LINE FINDER FRAMES
EQUIPMENT DESIGN REQUIREMENTS
PANEL SYSTEMS

1. GENERAL

Scope

1.01 This specification, together with the supplementary information listed herein, covers the equipment design requirements for the framework, equipment, and circuits to be used in the engineering, manufacture, and installation of the line finder frames and associated line and start units for use in panel offices with subscriber links and line circuits having either battery or ground on the cutoff relay.

1.02 This specification is reissued to:

(a) Rate J27402A "Mfr Disc."

(b) Incorporate previous appendix changes.

(c) Bring into conformity with the general Plant Series plan.

Capacity

1.03 The capacity of the line finder frame is as follows:

Line Circuits 28-28 Group (1 frame)	800
Line Circuits 40 Group (2 frames)	1200
Line Circuits 60 Group (1 frame)	400
Line Circuits 80 Group (4 frames)	1200
Line Finder Selectors 28-28 Group (1 frame)	56
Line Finder Selectors 40, 60, or 80 Group (1 frame)	60
Trip Circuits (per 400 lines)	10
Emergency Trip Circuit (per 400 lines)	1
Start Circuit (per 400 lines)	1
Emergency Start Circuit (per 400 lines)	1

Description

1.04 The line finder frame is one of a chain of frames required for the originating traffic. It is a steel structure of a type known as a "double sided" frame designed for mounting ten panel-type banks of 40 sets of terminals each, 56 or 60 line finders of the power-driven selector type, line, trip, and start circuit units, and various miscellaneous apparatus. The line finder is used to receive calls originated by dial subscriber whose line is connected by means of the line finder to a district selector. The latter has a subscriber sender link and subscriber sender attached to it, which enables the call to be completed mechanically.

1.05 A typical line finder frame consists of a center bay in which are mounted the banks, friction roll drive, clutches, brush rods, trip rods, etc., and one or two relay bays in which are mounted the line, trip, and start circuit relays.

1.06 The number of bays depends on whether the line finder frame is arranged for 28-, 40-, 60-, or 80-line finder groups as described below. There is also a frame without a relay bay which, under certain conditions, is used in combination with frames with one relay bay to complete an 80-selector group. The relay bay for the line finder frame is an integral part of the frame assembly.

1.07 Where a frame has two relay bays, one bay is located on each side of the frame. Where a frame has only one relay bay, it is generally located on the right side of the frame, although with certain floor plan arrangements of 40- and 80-selector group frames the relay bay will be located at the left of the frame.

1.08 It should be noted that the "front" of the frame is arbitrarily chosen as that side on which the odd-numbered line finders are located. However, the framework is the same whether the line relay bay is at the right or at the left, since the framework is simply turned around.

1.09 The manner in which the three types of frames should be arranged on the floor, and the locations of the divisions in the multiple banks to obtain 28-, 40-, 60-, or 80-selector groups can be determined by referring to the floor plan drawing data sheets.

