# DISTRICT LINK FRAME
# EQUIPMENT DESIGN REQUIREMENTS
# NO. 1 CROSSBAR SYSTEM

## 1. GENERAL

### SCOPE

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

**1.02** This specification is reissued:

(a) To facilitate the modification of the district link frame for increased junctor capacity in accordance with SD-25031-01, Issue 21D. J27552A is affected.

(b) To provide for a modular type fuse panel. The information is in accordance with SD-25205-01, Issue 8B. J27552B is affected.

### CAPACITY

**1.03** The district link frame has a capacity of 200 primary-secondary links known as district links which have access in the primary bay to 100 (120 when auxiliary district junctor frames are used) district junctors and in the secondary bay to 200 office junctors. Its capacity with respect to originating markers is 8, and with respect to office frames is 20.

**1.04** The regular district frame capacity with respect to district junctors can be increased to a maximum of 120 junctors in which case 40 of the 200 district links have multiple assignments.

### DESCRIPTION

**1.05** The district link frame is a 2-bay, bulb-angle structure 11 feet 6 inches high and 5 feet 4-1/4 inches long, which serves to interconnect district junctors and office junctors under the control of an originating marker. It is always accompanied on the floor plan by a district junctor frame and a subscriber sender link frame. The three frames constitute what is called a district group or a district frame. Figure 1 shows a regular district frame as it appears when no auxiliary district junctor frames are provided.

**1.06** In each of the two bays of the district link frame are mounted ten-3-wire 200-point crossbar switches. Those in the left bay are called primary switches, and have 100 district junctors from the adjacent frame connected to their horizontals. Those in the right bay are called secondary switches and have 200 office junctors connected to their verticals. Joining the primary switch verticals and the secondary switch horizontals are the district links; there are 100 links from the first ten verticals in each primary switch to the horizontals of the left half of the secondary switches, and a second 100 links joining the second ten primary switch verticals to the horizontals of the right half of the secondary switches. The links are connected in a fixed pattern wherein the 0 to 9 verticals on each left primary half-switch terminate in the respective 0 to 9 left secondary switches on the horizontal whose number is the same as that of the primary switch. The right halves are similarly connected. This results in a primary-secondary slip wherein the switch and vertical numbers identifying the primary end of a link represent, respectively, the horizontal and switch numbers of the secondary end.

**1.07** The capacity with respect to district junctors can be increased to a maximum of 120 by adding two additional primary switches to the regular district frame group. Due to lack of space on the district link frame, the added switches are physically located on the primary bay of the corresponding subscriber sender link frame. These switches each have ten district junctors from auxiliary district junctor frames connected to their horizontals. District links from these switches are multiplied to the existing links in such manner as to provide uniform distribution of the added district

junctors. Figure 2 shows a regular district frame arranged to provide the equipment required when auxiliary district frames are added. As shown in the figure an auxiliary district frame is generally similar to a regular district frame with no district link frame or district link switches provided.

**1.08** In addition to the crossbar switches, the district link frame accommodates three rows of multicontact relays, three plates of contact protection and relay equipment, a fuse panel, terminal strips, jacks, keys, and lamps. The multicontact relays perform a connector function, one group operating with the other two to associate the originating marker involved in a specific call, with the test and operating leads of the links and the office junctors available for reaching the desired destination.

**1.09** When the frame capacity with respect to district junctors is increased above 100, the required primary switch connector relays are added adjacent to the existing connector relays. This is illustrated in Fig. 2.

**1.10** The district link frame is a fully wired shipping unit with variable equipment only insofar as the marker connector and office junctor connector relays are concerned. The basic frame includes connector equipment for three originating markers and ten office link frames.

**1.11** The district link frame is also variable in that it is possible to increase the district junctor capacity 10 or 20 percent by adding one or two primary switches, respectively, as described in 1.04, 1.07, and 1.09.

**1.12** Interconnections between this and other frames, except the associated district junctor frame, are made with switchboard cable. Interconnections with the adjacent district junctor frame are made with five extensions on the district link frame local cable which terminate on the horizontal terminal strips on the respective district junctor units.

