INSTALLATION OF ADDITIONS TO SWITCHING EQUIPMENT

NO. 1 CROSSBAR SYSTEM

CONTENTS

1. GENERAL

Scope

1.01 This specification covers a general procedure for making additions to crossbar offices. The subject matter is necessarily treated broadly and must be used only as a guide in establishing a procedure for specific installations. This specification, together with supplementary office and line junctor redistribution specifications J29255, BSP AA240.010 and J29256, BSP AA240.011, respectively, covers a survey of the outstanding problems involved in making additions.

1.02 This specification is reissued to revise Chart, Fig. 11 and to add detailed procedures covering terminating sender multiple rearrangement, zone registration equipment addition, and office extension frames addition.

Statement of Problem

1.03 The major problem of additions to crossbar offices is that of temporarily reducing working equipments during the installing interval when the new equipments are being established in the working circuit pattern.

1.04 This problem is involved in all additions which fall within the scope of the following eleven work classifications. In approximate order of importance and extensiveness of work required, they are:

(1) Office Junctor Redistribution

(2) Line Junctor Redistribution

(3) Office Extension Frame Additions

(4) Subscriber Sender Multiple Rearrangement

(5) Terminating Sender Multiple Rearrangement

(6) District Junctor Redistribution

(7) Zone Registration Equipment Additions

(8) Coin Supervisory Multiple Rearrangement

(9) Key Pulsing Sender Multiple Rearrangement

(10) Transfer of Existing Numbers into New Number Groups

(11) Individual Frame Additions

1.05 Installing work for additions falling within the above classifications is divided into three phases: Preliminary, transitional, and clean-up.

1.06 Preliminary work involves the erection of all frameworks and running in an connecting all cables to the added equipments; installing and cutting in miscellaneous apparatus on existing equipment where it will not interfere with working circuits; installing auxiliary equipments; and making temporary modifications on working circuits which will facilitate the transitional phase of the work.

1.07 The transitional work establishes the new equipments in the working circuit pattern. During this phase of installation it will be desirable in some cases to remove temporarily some of the working equipment from service. Paragraphs 1.47 to 1.56, inclusive, pertain to this particular problem.

1.08 The clean-up work is the removal of temporary auxiliary equipments and circuit modifications needed during the transitional phase; the removal of abandoned cabling and jumpers; and in some instances the transfer of traffic load to the new equipments.

1.09 The succeeding paragraphs enlarge upon the general problems involved in the previous eleven work classifications. The equipment elements which do not fall within the scope of the multiple rearrangement problems of paragraphs 1.10 to 1.30 are covered in paragraphs 1.31 to 1.46.

Office Junctor Redistribution

1.10 The addition of office and district link frames will require a redistribution of the office junctors. The requirements for office junctor redistributions are covered in specification J29255, BSP AA240.010.

Line Junctor Redistribution

1.11 The addition of line link and incoming link frames will require a redistribution of the line junctors. The requirements for line junctor redistributions are covered in specification J29256, BSP AA240.011.

Office Extension Frames

1.12 There are two types of office extension frame additions: (1) Additions to offices of any district and office frame size which are already equipped with extension frames. (2) Additions to offices of 10 district - 10 office frames or less which are not equipped with office extension frames.

1.13 The former case involves no problem other than normal junctor redistributions as covered in specification J29255, BSP AA240.010. The remaining discussion applies to the second case in which the problem is installing extension frames, eliminating all split levels on the original office frames, and transferring the trunks from the split levels to the associated extension frame. The extension frame switch verticals must also be cabled to the office link secondary verticals. All of this work has to be accomplished with the minimum reduction in OGT service.

1.14 If the Telephone Company anticipates extensive growth in an office, they may elect to have extension frames installed along with new district-office frames before the office reaches the 10-10 size. Under these conditions, for the sake of consistent installing procedures, it is recommended that extension frames be installed and working before any change is made in office junctor assignments.

Subscriber Sender Multiple Rearrangement

1.15 Whenever additions to the originating equipment require new subscriber send-

er link frames or the establishing of new subscriber sender subgroups, it will be necessary to rearrange the sender multiple. Work on the sender multiple must be done with one sender subgroup busy at a time. This will require depriving one or more sender link frames of one or more sender subgroup appearances for short periods of time. This does not deprive district junctor units of sender service,but merely reduces sender access to those districts appearing on the affected sender link frames. The rearrangement of sender multiple must be complete before the added district junctors can be placed in service.

1.16 Other switching equipments affected by these changes may include senders, sender selectors, markers, and marker connectors.

1.17 Problems concerning these specific frames will be found under individual frame additions.

Terminating Sender Multiple Rearrangement

1.18 There are three types of additions in which the terminating sender multiple is affected: (1) Additions of terminating sender links, no additional sender subgroups. (2) Addition of sender subgroups, no additional sender links. (3) Addition of both sender links and sender subgroups.

1.19 The first case involves only the extension of the sender multiple to the added link frames. This work can be done with only one sender subgroup removed at a time from service as the new link frames are cut into the multiple pattern. Several night periods will be sufficient to complete this type or rearrangement.

1.20 The second case involves an extensive multiple rearrangement to accommodate the new sender subgroups. Only one sender subgroup will be out of service at one time during the rearrangement and this out of service condition can be limited to light load hours at night. However, several sender link frames may under certain conditions have to function during the daytime with access to only two sender subgroups.

1.21 The third type of addition is a combination of case one and case two and will involve the same amount of work as the two combined. No additional problem is involved because of the occurrence of the two jobs simultaneously.

District Junctor Redistribution

1.22 The addition of line link or district link frames involves a rearrangement of the district junctor multiple.

1.23 Where junctor changes are involved, various line link frames will necessarily function on reduced junctor access during installation and if new district junctor units are added, some link frames will have junctor access to the original working districts that is less than that preceding the change. Consequently, the new district frames must be available for service at the time district junctor changes are started so that the original line links will have full junctor access.

1.24 The installing procedure should be arranged so that no line is deprived of first choice junctor access during the busy hours of the day.

Zone Registration Equipment Additions

1.25 In an office equipped for zone registration the addition of district links will generally require additions to the zone registration equipment.

1.26 The work may involve extending timer multiples and marker multiples to added registration equipment. In some cases, for installing convenience, it may be desirable to allow one district link at a time to function on a single charge basis during light load hours.

Coin Supervisory Multiple Rearrangement

1.27 The coin supervisory multiple will require rearrangement whenever supervisory link frames are added. Sometime during the rearrangement, all original supervisory link frames will be deprived of one supervisory unit subgroup appearance on the secondary switches. The work can be done when load on coin districts is at a minimum.

Key Pulsing Sender Multiple Rearrangement

1.28 The key pulsing sender multiple will require rearrangement whenever key pulsing sender link frames are added. The multiple must be extended to the new link frames, thus depriving all original link frames for short periods during the modification work, of one sender subgroup appearance on the secondary switches. The work can be done at periods when the operator load on key senders is at a minimum.

Transferring Existing Numbers into New Number Groups

1.29 When additions are made to terminating equipment or when new number groups are added to permit a reduction in

the size of existing number groups, it may become necessary to form new number groups and to transfer numbers from one number group to another. This involves extending marker multiple to the new connectors, cutting in the connectors to the associated block relay frames, and changing the markers to look for the transferred numbers in the new number groups.

1.30 The procedures covered herein permit additions and arrangements and the associated tests to be made on an in service basis. Upon the completion of the work, the number group connector circuits must appear in numerical sequence on the block relay frames.

Individual Frame Additions

1.31 The scope of the ten preceding sections is limited to additions which affect the major multiple problems in the crossbar office. The following frames, however, require a treatment which is not specifically covered in the previous discussions: Originating markers, originating marker connectors, subscriber sender frames, key pulsing sender frames, coin supervisory units, terminating markers, terminating marker connectors, terminating sender frames.

1.32 Originating Marker: The addition of originating markers involves extending the new marker multiple to all district and office link frames, zone connector units, and to all marker connector units. These frames will be modified by the addition of marker connector relays for each new marker. One link frame at a time can be removed from service during light load periods when the relays are added. One marker connector at a time can also be removed for modification. As the removal of a marker connector involves removal of a maximum of ten senders from service, this work can be done at any time the telephone company is willing to release the senders. This addition can be made at the same time as the addition of sender connector relays (if any) to the connector unit.

1.33 Each new marker requires the addition of one zone connector relay to the zone connector units associated with each district frame served by zone registration. As the district link frame control circuit and registration control circuits are involved, this work must be done in a light load period, during which time one district link frame at a time may be put on a single charge basis for installing convenience.

1.34 Each new marker also requires the addition of a preference relay to the marker preference chains on the district and on the office frames. Each district frame can be transferred to the emergency chain when the regular chain is modified. Each office frame can be operated from the mate frame chain when its own chain is modified. Also for each new marker, two relays will be added to each marker connector in the preference and sequence relay chain. These relays must be cut into the circuit with the connector out of service. The cross connections for these relays are covered in the succeeding item on marker connectors.

1.35 Marker Connectors: When a new marker connector is established, the original marker multiples between connectors must be extended to the new connector unit. This work is done with one marker at a time being removed from service and can be coordinated with the extensions of marker multiple to new link frames.

1.36 Additions of markers and connectors will require a change in the cross connections of the marker preference chain and the sequence circuits which are in the marker connector unit. The sequence chain shall be changed first, with one marker connector at a time out of service. The marker preference chain should then be changed with one marker at a time out of service and with the (DA1) and (DA2) relays in the marker blocked operated.

1.37 Sender Frames - Subscriber and Key Pulsing: Subscriber and key pulsing senders may be added into existing sender subgroups without requiring a sender multiple rearrangement. The work involves extending the multiple from the added senders to the associated switches on the sender link frames; adding sender selecting relays to the associated sender selector and connecting the new selector relays to the senders and into the associated control circuit multiple on the sender link frames; and adding sender cut in relays for each added sender to the marker connectors and cabling the new relay to the new sender.

1.38 Much of this work is preliminary, such as connecting the added senders to sender test and sender make busy frames, to the marker connector and miscellaneous frames, and can be completed at any time prior to establishing the new sender in the sender subgroup. The work of extending the sender multiple from the added sender and selector equipment shall be done with the associated working subgroup out of service.

1.39 Coin Supervisory Units: These units can be added to existing unit subgroups without involving multiple rearrangements. The problems involves only the extension of the new unit multiple to the associated switch appearances on the supervisory link frames; adding unit selecting relays in the supervisory circuit and cabling new selecting relays to supervisory

units; and multipling new supervisory units to original units in the same subgroup.

1.40 Preliminary work which includes cabling to miscellaneous frames can be completed at any convenient time while transitional work of multiple extension will be done with the associated supervisory subgroup out of service.

1.41 Terminating Markers: The addition of terminating markers involves extending the multiple for the new markers to the original and new incoming link frames, line choice connector frames, marker connector, and number group connector frames. In each case, marker connector relays must be added to the original frames and preference relays added to the marker preference chains on these frames. In the case of the incoming link frames, one link frame can be removed at a time from service in light load hours, while the marker connector relays are cut in. The marker connector frame can be modified when the associated sender subgroups are made busy.

1.42 The remaining frames must be modified in light load hours, with the frames in service.

1.43 The marker preference relays can be added to the incoming link, line choice connectors, and number group connectors, at any time, as these frames can operate from an alternate marker preference chain when the other is modified. However, the marker connector unit must be out of service when the preference relays are cut into the circuit.

1.44 The extension of the existing marker multiple over added frames can be done in light load periods with one marker at a time out of service.

1.45 Terminating Marker Connectors: The problem here is identical to that of the originating marker connector additions.

1.46 Terminating Senders: The additional problems of terminating senders is similar to that of subscribers senders and all comments are applicable here.

Working Equipment Affected During Installation

1.47 The installers work in making additions can be greatly facilitated if some of the original working equipment can be temporarily removed from service during the installing interval.

1.48 The equipment elements which will be temporarily removed from service under these circumstances are district link and office link frames, originating and terminating markers and marker connectors, zone connector units and zone timing units, subscriber and terminating sender subgroups, incoming link frames, office junctors, line junctors, district junctors, and coin supervisory units.

