

RELAY RACK EQUIPMENT FOR 15C AND 15D "A" SWITCHBOARDS EQUIPMENT DESIGN REQUIREMENTS NO. 1 CROSSBAR, PANEL, AND STEP-BY-STEP 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 relay rack equipment common to "A" switchboard No. 15C and No. 15D in No. 1 crossbar, panel, and step-by-step offices.

1.02 This specification is reissued to incorporate previous appendix changes.

Capacity (See Note)

1.03 Face Equipment

Number Checking Mult	20,000	30,000	40,000
Outgoing Trunk Mult	1680	720	360
Answering Jacks per Panel (10 per Strip With Lamps and Designation Strips)	50	50	30

1.04 Keyshelf Equipment

Cords 17

Note: The face equipment capacities given are for special service positions with number checking multiple. For capacities of panels at the head of the board where the checking multiple is not equipped, refer to the front equipment drawings listed herein. In the step-by-step keyshelf, the number checking cord, when furnished, is in addition to the 17 cords.

Description

1.05 The "A" switchboard for panel and step-by-step offices as covered by this specification is for handling "A" board toll and assistance calls, intercepting service, manual lines, sender-monitoring in panel offices, and other types of service which for various reasons are not handled entirely on a mechanical basis.

Keypulsing

1.06 Calls not completed manually over trunks to "B" boards or tandem boards are completed by keypulsing. The calling end of the cord circuit used on a call is plugged into the jack of a keypulsing trunk or selector and the keyset is associated with the cord by the operation of a positional push-button key (KP) together with the cord talking key. The writing up of the desired number on the keyset supplies marginal pulses to a keypulsing sender circuit which has been automatically associated with the trunk. In panel offices, each keypulsing trunk has a sender selector which functions as the cord is plugged into the jack to select a keypulsing sender, working in conjunction with subscribers decoders and decoder connectors. When all digits are completed, the sender is notified, in most panel areas, by the operation of a positional push-button start key (ST). In step-by-step offices the arrangements are similar to those for No. 3 keypulsing toll switchboard. In these offices, link circuits function to connect keypulsing outgoing trunks to keypulsing all-relay senders. In step-by-step areas it will ordinarily be possible to omit the start key operation and, in this case, the ST key is omitted from the keyshelf. The arrangement of trunk classes as provided for in the step-by-step sender is covered in the sender specification.

Intercepting

1.07 The cords used for intercepting traffic are combination intercepting and special service and may be used with any circuit appearing in the face of the board. They may also be used to complete intercepted calls locally when used in connection with the necessary trunks. Intercepted calls originated by toll operators are distinguished by a tone heard by the operator upon answering and will not be completed.

Cord Circuits

1.08 The cord circuits for both panel and step-by-step are (1) combination intercepting and special service and (2) special service. The positional wiring is the same for both types and, since all cord circuit relay equipment is on the relay rack, it is possible to equip the position for either service by the use of the proper relay rack cord circuit units and the equipment of the position circuit when intercepting cords are furnished. Recording completing cords, the relay equipment for which is also entirely relay rack mounted, may be furnished in cord positions 15 to 17. A number checking cord may be located adjacent to cord position 1 when required in step-by-step offices.

Call Distributing "B" Equipment

1.09 Call distributing "B" equipment may economically be located in working positions of the "A" switchboard to care for the "B" service during light load periods or for handling night service. This arrangement is covered in this specification for panel offices. No subdivision of this equipment is set up for use in step-by-step offices due to the small and

rather uncertain demand. Other arrangements are set up to care for placing the call distributing "B" equipment in a blank or vacant position of a panel office "A" switchboard where the amount of "B" equipment does not justify a separate line-up of "B" positions. A third arrangement for panel offices is made whereby an "A" operator adjacent to a position with "B" equipment may operate the "B" position equipment during very light load periods such as at night. In all of these arrangements, the keyset handling the "B" traffic or combination "A" and "B" traffic is of a type similar to that used in the straight "A" positions.

Section

1.10 A universal section consisting of separate upper and lower units is specified. The upper unit is eight 8-1/2-inch panels in length and the three associated lower units each two and two-thirds panels in length. Insofar as the framework dimensions and design are concerned, it will line up with the existing DSA switchboards of the No. 1 switchboard section type. Equipment design requirements for such "A&M Only" arrangements are covered in specifications J21105 and J31102. In step-by-step offices it is frequently desirable to line up the "A" switchboard with a toll switchboard. The new section is identical with and will, therefore, line up with No. 3 toll switchboard, 92 jack sections. Some toll positions of this type have keyshelves 1 foot 7-3/4 inches in depth which extend forward over a pneumatic tube ticket distributing system in front of the lockrail. To line up with this arrangement, step-by-step "A" position keyshelves of the same depth are available. Normally, the "A" position keyshelf depth is 1 foot 4-3/8 inches.

Subdivisions of Equipment and Detailed Index

CIRCUIT DRAWING	EQUIPMENT CODE	RATING OF UNIT	TITLE	EQUIPMENT DRAWING	CKTS PER UNIT	MTG PLTS PER UNIT
<i>Relay Rack Units for Panel, Step-by-Step, and Crossbar Offices</i>						
SD-90451-01	J91101AG	A&M Only	Repair Service Trunks	ED-90670-01	10	9
SD-90453-01	J91101AA	A&M Only	Special Service Cords	ED-90658-01	10	18
SD-90453-02						
SD-90454-01	J91101AB	A&M Only	Combination Intercept-	ED-90659-01	10	24
SD-90454-02			ing and Special Service Cords			

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ISS 7, SECTION 814-050-153, 815-075-151, 816-028-151

CIRCUIT DRAWING	EQUIPMENT CODE	RATING OF UNIT	TITLE	EQUIPMENT DRAWING	CKTS PER UNIT	MTG PLTS PER UNIT
<i>Relay Rack Units for Panel, Step-by-Step and Crossbar Offices (Cont'd)</i>						
SD-96164-01	J91101AN	A&M Only	Idle Trunk Indicating Unit for Panel, Step-by-Step, and Crossbar Offices	ED-96164-01	80	10
SD-96189-01	J91101AP	A&M Only	Official PBX Trunk Unit	ED-96189-01	10	7
<i>Relay Rack Units for Panel Offices</i>						
SD-11205-01	J91101BJ	A&M Only	Outgoing Trunks To Tandem	ED-20502-01	10	8
SD-21172-01	J91101BA	A&M Only	Special Service Cord (Grounded Supervision)	ED-20585-01	10	20
SD-21174-01 SD-21174-02	J91101BB	A&M Only	Combination Intercepting and Special Service Cords (Grounded Supervision)	ED-20678-01	10	25
SD-21179-01	J91101BE	A&M Only	Keypulsing Outgoing Trunks	ED-20680-01	10	11
SD-21179-01 SD-21784-01 SD-21787-01 SD-21787-02 SD-21787-03 SD-21858-01 SD-21859-01 SD-25351-01 SD-25353-01	J91101BF	A&M Only	Sender Selectors (Ten Capacity)	ED-20681-01, Fig. 2	10	7
SD-21179-01 SD-21784-01 SD-21787-01 SD-21787-02 SD-21787-03 SD-21858-01 SD-21859-01 SD-25351-01 SD-25353-01	J91101BG	A&M Only	Sender Selectors (20 Capacity)	ED-20681-01, Fig. 1	20	12
SD-21361-01	J91101BS	A&M Only	Howler Unit	ED-21361-01	4	9
SD-21443-01	J91101BR	A&M Only	Plugging-up Lines for Individual Line Offices	ED-21443-02	10	9
SD-21565-01	J91101BD	A&M Only	Verification Trunks	ED-21565-01	10	6
SD-21600-01	J91101BC	A&M Only	Special Service Trunks	ED-21600-01	10	4

