

## FINAL 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 manufacture and installation of final frames, arranged for either graded or non-graded incoming multiple for use in panel offices.

1.02 This specification is reissued to add supplementary final frame J27801C.

#### Capacity

1.03 A final frame (Fig. 1) has a capacity of 60 selector circuits, 30 circuits on the front and 30 on the rear. It may have one selector group or be split between two selector groups (see 5.14 to 5.17).

1.04 A supplementary final frame has a capacity of 30 selector circuits, 15 circuits on the front and 15 on the rear. It is intended to have a minimum of three selector groups and a maximum of eight selector groups (see 5.18 to 5.20).

1.05 Each final selector group has access to 500 subscriber lines.

#### Description

1.06 The final frame is one of a chain of frames in the panel system which is used exclusively for terminating traffic. On the frame are mounted final selectors associated with the incoming multiple, together with the usual panel bank equipment on which appears the multiple leading to the subscriber lines. The final frame is a steel structure of a type known as a double-sided frame, designed for mounting panel-type banks, elevators, sequence switches, and associated relay equipment.

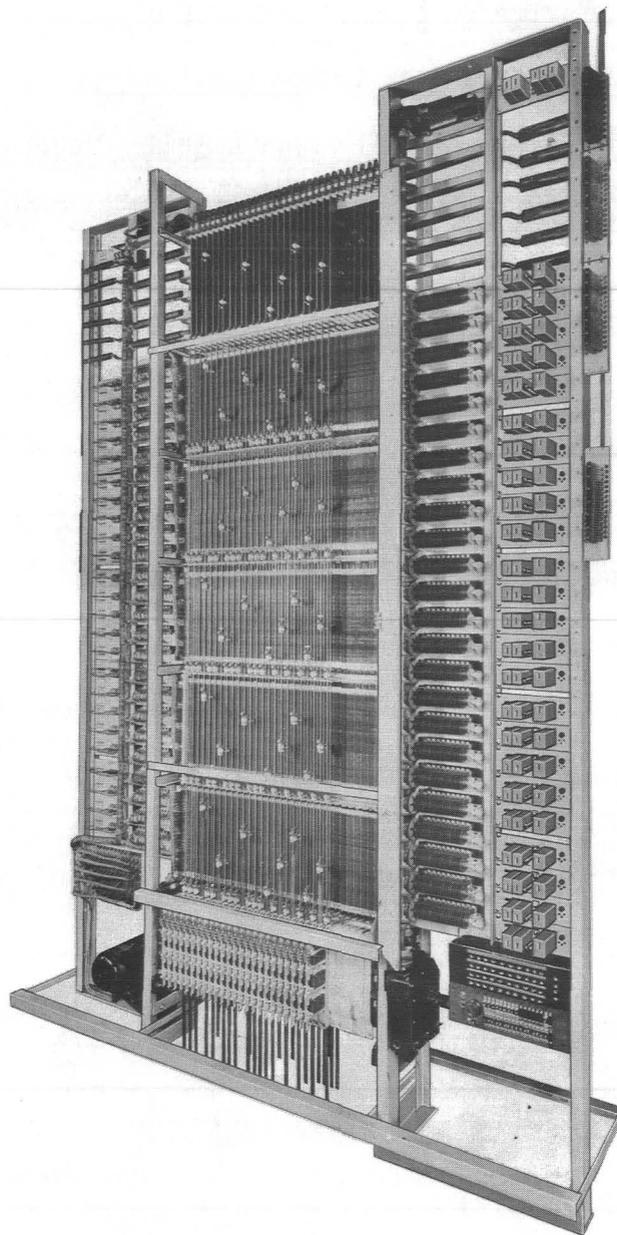


Fig. 1 — Final Frame

**1.07** The supplementary final frame has the same circuit elements and framework as a final frame and each selector group on a supplementary final frame is wired to, and serves as a part of, a selector group on a final frame.

**1.08** The frame consists of five bays: a center bay for mounting the banks, friction roll drives, clutches, brush rods, commutators, etc; two sequence switch bays; and two relay bays. The sequence switch bays are adjacent to the center bay, one at the right and one at the left. The relay bays are at each end of the frame.

## 2. SUPPLEMENTARY INFORMATION

AA128.002—List of Equipment Design Requirements Sections

AA128.006—Checking List — General Equipment Requirements

815-000-000—Panel Systems Index

J20102 (815-030-150)—Switchboard Power Cabling

Floor Plan Data—Section 4.12, Sheet 6

## 3. DRAWINGS

WECO J drawings listed should be ordered by referring to the prefix and base number and requesting the current dash (–) number.

