

## SUBSCRIBER 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 subscriber panel link frame in panel offices.

1.02 Master keysheets covering circuits arranged for use with line circuits having ground on the cut-off relay shall be used only on additions to existing offices.

1.03 Master keysheets covering circuits arranged for use with line circuits having battery on the cut-off relay shall be used for all new central office equipments.

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

#### Status of Former Standard Equipment

1.05 The following unit is no longer standard and is replaced as indicated. The recommended unit shall in all cases be used for additions or replacements to existing jobs and for all new jobs as covered below.

<u>Equip- ment</u>	<u>Rating</u>	<u>New Jobs</u>	<u>Exist. Grd.on C.O.</u>	<u>Exist. Bat.on C.O.</u>
J28401A	A&M Only	J28401B	J28401A	J28401B

#### Capacity

1.06 The subscriber link frame has a capacity of 30 link circuits or 60 dialing district sender selectors, 8 or 16 district test connectors; 20 or 40 district finder multiple and 100 sender selector multiple

#### General Description

1.07 The subscriber panel link frame is a steel structure of a type known as a double sided frame, designed for mounting the apparatus required to associate a line

finder and district circuit with subscriber sender.

1.08 The frame is divided into three bays, a center bay for mounting the banks which contain the multiple of the district selectors and the senders, 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, key, lamp, and jack panel and fuse panel. This frame is available in but one standard height, namely, 11'-6".

1.09 The subscriber link frame has a capacity of thirty link circuits having access to a group of one hundred senders and a line finder sub-group of 14, 20, 30 or 40 district selectors. A link consists of two elevators, a sequence switch and associated relays. The short elevator rod with 2 brushes hunts over two 100 point banks giving access to one hundred senders. The long elevator rod with 2 brushes hunts over one bank which has two sets of 20 or 40 terminals as required giving access to the district selectors.

Note: Where dialing district sender selectors are specified the capacity for subscriber link circuits on the frame is reduced by one-half the number of dialing districts specified.

#### Subdivisions of Equipment

J28401A (A&M Only) - Subscriber Link Frame-Ground on the CO Relay  
J28401B (A&M Only) - Subscriber Link Frame

### 2. SUPPLEMENTARY INFORMATION

815-000-000 - Panel Systems Index  
AA128.006 - List of General Equipment Requirement Sections  
X-61200 - List of Engineering Requirement Specifications - Ground on the C.O. Relay  
X-61400 - List of Engineering Requirement Specifications - Battery on the C.O. Relay  
J20102 - Switchboard Power Cable  
Floor Plan Data - Section 4.15, Sheet 8

### 3. DRAWINGS

#### Keysheets

SD-21300-01 - Battery on the CO Relay Panel Systems  
SD-21680-01 - Ground on the CO Relay Panel Systems

