INCOMING LINK AND INCOMING EXTENSION FRAMES EQUIPMENT DESIGN REQUIREMENTS NO. 1 CROSSBAR SYSTEM

1. GENERAL

Scope

1.01 This specification, together with the supplementary information listed herein, covers the equipment design requirements for the framework, equipment, and circuits to be used in the engineering, manufacture, and installation of the incoming link and incoming extension frames in No. 1 crossbar offices.

1.02 This section is reissued to incorporate previous appendix changes.

Capacity

1.03 The incoming link frame may be used alone or in conjunction with an incoming extension frame. In either case, 200 primary-secondary links known as incoming links are provided which have access in the primary bay of the incoming link frame to a maximum of either 100 (A&M Only) or 160 incoming trunks. The links, collectively, have access in the secondary bay of the incoming link frame to 200 line junctors and in the incoming extension frame to an additional 200 line junctors. When the incoming extension frame is used, each line junctor is multipled to either two incoming link frames or two incoming extension frames.

1.04 The capacity of both the 100- and 160-trunk incoming link frames with respect to terminating marker-connector equipment is ten.

Description

1.05 The function of the incoming link frame is to interconnect incoming trunks with line junctors under control of the terminating marker. It is always used in conjunction with an incoming trunk frame and a terminating sender link frame which, for wiring and cabling reasons, are always located in the order mentioned, from right to left, as viewed from the front.

1.06 An incoming extension frame is associated with each incoming link frame initially when a larger ultimate capacity than that of the latter frame with respect to line junctors is required. The incoming extension frame, when furnished, is located adjacent to the associated incoming link frame and to its right as viewed from the front.

1.07 The 100- and 160-trunk capacity incoming link frames and the incoming extension frames are single-sided steel structures, 11 feet 6 inches high and 5 feet 4-1/4 inches, 5 feet 8-3/8 inches, and 2 feet 8-1/8 inches long, respectively. The incoming link frames comprise two bays and the incoming extension frame, one bay, all bays being arranged for 30-1/2-in. apparatus, except the primary bay of the 160-trunk incoming link frame which is arranged to accommodate 34-1/2-in. crossbar switches.

1.08 The left or primary bay and the right or secondary bay of the incoming link frames obtain their names from the switches they accommodate. The primary bay contains ten primary switches each of which, in the case of the 160-trunk capacity frame, accommodates eight pairs of trunks on the upper eight levels. The operation of a crosspoint on any level connects the associated pair of trunks to a particular vertical, from which one or the other of the trunks is extended to a link at the differentiating levels, 0 and 1. This provides a means of selecting any one trunk of the maximum of 160 which may be assigned to a particular frame. In the case of the 100-trunk capacity frame, one trunk is connected to each of the ten levels of each switch with the links connected directly to the switch verticals. On either frame, the verticals of each primary switch provide 20 link outlets for the 16 or 10 incoming trunks appearing