### Keysheets—Panel Systems

ES-262532—3-Digit Office Code Sender Selector  
ES-262647—2- and 2- to 3-Digit Office Code Sender Selector

ES-262829—3-Digit Office Code Rotary Link Ground on the CO Relay

ES-262849—2- and 2- to 3-Digit Office Code Rotary Link Ground on the CO Relay

SD-21300-01—Battery on the CO Relay

SD-21680-01—Panel Link Ground on the CO Relay

### Framework

ED-20081-01—Sequence Switch Frame Details

ED-20193-01 }—Assembly of Frame  
ED-20193-52 }

ED-20293-01—Framework Limits

ED-20509-57—Assembly of Fuse Panel

ED-20624-50 }—Assembly of Jack Panel  
ED-20624-51 }

### Equipment

ED-90411-01—Designation Cards

ES-20044-01—Test Line B

ES-20233-01—Selector Time Alarm

ES-239664-01 }—Final Selector Circuit  
ES-239665-01 }

J27801A-( )—Final Frame Equipment—Battery on Cutoff Relay

J27801B-( )—Final Frame Equipment—Ground on Cutoff Relay

J27801C-( )—Supplementary Final Frame Equipment—Battery on Cutoff Relay

### Circuits

SD-20143-01—Motor Stop

SD-20149-01—Remote-Control G and H Jacks

SD-21200-01 }—Final Selector Circuit  
SD-21200-02 }

SD-21231-01—Miscellaneous Circuit

### Wiring and Cabling

ED-20192-01—Switchboard Cabling Plan

ED-20192-06—Switchboard Cabling Details

ED-20252-01—Schematic Layout—Battery on the CO Relay

ED-20287-01—Wiring of Group Registers

ED-20623-01—Method of Running and Supporting Frame Battery and Ground Leads

ED-20626-01—Local Cable

ED-20811-01—Switchboard Power Cabling Plan

ED-20827-01—Cabling Diagram

## 4. EQUIPMENT

***J27801A (A&M Only)—Final Frame Equipment—Battery on Cutoff Relay***

Equipment—J27801A-( )

Local Cable—ED-20626-01

***List 1—Framework, assembly, wiring, and equipment for one final frame.***

	WIRE	EQUIP	SEE NOTES
Assembly, ED-20193-52, G1		1	
Fuse Panel Assembly, ED-20509-57, G5		2	
Jack Panel Assembly, ED-20624-50, G1		2	

	WIRE	EQUIP	SEE NOTES
Final Selector Ckt, SD-21200-01 and Option V and T	56	0	5.04
Final Selector Ckt, SD-21200-02 and Option R and Q	4	0	5.04, 5.21
Misc Ckt, SD-21231-01: Fuse Alarm, Fig. 1	2	2	A
Selector Time Alarm, Fig. 4	2	2	
Motor Stop, Fig. 5	2	2	
Line Busy Int, Fig. 6	30	30	
Line Busy Int Alarm, Fig. 7	2	2	
Frame Line Tel Jacks Fig. 8	2	2	
Test Battery Supply A, Fig. 9	2	2	
Test Jack B, Fig. 11	2	2	
Routine Test Jacks C and D, Fig. 12	2	2	
Ringling Supply Jack F, Fig. 14	2	2	
Remote-Control Jacks G and H, Fig. 16	4	4	
Test Line Jack J, Fig. 17	1	1	
Spare Jack K, Fig. 18	2	2	
100- and 200-Volt Test Battery Jacks, Fig. 19	2	2	

*Note*

A. Test line circuit SD-21231-01, Fig. 21 and 22, shall be furnished in accordance with the notes on the circuit. One test line sleeve resistance circuit per SD-21231-01, Fig. 23, shall be furnished per office. The equipment for Fig. 22 and 23 shall be mounted on the fuseboard.

**J27801B (A&M Only) – Final Frame Equipment – Ground on Cutoff Relay**

Equipment – J27801B-( )  
Local Cable – ED-20626-01

*List 1* – Framework, assembly, wiring, and equipment for one final frame.

**List 2** – Assembly, wiring, and equipment per SD-21200-01, V option only, and SD-21200-02, R option only, required in addition to list 1, to eliminate flash on busy back, where ringling is ac-dc (MR-R1) and both ringling and silent interval battery are positive, or, where ringling supply is machine ringling full selective superimposed in final choices which receive machine ringling supply positive.

