

LINE 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 line link frames used in No. 1 crossbar offices. It also covers the emergency controller unit for offices having an odd number of line link frames.

1.02 This specification is reissued to incorporate previous addenda changes in accordance with SD-25553-01, Issues 29D and 30D, and SD-25060-01, Issue 14D.

CAPACITY

1.03 Depending on traffic conditions, a line link frame may serve from 190 to 690 lines (Fig. 1). Ten primary switch verticals on each frame are arranged for handling no-test calls, thus reducing the capacity of each frame to ten less than the total number of primary switch verticals.

DESCRIPTION

1.04 The line link frame (Fig. 2) connects subscriber lines to district junctors on originating calls and to line junctors on terminating calls. The frame does this by line links and a primary-secondary arrangement of crossbar switches. Subscriber lines appear on the verticals of the primary switches and district junctors and line junctors on the verticals of the secondary switches. The number of primary switch bays on a frame varies with the density of traffic. Subscriber lines appearing on primary switches in horizontal alignment make up what is called a horizontal group. The latter is served by ten line links which appear on the horizontals of the associated primary switches and fan over the horizontals of the ten secondary switches. There are thus 100

line links connecting the two sets of switches, the pattern being such that the subscriber lines in each horizontal group have access to the 100 district junctors and 100 line junctors appearing on the secondary switches. The group of ten line verticals, located one above another on the primary line switch bay is called a vertical file of lines. A vertical column comprises 100 lines and is made up of the ten vertical files in the left or right half of a 200-line primary bay or in a 100-line primary bay. Columns are numbered 00- up or 000- up, consecutively, throughout the line link frame associated with a group of terminating markers. See 5.01.

1.05 To provide the capacity range made necessary by different traffic conditions, the line frame is made up of a basic unit alone or a basic unit and one or more supplementary units. The basic unit, with a capacity of 200 line verticals, is a two-bay frame having the controller and ten 20-vertical secondary switches mounted in the left bay and ten 20-vertical primary switches and associated line and line connector relays in the right bay. Two supplementary units of 200 and 100 lines capacity are available, one with ten 20-vertical primary crossbar switches and associated line and line connector relays; another with ten 10-vertical primary switches and associated relays. With these three units, the capacity of the frame may be varied in steps of 100, from 200 lines to 700 lines. The number of leads in the connecting path between the subscriber line and district junctor is three, four, or five. Accordingly, on frames limited to flat rate, coin, and AMA service, the primary switches and the district junctor half of the secondary switches are equipped with 3-wire verticals; those on individual message rate and individual message timing frames are equipped with 4-wire verticals; and those on 2-party message rate frames, with 5-wire verticals. The line junctor portion of the secondary switch is 3-wire in all cases. A further variation involving the line circuit is brought about by coin lines where a customer must deposit the coin before he receives dial tone. Equipment codes J27450F, G, and H are assigned to frames with 4-, 5-, and 3-wire crossbar

NOTICE

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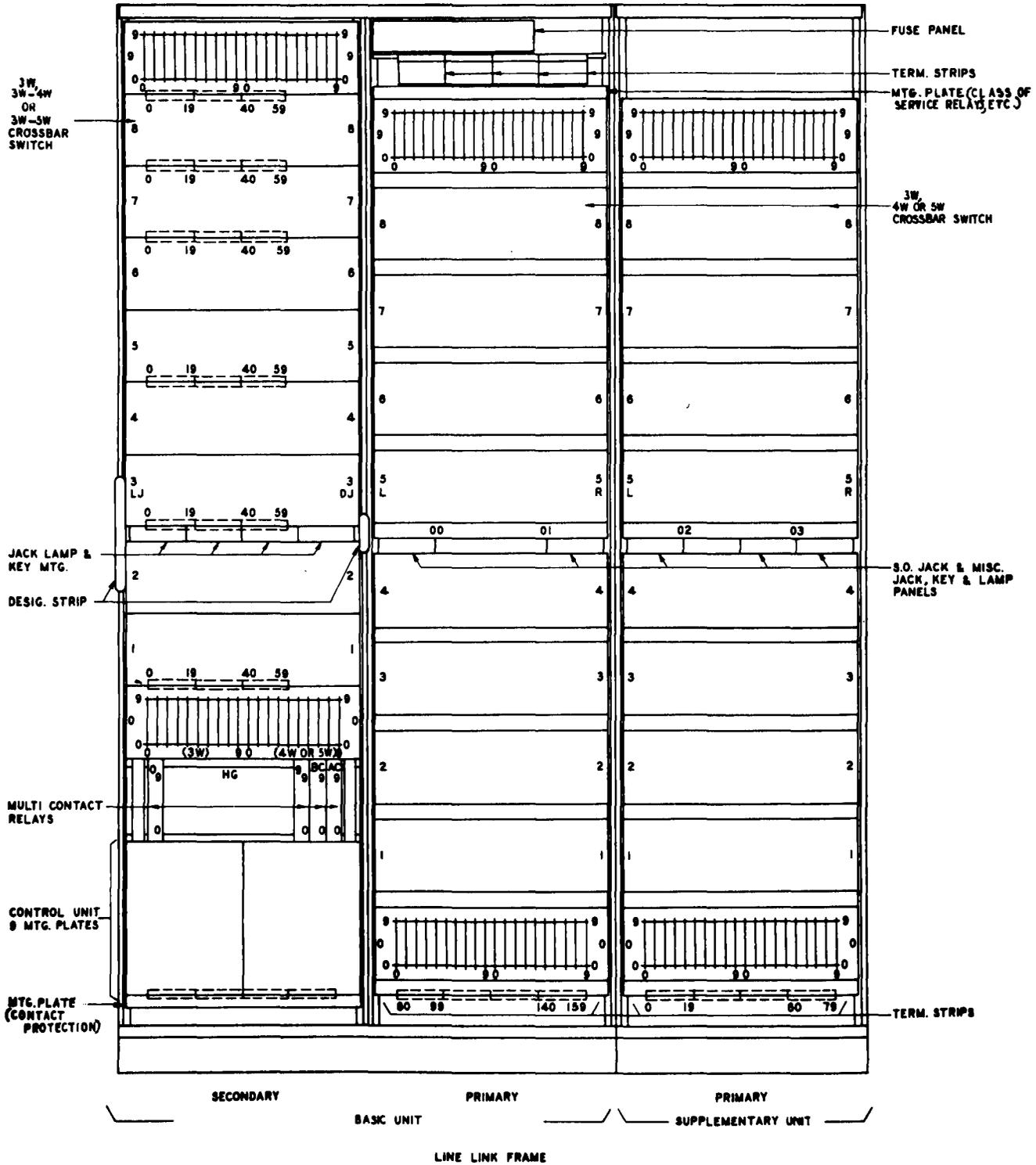


Fig. 1 — Line Link Frame — 390 Lines Capacity

switches, respectively. Lists under these codes identify the basic frame and supplementary bays arranged for noncoin and dial tone first service and for coin first service.

No-Test Verticals

1.06 The 0 vertical in each horizontal group on the basic frame is arranged for no-test calls, thus reducing the verticals available for subscriber use from 200 to 190. The no-test verticals have the line relays omitted and are cabled to no-test connector switches on the miscellaneous frame as shown on SD-25553-01, Fig. 109 and SD-25251-01. The leads in the switchboard cables to the line distributing frame and to the main distributing frame corresponding to the no-test verticals are terminated in order at the distributing frames, and left unconnected at the no-test verticals of the line link frames.

Controller—Regular and Emergency

1.07 Each line link frame includes a controller in the lower portion of the secondary bay, which among other functions identifies the horizontal group, vertical group or column of 100 lines, and a particular

line in a subgroup of ten on originating calls. The controller is arranged so that its functions are transferred to another controller if the circuit fails. This is referred to as mate controller operation. Ordinarily, the two frames making up a half-choice and adjacent on the floor plan are paired for controller operation. When there is an odd number of line link frames, an emergency controller unit is furnished which is mated with the controller on the odd frame. The emergency controller is mounted on the miscellaneous frame. Line link frames per J27450F, G, or H may be mated with frames per J27450A, B, C, or E. Also line link frames per J27450F, G, or H will operate with emergency controller per J27450 C or J.

Class-of-Service Indication

1.08 Like-numbered vertical files within each column on the line link frames are arranged to give either the same or different class-of-service indications to the sender. A maximum of six indications may be transmitted from any one line link frame. At the senders, provision is made for six times one, two, three, or four subscriber classes of service or a maximum of 24. See 5.24, 5.25, and 5.26.

