit is arranged to assign originating traffic to the district junctors on secondary switches in accordance with an order determined by the district junctor preference cross connections. Initially in any office, this order will give secondary switches 0 and 2 first preference, switches 1 and 3 second preference, followed in order by switches 4 to 9. With this the case, each group of 20 district junctors, as far as possible, should appear on a different pair of secondary switches on the succeeding line link frames which it serves. In addition, there should be a transposition of the 2 groups of 10 districts forming each group of 20, between their appearance on a pair of secondary switches on one line link frame, and their appearance on the next higher number pair of switches on the succeeding line link frame that they serve. The term "transposition" indicates that the 2 groups of 10 district junctors in a group of 20 shall be transposed with respect to each other but with no change in the order of the individual circuits in each group of 10. The purpose of this reversal is to equalize the traffic to the pair of district link primary switches with which the group of 20 district junctors is associated.

(d) In most cases, there will be irregular multipling of district junctors before the line link frames, such as some groups of 20 district junctors being multipled 5 times and some 6 times. Under these conditions, the multiples of 5 and 6 should be evenly distributed over the line link frames to equalize the access from each line group as far as possible, and equally over the district frames to equalize the traffic to these frames. Sixes are made up by adding one line link appearance to a regular multiple of 5. The additional appearance may or may not be first choice with respect to the assignment of originating traffic on the line link frame on which it appears. In some cases, it will be found necessary to give a particular line link frame access to 2 groups of districts both of which are multipled 6 times. Where this is necessary, the use of 2 multiples of 6, both of which are made up by adding first choice appearances, should be avoided.

(e) The district junctors serving any line link frame should, as far as possible, be distributed over 5 district frames. Where this is done, the shutting down of the district frame will remove from service only 20% of the district junctors serving a given line link frame.

(f) The number of district junctors to which any 2 line link frames have access, in common, should be kept to a minimum of, in general, not more than 40. This is to minimize the effect on other line link frames of a temporary overload on any one frame. Stating it in other words, this requirement has the effect of distributing the traffic from the line link frames uniformly over the district junctors serving the frames.

(g) The sender line frames, associated with the district junctors assigned to line link secondary switches 0-1 and 2-3 (where these have first preference initially) on each line link frame, should be checked to see that both do no have the same sender group preference. This is not to be considered as a limitation on the district junctor distribution since the subgroup preference may be changed at the sender link frames.

(h) Where line link frames located on different floors work into a common group of districts, satisfactory maintenance dictates that no combination of appearances of a group of 20 district junctors shall include line link frames on different floors.

5.05 ***Additions to Existing Offices:*** The factors which should be considered in associating both initial and added district junctors with initial and added line link frames on additions to existing offices are as follows:

(a) The number of line link frames to which a given group of 20 district junctors should be multipled will be determined by the ratio of originating to terminating traffic on the line link frames. Where the originating traffic is the higher, more district junctors will be furnished and each group multipled to a smaller number of line link frames. Where the terminating traffic is the higher, less district junctors will be required and each group will be multipled to a larger number of line link frames. For a given job, the number of times each group of 20 junctors should appear on line link frames equals the number of line link appearances (pairs of secondary switches) divided by the total number of district junctor groups (20 junctors each) available for the associated class of service. Where this quotient is not a whole number, some of the distirct junctor groups must be multipled to one more line link frame than others, and the remainder indicates the number of district junctor groups which must be multipled the higher number of times.

(b) Rearrangements in the association of district junctors, with respect to line link frames, will be necessary due to traffic changes or additions to the office. There shall be no direct cabling on additions between added and existing line link frames as it is a fundamental requirement that these changes be made at the grouping frame rather than in the cabling between line link frames. The cabling patterns which are recommended are designed to facilitate these rearrangements. However, in assigning district junctors to the various patterns, it is imperative that full consideration be given to providing as much flexibility as possible for future changes.

(c) The line link control circuit is arranged to assign originating traffic to the district junctors on secondary switches in accordance with an order determined by the district junctor preference cross connections. Initially in any office, this order will give secondary switches 0 and 2 first preference, switches 1 and 3 second preference, followed in order by switches 4 to 9. With this the case, each group of 20 district junctors, as far as possible, should appear on a different pair of secondary switches on the succeeding line link frames which it serves. In addition, there should be a transposition of the 2 groups of 10 districts forming each group of 20, between their appearance on a pair of secondary switches on one line link frame, and their appearance on the next higher number pair of switches on the succeeding line link frame that they serve. The term "transposition" indicates that the 2 groups of 10 district junctors in a group of 20 shall be transposed with respect to each other but with no change in the order of the individual circuits in each group of 10. The purpose of this reversal is to equalize the traffic to the pair of district link primary switches with which the group of 20 district junctors is associated.