1.49 The following paragraphs give a broader picture of the situation and list more specific equipment quantities that will be involved.

1.50 In connection with this problem, the telephone company can make traffic studies to determine the amount of equipments, whether frames or junctor groups, that can be removed from service during installation and will stipulate whether reduced working equipments can be tolerated during busy hours.

1.51 Should traffic be such that certain equipments cannot be released to the installer as required by the procedures covered in this specification, a special procedure will have to be worked out to suit the particular problem.

1.52 With the exception of sender subgroups, office junctors, line junctors, and district junctors, the above equipments will generally be removed from service, one frame or unit at a time and only for short periods during night hours.

1.53 In the work of rearranging the subscriber sender multiple (which may also include established new sender subgroups), it may be necessary to have two or possibly three sender subgroup appearances out of service on part of the sender link frames. At no time will more than one subgroup of senders be out of service. This work can usually be confined to light load hours at night and over weekends, but may extend through the busy hours.

1.54 The terminating sender multiple rearrangement is generally a simple extension of the multiple to the added sender link frames requiring only one subgroup of senders out of service at a time on the original sender links. However, if new sender subgroups are being established, it may be necessary to deprive part of the sender link frames of two sender subgroup appearances. This work can be confined to light load hours, usually at night and weekends.

1.55 District junctor rearrangement, though extensive, does not require a comparable reduction in working equipments. For the installers convenience, as many as forty district junctor circuits may be out of service at one time. Consequently, as many as forty district junctor appearances may be out of service on several line link frames. However, this condi-

tion can at all times be confined to night work during light load hours.

1.56 In the case of office and line junctors, the number to be removed temporarily will depend upon the job size and is covered in specifications, J29255, BSP AA240.010 and J29256, BSP AA240.011, respectively.

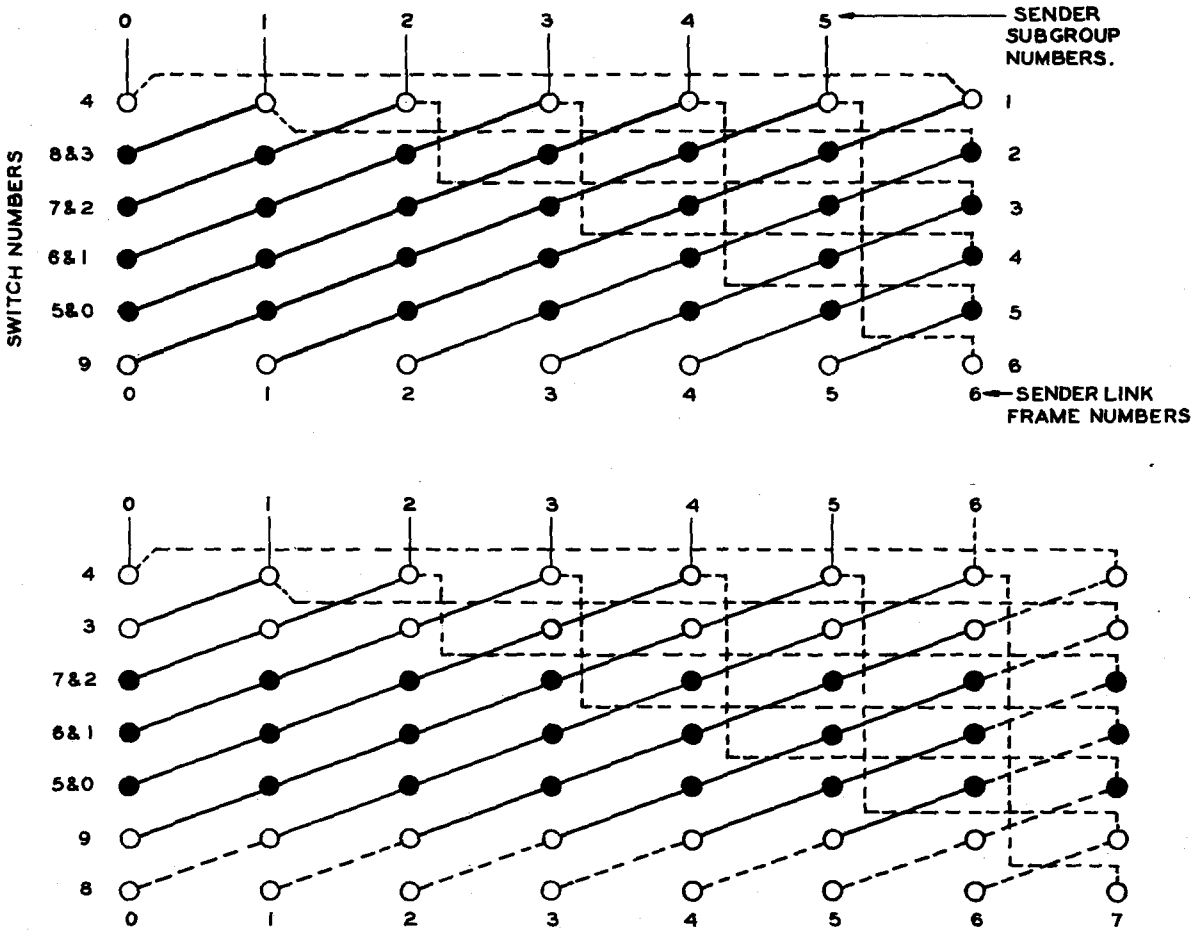
2. DETAILS OF SUBSCRIBER SENDER MULTIPLE REARRANGEMENT

General

2.01 The subscriber sender multiple for a specific job provides for the required number of sender link frames and sender subgroups and is engineered to the requirements of J27550. A wide variety of combinations is possible. An addition affecting the multiple will involve a transition from one to another of these many combinations. This section covers a specific case but is typical of the problem. It discusses in considerable detail a sufficient number of steps in the conversion to establish clearly the basic order of procedure, the nature of the details involved, and a method of planning them.

Preliminary work

2.02 The preliminary work can be performed at any time prior to the transitional procedure. It consists of erecting any new subscriber sender link frames involved, running all cables required, and connecting all cable ends but those which extend into the working sender multiple.



● REPRESENTS 2 APPEARANCES OBTAINED BY SWITCH STRAPPING; ASSOCIATED CABLES ARE CONNECTED AT THE LOWER NUMBERED OF THE 2 APPEARANCES.

---- IN THE FIRST OF THE ABOVE FIGURES REPRESENTS CABLING REMOVED DURING THE TRANSITION, AND IN THE SECOND, CABLING TO BE ADDED.

Fig. 1 - Subscriber Sender Multiple Rearrangement - Switch Multiple Changes

2.03 Before the transitional procedure is started, the work involved in making additional senders available for service should have been completed. Overlapping of these operations is permissible providing new sender subgroups are available for service as they are established in the the multiple.

Transitional Work

2.04 The transitional work consists of the replacement and addition of cable connections in a carefully planned order. The work should proceed in such a manner that no sender link frame is deprived of access to more than one of the original number of sender subgroups at a time. The changes for each subgroup include revisions in chain circuits and frame indication strapping as well as the cable connections in the "C" multicontact relay and secondary switch multiples. Revisions may be required in the strapping assigning the sender subgroup appearances to the required GB, GT, and RT leads from the sender-selector units. This work should be done with the chain circuit changes.

2.05 The following procedure is for the conversion of a multiple of six sender subgroups on seven sender link frames to one of seven subgroups on eight frames. These arrangements are illustrated schematically in Fig. 1. The latter is shown in greater detail on ED-25652-01, Fig. 3.

2.06 The first objective is the establishment in the multiple of the added sender subgroup, 6, as a working subgroup. This requires the use of an appearance initially employed by subgroup 1 and a chain of appearances initially employed by subgroup 0. In the following steps entries under b involve work at the secondary switches and associated terminal strips; under c, work at the multicontact relays.

Step 1.

(a) Remove sender subgroup 1 from service.

(b) Remove frame 0, switch 8 from the chain circuits for subgroup 1.
Remove strapping between frame 0, switch 8 and frame 0, switch 3.

(c) Remove local cable between frame 0, relay C8 and frame 0, relay C3.

(d) Restore subgroup 1 to service.

Step 2.

(a) Remove sender subgroup 0 from service.

(b) Remove cable between frame 0, switch 4 and frame 6, switch 4.
Remove strapping between frame 5, switch 8 and frame 5, switch 3.
Change the chain circuit for subgroup 0 at frame 0, switch 4 for use as first (F) and last (L) appearance.

(c) Remove cable between frame 0, terminal strip C4REL and frame 6, terminal strip C4REL.
Remove cable between frame 0, terminal strip C4REL, and frame 5, relay C8.
Remove the cable between frame 5, relay C8 and frame 4, relay C7.

(d) Restore subgroup 0 to service.

Step 3.

(b) Connect the cables for sender subgroup 6 at frame 6, switch 4.
Connect the cable between frame 6, switch 4 and frame 7, switch 8.
Connect the cable between frame 1, switch 9 and frame 0, switch 8.
Establish the chain circuit for subgroup 6 with frame 7, switch 8 as first (F) appearance and frame 4, switch 7, as last (L).

(c) Connect the cables for subgroup 6 at frame 6, terminal strip C4REL.
Connect the cable between frame 6, terminal strip C4REL and frame 7, relay C8.
Connect the cable between frame 1, relay C9 and frame 0, relay C8.
Connect the cable between frame 6, terminal strip C4REL and frame 4, relay C7.

(d) On each frame, for each switch on which subgroup 6 appears, change the frame indication cross connections accordingly.
Place subgroup 6 in service.

Note: At this point, frame 5, switch 8, has been disconnected and will be idle until used for subgroup 4 in a later stage of the transition.

2.07 The procedure described in paragraph 2.06 is illustrated schematically in Fig. 2. Heavy lines indicate changes. Dotted lines indicate strapping.

2.08 The second objective is the reestablishment in the multiple of sender subgroup 0 as a complete working subgroup. The work involved is indicated schematically in Fig. 3. The a and d classifications of paragraph 2.06 apply, affecting the appropriate subgroups.

2.09 The transition is continued to completion by comparable modifications for the establishment in the multiple of the remaining sender subgroups in their final form, in the order 1,2,3, 4, and 5.

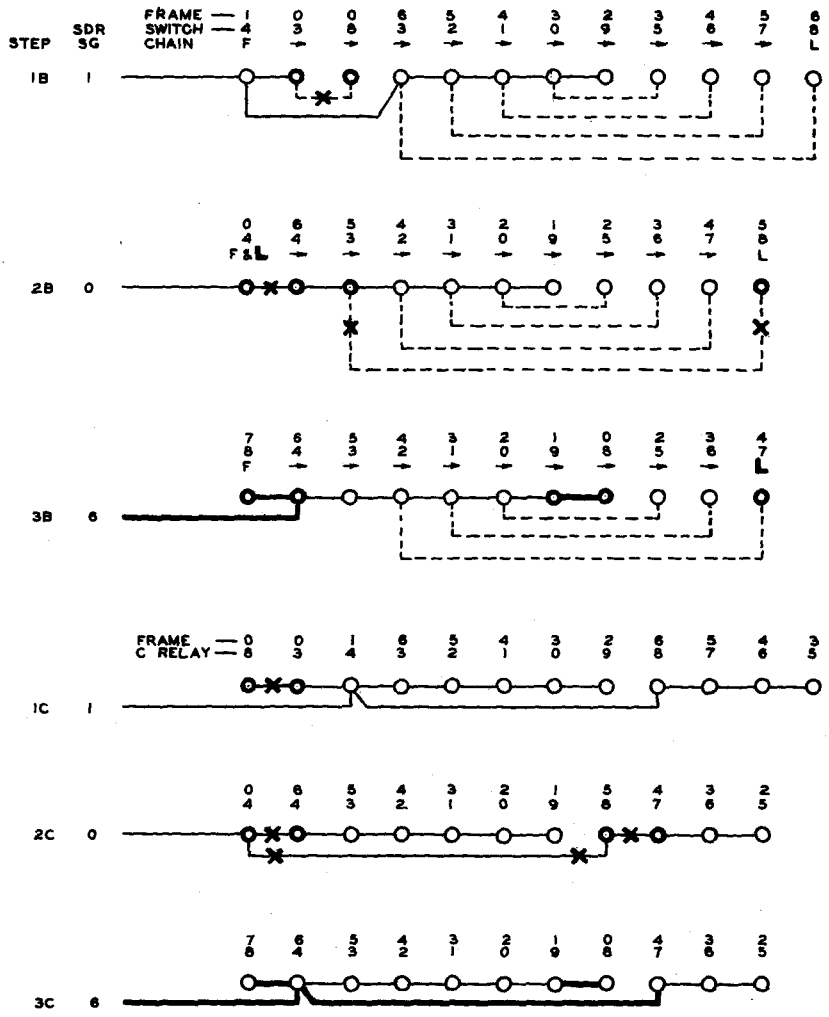


Fig. 2 - Subscriber Sender Multiple Rearrangement - Establishing Sender Subgroup 6

2.10 Unless other agreements are reached with the telephone company, this work will be done during periods of light load. The various steps should be completed by groups, generally without overlap, in the grouping indicated by paragraph 2.07 and 2.08.