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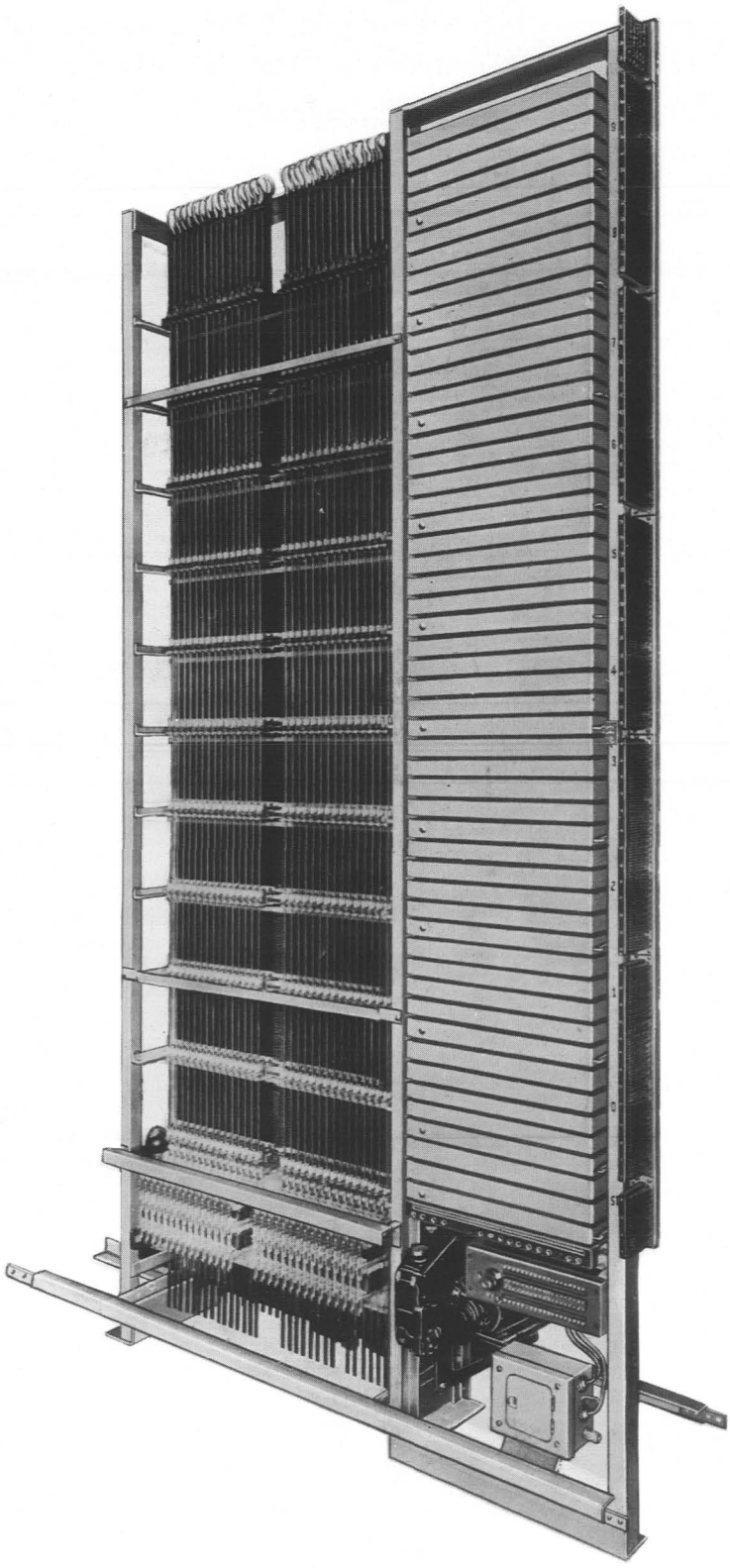

Fig. 1 - Line Finder Frame With One Relay Bay

1.10 Line Finder Framework: There are three types of line finder frames with respect to construction, as follows: (a) A frame complete without a relay bay consisting of a center bay for mounting the multiple banks, friction roll drives, clutches, brush rods, trip rods, etc., (b) a frame with one relay bay consisting of a center bay similar to (a) and a relay bay on one side arranged to mount five 80-circuit line relay units and a start unit, (c) a frame with two relay bays consisting of center bay similar to (a) or (b) and a relay bay on each side, each of which is arranged to mount five 80-circuit line relay units and a start circuit unit.

1.11 Line Finder Frame Capacity: Line finder frames are also divided with respect to the number of line finders having access to each group of 400 subscriber lines into four types known as 28-, 40-, 60-, and 80-group frames. These four capacities are obtained by various arrangements and combinations of banks, selectors, trip rods, etc.

1.12 28-selector Group

(a) On the 28-group frame there is a distinct electrical division in the middle of the multiple banks. There is no connection between the terminals in the two halves of the banks or between the trip rods associated with the selectors having access to the terminals in these bank sections. The frame has a total of 56 selector positions, 28 of which serve each half of the multiple banks. The frame is divided vertically into two equal parts and 400 subscriber lines can be terminated on each half, thus having 28 line finders with access to 400 subscriber lines.

(b) In order to reduce the elevator travel time there is a further division of each half of each bank on the 28-group frame into two equal parts, the terminals of which are connected with handformed cables. The two halves of each group, together with their associated line finders, are called "subgroups" and are designated by the letters A and B.

(c) A framework per ED-20608-52, Group 6 is required for the 28-group frame.

1.13 40-selector Group: On the 40-group frame the complete division in the multiple banks is so located that 40 selectors have access to the terminals in one part of the bank and 20 selectors have access to the terminals in the remaining portion of the bank. Two associated frames are required to form three groups, the 20 selectors on the first frame being combined with 20 selectors on the second frame to form the middle of the three groups. The banks of the two frames are turned with the 20-selector ends toward each other and the multiple slip between the banks is taken care of by means of the unit local cables which connect the two frames.

(a) With respect to the second group, subgroup A is on one frame and subgroup B is on the other.

(b) Two frames arranged in the above manner have a capacity of three groups of 400 subscriber lines, each served by 40 line finders. One framework having two relay bays per ED-20608-52, Group 7 and one framework having one relay bay per ED-20608-52, Group 3 are required for the combination.

1.14 60-selector Group: The 60-selector group is self-contained on one frame with the multiple slip between the subgroups taking place in the center of the banks. The one relay bay frame per ED-20608-52, Group 2 is required for mounting this group.

