

**CENTRAL "B" TRUNK UNITS
ASSOCIATED WITH CALL DISTRIBUTING "B" LINK FRAME
EQUIPMENT DESIGN REQUIREMENTS
PANEL SYSTEMS**

1. GENERAL

Scope

1.01 This specification, together with the supplementary information listed herein, covers the equipment design requirements for the framework, equipment, and circuits to be used in the manufacture and installation of the call distributing "B" link frame for use in new panel offices or additions to existing panel offices having battery on the cut-off relay equipment or in ground cut-off offices modified for call distributing "B" switchboard operation. It also covers the equipment design requirements for the framework, equipment, and circuits to be used in the manufacture and installation of the trunk units associated with "B" link frames arranged for central operation, and the modification of local "B" link frames for central operation. Equipment included in this specification may be ordered by specifying the code and list numbers covered in part 4.

1.02 This specification is reissued to incorporate previous appendix changes and to change the rating from "AT&TCo Standard" to "A&M Only."

Capacity

1.03 Call Distributing "B" Link Frame (Central or Local Operation):

Link groups per frame	2
Links per group	14
Trunk Multiple	240 trunks
Sender Multiple	100 senders
Position Multiple	
(Non-graded)	20 positions
(Graded)	60 positions

1.04 Central "B" Trunk Units:

Incoming from Local Manual or Manual Tandem Office	10 trunks
Incoming from a Long Distance Office	10 trunks
Incoming from Panel "A" Switchboard	10 trunks

Description

Call Distributing "B" Equipment

1.05 The principle function of the call distributing "B" equipment is to complete calls to panel subscribers from manual, toll or tandem offices. It is also used by the panel "A" operator for the verification of busy lines and the completion of delayed "AB" toll calls, and for the completion of intercepted calls when the associated equipment is arranged for completion. The "B" switchboard, link, sender, and associated test equipment are located either in a local panel office along with the call distributing incomings to complete calls to subscribers in the same office or in an operating center with the associated central "B" trunk units to complete calls to subscribers in local offices served by this operating center.

Local "B" Switchboard

1.06 Local call distributing "B" equipment is used to complete calls to subscribers in the same panel office in which the operators are located. Under this condition the distant operator selects a trunk to the called panel office and inserts a plug. This trunk is terminated in the panel office on an incoming selector and a multiple of it appears on the trunk finder banks of a call distributing "B" link frame. The "B" link is known as a 3-way link, its function being to hunt for and connect together the seized trunk,

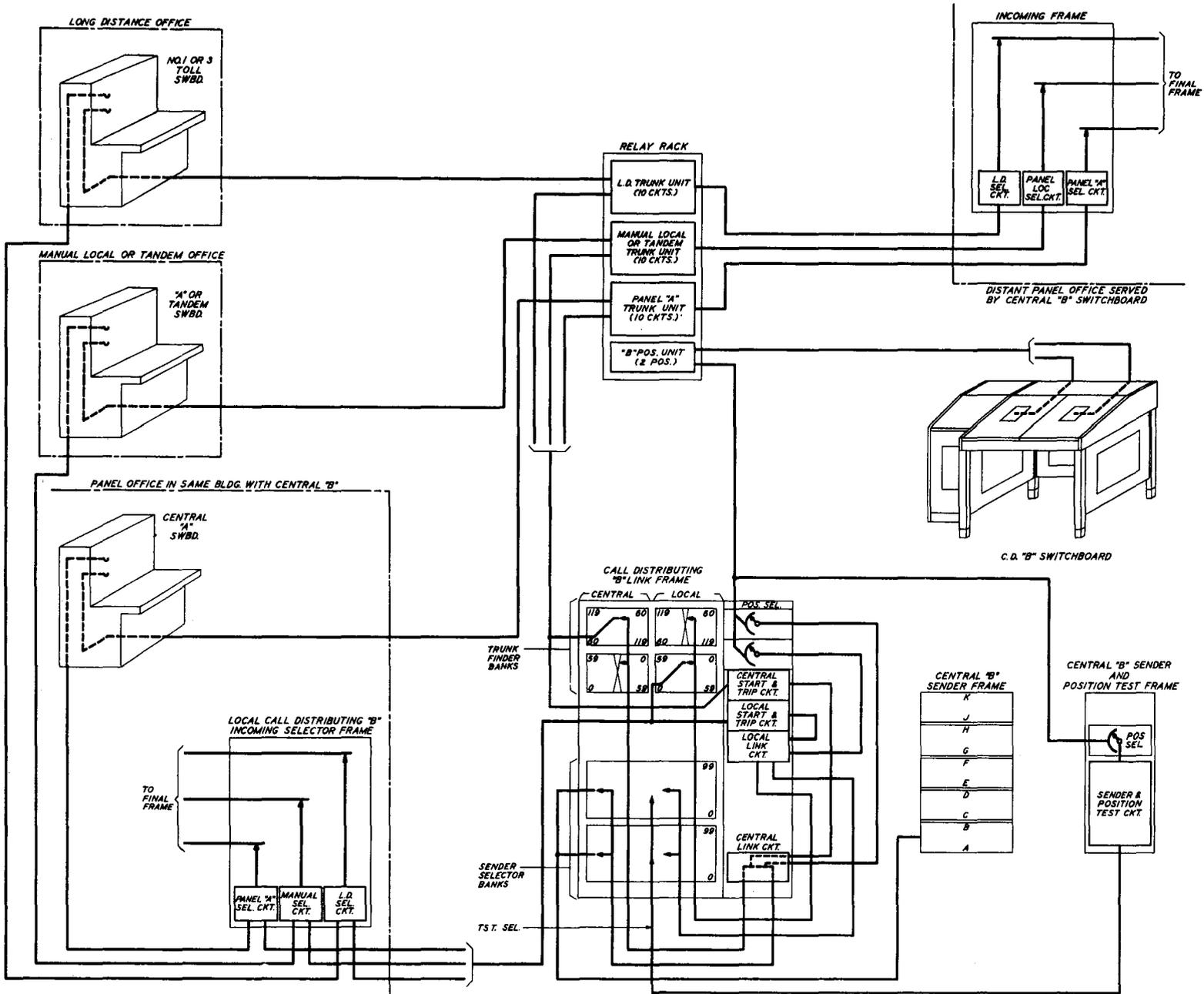


Fig. 1 - Call Distributing "B" Switchboard - Traffic Diagram

an idle sender and an idle "B" switchboard position. The insertion of the "A" operator's plug in the trunk jack causes the link to perform these functions. As soon as the "B" position has been connected a tone is sent out on the trunk to the "A" operator indicating that the "B" operator is attached. The order is then passed, acknowledged and set up by the "B" operator on her key set. As soon as the last numerical key has been depressed, the "B" operator is automatically released from the link and is ready to receive another call. The attached sender registers the called number and sends out pulses corresponding to the digits of the number. After the final selections have been made, the link is disconnected.