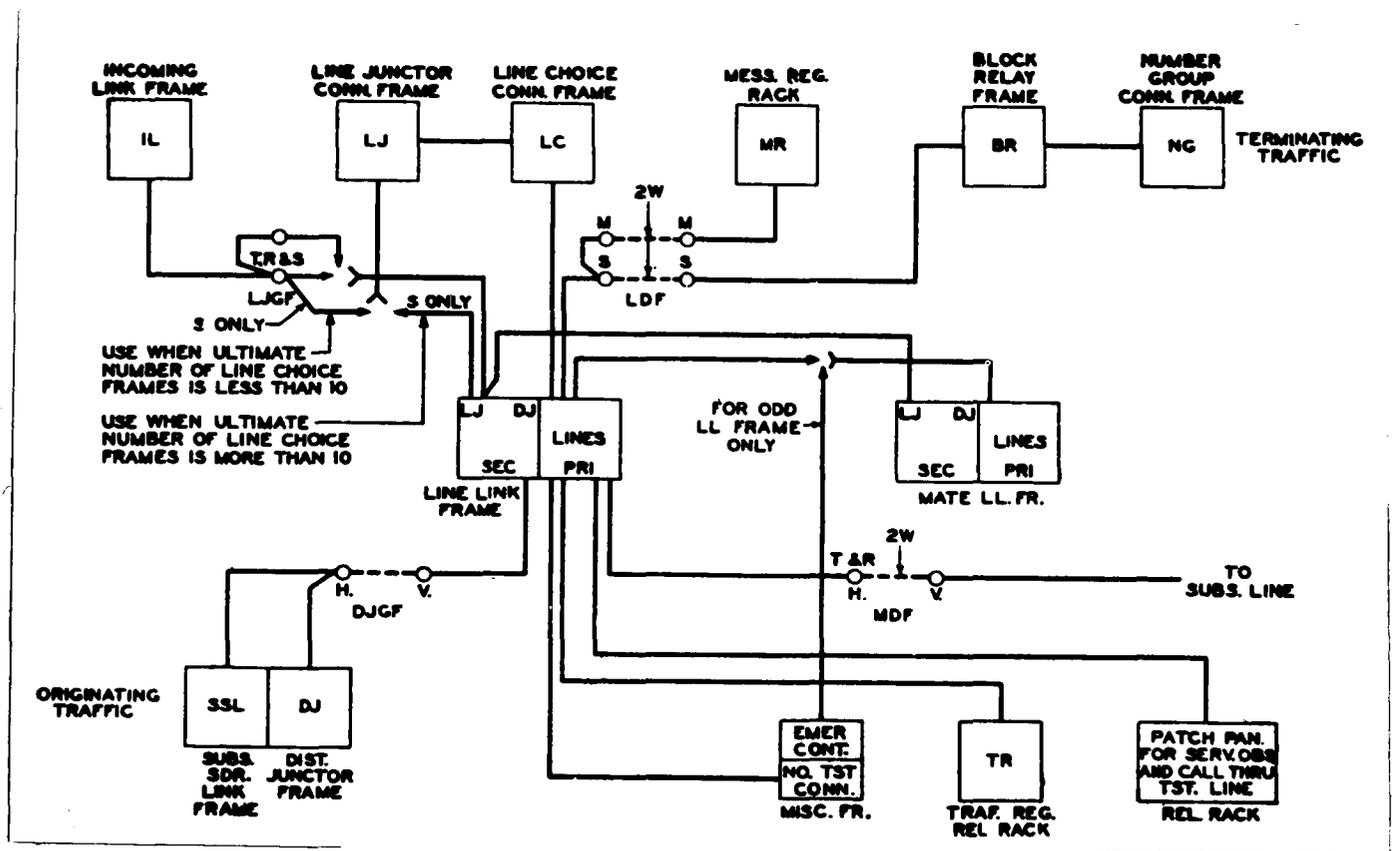


Fig. 2 — Line Link Frame—Schematic of Connecting Frames

Automatic Message Accounting

1.09 In offices arranged for AMA, the frames are equipped to transmit towards the sender, vertical file, horizontal group, and column indications. Vertical file and horizontal group information is given by the LT- and HG-relays; the column number is given by a VC- relay per column of lines.

Line Insulation Testing

1.10 The frames are arranged for automatic line insulation testing which involves extending 22 to 26 leads from each line link frame to a line insulation test frame. When so arranged, certain line circuits must be skipped. This is accomplished by adding resistor across the terminals of the associated line relay as covered by SD-25553-01, Fig. 1, option YL. The resistors are furnished separately and installed as directed by the telephone company.

Line-Load Control

1.11 The frames include provision for line-load control to safeguard the service of essential lines in the event of an unexpected overload. Under this plan, the lines on each line link frame are divided into three classes. Class A lines comprise about 5 or 10 per cent of the lines in the office. The remaining lines are about evenly divided between class B and class C. Service to class A lines is insured by denying originating service in one or two steps to class B and class C lines. This is done with common control equipment located at the incoming trunk test frame or in a wall cabinet. At the line link frames, a B or a C relay per column of lines is furnished, except at the lowest-numbered column on each frame, where a B relay only is supplied. These relays open the ST leads of lines whose service is denied. The ST leads of each subgroup of ten lines in the column, looped at both the B and C relays, permit each line subgroup to be given a class B or class C assignment. Line subgroups not so connected become class A lines. See 5.12 and 5.13. Also see J99230, 816-045-150.

1.12 One line link frame TOUCH-TONE® and/or coin service improvements (dial-tone-first) control unit is required per line link frame. Its function is to give an indication to the sender link concerning the type sender, rotary dial, or TOUCH-TONE and/or coin service improvements (dial-tone-first) required for serving the call. Since TOUCH-TONE and/or coin service improvements (dial-tone-first) customers are assigned by horizontal groups, provi-

sion is made on this unit for cross-connections which identify the type of sender required per horizontal groups.

Floor Plan Arrangement

1.13 The length of the basic frame, 190-lines capacity, is 5 feet 4-1/4 inches. That of the 100-line and 200-line supplementary primary bays is 1 foot 10-1/8 inches and 2 feet 8-1/8 inches, respectively. The two line link frames in a half-choice are normally paired for mate controller operation and are located adjacent to each other on the floor plan. Likewise, the two pairs making up a line choice are preferably located together. Supplementary line link frame units are furnished initially for the indicated ultimate complement of lines, using the 100-line unit for the last odd column of lines when required. Supplementary units are installed in a left-to-right direction. Where unforeseen conditions make it necessary to enlarge the line capacity at a later date, supplementary units may be added in a nonadjacent location at a penalty in cabling and maintenance. The numbering of the frames is covered in 5.01. Resistance limits are imposed on certain of the leads radiating from the line link frames as covered in J20151, 816-016-150.

2. SUPPLEMENTARY INFORMATION

816-000-000—Numerical Index—Crossbar System
 800-600-000—Checking List—General Equipment Requirements
 J20151—816-016-150—Limiting Conductor Lengths
 J22457—816-104-100—Automatic Message Accounting Equipment—General—Crossbar System No. 1
 J99230—816-045-150—Modification of Existing Offices for Line-load Control
 Floor Plan Data—Section 9.1, Sheet 1

3. DRAWINGS

Keysheet

SD-25000-01—No. 1 Crossbar System

Equipment

ED-25212-01—Designation Cards
 ED-25676-01—Equipment for Line Link Emergency Controller Unit
 ED-25678-01—Line Link Frame Equipment
 ED-26746-01—Miscellaneous Frame Equipment

Wiring and Cabling

| | WIRE | EQUIP | NOTES |
|--|------|-------|--|
| ED-25030-01—Local Cable—Emergency Controller Unit | | | Primary Line Switches, 200 Point 4W, Fig. 3, |
| ED-25033-01—Local Cable—Basic Unit | | | K Wiring on Left |
| ED-25035-01—Local Cable—Supplementary Primary Units | | | Vertical O Only, All Others J, R, and M |
| ED-25037-01—Battery and Ground Schematic for Primary and Secondary Line Switches | 10 | 10 | Wiring |
| ED-25257-01—Typical Distribution Diagram—District Junctors to Line Link Frames | 10 | 10 | Secondary Switches, 200 Point 3W-4W, Fig. 5 |
| ED-25322-10—Switchboard Cabling Plans and Details | | | Line Conn Ckt, Fig. 7 |
| ED-25346-16—Method of Running Power Feeders | 20 | 20 | Horizontal Line Grp Ckt, Fig. 8 |
| ED-25433-12—Switchboard Power Cable | 10 | 10 | District Grp Ckt, Fig. 9 |

4. EQUIPMENT

J27450F—AT&T Co Std—Line Link Frame for FR, MRI, Message Timing Individual, Coin, or AMA Lines—4-wire Switches

Basic Unit Local Cable—ED-25033-01

Supplementary Unit Local Cables—ED-25035-01

List 1—Framework, assembly, wiring, and common equipment for one basic unit, including primary line switches and line relay equipment for 10 no-test and 190 FR, MRI, message timing individual, dial-tone-first coin, or automatic message accounting lines.

| | WIRE | EQUIP | NOTES |
|---|------|-------|-------|
| Framework, ED-91710-85, G2 | | 1 | |
| Jack, Key, and Lamp Panels, ED-25021-01: | | | |
| Item 1 | | 2 | |
| Item 2 | | 3 | |
| Item 10 | | 1 | |
| Casing Assy, Front Only, ED-90978-57 G3009 | | 1 | |
| Multicontact Rel Mtg Assy, ED-25022-01, Item 4 | | 1 | |
| Subscriber Line, Line Link, and Cont Ckt, SD-25553-01: Line Ckt, Fig. 1, YU App | 190 | 190 | |

| | | | |
|--|----|--------|----------------|
| Fig. A, B, or C | 5 | 5 | 5.05 |
| Start Ckt, Fig. 10 | 1 | 1 | |
| Cont Conn Ckt, Fig. 11 | 1 | 1 | |
| Cont Ckt, Fig. 12 | 1 | 1 | 5.06 |
| Class-of-Service Equip, Cross Conn, Fig. 13 | 1 | 1 | |
| Relays, Fig. 16 | 6 | 6 | {5.24 {5.25 |
| Test Bat Supply Coils, Fig. 17 | 10 | 10 | |
| Line-load Cont Ckt, Fig. 18 | 3 | As Req | 5.07 |
| Column Identification Fig. 19 | 7 | As Req | 5.04 |
| Misc Frame Ckt, SD-25060-01: Fig. 2, 3, 5, 6, 10, 12, and 18 | 1 | 1 | |
| Test Line Jack, Fig. 11 | 0 | 2 | |
| Service Observing Jacks, Fig. 7 | 0 | 4 | |