1.15 80-selector Group: Four frames are required to obtain three groups of 80 selectors each. Two kinds of banks are used. The banks on the first frame are divided at the 40-20 point and connected with slip cables. There is a complete electrical division in the banks on the second frame at the 20-40 point. The 20-selector portions of the banks on the first and second frames are connected by unit local cables without slip.

(a) The banks on the third frame are the same as those on the second frame except they are so turned that the complete electrical division occurs at the 40-20 point. The 40-selector portions of the banks on the second and third frames are connected with unit local cables with slip.

(b) The banks on the last frame are the same as those on the first frame except they are so turned that the slips occur at the 20-40 point. The 20-selector portions of the banks on the third and last frames are connected with unit local cables without slip.

(c) From the above description it will be noted that the first group occupies all of the first frame and one third of the second frame. The second group occupies two thirds of each of the second and third frames. The third group occupies one third of the third frame and all of the last frame.

(d) The first frame in the 80-selector group per ED-20608-52, Group 4 has one relay bay, the second and third frames per ED-20608-52, Group 3 each have one relay bay, while the fourth frame in the group per ED-20608-52, Group 1 has no relay bays.

1.16 Line Load Control Equipment

(a) The purpose of the line load control equipment is to safeguard the service of certain lines by denying originating service temporarily to others during an overload. It provides a means for denying originating

service in two steps, called class B and class C, each step comprising about 45 per cent of the total lines. The remaining 10 per cent of the lines called class A will not be subject to denial of service and will therefore include those considered more important.

(b) Common control equipment consisting of keys, lamps, and relays will be located at a central point in a wall cabinet with an associated relay rack unit. A class B and a class C key and lamp will be provided per line finder frame in the wall cabinet, together with a master key and lamp for each class.

(c) At the line finder frames, two class B (LB1 and LB2) and two class C (LC1 and LC2) relays will be furnished per frame. The purpose of these relays is to operate the release R relays of the trip circuits on which service is to be denied. The LB1 and LC1 relays will be located in trip circuits 2 and 3, respectively, and the LC1 and LC2 in trip circuits 6 and 7. The contacts of these relays may, however, be connected to any trip circuit on the frame except 0 and 1. The lines controlled by trip circuits 0 and 1 will therefore be in class A while those controlled by the remaining trip circuits may be in either class B or C at the option of the telephone company. The 40 lines controlled by one trip circuit will all be in the same class.

1.17 Floor Plan Arrangement

(a) Since the 28-group frame is symmetrical, the arrangement on the floor is the same for either left-to-right or right-to-left growth.

(b) In arranging 40-group frames, the first frame of a pair shall always be a frame having two line relay bays.

(c) The 60-group frame shall always be so arranged that the line relay bay will be at the right side.

(d) In arranging 80-group frames, the first frame of a group of four frames shall be a frame with a line relay bay.

(e) For maintenance reasons the line finder frames should be located near the district frames. The line finder frames use with nondial subscriber lines, in most cases, will ultimately be converted to dial use and they should therefore be located in the same group of frames with the regular dial-type line finder frames. The line finder frames should also be located as near the intermediate distributing frame as practicable in order to make the length of the cable run of the subscriber line circuit as short as possible.

2. SUPPLEMENTARY INFORMATION

815-000-000 - Panel Systems Index
AA128.002 - List of Equipment Design Requirements Sections
AA128.006 - List of General Equipments Requirements Sections
Floor Plan Data
Section 4.11,
Sheet 13
Section 4.4,
Sheet 1

3. DRAWINGS

WECo J drawings listed should be ordered by referring to the prefix and base number and requesting the highest suffix dash (-) number.

Key Sheets - Panel Systems

SD-21300-01 - Battery on CO Relay
SD-21680-01 - Ground on CO Relay

Framework

ED-20081-01 - Selector Designation Bar
ED-20293-01 - Framework Limits
ED-20446-01 - Length of Connecting Shafts
ED-20509-57 - Assembly of Fuse Panel - Item 38
ED-20608-52 - Assembly of Frame
ED-20609-51 - Assembly of Line and Start Units
ED-20672-01 - Guardrail Supports
ED-91183-01 - Relay Rack Unit Assembly

Equipment

ED-91802-01 - Line Load Control - Relay Rack Unit Equipment
ED-91803-01 - Line Load Control - Wall Cabinet Equipment
J27402D-( ) - Line Finder Equipment - Battery on the CO Relay
J27402E-( ) - Line Finder Equipment - Ground on the CO Relay
J27402F-( ) - Line Finder Start and Emergency Trip Equipment - Ground on the CO Relay
J27402G-( ) - Line Finder Equipment - With One Relay Bay
J27402H-( ) - Line Finder Equipment - With Two Line Relay Bays