1.07 For local operation the call distributing "B" switchboard, "B" link frame and the incoming frame used for completing the call are all located in the same panel office.

Central "B" Switchboard

1.08 The term "central operation" is given to the use of the call distributing "B" equipment to complete calls to subscribers whose lines terminate in panel offices located outside of the building in which the call distributing "B" equipment is placed. These offices have no "B" switchboards but are served in this respect by the central board. Under this system the trunk from the "A" board is selected in the usual manner. The trunk terminates on a relay rack trunk circuit unit in the central office. The trunk unit (with the exception of the incoming intercepting trunk not covered by this specification) is connected to an incoming selector in the terminating office. The function of the trunk circuit is to enable the call distributing "B" link and associated equipment in the central office to operate with the incoming frame in the terminating panel office, and to secure standard transmission. Each trunk circuit appears on the trunk finder banks of the call distributing "B" link frame. With these differences, the "B" link, arranged for central operation, functions in the same manner as described in paragraph 1.06.

1.09 In the case of central operation, "B" equipment located in the operating center consists of the call distributing "B" switchboard, call distributing "B" link frame, the "B" sender frame and the incoming trunk unit equip-

ment. The incoming selectors associated with the trunk circuits are located in the terminating local panel offices served by the central board.

1.10 Verification requests and completion of delayed AB toll calls to subscriber lines in the terminating offices handled at the central "A" board in the operating center are treated in the same manner as for local operation, an incoming trunk circuit unit being required for these trunks. When these classes of calls are to lines served by a panel office located in the same building as the central board, they are served by local call distributing "B" links and associated equipment.

1.11 In addition completion of intercepted calls by the central "A" operator thru the "B" equipment is handled in a similar manner. This type of traffic requires an incoming intercepting trunk. The equipment design requirements for the incoming intercepting trunk unit are covered in DS "A" switchboard specification J91101.

Call Distributing "B" Link Frame

1.12 The call distributing "B" link frame is a steel structure (shown in Fig. 2) of a type generally known as a double sided frame, designed for use with the call distributing "B" equipment for either local or central operation.

1.13 The frame consists of three bays, a center bay for mounting the trunk finder banks, the "B" sender banks, the friction roll drive, clutches, commutators, brushes, brush rods, etc., and two end bays in which are mounted the associated sequence switches, 206 type selectors, relay mounting plates, jacks and fuse panels.

1.14 The call distributing "B" link frame mounts two independent groups of 14 links each. The groups are distributed over both sides of the frame. The group is further divided into two subgroups, A and B, each containing 7 links which in turn are divided between the front and rear of each frame and so arranged under the control of start and trip circuits, that only one link in a subgroup may be started hunting at a time. There are two control trip and start circuits, one per group, and each of these contains separate relay and trip magnet equipment for the A and B subgroups. When all the

links in one subgroup are busy a chain circuit through the links sequence switches is brought into operation to extend the calls which would normally be served by that subgroup to the other subgroup of the same link group. Provision is also made in the control equipment to transfer service, in the event of failure of the driving motor on one side of the frame, from all the

links operating on that side of the frame to the links on the other side.

1.15 Each link being a three-way link, a sender selector is required to find an idle sender, a trunk finder to locate the trunk upon which the call comes in, and a position selector to find an idle "B" operator. The sender selector is a