**1.13** Interconnection of the eleventh and twelfth primary switches and connector relays with the added district junctors on the auxiliary district junctor frames is made by switchboard cable.

**Office Junctor Assignment**

**1.14** An office junctor group consists of all of the junctors on a district link frame which terminate on a specific office link frame. In a particular office, each district link frame will have equal junctor access to all office frames. The number of district link frames serving in a common group may vary from 2 to 20. The size of the junctor group, interconnecting each district with each office link frame, depends upon the size of the installation and becomes smaller as the number of link frames increases. However, this reduction in junctor group size with growth is not directly proportional to the office size since the larger junctor groups in the smaller offices operate more efficiently. For this reason, not all of the available district link secondary verticals are used to terminate junctors in the smaller installations. The number and size of the office junctor groups on the district frames vary from 2 groups of 60 to 20 groups of 10 junctors.

**1.15** Office junctor assignment, insofar as junctor connector relays are concerned, involves only sleeve lead connections. Since a junctor connector relay accommodates a maximum of 20 junctors, it becomes necessary to subgroup the junctor groups for the smaller jobs. The minimum number of junctors per group being 10, and the minimum number of groups or subgroups 10, 100 junctors can be permanently assigned to the 10 junctor connector relays (5 multicontact relays) which are always furnished. The 100 permanently assigned junctors are those originating at the 0L to 4L and 0R to 4R verticals of the 10 secondary switches. The remaining junctors are variably distributed as required. For this purpose, the variable junctors and their possible terminations on the junctor connector relays are wired separately to a terminal strip designated SHX where they may be cross-connected in accordance with standard patterns to assign the required junctors to the required groups.

**1.16** The subgrouping of junctors for jobs having less than 10 office frames results in the distribution of the junctors of a group over two or more connector relays. The various junctor connector relays associated with a given group are used to connect first, second, or third subgroups to the marker. In some cases, junctors of several junctor groups, other than first subgroup junctors, are assigned to a specific relay. In the routing

of a call involving such a relay, a feature of the originating marker employing "blanking patterns" is used by means of which those of the junctors having other than the desired destination are made to appear busy to the marker during test. This feature of the marker makes it possible to utilize the same assignment of variable junctors to junctor connector relays for the respective district frames of all sizes of installations involving from 2 to 10 office frames inclusive. This assignment changes, however, with each increase in the number of office frames beyond 10.

**1.17** On jobs having junctor distributions arranged for more than 10 office frames, the number of office junctors per group is less than 20. Since the originating marker is arranged to test 20 junctors on each call, the unassigned paths under such conditions are made to appear busy to the marker during test. This is also accomplished by the "blanking patterns" in the marker. It has been found economically advantageous to utilize the same blanking pattern for offices having 16 to 18 office frames, supplementing the pattern in the 18 frame case by grounding junctor sleeves on the district link frame as covered on the office junctor assignment chart. To this end, ground punchings are provided on the terminal strip furnished for junctor sleeve cross connections.

**1.18** The assignment of junctor connector relays, with respect to office frame destination, shall be in agreement with the office junctor assignment charts covered on ED-25012-01 and ED-25016-01. The assignment of junctors on the junctor connector relays shall also conform with the assignment charts in offices arranged for 8 or more office link frames; on the smaller size jobs, where the assignment charts do not show all of the first 10 connector relays assigned to junctor groups or do not show their contacts fully cross-connected, the junctors shall be assigned to the connector relays in accordance with ED-25012-01, Fig. 1. The assignment of the relays with respect to destination of first subgroup junctors differs on odd-numbered frames from the assignment on even-numbered frames, but is alike on all odd-numbered and on all even-numbered frames. This results from the fact that the junctors to office frame 0, for instance, include paths from secondary half-switches 0L, 1R, 2L, 3R, etc, on even district frames; whereas secondary half-switches 0R, 1L, 2R, 3L, etc, provides the corresponding paths on odd district frames. Since these junctors appear on relays (JC0) and (JC1), respectively, on all district frames, it is necessary to operate the (JC0) relay on even frames and the (JC1) relay on odd frames to route a call to office frame 0. The marker applies ground to a particular one of 20 leads to the junctor connector relays to effect a specific routing. Flexibility is consequently provided on the MISC terminal strip so that the junctor connector relays may be connected properly to the operating leads from the marker. This flexibility is also used in offices having less than 10 office link frames to permit the assignment of second subgroup junctors to the same office link frame to different (JC) relays on different district link frames. Higher-numbered subgroups of junctors are similiary assigned. This usage of the (JC) relays is required by the permanent assignment of 100 junctors on each district link frame referred to in 1.11. Reference to the office junctor assignment charts will reveal that any attempt to use corresponding relays for corresponding subgroups would result in the connection of several junctors to the same vertical on the same office frame.