List 2—Framework, assembly, wiring, and common equipment for one basic unit, including primary line switches and line relay equipment for ten no-test and 190 coin-first coin lines.

| | WIRE | EQUIP | NOTES |
|---|------|-------|-------|
| Framework, ED-91710-85, G2 | | 1 | |
| Jack, Key, and Lamp Panels, ED-25021-01: Item 1 | | 2 | |

| | WIRE | EQUIP | NOTES |
|---|------|--------|-------|
| Misc Frame Ckt, SD-25060-01: Fig 3 and 10 | 1 | 1 | 5.08 |
| Test Line Jack, Fig. 11 | 0 | 1 | |
| Service Observing Jacks Fig. 7 | 0 | 2 | |
| List 5 —Framework, assembly, and wiring for one line link frame supplementary unit for 200 FR, MRI, message timing individual dial-tone-first coin, or automatic message accounting lines. | | | |
| | WIRE | EQUIP | NOTES |
| Framework, ED-91710-85, G2 | | 1 | |
| Jack, Key, and Lamp Panels, ED-25021-01: Item 1 | | 2 | |
| Item 10 | | 0 or 1 | 5.08 |
| Subscriber Line, Line Link, and Cont Ckt, SD-25553-01: Line Ckt, Fig. 1, YU App | 200 | 200 | |
| Primary Line Switches, 200 Point 4W, Fig. 3, J, R, and M Wiring | 10 | 10 | C |
| Line Conn Ckt, Fig. 7 | 20 | 20 | |
| Line-load Cont Relays, Fig. 18 | 4 | As Req | 5.07 |
| Misc Frame Ckt, SD-25060-01: Fig. 3 and 10 | 1 | 1 | 5.08 |
| Test Line Jack, Fig. 11 | 0 | 2 | |
| Service Observing Jacks, Fig. 7 | 0 | 4 | |
| List 6 —Framework, assembly, and wiring for one line link frame supplementary unit for 200 coin-first coin lines. | | | |
| | WIRE | EQUIP | NOTES |
| Framework, ED-91710-85, G2 | | 1 | |
| Jack, Key, and Lamp Panels, ED-25021-01: Item 1 | | 2 | |
| Item 10 | | 0 or 1 | 5.08 |

| | WIRE | EQUIP | NOTES |
|--|------|--------|-------|
| Subscriber Line, Line Link, and Cont Ckt, SD-25553-01: Line Ckt, Fig. 1, YV App | 200 | 200 | |
| Primary Line Switches, 200 Point 4W, Fig. 3, J and M Wiring | 10 | 10 | |
| Line Conn Ckt, Fig. 7 | 20 | 20 | |
| Line-load Cont Relays, Fig. 18 | 4 | As Req | 5.07 |
| Misc Frame Ckt, SD-25060-01: Fig. 3 and 10 | 1 | 1 | 5.08 |
| Test Line Jack, Fig. 22 | 0 | 2 | |
| Service Observing Jacks, Fig. 7 | 0 | 4 | |

List 8—Equipment required in addition to list 3, 4, 5, or 6 to equip one supplementary bay with miscellaneous jacks per SD-25060-01, Fig. 2, 5, 6, and 12. (See Note A.)

List 9—Wiring and equipment per SD-25553-01, Fig. 26 required in addition to list 3 or 5 to provide class-of-service by individual column and vertical file. (See Note B.)

Notes

A. Miscellaneous jacks per J27450F, List 8, are to be furnished on each remote supplementary bay and on alternate bays starting with the second bay in a lineup of bays located remote from their associated basic frames.

B. Provide one Fig. 25 for first supplementary frame only.

C. Provide resistor mounting(s) ED-27868-10, G1, as required on the distributing frame associated with the subscribers line when message metering is not required and the Message Charging System is provided per SD-25553-01, Fig. 29A.

J27450G—AT&T Co Std—Line Link Frame for Message Rate 2-party or AMA Lines—5-Wire Switches

| |
|---|
| Basic Unit Local Cable—ED-25033-01 |
| Supplementary Unit Local Cables—ED-25035-01 |

List 1—Framework, assembly, wiring, and common equipment for one basic unit, including primary line switches and line relay equipment for ten no-test and 190 message rate 2-party or automatic message accounting lines.

| | WIRE | EQUIP | NOTES |
|---|------|--------|----------------|
| Framework, ED-91710-85, G2 | | 1 | |
| Jack, Key, and Lamp Panels, ED-25021-01: | | | |
| Item 1 | | 2 | |
| Item 2 | | 3 | |
| Item 10 | | 1 | |
| Casing Assy, Front Only, ED-90978-57, G3009 | | 1 | |
| Multicontact Rel Mtg Assy, ED-25022-01, Item 4 | | 1 | |
| Subscriber Line, Line Link, and Cont Ckt, SD-25553-01: | | | |
| Line Ckt, Fig. 1, YU App | 190 | 190 | |
| Primary Line Switches 200 Point 5W, Fig. 4, K Wiring on Left Vertical O Only, All others J, R, and M Wiring | 10 | 10 | C |
| Secondary Switches 200 Point 3W-5W, Fig. 15 | 10 | 10 | |
| Line Conn Ckt, Fig. 7 | 20 | 20 | |
| Horizontal Line Grp Ckt, Fig. 8 | 10 | 10 | |
| District Grp Ckt, Fig. 9 | 5 | 5 | |
| Fig. A, B, or C | 5 | 5 | 5.05 |
| Start Ckt, Fig. 10 | 1 | 1 | |
| Cont Conn Ckt, Fig. 11 | 1 | 1 | |
| Cont Ckt, Fig. 12 | 1 | 1 | 5.06 |
| Class-of-Service Equip, Cross Conn, Fig. 13 | 1 | 1 | |
| Relays, Fig. 16 | 6 | 6 | { 5.24 5.25 |
| Test Bat Supply Coils, Fig. 17 | 10 | 10 | |
| Line-load Cont Ckt, Fig. 18 | 3 | As Req | 5.07 |

| | WIRE | EQUIP | NOTES |
|------------------------------------|------|--------|-------|
| Column Identification Ckt, Fig. 19 | 7 | As Req | 5.04 |
| Misc Frame Ckt, SD-25060-01: | | | |
| Fig. 2, 3, 5, 6, 10, 12, and 18 | 1 | 1 | |
| Test Line Jack, Fig. 11 | 0 | 2 | |
| Service Observing Jacks, Fig. 7 | 0 | 4 | |

List 2—Framework, assembly, and wiring for one line link frame supplementary unit for 100 message rate 2-party or automatic message accounting lines.

| | WIRE | EQUIP | NOTES |
|--|------|--------|-------|
| Framework, ED-91710-85, G2 | | 1 | |
| Jack, Key, and Lamp Panels, ED-25021-01: | | | |
| Item 1 | | 1 | |
| Item 10 | | 0 or 1 | 5.08 |
| Subscriber Line, Line Link, and Cont Ckt, SD-25553-01: | | | |
| Line Ckt, Fig. 1 | | | |
| YU App | 100 | 100 | |
| Primary Line Switches 100 Point 5W, Fig. 4, J, R, and M Wiring | 10 | 10 | C |
| Line Conn Ckt, Fig. 7 | 10 | 10 | |
| Line-load Cont Relays, Fig. 18 | 2 | As Req | 5.07 |
| Misc Frame Ckt, SD-25060-01: | | | |
| Fig. 3 and 10 | 1 | 1 | |
| Test Line Jack, Fig. 11 | 0 | 1 | 5.08 |
| Service Observing Jacks, Fig. 7 | 0 | 2 | |

List 3—Framework, assembly, and wiring for one line link frame supplementary unit for 200 message rate 2-party or automatic message accounting lines.

| | WIRE | EQUIP | NOTES |
|--|------|-------|-------|
| Framework, ED-91710-85, G2 | | 1 | |
| Jack, Key, and Lamp Panels, ED-25021-01: | | | |

| | WIRE | EQUIP | NOTES |
|--|------|--------|-------|
| Item 1 | | 2 | |
| Item 10 | | 0 or 1 | 5.08 |
| Subscriber Line, Line Link, and Cont Ckt, SD-25553-01: Line Ckt, Fig. 1 YU App | 200 | 200 | |
| Primary Line Switches, 200 Point 5W, Fig. 4, J, R, and M Wiring | 10 | 10 | C |
| Line Conn Ckt, Fig. 7 | 20 | 20 | |
| Line-load Cont Relays, Fig. 18 | 4 | As Req | 5.07 |
| Misc Frame Ckt, SD-25060-01: Fig. 3 and 10 | 1 | 1 | 5.08 |
| Test Line Jack, Fig. 11 | 0 | 2 | |
| Service Observing Jacks, Fig. 7 | 0 | 4 | |

List 5—Equipment required in addition to list 2 or 3 to equip one supplementary bay with miscellaneous jacks per SD-25060-01, Fig. 2, 5, and 12. (See Note A.)

List 6—Equipment required in addition to list 5 when access is not required to a second line message register circuit. Provides spare jack per SD-25060-01, Fig. 6. (See Note A.)

