

1A AND 1A1 KEY TELEPHONE SYSTEMS INSTALLATION

1.00 INTRODUCTION

1.01 This section is reissued to:

- Show major revisions in Fig. 1.
- Add illustrations for 31A apparatus mounting (Fig. 6) and 26A apparatus mounting (Fig. 12).
- Revise illustrations for running cables (Fig. 8 and 9) and for 15A apparatus mountings (Fig. 11).
- Add information on mounting plastic backboards.
- Make major revisions in Table A.
- Expand Table B from 12 to 20 lamps.

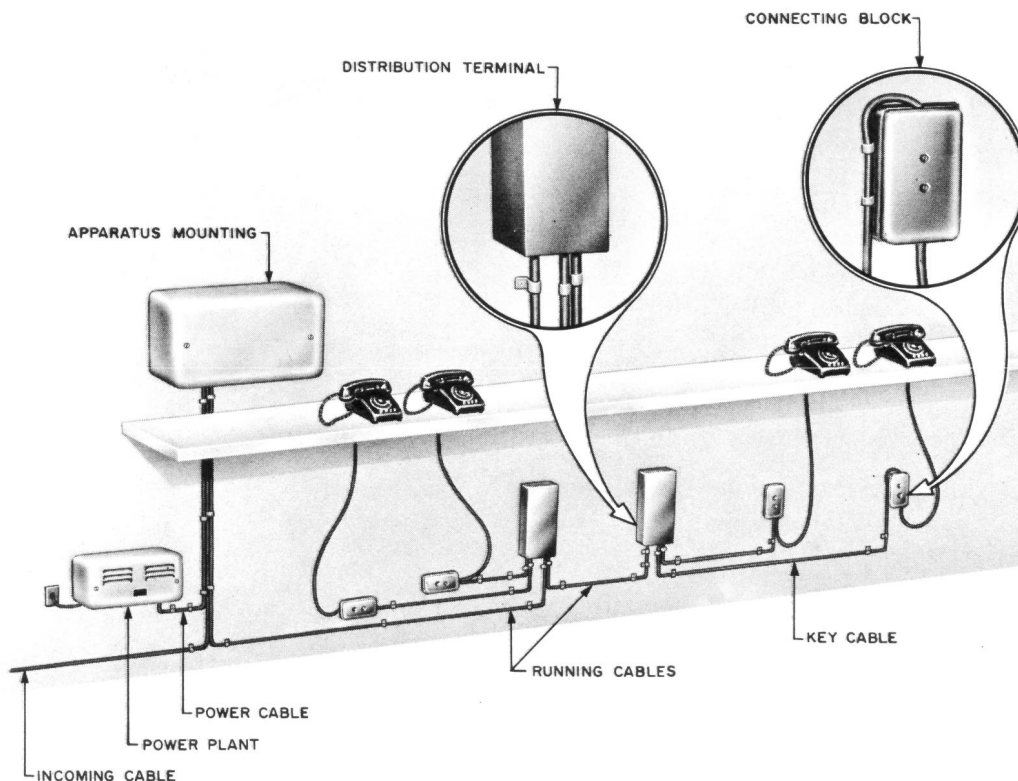
1.02 Due to extensive changes marginal arrows have been omitted.

2.00 GENERAL

2.01 Requirements for installing key telephone sets are the same as for other desk-type sets. These requirements are covered in other C Sections, as is wiring of connecting blocks, jacks, and plugs. Additional station and wiring information is shown in this section.

2.02 Install external keys, pushbuttons, buzzers, etc, as described in the C Section covering the type of equipment to be installed.

2.03 Fig. 1 shows a typical key telephone system installation.



Note: Regardless of type of line, first line unit in system is first line in equipment cabinet. First line in each telephone set is associated with first pickup key and may be any line in system.

Fig. 1 — Main Components of Key Telephone System Installations

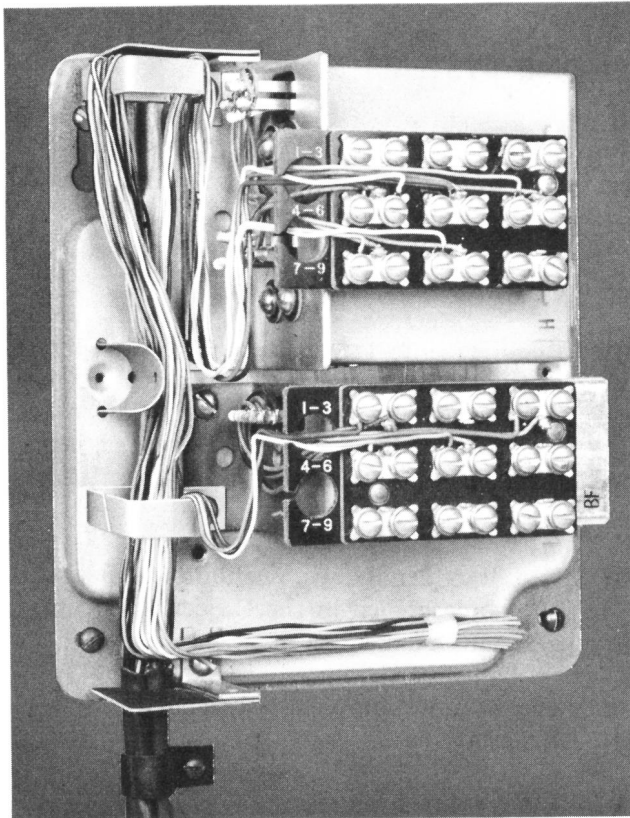


Fig. 2 — 105-Type Apparatus Box with Angle-Bracket-Type Key Telephone Units, 1A System

3.00 LOCATING AND MOUNTING

3.01 Before selecting a cabinet, apparatus mounting, or apparatus box, refer to C Section entitled Equipment Cabinets and Apparatus Mountings, Identification. Mount equipment cabinets, apparatus mountings, and apparatus boxes as described in the C Section entitled Equipment Cabinets and Apparatus Mountings, Installation.