**List 3** – Assembly, wiring, and equipment per SD-21200-01, T option only, and SD-21200-02, Q option only, required in addition to list 1 to eliminate flash on busy back where ringling supply is machine ringling full selective superimposed in final choices which receive machine ringling supply negative.

	WIRE	EQUIP	SEE NOTES
Assembly, ED-20193-52, G1			1
Fuse Panel Assembly, ED-20509-57, G5			2
Jack Panel Assembly, ED-20624-51, G1			2
Test Line B, ES-20044-01	1	1	A
Selector Time Alarm, ES-20233-01, Fig. 2 or Similar Ckt	2	2	A
Final Selector Ckt, ES-239664 or Similar Ckt	56	0	5.04
Final Selector Ckt, ES-239665 or Similar Ckt	4	0	5.04, 5.21
Motor Stop, SD-20143-01, Fig. 6 or Similar Ckt	2	2	A
Remote-Control G and H Jacks, SD-20149-01 or Similar Ckt	4	4	A
Misc Ckt, SD-21231-01: Fuse Alarm, Fig. 1	2	2	
Line Busy Int, Fig. 6	30	30	
Line Busy Int Alarm, Fig. 7	2	2	
Frame Line Tel Jacks, Fig. 8	2	2	
Test Battery Supply A, Fig. 9	2	2	
Int E Jack, Fig. 13	2	2	

	WIRE	EQUIP	SEE NOTES
Ringling Current Supply F Jack, Fig. 14	2	2	
Spare J and K Jacks, Fig. 18	4	4	
100- and 200-Volt Test Battery Jacks, Fig. 19	2	2	

**Note**

- A. The local wiring for these circuits on the final frame is the same as shown for the corresponding figures on the standard miscellaneous circuit, SD-21231-01.

**J27801C (A&M Only) – Supplementary Final Frame  
Equipment – Battery on Cutoff Relay**

Equipment – J27801C-( )  
Local Cable – ED-20626-01

- List 1** – Framework, assembly, wiring, and common equipment for one supplementary final frame.

	WIRE	EQUIP	SEE NOTES
Assembly, ED-20193-52,G2		1	
Fuse Panel Assembly:			
ED-20509-57, G5, Fig. 26		1	
ED-20509-57, G5, Fig. 27		1	
Jack Panel Assembly:			
ED-20624-50, G13, Fig. 20		1	
ED-20624-50, G13, Fig. 21		1	
Final Selector Ckt, SD-21200-01, Including Options V and T	30	0	B
Miscellaneous Ckt, SD-21231-01:			A
Fuse Alarm, Fig. 1	2	0	
Motor Stop, Fig. 5	2	2	
Line Busy Int, Fig. 6	16	16	
Line Busy Int Alarm, Fig. 7	2	2	
Frame Line Tel Jacks, Fig. 8	2	0	
Test Battery Supply A, Fig. 9	2	0	
Test Jack B, Fig. 11	2	0	
Routine Test Jacks C & D, Fig. 12	2	0	
Int Jack E, Fig. 13	2	0	
Ringling Supply			

	WIRE	EQUIP	SEE NOTES
Jack F, Fig. 14	2	0	
Remote Control Jacks G & H, Fig. 16	4	0	
Test Line Jack J, Fig. 17	1	0	
Spare Jack K, Fig. 18	2	0	
100- and 200-Volt Test Battery Jacks, Fig. 19	2	0	

- List 2** – Assembly and equipment per SD-21200-01, option V only; one list 2 per each selector circuit equipped is required in addition to list 1 to eliminate flash on busy back where ringling is ac-dc (MR R1) and both ringling and silent interval battery are positive or where ringling supply is machine ringling full selective superimposed in final choices which receive machine ringling supply positive.

- List 3** – Assembly and equipment per SD-21200-01, option T only; one list 3 per each selector circuit equipped is required in addition to list 1 to eliminate flash on busy back where ringling supply is machine ringling full selective superimposed in final choices which receive machine ringling supply negative.

**Notes**

- A. Miscellaneous circuit SD-21231-01, Fig. 21, 22, 23, shall be furnished in accordance with the notes on that drawing. The equipment for Fig. 22 and 23 are mounted on the miscellaneous fuse bay.
- B. See 5.01, 5.02, 5.03, and 5.04.