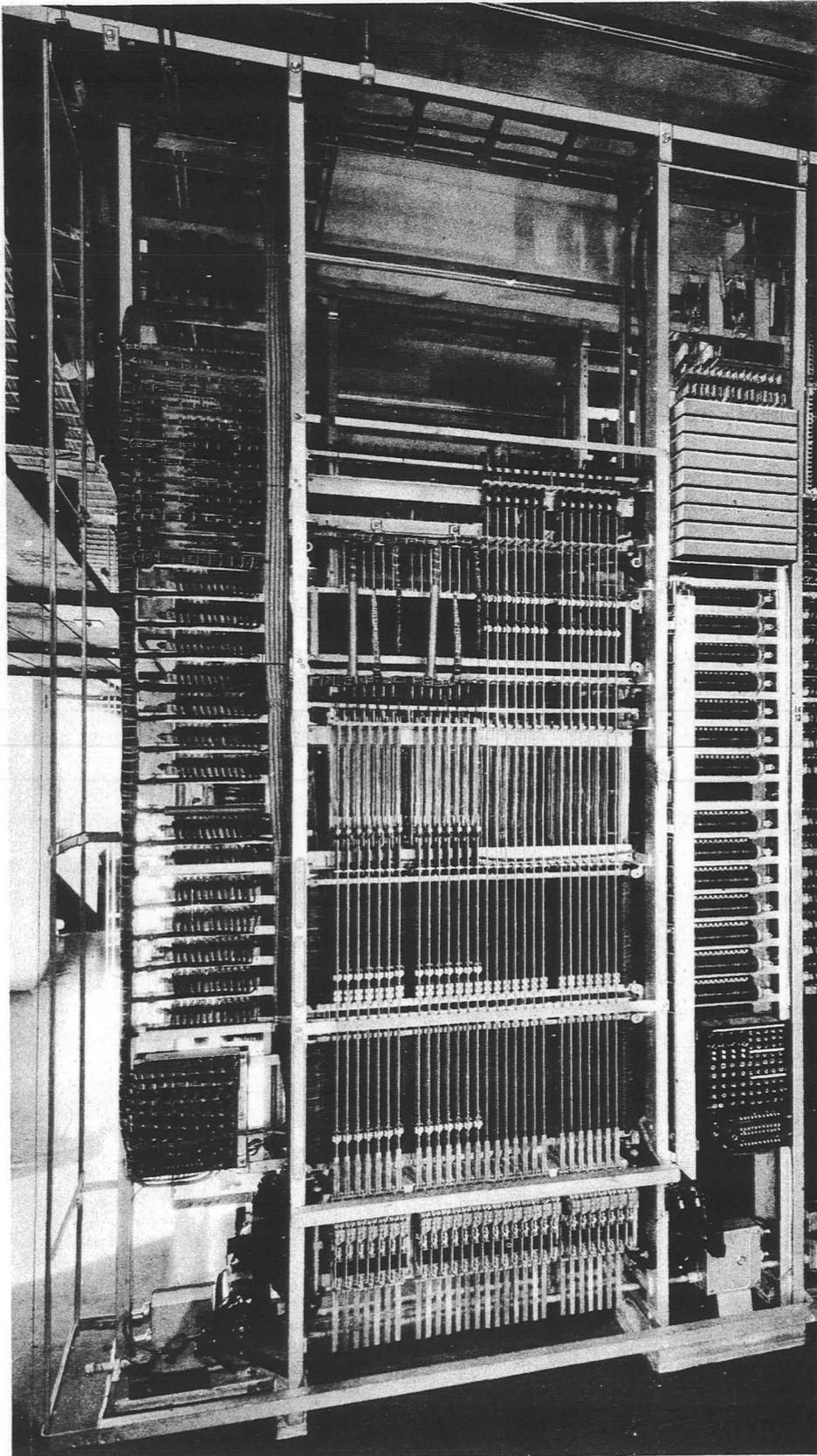


Fig. 1 - Subscriber Panel Link Frame - 28 or 40 Selector Group

Framework

- ED-20751-01 - Assembly of Link Frame
- ED-20749-01 - Assembly of Key, Lamp & Jack Panel (Bat. on CO)
- ED-20633-01 - Assembly of Key, Lamp & Jack Panel (Grd. on CO)
- ED-20509-01 - Assembly of Fuse Panel
- ED-20081-01 - Sequence Switch Framework Details
- ED-20293-01 - Framework Limits

Equipment and Numbering

- ED-20750-01 - Equipment of Frame (1 or 2 classes of service)
- ED-20317-01 - Equipment of Frame (Grd. on CO)
- ED-90411-01 - Designation Cards

Wiring and Cabling

- ED-20271-01 - Local Cable Plan
- ED-20755-01 - Switchboard Cabling Plan
- ED-20811-01 - Switchboard Power Cable
- ED-20001-01 - Sender Multiple (80-20)
- ED-20001-02 - Sender Multiple (90-10)
- ED-20146-01 - Method of Cabling between Districts, Subscriber Link and Sender Frames
- ED-20662-01 - Switchboard Cabling Plan for Dialing District Sender Selector Frame
- ED-20627-01 - Arrangement of Districts on the District Finder Bank
- ED-20623-01 - Method of Running and Supporting Frame Battery and Ground Leads
- ED-20252-01 - Schematic Layout

4. EQUIPMENT

J28401A (A&M Only) - Subscriber Link Frame - Ground on CO Relay

List 1 - Framework, assembly, common wiring, and equipment for a 28 or 40 selector group subscriber link frame arranged for one class of service.

Equipment - ED-20317-01, Fig. 1  
Local Cable - ED-20271-01

	Wire	Equip
Framework ED-20751-01	-	1
Key, Lamp, & Jack Panel ED-20749-01	-	2
Fuse Panel ED-20509-01, Item 22	-	2
Subscriber Link Ckt. SD-21716-01	30	0
Dist. Test Connector Ckt. SD-20240-01 or -02	8	0
Misc. Frame Ckt. SD-21228-01	2	2

List 2 - Framework, assembly, common wiring, and equipment for a 60 or 80 selector group subscriber link frame arranged for one class of service.