Wiring and Cabling

ED-20252-01 - Typical Schematic Layout - Battery on the CO Relay
ED-20610-01 - Line Relay Bay Local Cable
ED-20611-02 - Line and Start Unit Local Cable
ED-20615-01 - Line Finder Frame Switchboard Cabling Plan
ED-20623-01 - Method of Running and Supporting Frame Battery and Ground Leads
ED-20740-01 - Line Finder District Cabling Schematic
ED-20811-01 - Switchboard Power Cabling
ED-90411-01 - Designation Cards

4. EQUIPMENT

J27402D (A&M Only) - Line Relay and Trip Circuit Unit - Battery on the CO Relay

Equipment - J27402D-( )
Local Cable - ED-20611-02

List 1 - Framework, assembly, wiring, and equipment for one line unit arranged for flat-rate or message-rate individual; also for message-rate individual or 2-party message rate with zone registration. (See 5.07, 5.08, and 5.18.)

	Wire	Equip	See Notes
Line Unit Assembly, ED-20609-51, Fig. 1		1	
Line Ckt, SD-21712-01, Fig. 1, 2, or 4	80	80	A, 5.14
Trip Ckt, SD-21713-01, Fig. 1 & 2	2	2	

List 2 - Framework, assembly, wiring, and equipment for one line unit arranged for flat-rate or message-rate individual; also for message-rate individual or 2-party message rate with zone registration where the multiple is split between two frames. (See 5.07, 5.08, and 5.18.)

	Wire	Equip	See Notes
Line Unit Assembly, ED-20609-51, Fig. 1		1	
Line Ckt, SD-21712-01, Fig. 1, 2, or 4	80	80	A, 5.14
Trip Ckt, SD-21713-01, Fig. 1 & 2	2	2	

List 3 - Framework, assembly, wiring, and equipment for one line unit arranged for 2-party flat or message rate without zone registration. (See 5.07 and 5.08.)

	Wire	Equip	See Notes
Line Unit Assembly, ED-20609-51, Fig. 1		1	
Line Ckt, SD-21712-01, Fig. 3	80	80	A, 5.14
Trip Ckt, SD-21713-01, Fig. 1 & 2	2	2	

List 4 - Framework, assembly, wiring, and equipment for one line unit arranged for 2-party flat or message rate without zone registration where the multiple is split between two frames. [See 5.08(a).]

	Wire	Equip	See Notes
Line Unit Assembly, ED-20609-51, Fig. 1		1	
Line Ckt, SD-21712-01, Fig. 3	80	80	A, 5.14
Trip Ckt, SD-21713-01, Fig. 1 & 2	2	2	

List 5 - Framework, assembly, wiring, and equipment for one line unit arranged for coin box lines with coin deposit before or after dial tone and with or without overtime coin collection. (See 5.07, 5.08, and 5.18.)

	Wire	Equip	See Notes
Line Unit Assembly, ED-20609-51, Fig. 1		1	
Line Ckt, SD-21712-01, Fig. 1 or 2	80	80	A, 5.14
Trip Ckt, SD-21713-01, Fig. 1 & 2	2	2	

List 6 - Framework, assembly, wiring, and equipment for one line unit arranged for coin box lines with coin deposit before or after dial tone and with or without overtime coin collection where the multiple is split between two frames. (See 5.07, 5.08, and 5.18.)

	Wire	Equip	See Notes
Line Unit Assembly, ED-20609-51, Fig. 1		1	
Line Ckt, SD-21712-01, Fig. 1 or 2	80	80	A, 5.14
Trip Ckt, SD-21713-01, Fig. 1 & 2	2	2	

Note

A. Optional wiring shall be furnished in all cases and connected as required. Strap X shall be furnished in all cases and removed on the first or intermediate lines of a PBX group. The "W," "Y," "Z," and "ZB" wiring shall be looped at the position of the CO relay as required. Where the type of wiring is not known or when converting from one wiring to another, these leads may be spliced at the position of the CO relay.

J27402E (A&M Only) - Relay and Trip Circuit Unit - Ground on the CO Relay

Equipment - J27402E-( )
Local Cable - ED-20611-02

List 1 - Framework, assembly, wiring, and equipment for one line unit arranged for flat-rate and message-rate indi-

vidual, also for message-rate individual or 2-party message rate with zone registration. (See 5.07, 5.08, and 5.18.)

	Wire	Equip	See Notes
Line Unit Assembly, ED-20609-51, Fig. 1		1	
Line Ckt, SD-21715-01, Fig. 1, 2, or 4	80	80	A, 5.14
Trip Ckt, SD-21713-01, Fig. 1 & 2	2	2	

List 2 - Framework, assembly, wiring, and equipment for one line unit arranged for flat-rate or message-rate individual, also for message-rate individual or 2-party message rate with zone registration where the multiple is split between two frames. [See 5.08(a) and 5.18.]