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CIRCUIT DRAWING	EQUIPMENT CODE	RATING OF UNIT	TITLE	EQUIPMENT DRAWING	CKTS PER UNIT	MTG PLTS PER UNIT
<i>Relay Rack Units for Panel Offices (Cont'd)</i>						
SD-21704-01	J91101BU	A&M Only	Plugging-up Lines for Party Line Offices	ED-21704-01	10	11
SD-21855-01	J91101BV	A&M Only	Free Line Unit For Panel Offices	ED-21855-01	1	2
<i>Relay Rack Units for Step-by-Step Offices</i>						
SD-31106-01	J91101CH	A&M Only	Incoming Trunks to Rural Operator From Toll Selector	ED-30268-01, Fig. 15	10	7
SD-31127-01	J91101CG	A&M Only	Incoming Trunks to Rural or Special Service Operator	ED-30268-01, Fig. 20	10	9
SD-31130-01	J91101CE	A&M Only	Magneto Rural Lines	ED-30272-01	10	8
SD-31314-01	J91101DA	A&M Only	Central "A" Board Special Service Trunks	ED-31314-01	10	25
SD-31406-01	J91101CD	A&M Only	Plugging-up Lines	ED-31406-01	10	12
SD-31407-01	J91101CB	A&M Only	Intercepting Trunks	ED-31407-01	5	8
SD-31432-01	J91101DB	A&M Only	Central "A" Board Special Service Trunks Not Arranged for Mes- sage Registration (Noncoin)	ED-31432-01	10	13
SD-31436-01	J91101CC	A&M Only	Keypulsing Outgoing Trunk	ED-31436-01	10	7
SD-31499-01	J91101CA	A&M Only	Special Service Trunk Not Arranged for Make Busy	ED-31499-01	10	5
SD-31538-01	J91101DE	A&M Only	Central "A" Board In- coming Trunks to Rural Operator — 2 Wire	ED-31538-01	10	10
SD-31539-01	J91101CL	A&M Only	Incoming Trunks to Rural Operator From Local Selectors	ED-31539-01	10	12
SD-31588-01	J91101CN	A&M Only	Verification Request Trunk — 2 Wire — For Step-by-Step Offices	ED-31588-01	5	6
SD-31589-01	J91101CP	A&M Only	Verification Request Trunk — 3 Wire—From No. 3 Toll Switchboard	ED-31589-01	5	6
SD-31668-01	J91101CQ	A&M Only	Official Service Trunks	ED-31668-01	10	9
SD-31678-01	J91101CR	A&M Only	Operator Recording Completing Trunks	ED-31678-01	10	22

2. SUPPLEMENTARY INFORMATION

814-000-000 — Step-by-Step Systems Index
815-000-000 — Panel Systems Index
816-000-000 — No. 1 Crossbar System Index
AA128.006 — List of General Equipment Requirement Sections
815-016-181 — Performance Requirements, Panel Offices
814-020-180 — Performance Requirements, Step-by-Step Offices
J91103 (815-075-150, 816-029-150) — No. 15D "A" Switchboard
J91104CA (814-050-152, 815-075-152, 816-028-150) — Supervisors Telephone Equipment Unit
J39206 (814-005-150) — General Outline — No. 1 and 350A Step-by-Step Offices
X-61400 — List of Engineering Requirement Specifications, Panel Offices
Floor Plan Data — Section 7.2, Sheet 26 — Switchboard
Section 7.3, Sheet 2 — Angle Section
KS-5645 — Plastic Bulletin Holders

3. DRAWINGS

For additional drawings forming a part of this specification, see listings under Subdivisions of Equipment and Detailed Index.

Keysheets

SD-21300-01 — Keysheet, Panel Offices
SD-25000-01 — Keysheet, No. 1 Crossbar Offices
SD-31359-01 — Keysheet, Step-by-Step Offices

Framework

ED-20783-01 — Call Distributing "B" Position (Two Position)
ED-60919-01 — Fuse Panel Assembly
ED-90395-01 — Relay Rack Unit Assembly
ED-90395-02 — Relay Rack Unit Assembly
ED-90620-01 — Lower Unit Ironwork
ED-90628-01 — End Panel Assembly
ED-90638-01 — Cable Turning Section Assembly
ED-90645-01 — Angle Section Assembly (30 Degrees)
ED-90661-02 — CTS Mounting Details
ED-90717-01 — Cable Pin Support Details
ED-90737-01 — Intercepting Position Cable Rack

ED-90739-01 — Cable Turning Section Assembly
ED-90782-01 — Relay Rack Unit Assembly
ED-90926-01 — Upper Unit Assembly
ED-90927-01 — Upper Unit Ironwork
ED-91637-01 — Calls Waiting Signal Unit Equipment

Relay Rack Equipment

ED-10129-01 — Manual Outgoing Trunk Equipment
ED-20502-01 — Miscellaneous Trunk Equipment
ED-20503-01 — Miscellaneous Line Equipment
ED-20552-01 — Call Distributing "B" Relay Rack Equipment
ED-21555-01 — Miscellaneous Trunk Equipment
ED-21633-01 — Interrupting Trunk Equipment
ED-30270-01 — Miscellaneous Relay Rack Equipment
ED-30534-01 — Two-way Master Office Trunk Equipment to Community Dial Office
ED-90146-01 — Clock Circuit Equipment
ED-90687-01 — Toll Switching Trunk Equipment
ED-90803-01 — Miscellaneous Relay Rack Equipment
ED-90974-01 — Cord Monitoring Equipment
ED-91138-01 — Test Circuit Equipment for 209FA and 209FD Relays
ED-91384-01 — Call Distributing "B" Unit
ED-91526-01 — Miscellaneous Relay Rack Equipment

Wiring and Cabling

ED-20681-02 — Cabling, Slip and Grading of Sender Selector Unit
ED-20725-02 — Switchboard Cabling Plan (Panel Offices)
ED-20725-03 — Switchboard Cabling Plan (Panel Offices)
ED-90437-02 — Switchboard Cabling Plan (Step-by-Step Offices)
ED-90440-01 — Cabling of Relay Rack Units
ED-90440-02 — Cabling of Relay Rack Units
ED-90440-03 — Cabling of Relay Rack Units
ED-90699-01 — Position of Local Cable
ED-90730-01 — Cabling of Relay Rack Units
ED-90738-01 — Checking Multiple Cable Forms
ED-90741-01 — CTS Local Cable
ED-90757-02 — Cabling of Relay Rack Units
ED-90757-03 — Cabling of Relay Rack Units
ED-90757-06 — Cabling of Relay Rack Units

- ED-90869-01 — Position Local Cable Support and Protection Details
- ED-91118-01 — Typical Cabling Plan for Distributing Rings
- ED-91149-01 — Roof Equipment and Cable
- SD-91208-01 — Switchboard Grounding Arrangements
- ED-91601-01 — Calls Waiting Signal Unit Local Cable

Miscellaneous

- ED-20597-01 — Typical Relay Rack Equipment (Panel Offices)
- ED-30359-01 — Typical Relay Rack Equipment (Step-by-Step Offices)
- ED-90002-01 — Keyshelf Flush Panels
- ED-90011-01 — Curtain Case Assembly
- ED-90013-01 — Stile Strips and Stile Casings
- ED-90062-01 — Location of Keyshelf Braces
- ED-90198-01 — Plug Seats
- ED-90210-01 — Dial Mounting
- ED-90224-01 — Cable Rack
- ED-90273-01 — Adapters
- ED-91457-01 — Adapter Details — Message Registers
- ED-90283-01 — Resistance Shield
- ED-90367-01 — Voltmeter Mounting
- ED-90411-01 — Designation Cards
- ED-90492-01 — Keyshelf Details
- ED-90637-01 — Panel and Position Numbering
- ED-90683-01 — Cable Rack for Rear of Sections
- ED-91484-01 — Appliance Outlets Rear of Switchboard Having Rear Curtains

4. EQUIPMENT

Framework

ED-90628-01 — End Panel

- Group 3* — End panel for switchboard with 1-foot 4-3/8-inch keyshelf.
- Group 4* — End panel for switchboard with 1-foot 7-3/4-inch keyshelf.