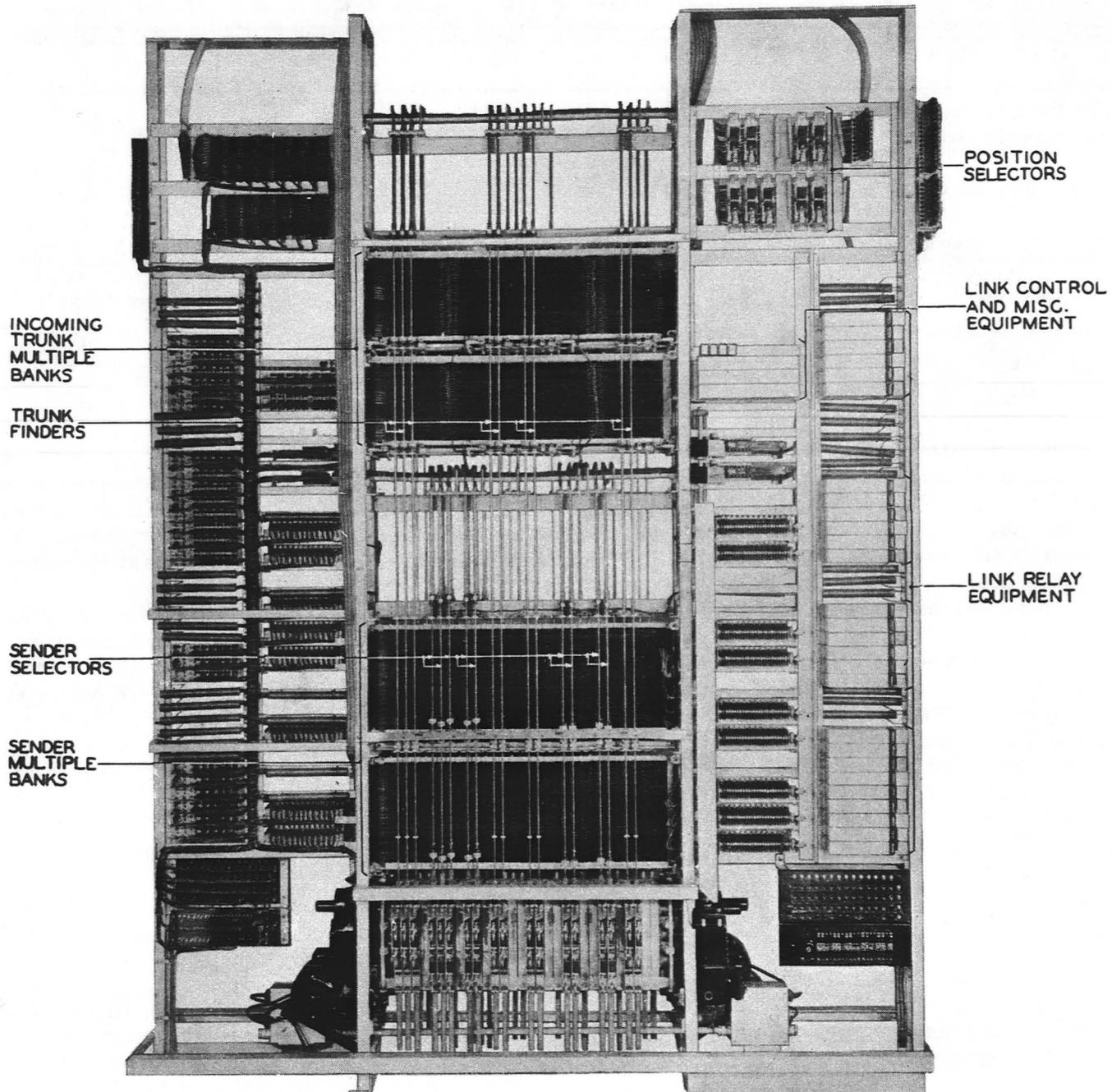


Fig. 2 - Call Distributing "B" Link Frame - Local or Central

six conductor panel selector using two 100 point three conductor banks, the trunk finder is a four conductor circuit arranged to hunt over 120 trunks on two 60 point four conductor banks, and the position finder is a six conductor circuit using a 206 type selector and has a capacity of hunting twenty positions. Each trunk finder bank is made in four sections, there being no connections between the two at one end and the two at the other, but a complete turnover is wired between the first and second section of each half. Due to the different terminal set arrangement on trunk finder and sender selector banks and also because in general the sender selector has a short up-travel to find an idle sender, a two-speed up-drive is used on all call distributing "B" link frames, the trunk finder selector moving up at the rate of 40 terminals per second and the sender selector at 30 terminals per second.

1.16 The space required for the turnovers in the trunk bank results in placing the sender selectors of a group in the center with trunk finders on each side of them. By so doing it is not necessary to waste clutch space at the drive on account of the trunk bank turnover.

1.17 Three distinct call distributing "B" link frames are covered in this specification, one for local operation only, one for central operation only, and one containing one group of local "B" links together with one group of central "B" links. The grouping of the individual links on the frame and the general equipment layout is the same on all three types of frames. The framework is identical for each type of frame, the only differences being in the apparatus and wiring used. These differences, which are those existing between links arranged for central operation and local operation, lie chiefly in the wiring used, the relay and sequence switch codes and five additional resistances and one relay per link required with the central "B" links.

Trunk Units

1.18 The trunk units which are associated only with call distributing "B" links arranged for central operation, are ten circuit relay rack units, each circuit taking care of one incoming trunk. In this connection, three different circuits are required necessitating three different equipment units, one for trunks incoming from man-

ual local or manual tandem offices, one for trunks from long distance toll offices and one for trunks from the central DS "A" board in the same building. The first of these units is made up of sixteen 1-3/4" mounting plates and the last two units each have twenty 1-3/4" mounting plates. Each trunk circuit on all three types of units is equipped with a repeating coil, mounted on the unit. Though otherwise differing in circuit and equipment, each of these units has the same function as outlined in paragraph 1.08.

Conversion from Local to Central Operation

1.19 The call distributing "B" link frame covered by this specification has been so designed that if built for local service it may later be modified for central operation. When it is required to convert a "B" link frame from local to central operation changes and additions to the link circuit equipment on the link frame and the addition of relay rack trunk units are involved. Space is provided on the link relay mounting plates for the additional relays and resistances required by the link circuit. Due to the similarity between both link circuits it is possible to reuse the greater part of the wiring in the local cable used in local operation and to supply the extra and changed wiring in a small supplementary local cable. In addition switchboard cables to the trunk units in place of those going to incoming selector frames are required. This modification will be made by the installer, and the supplementary local cable furnished by the shop.

1.20 When it is required to modify an existing call distributing "B" link frame per specification J21901 for central operation it becomes necessary to mount some of the additional link circuit equipment above the position selectors at each side of the frame as well as to utilize all space available on the link relay mounting plates. A small supplementary local cable will also be required in the modification of this link frame and should be furnished by the shop. The trunk unit equipment and switchboard cables are required in the same manner as outlined in the preceding paragraph. This modification will also be made by the installer.

Conversion From Cordless to Call Distribution "B" Operation

1.21 In multi-unit buildings in which the majority of the terminating equipment is of the call distributing type and where there is sufficient surplus call distributing equipment, the cordless "B" incoming selectors may be converted to work with and cabled to call distributing equipment. In this case the cordless key listening "B" switchboard, the "B" sender and link frames and the "B" sender test frame will be removed from the ground on the cut-off unit.

Subdivisions of Equipment

- J28002AA (A&M Only) — Central "B" Trunk Unit Incoming from Local Manual or Manual Tandem Office
 J28002AB (A&M Only) — Central "B" Trunk Unit Incoming from a Long Distance Office
 J28002AC (A&M Only) — Central "B" Trunk Unit Incoming from Panel "A" Switchboard

2. SUPPLEMENTARY INFORMATION

- 815-000-000 — Panel Systems Index
 AA128.006 — List of General Equipment Requirement Sections
 X-61400 — List of Engineering Requirement Specifications — Battery on the C.O. Relay
 J20102 (815-030-150) — Switchboard Power Cabling
 Floor Plan Data — Section 4.15, Sheet 11

3. DRAWINGS

Keysheet

- SD-21300-01 — Panel System — Battery on Cut-Off Relay Office Keysheet

Framework

- ED-20081-01 — Sequence Switch Frame Details
 ED-20293-01 — Framework Limits
 ED-20509-01 — Assembly of Fuse Panel
 ED-20779-01 — Bracket for 63F Designation Strip
 ED-90395-01 — Relay Rack Unit Assembly

Equipment

- ED-20775-01 — Typical Relay Rack Equipment
 ED-21573-01 — Trunk Unit Equipment — Trunks from Manual, Local or Tandem Office
 ED-21574-01 — Trunk Unit Equipment — Trunks from Long Distance Office
 ED-21576-01 — Trunk Unit Equipment — Trunks from Panel "A" Switchboard
 ED-90411-01 — Designation Cards

Wiring and Cabling

- ED-20001-01 — Sender Multiple (80-20)
 ED-20001-02 — Sender Multiple (90-10)
 ED-20109-01 — Local Cable Plan
 ED-20136-01 — Switchboard Cabling Plan
 ED-20137-01 — Cabling Diagram
 ED-20379-01 — Position Multiple
 ED-20623-01 — Method of Running and Supporting Frame Battery and Ground leads
 ED-20792-01 — Supplementary Local Cable — Local to Central Operation
 ED-20811-01 — Switchboard Power Cables
 ED-90440-01 — Unit Local Cable

4. EQUIPMENT

J28002AA (A&M Only) — Central "B" Trunk Unit Incoming from Local Manual or Manual Tandem Office

- Equipment — ED-21573-01, Figs. 1 and A
 Local Cable — ED-90440-01, Fig. 1

List 1 — Framework, assembly, wiring, and common equipment for one central "B" trunk unit incoming from local manual or manual tandem office.