**5. GENERAL NOTES**

**5.01** The frames shall be fully equipped with multiple banks unless otherwise specified by the telephone company (see 5.09 to 5.13).

**5.02** Drive and motor equipment is not furnished as part of list 1 of these frames but must be ordered separately.

**5.03** The frames will be equipped with as many selector circuits as are ordered (see 5.14 to 5.20).

**5.04** The MB jacks of the final selector circuits appear on the jack panel. The full complement of MB jacks shall be furnished even though wiring only is provided for some selector circuits.

**5.05** In making floor plan layouts, the final frames should be located as near the intermediate distributing frame as practicable in order to effect economy in cabling. For the same reason it is desirable that the final frames be located near the incoming frames. If both conditions cannot be met, it is preferable to locate the final frames near the IDF, since the amount of cable involved is considerably greater than between the final selectors and incoming multiple.

**5.06** One test battery supply circuit per SD-21231-01, Fig. 10, one ringing current supply per SD-21231-01, Fig. 15, and one permanent final busy line circuit per SD-21231-01, Fig. 24, shall be furnished per office.

**5.07** One set of resistance lamps per SD-21231-01, Fig. 20, shall be furnished per floor for 100- and 200-volt test battery supply.

**5.08** The time measure release interrupter shown on final selector circuits and the test interrupter shown in Fig. 13 on miscellaneous circuit SD-21231-01, shall be located on the miscellaneous interrupter frame.

#### **FINAL MULTIPLE**

**5.09** The final multiple consists of five banks each with 100 sets of terminals in horizontal rows. They constitute a multiple of 500 subscriber lines and each group of 500 lines is known as a "final choice." Some banks are divided or split vertically so that more than one group of 500 lines, that is two or more final choices, appear on each frame.

**5.10** Banks coded 1D, 2A, and 2B are available for use on the J27801A and J27801B final frames. Respectively, they provide a bank

multiple for (1) a single final choice or group for use with 60 selectors (2) a divided bank for use with 30 selectors on each of two groups, and (3) a divided bank for use with 40 selectors in one group and 20 in the other.

**5.11** A bank coded 15H is used on the J27801C supplementary final frame. It is a divided bank which can be furnished for use with two groups of 15 selectors each or, if so ordered by the telephone company, for use with 3 to 14 groups. (Each half divided into seven groups, one for three selectors and six for two selectors each.) A maximum of four groups for each half is recommended.

**5.12** When banks on more than one frame are used for the same selector group, the banks shall be interconnected so as to form one continuous multiple, in which case the two or more frames operate as one.

**5.13** When the banks on two frames are used for the same selector group, as in 5.12, the multiple between frames shall not be slipped except for large PBX groups. In that case, it shall be in accordance with the telephone company specification.

#### **FINAL SELECTORS FOR J27801A AND J27801B FINAL FRAMES**

**5.14** The number of final selectors required to complete connections to a group of 500 subscriber lines will vary, depending upon traffic conditions.

**5.15** Although the final frame has a capacity of 60 final selectors, by the use of regular or split banks, as described above, selector groups of 60, 40, or 30 selectors per group of 500 lines may be obtained. One frame will thus accommodate one 60-final selector group, 1-1/2 40 selector groups, or two 30 selector groups.

**5.16** If more than 60 final selectors are required per group of 500 lines, two or more final frames equipped with banks, as necessary, may be combined to accommodate the number of selectors required. For example, where 90 final selectors are required per choice, three final frames are required per 1000 lines, or 1-1/2 frames per choice.

**5.17** The cables from the incoming multiple banks shall terminate on "Inc Mult" terminal strips located on the first final frame which has the maximum number of selectors for the associated choice. The terminal strips are arranged for either 2, 4, 6, 8, 10, or 12 incoming groups, depending on the traffic requirements. Final selectors are assigned in each final choice for all individual, convertible, and common trunks from the incoming multiple. The lowest numbered final selectors shall be assigned to the highest numbered incoming bank terminals in the choice with the common group of terminals on the lower final selectors. This will leave the spare selectors at the highest numbered positions with the following exceptions.

(a) When more than two final selectors per final frame are to be used with the test desk equipment, as in the case of small groups on split final frames, it may be necessary to equip selectors 59 and 60 before equipping the preceding selectors.

(b) In the larger groups, the final selectors on the split frames shall be the last to be assigned, so that the split final portion of the frame may be disconnected and reused with some other choice in the event of a shift in the terminating traffic load.