ED-90638-01 — Cable Turning Section (Large)

- Group 3* — Cable turning section for right end of switchboard.
- Group 4* — Cable turning section for left end of switchboard.

ED-90645-01 — 30-degree Angle Section Assembly

- Group 6* — One angle section for use with 1-foot 4-3/8-inch keyshelf with 1-foot 2-3/8-inch lockrail.
- Group 8* — One multiple shelf.
- Group 9* — Small cable bracket.
- Group 10* — Large cable bracket.
- Group 11* — Cable pin support.

ED-90737-01 — Intercepting Position Cable Rack (See 5.01)

- Group 1* — Cable rack details for one upper unit associated with one or more intercepting positions.
- Group 2* — Material for fastening cable rack to multiple shelf.

ED-90739-01 — Cable Turning Section (Small)

- Group 3* — Cable turning section for right end of switchboard.
- Group 4* — Cable turning section for left end of switchboard.

ED-90926-01 — Upper Unit (See 5.01)

- Group 1* — Section assembly for one upper unit without upper multiple shelf and cable brackets.
- Group 3* — Cable brackets (small capacity).
- Group 4* — Cable brackets (large capacity).
- Group 5* — Section assembly for one upper unit without upper and lower multiple shelves and cable brackets.

J91101G	}	Unassigned
J91101H		
J91101J through J91101N		
J91101P		
J91101R through J91101U		
J91101W		
J91101Y		

Relay Rack Units for Panel, Step-by-Step, and Crossbar Offices (The following items cover relay rack mounted units using 23-inch mounting plates.)

J91101AA (A&M Only)—Special Service Cords

Equipment — ED-90658-01
Local Cable — ED-90440-02, Fig. 1

List 1 — Framework, assembly, wiring, and common equipment of one unit of special service cord circuits.

	WIRE	EQUIP
Framework, ED-90395-02 Special Service Cord Ckt, SD-90453-01 or SD-90453-02, "X" & "Y" Wiring	10	0

J91101AB (A&M Only) — Combination Intercepting and Special Service Cords

Equipment — ED-90659-01
Local Cable — ED-90440-02, Fig. 1

List 1 — Framework, assembly, wiring, and common equipment of one unit of combination intercepting and special service cords.

	WIRE	EQUIP
Framework, ED-90395-02 Intercepting and Special Service Cord Ckt, SD-90454-01 or SD-90454-02, "X," "Y" "K," & "L" Wiring	10	0

J91101AG (A&M Only) — Repair Service Trunks

Equipment — ED-90670-01
Local Cable — ED-90440-01, Fig. 2

List 1 — Framework, assembly, wiring, and common equipment for one unit of repair service trunks.

	WIRE	EQUIP
Framework, ED-90395-01 Repair Service Trunk Ckt, SD-90451-01	10	0

J91101AN (A&M Only) — Idle Trunk Indicating Unit for Panel, Step-by-Step, and Crossbar Offices

Equipment — ED-96164-01, Fig. 3

List 1 — Framework, assembly, wiring, and common equipment for one idle trunk indicating unit for 80 trunks.

	WIRE	EQUIP
Framework, ED-25081-01, Fig. 1 Idle Trunk Indicating Relay Ckt, SD-96164-01, Fig. 6 & 7	80	0

List 2 — Equipment required in addition to list 1 for one trunk with OGT jack only per SD-96164-01, Fig. 6.

List 3 — Equipment required in addition to list 1 for one trunk associated with mechanical equipment per SD-96164-01, Fig. 7.

J91101AP (A&M Only) — Official PBX Trunk Unit

Equipment — ED-96189-01

List 1 — Framework, assembly, wiring, and common equipment for one unit of ten trunks from crossbar offices secondary multiple or panel district or office multiple.

	WIRE	EQUIP
Framework, ED-25081-01 Fig. 2 (P-424507) Official PBX Trunk Ckt, SD-96189-01	10	0

List 2 — Equipment required in addition to list 1 for one trunk circuit.

List 3 — Arrangement of unit for mounting on crossbar relay rack.

J91101AR	} Unassigned
J91101AS	
J91101AU	
J91101AW	
J91101AY	

Relay Rack Units for Panel Offices

J91101BA (A&M Only) — Special Service Cord (Grounded Supervision)

Equipment — ED-20585-01
Local Cable — ED-90440-02, Fig. 1

List 1 — Framework, assembly, wiring, and common equipment for one unit of special service cord circuits with grounded supervision for use in panel offices.

	WIRE	EQUIP
Framework, ED-90395-02 Special Service Cord Ckt, SD-21172-01, Fig. A & B, and "X" & "Y" Wiring	10	0

J91101BB (A&M Only) — Combination Intercepting and Special Service Cords (Grounded Supervision)

Equipment — ED-20678-01

Local Cable — ED-90440-02, Fig. 1

List 1 — Framework, assembly, wiring, and common equipment of one unit of combination intercepting and special service cord circuits with grounded supervision for use in panel offices.

	WIRE	EQUIP
Framework, ED-90395-02		1
Intercepting and Special Service Cord Ckt, SD-21174-01 or SD-21174-02, "X" & "Y" Wiring	10	0

J91101BC (A&M Only) — Special Service Trunks

Equipment — ED-21600-01

Local Cable — ED-90440-01, Fig. 4

List 1 — Framework, assembly, wiring, and common equipment of one unit of incoming trunks to special service operator from district or office multiple.

	WIRE	EQUIP
Framework, ED-90395-01		1
Trunk Ckt, SD-21600-01, "X" & "Y" Wiring	10	0

List 2 — Equipment required in addition to list 1 for one special service trunk circuit arranged for number checking.

List 3 — Equipment required in addition to list 1 for one special service trunk circuit not arranged for number checking.

J91101BD (A&M Only) — Verification Trunks

Equipment — ED-21565-01, Fig. 1

Local Cable — ED-90440-01, Fig. 2

List 1 — Framework, assembly, wiring, and equipment of one unit of verification trunk circuits from final multiple for use in panel offices.

	WIRE	EQUIP	SEE NOTES
Framework, ED-90395-01		1	
Verification Trunks, SD-21565-01, "X" Wiring Only	10	10	A

Note

A. When "Y" wiring is required, "X" wiring shall be converted to "Y" wiring.

J91101BE (A&M Only) — Key pulsing Outgoing Trunks

Equipment — ED-20680-01

Local Cable — ED-90440-01, Fig. 1

List 1 — Framework, assembly, wiring, and common equipment of one unit of outgoing trunk circuits to incoming selector, tandem district selector, or distant office selector for use in panel offices.