List 7—Wiring and equipment per SD-25553-01, Fig. 26 required in addition to list 2 or 3 to provide class-of-service by individual column and vertical file. (See Note B.)

Notes

- A. Miscellaneous jacks per J27450G, List 5 are to be furnished on each remote supplementary bay and on alternate bays, starting with the second bay in a lineup of bays located remote from their associated basic frames.
- B. Provide one Fig. 25 for first supplementary frame only.
- C. Provide resistor mounting(s) ED-27868-10, G1, as required on the distributing frame associated with the subscribers line when message metering is not required and the Message Charging System is provided per SD-25553-01, Fig. 29A.

J27450H—AT&T Co Std—Line Link Frame for FR, Coin, or AMA Lines—3-wire Switches

Basic Unit Local Cable—ED-25033-01
 Supplementary Unit Local Cable—ED-25035-01
List 1—Framework, assembly, wiring, and common equipment for one basic unit, including primary line switches and line relay equipment for ten no-test and 190 FR, dial-tone-first, or automatic accounting lines.

| | WIRE | EQUIP | NOTES |
|--|------|-------|----------------|
| Framework, ED-91710-85, G2 | | | 1 |
| Jack, Key, and Lamp Panels, ED-25021-01: | | | |
| Item 1 | | | 2 |
| Item 2 | | | 3 |
| Item 10 | | | 1 |
| Casing Assy, Front Only, ED-90978-57, G3009 | | | 1 |
| Multicontact Rel Mtg Assy, ED-25022-01, Item 4 | | | 1 |
| Subscriber Line, Line Link, and Cont Ckt, SD-25553-01: Line Ckt, Fig. 1, YU App | 190 | 190 | |
| Primary Line Switches, 200 Point 3W, Fig. 14, K Wiring on Left Vertical O Only, All Other J, R, and M Wiring | 10 | 10 | |
| Secondary Switches, 200 Point 3W, Fig. 6 | 10 | 10 | |
| Line Conn Ckt, Fig. 7 | 20 | 20 | |
| Horizontal Line Grp Ckt, Fig. 8 | 10 | 10 | |
| District Grp Ckt, Fig. 9 | 5 | 5 | |
| Fig. A, B, or C | 5 | 5 | 5.05 |
| Start Ckt, Fig. 10 | 1 | 1 | |
| Cont Conn Ckt, Fig. 11 | 1 | 1 | |
| Cont Ckt, Fig. 12 | 1 | 1 | 5.06 |
| Class-of-Service Equip, Cross Conn, Fig. 13 | 1 | 1 | |
| Relays, Fig. 16 | 6 | 6 | { 5.24 5.25 |

| | WIRE | EQUIP | NOTES | | WIRE | EQUIP | NOTES |
|--|------|-------|-------|--|------|--------|--------|
| Test Bat Supply | | | | Start Ckt, Fig. 10 | 1 | 1 | |
| Coils, Fig. 17 | 10 | 10 | | Cont Conn Ckt, | | | |
| Line-load Control Ckt, | | As | | Fig. 11 | 1 | 1 | |
| Fig. 18 | 3 | Req | 5.07 | Cont Ckt, Fig. 12 | 1 | 1 | 5.06 |
| Column Identification | | As | | Class-of-Service | | | |
| Ckt, Fig. 19 | 7 | Req | 5.04 | Equip, Cross Conn, | | | |
| Misc Frame Ckt, | | | | Fig. 13 | 1 | 1 | |
| SD-25060-01: | | | | Relays, Fig. 16 | 6 | 6 | { 5.24 |
| Fig. 2, 3, 5, 6, 12, | | | | | | | { 5.25 |
| 17, and 18 | 1 | 1 | A | Test Bat Supply | | | |
| Test Line Jack, | | | | Coils, Fig. 17 | 10 | 10 | |
| Fig. 11 | 0 | 2 | | Line-load Cont Ckt, | | As | |
| Service Observing | | | | Fig. 18 | 3 | Req | 5.07 |
| Jacks, Fig. 7 | 0 | 4 | | Column Identification | | As | |
| <i>List 2</i> —Framework, assembly, wiring, and common | | | | Ckt, Fig. 19 | 7 | Req | 5.04 |
| equipment for one basic unit, including pri- | | | | Misc Frame Ckt, | | | |
| mary line switches and line relay equipment | | | | SD-25060-01: | | | |
| for 190 coin-first coin lines. | | | | Fig. 2, 3, 5, 6, 12, | | | |
| | WIRE | EQUIP | NOTES | 17, and 18 | 1 | 1 | A |
| Framework, ED-91710-85, | | | | Test Line Jack, | | | |
| G2 | | 1 | | Fig. 11 | 0 | 2 | |
| Jack, Key, and Lamp | | | | Service Observing | | | |
| Panels, ED-25021-01: | | | | Jacks, Fig. 7 | 0 | 4 | |
| Item 1 | | 2 | | | | | |
| Item 2 | | 3 | | <i>List 3</i> —Framework, assembly, and wiring for one | | | |
| Item 10 | | 1 | | line link frame supplementary unit for 100 | | | |
| Casing Assy, Front | | | | FR, dial-tone-first coin, or automatic message | | | |
| Only, ED-90978-01, | | | | accounting lines. | | | |
| G3009 | | 1 | | | WIRE | EQUIP | NOTES |
| Multicontact Rel Mtg | | | | Framework, ED-91710-85, | | | |
| Assy, ED-25022-01, | | | | G2 | | 1 | |
| Item 4 | | 1 | | Jack, Key, and Lamp | | | |
| Subscriber Line, Line | | | | Panels, ED-25021-01: | | | |
| Link, and Cont Ckt, | | | | Item 1 | | 1 | |
| SD-25553-01: | | | | Item 10 | | 0 or 1 | 5.08 |
| Line Ckt, Fig. 1, | | | | Subscriber Line, Line | | | |
| YV App | 190 | 190 | | Link, and Cont Ckt, | | | |
| Primary Line Switches, | | | | SD-25553-01: | | | |
| 200 Point 3W, Fig. 14, | | | | Line Ckt, Fig. 1, | | | |
| K Wiring on Left | | | | YU App | 100 | 100 | |
| Vertical O Only, All | | | | Primary Line Switches | | | |
| Others J and M | | | | 100 Point 3W, Fig. 14, | | | |
| Wiring | 10 | 10 | | J, R, and M Wiring | 10 | 10 | |
| Secondary Switches, | | | | Line Conn Ckt, | | | |
| 200 Point 3W, Fig. 6 | 10 | 10 | | Fig. 7 | 10 | 10 | |
| Line Conn Ckt, Fig. 7 | 20 | 20 | | Line-load Cont | | As | |
| Horizontal Line Grp | | | | Relays, Fig. 18 | 2 | Req | 5.07 |
| Ckt, Fig. 8 | 10 | 10 | | Misc Frame Ckt, | | | |
| District Grp Ckt, | | | | SD-25060-01: | | | |
| Fig. 9 | 5 | 5 | | Fig. 3 and 17 | 1 | 1 | 5.08 |
| Fig. A, B, or C | 5 | 5 | 5.05 | | | | |

| | WIRE | EQUIP | NOTES |
|---|------|-----------|-------|
| Test Line Jack, Fig. 11 | 0 | 1 | |
| Service Observing Jacks, Fig. 7 | 0 | 2 | |
| List 4 —Framework, assembly, and wiring for one line link frame supplementary unit 100 coin-first coin lines. | | | |
| | WIRE | EQUIP | NOTES |
| Framework, ED-91710-85, G2 | | 1 | |
| Jack, Key, and Lamp Panels, ED-25021-01: Item 1 | | 1 | |
| Item 10 | | 0 or 1 | 5.08 |
| Subscriber Line, Line Link, and Cont Ckt, SD-25553-01: Line Circuit, Fig. 1, YV App | 100 | 100 | |
| Primary Line Switches 100 Point 3W, Fig. 14, J and M Wiring | 10 | 10 | |
| Line Conn Ckt, Fig. 7 | 10 | 10 | |
| Line-load Cont Relays, Fig. 18 | 2 | As Req | 5.07 |
| Misc Frame Ckt, SD-25060-01: Fig. 3 and 17 | 1 | 1 | 5.08 |
| Test Line Jack, Fig. 11 | | 1 | A |
| Service Observing Jacks, Fig. 7 | 0 | 2 | |
| List 5 —Framework, assembly, and wiring for one line link frame supplementary unit for 200 FR, dial-tone-first, or automatic message accounting lines. | | | |
| | WIRE | EQUIP | NOTES |
| Framework, ED-91710-85, G2 | | 1 | |
| Jack, Key, and Lamp Panels, ED-25021-01: Item 1 | | 2 | |
| Item 10 | | 0 or 1 | 5.08 |
| Subscriber Line, Line Link, and Cont Ckt, SD-25553-01: Line Ckt, Fig. 1, YU App | 200 | 200 | |

| | WIRE | EQUIP | NOTES |
|---|------|-----------|------------|
| Primary Line Switches 200 Point 3W, Fig. 14, J, R, and M Wiring | 10 | 10 | |
| Line Conn Ckt, Fig. 7 | 20 | 20 | |
| Line-load Cont Relays, Fig. 18 | 4 | As Req | 5.07 |
| Misc Frame Ckt, SD-25060-01: Fig. 3 and 17 | 1 | 1 | 5.08, A |
| Test Line Jack, Fig. 11 | 0 | 2 | |
| Service Observing Jacks, Fig. 7 | 0 | 4 | |

List 6—Framework, assembly, and wiring for one line link frame supplementary unit for 200 coin-first lines.

| | WIRE | EQUIP | NOTES |
|---|------|-----------|------------|
| Framework, ED-91710-85, G2 | | 1 | |
| Jack, Key, and Lamp Panels, ED-25021-01: Item 1 | | 2 | |
| Item 10 | | 0 or 1 | 5.08 |
| Subscriber Line, Line Link, and Cont Ckt, SD-25553-01: Line Ckt, Fig. 1, YV App | 200 | 200 | |
| Primary Line Switches, 200 Point 3W, Fig. 14, J and M Wiring | 10 | 10 | |
| Line Conn Ckt, Fig. 7 | 20 | 20 | |
| Line-load Cont Relays, Fig. 18 | 4 | As Req | 5.07 |
| Misc Frame Ckt, SD-25060-01: Fig.3 and 17 | 1 | 1 | 5.08, A |
| Test Line Jack, Fig. 11 | 0 | 2 | |
| Service Observing Jacks, Fig. 7 | 0 | 4 | |

List 8—Equipment required in addition to list 3, 4, 5, or 6 to equip one supplementary bay with miscellaneous jacks per SD-25060-01, Fig. 2, 5, 6, and 12. (See Note B.)