Clean-up Work

2.11 The clean-up work consists mainly of the final sewing of modified and new cable forms. During the course of the complete transition, each sender link frame will be involved in a number of modifications. The final sewing of the cable arms should be deferred until the last change affecting each has been completed. The order in which this work may procede is established in the detailed planning per paragraphs 2.07 and 2.08 and may be conducted as far as possible as an overlap operation with the transitional work.

3. DETAILS OF SPLITTING OFFICE FRAME SECONDARY SWITCH LEVELS TO ACCOMMODATE ADDITIONAL TRUNKS

General

3.01 The trunk capacity of existing office link frames can be increased by splitting levels on the secondary switches to accommodate the added trunks. No special transitional facilities are needed for this procedure, the problem being merely one of proper coordination of the work.

Preliminary Work

3.02 Run in any additional cables required in accordance with switchboard

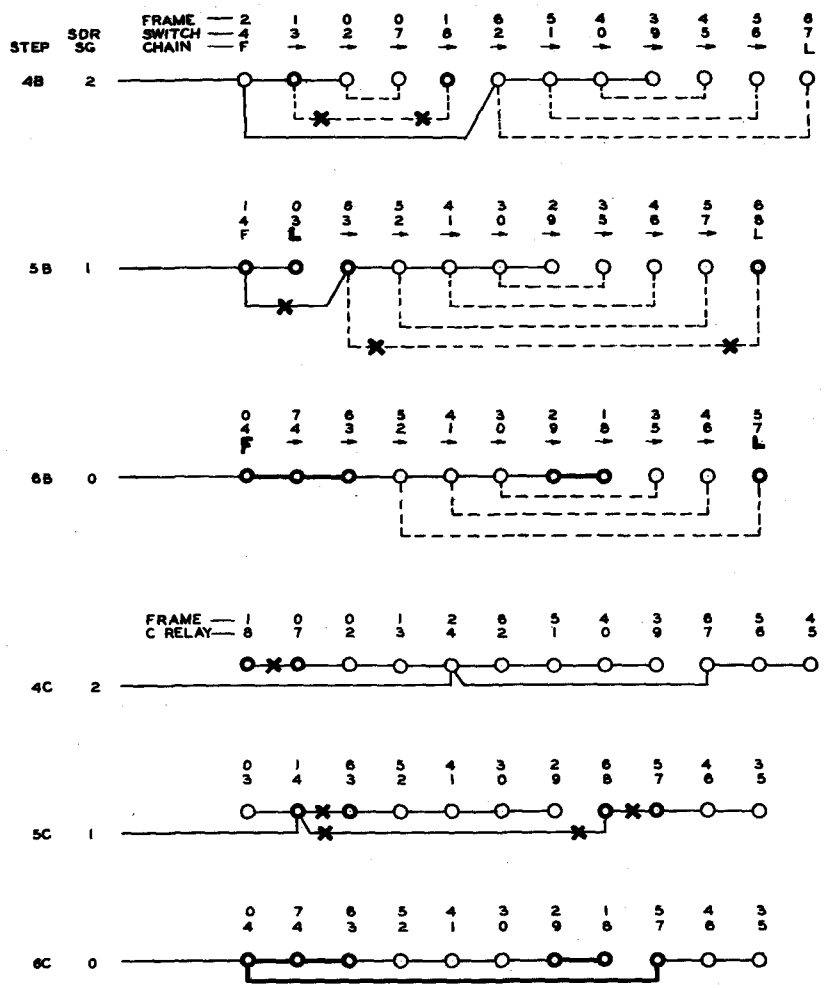


Fig. 3 - Subscriber Sender Multiple Rearrangement - Reestablishing Sender Subgroup 0

cabling detail drawing ED-25170-01 or ED-25565-01, depending on the job arrangements. Cut in the cables except at the office link frames.

3.03 Install additional (TL) odd and (TR) even switch connector relays, as required, making all connections to secondary switches and marker connector relays but temporarily blocking these relays nonoperated so as to assure no crossing of trunk sleeves or other leads back through contacts of the existing (TL) even and (TR) odd relays.

Transitional Work

3.04 During a light load period make one office frame of a pair busy and change the wiring from the "BS" terminals to the "SP" terminals of the (TL) even and (TR) odd relays of the pair of levels to be split on that frame. This will cause the marker to use only 10 office links to select a trunk on either of the levels to be split. Remove the busy from this frame and immediately make the other frame of the pair busy.

3.05 Make the same split level cross-connection changes on the second frame and restore the frame to service. Both frames will now be operating on the basis of only ten office links to the trunks of each pair of levels being split.

3.06 Split the particular pair of levels at the secondary switches on both frames, connect the trunk cables, cross connect trunks to these levels and make the trunks busy.

3.07 Remove a marker from service, make the necessary route relay cross connections to test for the new trunks and test the trunks, using this marker.

3.08 Restore the modified marker to service. Modify and test out the cross connections on each of the remaining markers. If the transfer of a trunk group from another pair of office frames is involved, it will be necessary to change the route relay connections in all markers before cutting the trunks into service at the new location and completing the transfer of the trunks from the old location. If any of the trunks are in a new group, service to this group should not be started until all markers are changed to test the new group.

3.09 Split corresponding levels on other pairs of office frames and make the necessary route relay cross connection changes as outlined in 3.01 to 3.07.

3.10 If additional pairs of levels are to be split repeat 3.01 to 3.08.

3.11 If office link frames are also being added, the over-all trunk assignment after the addition of the new frames should be taken into consideration when assigning additional trunks to the existing frames. The procedure for splitting trunk levels on existing office link frames and that of adding frames should be carried along separately. In general, it will be more satisfactory to split the levels on the existing frames first and then add the new office frames and change the office junctor distribution in accordance with specification J29255, BSP AA240.010. All office frames will thereby be placed in service on the same basis with regard to split levels.

4. DETAILS OF NUMBER GROUP REVISIONS

4.01 When new numbers are to be added to existing number groups, hundred block and twenty block relays and the required "HB" cross connections shall be added on the block relay frames in the standard manner as shown on ED-25368-01. After this the "HB" and "ST" cross connections in the markers shall be modified to enable the markers to reach the new numbers. The markers shall be modified one at a time during light load periods or at night.

4.02 When new numbers are to be added in newly formed number groups, the same procedure shall be followed but, in addition, as a preliminary step, new NGC's shall be installed as required and these connectors cabled to their associated block relay frames, as shown on switchboard cabling drawing ED-25315-01 and ED-25316-01. When new NGC frames are required, the marker multiple(SD-25276-01, Fig. 2U) and start leads (SD-25276-01, Figs. 11K and 13K) shall be extended to these frames as shown on switchboard cabling drawings ED-25300-01 and ED-25315-01.

4.03 When numbers are to be transferred from one existing number group to another, the lockout circuits of the two involved number group connectors shall be temporarily connected in tandem per SD-25515-01 to eliminate the possibility of having more than one marker at a time testing into these number groups during the transition period. Corresponding equipment information is covered on ED-25638-01. In effect, when several lockout circuits are connected in tandem, they function as one lockout circuit with an increased number of marker preference relays. The TB, TBA, NS, NF, NC, HF, TF, HF, XF, HG, JC, and JF punchings which are normally multipled throughout each number group shall then be strapped together to make them common to the two number groups involved in the modification. After this, the "HB" cross connections on the block relay frames shall be modified so that the (HB) relays containing the numbers to be transferred will be temporarily connected over the "HB" leads to both number group connectors. The added "HB" cross connections shall be connected to the multiple appearances of the "HB" punchings that are now used for cross connecting the involved (HB) relays to their existing N.G.C. (See SD-25276-01, Fig. 5N and ED-25368-01, Figs. D and E for "HB" punchings.) One marker at a time shall then be modified by changing the "HB" and "ST" cross connections so that the affected numbers will be reached through the new number group connector. The markers shall be modified during light load periods or at night. The modified markers will gain access to the transferred numbers through the new number group connector and the unmodified markers will continue to reach these numbers through the original number group connector. After all markers have been modified, the multiple straps between the TB, TBA, NS, NF, NC, HF, TF, HF, XF, HG, JC and JF punchings on the block relay frames shall be cut to separate the numbers into two groups as required, after which the lockout circuits shall be restored to normal per SD-25276-01. It should be noted that this procedure assumes that the numbers in two number groups may be treated as though they were in one number group during the transition period. If traffic is too heavy to permit this, the numbers to be shifted shall be first transferred to a spare number group connector and then to their ultimate location. However, the use of a spare connector should rarely, if ever, be required as the transition period should never exceed one or two days, thus permitting the work to be completed over a week-end or other light load period.

4.04 When numbers are to be transferred from an existing number group to one or more newly formed number groups, the new number group connectors shall be installed and the marker multiple (SD-25276-01, Fig. 2U) and start leads (SD-25276-01, Figs. 11K and 13K) extended to these connectors as shown on SD-25300-01 and SD-25315-01. The connectors shall then be cabled to the block relay frames as required so that they will be in multiple with the working connector serving the involved number groups. The "HB" cross connections on the block relay frames shall be modified so that the (HB) relays containing the numbers to be transferred will be temporarily connected over the "HB" leads to both the existing and the new NGC's. The added "HB" cross connections shall be connected to the multiple appearances of the "HB" punchings that are now used for cross connecting the involved (HB) relays to their existing NGC. (See SD-25276-01, Fig. 5N and ED-25368-01, Figs. D and E for "HB" Punchings.)

4.05 These new connectors will not function until the "HB" and "ST" leads have been properly cross connected in the markers. Before changing these marker cross connections, the lockout circuits of the working and new connectors shall be connected in tandem per SD-25515-01 to eliminate the possibility of having more than one marker at a time testing into this group of numbers through different connectors. Corresponding equipment information is covered on ED-25638-01. Following this, one marker shall be busied at a time and the "HB" and "ST" cross connections changed so that the numbers will be reached thru the new number group connectors as required. The markers shall be modified during light load periods or at night. The modified markers will gain access to the involved numbers through the new number group connectors and the unmodified markers will reach these numbers through the old or existing connector. After all markers have been modified, the multiple straps between the TB, TBA, NF, NS, NC, HF, TF, RF, XF, HG, JC, and JF punchings on the block relay frames shall be cut to separate the numbers into new number groups, as required, after which the lock out circuits shall be restored to normal per SD-25276-01.

4.06 When number groups are to be added in a working office to permit a reduction in the size of existing number groups, the numbers in the highest numbered existing number group shall be transferred to their new number group connectors as outlined in paragraphs 4.04 and 4.05 and the existing number group connector released from service for subsequent use in its proper place. Numbers in the second highest numbered number group shall then be transferred, and so on until all existing numbers have been transferred into their ultimate number groups.

4.07 During the period that any existing number group is being worked on, test calls shall be routed through the associated number connector from the trouble indicator frame to detect crosses or false grounds that might be inadvertently introduced. After the first marker has been modified to reach transferred numbers through their new number group connectors, a terminating load test set (ITE 4072) shall be used to simulate heavy load conditions in the affected number groups. If serious troubles are encountered during this period, the marker cross connections shall be restored to their original condition before the heavy load period begins so that all numbers will again be reached through their original number group connectors which were functioning satisfactorily before the transition began.