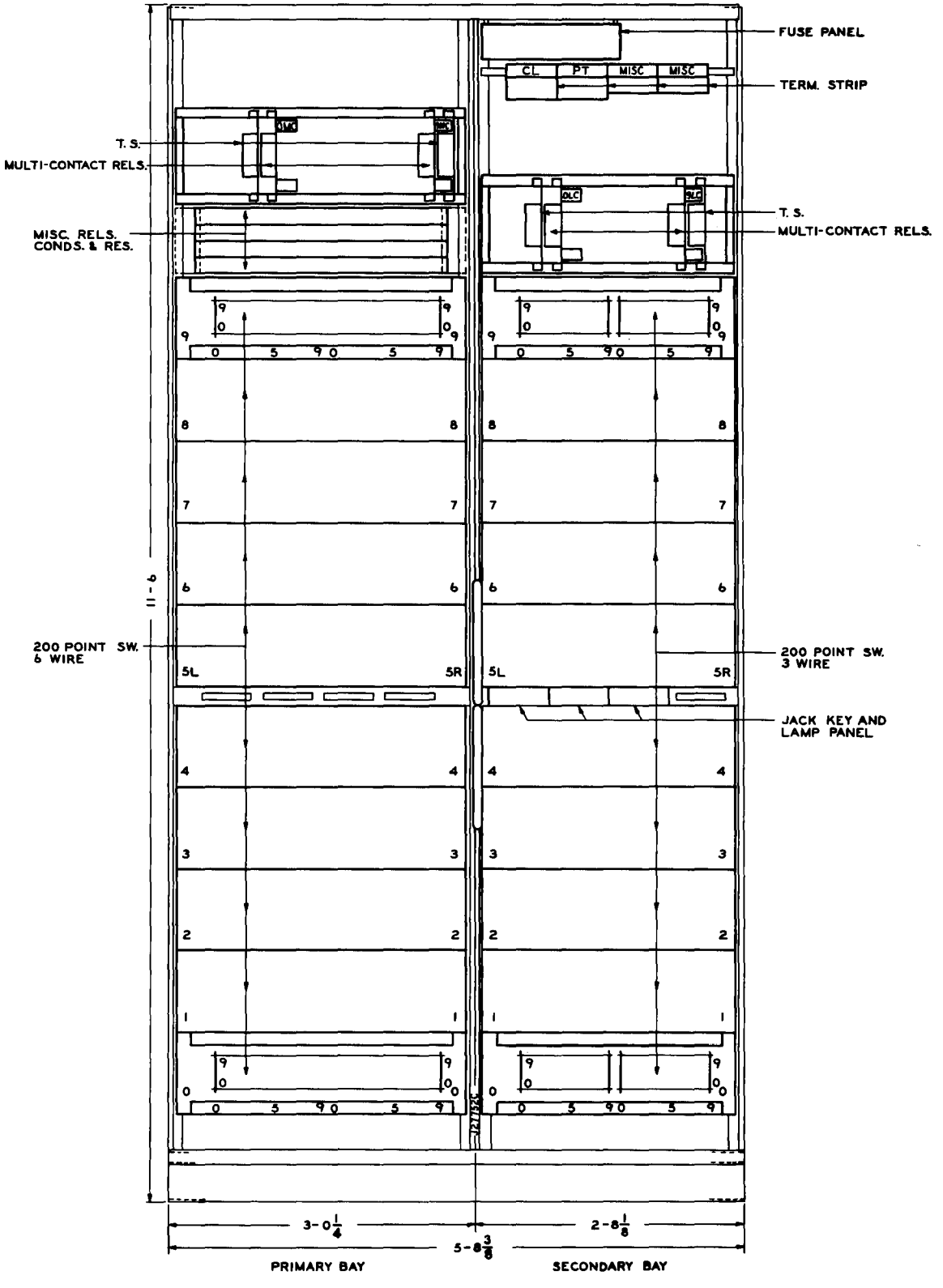

Fig. 1 – 160-trunk Capacity Incoming Link Frame

on that switch. The secondary bay contains ten secondary switches, the horizontal multiples of which are split at the midpoint when the extension frame is not required, providing a left group and a right group of ten link terminations per switch. When the extension frame is required, the left and right groups of ten links terminate respectively on the nonsplit horizontal multiple of each secondary switch and its associated extension secondary switch. The outlets for the incoming links between primary verticals and secondary horizontals are the secondary verticals which represent the incoming frame end of the line junctors. The 200 incoming links, from a distribution standpoint, are divided into two similar groups of 100, one group interconnecting the left halves and one, the right halves of the primary switch verticals and the secondary switch horizontals. The 0 to 9 verticals of each left primary half-switch are connected, at the respective 0 to 9 left secondary switches, to the horizontal corresponding in number to the primary switch. The right links are similarly wired.

1.09 In addition to the crossbar switches, the incoming link frames accommodate two rows of multicontact relays, four mounting plates, a fuse panel, terminal strips, jacks, keys, and lamps. The multicontact relays perform a connector function, one group operating with the other primarily to associate the terminating marker assigned to a specific call with the test and operating leads of the links available for that call. The incoming extension frame accommodates only the ten extension secondary crossbar switches.