	Wire	Equip	See Notes
Line Unit Assembly, ED-20609-51, Fig. 1		1	
Line Ckt, SD-21715-01, Fig. 1, 2, or 4	80	80	A, 5.14
Trip Ckt, SD-21713-01, Fig. 1 & 2	2	2	

List 3 - Framework, assembly, wiring, and equipment for one line unit arranged for 2-party flat or message rate without zone registration. (See 5.07 and 5.08.)

	Wire	Equip	See Notes
Line Unit Assembly, ED-20609-51, Fig. 1		1	
Line Ckt, SD-21715-01, Fig. 3	80	80	A, 5.14
Trip Ckt, SD-21713-01, Fig. 1 & 2	2	2	

List 4 - Framework, assembly, wiring, and equipment for one line unit arranged for 2-party flat or message rate without zone registration where the multiple is split between two frames. (See 5.07 and 5.08.)

	Wire	Equip	See Notes
Line Unit Assembly, ED-20609-51, Fig. 1		1	
Line Ckt, SD-21715-01, Fig. 3	80	80	A, 5.14
Trip Ckt, SD-21713-01, Fig. 1 & 2	2	2	

List 5 - Framework, assembly, wiring, and equipment for one line unit arranged for coin box lines with coin deposit before or after dial tone and with or without overtime coin collection. (See 5.07, 5.08, and 5.18.)

	Wire	Equip	See Notes
Line Unit Assembly, ED-20609-51, Fig. 1		1	
Line Ckt, SD-21715-01, Fig. 1 or 2	80	80	A, 5.14
Trip Ckt, SD-21713-01, Fig. 1 & 2	2	2	

List 6 - Framework, assembly, wiring, and equipment for one line unit arranged for coin box lines with coin deposit before or after dial tone and with or without overtime coin collection where the multiple is split between frames. (See 5.07, 5.08, and 5.18.)

	Wire	Equip	See Notes
Line Unit Assembly, ED-20609-51, Fig. 1		1	
Line Ckt, SD-21715-01, Fig. 1 or 2	80	80	A, 5.14
Trip Ckt, SD-21713-01, Fig. 1 & 2	2	2	

Note

A. The "X" wiring shall be furnished and connected in all cases. The "Y" wiring shall be obtained by having the installer add a strap across the 1000-ohm winding on all lines in a PBX group except the last line. Other optional wiring shall be furnished in all cases and connected as required.

J27402F (A&M Only) - Start and Emergency Trip Circuit Unit - Ground or Battery on the CO Relay

Equipment - J27402F-( )
Local Cable - ED-20611-02, Fig. 2

List 1 - Framework, assembly, wiring, and equipment for one start unit arranged for use in ground or battery on the cutoff relay offices.

	Wire	Equip	See Notes
Start Unit Assembly, ED-20609-51, Fig. 2		1	
Emer Trip Ckt, SD-21713-01:			
Fig. 2 & 5	1	1	
Start Ckt, Fig. 3 & 4	1	1	A, 5.06
Emer Start Ckt, Fig. 4	1	1	A

Note

A. Optional wiring shall be furnished in all cases and connected as required. Optional apparatus shall be furnished as required.

J27402G (A&M Only) - Line Finder Frame - With One Relay Bay (See 5.23)

Equipment - J27402G-( ) (See 5.01)
Local Cabling Plan - ED-20610-01 (See 5.03)
Switchboard Cabling Plan - ED-20615-01 (See 5.05)

List 1 - Framework, assembly, wiring, and common equipment for one line finder frame with one line relay bay for use as the second frame in a 40-selector group not equipped with line and start units.

	Wire	Equip	See Notes
Frame Assembly, ED-20608-52, Item 3		1	
Fuse Panel Assembly, ED-20509-57, Item 38		1	
Line Finder Misc Ckts, SD-21660-01	2	2	5.14

List 2 - Framework, assembly, wiring, and common equipment for one line finder frame with one line relay bay for use in a 60-selector group not equipped with line and start units.

	Wire	Equip	See Notes
Frame Assembly, ED-20608-52, Item 2		1	
Fuse Panel Assembly, ED-20509-57, Item 38		1	
Line Finder Misc Ckts, SD-21660-01	2	2	5.14

List 3 - Framework, assembly, wiring, and common equipment for one line finder frame with one line relay bay for use as the first frame of an 80-selector group not equipped with line and start units.