Equipment - ED-20317-01, Fig. 2  
Local Cable - ED-20271-01

	Wire	Equip
Framework ED-20751-01	-	1
Key, Lamp, & Jack Panel ED-20749-01	-	2
Fuse Panel ED-20509-01, Item 22	-	2
Subscriber Link Ckt. SD-21716-01	30	0
Dist. Test Connector Ckt. SD-20240-01 or -02	8	0
Misc. Frame Ckt. SD-21228-01	2	2

J28401B (A&M Only) - Subscriber Link Frame

List 1 - Framework, assembly, wiring, and equipment for a 28 or 40 selector group subscriber link frame arranged for one or two classes of service.

Equipment - ED-20750-01, Fig. 1  
Local Cable - ED-20271-01

	Wire	Equip
Framework ED-20751-01	-	1
Key, Lamp, & Jack Panel ED-20749-01	-	2
Fuse Panel ED-20509-01, Item 22	-	2
Subscriber Link Ckt. SD-21714-01	30	0
Dist. Test Connector Ckt. SD-20240-01 or -02	8	0
Misc. Frame Ckt. SD-21228-01	2	2

List 2 - Framework, assembly, wiring, and equipment for a 60 or 80 selector group subscriber link frame arranged for one or two classes of service.

Equipment - ED-20750-01, Fig. 2  
Local Cable - ED-20271-01

	Wire	Equip
Framework ED-20751-01	-	1
Key, Lamp and Jack Panel ED-20749-01	-	2
Fuse Panel ED-20509-01, Item 22	-	2
Subscriber Link Ckt. SD-21714-01	30	0
Dist. Test Connector Ckt. SD-20240-01 or -02	8	0
Misc. Frame Ckt. SD-21228-01	2	2

5. EQUIPMENT NOTES

General

5.01 Due to the close association between the link, sender, and district frames, they shall be located as near each other as possible with the link frames in the center.

5.02 Separate frames shall be provided for the "A" and "B" sub-groups of links and the two sub-groups of a group shall not be driven by the same motor. This is done by placing the two sub-groups on opposite sides of adjacent frames.

5.03 The multiple bank for the district finders has ten extra terminals used as guides. They are the bottom three, middle five and top two.

5.04 The multiple banks for the sender selectors have five extra guide terminals, the bottom three and top two.

5.05 Where operator's dialing district circuits per SD-21080-01 are required, they shall ordinarily be placed on Link Frames 1 and 2 and equally divided between the front and the rear of each frame. Two dialing sender selectors may be provided in place of each link. Where less than 30 dialing sender selectors are required per side of frame the wiring shall be superimposed on the link circuit wiring.

5.06 If traffic conditions require a large number of dialing district circuits, the frame may be equipped with sixty sender selectors. Where this arrangement is used, the district finder banks, commutators and selectors, the terminal strips, vertical drive shafts and associated bearings, jack panels, and fuse panels should be omitted. The frame local cable should also be omitted and the switchboard cables from the district frame terminated directly on the commutators and clutches. The "G" segments of the commutators shall be wired to ground lugs on the frame which must be provided for this purpose since there are no fuse panels. One lead of 20 BBE wire shall be provided for each 15 circuits for the purpose of grounding the commutator "G" segments. One test battery jack, one telephone circuit, and one motor-stop alarm, without the frame busy feature, should be provided. The jacks should be mounted on 78 type mountings supported from the regular jack panel mounting holes. The wires from the drive contacts and jacks should be run with 20 BBE wire to the D.P.T.S. or the various points of termination.

5.07 The drive and motor equipment shall not be furnished as a part of the lists but shall be furnished separately.

5.08 Figures on the miscellaneous frame circuit shall be furnished as required.

5.09 The key, lamp, and jack panel shall, in all cases, be fully equipped for four sub-groups.

5.10 Two classes of service in the same group of 400 lines may be provided in either battery or ground on the cut-off relay offices by furnishing frames per J28401B with the link circuits equipped with (Z) relays.

#### District Test Connectors

5.11 The district test connector switches (206 type selectors and associated condensers and resistances) required for connecting the district selector circuits to the district test frame for testing purposes are located on the subscriber's link frames. One or two 206 type selectors and associated condensers are required per sub-group of links depending on the group capacity of the line finder frames as follows: Each link sub-group serving 28 or 40 line finder frames requires one 206 type selector, while the 60 and 80 line finder frames each require two 206 type selectors and associated condensers and resistances. The wiring for the test connector switches shall be furnished in all cases. The associated banks and switches shall be furnished as required.

#### Sender Multiple

5.12 The sender multiple consists of two panel 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. 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.

5.13 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 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 after serving calls in the top portion of the bank.

5.14 The 80-20 arrangement of assigning the senders is the same as the 90-10 arrangement with the exception that 80% 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 banks 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.