1.10 The incoming link and incoming extension frames constitute fully wired shipping units. The equipment of the incoming link frame is variable insofar as the marker connector equipment is concerned and can be arranged for use with a minimum of three and a maximum of ten terminating markers. In addition, a small amount of equipment supplementary to the basic frame is required for incoming link frame when used with incoming extension frames. There are no variables affecting the equipment of the incoming extension frame.

1.11 Interconnections between the incoming link frame and other frames are made by means of switchboard cable, with the exception of those to the incoming trunk frame and certain connections to the incoming extension frame. The connections to the incoming trunk frame are included in horizontal local cable arms extending to the positions of terminal strips on each of the five incoming trunk units. The leads from the incoming link primary switches for the right 100 incoming links, which may terminate on the regular secondary switches or on extension secondary switches, are included in the ten horizontal arms associated with the secondary crossbar switches. Sufficient slack is provided in these leads so that they may be extended to the incoming extension frame which, when furnished, is located adjacent to and to the right of the incoming link frame. Other interconnections between incoming link and associated incoming extension frames, which consist of the selecting magnet multiple and the battery connection for these magnets, are included in small interbay local cables, one of which is furnished for each secondary extension switch.

1.12 The need for incoming extension frames arises from the requirement that each incoming frame be provided with a minimum of ten line junctors to each pair of line link frames utilizing these junctors in common and constituting a half-choice. Based on this requirement, either of two conditions may dictate the use of extension frames on a specific job.

(a) An incoming link frame, having a capacity of 200 line junctors, will provide the minimum junctor group to each of 20 half-choices. Where the number of half-choices exceeds 20, the line junctor capacity of the incoming link frames must be increased by the use of incoming extension frames which increase the line junctor capacity to 400 and provide the minimum junctor group to a maximum of 40 half-choices.

(b) Since a half-choice has a capacity of 100 line junctors, it will accommodate the minimum junctor group from each of ten incoming link frames. Where the number of incoming link frames exceeds ten, it becomes necessary that each group of line junctors be common to two incoming link frames rather than to a single frame. In this way, the 100

line junctor capacity of the half-choice is made available to a maximum of 20 incoming frames, which is the maximum number that may be served by a terminating marker group.

Where more than ten incoming frames are required, there will be, in the usual case, more than 20 half-choices and vice versa. Where extension frames are required and the line junctor groups appear on two incoming link frames or their associated extension frames, these frames, which have common access to 400 line junctors, are designated as an "incoming link group."

1.13 The distribution of line junctors is covered on drawing ED-25713-01 for installations of 2 to 10 incoming link frames and 2 to 10 line choices and on drawing ED-25714-01 for installations with 2 to 10 incoming groups and 4 to 20 line choices.

Subdivisions of Equipment

J27752B (AT&TCo Std) — Incoming Extension Frame

J27752C (AT&TCo Std) — Incoming Link Frame — 160-trunk Capacity

2. SUPPLEMENTARY INFORMATION

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

J29256 (816-011-150) — Line Junctor Redistribution Procedures

Floor Plan Data — Section 9.1, Sheets 6, 14, 25, and 26

3. DRAWINGS

Key Sheet

SD-25000-01 — Crossbar System No. 1

Framework

ED-25020-01 — Terminal Strip and Switch Mounting Details and Cable Brackets

ED-25021-01 — Assembly of Jack, Key, and Lamp Panels

ED-25022-01 — Assembly of Multicontact Relay Mounting

ED-25023-01 — Frame Details

ED-25025-01 — Assembly of Fuse Panel

ED-25041-01 — Assembly of District, Office, and 100-trunk Capacity Incoming Link Frames

ED-25075-01 — Assembly of Office and Incoming Extension Frames

ED-25499-01 — Assembly of 160-trunk Capacity Incoming Link Frame

Equipment

ED-25076-01 — Incoming Extension Frame

ED-25212-01 — Designation Cards

ED-25498-01 — Incoming Link Frame — 160-trunk Capacity

Wiring and Cabling

ED-25111-01 — Battery Distribution to Regular Secondary and Extension Secondary Switches