3.02 Fig. 2 shows a 105-type apparatus box and angle-bracket key telephone units. Mount apparatus boxes on a backboard under the following conditions:

- Where fasteners for boxes would come in contact with metal or damp surfaces.
- On all masonry surfaces.
- On all uneven surfaces.

3.03 Strip-mounted equipment for the 1A system is usually mounted in a 4-plate cabinet (Fig. 3).

3.04 The 16A apparatus mounting was primarily designed to house key telephone units of the 1A1 system. Fig. 4 shows a 16A apparatus mounting with panel-mounted key telephone units.

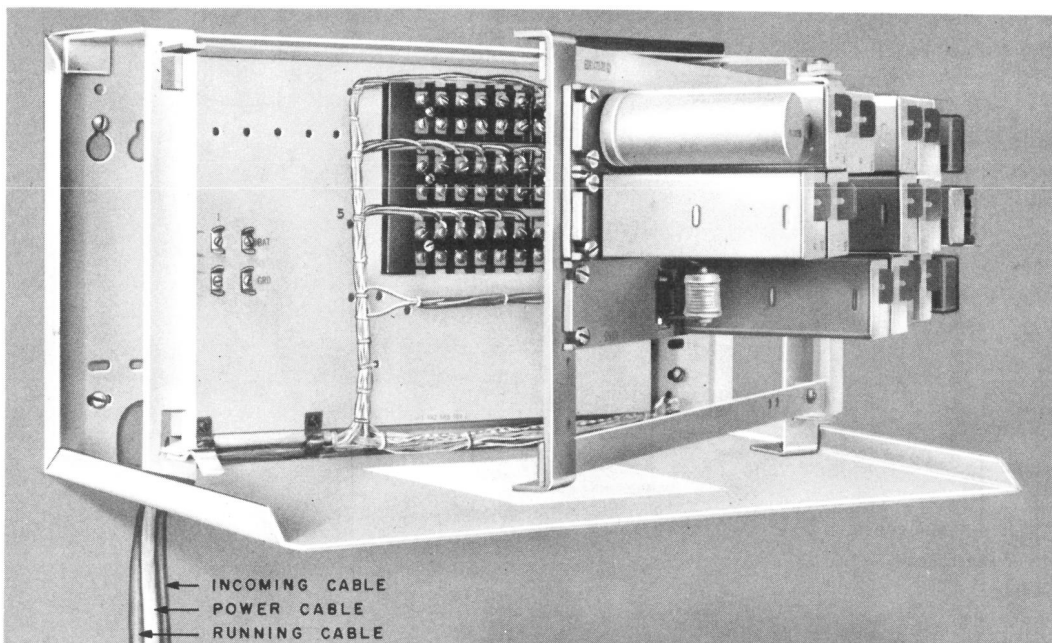


Fig. 3 — Strip-Mounted 50-Type Key Telephone Units in a 4-Plate Cabinet, 1A System

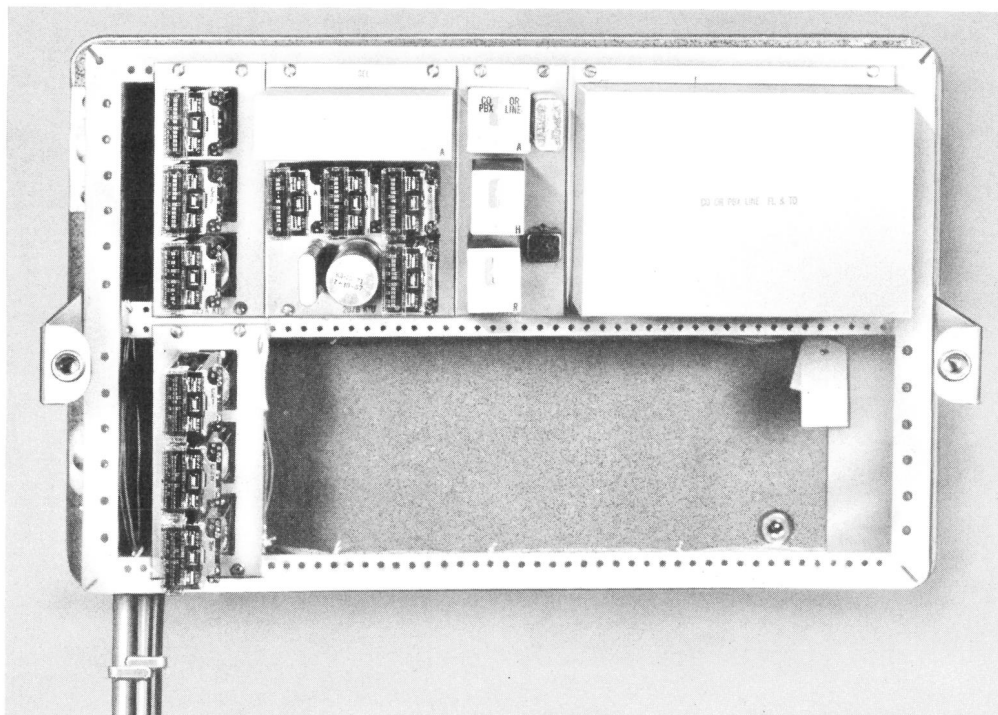


Fig. 4 — 16A Apparatus Mounting, 1A1 System

3.05 Fig. 5 shows a 1A1 system on two 15A apparatus mountings, mounted on a 173A backboard.

3.06 By the use of mounting bars, key telephone units for 1A and 1A1 systems can be mounted in any of the larger cabinets or relay racks. See C Section covering identification of station system cabinets.