	Wire	Equip	See Notes
Frame Assembly, ED-20608-52, Item 4		1	
Fuse Panel Assembly, ED-20509-57, Item 38		1	
Line Finder Misc Ckts, SD-21660-01	2	2	5.14

List 4 - Framework, assembly, wiring, and common equipment for one line finder frame with one line relay bay for use on the second or third frame in an 80-selector group not equipped with line and start units.

	Wire	Equip	See Notes
Frame Assembly, ED-20608-52, Item 5		1	
Fuse Panel Assembly, ED-20509-57, Item 38		1	
Line Finder Misc Ckts, SD-21660-01	2	2	5.14

J27402H (A&M Only) - Line Finder Frame - With Two Line Relay Bays (See 5.23)

Equipment - J27402H-( ) (See 5.01)
Bay Local Cable - ED-20610-01 (See 5.03)

List 1 - Framework, assembly, wiring, and common equipment for one line finder frame with two line relay bays for use as the first frame in a 40-selector group not equipped with line and start units.

	Wire	Equip	See Notes
Frame Assembly, ED-20608-52, Item 7		1	
Fuse Panel Assembly, ED-20509-57, Item 38		2	
Line Finder Misc Ckts, SD-21660-01	2	2	5.14

List 2 - Framework, assembly, wiring, and common equipment for one line finder frame with two line relay bays for use in a 28-28 selector group not equipped with line and start Units.

	Wire	Equip	See Notes
Frame Assembly, ED-20608-52, Item 6		1	
Fuse Panel Assembly, ED-20509-57, Item 38		2	
Line Finder Misc Ckts, SD-21660-01	2	2	5.14

5. GENERAL NOTES

Equipment

5.01 Motor and drive equipment shall be furnished independently of the framework and equipment covered by this specification.

5.02 This framework has no relay bays and shall be used only as the last frame in an 80-selector group.

5.03 The relay bay local cable consists of leads from the line unit terminal strips to the fuse panel, and to the start unit terminal strip; also those from the connecting block, jack panel, and the motor alarm governor which terminate at the miscellaneous terminal strip at the top of the frame.

5.04 Battery and ground leads in the local cables shall be No. 20 gauge type "AM" wire and those for the line, trip, and start circuits shall be No. 24 gauge wire.

5.05 Where there is no relay bay, a 205CL (or a similar) cable shall be furnished for the test jack and motor alarm leads which terminate at the frame miscellaneous terminal strip.

5.06 The start circuit shall be wired for the OF relay, but it should be equipped only where the "All Circuits Busy" register requires 24 volts, since the relay is not required for circuits using 48 volts. The trip circuit wiring for this feature shall be included in all units except the unit containing trip circuit 0 as covered on the circuit cross connections.

5.07 When a line finder frame is to be arranged for line load control, per SD-21713-01, Fig. 7, four relays per frame are required, two LB1 and LB2 for class B and two LC1 and LC2 for class C. These relays shall be equipped only where specified by the telephone company, but wiring for them shall be included in all new line units. Relays LB1, LB2, LC1, and LC2 shall be located in trip circuits 2, 3, 6, and 7, respectively, and wiring for them included in the associated units. The trip circuit wiring for this feature shall be included in all units except the unit containing trip circuits 0 and 1 as covered on the circuit cross connections.

5.08 Equipment Requirements With Respect to Number of Lines Equipped

(a) Where less than a full group of lines is terminated on a frame and one or more banks are not needed initially or ultimately, the banks and their associated trip mechanism, multiple brushes, and line units will be omitted from the top of the frame as specified by the telephone company. If it is advisable from a traffic standpoint to use a partially equipped line unit, the highest numbered lines in the line group may be omitted from the upper unit in multiples of ten circuits. Since the fully equipped line unit of 80 circuits is more economically manufactured, it should be specified wherever possible.

(b) Where one frame of a pair of 40-group frames, or one, two, or three frames of four 80-group frames are furnished, the last line group shall be equipped approximately in proportion to the number of selectors having access to the lines in the group. If the last subgroup furnished is an A subgroup, only the lower two mounting plates of the four that are associated with each bank should be equipped, and if it is a B subgroup, only the upper two mounting plates are to be equipped.

(c) Where only the B subgroup of a line group is furnished, two line finders shall be used as test selectors. They shall be the left-hand selectors when facing either the front or the rear of the frame.

5.09 Interrupters

(a) Four 165-type interrupters shall be furnished for each 30 relay bays or less in an office. The STA regular leads shall be connected to one interrupter and STB regular to the second, the STA emergency to the third, and the STB emergency to the fourth.

(b) One 166-type interrupter shall be furnished for each two relay bays in an office. The ten regular trip TA leads, the one set of emergency trip TA leads, and the one set of common TA leads for each of two line relay bays shall be connected to one interrupter.

(c) These interrupters shall be mounted on the line finder interrupter frame as covered in the engineering requirement specification for that frame.