ED-25130-01 — Schematic of Marker Multiple Cable to Frame Connectors

ED-25150-01 — General Switchboard Cabling Plan for Link Frames

ED-25171-01 — Incoming Link Frame Switchboard Cabling Details

ED-25171-02 — Incoming Link and Extension Frame Switchboard Cabling Details

ED-25346-01 — Method of Running Power Feeders

ED-25500-01 — Incoming Link Frame — 160-trunk Capacity — Local Cable

ED-25713-01 — Line Junctor Assignment Chart — For Installations With 2 to 10 Incoming Link Frames and 2 to 10 Line Choices

ED-25714-01 — Line Junctor Assignment Chart — For Installations With 2 to 10 Incoming Groups and 4 to 20 Line Choices

4. EQUIPMENT

J27752B (AT&TCo Std) — Incoming Extension Frame

Equipment — ED-25076-01

Local Cable — ED-25074-01 or ED-25500-01

List 1 — Framework, assembly, wiring, and common equipment for one incoming extension frame

	WIRE	EQUIP
Framework ED-25075-01, G1		1
Jack, Key, & Lamp Panel ED-25021-01, Item 10		1
Sec Switch Ckt SD-25032-01, or SD-25457-01, Fig. 2	10	10
Frame Test Bat. Ckt SD-25207-01, Fig. 2		1

Notes

A. The incoming extension frame has no frame local cable. All connections are made by means of switchboard cable, frame local cable extensions from the incoming link frame, and ten small interbay local cables, furnished as part of list 1, which are individual to each extension switch and which provide connections to the associated switch on the incoming link frame.

B. The wiring furnished for the secondary switch circuit consists of the strapping of the switch horizontals, the selecting and holding magnets, and the supplementary interbay local cables to the incoming link frame. The switch horizontals represent the secondary ends of the right links. The selecting and holding magnets are strapped for the purpose of battery distribution. The link wiring is furnished as part of the incoming link frame local cable in the form of cable extensions from that frame. The selecting magnet multiple and the battery connection for these magnets are contained in the interbay local cables, which are placed and connected by the installer. Battery connections for the hold magnets are carried in switchboard cable in accordance with the battery distribution drawing.

C. The wiring of the frame test battery circuit consists of a multiple of the battery, ground, and high-resistance ground leads from the test terminals on the incoming link frame. This wiring is superimposed by the installer on the arm of the incoming link frame local cable which extends to the extension secondary switch immediately above the test terminals.

J27752C (AT&TCo Std) — Incoming Link Frame — 160-trunk Capacity

Equipment — ED-25498-01

Local Cable — ED-25500-01

List 1 — Framework, assembly, wiring, and common equipment for one incoming link frame wired for ten terminating markers and equipped for three terminating markers.

	WIRE	EQUIP
Framework ED-25499-01		1
Multicontact Relay Mtg P-423684		1
Multicontact Relay Mtg P-430734		1
Fuse Panel ED-25025-01, Item 4		1
Jack, Key, & Lamp Panel ED-25021-01:		
Item 2		2
Item 10		1
Inc Link & Conn Ckt SD-25457-01:		
Pri Switch Ckt, Fig. 1	10	10
Sec Switch Ckt, Fig. 2	10	10
Pri Switch Conn Ckt, Fig. 3	10	10
Sec Switch MB Ckt, Fig. 4	10	10
Mkr Conn Ckt, Fig. 5	10	3
Tbl Ind Conn Ckt, Fig. 7	1	1
Frame Lockout Ckt, Figs. 8, 9, & 11	1	0
Figs. 8, 9, & 11 (ES & RS Rels Only)		1
Frame Lockout Cont Ckt, Fig. 10	1	0