3.07 Fig. 6 shows a 31A apparatus mounting mounted on a 173B backboard.

3.08 At locations where the noise of relays and selectors is objectionable, the use of noise-isolator assemblies should be considered. They may be used with specified key telephone units as follows:

KTU	Noise-Isolator Assembly
207A	P-37A706
207B, C	P-38B103
209A	P-38A019
210A	P-38A020
212A	P-37B234

Install as shown in Fig. 7. Note that the positioning dot is out and up on the top isolator bar, and out and down on the bottom isolator bar. Each isolator assembly consists of two isolator bars and four P-206519 round head machine screws.

4.00 WIRING

4.01 Select, place, and fasten wire or cable according to the C Sections covering wiring. Use 42-, 44-, or 47-type connecting block to connect station to wire or key cable, except where A-type connector cables are used.

4.02 Station connections for 1A and 1A1 key telephone systems are given in the various C Sections covering connections for 400-, 500-, and 600-series key telephone sets.

4.03 Avoid placing 44-type connecting blocks under desks, in desks, or in knee-wells of desks unless the manufacturer of the desk has made provisions for such installations. Connecting blocks should be placed preferably on walls adjacent to desks.

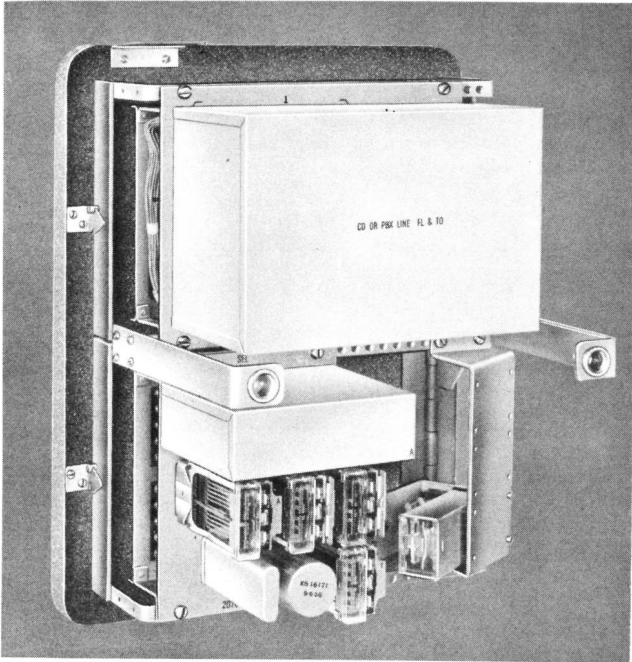


Fig. 5 - Two 15A Apparatus Mountings on 173A Backboard, 1A1 System

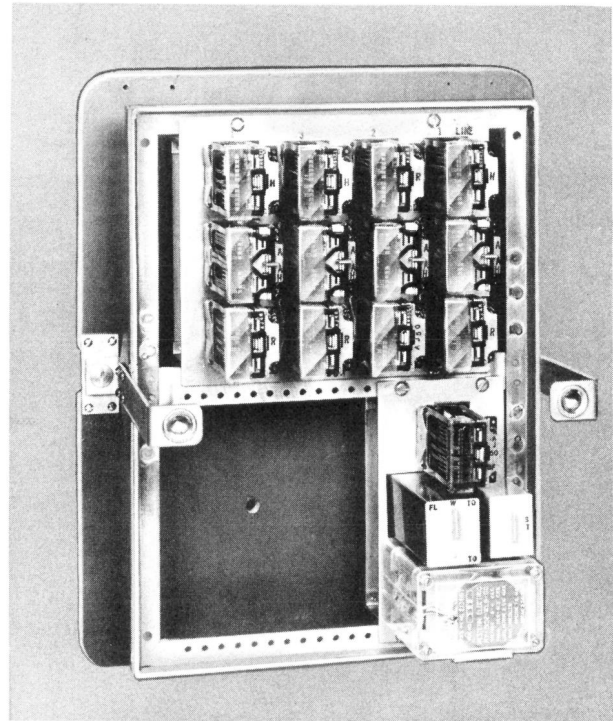


Fig. 6 - 31A Apparatus Mounting on 173B Backboard, 1A1 System

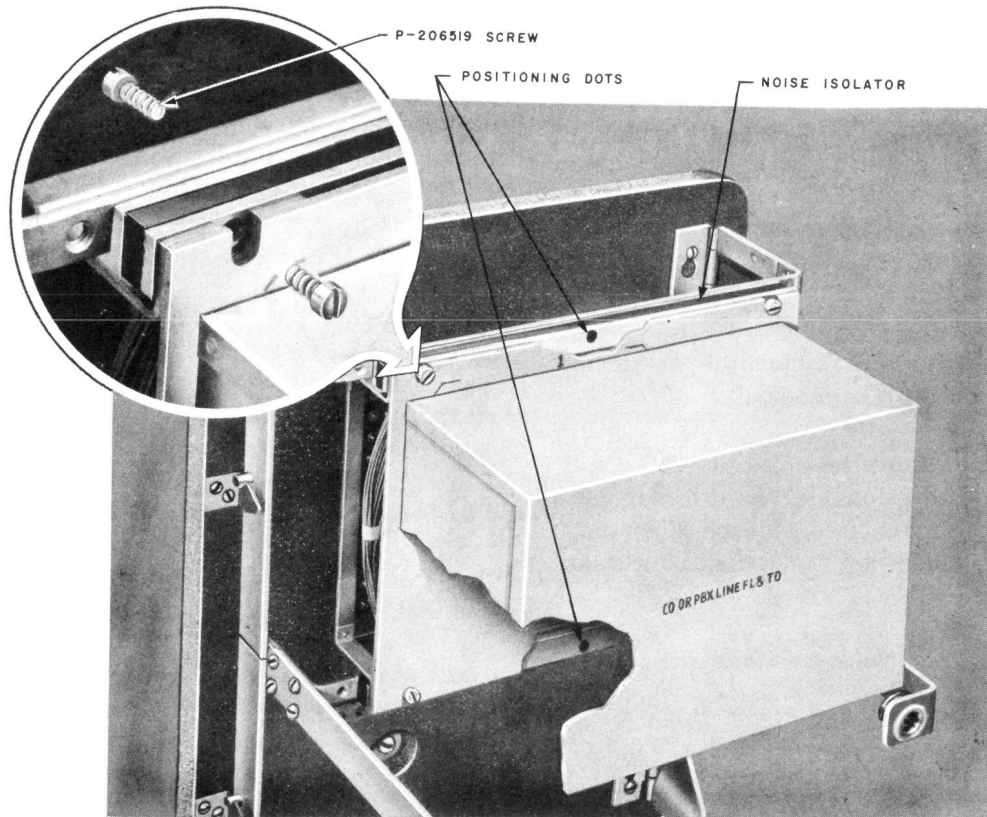


Fig. 7 - Noise-Isolator Assembly

4.04 Do not connect more than one set cord to a connecting block.