List 9—Wiring and equipment per SD-25553-01, Fig. 26 required in addition to list 3 or 5 to provide class-of-service by individual column and vertical file. (See Note C.)

Notes

- A. When 3-wire frames are used in offices equipped for AMA, the T jack per Fig. 17 of SD-25060-01 is connected to the line verification test incoming trunk. When used for FR and coin groups in message register offices, the T jack is connected to the miscellaneous circuit for the line message register rack for use in making line relay and cross-connection tests. The T1 jack used in making message register tests is not required on 3-wire line link frames.
- B. Miscellaneous jacks per J27450H, List 8 are to be furnished on each remote supplementary bay and on alternate bays starting with the second bay in a lineup of bays located remote from their associated basic frames.
- C. Provide one Fig. 25 for first supplementary frame only.

**J27450J—AT&TCo Std—Line Link Frame
Emergency Controller Unit**

Local Cable—ED-25030-01

List 1—Framework, assembly, wiring, and equipment for one emergency controller unit. See Notes A and B.

| | WIRE | EQUIP | NOTES |
|--|------|-------|-------|
| Unit Assy ED-25028-01, Item 11 | | 1 | |
| Unit Casing ED-90978-01, G2008, Front Only | | 1 | |
| Terminal Strip Mtg Detail, ED-25020-01, Item 1 | | 1 | |
| Cont Ckt, SD-25553-01: Fig. 12 | 1 | 1 | |

Notes

- A. This unit and the MB jack shall be mounted on a miscellaneous frame in accordance with ED-26746-01.

- B. All seven V-relays per Fig. D, E, or F shall be furnished regardless of the number of columns of lines served by the associated line link frame.

**J27450K—AT&TCo Std—Line Link Frame
“TOUCH-TONE” and/or Coin Service
Improvements (Dial-Tone- First) Con-
trol Unit**

List 1—Equipment and wiring for one line link frame TOUCH-TONE and/or coin service improvements (dial-tone-first) control unit per SD-25553-01, Fig. 27, to serve one line link frame in office with partial TOUCH-TONE and/or coin service improvements (dial-tone-first) conversion.

5. GENERAL NOTES AND INDEXES

Numbering of Frames

5.01 Line link frames associated with 2-office terminating equipment shall be numbered 0-up for the first pair of offices in the building, and 200-up for the second pair, etc. Line link frames associated with single-office terminating equipment shall be numbered 0-up for the first office in the building, 100-up for the second office, etc. Line link columns associated with 2-office terminating equipment shall be numbered 00-up for the first pair of offices in each originating marker group, 200-up for the second pair, etc. The same procedure applies to single-office terminating groups, except that the columns for the second office can start with 100 if the ultimate number of columns in the first office does not exceed 100. Examples follow for a building with two originating marker groups.

Single-office Terminating

| ORIG MKR GRP | LI & TERM. FRG | LI COL |
|--------------|----------------|----------------|
| 0 | 0-up | 00-up |
| | 100-up | 100- or 200-up |
| 100 | 200-up | 00-up |
| | 300-up | 100- or 200-up |

Two-office Terminating

Two Term. Grps Per Orig Mkr Grp

| ORIG MKR GRP | LL & TERM. FRS | LL COL |
|--------------|----------------|--------|
| 0 | 0-up | 00-up |
| | 200-up | 200-up |
| 100 | 400-up | 00-up |
| | 600-up | 200-up |

Two-office Terminating

Three Term. Grps Per Orig Mkr Grp

| ORIG MKR GRP | LL & TERM. FRS | LL COL |
|--------------|----------------|--------|
| 0 | 0-up | 00-up |
| | 200-up | 200-up |
| | 400-up | 400-up |
| 100 | 600-up | 00-up |
| | 800-up | 200-up |
| | 1000-up | 400-up |

5.02 Originating service may be denied on subscriber lines opening the M1 or M2 leads at the line distributing frame. Where it is desired to follow this method for all classes of service, it is necessary that flat-rate lines be placed in message-rate groups, or assigned to separate 4- or 5-wire line link frames and their M1 and M2 leads grounded at the line distributing frame. District junctions serving such two-party flat-rate groups have the tip-party identification relay equipped and the M1 and M2 leads cabled through to the line link frames. Opening the M lead is not effective in denying service on coin lines, because the M lead is not extended through the coin district to the marker.

5.03 Coin line link frames, because of low level of terminating traffic, are limited to one frame per half-choice and preferably to one frame per choice. Any lines with predominantly terminating traffic such as one-way PBX lines should be assigned to line link frames in the same half-choice with coin lines as an aid to efficient loading of the district junctions. To reduce jumper congestion on the block relay frames where numbers are assigned to horizontal groups, coin frames should be rotated in their positions within the choice; that is, the first coin frame may be line link frame A of one choice, the second, line link frame B of the next choice, etc. Because of

limited value of message registers on coin lines, 3-wire line link frames are ordinarily specified for this class of service.

Automatic Message Accounting

5.04 In offices equipped initially for automatic message accounting, line link frames per J27450H having 3-wire primary and secondary switches are furnished. For this type of service, each line link frame, including coin frames, is arranged to give vertical file, horizontal group, and column identification to the AMA equipment. Vertical file and horizontal group indications are given by the LT- and HG- relays of the line link frame and the wiring for this purpose is included in all line link frames. Column identification is given on a 3-digit basis by a VC- relay per column of lines on each line link frame. The VC- relays are furnished as required. The wiring at the make-contacts of these relays varies with the column numbering and necessarily is different on each frame in the originating marker group. This wiring takes the form of a supplementary local cable and associated terminal strip furnished with the VC-relays. The remaining column identification wiring is included in all line link frame local cables. The column indications must agree with the column numbering plan for the originating marker group, as outlined under 5.01, with the minor exception that the VC- relays transmit a full 3-digit column number 000- up, whereas the numbering of the columns in the first terminating marker group omits the hundreds 0, the columns being numbered 00- up instead of 000-up. This is to simplify the entry of the column's number on plant records, especially in the smaller offices. Prior to the introduction of AMA, the columns within each terminating group were generally numbered 00- up. When such offices are modified for AMA, it is not necessary to add the distinctive hundreds digit to the column numbers since the office code stamping on the frames identifies the terminating group. Offices not equipped initially for AMA may use 4-wire and 5-wire line link frames per J27450F or J27450G. These frames may be converted to AMA later by adding the VC- column identification relays, terminal strip, and associated supplementary cable.

5.05 Five district group relays D per Figs. A, B, or C of SD-25553-01 are provided in each controller, the D0 relay being associated with district junctions on secondary switches 0 and 1, the D1 relay with switches 2 and 3, etc. These relays are wired to terminal strip punchings uniformly and interconnect-

ed as determined by the district junctor multiple pattern.

5.06 A full complement of *column V and class-of-service (CS) relays* is furnished in each controller. This is done to simplify engineering and manufacture.

5.07 Line-load control relays B and C per Fig. 18 of SD-25553-01 are furnished when specified by the telephone company. On the basic unit, the B0 relay shall be associated with the ST0 leads and the B1 and C1 relays with the ST1 leads. On the supplementary units, two relays per column of lines should be associated with the ST- leads for the associated column and the relay in each case shall be numbered to agree with the associated start leads. Unless otherwise specified by the telephone company, the B- and C- relays shall be equipped in the various columns as follows:

| COL | Size of Line Group | | | | | |
|-----|--------------------|----------|----------|-----|----------|-----|
| | 190 | 290 | 390 | 490 | 590 | 690 |
| 0 | B0 | B0 | B0 | — | — | — |
| 1 | B1 C1 | B1 C1 | B1 | B1 | B1 | B1 |
| 2 | | C2 | B2 C2 | B2 | B2 | B2 |
| 3 | | | C3 | C3 | B3 C3 | B3 |
| 4 | | | | C4 | C4 | C4 |
| 5 | | | | | C5 | C5 |
| 6 | | | | | | C6 |

5.08 *Service observing and message register test jacks* are furnished per 100 lines in accordance with Figs. 7 and 10 of SD-25060-01. On 3-wire line link frames, line relay test and line verification jack per Fig. 17 is furnished instead of Fig. 10. Service observing and test cords are furnished as ordered by the telephone company. *Battery and ground test posts* are furnished on the secondary bay, on first and third supplementary frames when all frames are adjacent on alternate frames in a line-up of nonadjacent supplementary frames, and on all supplementary frames located remote from other line link frames.