**1.19** The distribution of office junctors is covered on drawing ED-25016-01 for installations with 2 to 8 office frames and on ED-25012-01 for installations with 10 to 20 office frames.

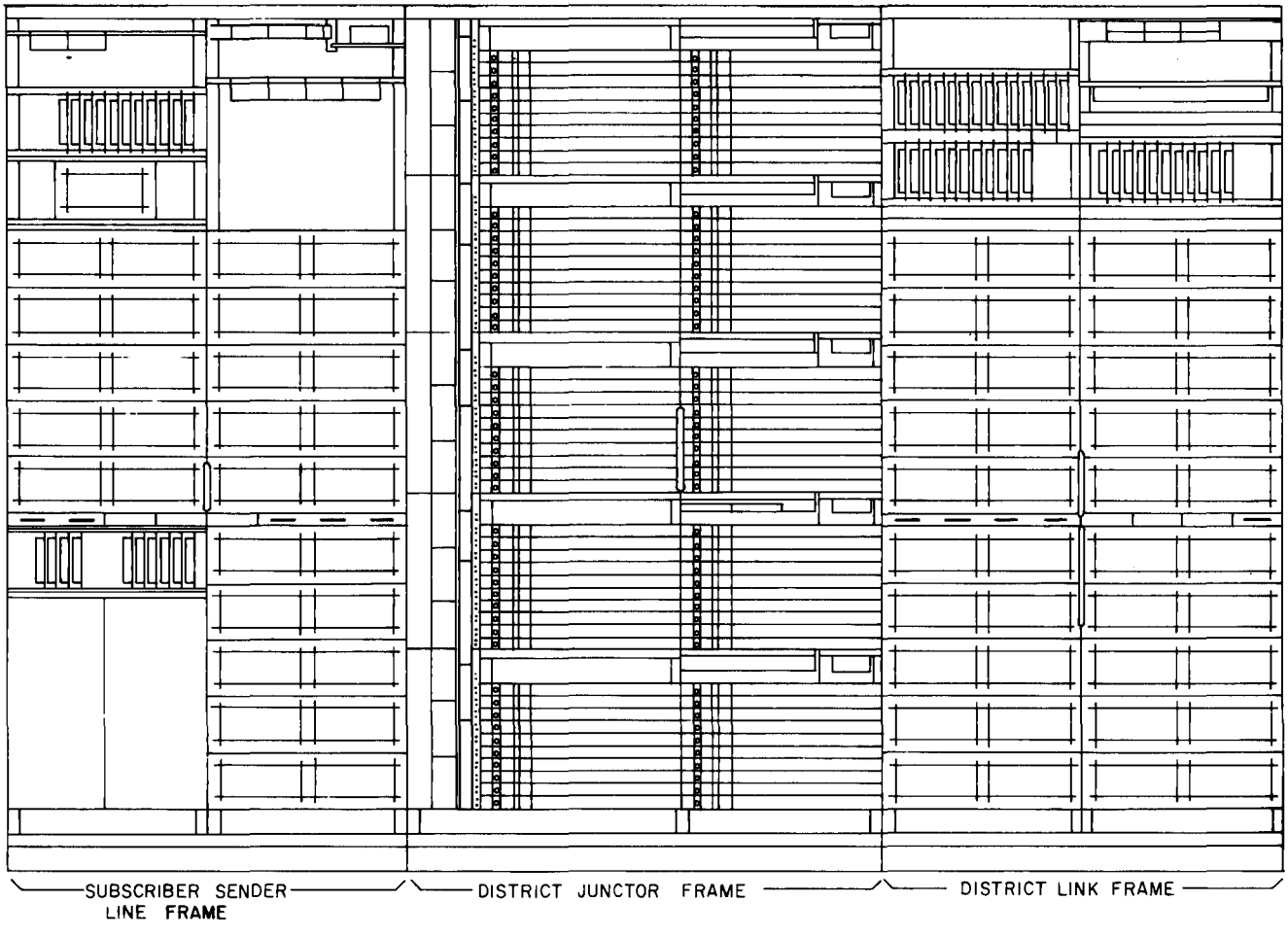


**Fig. 1—Regular Distinct Frame Group**

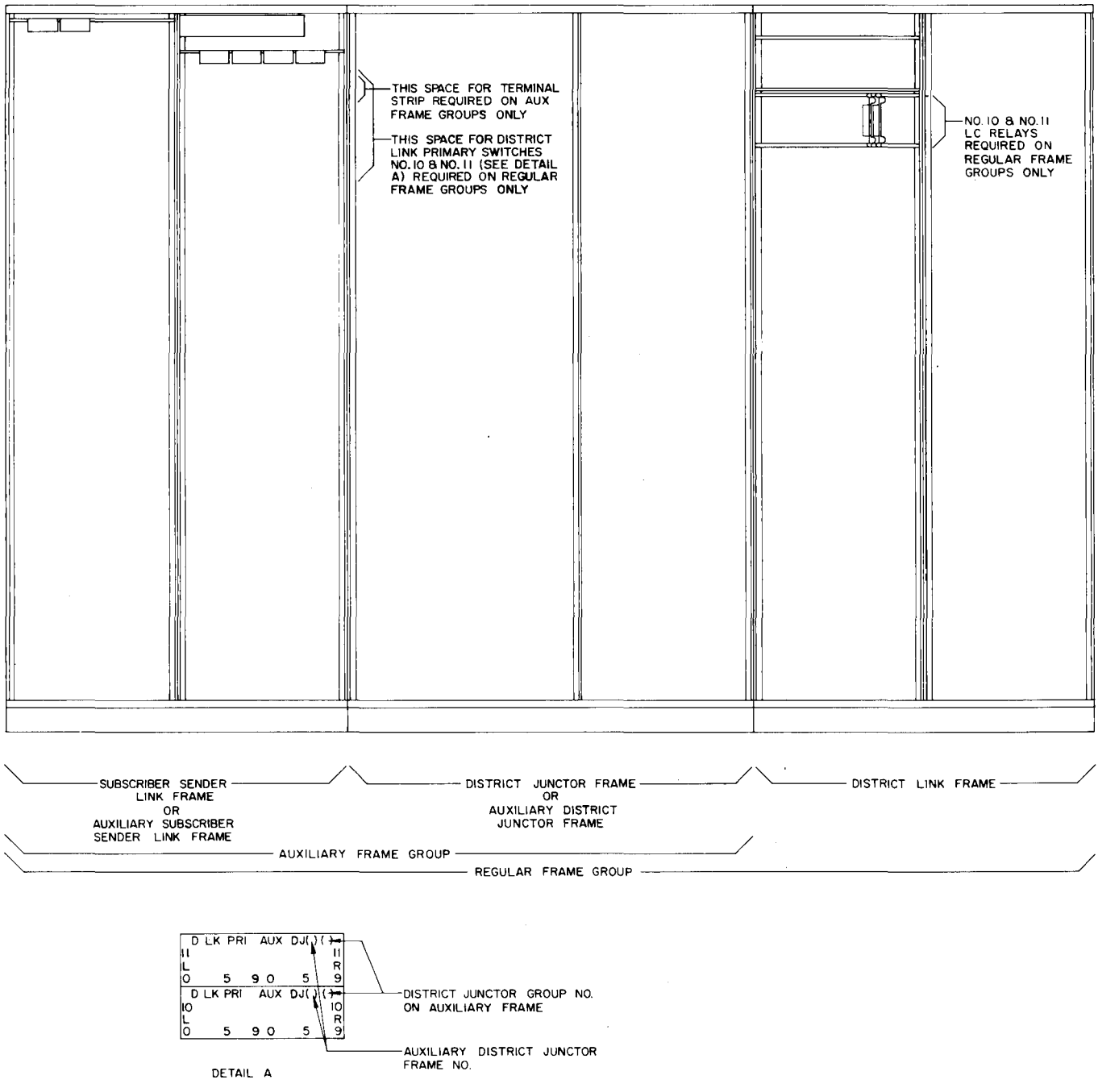


**Fig. 2—Auxiliary District Frame Group**

## 2. SUPPLEMENTARY INFORMATION

816-000-000—No. 1 Crossbar System Index
J29254—816-009-200—Installation of Additions to Switching Equipment
J29255—816-010-150 817-018-150—Office Junctor Redistribution Procedures for the Installation of Additions
Floor Plan Data—Section 9.1, Sheet 4
—Section 9.1, Sheet 82

## 3. DRAWINGS

WE J drawings should be ordered by referring to the prefix and base number and requesting the current dash (—) number.