4.05 Cords used for speakerphone installations require five 44-type connecting blocks. In some instances, the speakerphone feature is not used and the fifth connecting block need not be mounted. In this case, tape and store spare cord tips. Normally, all cord conductors should be terminated on connecting blocks.

4.06 Tape the spare cord tips with KS-14090 tape or RS-9094 cord tip wrapper.

4.07 Do not deviate from the specific assignment (as shown in the C Section covering connections) given to each cord conductor, connecting block terminal, and key cable conductor.

4.08 The 44-type connecting blocks may be mounted in either a vertical or horizontal position. When mounted in a vertical position, telephone set cord should enter from bottom. The 168E and 168F backboards (plastic) are notched to permit mounting with both telephone set cord and cable entering from same end. The 168A, B, and C backboards (wood), and 168D backboard (plastic) are unnotched. When mounted in a vertical position, unnotched backboards should be installed with telephone set cord entering from bottom and cable entering from top. When horizontal mounting is used, cable should enter from direction of cable run, as shown in Fig. 1.

4.09 When 168A, B, C, or D backboards are mounted vertically, two cable clamps are first placed over the cable and then inserted under the backboard (Fig. 1). Tightening of backboard mounting screws will hold the clamps in position. This method reduces the number of screws required and results in less damage to the mounting surface.

4.10 The number of lines and features and whether or not station line concentrators are used determine the size of key cables to be installed. However, where practical, install as a minimum a 25-pair inside wiring cable as key cable.