	WIRE	EQUIP
Framework, ED-90395-01		1
Outgoing Trunk Ckt, SD-21179-01, "K" and "L" Wiring	10	0

J91101BF (A&M Only) — Sender Selectors (Ten Capacity)

Equipment — ED-20681-01, Fig. 2

Local Cable — ED-20681-02, Fig. 1

List 1 — Framework, assembly, wiring, and equipment of one unit of ten sender selectors for key pulsing outgoing trunks or key pulsing "A" board district and incoming selectors for use in panel offices.

	WIRE	EQUIP
Framework, ED-90395-02		1
Sender Selector Ckt, SD-21179-01, SD-21784-01, SD-21787-01, SD-21787-02, SD-21787-03, SD-21858-01, SD-21859-01, SD-25351-01, Fig. 2, SD-25353-01, Fig. 2	10	10

J91101BG (A&M Only) — Sender Selectors (20 Capacity)

Equipment — ED-20681-01, Fig. 1

Local Cable — ED-20681-02, Fig. 1

List 1 — Framework, assembly, wiring, and equipment of one unit of twenty sender selectors for key pulsing outgoing trunks or key pulsing "A" board district and incoming selectors for use in panel offices.

	WIRE	EQUIP
Framework, ED-90395-02		1
Sender Selector Ckt,		
SD-21179-01, SD-21784-01,		
SD-21787-01, SD-21787-02,		
SD-21787-03, SD-21858-01,		
SD-21859-01, SD-25351-01, Fig. 2,		
SD-25353-01, Fig. 2	20	20

J91101BJ (A&M Only) — Outgoing Trunks to Tandem

Equipment — ED-20502-01, Fig. 11
Local Cable — ED-90440-01, Fig. 2

List 1 — Framework, assembly, wiring, and common equipment of one unit of trunks outgoing to No. 1 tandem switchboard arranged to be multiplied before an "A" board (for use in panel offices).

	WIRE	EQUIP
Framework, ED-90395-01		1
Trunk Ckt, Outgoing to Tandem Swbd No. 1,		
SD-11205-01	10	0

J91101BR (A&M Only) — Plugging-up Lines for Individual Line Offices

Equipment — ED-21443-02
Local Cable — ED-90757-02, Fig. 1

List 1 — Framework, assembly, wiring, and common equipment of one unit of plugging-up line circuit, for use in connection with individual lines in panel offices.

	WIRE	EQUIP
Framework, ED-90395-01		1
Plugging-up Line Ckt,		
SD-21443-01, Fig. B,		
"Y" & "Z" Wiring	10	0

List 2 — Assembly and equipment required in addition to list 1 for one plugging-up line circuit.

List 3 — Assembly and equipment required in addition to list 1 for one plugging-up line circuit for use where zero operators trunks have high-resistance sleeves and intercepting trunks have low-resistance sleeves.

J91101BS (A&M Only) — Howler Unit (See note A)

Equipment — ED-21361-01
Local Cable — ED-90757-06

List 1 — Framework, assembly, wiring, and common equipment for one howler unit for four positions.

	WIRE	EQUIP
Framework, ED-90782-01,		
Fig. 3		1
Howler Ckt, SD-21361-01,		
Fig. 2	1	1
Howler Ckt, SD-21361-01,		
Fig. 7 (Less Keys,		
Lamps and Cords) "X" & "Y"		
Wiring and Fig. D	4	0

List 2 — Equipment required in addition to list 1 for one position.

Note

A. In order to avoid inductive interference with unshielded induction coils and repeating coils of other equipment, the howler shall be located so as to obtain a spacing not less than 1 foot 10 inches between the 49 repeating coil and other coils.

J91101BU (A&M Only) — Plugging-up Lines for Party Line Offices

Equipment — ED-21704-01, Fig. 2
Local Cable — ED-90440-01, Fig. 1

List 1 — Framework, assembly, wiring, and common equipment for one unit of ten plugging-up line circuits for use in connection with party line panel offices.

	WIRE	EQUIP
Framework, ED-90395-01		1
Plugging-up Line Ckt,		
SD-21704-01 (Less Fig. A)	10	0

List 2 — Equipment required in addition to list 1 of one plugging-up line circuit.

J91101BV (A&M Only) — Free Line Unit for Panel Offices

Equipment and Local Cable — ED-21855-01

List 1 — Assembly, wiring, and equipment for one unit of one free line circuit per SD-21855-01 ("Y" and "Z" wiring).

J91101BW	}	Unassigned
J91101BY		

Relay Rack Units for Step-by-Step Offices

**J91101CA (A&M Only) — Special Service
Trunks Not Arranged for Make Busy**

Equipment — ED-31499-01

Local Cable — ED-90440-01, Fig. 2

List 1 — Framework, assembly, wiring, and common equipment for one unit of incoming trunk circuits from selectors for use in step-by-step offices.

	WIRE	EQUIP	SEE NOTES
Framework, ED-90395-01		1	
Incoming Trunk Ckt, SD-31499-01, "X," "Y," & "N" Wiring	10	0	A

Note

A. When "M" wiring is required, "N" shall be converted to "M."

J91101CB (A&M Only) — Intercepting Trunks

Equipment — ED-31407-01

Local Cable — ED-90440-01, Fig. 2

List 1 — Framework, assembly, wiring, and common equipment for one unit of intercepting trunk circuits from local selector multiple for use in step-by-step offices.

	WIRE	EQUIP
Framework, ED-90395-01		1
Intercepting Trunk Ckt, SD-31407-01, Fig. 1	5	0

List 2 — Assembly and equipment for one intercepting trunk circuit per SD-31407-01, Fig. 2, for use with switchboards equipped with 49 jacks.

J91101CC (A&M Only) — Key pulsing Outgoing Trunks

Equipment — ED-31436-01

Local Cable — ED-90440-01, Fig. 1

List 1 — Framework, assembly, wiring, and common equipment for one unit of key pulsing outgoing trunks for use in step-by-step offices.

	WIRE	EQUIP
Framework, ED-90395-01		1
Outgoing Trunk Ckt, SD-31436-01, Fig. 1, 2, & 3	10	0

J91101CD (A&M Only) — Plugging-up Lines

Equipment — ED-31406-01

Local Cable — ED-90440-01, Fig. 1

List 1 — Framework, assembly, wiring, and common equipment for one unit of plugging-up line circuits for use in step-by-step offices.

	WIRE	EQUIP
Framework, ED-90395-01	—	1
Plugging-up Line Ckt, SD-31406-01, Fig. 1 & 2	10	0

J91101CE (A&M Only) — Magneto Rural Lines

Equipment — ED-30272-01

Local Cable — ED-90440-01, Fig. 2

List 1 — Framework, assembly, wiring, and common equipment for one unit of magneto rural lines for use with common battery cords for use in step-by-step offices.

	WIRE	EQUIP
Framework, ED-90395-01		1
Magneto Rural Line Ckt, SD-31130-01	10	10

J91101CG (A&M Only) — Incoming Trunks to Rural or Special Service Operator

Equipment — ED-30268-01, Fig. 20

Local Cable — ED-90440-01, Fig. 2

List 1 — Framework, assembly, wiring, and common equipment for one unit of incoming trunks to rural not arranged for coin control for use in step-by-step offices.

	WIRE	EQUIP
Framework, ED-90395-01		1
Incoming Trunk Ckt, SD-31127-01	10	0

List 2 — Assembly, wiring, and equipment for one unit similar to list 1 but equipped for use as incoming trunks to special service operator.