5.10 PBX Lines: Unless otherwise specified by the telephone company, PBX lines shall be the lowest numbered lines in the A subgroup of the unit and the highest numbered lines in the B subgroup. This arrangement will give a minimum hunting time for the PBX lines.

5.11 Line Finder Frame Multiple

(a) The line finder frame multiple consists of ten panel-type banks each having 41 sets of terminals and two sets of guide terminals. The two sets of guide terminals are located at the top of each bank and are used for guiding the brushes in the telltale position. The forty-first terminal is used for overflow and is arranged to return the line finder to normal in case the subscriber hangs up before the selector finds the calling line.

(b) As previously explained, the banks on the 60-group frame form the multiple of 400 subscriber lines. On the 28-group frame, by a division in the middle of each bank, they form the multiples of two groups of 400 lines each or a total of 800 lines. The banks on two 40-group frames form the multiples of three groups of 400 lines each or a total of 1200 lines. Similarly, the banks on four 80-group frames form the multiples of three groups of 400 lines each or a total of 1200 lines.

5.12 Line Load Control Common Equipment: The relay rack unit mounting the relays and resistances for the line load control common equipment is shown on ED-91802-01. The wall cabinet for the keys and lamps is shown on ED-91803-01. The relay rack unit may be located at any convenient point on either a 23- or 19-inch relay rack. The wall cabinet, however, should be located in the activity center of the office where the lamps can be readily seen at all times and at a convenient height for operating the keys.

Wiring

5.13 Cross Connection Between Subgroups: In order to reduce the time required to find a line originating a call, each multiple bank is arranged so that the 40 lines terminating on one set of multiple terminals will appear before one half of the line finders in the reverse order to that in which they appear before the other half. To accomplish this, a slip multiple local cable is provided in the middle of each line finder group, dividing the group into two subgroups. In the first subgroup the subscribers lines number from bottom up and in the second subgroup from top down. The slip cable is furnished as a part of the coded bank where the slip occurs on the bank and is made in the local cable where the slip occurs between frames.

5.14 Test Lines

(a) The terminals of circuits 0 and 39 of bank zero on every line finder frame are required for test purposes. The installer shall remove the transposition leads for these circuits and connect the adjacent terminals of the two subgroups straight across. Similar procedure is to be followed where the transposition occurs in the unit local cable between two frames in a selector group.

(b) Circuit 0 of bank zero will be used for the originating test circuit, therefore, it should not be cross connected to a subscriber line. The tip, ring, sleeve, and hunt leads shall be cut at the L and CO relays and at the multiple bank, or banks, depending on whether split multiple cable is required. Four similar leads shall be provided on each line unit from the T, R, S, and H punchings on the miscellaneous portion of the line unit terminal strip to the zero terminals of the zero multiple bank or banks. These test leads will be used only on the unit associated with bank zero, so on all other line units they should be cut dead at the multiple bank form.

(c) For exercise test purposes the T and R leads from jack C on the district selector test frame should be connected to the T and R punchings on the line unit terminal strip for circuit 39 of bank zero. The similarly designated leads of the line circuit should be left disconnected at the multiple bank or banks. No message register or ground leads shall be connected to the M or M1 punchings for this circuit.

5.15 Registers

(a) The district and link overflow registers provided for each line finder group, shall be wired from the line finder start circuit, in the local cable to the miscellaneous terminal strip at the top of each frame, thence in the local power cable to the DPTS and finally in switchboard cable to the traffic register rack via the IDF.

(b) The peg count register, which is provided one for each line finder group, shall be wired from the line finder trip circuit in the local cable to the miscellaneous terminal strip at the top of each frame, thence in the local power cable to the distributing power terminal strip and finally in switchboard cable to the stuck connection finder frame.

5.16 Alarm Circuits: The relays in the various alarm circuits shall be mounted on the floor alarm board. The wiring between the line finder frames and the floor alarm board shall be carried to the miscellaneous terminal strip at the top of each frame, thence in the local power cable to the distributing power terminal strip and finally in switchboard cable to the floor alarm board.

5.17 Grounding of Commutators, Connecting Blocks, and Motor Alarm Governor

(a) One No. 20 gauge type "AM" ground lead shall be provided in the local power cable for each 15 commutators. These leads should be run from the miscellaneous terminal strip at either end of the frame to the midpoint of the selector bay and left long enough to reach the commutator terminals.

(b) Where relay bays are not furnished, ground should be supplied to the miscellaneous terminal strip by a No. 14 lead attached to the adjacent No. 4 frame ground cable with a standard connector. A conductor is provided in the test jack cable to run from this ground supply to the jack panel where it will multiple between the test jacks requiring ground and the motor alarm governor. The ground lead for the connecting block will be sewed to the switchboard cable and terminated at the GC1 punching on the terminal strip.