4.08 When numbers are to be regrouped in a working office, the following points shall be considered and treated as required for each particular job.

(A) Split Hundreds

When the twenty block (TB) relays of a split hundred block fall into more than one number group due to regrouping, certain of the numbers will have to be reassigned so that the split hundreds (HB) relay and its associated (TB) relays will be in the same number group.

(B) Extra Hundreds

If extra numbers are associated with an existing number group, and the group is split so that the directory numbers requiring extra numbers fall into more than one number group, additional extra number (HB) and (TB) relays shall be provided as required so that one extra number hundred block will be available for each number group requiring such numbers.

(C) PBX Allotter

If numbers which are allotted into two number groups fall into the same number group after regrouping, certain of these numbers shall be reassigned into another group if allotting is still required. However, with the reduced size of the new number groups, it might be satisfactory to leave all the numbers in one number group and discontinue the use of the allotter. Problems of this type will have to be analyzed and decided upon by the Operating Companies.

(D) Number Checking

When numbers are being transferred from one number group to another, care

should be taken that each number group, containing a PBX served by one-way trunks, is equipped with (XG-) relays (SD-25276-01, Figs. 3 and 9) which are required for number checking. These relays are mounted on the block relay frame (ED-25368-01, Fig. 1) and may be transferred from one number group to another by connecting 8T (XGA) relay to terminal "41" on the right-hand terminal strip of the (MCC) relay of the new number group connector. When (XG-) relays are transferred from one number group to another, the leads from these relays to the "XF", "HF" and "RF" terminal strips shall be checked to insure that they connect to terminals associated with the new number group.

(E) Physical and Theoretical Numbers

When numbers are to be regrouped in an office containing theoretical numbers, the strapping and cross connections at the "PT" punchings on the block relay frames shall be changed as required so that during the transition period the punchings associated with the (HB) relays to be transferred from one group to another shall be temporarily cross connected to both the existing and the new number group connectors. After all markers have been modified so that the (HB) relays are operated through the new number group connectors, the straps and cross connections at the "PT" punchings shall be removed as required so that these punchings will be connected to only one number group connector in accordance with notes 111 and 207 of SD-25276-01.

4.09 For a detailed discussion of the procedure to be followed when additional NG's are required to permit a reduction in the size of existing number groups, let it be assumed that an office of 10,000 numbers, which is at present divided in five, 2000 number groups (NG0-4), is to be regrouped into eleven, 800 (NG0-10) and one, 1200 (NG 11) number groups. The numbers in existing NG's 0-4 shall be regrouped into 0-11 in the following steps. The detailed procedure for performing step 1 is covered in paragraph 4.10.

Step 1. NGC 10 and 11 shall be connected to existing NG 4.

(a) Nos. 8000 to 8799 shall be placed in NG 10.

(b) Nos. 8800 to 9999 shall be placed in NG 11.

(c) NGC 4 shall be released.

Step 2. NGC's 7, 8 & 9 shall be connected to existing NG3.

(a) Nos. 6000 to 6399 shall be placed in NG 7.

(b) Nos. 6400 to 7199 shall be placed in NG 8.

(c) Nos. 7200 to 7999 shall be placed in NG 9.

(d) NGC 3 shall be released.

Step 3. NGC 5 shall be connected to existing NG 2.

(a) Nos. 4000 to 4799 shall be placed in NG 5.

(b) Nos. 4800 to 5999 shall remain in NG 2.

Step 4. NGC 6 shall be connected to existing NG 2 and NGC 7 shall be connected in tandem with NGC's 2 and 6.

(a) Nos. 4800 to 5599 shall be placed in NG 6.

(b) Nos. 5600 to 5999 shall be added to NG 7.

(c) NGC 2 shall be released.

Step 5. NGC's 2, 3 & 4 shall be connected to existing NG 1.

(a) Nos. 3200 to 3999 shall be placed in NG 4.

(b) Nos. 2400 to 3199 shall be placed in NG 3.

(c) Nos. 2000 to 2399 shall be placed in NG 2.

(d) NGC 1 shall be released.

Step 6. NGC 1 shall be connected to existing NG 0.

(a) Nos. 0000 to 1999 shall be transferred to NG 1.

(b) NGC 0 shall be released.

This step is necessary since the cabling from existing NGC 0 is terminated between hundreds 9 and

10 on BR1 and must be reterminated between hundreds 3 and 4 on BR 0 (Step 7).

Step 7. NGC 0 shall be connected to NG1.

(a) Nos. 0000 - 0799 shall be placed in NG 0.

(b) Nos. 0800 - 1999 shall remain in NG 1.

Step 8. NGC's 1 and 2 shall be connected in tandem.

(a) Nos. 1600 - 1999 shall be transferred from NG1 to NG 2.

(b) Nos. 0800 - 1599 shall remain in NG 1.

4.10 The detailed procedure for performing the conversion outlined in paragraph 4.09 is as follows:

(A) Preliminary Work

This work may be done at any time prior to the transition period, although it is recommended that all soldering to active terminals be done during light load periods.

Step A. Install additional NGC frames and equip these frames with NGC's 5-11.

Step B. Modify the lock-out circuits of NGC's 0-11 in accordance with SD-25515-01 (A wiring), Figs. 54 and 55. With this wiring the circuits will continue to function in accordance with the standard arrangement shown on SD-25876-01. The lock-out circuits shall be operated on their regular chains ((MP) relays) while the emergency chains ((E) relays) are being modified, and on the emergency chains while the regular chains are being modified. Wiring per Fig. 55 shall be superimposed on the frame local cable as shown on ED-25638-01. All existing wiring which is disconnected for this modification shall be taped and left in place in the frame local cable. This is a preparatory step to facilitate subsequent tandem operation of the lock-out circuits.

Step C. Extend the marker multiple (SD-25876-01, Fig. 2U) and start leads (SD-25876-01, Figs. 11K and 13K) to added NGC frames. (See Swbd. Cabling drawings ED-25300-01 and ED-25315-01.)

The following steps cover the detailed procedure for performing Step 1 of paragraph 4.09. Test calls shall be routed thru NGC 4 from the trouble indicator frame while work is being done on this number group.

Step D. Connect the lock-out circuits of NGC's 4, 10, and 11 in tandem to prevent more than one marker at a time from gaining access to numbers 8000 to 9999. To accomplish this, the wiring per SD-25515-01, Fig. 54 of NGC's 4, 10, and 11 shall be modified to conform with Figs. 51, 52, and 53. All three lock-out circuits shall be operated on their regular chains while the emergency chains are being modified and on their emergency chains while the regular chains are being modified.

Step E. Run in new cables from NGC's 10 and 11 to block relay frames 10 and 11, respectively. The "HB" leads shall be terminated on the (HB2) punchings on the (NG) terminal strip at the top of the block relay frame so as not to interfere with the "HB" leads from existing NGC 4 which are now connected to the (HB0) punchings on these terminal strips. (See ED-25368-01, Figs. D, E, and F.) The TB, TBA, NF, NS, NC, HG, HF, TF, HF, XF, JC, and JF leads which connect to punchings that are multipled throughout NG4 on the BR frames 10, 11, and 12 shall be connected to terminals in the multiple other than those used for NGC 4. Since these multipled punchings are connected to a working number group, extreme care shall be taken while soldering to reduce the possibility of introducing false grounds or crossed.

Step F. Add "HB" cross connections on the (NG) T.S. at the top of BR frames 10, 11, and 12 so that the (HB)80 to (HB)87 relays on BR frame 10 are operated over the "HB0-7" leads of NGC 10, and the (HB)88 to (HB)95 relays on frame 11 and (HB)96 to (HB)99 on frame 12 over the "HB0-11" of NGC 11. The existing "HB" cross connections on frames 10,11,and 12 shall not be disturbed at this time.

(B) Transitional Work

It is recommended that this work be done at night, or during light load periods in the daytime if approved by the Telephone Company.

Step G. Busy one marker and change the "ST" and "HB" cross connections so that this marker will work into numbers 8000 to 8799 through NGC 10 and into numbers 8800 to 9999 through NGC 11. (The cross connections and terminal strips involved in this change are shown on SD-25283-0120, Fig. 7X and ED-25333-01, Fig. 2.) Make all necessary tests in accordance with standard practices before restoring the marker to service, and then use terminating load test set as discussed in paragraph 4.07. Repeat this procedure for each remaining marker.

Step H. Cut straps and multiple leads between the TB, TBA, NF, NS, NC, HG, HF, TF, RF, XF, JC, and JF terminals on the block relays frames to form new number groups 10 and 11. When straps are cut between the TB and TBA punchings on the (HB) T.S. (ED-25368-01, Fig. H), all open ends of the "TB" loop wiring shall again be closed down per SD-25276-01, Fig. 5M.

Step I. The lock-out circuits of NGC's 4, 10 and 11 shall then be modified to conform with SD-25515-01, Fig. 54, so that they will be separated and again function in the standard manner.

(C) Clean-up Work

This work may be done at any time after the transition work has been completed.

Step J. Disconnect cables from NGC 4 at the block relay frame and retest the new NG's. These cables may be reused if they reach block relay frame 4 which will ultimately be connected to NGC 4. If the cables cannot be reused, they shall be disconnected at the NGC frame and removed.

4.11 Steps 2 through 8, paragraph 4.09, shall be performed in a manner similar to that outlined in paragraph 4.10 for Step 1 but, in addition, in step 6 the "HBO-24" leads of NGC 1 shall be connected to the (HB1) punching on block relay frame 1 and these punchings strapped to corresponding (HBO) punchings on the front of the frame. This temporary strapping is required so that NGC 1 may gain access to numbers on block relay frames 0 and 2, over the existing "HB" lead multiple between these frames. These straps and multiple leads may be removed when the numbers on BR frames 0 and 2 have been transferred to NG's 0 and 2, respectively.

4.12 After all numbers have been transferred to their proper NG's, the lock-out circuits shall be restored to their original standard arrangement per SD-25276-01 by removing the temporary terminal strips and wiring shown on modification equipment drawing ED-25638-01 and reconnecting all leads that were temporarily disconnected, taped, and left dead in the frame local cable. The lock-out circuits shall be operated on their regular chains ((MP) relays) while the emergency chains ((E) relays) are being restored to normal and on the emergency chains while the regular chains are being restored to normal.

5. DETAILS OF KEY PULSING SENDER MULTIPLE REARRANGEMENT

Preliminary Work

5.01 The preliminary work can be performed at any time prior to the transitional procedure and consists of erecting the new key pulsing sender link frame, running in and connecting cables to the associated frames as shown on switchboard cabling detail drawing ED-25155-01 with the exception of actually connecting the sender multiple cables to the working sender multiple.

Transitional Work

5.02 A subgroup of key pulsing senders should be removed from service, the sender multiple cables connected at the crossbar switch and C relay and the chain circuit of the (LL) relay changed to the intermediate frame arrangement. The cables and leads involved are shown on sender multiple drawing ED-25430-01. This subgroup of senders should then be restored to service.

5.03 The sender subgroup cables from the added link frame for each of the other subgroups should be similarly connected to the proper sender subgroup multiple, only one subgroup of senders being taken out of service at a time.

5.04 When, because of an unanticipated expansion, key pulsing sender link frames having access to four sender subgroups must be given access to five subgroups, provision for the added subgroup should be made by opening the multiple between the A and B link groups on frame 0 as illustrated in Figs. 1 and 2 of

ED-25430-01 and changing the chain circuit from the intermediate frame to the first and last appearance condition.

6. DETAILS OF COIN SUPERVISORY MULTIPLE REARRANGEMENT

6.01 The procedure for extending the coin supervisory multiple is the same as that given in part 5 for extending the key pulsing sender multiple.

7. DETAILS OF DISTRICT JUNCTOR REDISTRIBUTION

General

7.01 The cabling pattern between line link frames and the district junctor grouping frame is engineered with flexibility for district junctor redistribution so that installation changes are made at the district junctor grouping frame rather than in the cabling between line link frames. It should not be necessary to make any changes in the cabling of existing line link frames due to the reassignment of district junctors as the result of an addition or any changes in the cross connection on existing line link frames with the possible exception of the "DA" leads, see paragraph 7.04.