**Keysheet**

SD-25000-01—No. 1 Crossbar System

**Framework**

ED-25020-01—Terminal Strip and Switch Mounting Details and Cable Brackets
ED-25021-53—Assembly of Jack, Key, and Panels
ED-25022-01—Assembly of Multicontact Relay Mounting
ED-25023-18—Frame Details
ED-25025-59—Assembly of Fuse Panel
ED-25041-30—A&M Only—Assembly of District, Office, and Incoming Link Frames
ED-25553-70—Assembly of District or Office Link Frame

**Equipment**

ED-25042-01—A&M Only—District Link Frame Equipment—For Use in Offices Arranged for Office Junctor Battery Distribution
ED-25653-01—District Link Frame Equipment
ED-25212-10—Designation Cards
J27552A—A&M Only—District Link Frame—For Use in Offices Arranged for Office Junctor Battery Distribution
J27552B—AT&TCo Std—District Link Frame

**Wiring and Cabling**

ED-25012-( )—Office Junctor Assignment Chart—10 to 20 Office Frames
ED-25016-01—Office Junctor Assignment Chart—2 to 8 Office Frames
ED-25043-10—District Link Frame Local Cable
ED-25130-10—Schematic of Marker Multiple Cabling to Frame Connectors
ED-25168-10—District Link Frame Switchboard Cabling Details
ED-25346-01—Method of Running Power Feeders

## 4. EQUIPMENT

### *J27552A—A&M Only—District Link Frame—For Use in Offices Arranged for Office Junctor Battery Distribution*

Equipment—ED-25042-01
Local Cable—ED-25043-01

***List 1***—Framework, assembly, wiring, and common equipment for one district frame wired for ten pairs of office link frames and eight originating markers and equipped for one to five pairs of office frames and three originating markers (see 5.04).