(c) Where there is a relay bay, the ground leads to the test jacks, connecting block, and the motor alarm governor are to be run in the relay bay local cable from punchings provided on the fuse panel.

(d) The D and E jacks shall be wired by the installer from the LF miscellaneous terminal strip to the T, R, and S commutator terminals of the line finder arranged for tests using No. 20 gauge type "AM" wire.

5.18 Grounding of Punchings: Line circuits having the H lead, M punchings, cabled to the IDF and which serve flat-rate lines in a message-rate group shall be strapped together and grounded at the IDF. Where these leads are not cabled to the IDF, they shall be strapped together and grounded on the line unit terminal strip.

5.19 Test Battery and HRG Supply: The 48V, 24V, and the HRG lead shall be run in switchboard cable from the miscellaneous fuse board to the DPTS where they will be strapped to local power cable conductors which multiple between all the miscellaneous terminal strips in each line-up of frames.

5.20 Line Load Control Equipment: The contacts of the line load control relays are wired to terminal strip punchings on their associated line units. The line load control wiring for the various trip circuits, consisting of the HB or HC and GB or GC leads is also wired to punchings on the unit terminal strips. The trip circuit leads should be connected in the frame local cable to the contacts of the LB- or LC- relays, as specified by the telephone company, to put the various trip circuits in either class B or C. The method of making these connections is illustrated on the circuit cross connections.

5.21 The code numbers of the switchboard cables ordinarily used in cabling the various circuits are given under the circuits listed below. The circuits should, however, be checked to insure that the proper codes are specified to meet the latest circuit requirements.

5.22 Line Finder Multiple to VIDF

(a) The line finder multiples are connected by local cables to five terminal strips mounted on the relay bay, whence they are cabled to the VIDF with various code cables, depending on whether they are arranged for flat-rate, coin box and message-rate individual, or message-rate party line service, respectively.

(b) When for equipment reasons it is desirable to provide an odd number of shelves at the IDF for terminating the lines, 20-circuit cable shall be provided between the line finder frames and the IDF.

5.23 Commutators and Clutches: The wiring to the commutators and clutches shall be run in separate cables direct to the district frame or line finder trunk units on the relay rack. The selection of the size cable to run is outlined on the switchboard cabling plan and cabling schematic drawings listed herein.

5.24 Line Finder to Line Finder Interrupter Frame: One cable should be run between each line relay bay and the line finder interrupter frame. The cable shall be stripped, and the conductors superimposed on the line relay bay local cable with stitches spaced alternately with those of the local cable.

5.25 Line Finder to District Test Frame: One 182CL cable shall be run from each line group to a separate terminal strip on the line finder DPTS or to a block on the most conveniently located end guard. The test leads that will be run in this manner are the T, R, and ET for the exercise test circuit; the TR, ST, AL, and BC for the automatic district test circuit; and the H lead for the originating test circuit. The T, R, and S leads of the latter circuit are multipled through the local power cable between all the line groups served by the same test group and terminated on the regular line finder DPTS. Loop leads from the above DPTS punchings shall then be run to the terminal strip provided for the district test DPTS. If this DPTS is located on an end guard remote from the line finder DPTS, a 3-conductor cable shall be run between these two points. From the district test grouping block, these T, R, and S leads can be run in the same switchboard cables with the TR, BC, ST, etc., leads of the automatic district test circuit which terminate on the various test group units. The leads in the exercise test circuit shall be run in one separate large cable to the top of the test frame.

5.26 Miscellaneous

(a) Cables consisting of No. 20 gauge type "AM" wires shall be used for the battery, ground, interrupter, test, and alarm leads from the distributing power terminal strips to the miscellaneous fuse board.

(b) The cabling between the distributing power terminal strips and points of termination for the various circuits shall be run in the largest switchboard cables possible, consistent with the grouping of leads and points of termination. Cables shall be of No. 22 gauge wire, except battery, ground, interrupter, test, and alarm leads requiring larger gauge wire.

(c) The leads to the common circuit for line load control shall be connected in the switchboard power cable through a DPTS. The distance from the common control relay rack unit to the first DPTS shall not be less than 50 feet of No. 24 gauge cable.

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	Rating	Details Last Shown in Issue	Replacing Equipment
J27402A	Mfr.Disc.	3	-
J27402B	Mfr.Disc.	1	J27402G & F
J27402C	Mfr.Disc.	1	J27402H & F
J27402J	Mfr.Disc.	2	-
J27402K	Mfr.Disc.	2	-
J27402L	Mfr.Disc.	2	-
J27402M	Mfr.Disc.	2	-

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