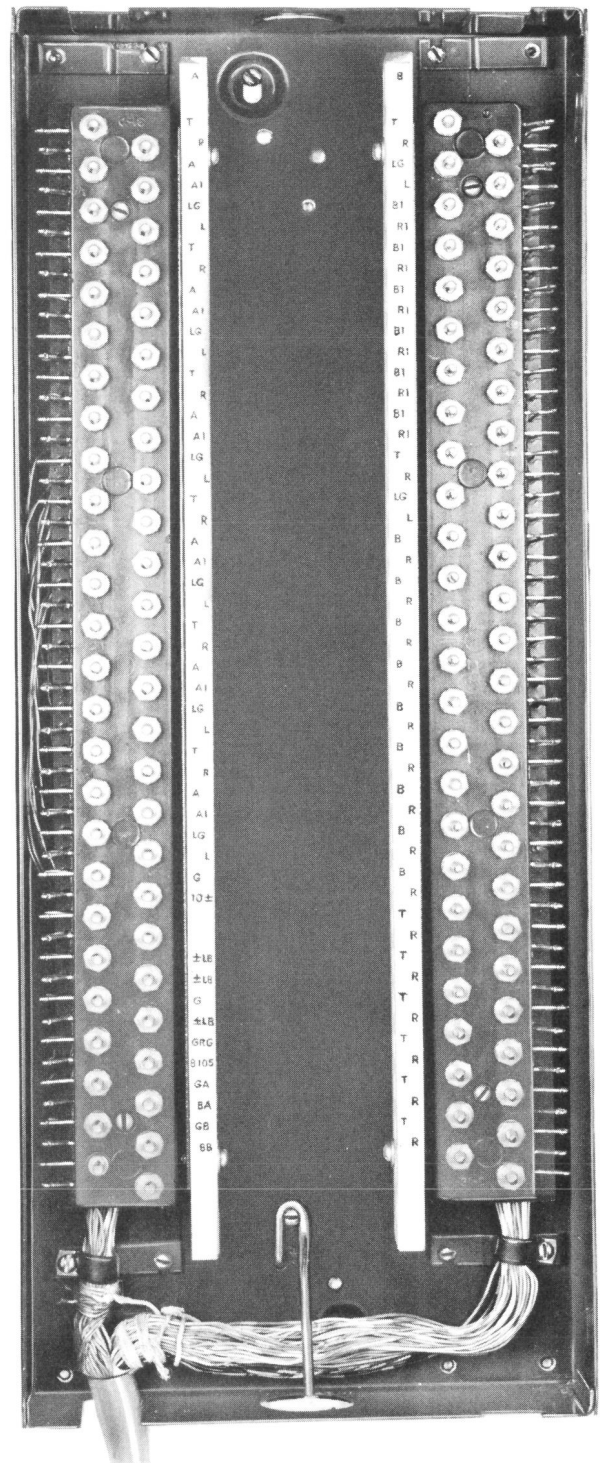


Fig. 8 — 25-Pair Running Cable Terminated in a GC52 Terminal Box

4.11 Wherever practical, running cable pair assignments should follow the same assignment as the key cable (see Fig. 8).

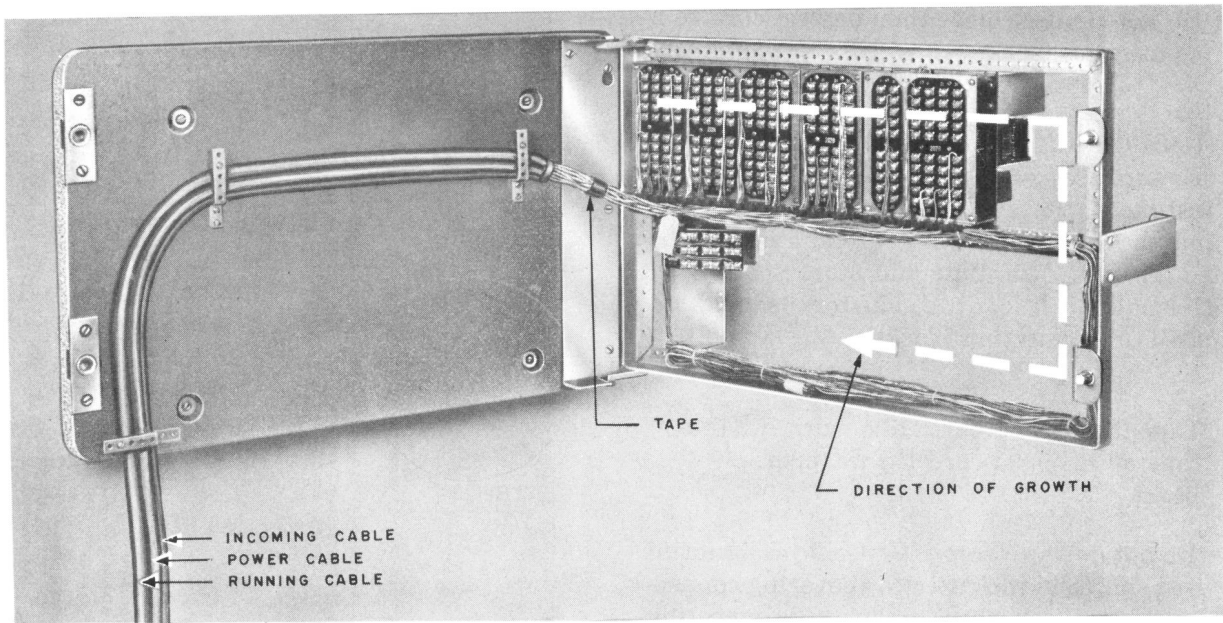


Fig. 9 — Installation of Running, Power, and Incoming Cables

4.12 Screw terminals on individual key telephone units permit termination of six key cables. However, the preferred method is to install a running cable. Terminate the running cable on a 30- or 31-type connecting block in a GA-, GB-, or GC-type terminal box. Select connecting blocks that are large enough to terminate all pairs of running cables. Place distribution terminal in a convenient and centralized location.

4.13 Fig. 9 shows an installation using a running cable. Fig. 10 shows key cables run directly into the apparatus mounting.

4.14 Use three colors of 24-gauge BG or BU wire for strapping and cross-connecting key telephone units: red for battery leads, black for ground leads, and green for all other leads.

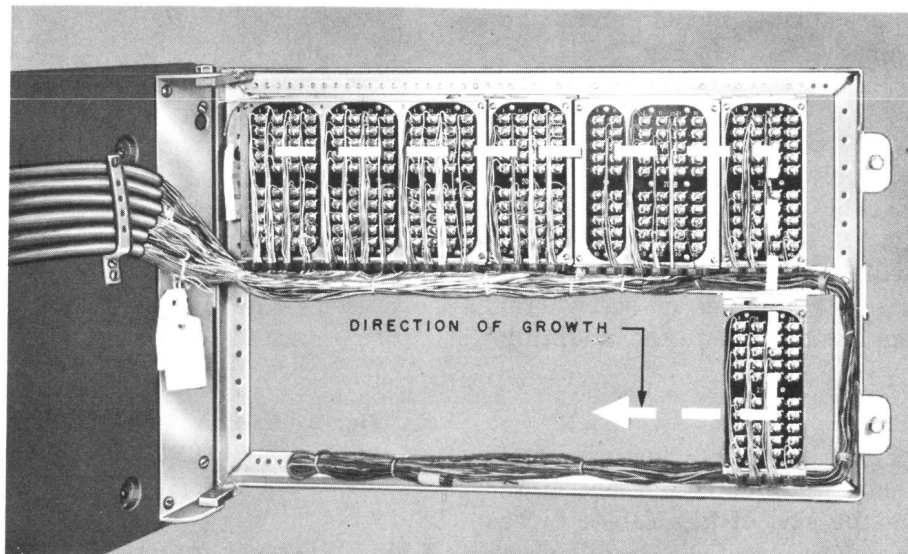


Fig. 10 — Key Cables Run Directly to Apparatus Mounting



Because of fire hazard, do not use wrapped cotton insulated wire for cross-connecting power leads.

4.15 When no tag is provided, tag each key cable with a linen tag or equivalent at distribution terminal or key telephone units. In all cases, fill in tag with information identifying station or stations connected by the cable. A tag should also be attached to the apparatus housing the key telephone units, showing which C Section was used for connecting data and what options were used.