| | WIRE | EQUIP | NOTES |
|---|---|---|---|
| Framework, ED-25041-30: | | | |
| G1 | | 1 | |
| Multicontact Relay Mtg, ED-25022-01: | | | |
| Item 4 | | 3 | |
| Fuse Panel, ED-25025-59: | | | |
| Gr 4 | | 1 | |
| Jack, Key, and Lamp Panel, ED-25021-53: | | | |
| Gr 2 | | 2 | |
| ED-25021-53: | | | |
| Gr 10 | | 1 | |
| Dist Link & Conn Ckt, SD-25031-01: | | | |
| Primary Sw Ckt, Fig. 1, With ZE Option | 12 | 10 | D |
| Secondary Sw Ckt, Fig. 2 | 10 | 10 | |
| Primary Sw Conn Ckt, Fig. 3 | 12 | 10 | D |
| Secondary Sw Make-busy Ckt, Fig. 4 | 10 | 10 | |
| Secondary Sw & Office Junctor Conn Ckt for Relays (JC0) to (JC9) Fig. 5 | 10 | 10 | |
| Secondary Sw & Office Junctor Conn Ckt for Relays (JC10) to (JC19); Fig. 5, less wiring from contacts 10 to 49 | 10 | 0 | B |
| Marker Conn Ckt, Fig. 6 | 8 | 3 | A |
| Marker Lockout Ckt, for Originating Marker 0 Fig. D | 1 | 1 | |
| Marker Lockout Ckt for Originating Marker 1 to 6 Fig. E | 6 | 2 | |
| Marker Lockout Ckt for Originating Marker 7, Fig. F | 1 | 0 | |
| District Frame Trouble Indicator Conn Ckt, Fig. 8 | 1 | 1 | |
| Marker Lockout & Control Ckt, Fig. 9, less (TR4) and (TR5) Relays | 1 | 1 | 5.03 |
| District Link Frame Misc Ckt, SD-25205-01: | | | |
| Frame Test Bat. Ckt, Fig. 2 | 1 | 1 | |
| Permanent Signal Overflow Alarm, Fig. 4 | 1 | 0 | C |
| Remote-control Jack Ckt, Fig. 5 | 1 | 1 | |
| Fuse Alarm Ckt, Fig. 7 | 1 | 1 | |
| District Junctor Frame Misc Ckt, SD-25204-01: | | | |
| Fig. 2 & 6 | 1 | 0 | 5.09 |

***List 2***—Apparatus per SD-25031-01, Fig. E or F, and Fig. 6, less MCB relay and A resistance, required in addition to list 1 for each originating marker in excess of three.

***List 3***—Apparatus per SD-25031-01, Fig. 6 (MCB relay and A resistance only) required in addition to list 1 and 2 for the fifth and seventh originating markers.

***List 4***—Apparatus per SD-25031-01, Fig. 5 required in addition to list 1 for each pair of office link frames in excess of five pairs.

***List 5***—Wiring per SD-25031-01, Fig. 5 (contacts 10 to 49 of JC10 to JC19 relays) required in addition to list 1 and 4 when frame is arranged for more than five pairs of office link frames.

***List 6***—Apparatus per SD-25205-01, Fig. 4 required in addition to list 1 for permanent signal overflow alarm.

***List 7***—Wiring and equipment per SD-25031-01, Fig. 3, with ZF and ZH options required in addition to list 1 for each subgroup of ten district junctors added to increase the regular district frame capacity above 100 district junctors. (See Notes D and E.)

***List 8***—A&M Only—Equipment per SD-25031-01, Fig. 3, with ZF and ZG options required in addition to list 1 for each subgroup of ten district junctors added to increase the regular district frame capacity above 100 district junctors. (See Notes D and E.)

***Notes***

A. The marker connector for this circuit requires 1-1/2 multicontact relays. List 2 accordingly furnishes the MCA relay and A resistance for each marker beyond three, and list 3 furnishes the MCB relay and A resistance for the fifth and sixth or seventh and eighth originating markers.

B. List 5 furnishes wiring from the JC10 to JC19 relays to the SHX terminal strip to provide marker access flexibility for the sleeves of variable junctors, as discussed in 1.14. The

remaining wiring for the JC10 to JC19 relays is included in the frame local cable. (See Note 2.03 on SD-25031-01.)

C. List 6 furnishes apparatus for the permanent signal overflow alarm feature which is not required in offices equipped for automatic message accounting.

D. A maximum of two lists 7 or 8 can be provided per regular district frame. The added primary switch connector relays are located adjacent to the existing connector relays. The district junctors required are subgroups located on an auxiliary district frame group.

E. List 8 provides the equipment required to increase the regular district frame capacity above 100 district junctors in existing installations.