(d) In most cases, there will be irregular multipling of district junctors before the line link frames, such as some groups of 20 district junctors being multipled 5 times and some 6 times. Under these conditions, the multiples of 5 and 6 should be evenly distributed over the line link frames to equalize the access from each line group as far as possible, and equally over the district frames to equalize the traffic to these frames. Sixes are made up by adding one line link appearance to a regular multiple of 5. The additional appearance may or may not be first choice with respect to the assignment of originating traffic on the line link frame on which it appears. In some cases,

it will be found necessary to give a particular line link frame access to 2 groups of districts both of which are multipled 6 times. Where this is necessary, the use of 2 multiples of 6, both of which are made up by adding first choice appearances, should be avoided.

(e) The district junctors serving any line link frame should, as far as possible, be distributed over three or more district frames. There shall not be more than 60 district junctors from the same district frame associated with a line link frame. District junctor groups from the same district frame shall not appear on adjacent line link secondary switches on the same line link frame.

(f) The sender link frames, associated with the district junctors assigned to line link secondary switches 0-1 and 2-3 (where these have first preference initially) on each line link frame, should be checked to see that both do not have the same sender group preference. This is not to be considered as a limitation on the district junctor distribution since the subgroup preference may be changed at the sender link frames.

(g) Where line link frames located on different floors work into a common group of districts, satisfactory maintenance dictates that no combination of appearances of a group of 20 district junctors shall include line link frames on different floors.

District Junctor Multiple Patterns

5.06 In order to meet the objectives outlined above for specific jobs, a number of multiple diagrams have been prepared. These diagrams are shown on ED-25257-01 and they form the basis for district junctor assignment. Each diagram has a specific application to job conditions in terms of quantities of line link frames and types of multiple required. All the diagrams are variations of the same fundamental pattern, differing only the number and arrangement of single line link frame appearances which are cabled individually to the district junctor grouping frame. They cover the method of running cables between line link secondary switches and from the line link frames to the grouping frame. They also indicate typical methods of combining the various line link appearances by means of jumper cables at the grouping frame.

5.07 The diagrams indicate that certain pairs of secondary switches (appearances) should be multipled together to obtain a certain number of combinations of 2 and 3 appearances. These are obtained by means of direct cabling between the respective line link frames. There are 2 types of multiples of 3, but each type multiples together secondary switches 0-1, 4-5, and 8-9 on 3 different line link frames. The variation occurs in the spread over the line link frames, as can be seen by inspection. All multiples of 2 are alike, connecting switches 2-3 and 6-7 on different line link frames. The cable to the grouping frame for each multiple of 2 or 3 is taken from the highest appearance.

Multiples of Five, Six or Seven

5.08 Fig. 1 of ED-25257-01 shows a complete multiple diagram together with typical district junctor assignments. This diagram is particularly adaptable to jobs requiring district junctors to be multipled to five line link frames or combined multiples of 5 and 6. It should be used for jobs having in excess of ten line link frames served by the same district junctors and requiring multiples of 5, combined multiples of 5 and 6 or combined multiples of 6 and 7 line link appearances. (An exception to this rule is noted in paragraph 5.17.)

5.09 An inspection of the pattern will show that multiples of 5 are, in general, made up by connecting a multiple of 3 cabled to the grouping frame from a given line link frame to a multiple of 2 cabled to the grouping from the sixth line link frame down the line-up. This method is followed all the way through the line-up. It should be pointed out that this method of using the pattern does not lend itself to the future creation of multiples of four and therefore should not be used where such a rearrangement is contemplated. (See Paragraph 5.17.)

5.10 In some instances it is necessary to give certain groups of districts 6 appearances on as many line link frames. In this case, single appearances are added to twos and threes to give the necessary 6 and special provision must be made to obtain the necessary additional single appearances for this purpose. In order to obtain additional single appearances a number of combinations which would normally consist of 2 and 3 appearances in the regular pattern are broken

up into singles, each single being cabled to a separate terminal strip on the vertical side of the grouping frame. These singles will then be combined with other twos and threes to give a total of 6 appearances to certain groups.