	WIRE	EQUIP
Transfer Relay Ckt, Fig. 12	4	1
Mkr Pref Relay for Term. Mkr 0, Fig. 15	1	1
Mkr Pref Relay for Term. Mkrs 1 to 8, Fig. 13	8	2
Mkr Pref Relay for Term. Mkr 9, Fig. 14	1	0
Mkr Lockout & Cont, Fig. 16	1	1
Misc Ckt SD-25207-01:		
Frame Test Bat. Ckt, Fig. 2	1	1
Remote Cont Jk Ckt, Fig. 4	1	1
Fuse Alarm Ckt, Fig. 5	1	1
Inc Trunk Frame Misc Ckts SD-25439-01, Figs. 2, 3, 5, 6, 7, 10, 11, 13, 14, & 15	1	0
Timing Ckt SD-25038-01, Fig. 1, DX Key & DX Lamp Only	1	0

List 2 — Apparatus per SD-25457-01, Fig. 5 less A resistance and Fig. 13 or 14 required in addition to list 1 for each terminating marker in excess of three.

List 3 — Apparatus per SD-25457-01, Fig. 5, A resistance only and Fig. 12 required in addition to list 1 and 2 for terminating markers 4, 6, or 8.

List 4 — Apparatus per SD-25457-01, Fig. 8 or 9 less ES and RS relays required in addition to list 1 for mate operation.

List 5 — Apparatus per SD-25457-01, Fig. 11 less ES and RS relays required in addition to list 1 for nonmate operation.

List 6 — Apparatus per SD-25457-01, Fig. 10 required in addition to lists 1 and 4 on even-numbered frames arranged for mate operation.

5. GENERAL NOTES

Equipment

5.01 The incoming link frames for an office not requiring extension frames are uniform in every respect. Where extension frames are required, the link frames vary depending on their use as even or odd frames. The variation involves one additional relay on even-numbered frames and minor differences in wiring at the apparatus associated with mate frame operation.

5.02 The incoming link frames for a specific job shall be provided with incoming extension frames and arranged in incoming groups initially wherever the ultimate requirements indicate that this arrangement will be necessary.

5.03 Marker lockout and control circuit per Fig. 16 of SD-25457-01 includes provision for the release from a distant point of alarms that may come in while the emergency marker preference relays are in use. With the earlier arrangement per Fig. 6 of SD-25457-01, it was necessary that all incoming link frames be operating on the regular marker preference relay chain at the time of transferring the alarms, since an alarm caused by the emergency relay chain could not be released from the distant point.

Wiring

5.04 No. 24 gauge type "C" wire shall be used for the frame local cables except battery and ground distributing leads which shall be No. 22 gauge.

5.05 The inner end of each hold magnet winding on the primary switches for the 100-trunk capacity incoming link frame and on all regular and extension secondary switches shall be connected by means of strapping or surface wiring from the shank of the terminal to the hole in the lower fork of the sleeve multiple strip of the associated vertical. This wiring may be applied on the bench at the time the outer ends of the select and hold magnet windings are strapped for battery distribution. Where there is any choice, the use of the hold magnet terminals for the termination of local or switchboard cable is avoided, the more readily accessible multiple strip terminals being preferred. In the case of the 160-trunk capacity incoming link frame primary switches, the wiring between the hold magnet and the zero level operating spring terminal of the associated vertical shall be included in the frame local cable.

5.06 The connections between the primary switch connector multicontact relays and the sleeves of the links shall be made at the primary switch multiple strip terminals for the 100-trunk capacity link frame and at the primary switch hold magnet terminals for the 160-trunk capacity incoming link frame.

5.07 The secondary switch wiring shall be arranged to permit the incoming link frame to be used with or without an incoming extension frame. The variables involved affect the secondary switch horizontal strapping and the right primary-secondary links. The strapping on the switches is cut at the midpoint on frames intended for use without extension frames. The secondary ends of the right links are terminated on the horizontals at the twelfth or 1R vertical on frames intended for use without extension frames and are left unconnected for extension to the extension frames on frames intended for use in this manner. In the latter case the right links are connected to the extension switch horizontals at the second or 1R vertical. The slack required in the link leads is handled as indicated on the local cable drawing.