(c) Unusual cases may arise where the telephone company may find it desirable to leave spare final selectors between the various subgroups to facilitate future changes. The telephone company will specify, in these cases, which selectors shall be skipped.

#### **FINAL SELECTORS FOR J27801C SUPPLEMENTARY FINAL FRAME**

**5.18** When it is desirable to slightly increase the number of selectors in three or more final choices by the addition of a single frame rather than two or more frames, it can be accomplished by the use of a J27801C supplementary final frame.

**5.19** This frame has no incoming multiple terminal strips and its selector terminal strip (to which its own selectors are wired) shall be connected by switchboard cable to the incoming multiple terminal strips on the J27801A final frames of the same final choices.

**5.20** Reference to 5.11 will reveal the number of selector groups (final choices) which may appear on each frame.

#### **TEST SELECTORS**

**5.21** The supplementary final frame does not require test selectors, and the following information for test selectors applies only to the J27801A and J27801B final frames.

**5.22** In order to test subscriber lines, final selector circuits 1, 2, 59, and 60 shall be wired in all cases for the use of the No. 14 local test desk as well as for regular service. These test selectors shall be connected to incoming multiple terminals at the top of each choice. In this connection, the SC relay shall be furnished only when the final selector is used for test desk testing of subscriber lines.

**5.23** When the incoming multiple is not arranged to cable the test trunks straight through at the top of the choice, it will be necessary in many cases to supply three or four test selectors per choice as some of them may be busy with regular calls due to the slip arrangement on the incoming banks.

**5.24** When the final multiple is split, due to large PBX groups, the number of test selectors will vary as one or more test elevators will be required in each subgroup of the PBX multiple.

**5.25** Final selector circuits 1 and 2 shall also be provided with test jacks for the use of the subscriber line test set. It will be noted that with this arrangement, when there is one final frame per choice, two final selector test jacks will be available for testing the subscriber lines of that choice. When there are two frames per choice, four selectors will be available for routine testing. If only 40 selectors per choice are required, so that the final frames are all split 40-20, two selectors per choice will be available for testing 1/3 of the choices, but only one selector per choice will be available for testing the remaining choices, if 30 less selectors per choice are required, so that the final frames are all split 30-30, only one selector per choice will be available for testing.

**LOCAL WIRING**

**5.26** The final selectors are connected to the incoming multiple at the final frame by cabling between the selector terminal strip and the incoming multiple terminal strips. The lowest numbered selectors shall be connected to the highest numbered incoming multiple terminals in the individual subgroups and in the common group, except selectors 59 and 60 which may be assigned in the top of the common group if they are to be used for test purposes.

**5.27** Unequipped trunks in each choice shall be strapped to equipped trunks with loop leads at the incoming multiple terminal strips.

**5.28** For graded multiples, the common trunks of all subgroups of each choice shall be connected together and reversed by means of loop leads at the incoming multiple terminal strips.

**REGISTERS**

**5.29** Group register leads shall be provided in accordance with ED-20287-01. These leads shall be cross-connected to registers in accordance with the telephone company information on a group or subgroup basis, as required. In the case of graded multiples, no additional leads are required for the "Common" trunks since they will in general be grouped with the "Individual" trunks of the choice.

**TEST LINE JACK MULTIPLE**

**5.30** When two or more frames are multiplied together to form one final group of 500 lines, the regular multiple between frames shall be left disconnected from the ninety-ninth terminal on the zero banks so that a test line jack multiple can be installed for routine test purposes, as shown on the miscellaneous frame circuit.

**CABLING**

**Final Multiple to HIDF**

**5.31** The final multiple shall be cabled to the HIDF (as indicated in Fig. 2) with 100-circuit cables, one cable being required per bank. At the final and supplementary final frames, the cables shall be connected directly to the bank terminals without the use of terminal strips.

**5.32** The cabling of the final multiple and terminal strips on the IDF shall be furnished for lines in multiples of 500, regardless of the number of terminals specified to be equipped.

**Final Multiple Between Frames**

**5.33** When the number of final selectors per choice is such as to require more than one final frame, the banks shall be multiplied between frames with 100-circuit switchboard cables, except as noted in 5.30.