7.02 The T, R, S, M1, and M2 leads, as required, plus the miscellaneous leads are jumpered between the V and H DJGF frame in 10-pair 22 gauge wire jumpers. Job drawings are provided by Hawthorne showing the method and assignment of jumpers and also the short multiple cable sometimes required on the V DJGF to keep the number of jumper leads connected to terminals on the H DJGF to two or less.

Miscellaneous Leads to Sender Link

7.03 With the exception of the "DA", "SL", and "G" leads, the miscellaneous leads shall be multipled to all line link appearances of the district junctor group. When the junctors themselves are transposed between line link appearances at the grouping frame, the "RA" and "RB", "TA" and "TB", and the "A" and "B" leads shall also be reversed. All other miscellaneous leads shall be connected straight. The term "transposed" indicates that the two groups of ten district junctors, each in a group of twenty, shall be reversed with respect to each other but with no change in the order of the individual circuits in each group of ten.

"DA" Leads

7.04 One "DA" lead is required per line link appearance of a district junctor group. For this reason seven punchings (30 -33 and 50-52) are provided on the H DJGF and cabled to the subscribers sender link frame. On the line link frame terminal strip between secondary switches punchings 30, 31, and 32, and on older jobs also 33, are assigned for terminating the three "DA" leads multipled between line link frames. By strapping one of these punchings to punching 29 on which the local cable "DA" lead terminates, a different "DA" may be connected for each of the three line link frame multiple appearances. The method of connecting the "DA" leads to terminal strip punchings is indicated in the table below. Note that the strap connection between punching 29 and punching 30, 31, and 32 depend on the line link secondary switch number unless that occurrence is the sixth or seventh district junctor appearance on a line link frame. The only time it may be necessary to change this cross connection on the line link frame is where an addition provides a new sixth or seventh appearance, or an existing sixth or seventh appearance is changed to a first to fifth appearance. Under these conditions and provided the new appearance is not on secondary switches 0-1, it will be necessary to revise the strap at terminal 29 and provide a new strap between punchings 29 and 30 or 31.

Line Link Sec. Sw. Appearance	Pchg. on TS between Sec. Sw. Local Cable Termination	Swbd. Cable Termination	V.D.J.D.F. Misc. Pchg.	H.D.J.G.F. Misc. Pchg.
8-9	29	(34) 30	30	30
4-5	29	(35) 31	31	31
0-1	29	(36) 32	32	32
6-7	29	(34) 30	30	50
2-3	29	(35) 31	31	51
Sixth Appearance	29	(36) 32	32	52
Seventh Appearance	29	(33) 32	(33) 32	53

Pchg. Nos. in ( ) Mfr. Disc.

"SL" and "G" Leads

7.05 The various appearances of a district junctor group on line link frames are connected in a lock-out chain, the purpose of which is to lock out momentarily other appearances of a group after a call has originated at one appearance. The "SL" and "G" leads determine the place in the chain occupied by a particular appearance and shall be connected "in" and "out" at each appearance in accordance with circuit cross connections. No particular order need be followed in assigning the various appearances in a chain provided, of course, there is a first and a last appearance. In general, direct multiples of three line link appearances will include a "first appearance" and multiples of two appearances will include a "last appearance". The in and out chain connection is made by jumpers on the V.D.J.G.F. with the "SL" lead cross connected at the first appearance to the H.D.J.G.F. or cabling to the subscribers sender link frame. The District Junctor Distribution Job Drawing will indicate which cables have first and last appearances and how they are to be jumpered at the district junctor grouping frame.

Preliminary Work

7.06 The preliminary and cleanup work listed below in paragraphs 7.07 to 7.16 applies on all additions. The preliminary work may be performed at any time prior to the transitional period. The order in which the work is listed below is not intended to represent the installing sequence as this work may be performed in any desired order.

7.07 Erect the added line link and district junctor frames and also the associated auxiliary framing if and when required. Mount new junctors on existing district junctor frames, if required.

7.08 Erect added verticals as required to the district junctor grouping frame.

7.09 Run in and connect all switchboard cable between the district junctor units and district junctor grouping frame and also between the subscriber sender link and district junctor grouping frame.

7.10 Run in and connect all switchboard cables between the added line link frames and the district junctor grouping frame. This should include all multiple cables between the added line link frames.

7.11 Run in and connect all short multiple switchboard cable on the vertical side of the district junctor grouping frame required in connection with the added line link frame appearances.

7.12 Complete the zone registration addition not only as it affects the added district junctors but also as it involves changes in the zone registration associated with existing district junctors.

7.13 The district junctors should be cabled and connected to their associated test frame and routine test should be completed before they are put into service.

7.14 Run in and connect new jumpers between the added line link frame appearances and the added district junctor groups in accordance with the job district junctor distributing drawing. Care should be exercised in these cross connections to transpose the district junctors as indicated on the job drawing. If added line link frames are to be loaded during the transition, it will be necessary to establish a temporary SL chain to insure that there will be a first and last line link chain appearance to the associated district junctor group. In addition, the DA leads which are individual for each line link appearance must be connected to the associated district junctor group.

7.15 Run in jumpers between the added line link frame appearances and the existing district junctor group appearance in accordance with the job district junctor distributing drawing but connect only at the terminal strip on the vertical side of the district junctor grouping frame, line link frame appearance.

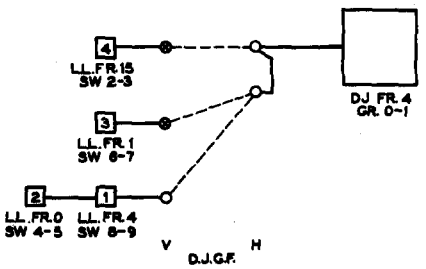
7.16 Run in jumpers between the added district junctor groups and existing line link frame appearances in accordance with the job district junctor distributing drawing but connect only at the terminal strip on the horizontal side of the district junctor grouping frame, district junctor appearance.

Transitional Work

7.17 It is recommended that this work be done at night, or during light load periods in the daytime if approved by the Telephone Company. In general, it will be preferable to place the added district junctor group in service first. This will lessen the load on existing district junctor as they will have fewer line link appearances. The lower traffic on existing district junctors should facilitate obtaining Telephone Company's approval to increase the amount of district junctor redistribution daytime work.

7.18 The following is a typical procedure for the reassignment of line link frame secondary switch appearance to a single district junctor group. Let it be assumed that the job district junctor distribution drawing shows added district

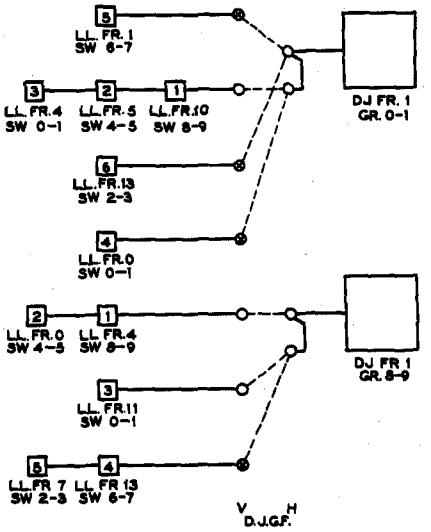
junctor group 0-1 on frame 4 associated with existing line link frames 0,4, and 1 and also with the added line link frame 15. The secondary switch appearance on these line link frames, the cabling between line link frames, and the district junctor grouping frame and the cross connections at the grouping frame for assignment to district junctor frame 4 group 0-1 is illustrated in Fig. 4. This information is part of the job drawing.



NOTES:
1. ⊛ DENOTES JUMPER REVERSAL BETWEEN LL. SEC. SW. MULT. ON VDJGF AND DISTRICT JUNCTOR ON HDJGF
2. NUMBER IN □ SHOWS DISTRICT JUNCTOR APPEARANCE IN THE SL AND G LEAD CHAIN CIRCUIT.

LINE LINK FRAMES AND DISTRICT JUNCTOR ARRANGEMENTS AFTER REDISTRIBUTION

Fig. 4 - Line Link Frames and District Junctor Arrangements After Redistribution



NOTES:
1. ⊛ DENOTES JUMPER REVERSAL BETWEEN LL. SEC. SW. MULT. ON VDJGF AND DISTRICT JUNCTOR ON HDJGF
2. NUMBER IN □ SHOWS DISTRICT JUNCTOR APPEARANCE IN THE SL AND G LEAD CHAIN CIRCUIT.

LINE LINK FRAMES AND DISTRICT JUNCTOR ARRANGEMENTS BEFORE REDISTRIBUTION

Fig. 5 - Line Link Frames and District Junctor Arrangements Before Redistribution

In the existing line link district junctor distribution, line link frame 1, switches 6-7 with five other line link frame secondary switch appearances are assigned to district junctors frame 1 group 0-1, while line link frame 0, switches 4-5 and frame 4, switches 8-9 are assigned to district junctor frame 1 group 8-9, as indicated in Fig. 5. It is the object of this procedure to reassign line link frame 1, switches 6-7, line link frame 0, switches 4-5 and line link frame 4, switches 8-9 to district junctor frame 4 group 0-1 in accordance with Fig. 4.

(A) Preliminary Work

Run and connect jumpers between line link frame 15, switches 2 and 3 on V.D.J.G.F. and district junctor frame 4 group 0-1 on H.D.J.G.F. This cross connection can be made prior to the transition because both district junctor group and line link frame are added units. See paragraph 7.14.

(B) Transitional Work

Step 1.

(a) Make district junctor group 0-1 on frame 1 busy.

(b) Busy the following line link frame secondary switch appearances:

Line link frame 1, switches 6-7
Line link frame 4, switches 0-1
Line link frame 5, switches 4-5
Line link frame 10, switches 8-9
Line link frame 13, switches 2-3
Line link frame 0, switches 0-1

(c) Disconnect and remove jumpers between line link frame 1 switches 6-7 on V.D.J.G.F. and district junctor frame 1 group 0-1 on H.D.J.G.F.
On the assumption that the job distribution drawing indicates no further line link frame assignment for district junctor frame 1 group 0-1, connect by jumpers the "SL" and "G" chain between line link frame 13, switches 2-3 (last appearance) and line link frame 0 switches 0-1 on the V.D.J.G.F.

(d) Line link frame 13, switches 2-3 was a sixth appearance and is to be the fifth appearance after line link frame 1, switches 6-7 appearance is reassigned. Therefore, it is necessary to remove the existing strap for the "DA" lead on the terminal strip between secondary.

switches 2-3 on line link frame 13 between punching 29 and 32 and run a new strap between punching 29 and 31 in accordance with the table shown in paragraph 7.04 and also indicated on the job drawing. In addition, make the "DA" lead connections on the V.D.J.G.F. and cross connect to the H.D.J.G.F. as indicated on the job drawing and in the table of paragraph 7.04.

(e) Remove busy condition from the following line link frame secondary switch appearances:

Line link frame 4, switches 0-1
Line link frame 5, switches 4-5
Line link frame 10, switches 8-9
Line link frame 13, switches 2-3
Line link frame 0, switches 0-1

(f) Remove busy condition from district junctor frame 1 group 0-1 which will restore this group to service.

Step 2.

(a) Make district junctor group 8-9 on frame 1 busy.

(b) Busy the following line link frame secondary switch appearances:

Line link frame 0, switches 4-5
Line link frame 4, switches 8-9
Line link frame 11, switches 0-1
Line link frame 7, switches 2-3
Line link frame 13, switches 6-7

(c) Disconnect and remove jumpers between line link frame 4, switches 8-9 on V.D.J.G.F. and district junctor frame 1, group 8-9 on H.D.J.G.F.

(d) It is assumed that other line link frame reassignments for this district junctor group are to be made on another shift because it is necessary to restore this district junctor group and its associated line link frames to service. Therefore, complete the "SL" and "G" chain circuits by making line link frame 11 switch 0-1 the first appearance in accordance with the T drawing wiring diagram listed on the job drawing. This change is made by jumpers on the D.J.G.F.