	WIRE	EQUIP	SEE NOTE
Assembly ED-90395-01, Fig. 1	—	1	
Trunk Ckt. SD-21573-01, Figs. 1, A, B, and C (X Wiring)	10	0	A, D

List 2 — Equipment per SD-21573-01, Figs. 1 and B, required in addition to list 1, for one trunk circuit incoming from a local manual office (See Notes B and D).

List 3 — Equipment per SD-21573-01, Figs. 1 and A, required in addition to list 1, for one trunk circuit incoming from a manual tandem office (See Notes B and C).

Notes

- A. List 1 includes the terminal strip and all mounting plates except two plates for the (S1) and (S2) relays, which are required only with the trunk circuit incoming from a manual tandem office (List 3).
- B. The (C) and (D) resistances shall be furnished in all cases and strapped out as required.
- C. Furnish one 120C or 120D repeating coil as required.
- D. Connect "X" wiring for List 2 only.

J28002AB (A&M Only) — Central "B" Trunk Unit Incoming from a Long Distance Office

Equipment — ED-21574-01, Figs. 1 and A
 Local Cable — ED-90440-01, Fig. 1

List 1 — Framework, assembly, wiring, and common equipment for one central "B" trunk unit incoming from a long distance office.

	WIRE	EQUIP	SEE NOTE
Assembly ED-90395-01, Fig. 1 Trunk Ckt. SD-21574-01, Figs. 1, 2, A, and B ("M", "N", "X", and "Y" Wiring)	—	1	
	10	0	A

List 2 — Equipment per SD-21574-01, Fig. 1 required in addition to list 1, for one trunk circuit incoming from a No. 3 toll switchboard (See Notes B, C, and D).

List 3 — Equipment per SD-21574-01, Fig. 2 and "N" apparatus, required in addition to list 2, for one trunk circuit incoming from a No. 1 toll switchboard (See Notes B, C, and E).

List 4 — Equipment per SD-21574-01, Fig. A, required in addition to list 1 and list 2 or 3 for 20-cycle controlled ringing.

List 5 — Equipment per SD-21574-01, Fig. B, required in addition to list 1 and list 2 or 3 for simplex controlled start of ringing.

List 6 — One 609T mounting plate required in addition to list 1 to accommodate ten lists 4.

List 7 — One resistance shield ED-90283-01, Group 2, and one 609CJ mounting plate required in addition to list 1 to accommodate ten lists 5.

Notes

- A. List 1 includes the terminal strips and all mounting plates except one mounting plate for the (D2) and (D3) relays and one plate for the (F), (G), (H), and (J) resistances, required only for the trunks from a No. 1 toll switchboard, one mounting plate for the resistance lamps or (K) and (L) resistances and one resistance shield. The plate for the resistance lamps is covered in list 6, and the plate for the (K) and (L) resistances and the resistance shield is covered in list 7.
- B. The (C) and (D) resistances shall be furnished in all cases and strapped as required.
- C. Furnish one 120C, D, E, or F repeating coil as required.
- D. Connect "Y" and "M" wiring for List 2.
- E. Connect "N" and "X" wiring and strap out resistances (F), (G), (H) and (Y) as required for List 3.

J28002AC (A&M Only) — Central "B" Trunk Unit Incoming from Panel "A" Switchboard

Equipment — ED-21576-01, Figs. 1 and A
 Local Cable — ED-90440-01, Fig. 1

List 1 — Framework, assembly, wiring, and common equipment for one central "B" trunk unit incoming from a panel "A" switchboard.

	WIRE	EQUIP	SEE NOTE
Assembly ED-90395-01, Fig. 1	—	1	
Trunk Ckt. SD-21576-01	10	0	A, D

List 2 — Equipment per SD-21576-01 (less X apparatus), required in addition to list 1, for one trunk circuit incoming from a panel "A" switchboard and for use with no test incoming (See Notes B and C).

List 3 — Equipment per SD-21576-01 (X apparatus), required in addition to list 2, for one trunk circuit for use with an incoming selector not arranged for the no test feature (See Notes B and C).

Notes

- A. List 1 includes the terminal strip and all mounting plates except the plates for the (R), (R1) and (R2) relays. These plates are required only with the trunk circuit for use with incoming not arranged for the no test feature (List 3).
- B. The (C) and (D) resistances shall be furnished in all cases and strapped as required.
- C. Furnish one 120C or 120D repeating coil and one R292 or E1252 (SL) relay as required.
- D. This unit is for verification of busy lines and completion of delayed AB toll calls from central "A" switchboard. If this unit is specified by the Telephone Company for use with a local Panel "A" switchboard, the order shall be referred to the Bell Telephone Laboratories for recommendation.

5. EQUIPMENT NOTES

5.01 Drive and motor equipment shall not be furnished as part of J28002A, J28002B or J28002C but should be ordered separately. The 46A, a double unit drive, shall be provided except for odd frames in a lineup or when a column intervenes between two frames which would otherwise be paired. In these cases the drive can be associated with only one frame so the 45A, single unit drive, shall be provided. This 45A drive shall be mounted on the frame so that the drive shaft extension points in the direction of growth of the lineup; this is to prevent the pos-

sibility of having to remount this drive at the other side of the frame when additions are made to the lineup.

5.02 A minimum of two link frames is recommended to cope with the possibility of bank failure. When two link frames are provided the trunks to the trunk finder banks shall be divided approximately equally over the two link frames. Likewise, in the case of the "B" link frame arranged for local operation, the incoming trunks from Long Distance Offices, together with incoming trunks from Manual Tandem Offices, shall be split over two link frames. For the "B" link frame arranged for central operation, the trunks from the panel "A" switchboard units and the long distance units shall be split over two link frames.

5.03 Due to the close association between the call distributing "B" link frame arranged for local operation and the manual, manual tandem and toll incoming frames, they shall be located as near to each other as practicable. The link frames should where possible be located in a separate lineup from the incomings with which they are associated.