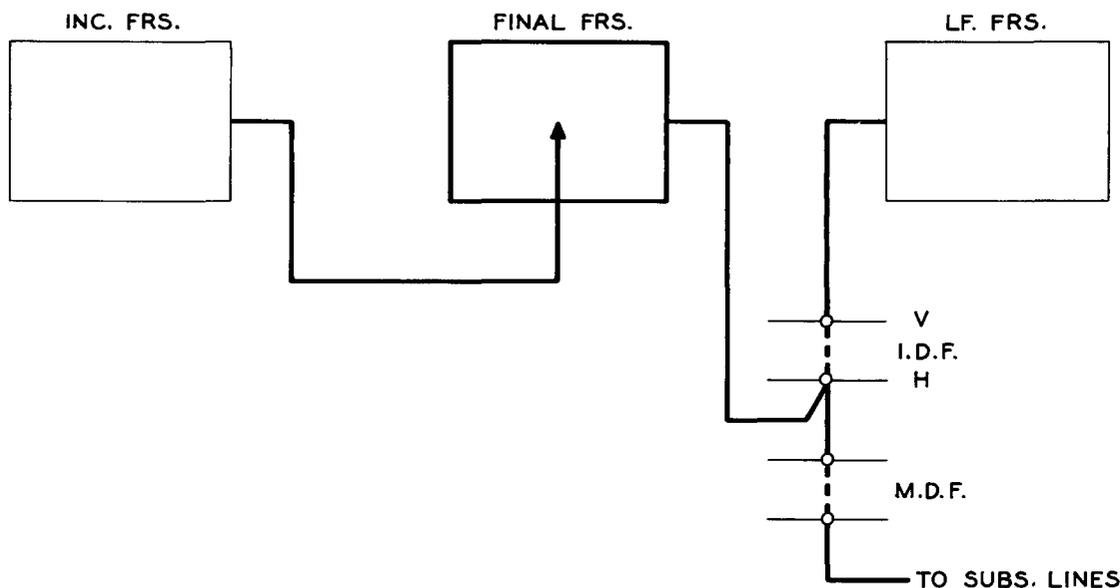


Fig. 2 — Traffic Schematic

**5.34** In certain offices, it may be found that the number of final selectors per choice in the ultimate will be so reduced from the number required initially as to make it advisable to employ split frames so connected initially as to operate as full frames but arranged so that ultimately the two sections of the multiple banks can be separated. Similarly, it may be desirable to operate certain frames initially as split frames but ultimately as regular frames without changing the multiple banks. In the first case, the two sections of the split banks shall be connected in the manner shown on ED-20192-06. In the second case, the initial cabling shall be so arranged that the tie cables can be added at a later date.

**5.35** When the multiple is slipped between frames in PBX groups, the ninety-eighth terminal on zero bank shall be wired without slip for battery on the CO relay offices and the ninety-seventh and ninety-eighth terminals for ground on the CO relay offices.

#### Vacant Final Terminals

**5.36** Vacant or unassigned final terminals are connected to an intercepting trunk so that when a subscriber dials a vacant line, the call terminates at an intercepting position of the A switchboard. Consecutive vacant terminals of a bank are grouped together and connected to the same intercepting trunk. The tip, ring, and sleeve of all vacant terminals in the same group shall be strapped together at the HIDEF and cross-connected to the trunk circuit.

#### Final Selectors

**5.37** The final selectors shall be cross-connected at the final frame from the selector terminal strip to the incoming multiple terminal strips and from there cabled to the incoming multiple banks, one 12-circuit cable from the front and one from the rear of the final frame for each choice.

#### Miscellaneous

**5.38** Cables consisting of No. 20 gauge wires shall be used for the battery and ground leads from the final and supplementary final frames to the miscellaneous fuseboard. No. 16 gauge wires shall be used for the busy back tone leads between final and supplementary final frames and the distributing power terminal strip and No. 14 gauge flameproof wire per KS-5482 shall be used for these leads between the distributing power terminal strip and the miscellaneous fuseboard. Two busy tone leads shall be cabled from the miscellaneous fuseboard to the DPTS of each unit and each connected to approximately one-half of the final and supplementary final frames on a row basis. This arrangement is to prevent putting out of service (with respect to busy tone) more than one-half of the final selectors of a unit, in the event that the tone supply should fail.

**5.39** The cabling between the distributing power terminal strip and the points of termination of the various circuits shall be run in the largest switchboard cable consistent with the grouping to leads and the points of termination. Cables shall be No. 22 gauge wire, except ringing, tone, or battery leads requiring larger gauge wire.

#### 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
J27801A	A&M Only	7	—
J27801B	A&M Only	5	J27801A
J27801C	A&M Only	8	—

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Dept 5824