5.08 The incoming link frame local cable shall be provided with universal wiring to permit the equipping of a specific frame with either Figs. 8 and 10, or Fig. 9 or Fig. 11 of SD-25032-01 for the 100-trunk capacity link frame or SD-25457-01 for the 160-trunk capacity link frame. In offices where the incoming link frames are arranged for mate operation, the even-numbered frames require Figs. 8 and 10 and the odd-numbered frames, Fig. 9. In offices where the incoming link frames are arranged for non-mate operation, Fig. 11 is required on all frames.

5.09 The equipment for the incoming trunk frame miscellaneous and timing circuits is furnished with and located on that frame. The wiring for these circuits, however, is included in the incoming link frame local cable as indicated on the local cable drawing. This permits the use of punchings on the miscellaneous terminal strips at the top of the incoming link frame for switchboard power cable connections. The incoming trunk frame is not provided with a frame local cable or terminal strips that can be used conveniently for this purpose.

5.10 The battery connection for Figs. 6, 7, and 10 of SD-25032-01 or Figs. 7, 8 or 9, 10, 12, and 16 of SD-25457-01 shall be made at the fuse designated "A."

5.11 The leads designated "HE," "CTT," "NC," "NT," "NTX," "NH," "NHX," "NN," and "NNX" from the marker connector multicontact relay multiple to the incoming trunks are included in the top arm of the local cable extending into the incoming trunk frame, as described in paragraph 1.11.

5.12 The distribution of battery to the secondary switches varies with the application of the incoming link frame with respect to its use alone or as a paired or unpaired frame with an extension frame. The shop wiring involved shall be universal, as shown on the drawing covering battery distribution to regular secondary and extension secondary switches. As shown on this drawing, the variables are applied by the installer.

5.13 The primary-secondary slip, as indicated in paragraph 1.08, is such that the switch and vertical numbers identifying the primary end of a link represent respectively the horizontal and switch numbers of the secondary end.

5.14 The strapping of the multicontact relays of the marker connector circuits shall be furnished for the full complement of relays in all cases. When these relays are only partially equipped, insulation and support shall be furnished for the strap wire as covered in the wiring and cabling specification.

5.15 25B terminal punchings shall be mounted at the positions of the (MP9) and (E9) relays of SD-25032-01 or SD-25457-01 when these relays are not equipped. The wiring normally terminating on the 1B and 3B contacts of these relays on SD-25032-01 and on the 1T and 3T contacts of these relays on SD-25457-01 shall be connected to the respective terminal punchings.

5.16 Terminals are provided at the top of the incoming link frame to permit any one of three optical cross connections to be applied to the "CL" and "PT" leads associated with

each group of incoming trunks. The purpose of these connections is to provide the terminating marker with certain information needed in completing a call. The three options for the "CL" lead serve to indicate the proper intercept routings and the supervisory features to be established for free calls, and they are designated "FS," "MAN," and "TOL" for full selector, manual, and toll types of incoming trunks and are used, in general, as follows:

FS — To route to the local intercepting or local trouble intercepting trunks on intercepted calls and to cancel supervision on free calls.

MAN — To route to the local intercepting or local trouble intercepting trunks on intercepted calls and to give supervision on free calls.

TOL — To route to the toll intercepting or toll trouble intercepting trunks on intercepted calls and to give supervision on free calls.

Note: The above wording is on the basis of separate routings for local and toll intercepted calls, but the same cross connections are required in offices having machine intercepting to enable the terminating marker to distinguish between operator- and machine-intercepted calls.

The three optional connections for the "PT" lead indicate whether or not service from specific incoming trunks is to be restricted to either physical or theoretical numbers within the same number series. They are designated "IP," "IT," and "IPT" and are used as follows:

IP — In offices in which 160-trunk capacity incoming link frames are used either initially or in conjunction with 100-trunk capacity incoming link frames as additions:

(a) The "PT" leads for all trunks in a 10,000 number series, which contains only physical office numbers, should be cross-connected to the "IP" terminal.

(b) The "PT" leads for all trunks which are common to the physical and theoretical offices of a 10,000 number series should be cross-connected to the "IP" terminal when completion of calls over these trunks is restricted to either physical or theoretical office numbers, in accordance with a discriminating signal received from the originating sender on full mechanical calls and from the "B" switchboard on calls from manual offices.