5.04 The relay rack mounting the trunk units associated with the call distributing "B" link frame arranged for central operation shall be located as near the link frames as possible for cabling and maintenance reasons.

5.05 The link circuits shall be equipped as required. In case of partial equipment the links shall be split approximately equally between the front and rear of the frame and between subgroups. The lower numbered links on each side of the frame for each subgroup shall be equipped first.

5.06 The link frame jack panels shall be fully equipped in all cases and the link frame itself shall be fully equipped with incoming trunk, sender and position multiple banks. The associated selectors shall be equipped as required.

5.07 Where the number of senders in an office is less than 100, one test selector is required. When over 100 senders are provided the capacity of the sender multiple bank is exceeded so two groups of senders are necessary. In this

case a test selector is required for each group. The test selector shall be located on the front of the link frame which has the senders located in numerical order on the sender multiple bank. This location is chosen in order that the majority of the senders may be automatically routine-tested without duplication and a faster testing period thus obtained.

5.08 The local "B" link frame shall be wired for two sender test selectors so that the local cable form on the front and rear will be identical. Likewise, the central "B" link frame shall be wired for two sender test selectors so that the local cable form on the front and rear will be identical.

Incoming Trunk Multiple

5.09 The incoming trunk multiple consists of two panel type banks each having 61 sets of 4 terminals (one set per trunk) and two sets of guide terminals. The two sets of guide terminals are located at the top of each bank and are used for guiding the brushes in the tell-tale position. The 61st set of terminals shall be used for overflow and is arranged to return the trunk finder to normal in case the manual operator removes the plug before the trunk is found. These banks are split in the middle thereby providing for two groups of a maximum of 120 trunks each, or a total capacity per link frame of 240 trunks.

Sender Multiple

5.10 The sender multiple consists of two panel type banks each having 100 sets of 3 terminals and 5 sets of guide terminals. Three sets of these guide terminals are located at the bottom of the bank and two at the top. One set on each of the two banks is required to complete connection to each sender, there being six leads per circuit to the sender.

5.11 In general when 100 or less senders are provided, the link frames shall be arranged in a single group. If over 100 senders are required, the link frames shall be arranged in several groups as required. The corresponding sender multiple banks of all link frames serving the same sender group shall be multiplied together with a slip arrangement as shown on the wiring of the sender multiple drawings.

5.12 The 90-10 arrangement of assigning the senders consists of assigning 90% of the senders in the lower 90 sets of terminals on the bank and multiplying them to the other banks in the same group with a Latin square slip between banks. The other 10% of the senders should be assigned to the top 10 sets of terminals and multiplied to the other banks using a rotary slip. The links are arranged to return to normal only after serving calls in the top portion of the bank.

5.13 The 80-20 arrangement of assigning the senders is the same as to the 90-10 arrangement with the exception that 80% of the senders are assigned in the lower portion and 20% in the upper portion of the bank. This 80-20 arrangement should only be used on additions where it is now in service. In order to increase the use of the top 20% of the senders the slip between the multiple bank at the middle of a group of link frames may be modified to interchange one-half of the top 20% of the senders with a like number in the lower 80%. Care shall be taken to see that these interchanged senders are not multiplied to other terminals on the same bank.

5.14 The equipped terminals on the sender multiple banks shall be multiplied up to unequipped terminals with the exception of those terminals associated with the modified slip described in the preceding paragraph. This multiple shall be placed on the lowest numbered link frame in the group.

Position Multiple

5.15 The position multiple consists of 28-26 type banks served by 206 selectors; 14 banks are located on each side of frame. Each bank has 21 rows of 6 terminals each. To simplify cabling only the first 20 rows of terminals are used, row 21 being left unequipped.

5.16 When 20 or less positions are provided all positions shall be multiplied thru all frames so that all links have access to all positions. The terminals on the position multiple shall be assigned as shown on the position grading drawing.

5.17 When more than 20 positions are provided, it is essential that a few positions be multiplied thru all frames so that during light load all but these positions which are

accessible to all links, can be cut out of service. The other positions shall be divided into equal groups which shall be individual to a number of fronts and rears of link frames. The positions shall be so assigned in these individual groups that they may be cut out of service in regular order from the terminating end of the call distributing "B" switchboards and still have approximately the same number of positions accessible to each link group. This arrangement of positions when 21 to 60 are provided shall agree with the positions multiple grading drawing.

Relay Rack

5.18 The relay rack units associated with the call distributing "B" link frame arranged for central operation shall be mounted on standard 23-1/2" I-beam relay rack. These racks shall be located as near as possible to the "B" link frames with which the units are associated. The relay rack shall be equipped from the bottom up in all cases. In general the manual trunk units shall be mounted four to a bay but provision for mounting long distance and panel "A" trunk units one to a bay above the manual trunk units should be made. The trunks on each relay rack bay shall be numbered from 1 up starting at the bottom unit irrespective of the types of units on the bay. Each unit shall be stamped with its associated link frame and group number. A designation card shall be provided per bay indicating the terminating office, incoming frame and selector for each trunk circuit. The location and E code of the designation card and a typical relay rack equipment layout for these units are shown on ED-20775-01.

5.19 Test jacks are required at the relay rack in accordance with circuits SD-90619-01 and SD-21717-01. These jacks are mounted in a 192 type jack mounting and located approximately six feet above the floor level in every third bay of relay rack beginning with the second bay from the originating end of each lineup. The equipment layout of these test jacks is shown on ED-20775-01.

Conversion of Call Distributing "B" Link Frames From Local to Central Operation

5.20 In outlining the procedure for the conversion of local "B" link frames to central operation two types of call distributing "B" link

frames must be considered, namely the link frame covered in this specification, J28002A, and the frame which it supersedes, J21901A, herein-after termed the "existing" frame. These two types differ principally in the size of link relay mounting plates used, the existing frame having 11" plates and the frame per J28002A using 13" plates, the link equipment layout and the overall framework dimensions. There are also minor differences in the framework design and local cables due largely to the overall 4" difference in the floor lengths of the two frames and the altered equipment layout. The same circuits are used for both frames.

Call Distributing "B" Link Frame per J28002A

5.21 The framework design and equipment arrangement of this frame were developed with the object of not only accommodating the extra equipment required in central operation but of facilitating the conversion of the local links to centralized operation by maintaining the same 3 mounting plate arrangement for each link circuit and the same general equipment layout.