5.15 The equipped terminals shall be multiplied up to unequipped terminals with

the exception of those terminals associated with the modified slip described in the preceding pair. This multiple shall be placed on the lowest numbered link frame in the group.

## 6. WIRING NOTES

### Local

#### Link Circuit

6.01 The various equipment on the link frames shall be so wired that it will be possible to change any link (the district multiple permitting) from one sub-group to an adjacent sub-group without any changes in the local cable. These changes should be made at the terminal strips and at the district finder banks.

#### District Multiple - 15F and 15G Banks

6.02 Subgrouping of the district finder multiple shall be obtained as required by cutting the loops of the segments on the district finder banks.

6.03 If the banks are not fully equipped, the unequipped district choices shall be multiplied to the unequipped district selectors by means of a separate form. This form, if possible, shall be wired to the terminals not used for other wiring.

6.04 When the link circuits are regrouped it may be necessary to reconnect the previously cut district finder multiple bank terminals. The solder placed across the 1/32" gap cut in the terminal shall have a clearance of at least 3/64" between the top of the solder and the bottom of the terminal located directly above to avoid electrically shorting terminals on different levels. Furthermore the width of the solder across the gap shall be at least 3/64" that is, at least one-half of the width of the terminals which are being bridged in order to assure sufficient mechanical strength and electrical conductivity.

#### District Test Connectors

6.05 Leads to the district test connectors shall be connected to the nearest set of terminals in the sub-group and included in the local cable.

6.06 The leads from the test connectors to the secondary district terminals at the district-finder bank shall be left disconnected at the multiple bank and sewed into the form.

#### District Selector Test

6.07 The leads common to the test connectors of the same test group shall be run in the power cable between frame terminal strips. Twenty district test connectors constitute one test group.

#### Contact Protection Ground

6.08 The ground strap from each mounting plate having condensers and resistances for contact protection shall be multiplied together and terminated at the punching provided on the frame fuse panel.

### Cabling

#### General

6.09 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.

6.10 Care shall be taken to avoid connecting the switchboard cable to the same terminals of the district finder banks where the test connector local cable connects.

#### To District Frames

6.11 The number and size of the cables between the subscribers link frame and the district selectors are dependent on the line finder-district sub-grouping, and the arrangement of the district selectors on the district frames. Where the district selectors in the sub-group are split evenly between the two sides of the district frame, the following cables shall be used wherever possible:

6035 for a 28-28 group per 7 ckts.  
6016 for a 40-20 group per 10 ckts.  
6191 for a 60 group per 15 ckts.

6.12 Cables for other arrangements shall be furnished as required.

#### District Selector Multiple Between Link Frames

6.13 Where a sub-group of links is split over two frames the links shall be cabled together without slip.

#### To Sender Frames

6.14 The number and size of the cables between the link and sender frames are dependent on the arrangement of the sender groups. One cable is required for the six or ten senders on any one sender frame in the same sender group. Two cables are required if the senders on a frame are divided in different sender groups. Cables for such sender arrangements shall be furnished as required. To minimize possible service reaction, the sender cables should not all terminate at the same link frame but 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.

**Sender Multiple Between Link Frames**

6.15 The sender multiple shall be run in hand made cable between adjacent frames and in switchboard cable over aisles. The arrangement of the senders in the multiple and the slip between frames are shown on the wiring of sender multiple drawings.

**Start Circuit**

6.16 The start leads ST and K from the district frame shall be included in the district finder cabling and terminated on a 203A terminal strip on the link frame.

6.17 One cable shall be furnished for cabling the start circuit from the line finder frame to the link frame having the "A" sub-groups and looped to the link frame having the "B" sub-groups.

**To District Selector Test Frame**

6.18 The leads individual to the test connectors shall be wired in the frame local cable to the miscellaneous terminal strip and cabled from there to the test frame. One cable shall be furnished for cabling the Test Connector leads to the District Selector Test Frame for each link frame with part of the leads

looped at the miscellaneous terminal strip on the side of the link frame first served and then terminated at the miscellaneous terminal strip on the opposite side of the frame.

**To Link Finder Frame**

6.19 One cable per side of frame shall be furnished from the link frame to the link finder frame.

**Miscellaneous**

6.20 Cables consisting of 20 BBE wires shall be used for the battery, ground etc. leads from the distributing power terminal strip to the miscellaneous fuse board.

6.21 The cabling between the distributing power terminal strip and the points of termination of the various circuits shall be run in the largest switchboard cable consistent with the grouping of leads and the points of termination. Cables shall be #22 gauge wire, except ringing, tone or battery leads requiring larger gauge wire.

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