### *J27552B—AT&TCo Std—District Link Frame*

Equipment—ED-25653-01
Local Cable—ED-25043-10

*List 1*—Framework, assembly, wiring, and common equipment for one district link frame wired for ten pairs of office link frames and eight originating markers and equipped for one to five pairs of office frames and three originating markers (see 5.05).

| | WIRE | EQUIP | NOTES |
|---|---|---|---|
| Framework, ED-25553-70: | | | |
| G2 | | 1 | |
| Multicontact Relay Mtg, ED-25022-01: | | | |
| Item 4 | | 3 | |
| Jack, Key, & Lamp Panel, ED-25021-53: | | | |
| Gr 2 | | 2 | |
| ED-25021-53: | | | |
| Gr 8 | | 1 | |
| Dist Link & Conn Ckt, SD-25031-01: | | | |
| Primary Sw Ckt, Fig. 1, With ZE Option | 12 | 10 | D |
| Secondary Sw Ckt, Fig. 2 | 10 | 10 | |
| Primary Sw Conn Ckt, Fig. 3 | 12 | 10 | D |
| Secondary Sw Make-busy Ckt, Fig. 4 | 10 | 10 | |
| Secondary Sw & Office Junctor Conn Ckt for Relays (JC0) to JC9) Fig. 5 | 10 | 10 | |
| Secondary Sw & Office Junctor Conn Ckt for Relays (JC10) to (JC19), Fig. 5, less wiring from contacts 10 to 49 | 10 | 0 | B |
| Marker Conn Ckt, Fig. 6 | 8 | 3 | A |
| Marker Lockout Ckt for Originating Marker 0 Fig. D | 1 | 1 | |
| Marker Lockout Ckt for Originating Marker 1 to 6 Fig. E | 6 | 2 | |
| Marker Lockout Ckt for Originating Marker 7 Fig. F | 1 | 0 | |
| Marker Lockout & Control Ckt Fig. 9, Less (TR4) and (TR5) Relays | 1 | 1 | 5.03 |
| District Frame Trouble Indicator Conn Ckt, Fig. 8 | 1 | 1 | |
| District Link Frame Misc Ckt, SD-25205-01: | | | |
| Frame Test Bat. Ckt, Fig. 2 | 1 | 1 | |
| Permanent Signal Overflow Alarm, Fig. 4 | 1 | 0 | C |
| Remote-control Jack Ckt, Fig. 5 | 1 | 1 | |
| Fuse Alarm Ckt, Fig. 7 | 1 | 1 | |
| District Junctor Frame Misc Ckt, SD-25204-01: | | | |
| Fig. 2 & 6 | 1 | 0 | 5.09 |

*List 2*—Apparatus per SD-25031-01, Fig. E or F, and Fig. 6, less MCB relay and A resistance, required in addition to list 1 for each originating marker in excess of three.

*List 3*—Apparatus per SD-25031-01, Fig. 6 (MCB relay and A resistance only) required in addition to list 1 and 2 for the fifth and seventh originating markers.

*List 4*—Apparatus per SD-25031-01, Fig. 5 required in additon to list 1 for each pair of office link frames in excess of five pairs.

*List 5*—Wiring per SD-25031-01, Fig. 5 (contacts 10-49 of JC10 to JC19 relays) required in addition to list 1 and 4 when frame is arranged for more than five pairs of office link frames.

*List 6*—Apparatus per SD-25205-01, Fig. 4 required in addition to list 1 for permanent signal overflow alarm.

*List 7*—Wiring and equipment per SD-25031-01, Fig. 3, with ZF and ZH options required in addition to list 1 for each subgroup of ten district junctors added to increase the regular district frame capacity above 100 district junctors. (See Notes D and E.)

*List 8*—A&M Only—Equipment per SD-25031-01, Fig. 3, with ZF and ZG options required in addition to list 1 for each subgroup of ten district junctors added to increase the regular district frame capacity above 100 district junctors. (See Notes D and E.)

*Notes*

A. The marker connector for this circuit requires 1-1/2 multicontact relays. List 2 accordingly furnishes the MCA relay and A resistance for each marker beyond three, and list 3 furnishes the MCB relay and A resistance for the fifth and sixth or seventh and eighth originating markers.

B. List 5 furnishes wiring from the JC10 to JC19 relays to the SHX terminal strip to provide marker access flexibility for the sleeves of variable junctors, as discussed in 1.14. The remaining wiring for the JC10 to JC19 relays is included in the frame local cable. (See Note 2.03 on SD-25031-01.)