5.22 In modifying this frame one additional R-type relay and five E or R type relays as replacements are required per link circuit. The additional relay is designated (ST) and the existing (R1), (R2), and (R3) relays are replaced by the (FS), (R0), and (PT) relays respectively as indicated in the equipment details drawing. The (TF) and (WO) relays in each link are replaced by differently coded R-type relays with the same circuit designations. Five additional resistances, four of which are of the 18-type and one a 44 type resistance, are also required per link circuit. The 18 type resistances are mounted on the link relay mounting plates and the 44 type resistances on two mounting plates located above the link relay mounting plates. A new sequence switch and (H) jack in place of those for the local circuit are also required per link circuit.

5.23 The additional leads required in modifying the link circuit shall be made up in a supplementary shop-made local cable which shall conform in design to ED-20792-01. In order to keep the leads in this supplementary cable at a minimum, leads in the existing local cable

shall be reused wherever possible. Leads in the existing form not required for the central link circuit shall be cut at the local cable arm.

5.24 The supplementary local cable drawing ED-20792-01 shows the main vertical arm of this cable brought down along the outside frame upright. This is because the thickness of the main vertical arm of the existing local cable which runs down between the sequence switches and the link relay equipment is too great to permit running the additional wiring required for central operation along the same upright. The leads to the sequence switches and sender selector commutators are brought across the frame to the channel upright at the banks by means of a 1" channel iron cross-bar support similar to those used for supporting the sender multiple cables between frames. This 1" channel support and other cable support details which are shown on the frame assembly drawing ED-20765-01 and covered by note 3 of this drawing, are only required for modifying local frames for central operation and shall be ordered with the supplementary local cable. Drillings for these details are provided in the framework of all "B" link frames covered in this specification.

5.25 New switchboard cables shall be provided on a ten circuit basis between the trunk multiple banks and the central "B" trunk units in place of the cables between these banks and the incoming selectors.

Call Distributing "B" Link Frame per J21901A (Existing Frames)

5.26 In modifying the call distributing "B" link frame per J21901A for use with the central "B" switchboard, the additional apparatus and replaced apparatus required is the same as outlined in paragraph 5.22 of this specification with the additional requirement that 166AC interrupters shall be substituted for the existing (TL1) interrupters mounted one on each side of the J21901A frame. This is due to the fact that the local "B" link circuit SD-21105-01 is used for both the link frame per J28002A and the frame per J21901A. The modification of either one of these frames for use with the central "B" switchboard consists in replacing circuit SD-21105-01 by circuit SD-21105-02. Due, however, to the smaller overall dimension of the

J21901A frame the manner of mounting the additional apparatus on this frame differs from that employed in modifying the J28002A frame. The additional resistances required by the modification shall be mounted on two 23" mounting plates which shall be placed above the position selectors in both side bays as shown on the frame equipment drawing ED-20111-01. The brackets mounting these 23" plates are shown on the frame assembly drawing ED-20110-01, and the arrangement of the resistances on these plates is shown in Figs. 11-F and 11-R of ED-20108-01. Fig. 4 of ED-20108-01 shows the manner of mounting the additional (ST) relay and the five replaced relays.

5.27 The additional leads required in modifying the link circuit shall be made up in a supplementary shop-made local cable which shall conform in design to that shown on ED-20792-01. In order to keep the leads in this supplementary cable at a minimum, leads in the existing local cable shall be reused wherever possible. Leads in the existing form not required for the central "B" link circuit shall be cut at the local cable arm by the installer.

5.28 The supplementary local cable, required in modifying a link frame per J21901A, differs only slightly in design from that required in modifying the J28002A link frame for central operation. This difference is the elongation of the outside vertical arm to run the leads to the resistances mounted above the 206 type position selectors. The same type of supports for this supplementary cable are required in both cases, but as drillings in the J21901A frame are not provided for these supports, the installer shall make the necessary drillings for these details. In mounting the 1" channel iron support, due to the inaccessibility of the inner frame upright for drilling purposes, the installer shall provide a clamp to attach the 1" channel to this upright. ED-20110-01 shows the additional supports and drillings in the frame required for this modification and identifies them by reference to Note 3 on this drawing.

5.29 The central "B" trunk units required in this modification and the wiring between these units and the link frames shall be provided as outlined in paragraphs 5.21 and 5.22 of this specification.

Local Links and Central "B" Senders

5.30 In order to have central "B" senders function for local operation it is necessary to add a resistance per local link. This resistance is shown as "S" wiring and apparatus on SD-21105-011, Fig. 4. The local call distributing "B" link frame per J28002A is wired in all cases for this resistance which shall be equipped in the location shown on the equipment drawing only when the local links are associated with central "B" senders.

5.31 When an existing local call distributing "B" link frame per J21901A is to be associated with central "B" senders the conditional wiring and apparatus must also be provided. As the existing local cable does not contain this wiring, the necessary changes shall be made by the installer. The additional resistance shall be located in the relay bay as shown on the equipment drawings.

6. WIRING**Local**

6.01 Because of the thickness of the main vertical local cable arm of the local "B" link frame and the large number of additional leads in the central "B" link circuit it is not feasible to provide a universal local cable form containing the wiring for both local and central "B" link circuits. Therefore, different local cable forms are required for the call distributing "B" link frames covered in this specification, in general the physical shape of these forms differs very little. In converting a local call distributing "B" link frame to central operation a supplementary local cable form is required which is used in conjunction with the local cable already on the frame.

6.02 Each of the above local cables shall be wired in all cases for the ultimate equipment. All unequipped wires shall be treated in accordance with the general Engineering Requirements Specifications for Wiring and Cabling.

6.03 Three different local cables are required for the three types of relay rack units associated with central "B" links. These cables are, however, of the same physical form and

each contains all the necessary wiring to cover the lists included in its particular "J" code.

Switchboard Power Cabling

6.04 Switchboard power cables containing the miscellaneous wiring from the centralized DPTS shall be run on the top of the cable rack for each row of "B" link frames. At each frame the cable shall be looped at the miscellaneous terminal strip and connected as required.

Trunk Multiple

6.05 With local call distributing "B" links, switchboard cable shall be furnished for cabling between the trunk multiple banks on the link frame and the incoming selector frames. In general, trunks between these banks and the incoming frames shall be run in thirty-circuit switchboard cable. Ten circuit cables, however, shall be provided from incoming frames equipped with both full mechanical and call distributing "B" incoming trunks and from incoming frames equipped with long distance selectors. In addition ten circuit cables are necessary when a small number of link frames are provided and the trunks from an incoming frame are split between link frames or between link groups.