Wiring

5.09 Leads in the frame local cables shall be No. 24 gauge type BU wire except battery and ground supply leads. These shall be No. 22 gauge type BU wire except the leads associated with the 2-ampere horizontal group fuses which shall be No. 20 gauge type BH wire. Surface wiring shall be No. 24 gauge type BW wire.

5.10 *The local cable for the basic frame* is shown on ED-25033-01. It contains leads between mounting plates in the controller, those interconnecting the controller with other apparatus on the frame, and wiring to terminal strips, fuse panel, switches, keys, jacks, lamps, etc. It also contains the slip multiple for the 100 line links between the horizontals of primary and secondary switches, and all other leads except those which are run as surface wiring and straps. The HM and LR leads loop from one line subgroup to another, terminal strip punchings being provided at the bottom of the basic unit to permit looping to line subgroups on supplementary units. The sleeve leads, LL and B, from the line link horizontal multiple on the secondary switches, are wired to the horizontal group multicontact relays HG in accordance with the same pattern used to multiple the line links between the horizontals of primary and secondary switches. The leads for multiplying the message register test jacks or the line relay test and line verification jack, and the leads for multiplying frame test battery to the supplementary primary bays, are wired to terminal strip punchings at the bottom of the basic unit.

5.11 *Local cables for supplementary frames* of 100 and 200 lines capacity are shown on ED-25035-01. These cables contain the HM and LR leads which loop between line connector circuits in the bay and also the ST and VS leads which run direct to the controller circuit on the basic unit. Each supplementary primary bay local cable contains the HM and LR leads in a tail of sufficient length to reach the terminal strip punchings at the bottom of the adjacent primary bay on the left. If several supplementary bays are employed, these local cable tails are fastened down in order to provide complete looping for the HM and LR leads throughout all primary bays. The local cable tails also include the leads for multiplying the frame test battery supply and the message register test jacks, or line relay and line verification jack. In addition, a complete set of HM and LR leads are run from the punchings at the bottom of the last supplementary unit to the punchings at the bottom of the basic unit. This additional set of leads is not required

when there is only one supplementary primary unit. However, the ST and VS leads which are individual to each line subgroup of ten lines are run from the terminal strips at the bottom of each supplementary primary bay to the terminal strips at the bottom of the basic unit in order to associate the various line subgroups with the controller circuit. This should be done by means of a hand-formed local cable superimposed upon existing cable arms at the bottom of each bay. Where it becomes necessary to add supplementary units per this specification to basic units or 200 line supplementary units per SD-25003-01, the local cable tails on the new units must be made approximately two inches longer than standard in order to reach the terminal strips on the older units. Switchboard cable is used in place of local cable between supplementary frames in nonadjacent locations and other frames in the same line group.

5.12 ST and VS Leads: For the ten subgroups of nine lines each, located immediately adjacent to the secondary bay, the ST leads are designated ST0, there being one ST0 lead for each of the corresponding ten line subgroups. For the next column of ten subgroups of ten lines each, they are designated ST1 and so on through succeeding columns of 100 lines. The ST0 leads shall be looped at the position of the B0 relay for line-load control. The ST1 leads shall be looped at the positions of both the B1 and the C1 relays. When these relays are equipped, the ST- leads shall be cut and connected in accordance with the following table unless otherwise specified by the telephone company.

When 5% of Lines Are Class A Cont

| SIZE OF LINE GROUP | | COLUMN 0 | | | COLUMN 1 | | |
|--------------------|-----------|----------|-----|-----|----------|--|--|
| | | B0 | B1 | C1 | | | |
| | At relay | | | | | | |
| 190 | | 1-9 | 0 | 1-9 | | | |
| 290 | | 2-9 | 0-5 | 6-9 | | | |
| 390 | Connect | 2-9 | 0-9 | — | | | |
| 490 | ST- leads | 3-9 | 0-9 | — | | | |
| 590 | | 3-9 | 0-9 | — | | | |
| 690 | | 4-9 | 0-9 | — | | | |

5.13 Since the first two columns of lines appear on the basic unit, the ST0 and ST1 leads are confined to the basic unit local cable. However, the ST2 to ST6 are carried to terminal strips at the bottom of the basic unit in the local cable for extension to supplementary units. This same procedure is followed for the VS leads. The ST- leads shall be looped at the positions of both the B- and the C- relay for each column of lines on the supplementary units. When these relays are equipped, the ST- leads are cut and connected in accordance with the following table unless otherwise specified by the telephone company.

When 10% of Lines are Class A

| SIZE OF LINE GROUP | | COLUMN 0 | | | COLUMN 1 | | |
|--------------------|-----------|----------|-----|-----|----------|--|--|
| | | B0 | B1 | C1 | | | |
| | At relay | | | | | | |
| 190 | | 2-9 | 0 | 1-9 | | | |
| 290 | | 3-9 | 0-6 | 7-9 | | | |
| 390 | Connect | 4-9 | 0-9 | — | | | |
| 490 | ST- leads | 5-9 | 0-9 | — | | | |
| 590 | | 7-9 | 0-9 | — | | | |
| 690 | | 8-9 | 0-9 | — | | | |

When 10% of Lines Are Class A

| Size of line Group and ST- Lead | | | | | | |
|---------------------------------|-----|-----|-----|-----|-----|-----|
| COL | REL | 290 | 390 | 490 | 590 | 690 |
| 2 | B2 | — | 0-1 | 0-7 | 0-9 | 0-9 |
| | C2 | 0-9 | 2-9 | 8-9 | — | — |
| 3 | B3 | | — | — | 0-3 | 0-8 |
| | C3 | | 0-9 | 0-9 | 4-9 | 9 |
| 4 | B4 | | | — | — | — |
| | C4 | | | 0-9 | 0-9 | 0-9 |
| 5 | B5 | | | | — | — |
| | C5 | | | | 0-9 | 0-9 |
| 6 | B6 | | | | | — |
| | C6 | | | | | 0-9 |

When 5% of Lines Are Class A

Size of Line Group and ST- Lead

| COL | REL | 290 | 390 | 490 | 590 | 690 |
|-----|-----|-----|-----|-----|-----|-----|
| 2 | B2 | — | 0 | 0-6 | 0-9 | 0-9 |
| | C2 | 0-9 | 1-9 | 7-9 | — | — |
| 3 | B3 | — | — | — | 0-1 | 0-6 |
| | C3 | — | C3 | 0-9 | 2-9 | 7-9 |
| 4 | B4 | — | — | — | — | — |
| | C4 | — | — | 0-6 | 0-9 | 0-9 |
| 5 | B5 | — | — | — | — | — |
| | C5 | — | — | — | 0-9 | 0-9 |
| 6 | B6 | — | — | — | — | — |
| | C6 | — | — | — | — | 0-9 |

5.14 The VS and ST leads enter the controller circuit from the line and line connector circuits on the respective primary bays. The ten VS or ten ST leads from a given column of 100 lines appear adjacent to each other on the terminal strip punchings at the bottom of the supplementary unit. On the basic unit, these terminals are assigned consecutively by horizontal groups. This has the effect of permitting each of the ten H and HG relays to be wired with the same color combinations on corresponding terminals and at the same time avoids having identical colors appear adjacent to each other on the terminal strip punchings at the bottom of the basic unit. Ten stitches should be provided for the VS and ten for the ST leads at the terminal strips at the bottom of the basic unit, one stitch per horizontal group.

5.15 *Wiring for Mate Controller:* For mate controller operation, a number of leads are required between one line link controller circuit mate. These leads are carried from the controller circuit to home controller and mate controller terminal strips in the local cable on each line link frame. The "X" and "Y" wiring called for on SD-25553-01 takes the form of a switchboard cable reversal between the two frames.

5.16 When an emergency controller unit is employed, it is necessary, in addition to providing cabling to the line link frame with which it is to work, to also provide "W" wiring on that frame.

"W" wiring consists of straps between punchings on the home and the mate terminal strips at the top of the basic unit, as shown on the circuit cross connections.

5.17 *District Group Preference:* Flexibility is provided for varying the order in which district junctor groups serve originating calls at the line link frames. This is done for the purpose of distributing wear on the secondary switches. It is accomplished with straps on the miscellaneous terminal strip at the top of the basic unit and in accordance with notes on the circuit drawing. Newly installed frames are strapped to give the preference to district groups 0 and 2 unless the telephone company specifies otherwise.

5.18 *Ground Assignments:* ED-25037-01 shows the method of running battery and ground leads. One ground lead shall be run from the fuse panel to the relays and switches of each horizontal group. The ground punching designated A shall be connected to the apparatus on the top four mounting plates, the B punching to the bottom five mounting plates, and the CP punching to the networks. One lead from the fuse panel to the first piece of apparatus and one to the last piece of apparatus shall be run for both the A, B, and CP grounds. One ground designated C shall be furnished for the AC relay contacts and one ground designated D for the BC relay contacts. One ground lead designated DJ shall be run from the fuse panel to punching 49 between secondary switches 8 and 9 and a second lead from the same ground terminal to punching 49 between secondary switches 0 and 1. These two punchings shall then be looped in the local cable to punchings 49 between secondary switches 2 and 3, 4 and 5, 6 and 7. A TBS ground punching serves the GRD test post and the A test jack on the basic unit and a K punching supplies ground to the column identification relays.