J91101CH (A&M Only) — Incoming Trunks to Rural Operator From Toll Selectors

Equipment — ED-30268-01, Fig. 15

Local Cable — ED-90440-01, Fig. 2

List 1 — Framework, assembly, wiring, and common equipment for one unit of incoming trunks to rural operator from incoming toll selectors or intermediate toll selectors for use in step-by-step offices.

	WIRE	EQUIP
Framework, ED-90395-01		1
Trunk Ckt Incoming From Toll Selectors, SD-31106-01	10	0

J91101CL (A&M Only) — Incoming Trunks to Rural Operator From Local Selectors

Equipment — ED-31539-01
Local Cable — ED-90440-01, Fig. 2

List 1 — Framework, assembly, wiring, and common equipment for one unit of incoming trunks to rural operator from local selectors for use in step-by-step offices.

	WIRE	EQUIP
Framework, ED-90395-01		1
Rural Trunk Ckt, SD-31539-01, "M," "N," "X," & "Y" Wiring	10	0

List 2 — Assembly and equipment required in addition to list 1 for one rural trunk circuit without "M" or "X" apparatus.

List 3 — Assembly and equipment required in addition to list 1 for "M" apparatus.

List 4 — Assembly and equipment required in addition to list 1 for "X" apparatus for flashing recall.

J91101CN (A&M Only) — Verification Request Trunks—2 Wire—For Step-by-Step Offices

Equipment — ED-31588-01
Local Cable — ED-90757-02

List 1 — Framework, assembly, wiring, and common equipment for one unit of incoming trunks to step-by-step intercepting operator for verification request from manual or toll.

	WIRE	EQUIP
Framework, ED-90782-01		1
Incoming Trunk Ckt, SD-31588-01, "X" Wiring	5	0

List 2 — Assembly and equipment required in addition to list 1 for one incoming trunk circuit with 94E repeating coil without "X" apparatus.

List 3 — Assembly and equipment required in addition to list 1 for one incoming trunk circuit with 94F repeating coil without "X" apparatus.

List 4 — Assembly and equipment required in addition to list 1 for "X" apparatus for trunks from toll.

J91101CP (A&M Only) — Verification Request Trunk — 3 Wire — From No. 3 Toll Switchboard

Equipment — ED-31589-01
Local Cable — ED-90757-02

List 1 — Framework, assembly, wiring, and common equipment for one unit of incoming trunks to step-by-step intercepting operator for verification request from toll.

	WIRE	EQUIP	SEE NOTES
Framework, ED-90782-01		1	
Incoming Trunk Ckt, SD-31589-01, "X" Wiring	5	0	A

List 2 — Assembly and equipment required in addition to list 1 for one incoming trunk circuit with toll line pad control resistance ("X" apparatus).

Note

A. The PC resistance ("X" apparatus) shall be furnished in all cases and disconnected when not required.

J91101CQ (A&M Only) — Official Service Trunks

Equipment — ED-31668-01
Local Cable — ED-90757-02

List 1 — Framework, assembly, wiring, and common equipment for one unit of ten official service trunks from connector terminals in step-by-step offices.

	WIRE	EQUIP
Framework, ED-90782-01, Fig. 1		1
Trunk Ckt, SD-31668-01	10	0

List 2 — Equipment required in addition to list 1 for one trunk circuit.

J91101CR (A&M Only) — Operator Recording Completing Trunks

Equipment — ED-31678-01

Local Cable — ED-90757-02, Fig. 1

List 1 — Framework, assembly, wiring, and common equipment for one unit of ten operator recording completing trunks in step-by-step offices.

	WIRE	EQUIP
Framework, ED-90782-01, Fig. 1		1
Operator Recording Completing Trk Ckts, SD-31678-01, "K," "L," & "X" Wiring and SD-31678-02, "F," "K," "L," & "X" Wiring	10	0

List 2 — Equipment required in addition to list 1 for one operator recording completing trunk not arranged for coin control.

List 3 — Mounting plate required in addition to list 1 when list 4 is specified.

List 4 — Equipment required in addition to list 2 for one operator recording completing trunk arranged for coin control.

List 5 — Equipment per SD-31678-01 (120C repeating coil) in addition to list 2 when trunk impedance at 1000 cycles is 1200 ohms or less.

List 6 — Equipment per SD-31678-01, (120D repeating coil) required in addition to list 2 when trunk impedance at 1000 cycles is greater than 1200 ohms.

J91101CS through J91101CU	} Unassigned
J91101CW	
J91101CY	

J91101DA (A&M Only) — Central "A" Board Special Service Trunks

Equipment — ED-31314-01

Local Cable — ED-90440-01, Fig. 2

List 1 — Framework, assembly, wiring, and equipment for one unit of central "A" switchboard incoming trunks to special service operator for coin service for use in step-by-step offices.

Framework, ED-90395-01		1
Incoming Trunk Ckt to Special Service Operator, SD-31314-01	10	0

J91101DB (A&M Only — Central "A" Board Special Service Trunks Not Arranged for Message Registration (Noncoin))

Equipment — ED-31432-01

Local Cable — ED-90440-01, Fig. 2

List 1 — Framework, assembly, wiring, and equipment for one unit of incoming trunks to central "A" board special service operator for noncoin service not arranged for message registration for use in step-by-step offices.

	WIRE	EQUIP
Framework, ED-90395-01	—	1
Incoming Trunk Ckt, SD-31432-01, Without Message Registration Apparatus	10	0

J91101DE (A&M Only) — Central "A" Board Incoming Trunks to Rural Operator, 2 Wire

Equipment — ED-31538-01

Local Cable — ED-90440-01, Fig. 1

List 1 — Framework, assembly, wiring, and common equipment for one unit of ten incoming trunk circuits to rural operator.

	WIRE	EQUIP
Framework, ED-90395-01		1
2-wire Rural Trunk Ckt, SD-31538-01	10	0

List 2 — Assembly and equipment required in addition to list 1 for one rural trunk with 94E repeating coil without flashing recall and for trunks which are nonloaded or which have M88 or M135 loading.

List 3 — Assembly and equipment required in addition to list 1 for one rural trunk circuit with 94F repeating coil and without flashing recall relay and for trunks which have D175, H135, H175, H250, or M175 loading.

List 4 — Assembly and equipment required in addition to list 1 for flashing recall relay per SD-31538-01, "Y" apparatus.

J91101DK through J91101DN J91101DP J91101DR through J91101DU J91101DW J91101DY	}	Unassigned
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Miscellaneous Equipment

4.01 The following list covers miscellaneous "A" switchboard circuits and associated equipment drawings not otherwise covered in this specification.