(e) Remove busy condition from the following line link frame secondary switch appearances:

Line link frame 11, switches 0-1
Line link frame 7, switches 2-3
Line link frame 13, switches 6-7

(f) On the removal of the busy condition from district junctor frame 1 group 8-9, this group is restored to service handling the traffic for only three line link frame appearances.

Step 3.

(a) Run and connect jumpers between line link frame secondary switch appearances on V.D.J.G.F. and the district junctor group on H.D.J.G.F. as indicated below:

L.L.Fr. 1, Sw. 6-7 to D.J. Fr. 4, Group 0-1
L.L.Fr. 4, Sw. 8-9 to D.J. Fr. 4, Group 0-1

(b) Complete the "SL" and "G" chain by jumpers on the D.J.G.F. as indicated on job drawing (see Fig. 4 for order of chain).

(c) Remove busy condition from the following line link frame secondary switch appearances:

Line link frame 1, switches 6-7
Line link frame 0, switches 4-5
Line link frame 4, switches 8-9

(d) District junctor group 0-1 on frame 4 is now in service in accordance with Fig. 4.

7.19 The procedure for the redistribution on line link frames to existing district junctor groups is in general similar to the preceding typical procedure. The line link frame appearance of the existing district junctors that are not to be changed are made busy, until the reassigned line link frames are freed and cross connected to the district junctor group. If existing line link frame appearance for the district junctor group is to be reassigned, the associated jumper cross connections are removed and the line link frame reconnected to the new district junctor group in accordance with the job drawing.

7.20 A vertical multiple switchboard cable is sometimes shown on the job drawing between line link frame appearances on the V.D.J.G.F. This is to avoid running more than four sets of jumpers to a particular district junctor group on the H.D.J.G.F. and connecting more than two jumper wires on a terminal. This switchboard cable is connected the same as if it was multipled between the line link frame secondary switches. From a procedure standpoint, the added or removed vertical cable requires the associated line link frame appearance and district junctors to be made busy. The vertical multiple cable then can be changed and the associated cross connection redistributed in accordance with the job drawing.

7.21 When because of the installing effort involved in reassigning line link frame secondary switch appearances to a group of district junctors, it will be necessary that a line link frame operate thru the busy hour with one group of district junctors out of service, care shall be taken in planning the redistribution that the missing district junctors are not "first choice" to the particular line link frame. If the missing group of district junctors were "first choice", the subscribers served by the frame might be locked out because of the heavy traffic on other line link frames in more favorable positions in the lockout chains using all available district junctors.

8. DETAILS OF SUBSTITUTING THE CONTROLLER ON AN ADDED LINE LINK FRAME FOR THE EMERGENCY CONTROLLER ASSOCIATED WITH AN EXISTING LINE LINK FRAME

General

8.01 This problem will arise on making an addition of a line link frame to an office equipped initially with an odd number of line link frames necessitating that the odd link frames be connected to an emergency controller located on the miscellaneous frame. The problem is illustrated in Fig. 6.

Preliminary Work

8.02 The preliminary phase of this problem consists of erecting and cabling the new line link frame in accordance with line link frame specification J27450, BSP AA241.001 with the exception of actually cutting in the mating cables on the existing line link frame.

8.03 When line and district junctors have been connected to the added frame in accordance with recommended procedures, the controller circuit should be tested. Working subscriber lines should not be connected to the frame at this time.

8.04 Block the (AC), (BC), (HC0-HC3), and (MC0-MC3) relays on the added frame nonoperated so that all leads between frames will be kept open at the added frame except for leads numbered 1-18 on punchings 121-138, inclusive, of the "home" and "mate" terminal strips.

8.05 Connect the mating cables at the "home" and "mate" terminal strips except for leads 1-18 on punchings 121-138, inclusive, on both terminal strips. The connections to the "home" terminal strip

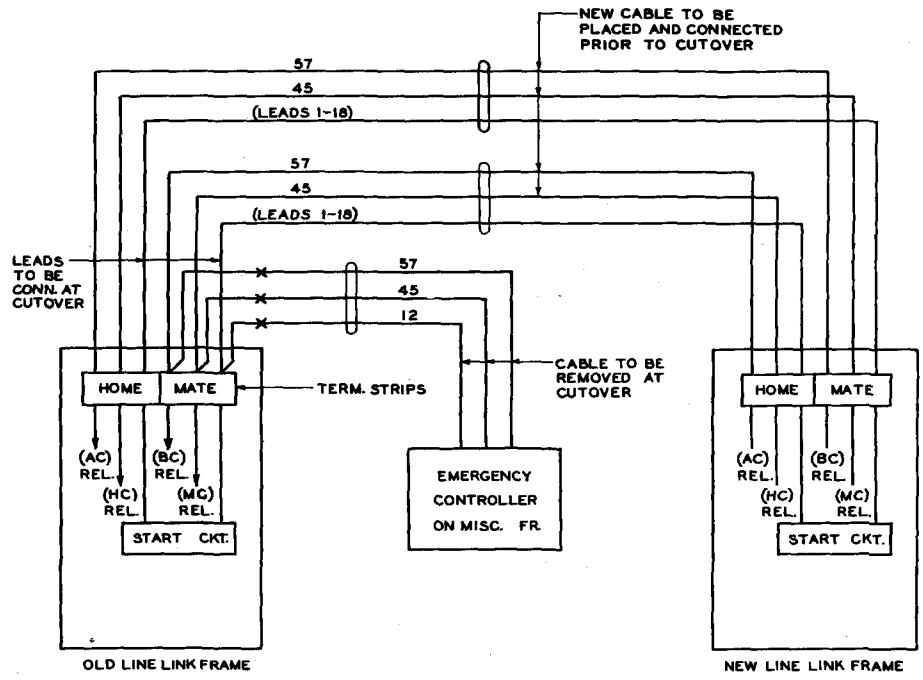


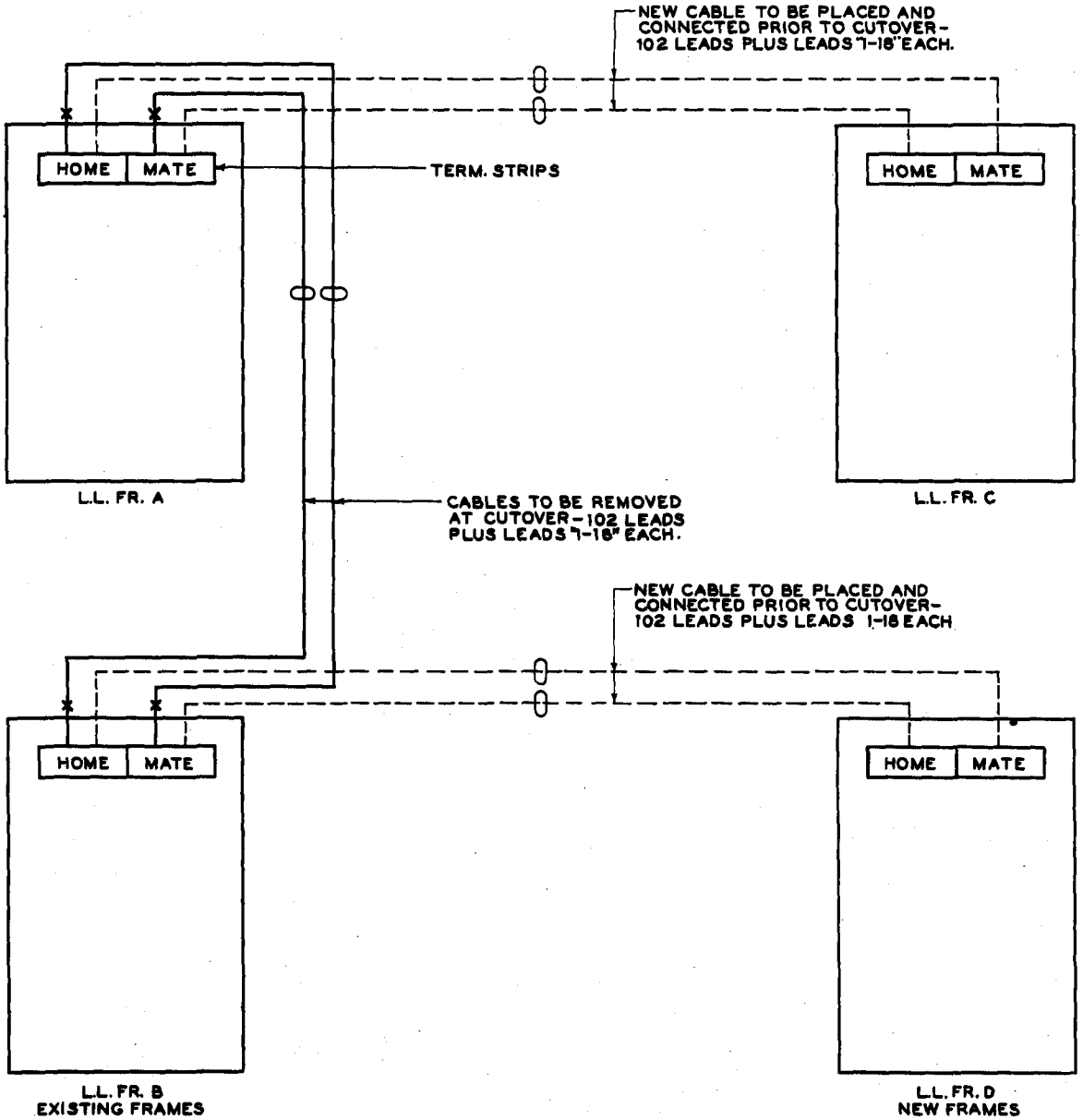
Fig. 6 - Substitution of New Line Link Frame for Emergency Controller

should be made with the "A" start circuit made busy and the connections to the "mate" terminal strip with the "B" start circuit made busy to avoid interference with calls going thru the frame. At the "mate" terminal strip of the existing frame, the leads should be connected to the outer notch of each terminal since the leads from the emergency controller are connected at the inner notch.

Transitional Work

8.06 Make the "B" start circuit busy so that all calls will be handled thru the "A" start circuit and the home controller.

8.07 Disconnect the emergency controller unit and connect leads 1-18 to punchings 121-138, inclusive, on both the "home" and "mate" terminal strips.



NOTE:
1. THIS FIGURE ILLUSTRATES THE PROBLEM OF SUBSTITUTING TWO NEW MATE FRAMES FOR EACH OF TWO LINE LINK FRAMES WHICH HAVE PREVIOUSLY BEEN MATED TOGETHER.

Fig. 7 - Line Link Frame Mate Controller Rearrangement

8.08 Unblock the (AC), (BC), (HC0-HC3), and (MC0-MC3) relays on the added frame.

8.09 Remove the busy condition from the "B" start circuit and send test calls thru the "B" start circuit on the old frame to use the controller on the added line link frame.

8.10 Send a test call thru the "B" start circuit on the added frame to use the controller on the old frame.

Clean-up Work

8.11 Disconnect the cable at the emergency controller unit on the miscellaneous frame and dispose of the unit in accordance with the desires of the Telephone Company.

9. DETAILS OF LINE LINK FRAME MATE CONTROLLER REARRANGEMENTS

General

9.01 This condition will probably arise only in a multioffice unit where the odd line link frame in each of two offices were mated on the initial installation to avoid furnishing two emergency controller units and on adding line link frames in the two offices, it is desired for uniformity to mate each of the odd frames with an added line link frame in its own office. This problem is illustrated in Fig. 7.

Preliminary Work

9.02 Erect and cable the new line link frames in accordance with line link frame specification J27450, BSP AA241.001 with the exception of actually cutting in the "mating" cables on the two existing line link frames.

9.03 When line and district junctors have been connected to the added frames in accordance with recommended procedures, the controller circuit on each of the added frames should be tested. Working lines should not be connected to either of these frames at this time.