5.11 It will be noticed that more singles have been provided by the pattern than are required to make sixes on the initial job. This attempt to provide for future rearrangements requires special treatment of the single appearances at the grouping frame. The reason for this is found in the fact that the additional singles reserved for future use must be combined at the grouping frame to form fives temporarily. This would require 5 sets of jumper cables to be wired to the same set of terminal strips on the horizontal side of the grouping frame if the same method were followed as is used to combine a 2 and a 3 to make a 5. This is objectionable from a wiring standpoint. As will be explained later, these singles are recombined by means of switchboard cable between their terminal strips on the vertical side of the grouping frame to form combinations of 2 appearances.

5.12 These singles provided for future rearrangements, which are temporarily multipled together to form fives, can be identified on the pattern by the line link frames on which they have their 0-1 appearance. ED-25257-01, Fig. 1 shows the temporary multiples of 5 associated with the 0-1 appearance on line link frames 0 and 1, 12 and 13, and 24 and 25 cabled individually to the grouping frame for this purpose. As future sixes are required the temporary multiples of 5 associated with frames 24 and 25 should be used first, followed by 12 and 13 and then 0 and 1.

5.13 The single appearances used in the pattern for forming present multiples of 6 are the 0-1 secondary switches on frames 36 and 37; the 2-3 switches on frames 42 and 44; the 4-5 switches on frames 38 and 39; the 6-7 switches on frames 48 and 49, and the 8-9 switches on frames 40 and 41. These are combined with the multiples of 5 having their 0-1 appearances on frames 3, 2; 15, 14; 26, 27; 11, 10; and 45, 46, respectively. This arrangement spreads the district junctor groups having 6 appearances quite uniformly over the line link frames. As more multiples of 6 are required this uniformity should be maintained as additional singles are added to multiples of 5.

Small Groups of Three or Less Frames

5.14 Fig. 3 of ED-25257-01 illustrates the method of handling small groups of three or less line link frames. Each line link appearance is shown cabled individually to the grouping frame and this method should be followed regardless of the class of service or the types of multiple involved. The assignment shown is typical for coin district junctors requiring multiples of three. Other multiples can of course be obtained and in any case it will be impossible to completely meet the objectives outlined in paragraphs 5.04 and 5.05 with such a small group of line link frames.

Groups of 4 to 10 Line Link Frames

5.15 Figs. 4 to 10, inclusive, of ED-25257-01 show multiple patterns which should be applied for groups of 4 to 10 line link frames, respectively, regardless of class of service or types of multiple required. It will be found on inspection that these figures are very similar to Fig. 1 for the quantities of frames involved. It is felt that these figures may be applied on any job with safety, enough singles being provided to facilitate any additions or rearrangements which may occur, particularly on initial jobs. In the extreme case where all district junctor groups must be multipled to only two line link frames, the multiples of three shown should be broken up into singles.

Multiples of Three, Four and Five

5.16 Fig. 11 of ED-25257-01 has been provided to be used for quantities of line link frames in excess of ten when multiples of four, combined multiples of four and five, multiples of three or combined multiples of four and three appearances are required. The only difference between Figs. 1 and 11 is found in the quantities of singles which are provided. These singles are very important when rearrangements are to be made and are particularly advantageous when changes are to be made in combination of fours and fives. Obviously, if districts are to be added to such a combination (i.e., increase the number of fours) it will be of great advantage if singles can be easily picked up from the multiples of

five. In assigning districts to a combined multiple of four and five, it is therefore highly desirable that as many of the fives as possible shall contain singles. Fives can be made up in the following ways:

(a) A three plus a single in the 2-3 and 6-7 rows.

(b) A two plus a single in the 0-1, 4-5 and 8-9 rows.

(c) A single from each of the five rows.

(d) A three plus a two (to be avoided as much as possible in multiple patterns of 4 and 5 line link appearances).

Fours can be made up as follows:

(a) A three plus a single in either the 2-3 or 6-7 rows.

(b) A two plus two singles in the 0-1, 4-5 or 8-9 rows.

(c) Four singles in four different rows.