4.16 Fig. 11 shows methods of cabling 15A apparatus mountings.

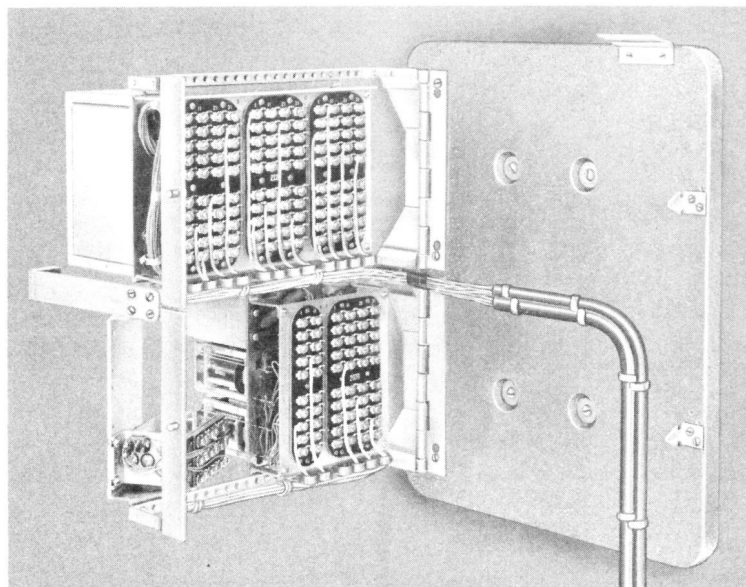
4.17 Fig. 12 shows direction of growth of key telephone units in a 26A apparatus mounting. Cable may enter from top or bottom, but in either case growth of units is from top down.

5.00 POWER

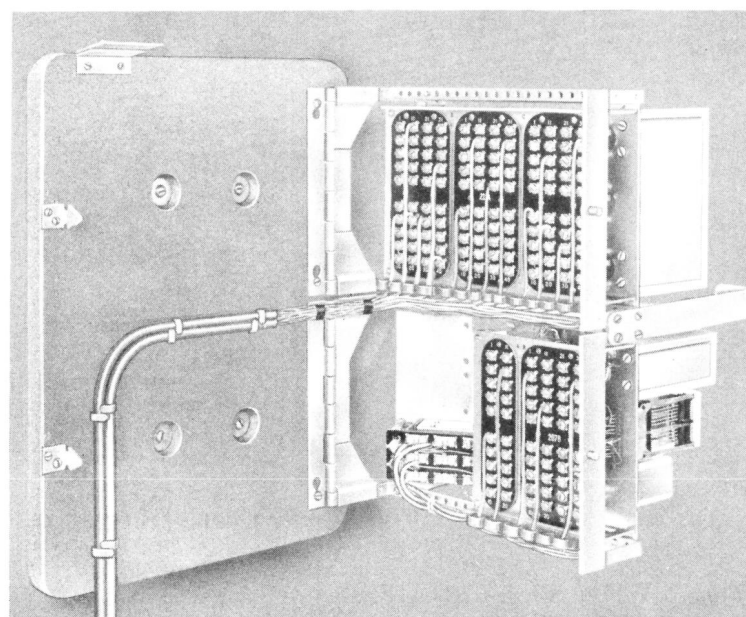
5.01 Determine the power supply arrangement to be used for 1A and 1A1 key telephone systems in accordance with the C Section entitled Station Systems, Power Supply, Identification. The basic voltage requirements are:

Relay	— 14 to 26 volts dc
Lamp	— 9 to 11 volts ac or 14 to 50 volts dc
Ringer	— 105 volts 20 cycles
Buzzers or Bells	— 14 to 28 volts dc or 15 to 25 volts ac

5.02 The 101G power plant was designed primarily for 1A and 1A1 key telephone system installations. Other power plants may be used. The 101H is suitable for small installations. The 101J is suitable for large installations. Self-contained fuse blocks in the 101J power plant



Hinged on Left



Hinged on Right

Fig. 11 — 15A Apparatus Mountings

make it suitable for a common centralized power source. A 10- to 11-volt 17-amp power plant with self-contained fuse block is provided in the J86731B, List 1 power plant. It is capable of operating a total of four hundred and twenty-five 51A lamps or three hundred and forty G2 lamps.