5.19 *Battery and Ground Connecting Posts and Message Register Test Jacks or Line Relay Test and Line Verification Jack:* The jack equipment is furnished on the basic unit and on each supplementary primary bay. The connecting posts for battery and ground are located on alternate supplementary primary bays. This apparatus shall be wired in multiple with that located on the basic unit. The supplementary bay local cable shall carry the leads required for this purpose to terminal strip punchings at the bottom of the bay and they shall then be included in the local cable tail for multiplying to the pri-

when there is only one supplementary primary unit. However, the ST and VS leads which are individual to each line subgroup of ten lines are run from the terminal strips at the bottom of each supplementary primary bay to the terminal strips at the bottom of the basic unit in order to associate the various line subgroups with the controller circuit. This should be done by means of a hand-formed local cable superimposed upon existing cable arms at the bottom of each bay. Where it becomes necessary to add supplementary units per this specification to basic units or 200 line supplementary units per SD-25003-01, the local cable tails on the new units must be made approximately two inches longer than standard in order to reach the terminal strips on the older units. Switchboard cable is used in place of local cable between supplementary frames in nonadjacent locations and other frames in the same line group.

5.12 ST and VS Leads: For the ten subgroups of nine lines each, located immediately adjacent to the secondary bay, the ST leads are designated ST0, there being one ST0 lead for each of the corresponding ten line subgroups. For the next column of ten subgroups of ten lines each, they are designated ST1 and so on through succeeding columns of 100 lines. The ST0 leads shall be looped at the position of the B0 relay for line-load control. The ST1 leads shall be looped at the positions of both the B1 and the C1 relays. When these relays are equipped, the ST- leads shall be cut and connected in accordance with the following table unless otherwise specified by the telephone company.

When 10% of Lines are Class A

| SIZE OF LINE GROUP | COLUMN 0 | | | COLUMN 1 | | |
|--------------------|-----------|-----|-----|----------|--|--|
| | | B0 | B1 | C1 | | |
| | At relay | | | | | |
| 190 | | 2-9 | 0 | 1-9 | | |
| 290 | | 3-9 | 0-6 | 7-9 | | |
| 390 | Connect | 4-9 | 0-9 | — | | |
| 490 | ST- leads | 5-9 | 0-9 | — | | |
| 590 | | 7-9 | 0-9 | — | | |
| 690 | | 8-9 | 0-9 | — | | |

When 5% of Lines Are Class A Cont

| SIZE OF LINE GROUP | | COLUMN 0 | | | COLUMN 1 | | |
|--------------------|-----------|----------|-----|-----|----------|--|--|
| | | | B0 | B1 | C1 | | |
| | At relay | | | | | | |
| 190 | | 1-9 | 0 | 1-9 | | | |
| 290 | | 2-9 | 0-5 | 6-9 | | | |
| 390 | Connect | 2-9 | 0-9 | — | | | |
| 490 | ST- leads | 3-9 | 0-9 | — | | | |
| 590 | | 3-9 | 0-9 | — | | | |
| 690 | | 4-9 | 0-9 | — | | | |

5.13 Since the first two columns of lines appear on the basic unit, the ST0 and ST1 leads are confined to the basic unit local cable. However, the ST2 to ST6 are carried to terminal strips at the bottom of the basic unit in the local cable for extension to supplementary units. This same procedure is followed for the VS leads. The ST- leads shall be looped at the positions of both the B- and the C- relay for each column of lines on the supplementary units. When these relays are equipped, the ST- leads are cut and connected in accordance with the following table unless otherwise specified by the telephone company.

When 10% of Lines Are Class A

| Size of Line Group and ST- Lead | | | | | | |
|---------------------------------|-----|-----|-----|-----|-----|-----|
| COL | REL | 290 | 390 | 490 | 590 | 690 |
| 2 | B2 | — | 0-1 | 0-7 | 0-9 | 0-9 |
| | C2 | 0-9 | 2-9 | 8-9 | — | — |
| 3 | B3 | | — | — | 0-3 | 0-8 |
| | C3 | | 0-9 | 0-9 | 4-9 | 9 |
| 4 | B4 | | | — | — | — |
| | C4 | | | 0-9 | 0-9 | 0-9 |
| 5 | B5 | | | | — | — |
| | C5 | | | | 0-9 | 0-9 |
| 6 | B6 | | | | | — |
| | C6 | | | | | 0-9 |

When 5% of Lines Are Class A

Size of Line Group and ST- Lead

| COL | REL | 290 | 390 | 490 | 590 | 690 |
|-----|-----|-----|-----|-----|-----|-----|
| 2 | B2 | — | 0 | 0-6 | 0-9 | 0-9 |
| | C2 | 0-9 | 1-9 | 7-9 | — | — |
| 3 | B3 | — | — | — | 0-1 | 0-6 |
| | C3 | — | C3 | 0-9 | 2-9 | 7-9 |
| 4 | B4 | — | — | — | — | — |
| | C4 | — | — | 0-6 | 0-9 | 0-9 |
| 5 | B5 | — | — | — | — | — |
| | C5 | — | — | — | 0-9 | 0-9 |
| 6 | B6 | — | — | — | — | — |
| | C6 | — | — | — | — | 0-9 |

5.14 The VS and ST leads enter the controller circuit from the line and line connector circuits on the respective primary bays. The ten VS or ten ST leads from a given column of 100 lines appear adjacent to each other on the terminal strip punchings at the bottom of the supplementary unit. On the basic unit, these terminals are assigned consecutively by horizontal groups. This has the effect of permitting each of the ten H and HG relays to be wired with the same color combinations on corresponding terminals and at the same time avoids having identical colors appear adjacent to each other on the terminal strip punchings at the bottom of the basic unit. Ten stitches should be provided for the VS and ten for the ST leads at the terminal strips at the bottom of the basic unit, one stitch per horizontal group.

5.15 *Wiring for Mate Controller:* For mate controller operation, a number of leads are required between one line link controller circuit mate. These leads are carried from the controller circuit to home controller and mate controller terminal strips in the local cable on each line link frame. The "X" and "Y" wiring called for on SD-25553-01 takes the form of a switchboard cable reversal between the two frames.

5.16 When an emergency controller unit is employed, it is necessary, in addition to providing cabling to the line link frame with which it is to work, to also provide "W" wiring on that frame.

"W" wiring consists of straps between punchings on the home and the mate terminal strips at the top of the basic unit, as shown on the circuit cross connections.

5.17 *District Group Preference:* Flexibility is provided for varying the order in which district junctor groups serve originating calls at the line link frames. This is done for the purpose of distributing wear on the secondary switches. It is accomplished with straps on the miscellaneous terminal strip at the top of the basic unit and in accordance with notes on the circuit drawing. Newly installed frames are strapped to give the preference to district groups 0 and 2 unless the telephone company specifies otherwise.

5.18 *Ground Assignments:* ED-25037-01 shows the method of running battery and ground leads. One ground lead shall be run from the fuse panel to the relays and switches of each horizontal group. The ground punching designated A shall be connected to the apparatus on the top four mounting plates, the B punching to the bottom five mounting plates, and the CP punching to the networks. One lead from the fuse panel to the first piece of apparatus and one to the last piece of apparatus shall be run for both the A, B, and CP grounds. One ground designated C shall be furnished for the AC relay contacts and one ground designated D for the BC relay contacts. One ground lead designated DJ shall be run from the fuse panel to punching 49 between secondary switches 8 and 9 and a second lead from the same ground terminal to punching 49 between secondary switches 0 and 1. These two punchings shall then be looped in the local cable to punchings 49 between secondary switches 2 and 3, 4 and 5, 6 and 7. A TBS ground punching serves the GRD test post and the A test jack on the basic unit and a K punching supplies ground to the column identification relays.

5.19 *Battery and Ground Connecting Posts and Message Register Test Jacks or Line Relay Test and Line Verification Jack:* The jack equipment is furnished on the basic unit and on each supplementary primary bay. The connecting posts for battery and ground are located on alternate supplementary primary bays. This apparatus shall be wired in multiple with that located on the basic unit. The supplementary bay local cable shall carry the leads required for this purpose to terminal strip punchings at the bottom of the bay and they shall then be included in the local cable tail for multiplying to the pri-

mary bay on the left. For nonadjacent bays, leads are run as switchboard cable.

Surface Wiring and Strapping

5.20 The wiring between the line relays and their associated line connector circuits and between the relays on the line circuit mounting plates and the primary switch verticals shall be surface-wired. Surface wiring also is used for leads confined to individual mounting plates in the controller.

5.21 Below are listed leads that are surface-wired, other than those confined to individual mounting plates in the controller.