CIRCUITS	EQUIPMENT
Panel	
SD-20372-01 — Permanent Signal Overflow Line	ED-20724-01
SD-20377-01 — Emergency Completing Cord Ckt	ED-90803-01, Fig. 25
SD-21236-01, — Link Down Drive Lamps Fig. 10	ED-20724-01
SD-21290-01 — Rural Trunk	ED-20502-01, Fig. 7
SD-21306-01 — Magneto Rural Line	ED-20503-01, Fig. 7
SD-21310-01 — Interposition Trunk	ED-20502-01, Fig. 1
SD-21311-01 — Busy Back Signal	Locate resistors on relay rack
SD-21352-01 — Misc Tone Ckt Relays	ED-90803-01, Fig. 23
SD-21467-01 — Number Check Trk	ED-20502-01, Fig. 10
SD-21549-01 — Coin Control	ED-90803-01, Fig. 16, 17, & 18
SD-21554-01 — Incpt and Verif Trk	ED-21555-01, Fig. 4
SD-21555-01 — Vacant Inc Mult Trk	ED-21555-01, Fig. 1
SD-21558-01 — Tbl Incpt Trk	ED-21555-01, Fig. 3
SD-21594-01 — Commercial Office Line	ED-20503-01, Fig. 9
SD-21595-01 — Official Line	ED-20503-01, Fig. 8
SD-21601-01 — Desk Tie Line	ED-90803-01, Fig. 1

CIRCUITS	EQUIPMENT
SD-21606-01 — Vacant Code Incpt Trunk	ED-90803-01, Fig. 2
SD-21619-01 — Voltmeter Cord Ckt	ED-90803-01, Fig. 25
SD-21633-01 — Intercepting Trk	ED-21633-01
SD-21705-01 — Coin Control	ED-90803-01, Fig. 19 & 20
SD-21710-01 — Outgoing Aux Line	ED-90803-01, Fig. 21
SD-21758-01 — CW Signal Lamps	ED-20724-01, Fig. S9
SD-21758-01, — CW Signal Buzzer Ckt Fig. 4	ED-90740-02
SD-21778-01 — Manual Line with Final Multiple	ED-90803-01, Fig. 24
SD-21883-01 — Business Office Line Ckt	ED-90803-01, Fig. 28

Step-by-Step

ES-239345 — Interposition Trk	ES-30268-01, Fig. 9
ES-241550 — Inc Information Trk	ED-30268-01, Fig. 4
ES-241904 — Tone Jack Ckt	ED-30270-01, Fig. 1 & 2
SD-31405-01 — Intercepting Trk	ED-90803-01, Fig. 3 & 22
SD-31406-01 — Fig. 1 — Tbl Obs and Tst Trunk	ED-90803-01, Fig. 15
SD-31470-01 — Subscriber Lines	ED-90803-01, Fig. 4
SD-31480-01 — Completing Intercepting Trk	ED-90803-01, Fig. 5 & 6
SD-31498-01 — Official Line	ED-90803-01, Fig. 7
SD-31608-01 — Outgoing Aux Line	ED-90803-01, Fig. 21
SD-31710-01 — Two-way Community Dial Trunk Ckt (CX Sig)	ED-30534-01, Fig. 2
SD-31714-01 — Toll Conn. Trk	ED-90803-01, Fig. 31

Common Systems

SD-90449-01 — Cord Monitoring Ckt	ED-90974-01
SD-90450-01 — Manual Line	ED-90803-01, Fig. 8

CIRCUITS	EQUIPMENT
SD-90463-01 — Dial Monitoring Ckt	ED-90803-01, Fig. 14
SD-90466-01 — Outgoing Trunks or SD-96028-01 Fig. 1, 4, & 5	ED-90803-01, Fig. 9, 10, 11, & 12
SD-90467-01 — Outgoing Trunk Jacks	ED-20724-01 ED-30438-01
SD-90468-01 — Answering Jacks and Lamps	ED-20724-01 ED-30438-01
SD-90464-01 — Time Measure Alarm and Coin Control Aux Ckts	ED-90803-01, Fig. 16
SD-90467-01 — Multiple Answering Jack Lamp	ED-90803-01, Fig. 13
SD-90476-01 — Toll Sw Trk for Com Bat. Lines	ED-90687-01, Fig. 1
SD-90574-01 — Toll Sw Trk for Mag Rural Lines	ED-90687-01, Fig. 2
SD-95005-01 — Alarm Ckt	ED-91696-01, Fig. C & A
SD-96033-01 — Ind Cont Ckt	ED-91696-01, Fig. D
SD-96164-01 — Lamp Relays	ED-91696-01, Fig. B
SD-96180-01 — Emergency Transfer Ckt	ED-90803-01, Fig. 32
SD-96193-01 — Comb A and B Sr Tel Ckt	ED-90803-01, Fig. 29
SD-96470-01 — Answering Jack Lamp Transfer Ckt	ED-91530-01
ES-96198-01 — Sdr Mon Serv Obs Ckt	ED-90803-01, Fig. 30

5. GENERAL NOTES

5.01 The upper unit section assembly specified includes a multiple shelf which supports outgoing trunk cable brackets. The upper multiple shelf is not required for the DSA switchboard. In any line of switchboard not equipped with checking multiple and where this multiple is not expected to be equipped ultimately, the outgoing trunk multiple cables shall be placed on the multiple shelf. At those positions at the head of the board where check-

ing multiple cable is carried at a higher level, the intercepting position cable rack shall be used. The cable pin details, separate from this multiple shelf, shall be used for supporting cables in intercepting positions which are in a separate line of board or in any line-up of positions where no checking multiple cable and but one layer of OGT cables is furnished. When "A" positions are at the head of a line of toll switchboard positions in step-by-step offices, the location of the multiple shelf and arrangement of cables is governed by the toll line multiple cabling as covered in the toll switchboard specification.

5.02 The keyshelf specified for this switchboard has no lamp rail for cord circuit supervisory lamps. These lamps are in all cases located in cord circuit keys of A18, A5, or other similar types, in 44 lamp sockets, or in flush panels. Wherever circuits specify optional keys whose carrying the necessary lamp sockets shall be furnished. All keyshelf lamps are A1 type except those in the key monitoring indicators which are E1.

5.03 The lengths and colors of cords shall be as shown on the keyshelf equipment drawings.

5.04 Answering jacks associated with such circuits as sender supervisory, district coin control supervisory, permanent signal holding trunks, trouble observation and test, trouble intercepting, link down drive, vacant incoming multiple trunks, vacant code intercepting trunks, verification request trunks, coin overtime jacks, and other circuits appearing in the sender monitor-intercepting portion of the switchboard are not ordinarily multiplied. They are equipped from top down, below the outgoing trunk multiple, and from bottom up, above the outgoing trunk multiple. Monitoring jacks and other central office observing circuits appearing at the monitoring position likewise are not multiplied. Answering jacks associated with final multiple or connector multiple intercepting trunks are often not multiplied but may be multiplied to not more than four appearances. Answering jacks associated with special service trunks, manual subscriber lines, trunks from information desks, and toll number checking request trunks are arranged on an 8-panel regular multiple basis.

Circuits in this classification are arranged to operate the answering lamps of eight multiple appearances. When the number of appearances exceeds eight, an additional lamp relay per trunk associated with the answering jack circuit is used to operate the lamps of the ninth to sixteenth and the seventeenth to twenty-fourth as well as the first to eight appearances.

5.05 Outgoing trunk jacks shall be multiplied on a 6-panel basis. The equipment shall be from top down.

5.06 Checking multiple, when specified, consists of 200 point test strips, arranged in an 8-panel multiple above the outgoing trunks, growing from bottom up. When more than one 10,000 line unit of checking multiple appears at any point in the switchboard, the test strips for the last 400 lines of each unit are located above the top unit. When two units of checking multiple only partially overlap, the test strips for the last 400 lines in each unit shall be located immediately above their associated unit except at the point of overlap where the arrangement first described is obtained by running separate cables for the two test strips associated with the first unit.

5.07 Tone jacks, when specified for education of subscribers as to the various tones used, shall be located in the OGT multiple.

5.08 Rural, official, and subscribers lines, when specified for appearance in the face equipment, shall be located above the outgoing trunk jacks, or, when only a few are required, among the outgoing trunk jacks.