C. List 6 furnishes apparatus for the permanent signal overflow alarm feature which is not required in offices equipped for automatic message accounting.

D. A maximum of two lists 7 or 8 can be provided per regular district frame. The added primary switch connector relays are located adjacent to the existing connector relays. The district junctors required are subgroups located on an auxiliary district frame group.

E. List 8 provides the equipment required to increase the regular district frame capacity above 100 district junctors in existing installations.

## 5. GENERAL NOTES

### Equipment

**5.01** The district link frames for a specific job are identical except for cross connections on the MISC and SHX terminal strips. These cross connections made on the front of the terminal strips follow standardized patterns as discussed in 1.11 and 1.14, respectively. These variables may be applied in the shop or in the field, their application by the installation force having the advantage that it permits the shipping of identical frames to the job.

**5.02** ***Marker lockout and control*** circuit per Fig. 9 of SD-25031-01 includes provision for the release of alarms from a distant point that may come in while the emergency marker perference relays are in use. With the earlier arrangement per Fig. 7 of SD-25031-01, it was necessary that all district link frames be operating on the regular marker preference relay chain, since an alarm caused by the emergency reference chain could not be released from the distant point.

**Office Junctor Battery Distribution**

**5.03** Prior to the introduction of J27552B, No. 1 crossbar offices were arranged to furnish battery supply for the office link primary holding magnets from the same fuses which supply the associated secondary holding magnets on the district link frames. Because of the varying association between district secondary verticals and office primary verticals, the battery distribution was also made variable. The battery distributing point, a group of terminals on the office junctor grouping frame, obtained the battery supply from the district frame fuses. Each vertical holding magnet on each office frame was cabled to the distributing terminal strips where it was strapped to the proper battery supply. J27552A shall be used for all additions to offices arranged in this manner.

**5.04** With the introduction of J27552B, the office junctor battery distribution is eliminated. With this arrangement, the primary holding magnets on the office link frame are fused independently of the secondary holding magnets on the district link frames. Battery supply for the holding magnets is obtained in each case at the fuse panels on the respective frames. Under these conditions, one fuse is furnished for each five holding magnets so that J27552B is furnished with a considerably larger fuse panel than J27552A.

**Wiring and Cabling**

**5.05** The No. 24 gauge type BU wire shall be used for the frame local cable except battery and ground distributing leads which shall be No. 22 gauge type BU wire.

**5.06** Cross connections at the MISC and SHX terminal strips shall be made with No. 22 gauge type K wire, white, black, red, brown, and orange being used for SH terminals 5 to 9, respectively.

**5.07** The strapping of the multicontact relays of the marker, primary switch connector, and junctor connector circuits shall be furnished for the full complement of relays in all cases. When these relays are only partially equipped, the straps shall be continued beyond the last unequipped position, supported at that position and insulated as illustrated in the wiring and cabling specification.

**5.08** The battery connection for Fig. 9 and 8 shall be made at the fuse designated "A."

**5.09** The equipment for the regular district junctor frame miscellaneous circuit is furnished with and located on that frame, but because the district junctor frame does not include a frame local cable, certain of the wiring for this circuit is included in the district link frame local cable. This permits the switchboard power cable connections to be made on the miscellaneous terminal strips at the top of the district link frame.

**5.10** On the auxiliary district junctor frame a hand formed local cable to a terminal strip on the auxiliary subscriber sender link frame substitutes for the required miscellaneous circuit connections since no district link frame is provided.

**5.11** The code numbers of the switchboard cables ordinarily used in cabling the various circuits are shown on the switchboard cabling drawing. These 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.

**5.12** The schematic of connections from the originating markers to district link frames for initial installations and additions of both link frames and markers is shown on ED-25130-01.

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

| EQUIPMENT | RATING | DETAILS LAST SHOWN IN ISSUE | REPLACING EQUIPMENT |
|---|---|---|---|
| J27552A | A&M Only | 2 | J27552B |

The above 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.