5.17 The question will undoubtedly arise, particularly on jobs requiring all multiples of 5, whether Fig. 1 or Fig. 11 should be used. In order to make this decision, some indication should be obtained from the Telephone Company as to what the future distribution is likely to be. If the distribution will call for fives and sixes in the future, or if no fours are likely to be introduced then Fig. 1 can safely be used. Fig. 1 can also safely be used for a certain proportion of fours, say 20%, but if the number of fours may exceed this figure, then Fig. 11 should be used without question. In addition, if Fig. 1 is used in anticipation of a certain proportion of multiples of 4, it is imperative that as many as possible of the fives have individually cabled singles in their makeup and the singles should be freely used for this purpose. The dominating reason for using Fig. 11 is of course the provision it makes for additional singles which not only facilitate the assignment of multiples of four but also facilitate later rearrangements.

Arrangement of Units on District Junctor Frames

5.18 It is assumed that the Telephone Company will have assigned the district junctor groups serving a given class of service approximately equally to all the district frames. Where there is an even number of district frames this should result in there being approximately the same number of district junctor groups from odd frames as from even, which is of course very desirable from the point of view of junctor distribution in order to meet objectives of paragraphs 5.04 and 5.05. Where there is an odd number of district frames, however, there may be a preponderance of even numbered district groups (i.e., groups from even frames). This makes it difficult to assign alternate odd and even groups to the line link frames. This can sometimes be overcome to some degree when the distribution calls for combination multiples, say of fours and fives. The district junctor groups multipled five times should be evenly spread over the district frames. However, it is usually not possible to assign them exactly equally, some district frames will have one more district junctor group multipled five times, than others. In order to increase the number of appearances from odd frames, the district frames having one more five than others can be an odd district frame in each case. In any case, the Telephone Company assignment should be checked to get the best possible distribution of district junctors for a given class of service over odd and even frames.

Assignment of District Junctors

5.19 It is realized that the assignment of district junctors to any one of the above patterns for a particular job must be made on more or less of a cut and try basis in order to meet the requirements and objectives listed in paragraphs 5.04 and 5.05. Each job must, of course, be considered on its own merits but there are certain preliminary steps which can be taken on any job which should result in an easier overall assignment and should produce fairly uniform results for all jobs. These steps are discussed below and it is recommended that this general procedure be followed in all cases.

(a) *Choice of Pattern*

The size of job and the multiple combinations required will determine which of the pattern figures should be used. A blank pattern similar to the chosen figure can then be prepared in advance of the actual assignment.

(b) ***Arrangement of Junctors on District Frame***

The arrangement of the district junctor units on the district frames should be checked to get the best distribution on odd and even frames as outlined in paragraph 5.18.

(c) ***Preliminary Assignment***

Using the blank pattern figure, a preliminary assignment can be made to switches 0 and 1 of all line link frames. In the case of multiples of four or three there will be more district junctor groups than line link frames and the district junctor groups unassigned on switches 0 and 1 should have their first choice on switches 2 and 3. In the case of multiples of five, six or seven some district junctor groups will have to be assigned to the 0-1 switches of two line link frames. The assignment consists of assigning the lowest numbered district junctor group from the lowest numbered district junctor frame to switches 0 and 1 on the lowest numbered line link frame (as an example — assign group 0-1 from district frame 0 to switches 0 and 1 on line link frame 0). Then assign the lowest numbered groups from two odd frames to the next two line link frames, then two evens and so on until as many line link frames as possible have had their 0-1 switches assigned. Each time a group from a given district frame is assigned it should be the next higher numbered group from the previous assignment. (See Tables A and E of ED-25257-01 for typical orders of assignment.)

After this preliminary assignment has been completed, the district junctor frame numbers represented by the assignments on the 0-1 row of the line link frames can be shown on the 4-5 and 8-9 rows in accordance with the fundamental method of making up threes. In a like manner, the frame assignments from the 0-1 row can be transferred up to the 2-3 row except shifted six frames to the right. Some slight rearrangements may be necessary to maintain the odd and even relationship between the 0-1 and 2-3 rows when the frame assignments left over from the right hand end of the 0-1 row are transferred to the left hand end of the 2-3 row. When the frame assignments are complete on the 2-3 row they can be transferred to the 6-7 row in accordance with the fundamental pattern for cabling two's. At the end of this preliminary assignment, each line link frame appearance will have been assigned a different district frame number and these should be alternately odd and even or even and odd on each line link frame. This assignment represents the ideal.