9.04 Block the (AC), (BC), (HC0-HC3), and (MC0-MC3) relays on the two added frames nonoperated.

9.05 During a light load period, connect the mating cables from the added frames at the "home" and "mate" terminal strips at each of the old line link frames with the exception of leads 1-18 on punchings 121-138 both terminal strips. The connections to a "home" terminal strip should be made with the "A" start circuit made busy and the connections to a "mate" terminal strip with the "B" start circuit made busy on only one frame at a time to avoid interference with calls going thru the frames.

Transitional Work

9.06 The transitional procedure is the same for both existing frames and should be carried on simultaneously.

9.07 Make the "B" start circuit busy so that all calls will be handled thru the "A" start circuit and the home controller.

9.08 Disconnect all leads to the old mate frame at the "mate" terminal strip. Care should be taken not to short or ground any of these leads in the process, since they affect the home controller on the mate frame.

9.09 After all leads have been disconnected, connect leads 1-18 from the new mate frames on punchings 121-138 of the "mate" terminal strip.

9.10 Unblock the (AC), (BC), (HC0-HC3), relays on the added frames.

9.11 Remove the busy condition from the "B" start circuit and send test calls thru the "B" start circuit and the controller on the new mate frame.

9.12 If the calls are handled satisfactorily by the new controller, make the "A" start circuit busy and disconnect all leads to the old mate frame at the "home" terminal strip.

9.13 Connect leads 1-18 from the new mate frame on punchings 121-138 of the "home" terminal strip.

9.14 Remove the busy condition from the "A" start circuit and made test calls using the "B" start circuit of the new frame to check the connections to the controller of the old frame.

Clean-up Work

9.15 Dispose of the disconnected cables.

10. DETAILS OF TERMINATING SENDER MULTIPLE REARANGEMENTS

General

10.01 The terminating sender multiple for a specific job provides for the required number of sender link frames and sender subgroups, and is engineered to the requirements of J27750. A variety of combinations is possible. An addition requiring a change in the number of subgroups in a multiple involves careful planning of

the transition. This section covers a specific case but is typical of the problem. It discusses the conversion in sufficient detail to establish clearly the basic order of procedure, the nature of the details involved, and a method of planning them.

Preliminary Work

10.02 The preliminary work can be performed at any time prior to the transitional procedure. It consists of erecting any new terminating sender link frames involved, running all cables required, and connecting all cable ends but those which extend into the working sender multiple.

10.03 Before the transitional procedure is started, the work involved in making additional senders available for service should have been completed. Overlapping of these operations is permissible providing new sender subgroups are available for service as they are established in the multiple.

Transitional Work

10.04 The transitional work consists of the replacement and addition of cable connections in a carefully planned order. The work should proceed in such a manner that no sender link frame is deprived of access to more than one sender subgroup at a time. The changes for each subgroup include revisions in the frame indication multiple cabling as well as the cable connections in the secondary switch and associated terminal strip multiples.

10.05 The following procedure is for the conversion of a multiple of three sender subgroups on six sender link frames to one of four subgroups on eight frames. These arrangements are illustrated schematically in Fig. 8. The former is shown in greater detail on ED-25519-01, Fig. 2

10.06 The first objective is the establishment in the multiple of the added sender subgroup 3, as a working subgroup. Thereafter, the remaining subgroups are modified step-by-step in the direction of the final requirements in the minimum number of steps and with the loss of not more than one sender subgroup at any time on any frame. With reference to Fig. 9, this is accomplished in the use under discussion as follows after completion of the preliminary work.

Step	Sender SG Made Busy	Remove Cables	Connect Cables	Restore Sender SG to Service
1	0	A	-	✓
2	3	-	B	✓
3	2	C	-	✓
4	3	-	D	✓
5	1	E	-	✓
6	0	-	F	✓
7	1	G	H	✓
8	2	J	K	✓
9	1	-	L	✓

It will be noted that frame indication cables C and G at the first sender frame may be reused as cables D and K respectively, without distributing their terminating sender link frame terminations.

10.07 The various steps in the transition should be completed by groups, generally without overlap, in the grouping indicated in the table in paragraph 10.06. Unless other agreements are reached with the telephone company, this work will be done during periods of light load.

Clean-up Work

10.08 The clean-up work consists mainly of the final sewing of modified and new cable forms. During the course of the complete transition, each sender link frame will be involved in several modifications. The final sewing of the cable arms should be deferred until the last change affecting each has been completed. Disconnected cables must also be disposed of. The order in which this work may proceed is established in the detailed planning and may be conducted, as far as possible, as an overlap operation with the transitional work.

11. DETAILS OF ZONE REGISTRATION EQUIPMENT ADDITION

General

11.01 The addition of zone registration equipment will require changes in the existing district connector switch and unit multiples. The trend will be to reduce the number of zone registration circuits used in common by a number of district junctor frames, increase the number of zone registration circuits serving a particular district junctor frame on an individual group basis, and to open up additional individual groups.

11.02 In making the necessary changes, working equipment will be removed from service as required to permit the orderly installation of the added equipment.

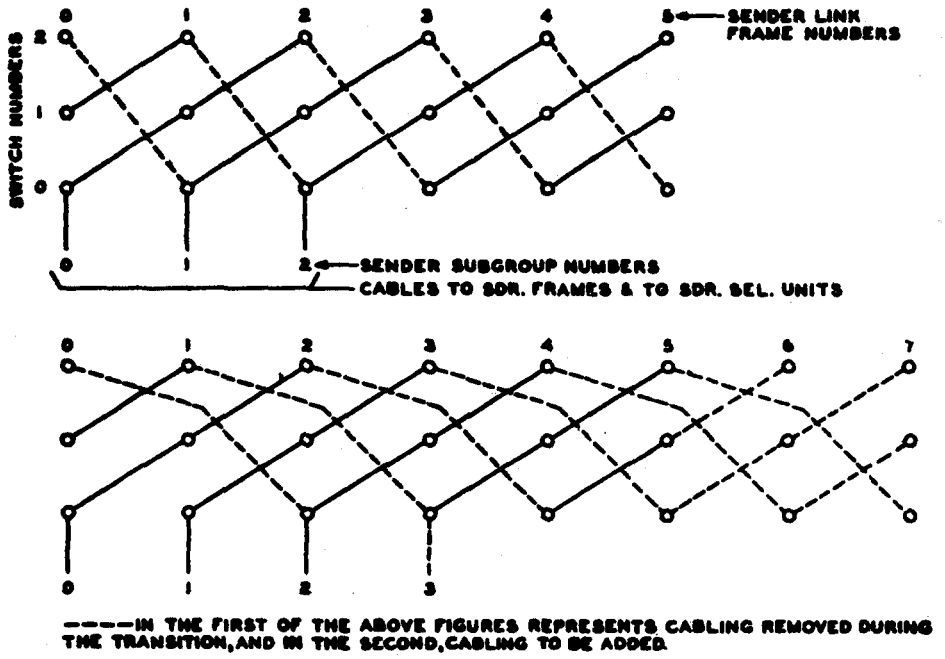


Fig. 8 - Terminating Sender Multiple Rearrangement - Switch Multiple Changes

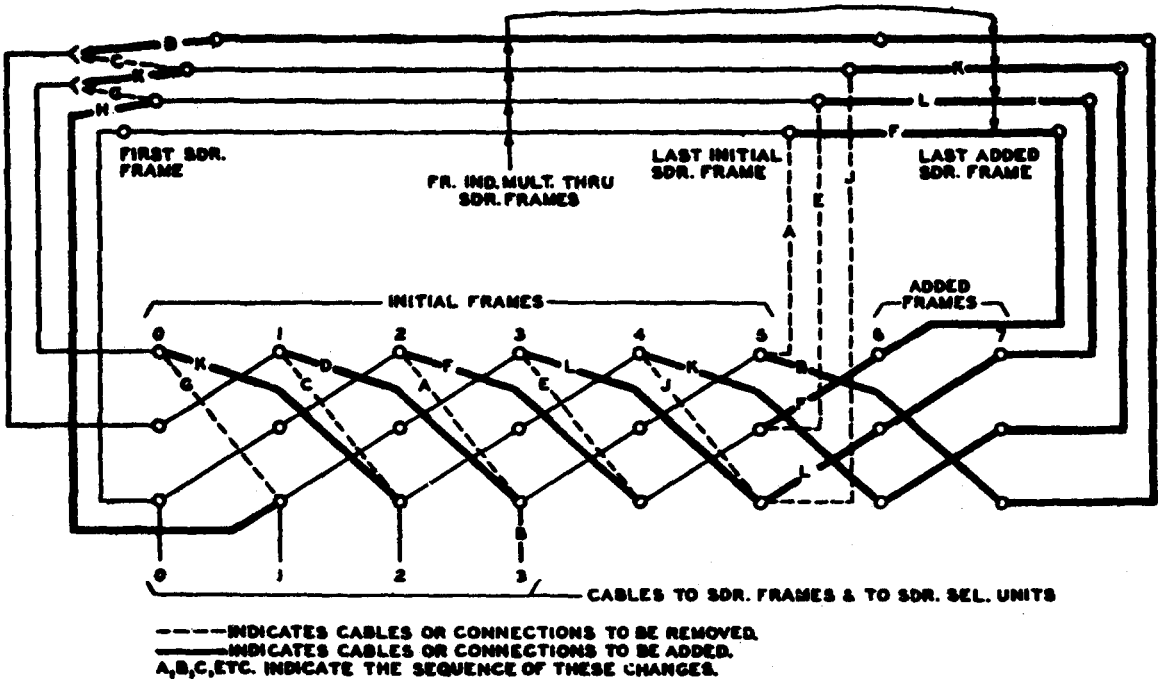


Fig. 9 - Terminating Sender Multiple Rearrangement - Cabling Sequence

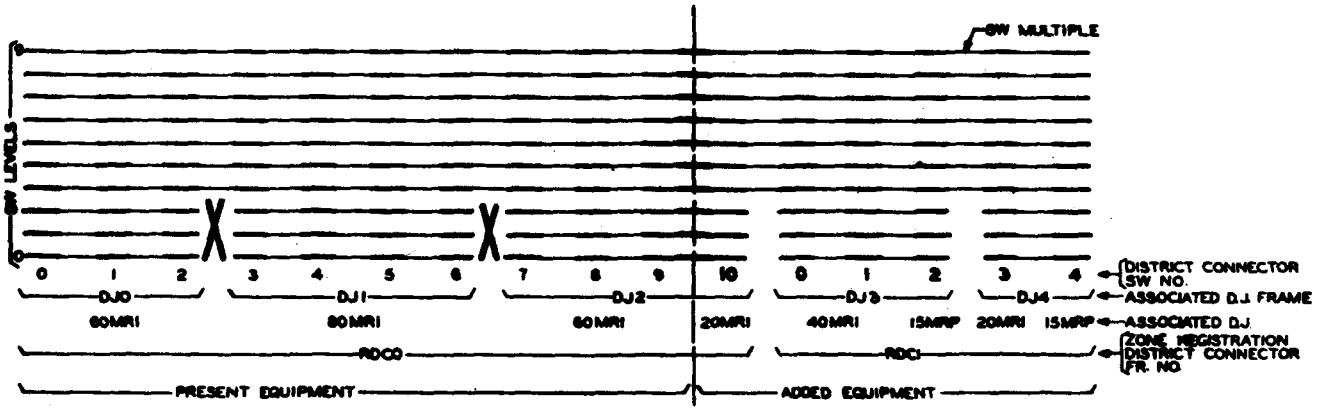


Fig. 10 - Zone Registration - District Connector Switch Assignment

For the purpose of demonstrating the general approach to the problem, assume that an office having three district junctor frames with 200 MRI district junctors distributed over ten district connector switches and served by ten zone registration circuits is to be expanded to five district junctor frames with 280 MRI and 30 MRP district junctors distributed over 16 district connector switches served by 22 zone registration circuits divided into one common group of seven and five individual groups of three each. This arrangement is shown in Fig. 10.

Preliminary Work

11.03 The preliminary work consists of erecting the new zone registration district connector frame, mounting the additional units involved, and running in and connecting all cables and strap leads in accordance with zone registration equipment specification J21553 and the particular job drawings, with the exception of cutting the added units into the working pattern.