5.09 Appliance outlets, when specified shall be furnished in accordance with drawings and specifications listed herein.

5.10 In locating the cord testing unit on the relay rack a space of one mounting plate shall be left both above and below the unit in anticipation of additions to the circuit to take care of possible additional cord circuit features in the future.

5.11 The fuses associated with the pulsing relay in the keyset circuit, the keypulsing sender circuit, and the "A" board key monitor-

ing circuit, as covered in notes on the circuit drawings, shall be mounted on the same fuse panel on the fuse board or on adjacent fuse panels when necessary.

5.12 In both panel and step-by-step offices with a "B" board line-up, the night bell shall be located in the CTS of the "A" board instead of in the CTS of the "B" board and the leads extended from the night alarm circuit in the "B" CTS to the bell in the "A" CTS.

5.13 The lockrail depth shall be 1 foot 2-3/8 inches on all position lower units except those furnished in line with "A" positions having 1-foot 0-3/8-inch lockrails or in line with toll positions having 1-foot 0-3/8-inch lockrails. In these cases, the lockrail shall line up.

5.14 Cord circuits of each type shall be located consecutively on the relay rack as they occur in the switchboard without leaving unequipped mounting plate positions for future additional cords except in the last unit. This is illustrated on the typical relay rack equipment drawings listed herein. This arrangement requires that cord circuit relay equipment added later be placed in a new location without particular reference to the location of the original equipment.

5.15 In offices having more than one lineup of DSA board it is sometimes desirable to abandon an entire line of board at night. Arrangements are available through the use of lamp transfer circuit SD-96470-01 listed under miscellaneous equipment by which a key is provided in the cable turning section key panel of the switchboard to be abandoned. The operation of this key transfers the answering lamp signals of the trunks having appearance in the night board and makes busy all trunks not transferred. Also, when required, it provides a tone on the number checking trunks in the abandoned board to indicate to a toll operator that number checking is waived.

5.16 In certain communities, arrangements are desired whereby a subscriber may be connected to fire, police, or hospital lines when these lines are busy, by dialing operator. Emergency auxiliary line circuits SD-21710-01 for panel and SD-31608-01 for step-by-step may

be connected between these line circuits and the associated final terminals or connector terminals for this service. Special service operators are provided with a jack and key for each of these emergency auxiliary lines by which the operator can cut off a conversation on the busy line and connect the calling subscriber. The front equipment drawing shows the key and jack equipment and ED-90803-01 shows the relay rack equipment.

5.17 Vacant incoming multiple trunks provide a means of intercepting calls dialed in error to subscribers lines that do not exist. They also provide a means of intercepting calls to final frames temporarily removed from service to permit bank replacements or other similar installation or maintenance work. Unless otherwise specified by the telephone company, five vacant incoming multiple trunks shall be provided for each office having vacant final choices. For multioffice installations, the trunks for offices having vacant choices may be extended to serve the offices not having vacant choices, each group of trunks serving a nearly equal number of offices. When all the final choices are equipped in all the offices of an installation, one set of five vacant incoming multiple trunks shall be provided to serve all the offices. However, when all the final choices are served by more than one final frame, these trunks are not required since one final frame can be arranged to serve the choice while the other frame is being repaired. Each group of five vacant incoming multiple trunks shall be cabled with a 50CL cable from the relay rack to an incoming frame DPTS and multiplied from there to other offices in the same building. For offices having all final choices equipped, the vacant incoming multiple trunk cabling shall be dead ended at the incoming frame DPTS.

5.18 The switchboard cable shall be arranged in accordance with the switchboard cabling drawing listed herein.

5.19 Code 24CL or 241CL cables shall be used for cabling 10-per-strip answering jacks.

5.20 Code 16CL cable is used between the distributing frame and the first appearance of OGT jacks in the switchboard for that portion of the trunk multiple not arranged for

idle trunk indicating. Code 16CL is used for short multiple. The cable for the trunks arranged for idle trunk indicating is covered in 5.25. Long multiple cable serving the small portion of the OGT multiple appearing before sender monitor and intercepting positions is connected to the same distributing frame punchings as the cable for the corresponding trunks in the remainder of the board. When the OGT is equipped with group-busy lamps, code 70CL cable shall be used for the jacks and for the lamp leads for the first 33 lamp appearances. Corresponding C-type cables shall be used for short multiple. For long line-ups where there are more than 33 multiple appearances of the OGT group-busy lamps, the lamp leads to the appearance shall be run in switchboard cable to the group-busy lamps in a manner similar to that for the answering jack lamp leads. The same shall be done at the sixty-seventh and one hundredth appearance as required. See 5.28.

5.21 The checking multiple shall be cabled with code 258CL cable in accordance with the drawings listed herein and 5.06.

5.22 Codes 1450CL, 1451CL, 1452CL, or 1453CL cables, as required, shall be used for power leads to relay rack units from the miscellaneous fuse boards, the talking battery fuse board, and miscellaneous interrupter frames.

5.23 The switchboard cables between the relay rack and the switchboard shall be as large as applicable to the units or other relay equipment served as covered in specification J90101. When distributing rings are used in the switchboard, the switchboard cable serving more than one terminal strip or position shall be butted at the center of the group and the leads spread in both directions in the rings without sewing as covered on ED-91118-01. Interposition leads shall also be run in the rings without sewing excepting that requirements covering "C" leads apply to leads in distributing rings. The "C" wiring shall be segregated from the other leads by tying to the lower part of the rings. Switchboard cable conventions for interposition leads on circuit drawings shall be ignored when distributing rings are used. The use of distributing rings makes it unnecessary to terminate miscellaneous power leads in the cable turning section.

5.24 Idle trunk indicating arrangements provide a lamp per trunk in the face of the switchboard operated on ac supplied from transformers through the contacts of lamp relays. The contacts of these relays are cabled directly to the switchboard without cross connection. These relays are controlled by idle trunk indicating relays which are cross connected on the regular distributing frame at the same terminal strips as those carrying tip, ring, and sleeve conductors. The idle trunk indicating relays are controlled either directly by the sleeve of the trunk or by other relays in trunks or selector circuits. The formation of indicating group chains is done on terminal strips on the idle trunk indicating unit.

5.25 As illustrated on SD-90468-01, Fig. 4, both terminals of the idle trunk indicating lamps are multipled through the board. Short multiple cable for the jacks and these lamps is 239CL using 20 pairs for T and R, 20 pairs for lamps, and 20 singles for S leads. The last appearance of the 283A lamp socket mountings will be arranged to ground the lower terminals to the framework. The switchboard stile strips will be grounded with a bus bar as covered on ED-91208-01 and connected to the ground bus bar of the relay rack bay carrying the transformer unit. The ac supply from the contacts of the lamp relays to the top terminals of the first appearance of the lamp socket mountings is cabled with 74CL cable (22 gauge) or 125CL cable (19 gauge) depending upon the number of multiples and the distance from the switchboard to the lamp relay bay as listed in the table in 5.26. The T, R, and S leads to the first appearance are cabled from the distributing frame with 6016 cable.

5.26 The table on the following page is a guide to the selection of the transformer unit and the gauge of cable to the first appearance of idle trunk indicating lamp. The installer will adjust the connections on the transformer taps to obtain 4 volts across the terminals of the lamp or lamps nearest the middle of the multiple where the voltage is lowest. The other voltages are for information only. The maximum cable runs for the smaller number of multiple appearance is actually greater than the 700 feet stated but the table carried only to this probable maximum distance.

5.27 Battery supply for sender monitor circuit lamps shall be run in switchboard cable direct from miscellaneous fuse board to lamps in the switchboard.