(d) ***Assignment of Irregular Multiples to District Frames***

The preliminary assignment on other than the 0-1 row is made without respect to anything but district frame numbers, no attention being paid to how the frame numbers fall on singles, twos and threes. This frame assignment should be retained as far as possible. The next step is to determine the distribution of fives and fours on the district frames. (The principle for other combinations is similar.) With fives and fours, it is desirable that as many of the fives as possible should include a single appearance (i.e., a line link appearance cabled individually to the grouping frame). After having made a tentative distribution of the fives and fours over the line link frames, the distribution on the district frames should be checked, giving each district frame and each line link frame an equal number of fives and fours as far as possible.

(e) ***Final Assignment***

In proceeding with the actual assignment of the district junctor groups to the line link appearances the preliminary frame number assignments will be found very helpful. Usually it will be found possible to assign a district juntor group to a line link appearance whose preliminary frame assignment agrees with the frame number of the district junctor group finally assigned. In some cases it will be necessary to assign a district junctor group with a different frame number than the preliminary assignment but even here, the preliminary assignment will be a guide as to whether an odd or an even district junctor group should be assigned. When there is a preponderance of even numbered groups, it will be necessary to assign an even numbered district junctor group in a few cases where the preliminary assignment calls for an odd. This cannot be avoided and is not considered serious.

The assignment when completed may or may not meet the requirements outlined in paragraphs 5.04 and 5.05 adequately. Where the number of district junctor frames is small it may be impossible to meet these requirements completely. It will seldom be possible to obtain a perfect assignment and there will nearly always be minor violations of the various requirements. After the assignment of district junctors has been made, the entire pattern should be reexamined to see how the objectives listed earlier in this specification have been met. Reassignment of districts may be desirable to keep the departures from these requirements as few in number as possible.

Terminal Strips

Vertical Side

5.20 Each terminal strip on the vertical side of the grouping frame, representing line link appearances, will accommodate all leads required for 20 circuits, one terminal being assigned to each lead. These leads consist of T, R, S, and M1 for coin, FR or MRI service, and T, R, S, M1, and M2 for MR2P service, plus the miscellaneous control leads to the sender link and control circuit common to the group of 20 district junctors. Seven point No. 70 terminal strips are required for coin, FR or MRI service and 8 point No. 184A terminal strips for MR2P service (and in some cases for FR2P service). The first 4 or 5 rows at the front of the terminal strip are assigned to the T, R, S, and M1, or T, R, S, M1, and M2 leads, respectively, and the 3 rear rows to the miscellaneous control leads.

Horizontal Side

5.21 On the horizontal side of the frame, each group of 20 district junctors requires double the number of punchings assigned to the group on the vertical side, since several line link appearance strips may be jumpered to a group of 20 district junctors appearing on the horizontal side. For this reason, 2 terminal strips are assigned to each group of 20 on the horizontal side, and a pair of terminals, strapped together, assigned to each lead. The general assignment of leads to these terminal strips is relatively the same as that used for the vertical side. The T, R, S, and M1, or T, R, S, M1, and M2 leads being assigned to the first 4 or 5 rows and the miscellaneous leads to the 3 rear rows. Two 7 point No. 48 terminal strips for coin, FR or MRI, and two 8 point No. 50 terminal strips for MR2P are required per 20 district junctors. The No. 50 terminal strips should be furnished for FR2P when discrimination between parties is required for any reason.

Connecting Blocks

5.22 33 type connecting blocks, providing battery and ground for testing purposes, arranged to clamp on the edge of a terminal strip fanning strip in accordance with the drawing covering the mounting of connecting blocks, shall be mounted on the horizontal terminal strip at the 5th and 10th shelves from the bottom in bay 8, and at the 5th and 10th vertical terminal strip from the bottom at vertical 9. Where a space is not equipped with a terminal strip the connecting block shall be mounted on a wood block as shown on the connecting block mounting drawing. The connecting block will be transferred to the terminal strip when the latter is furnished.

5.23 Battery and ground supply shall be obtained at the fuse board. Signalling battery shall be used and one fuse provided per frame. No. 16 type F wire shall be used in all cases.