Transitional Work

11.04 After all preliminary work has been completed, the individual groups of zone registration circuits should be created to serve the assigned district junctors. Then the common group should be changed to accommodate district junctors added on existing district junctor frames, in this case, 80 MRI district junctors are added on district junctor frame 2. As the last step, the common group equipment should be extended to the zone registration units provided for new district junctor frames 3 and 4. The foregoing objectives can be accomplished in the following steps. Figure numbers mentioned are shown on zone registration and control schematic drawing SD-25320-01, and ED-25371-01.

Step 1 - Creating Individual Groups

(a) Remove the three zone registration circuits per Fig. 1 which are connected to switch levels 0, 1, and 2 from service by means of their associated (MB) jacks.

(b) Disconnect switch level multiple wiring on levels 0,1, and 2 between switches 2 and 3 and between 6 and 7 on zone registration district connector frame 0.

(c) Multiple levels 0, 1, and 2 between switches 9 and 10.

(d) Disconnect only zone registration circuits connected to switch levels 0, 1, and 2 from the common group connector circuit Fig. 7 and common group busy circuit Fig. 8 at the zone registration unit terminal strips.

(e) Connect these three zone registration circuits to the assigned individual group busy circuit Fig. 8, individual group connector Fig. 3, and connect "E" wiring to the test frame.

(f) Connect the other individual groups of zone registration circuits to levels 0, 1, and 2 of the assigned district connector switches, to the assigned individual group busy and individual group connector circuits Figs.8 and 3, respectively, and connect "E" wiring to the test frame.

(g) Block the (CB) relay of the control circuit Fig. 4, associated with district junctor frame 0, 1, or 2, operated so that the frame will operate temporarily on a nonzone basis.

(h) Complete the connections for the particular individual group. This includes disconnecting the "ZS1" lead of chain relay Fig. A, B, or C from the dis-

trict link and connector circuit, connecting it as the "TC" lead to Fig. 3, connecting the "ZS1" lead of Fig. 3 to the proper (LC) relays on the district link frame and connecting the zone indication leads between Figs. 1 and 5.

(i) Unblock the (CB) relay and put the individual group into service.

(j) Repeat (g), (h), and (i) for each of the other frames.

Step 2 - Providing For District Junctors Added to DJ Frame 2

(a) Block operated the (CB) relay of the control circuit Fig.4 associated with district junctor frame 2 and remove the common group of zone registration circuits connected to levels 3 to 9 from service by means of their (MB) jacks.

(b) Multiple levels 3 to 9 between switches 9 and 10.

(c) Complete connections of district connector switch Fig. 2, including those at the (SM) relay added in the associated control unit as part of the preliminary work.

(d) Change wiring of (LL) relay from last appearance Fig. C, to intermediate appearance Fig. B, and extend the chain to Fig. B serving the succeeding frame.

(e) Unblock (CB) relay and restore to service.

(f) Restore common group of zone registration circuits to service.

Step 3 - Extending Common Group Multiple to Added Frames

(a) Remove zone registration circuits on levels 3 to 9 from service by means of their (MB) jacks.

(b) Extend multiple between old and new common group connectors, Fig. 7. Changes involving extending switch multiple and chain leads were completed in (b) and (d) of Step 2 and, therefore, no further work is required in this connection at this stage of the transition.

(c) Remove one originating marker from service, at a time and extend the multiple between corresponding old and new zone registration connectors,Fig. 5.

(d) Restore originating marker to service.

(e) Repeat (c) and (d) for each of the other originating markers.

(f) Extend originating trouble indicator multiple between old and new control circuits, Fig. 4.

(g) Restore zone registration circuits to service.

Clean-up Work

11.05 The clean-up work consists of disposing of all disconnected cable and strap leads.

12. DETAILS OF OFFICE EXTENSION FRAMES ADDITION

General

12.01 When the number of office link frames in an office grows beyond ten, it is necessary to eliminate any split levels on the secondary switches, and transfer trunks in excess of 100 from the office link frames to the added extension frames. This procedure is required so that the outgoing trunks will be available through not less than ten channels. Extension frames may, however, be added in offices equipped with ten or less office link frames in anticipation of growth.

12.02 The detailed procedure given herein covers the addition of extension frames adjacent to the office link frames, and where the extension frame outgoing trunk terminal strips shown on ED-25626-01 have been previously provided in anticipation of the extension frame addition.

12.03 While particular job conditions may differ from the conditions covered in paragraph 12.02 because of the practices in effect at the time of installation, the same general procedure for adding office extension frame, while maintaining service to the destination involved,applies. That is, the outgoing trunks to be transferred from a pair of office link frames to the added extension frames should be multipled to the extension frames, the originating marker route relays cross-connections changed so that the markers will test for the trunks in their new location on the extension frames rather than on the office link frames, the office link frame appearance removed by disconnecting at the office link frames the outgoing trunk multiple cables between the extension and office link frame secondary switches, the split levels bridged and the office link frames arranged for nonsplit operation. Where space has been reserved adjacent to the office link frames for the extension frames, and slack has been left in the split level outgoing trunk cables, the extension frame outgoing trunk terminal strips should be furnished, the cables cut, and both ends of each cut cable reterminated on these terminal strips to facilitate the addition. The addition procedure for this case will then be the same as covered herein.

12.04 Where space has not been provided adjacent to the office link frames

for the extension frames, or where slack has not been left in the split level trunk cables, it will be necessary to recable the outgoing trunks to the extension frames or to "T" splice the cables at the office link frames to obtain the multiple appearance at the extension frames. The Telephone Company should be consulted and their wishes as to recabling or "T" splicing followed.

Preliminary Work

12.05 The preliminary work consists of erecting the office extension frames adjacent to the office link frames, and fastening the extension frame outgoing trunk terminal strips shown on ED-25626-01 on the extension frames in the space reserved for them and indicated on ED-25194-01. The extension frames should be installed in accordance with specification J27650, and the particular job drawings, with the exception of connecting at the office link frame, the cables from the extension frame "MISC" terminal strip, the supplementary local cables used in multipling the verticals between the extension and office link frames and distributing battery to the secondary switches, and connecting the leads in the extension frame local cable to terminals on the outgoing trunk terminal strips to working trunks. The switchboard cables are shown on drawing ED-25632-01. The supplementary local cable arms and the battery distribution connections are shown on drawings ED-25555-01 and ED-25201-01, respectively. The relation between the extension frame local cable and the outgoing trunk terminal strips is shown in Fig. H of ED-25194-01.

Transitional Work

12.06 After the preliminary work has been completed up to the point of cutting the extension frame into the working pattern, remove one office link frame secondary switch from service by means of the associated (SMB) jack on the office link frame and cut in the leads of the supplementary local cable.

12.07 Restore the switch to service.

12.08 Repeat paragraphs 12.06 and 12.07 for each secondary switch on the pair of office link frame.

12.09 During a light load period, remove the even-numbered office link frame from service by means of the (OMB) jack. Calls to the destinations involved will then be routed through the odd-numbered office link frame.

12.10 Cut in the cables from the "MISC" terminal strip on the extension frame at the "MISC" and "MC" relay terminal strips on the even-numbered office frame.

12.11 Cut in the extension frame local cable at the OGT terminal strips.

12.12 Restore the frame to service.

12.13 Remove the odd-numbered office frame from service by means of the (OMB) jack.

12.14 Repeat paragraphs 12.10,12.11, and 12.12 for the odd-numbered office frame and associated extension frame.

12.15 Remove one originating marker from service at a time and change the route relay cross connections so that the marker will test for the trunks being transferred in their new location on the extension frames instead of on the office frames.

12.16 Remove the even office frame from service by means of the (OMB) jack.

12.17 Disconnect the cables between the terminal strips on the extension frame and the split levels on the office frame secondary switches at the secondary switches on the office frames and also at the OGT terminal strips on the extension frame.

12.18 Bridge the split levels on the link frame secondary switches.

12.19 At the "MISC" terminal strip on the office frame disconnect "SP" and connect "NS" leads (see SD-25033-01, Figs. 5 and 6) to change from split to nonsplit operation.

12.20 Restore the even office frame to service and at the same time remove the odd office frame from service.

12.21 Repeat paragraphs 12.17, 12.18, and 12.19 on the odd office and extension frames.

12.22 Restore the odd frame to service.

12.23 Repeat paragraphs 12.06 to 12.22 on the other pairs of office frames.

Clean-up Work

12.24 The designations TL1, TL3, TL5, TL7, and TL9, on the OGT terminal strips on the extension frames should be changed to TL10, TL11, TL12, TL13, and TL14, respectively. Likewise, at the main distributing, incoming trunk test connector and outgoing trunk test frames, all references to split level groups should be changed.

12.25 The cables disconnected in paragraph 12.17 should be disposed of

by cutting them off at the top bracket on the office link frame and the skinners at the stitches of the vertical forms at the switches on the office frame. The portion of the cable between the cut at the top bracket on the office frame, and the OGT terminal strips on the extension frames should be removed.

12.26 The operations covered in paragraphs 12.24 and 12.25 should be performed on an overlap basis with paragraph 12.23.

BELL TELEPHONE LABORATORIES, INC.

Attached: Fig. 11, Issue 2

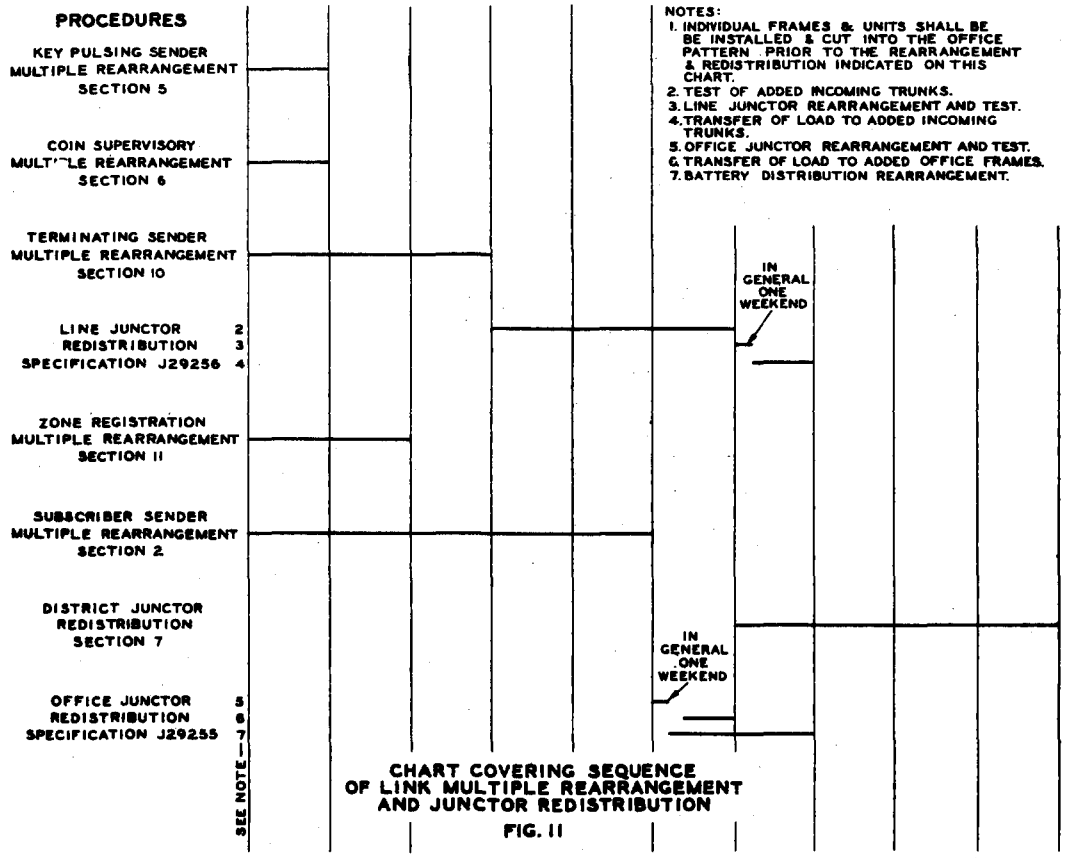


CHART COVERING SEQUENCE OF LINK MULTIPLE REARRANGEMENT AND JUNCTOR REDISTRIBUTION

FIG. 11