6.06 With central "B" links, switchboard cable shall be provided between the trunk multiple banks and the relay rack trunk units upon which the trunks incoming to the central office terminate. As the trunk units are all ten-circuit units, these cables shall be provided on a ten-circuit basis.

6.07 The start leads shall be wired direct to the link frames in the trunk finder cables and terminated on 203A terminal strips. These 203A terminal strips shall be connected to the miscellaneous frame terminal strips with switchboard cable.

Sender Multiple

6.08 The call distributing "B" senders, both for local and central operation shall be cabled to the sender multiple banks in switchboard cable accommodating 10 senders since the senders are mounted ten per frame. To minimize possible service reaction these cables should not all be terminated at the same link frame but

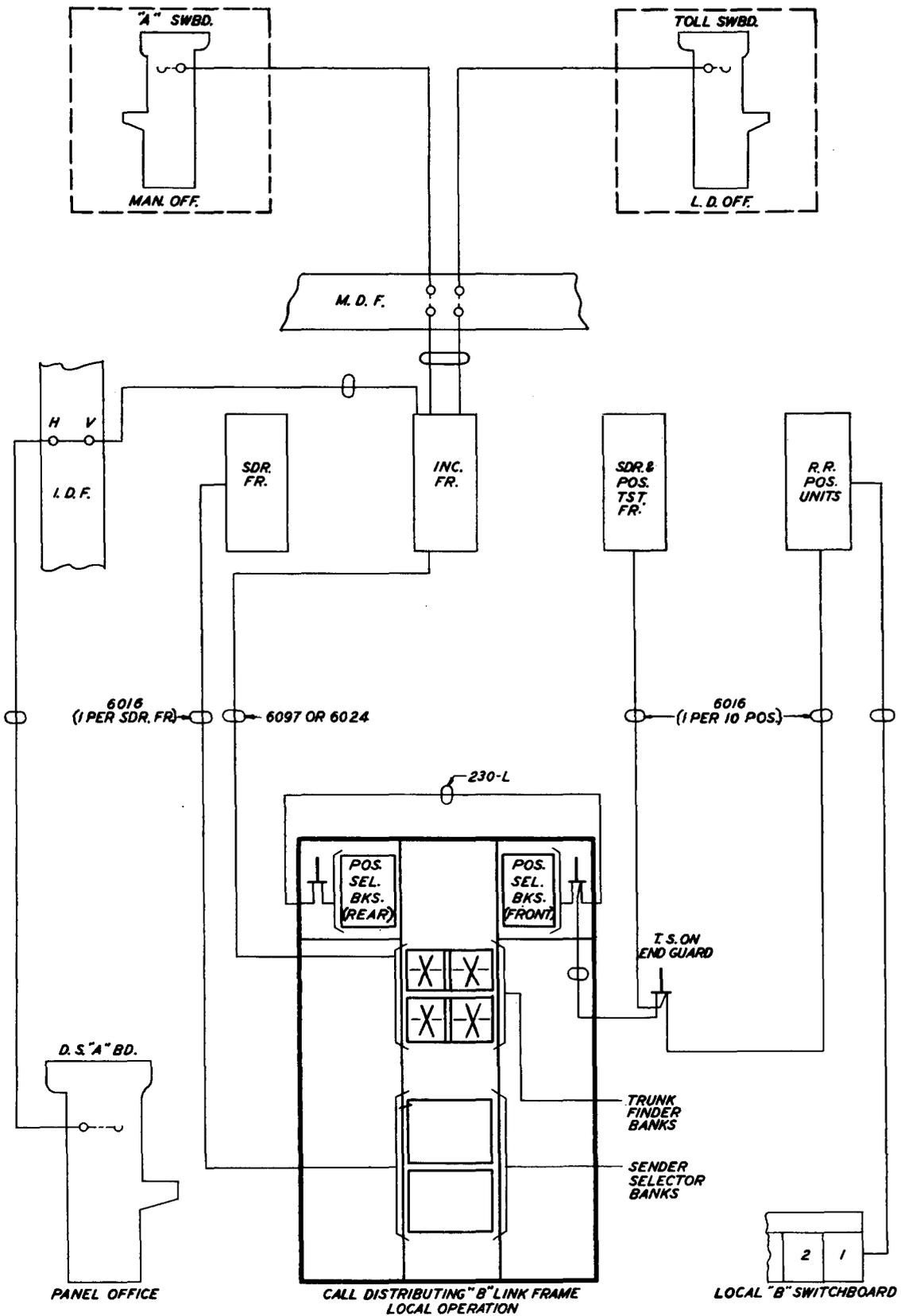


Fig. 3 - Cabling Diagram — "B" Link Frame Arranged for Local Operation

rather should be spread as evenly as possible over all the link frames. Where these cables terminate at intermediate points in the multiple, they should be connected at the lower numbered frame end of the short multiple cable as the other end will be slipped. The multiple between adjacent frames shall be run in hand made cable and in switchboard cable over aisles as shown on the wiring of sender multiple drawings.

Position Multiple

6.09 The leads between the relay rack position units and any call distributing "B" link frame shall be run in switchboard cable. Due to the grading of the position multiple it is impractical to run switchboard cable from the relay rack direct to the position multiple terminal strip. For this reason, the cables from the relay rack shall terminate first on a terminal strip located on the end guard before being brought to their respective link frame position multiple terminal strips.

6.10 The cables from the relay rack position units shall contain 10 position circuits, two cables being required per relay rack bay when the bay contains maximum equipment. As each position unit contains only two position circuits and occupies only four mounting plate spaces on the relay rack these units may be located on bays containing other equipment, and in such cases switchboard cabling shall be provided as required.

6.11 The cables for each 20 circuits shall terminate on a terminal strip located on the end guard of separate lineups of frames. This distribution is made to reduce the number of frames or positions that would be put out of service in case of fire.

6.12 When 20 or less positions are provided only one terminal strip on the end guard is required to terminate the position leads. Where less than 20 positions are terminated on this terminal strip the unequipped terminals shall be strapped to equipped terminals in accordance with the Position Grading drawing. Where only two positions are required in an office, the T and R leads shall be interchanged on rows 3, 4, 7, 8, 11, 12, 15, 16, 19, and 20 of the position multiple end guard terminal strip. The H leads on these rows shall not be con-

nected to the H punching. This procedure is to prevent capacity coupling between the operator's talking paths. From the end guard terminal strip where 20 or less positions are provided a 20 circuit cable shall be run to the link frame position multiple terminal strip.