5.28 When the monitoring position is located at the foot of the switchboard line-up, sufficient slack shall be stored in the switchboard cables to the position terminal strips and to the jacks associated with this position so that the position may be moved to the foot of the ultimate lineup.

5.29 Tone supply to the howler unit shall be run from the miscellaneous fuse board to the unit with No. 16 B&S gauge, three conductor rubber-covered lead covered cable (National Electric Code Low Tension). The sheaths of the lead-covered cable shall be butted on the relay rack upright adjacent to the unit and the leads spliced to No. 20 ESCB wire connected to the unit terminal strip punchings.

5.30 Leads to roof equipment shall be run in switchboard cable as covered on drawing ED-91149-01.

5.31 In order to obtain at least 20 volts at the last lamp in the OGT group-busy lamp multiple, the total length of 22 gauge switchboard cable and jumper from the miscellaneous fuse board to the first appearance of lamps shall not exceed the values given in the following table. The figures under I are for offices having 23-cell batteries in which the miscellaneous fuse panel voltage is not under 24.50 volts, except at power failure, and the figures under II are for offices having the old 24-cell batteries in which the miscellaneous fuse panel has a minimum voltage of approximately 23.25 volts, except at power failure. This table is based on 2J lamps having slightly higher current drain than the lamps representative of the 1929 commercial product.

NO. OF 2J LAMPS IN MULTIPLE	I	II
	MAX FEET OF CABLE	MAX FEET OF CABLE
33	235	135
30	280	170
25	330	240
20	505	300
15	710	485
12	910	630

**IDLE TRUNK INDICATING
TRANSFORMER UNIT AND CABLING REQUIREMENTS**

MULT APP	CURRENT	VOLTAGE			MAX DISTANCE LP REL BAY TO CTS (Ft)				MIN DIST (Ft) LP REL TO CTS	
		ACROSS MIDDLE LAMP	ACROSS END LAMPS	TOP. TERM. 1ST LAMP TO GRD	8.5 VOLTS TRANS		11.5 VOLTS TRANS		11.5 VOLTS TRANS	
					22 GAUGE	19 GAUGE	22 GAUGE	19 GAUGE	22 GAUGE	19 GAUGE
1	0.03	4.00	4.00	4.00	700	—	—	—	—	—
2	0.06	4.00	4.00	4.00	700	—	—	—	—	—
3	0.09	4.00	4.00	4.00	700	—	—	—	—	—
4	0.12	4.00	4.01	4.01	700	—	—	—	—	—
5	0.15	4.00	4.01	4.03	700	—	—	—	—	—
6	0.18	4.00	4.02	4.06	700	—	—	—	—	—
7	0.21	4.00	4.02	4.08	700	—	—	—	—	—
8	0.25	4.00	4.03	4.11	700	—	—	—	—	—
9	0.28	4.00	4.04	4.15	700	—	—	—	—	—
10	0.31	4.00	4.06	4.20	700	—	—	—	—	—
11	0.34	4.00	4.08	4.25	700	—	—	—	—	—
12	0.37	4.00	4.10	4.31	700	—	—	—	—	—
13	0.40	4.00	4.11	4.37	660	—	—	—	—	—
14	0.44	4.00	4.13	4.44	530	—	—	—	—	—
15	0.47	4.00	4.15	4.50	485	—	—	—	—	—
16	0.50	4.00	4.17	4.56	445	—	—	—	—	—
17	0.53	4.00	4.21	4.65	407	—	—	—	—	—
18	0.56	4.00	4.25	4.75	370	744	—	—	—	—
19	0.59	4.00	4.27	4.84	335	682	—	—	—	—
20	0.63	4.00	4.30	4.94	305	612	—	—	—	—
21	0.66	4.00	4.33	5.05	280	560	564	—	232	—
22	0.70	4.00	4.37	5.17	250	501	520	—	206	—
23	0.73	4.00	4.41	5.28	228	457	485	—	186	—
24	0.76	4.00	4.45	5.39	200	400	456	—	167	—
25	0.79	4.00	4.50	5.53	190	380	425	—	149	—
26	0.82	4.00	4.55	5.67	170	340	397	—	130	—
27	0.85	4.00	4.60	5.79	150	300	375	750	115	231
28	0.89	4.00	4.65	5.92	130	260	345	690	99	198
29	0.92	4.00	4.71	6.06	115	230	322	645	85	170
30	0.96	4.00	4.77	6.20	100	200	298	596	70	140
31	0.99	4.00	4.81	6.40	85	170	275	550	55	110
32	1.03	4.00	4.85	6.60	70	140	250	500	40	80
33	1.07	4.00	4.90	6.80	55	110	228	452	—	50

Note 1: These values are based upon a resistance of 0.75 ohm for the fuse, relay contacts, and bay wiring.

Note 2: The limitation of 33 lamps is imposed by lamp relay contact life.

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

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

EQUIPMENT	RATINGS	DETAILS LAST SHOWN IN ISSUE	REPLACING EQUIPMENT	EQUIPMENT	RATINGS	DETAILS LAST SHOWN IN ISSUE	REPLACING EQUIPMENT
J91101A	Mfr Disc.	6	—	J91101BK	Mfr Disc.	3	J91101BR
L2	Mfr Disc.	2	J91101A,L4	J91101BL	Mfr Disc.	2	J91101BQ
J91101B	Mfr Disc.	6	—	J91101BM	Mfr Disc.	5	J91104BZ
L8	Mfr Disc.	1	J91101B,L7	J91101BN	Mfr Disc.	4	J91101BS
L9	Mfr Disc.	2	J91101B,L11	J91101BP	Mfr Disc.	5	J91104C
J91101C	Mfr Disc.	2	J91101E	J91101BQ	Mfr Disc.	4	J91101BU
J91101D	Mfr Disc.	5	J91103R	J91101BT	Mfr Disc.	5	J91104J
J91101E	Mfr Disc.	6	—	J91101CF	Mfr Disc.	4	J91101CQ
J91101F	Mfr Disc.	5	—	J91101CJ	Mfr Disc.	4	J91101CR
J91101AC	Mfr Disc.	5	—	J91101CK	Mfr Disc.	5	J91104BX
J91101AD	Mfr Disc.	5	—	J91101CM	Mfr Disc.	5	J91104BY
J91101AE	Mfr Disc.	5	—	J91101DC	Mfr Disc.	5	—
J91101AF	Mfr Disc.	3	J91101AH	J91101DD	Mfr Disc.	5	{J91104CV J99235AK J95417D
J91101AH	Mfr Disc.	4	J91101AM	J91101DF	Mfr Disc.	5	—
J91101AJ	Mfr Disc.	5	J91101AN	J91101DG	Mfr Disc.	5	—
J91101AK	Mfr Disc.	5	J23050BD	J91101DH	Mfr Disc.	6	{J91104CV J99235AK J95417D
J91101AL	Mfr Disc.	5	J91103H	J91101DJ	Mfr Disc.	6	J91104L
J91101AM	Mfr Disc.	5	—	J91101EA	Mfr Disc.	5	J91104M
J91101AT	Mfr Disc.	4	—	J91101EB	Mfr Disc.	5	J91104T
J91101BH	Mfr Disc.	4	J91101BT	J91101EC	Mfr Disc.	5	J91104T
				J91101ED	Mfr Disc.	5	—
				J91101EE	Mfr Disc.	5	J91104J
				J91101EF	Mfr Disc.	5	J91104W
				J91101EG	Mfr Disc.	5	

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