- (a) 1T of L relay to LR relay contact terminals
- (b) 3RT of L relay to off-normal contact terminal No. 2 of associated primary holding magnet
- (c) The inner end of each primary hold magnet winding to the associated HM relay
- (d) Horizontal multiple of inner end of primary selecting magnet winding to like-numbered selecting magnets of same horizontal group (Include in multiple form)
- (e) Horizontal multiple of battery for primary selecting magnets (Include in multiple form for horizontal group 9)
- (f) Between the upper and lower magnets of the multicontact relays
- (g) Between 3T of the No. 1 L relay and off-normal contact terminal No 4 of vertical 2 on each primary switch for ground
- (h) Between RB1 of the No. 1 L relay and the outer end of the hold magnet winding of vertical 2 on each primary switch for battery
- (i) Between the inner end of the hold magnet winding and off-normal contact terminal No. 2 on secondary switch verticals
- (j) Between windings of HM and LR relays and for the battery lead between the LR and L relay windings
- (k) Between the inner end of the primary hold magnet winding and vertical spring 0

5.22 Primary Switch Selecting Magnet Multiple:

All like-numbered selecting magnets in a given horizontal group of primary switches shall be wired in parallel and connected to the controller circuit. Between adjacent primary bays, these leads are included in the multiple forms furnished for extending the line link multiple. The frame local cable for the basic unit picks up these leads on the primary bay associated with the originating unit and carries them to the controller circuit.

5.23 Strapping for Battery and Ground:

One 1-1/3-ampere fuse shall be provided for all the selecting magnets associated with the ten line links appearing on the same secondary switch. As shown on ED-25037-01, the battery lead for the selecting magnets of a given-numbered secondary switch is run to all primary selecting magnets having the same number as the associated secondary switch. Leads to the primary and secondary switches are doubled up at the fuse panel and run in the local cable to the selecting magnets of the first primary switch in the horizontal group 8. The battery leads for like-numbered primary selecting magnets are multiplied horizontally through horizontal group 9. Like-numbered selecting magnets in the same vertical group are multiplied vertically. One 1-1/3-ampere fuse shall be furnished for the secondary switch holding magnets for a group of 20 district junctors and the associated 20 line junctors, and one 2-ampere fuse for the relays and primary switch holding magnets of each horizontal group.

5.24 Class of Service:

Six CR terminals 10-15, representing the windings of the CS-class-of-service relays, and ten L terminals, 0-9, representing the ten vertical files in each column, are provided on the CS terminal strip at the top of the basic unit. The L terminals may be strapped to the CR terminals to give any combination of six or less class-of-service indications for the frame. If less than six indications are required, the CR punchings should be used consecutively from CR0 up. These cross connections will operate a separate CS- relay for each class of service.

5.25

Six CR terminals 151 through 156, representing the windings of the CS- class-of-service relays, and seven groups of ten L terminals 80 through 149, representing the ten vertical files in each column, are provided on the auxiliary CS terminal strip at the top of the first supplementary bay. The L terminals may be strapped to the CR terminals to give any combination of six or fewer class-of-service indications for the frame.

5.26 The contacts of the CS- relays are brought out to CA 20-25, CB 40-45, and CC 27-29 and 47-49 terminals on the CS terminal strip. The contacts of the DF- relays, which connect the class-of-service leads through to the sender link and sender, are brought out to terminals 30-39. Where the subscriber senders serve only one group of classes of service, cross connect the CA punchings as required to punchings 30-35, CS0-CS5. Where the senders serve 2 or 4 groups of six classes of service, cross connect the CA terminals to terminals 30-35, CS0-CS5, to choose each class of service and the CB terminals to 36-39, CS6-CS9, to choose the required group for each class.

Switchboard Cable

5.27 District Junctors: Each line link frame is served by 100 district junctors in five groups of 20 junctors, and each group is multiplied to a pair of secondary switches on 2, 3, 4, 5, 6, or 7 line link frames as determined by the traffic requirements. A grouping frame is provided to facilitate this multiplying. Part of the multiplying is done at the grouping frame and part by direct switchboard cabling between line link secondary switches. The direct multiplying is done in combinations of two or three line link frames, the secondary switches being multiplied together and cabled over to terminal strips on the vertical side of the district junctor grouping frame. In addition, certain secondary switches are cabled individually to the grouping frame. At the grouping frame, the combination appearances of two and three line link frames and the single appearances are multiplied together as required, and cross connected by means of jumper cables to district junctors on the horizontal side of the frame.

5.28 Miscellaneous Leads to Sender Link and Controller Circuit: Associated with each group of 20 district junctors, there is a series of miscellaneous control leads between the line link and the subscriber sender link. These leads are terminated at the line link on terminal strip punchings 0-53 between the secondary switches on which the corresponding 20 district junctors appear. They are run from the grouping frame to line link frames and between line link frames in the same cable with the associated district junctors. With the exception of the DA, SL, and G leads, which are handled as discussed in the following paragraphs, the miscellaneous leads shall be multiplied to all line link appearances of the district junctor group. When the district junctors are reversed between line link appearances at the grouping frame, the RA and RB, TA and TB, and the A and B leads

are also reversed. All other miscellaneous leads are connected straight. Unused switchboard cable leads corresponding to any of the terminal strip punchings in the series 0-39 at the terminal strips on the line link frame, at both sides of the grouping frame and at the sender link frame terminal strips shall not be cut off but shall be dressed back into the form at each of these points for possible future use.

5.29 One DA lead is required per line link appearance of a district junctor group. For this reason, sufficient DA punchings are provided at the grouping frame for the maximum number of appearances. Extra DA punchings are provided on the terminal strips between secondary switches and where multiplying is done on the switches, several extra DA leads shall be carried in the cable between frames. These shall be terminated on the punchings at each appearance and by means of a strap to the punching on which the local cable lead appears, a different DA lead may be connected at each appearance.

5.30 The various appearances of a district junctor group on line link frames are connected in a chain, which serves to lock out other appearances than the one involved on an originating call. The SL and G leads determine the place in the chain occupied by a particular appearance and are connected IN and OUT at each appearance in accordance with the circuit cross connections. No particular order need be followed in assigning the various appearances to the chain beyond meeting the requirement that there shall be one first appearance, one last appearance, the remainder being intermediate. In general, direct multiples of three line link appearances will include a first appearance and multiples of two appearances will include a last appearance as indicated in the suggested assignment on ED-25257-01.

5.31 Line Junctor Connector and Line Choice Connector Frames: One hundred HM leads are run from the secondary switch line junctor verticals of each line link frame to the line junctor connector frame. The miscellaneous leads to the line junctor connector frame terminated at the line link frame on terminal strips between secondary switches 7 and 8, shall be run in the same switchboard cable with the HM leads. The miscellaneous leads include ten BK leads BK0 to BK9, which shall be multiplied with the corresponding BK leads from the other line link frames in the choice at the BK terminal strip on the line junctor connector frame. The 100 LJ leads to the line junctor connector frame are common to the two line link frames in the same half-choice. In offices

where the ultimate will be ten or less choices, the LJ leads from the line junctor connector frame instead of terminating on the line link secondary switches as described above, shall terminate on the S terminals of the terminal strips on the line link side of the line junctor grouping frame. This treatment effects a saving in switchboard cable and permits the connecting to be done at terminal strips instead of at switch terminals. Where there are more than ten choices, this method cannot well be followed because of cable congestion over the LJGF. One switchboard cable per line link frame is required for the miscellaneous leads to the line choice connector frame and one cable per frame to the no-test connector switches on the miscellaneous frame.

5.32 Line Junctors: The switchboard cable carrying the 100-line junctors common to the two line link frames in the same half-choice, shall be run from the LJGF to the line junctor verticals of the secondary switches on the first frame of the half-choice. Since each 100 junctors serve two line link frames, it is necessary to multiple the line junctors from the first line link frame of the half-choice to the second. The multiplying is done on the Y terminals of the line junctor verticals of the secondary switches of the first frame and a second cable is carried from there to the corresponding line junctor verticals on the second frame.

5.33 Line and Main Distributing Frames: One hundred circuit cables shall be used for the S, the S and M1, and the S, M1, and M2 sets of leads to the line distributing frame, also for the T and R leads to the main distributing frame. The M1 lead of flat-rate and coin groups shall be extended to the line distributing frame only when specified by the telephone company. The resistance of the lead from the line distributing frame to the Message Charging System shall not exceed 1500 feet of 24-gauge cable or 42.9 ohms.

Mate Controller Leads

5.34 Of the leads between the two frames associated for mate controller operation, one-half represent leads which are used for home operation and the other half those which are used for mate operation. These two sets of leads are terminated on separate terminal strips at the top of the originating unit. In running the switchboard cable between the two frames, the punchings on the home controller terminal strip on one line link frame must be cabled to the punchings on the mate controller terminal strip on the mate line link frame. In order to facilitate this slip, two switchboard cables are used, it being necessary to reverse cables between frames. The reversal of cables provides the X and Y wiring called for on SD-25553-01.

5.35 When an emergency controller is provided, the punchings on the unit should be cabled to the corresponding punchings on the mate controller terminal strip of the line link frame with which it is to work. These leads from the emergency controller should be connected at the rear notch of the terminals on the mate controller terminals strip. This is to facilitate the connection of leads from an added line link frame, should one be furnished later on.

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

| EQUIP .ENT | RATING | DETAILS LAST SHOWN IN ISSUE | REPLACING EQUIPMENT |
|------------|-----------|--------------------------------------|------------------------|
| J27450A | Mfr Disc. | 4 | J27450F |
| J27450B | Mfr Disc. | 2 | J27450D |
| J27450C | Mfr Disc. | 4 | J27450J |
| J27450D | Mfr Disc. | 3 | J27450E |
| J27450E | Mfr Disc. | 4 | J27450G |
| J27450F,L7 | Mfr Disc. | 5 | — |
| J27450G,L4 | Mfr Disc. | 5 | — |
| J27450H,L7 | Mfr Disc. | 5 | — |

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.

Bell Telephone Laboratories, Incorporated

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