6.13 Where 21 to 60 positions are provided more than one terminal strip on the end guard is required. From these terminal strips cables shall be run for each group of positions individual to a number of link frames. The common positions shall be included in the cable containing the positions individual to the initial link frame. The number of groups of individual positions which determines the amount of cable from the end guard terminal strip and the number of common positions is shown on the position multiple grading drawing.

6.14 As the position multiple banks are located on front and rear of the link frames, a 20 circuit cable is provided between terminal strips. The position multiple also extends thru a number of link frames depending on the grouping of positions and shall be run in one 20 circuit cable. In order to prevent cross-talk between the leads from those positions common to all the links a latin square slip shall be inserted between each link frame and the next. This slip shall be applied to the whole group of twenty circuits so that regardless of the number of positions common to all the links the latin square cables will all be formed alike.

6.15 Although only the common positions are multiplied thru link frames of two groups, the cables used shall be the same as used between frames in the same group so that the division point may be changed if necessary. Only the common positions leads are connected through.

Test Frame

6.16 The cables from the position units on the relay rack to the position test selectors located on the test frame shall be doubled up with the position multiple bank leads at the terminal strip on the end guard.

6.17 On link frames on which the Sender Test Selector is equipped a switchboard cable shall be provided to the test frame containing test selector leads to the test circuit.

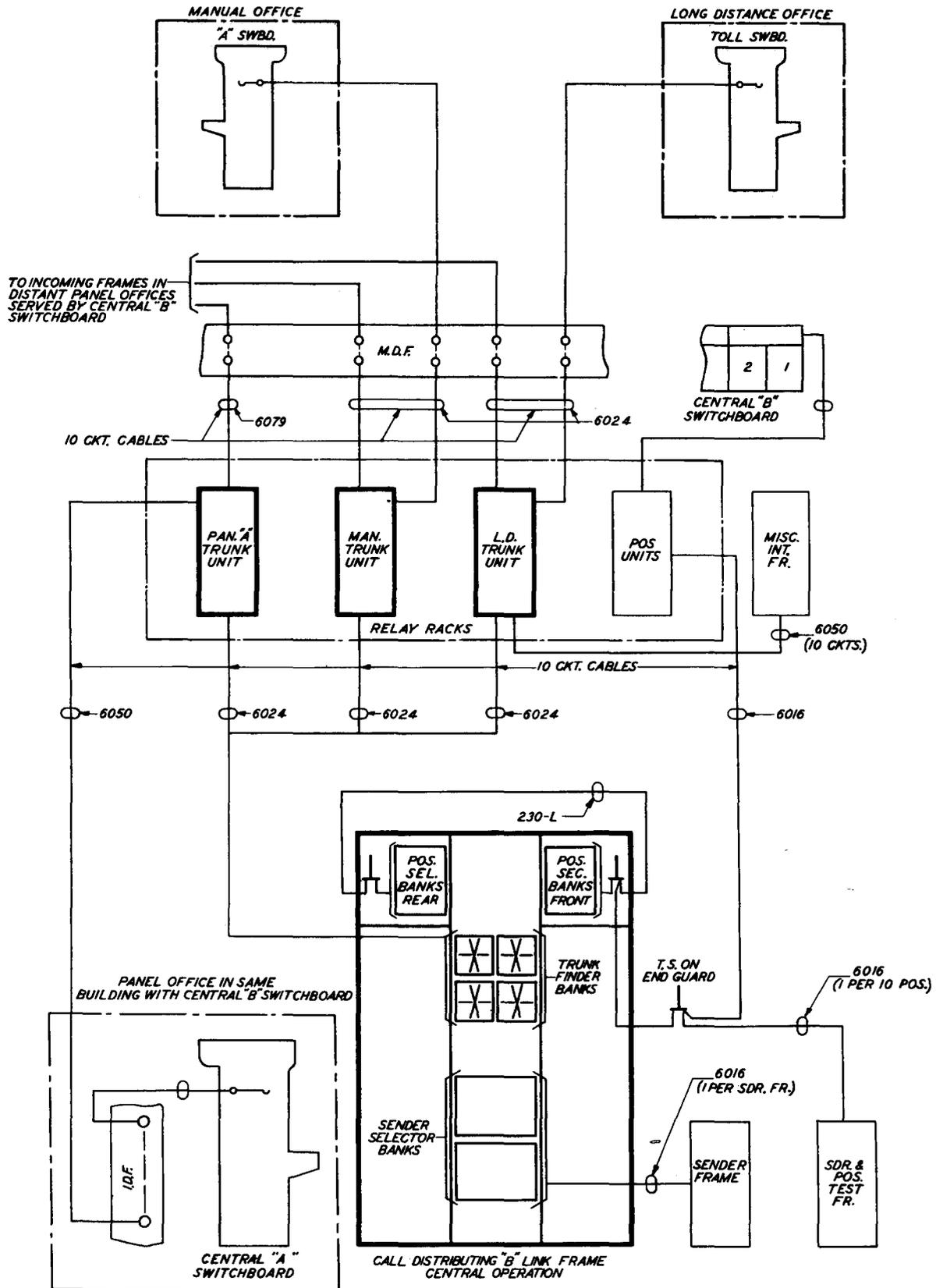


Fig. 4 - Cabling Diagram - "B" Link Frame Arranged for Central Operation

Trunk Units (Central Operation)

6.18 The leads from the trunk units associated with central "B" links to the trunk multiple on the central "B" link frame to the HMDF and to the miscellaneous interrupter frame shall be run in switchboard cable on a 10 circuit basis.

6.19 The register leads shall be cabled to the HIDF on the basis of one cable for each bay of relay rack having two leads per unit, one for the first and one for the last circuit. This method provides sufficient flexibility to meet any future regrouping by changes in strapping or jumpers at the IDF or by cutting the strapping on the units to produce groups of less than ten circuits.

Miscellaneous

6.20 The cabling between the distributing power terminal strips and the points of termination of the various circuits shall be run

in the largest switchboard cable consistent with the grouping of the leads and the point of termination.

6.21 The battery and ground leads to the relay rack trunk units used in central operation shall be cabled from the 48 volt fuse board. The cable code used shall be governed by the number of units in each bay of relay rack, one cable being provided per bay.

List of "A&M Only" and "Mfr Disc." Equipment

The following equipment has been replaced as indicated. Where "A&M Only" items appear, the issue numbers shown are those of the issue in which the rating was first applied.

EQUIPMENT	RATING	DETAILS	REPLACING EQUIPMENT
		LAST SHOWN IN ISSUE	
J28002A	Mfr Disc.	2	—
J28002B	Mfr Disc.	2	—
J28002C	Mfr Disc.	2	—

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