In offices in which only 100-trunk capacity incoming link frames are used, the above cross connections for the "PT" leads are not required.

In all offices, the "PT" leads for all trunks which are individual to the physical office of a 10,000 number series containing both physical and theoretical office numbers should be cross-connected to the "IP" terminal when completion of calls over these trunks is restricted to physical office numbers only.

IT — In all offices, the "PT" leads for all trunks which are individual to the theoretical office of a 10,000 number series containing both physical and theoretical office numbers should be cross-connected to the "IT" terminal when completion of calls over these trunks is restricted to theoretical office numbers only. The "IT" cross connection is not used for trunks which are common to both the physical and theoretical offices of a 10,000 number series.

IPT — In all offices, the "PT" leads for all trunks, either individual or common to the physical and theoretical offices of a 10,000 number series, should be cross-connected to the "IPT" terminal when completion of calls over these trunks to either physical or theoretical office numbers is not restricted.

On the 100-trunk capacity incoming link frame, the "CL" and "PT" leads are common to all of the trunks assigned to a particular primary switch and the cross connection of these leads must be made on the basis of groups of ten trunks. On the 160-trunk capacity incoming link frame, the "CL" and "PT" leads are common to the two trunks assigned to a particular primary switch horizontal and consequently the cross connection of these leads is made on the basis of groups of two trunks. The cross connections for each group of incoming trunks shall be made as specified by the telephone company.

Cabling

5.17 The code numbers of the switchboard cables ordinarily used in cabling the various circuits are shown on the switchboard cabling drawing. The circuits should, however, be checked to insure that the proper codes are specified to meet the latest circuit requirements. The cross-connecting information on the circuit shows what groups of leads are to be combined in the same cables.

5.18 For offices utilizing the incoming link frames in pairs, an odd number of frames may be specified to meet the incoming trunk requirements. In this case, one of the frames with its extension frame will be unpaired, and the associated 400 line junctors will not be multipled. Should the requirements indicate the future need for additional frames, the cables from the line junctor grouping frame for 100 junctors for the last equipped incoming link frame and for 100 junctors for the last equipped incoming extension frame shall be looped at the position of the future mate frames, as indicated on the switchboard cabling drawing. Sufficient slack shall be stored on the cable rack to permit the loops to be formed to the future secondary switches. This arrangement is required to minimize congestion of the line junctor cabling on the incoming and incoming extension frames.

5.19 The schematic of connections from the terminating markers to incoming link frames for initial installations and additions of both link frames and markers is shown on ED-25130-01.

5.20 The distribution of the battery supply to the select and hold magnets of the secondary switches on paired incoming link and extension frames is covered on ED-25111-01. The voltage drop between the fuses and any associated magnet may not exceed 0.25 volts. This requirement establishes a limitation on the separation of frames which have magnets fused in common. With the codes of cables specified on the switchboard cabling detail drawing, the length of the runs between the miscellaneous terminal strips of each frame and the secondary switches of the paired frame may not exceed 100 feet, including strippers. Any instances in which these requirements cannot be met shall be referred to the Bell Telephone Laboratories, Inc. Refer also to J20151 (816-016-150).

Switchboard Power Cabling

5.21 Switchboard power cables containing the miscellaneous wiring to the centralized DPTS and SDPTS shall be run along the under side of the cable rack for each row of frames and, when required, on top of the cable rack, from the end of the row of frames to the DPTS and SDPTS. At each frame the cables shall be looped at the miscellaneous terminal strips and connected as required.

5.22 The cabling between the DPTS and SDPTS and the points of termination of the various circuits shall be run in the largest switchboard cables consistent with the grouping of leads and the point of termination.

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

5.23 The following equipment has been replaced as indicated:

EQUIPMENT	RATING	COVERED IN ISSUE	REPLACING EQUIPMENT
J27752A	Mfr. Disc.	5	J27752C
J27752A, L5	Mfr. Disc.	1	J27752A, L1

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