Circuit Numbering and Growth

5.24 The circuit numbering on all individual terminal strips on the vertical side shall be from bottom up on the strip and the growth of equipment in groups of 20 circuits shall be from bottom up on the vertical. On the horizontal side, all individual terminal strips as well as groups of terminal strips shall be numbered from left to right regardless of the growth of the frame, and the growth of equipment shall be from bottom up.

Factors Governing Length of Frame

5.25 The requirements for line link terminal strips on the vertical side of the grouping frame will ordinarily be the controlling factor in determining the number of grouping frame bays to be furnished. For 1000 or less district junctors, 10 bays should generally be furnished, one shelf being assigned to the 100 district

junctors associated with each district junctor frame. Ten verticals may accommodate either more or less than 1000 districts, depending on the number of vertical terminal strips required. For a greater number of districts or for additions, either 6 or 10 additional bays should be furnished. With the smaller number of verticals, the district junctors shall be arranged with 60 circuits on the lowest shelf and 40 on the next and following this arrangement for all shelves of the frame.

Cross Connections

5.26 722 cross connecting cable, consisting of 10 pairs of 22 gauge TDSCBL wire shall be furnished as required. Cross connections shall be made in groups of 20 leads in accordance with the cross connecting diagram shown on the cabling drawing. Miscellaneous punchings 0-29 and 34-39 shall be cross connected between the vertical and horizontal sides of the frame for each set of jumper cables in all cases. The method of connecting punchings 30-33 is covered in Fig. 2 of ED-25257-01.

Jumper Transpositions

5.27 The typical distribution diagram listed in this specification shows the method of arranging single appearances and combinations of 2 or 3 appearances for a typical job and the method of grouping them at the grouping frame. Traffic consideration dictate that certain appearances of a group of district junctors shall be transposed with respect to other appearances. These transpositions shall be accomplished by connecting certain appearances to district junctors with a reversal in the jumper cables. The appearances not to be reversed shall be connected at the grouping frame with no reversal in the jumper cables.

5.28 The term "transposition" indicates that the 2 groups of 10 district junctors each in a group of 20 shall simply be reversed with respect to each other but with no change in the order of the individual circuits in each group of 10. In addition, the "RA" and "RB"; "TA" and "TB"; and the "A" and "B" leads shall be transposed when the associated groups of 10 district junctors are transposed. Ordinarily when a combination of 2 appearances is grouped with a combination of 3 the combination of 2 shall be connected to the district junctors with a reversal and the combination of 3 shall be connected straight. When a single appearance is added to a 2 and a 3 to make 6, the single shall be connected straight or reversed, whichever is required to cause the districts on the individual switches to be reversed from those on the correspondingly numbered switches in the multiple of 5. For multiples of five or less appearances the 0-1, 4-5 and 8-9 appearances shall all be connected straight with the 2-3 and 6-7 appearances reversed.

Cabling

5.29 The cable codes used, the arrangement of runs entering the frame, and the method of placing, turning, butting, and forming of cables, shall be in accordance with the switchboard cabling drawing. The direction of approach of the cable runs will be determined by the location of the grouping frame with respect to the line link and district junctor frames.

5.30 The regular patterns provide a certain proportion of single appearances to facilitate initial assignments and future rearrangements. Where it is necessary to regroup these singles to form multiples for certain district junctor groups, more than four sets of jumper cables might be required per group if all single appearances were jumpered direct. Since the terminal strips on the horizontal side of the grouping frame will accommodate only four leads per set of terminals certain of the singles should be recombined at the vertical side of the grouping frame. This shall be done by means of switchboard cable between the terminal strips on the vertical side of the grouping frame. In order to permit the addition of a jumper cable should it be required on a future rearrangement, not more than three sets of jumper cables per district junctor group should be run initially. Where five singles are to be combined, they should be jumpered as combinations of 2, 2 and 1. For four singles to be combined, jumper as 2, 1 and 1. Where there are a number of combinations of 2 appearances so connected on the vertical side of the frame, the jumpers to the horizontal side should not be run from the same appearance for all of them. This is to facilitate isolating single appearances on different pairs of line link secondary switches when additions or rearrangements are to be made.

5.31 Unused switchboard cable leads corresponding to miscellaneous terminal strip punchings in the series 0-39 at the line link frame terminal strips, at both sides of the grouping frame and at the sender link frame terminal strips shall not be cut off but shall be sewed back into the frame at each of these points for possible future use.

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