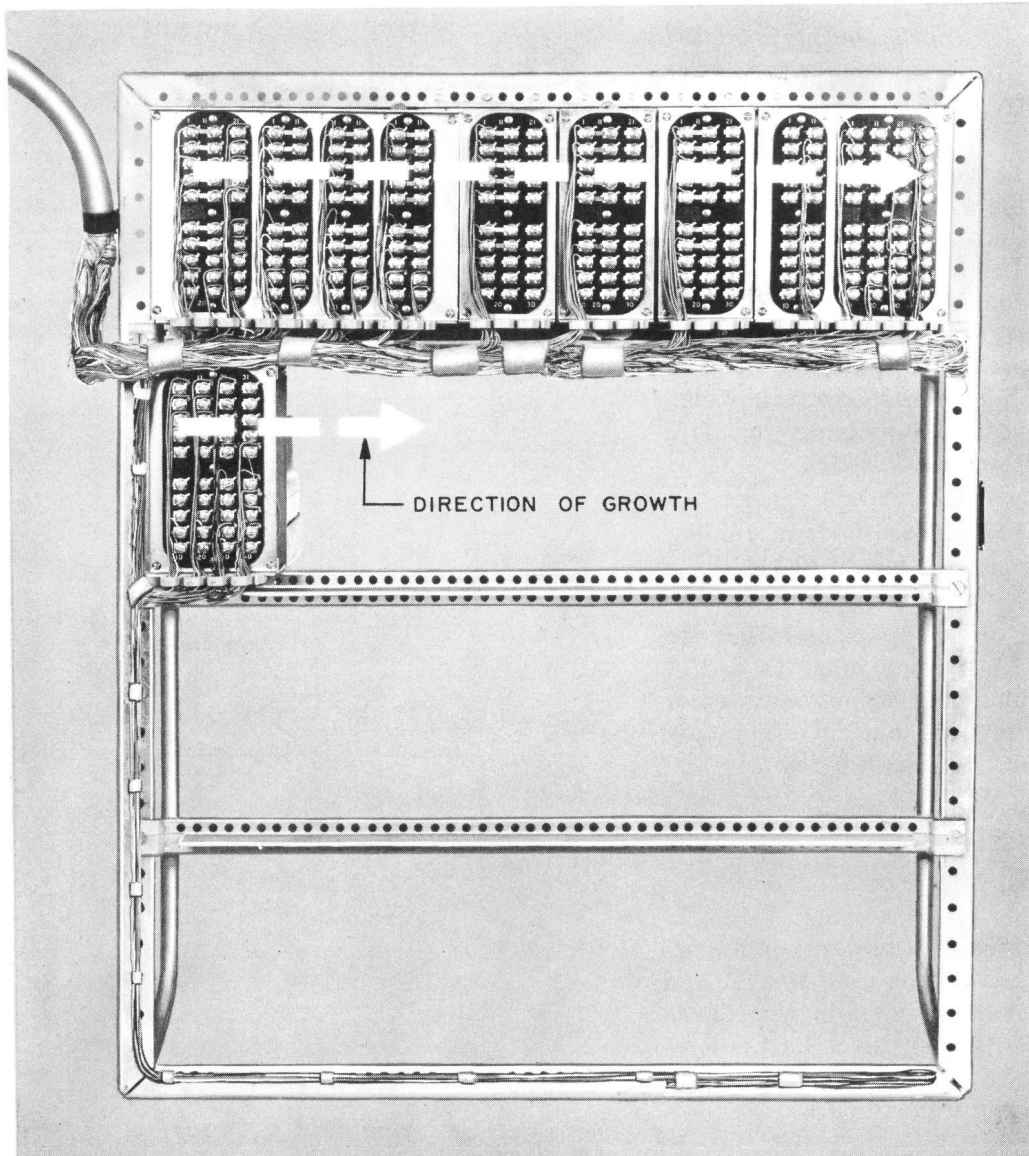


Fig. 12 – Direction of Growth in 26A Apparatus Mounting

5.03 When the J86731A, List 4 or List 6, or the J86731D, List 1 power plant is used on one key telephone system, it is not necessary to fuse each line unit individually. Other fusing arrangements for central office, PBX, or local battery are determined locally in accordance with existing C Sections.

5.04 A ringing lamp unit must be used when the 105-volt 20-cycle supply is from the central office or PBX. Also, an 11A or 211A key telephone unit (ringing lamp unit) is required when the 105-volt 20-cycle supply is from the J86731A, List 5 power plant (107B frequency generator) or

J86731C, List 1 or List 2 power plant (107C frequency generator) or static ringing generator supplying more than one system.

5.05 Each power plant must be grounded with a 20-gauge or larger copper wire. See the C Sections entitled Protector and Signaling Grounds; and Station Systems Power Supply, Installation and Maintenance.

6.00 LIMITATIONS

6.01 Do not install key telephone systems with the hold feature on magneto lines.

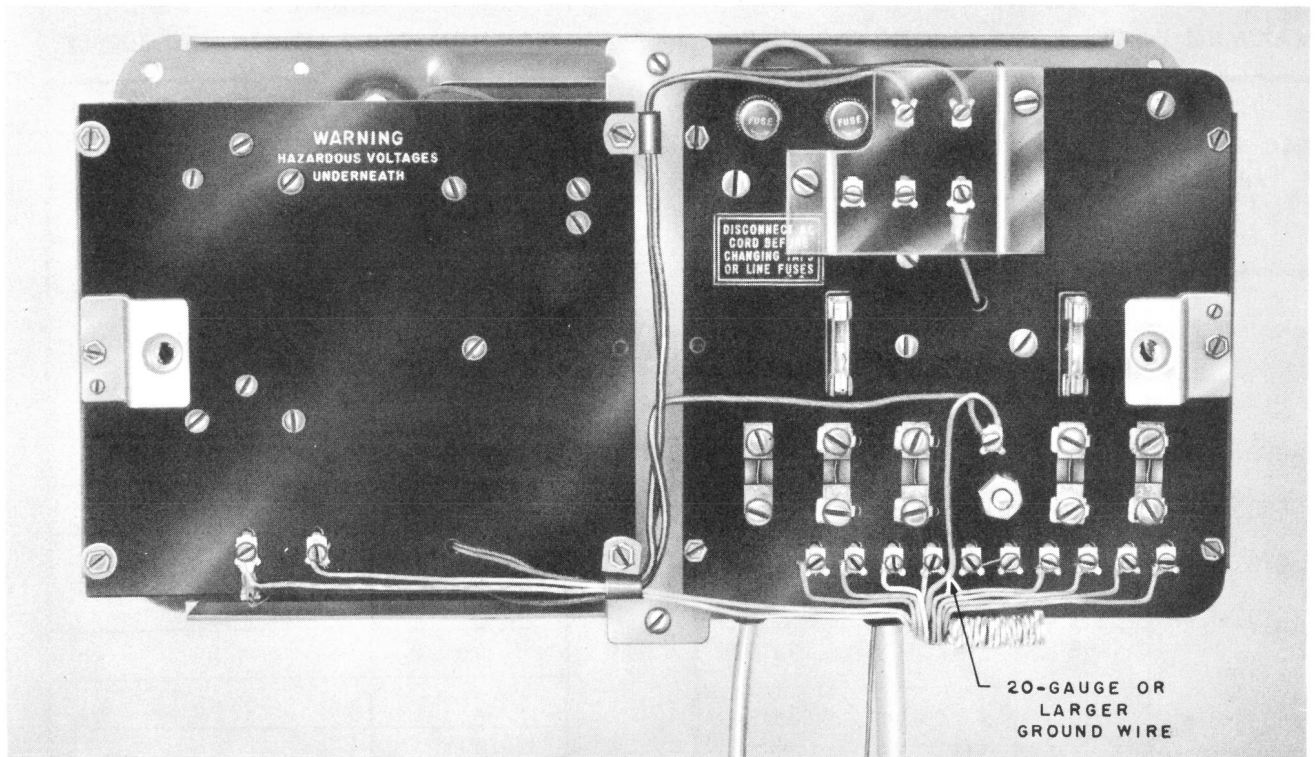


Fig. 13 — 101G Power Plant With Power Cable Terminated

- 6.02** The 1A or 1A1 key telephone system should not be installed on party lines unless authorized by local instructions.
- 6.03** Unless holding is provided, install at least one station per central office or PBX line.
- 6.04** Connect at least one ringer or the equivalent of a ringing circuit to each central office line. On PBX lines, the ringer or equivalent ringing circuit may be omitted if the customer so desires.
- 6.05** Each audible signaling circuit is equivalent to two high-impedance ringers.
- 6.06** Do not connect more than two high-impedance ringers or equivalent to the station side of a line circuit, signal circuit, or line and signaling circuit. Connect only one high-impedance ringer or its equivalent to the station side of a 6C key telephone unit.
- 6.07** Connect all stations to the station side of line circuits, signal circuits, or line and signaling circuits unless otherwise authorized by local instructions.
- 6.08** When 9 to 11 volts ac is required for lamps, it may be obtained from a J86731A, List 4 or List 6; J86731B, List 1; J86731D, List 1; or J86471A, List 1 power plant; or from a 393-type transformer.
- 6.09** Install a 20-gauge wire or equivalent between lamp power supply and key telephone units. Fig. 13 shows a J86731A, List 4 power plant and a power cable with 20-gauge conductors terminated.
- 6.10** The maximum continuous current rating for a 2-amp fuse at 10 volts ac is 1.6 amp. The maximum current used by lamps is 0.045 amp for each 51A lamp and 0.050 amp for each G2 lamp. When more than thirty-six 51A lamps or more than thirty G2 lamps are supplied from a J86731A or D power unit or 393B transformer, two dis-

TABLE A
MAXIMUM POWER CABLE LENGTH — AC SUPPLY

AC Power Supply 9-11 Volts	No. of 51A Lamps	No. of G2 Lamps	Length of Run For One Pair of 20-Gauge Copper Wires
			feet
J86731A, L4 J86731A, L6 J86731B, L1 J86731D, L1 or J86471A, L1 Power Plant 393B Transformer	5	4	315
	10	8	155
	15	12	104
	20	16	78
	25	20	62
	30	24	52
	35	28	44
	40	32	39
	45	36	35
	50	40	24
	55	44	22
	60	48	20
	65	52	18
70	56	17	

TABLE B
MAXIMUM CABLE LENGTH — AC SUPPLY

No. of Lamps per Pair	Length of Run For One Pair of 24-Gauge Cable
	feet
1	470
2	235
3	155
4	115
5	90
6	75
7	65
8	55
9	50
10	45
11	40
12	35
13	35
14	30
15	30
16	25
17	25
18	25
19	25
20	20

Note: Not more than 20 signal lamps may be connected to any one line or intercommunicating circuit.

tribution circuits must be provided. Each distribution circuit must be equipped with a 2-amp fuse.

6.11 Table A gives the approximate maximum distance between the 9- to 11-volt ac supply and key telephone units.

6.12 Table B gives the approximate maximum cable length between key telephone units and signal lamps when 9 to 11 volts ac is used. Length of run in feet is based on resistance of D inside wiring cable.

6.13 If it is not feasible to use 9 to 11 volts ac for lamp supply, and a direct current of higher voltage is used, a resistor (22-type KTU or

TABLE C
TYPE OF LAMPS MOST OFTEN REQUIRED

Signal Lamp Supply	Lamp in Telephone Set	Lamp Type Indicator and/or 101-Type Key Unit
10 volts ac	51A	G2
14 to 26 volts dc	51A*	A3
47 to 50 volts dc	51A*	K2

* With resistance in series.

ED-91929-01, Group 5, equipped with an 18-type resistor) must be used in series with each 9- to 11-volt lamp.

6.14 Table C shows type of lamps most often required.

7.00 FINAL TESTS

7.01 Upon completion of a system installation, check that all features of the system operate properly at each station.

7.02 Handling of key telephone units sometimes results in damage to wire-spring relays. After mounting, visually inspect all wire-spring relays for the following:

- Improper position of contact springs
- Broken actuating cards
- Improper position of actuating cards.

7.03 Check that all stations are equipped with the correct designation cards and strips. All unused keys may be blocked in the unoperated position with a proper blocking device, as follows:

- Eyelet P-339942 for 440- and 460-type sets.

- Ring blocking P-12A858 for 540- and 560-type sets and 6040-, 6041-, 6050-, and 6051-type keys.
- Guard D-96008 for 6021-, 6022-, 6023-, 6027-, and 6028-type keys.

7.04 On systems using commercial power, disconnect the power cord and check that outgoing calls can be made on all lines.

7.05 Before leaving the job, be sure that the customer fully understands the method of operation of the system and limitations, if any, in case local power fails.



In any key system where common audible signals are provided by means of locally furnished power, interruption of this power supply will render ALL visual and audible signals inoperative during the period of power failure. Standby power provisions and/or the use of appropriate power failure switching equipment and/or the connection of line ringers, where necessary, will preclude customer inconvenience during interruption of the normal source of power to the installation.