

# KEY SYSTEMS SERVICE MANUAL

VOLUME I







## **Key System Manual Vol I**

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# **KEY SYSTEMS SERVICE MANUAL VOL I**

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# INTRODUCTION

The Key Systems Service Manual consists of Volumes I, II, and III. Volume I contains three parts: Common Key System Information, General Apparatus, and Telephone Sets. Volume II contains information concerning 1A, 1A1, and 1A2 Key Telephone Systems. Volume III includes those BSPs unique to COM KEY\* services. The sections are compiled in the manual numerically and not in the order they appear in the Table of Contents.

This manual supports plant craft personnel in their daily work operations. The sections contained in the manual provide information necessary for installing and maintaining key systems.

For information not included in this manual, refer to the standard BSP files.

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## 101G (J86731) POWER PLANTS

### IDENTIFICATION, INSTALLATION, AND CONNECTIONS

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#### 1. GENERAL

**1.01** This section covers the identification, installation, and connections of the 101G power plants, J86731A, Lists 1 through 7; J86731B, List 1; J86731C, Lists 1 and 2; J86731D, List 1; J86731A, List 1, List 8; List 2, List 8; List 4, List 3; List 6, List 8; and J86731D, List 1, List 2. These plants are normally used to power the 1A, 1A1, 1A2, and 6A Key Telephone Systems. They may, however, be used wherever their characteristics and design apply.

**1.02** This section is reissued to include mounting information for the J86731B power plant.

#### 2. IDENTIFICATION

**2.01** The 101G power plants provide packaged small capacity ringing, low voltage ac and unregulated dc power supplies. Fig. 1, 2, 3, and 4 show views of some of the plants, while all of the various power plant codes, output and features are shown in Table A.

**2.02** The output data and features of the 101G power plants modified for use in the 1A2 Key Telephone System are in Table A. When the J86248A, List 1 rectifier is modified it is designated as the J86248A, List 1, 3. When the J86248A, List 2 rectifier is modified it is designated as the J86248A, List 2, 3. When the J86731A and J86731D power plants use the modified rectifiers the list number of the power plant is changed as noted in Table A. The modification of the J86248A rectifier consists of replacement of the selenium rectifier stack with a

silicon rectifier bridge, the addition of a capacitor and a bleeder resistor, and a change of wiring to the existing capacitor. The distributing house modification results in improved performance through narrower voltage limits at a rated dc current output of 1.5 amperes.

**2.03** *Spare fuses and Fusetrans* are accommodated on the faceplate of each plant with 2-ampere Bussmann MDL-2 Fusetrans supplied for the input and 24C fuses for the output.

**2.04** A three-conductor power cord equipped with a polarized plug is now standard on these plants and is available in 6- and 12-foot lengths.

**2.05** *Emergency dry battery reserve* may be arranged for small PBX and key systems to supply 20-volt DC TALK and SIGNAL battery.

#### 3. INSTALLATION

**3.01** *Reference shall be made to Section 167-400-200 for general requirements necessary for the proper installation of the power plant.*

**3.02** Install the power plant in the location selected. Refer to Table A for mounting arrangements.

**3.03** The J86731A, List 7 metal stand (see Fig. 5) consists of two metal legs and is used to floor-mount the J86731A, List 4 power plant, and where appearance is important, may be enclosed with the ED-95023-01, Group 5 cover.

**3.04** When dry cells are being used as a battery reserve, refer to appropriate section covering installation of dry cells.

**3.05** The J86731B power plant is intended for wall-mounting with the louvers positioned at the top. The bottom must be a minimum of 10 inches above any obstruction to insure free flow of air. The unit must not be oriented in

any other position, as overheating may result. The ambient temperature at the bottom of the unit, with the cover on, must not exceed 40°C (104°F).

4. CONNECTIONS

4.01 Power plant connections are shown in Fig. 6, 7, 8, and 9.

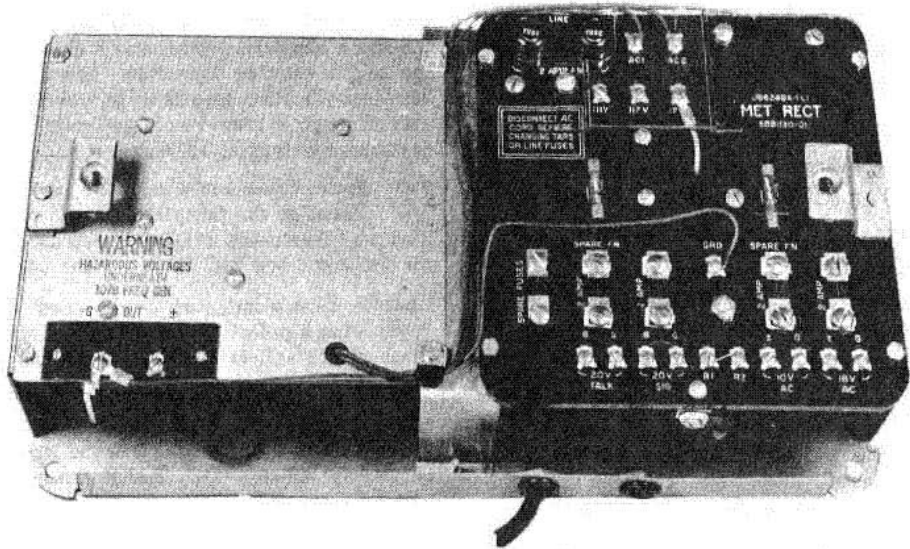


Fig. 1 — J86731A, List 4, Cover Removed

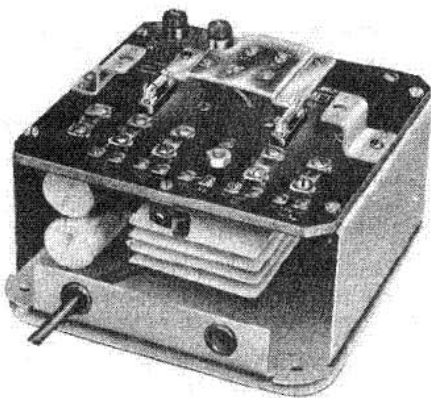


Fig. 2 — J86731A, List 6, Cover Removed

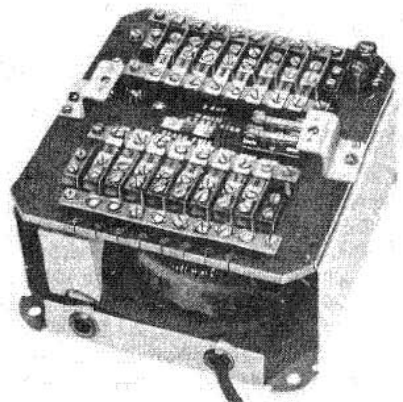


Fig. 3 — J86731B, List 1, Cover Removed

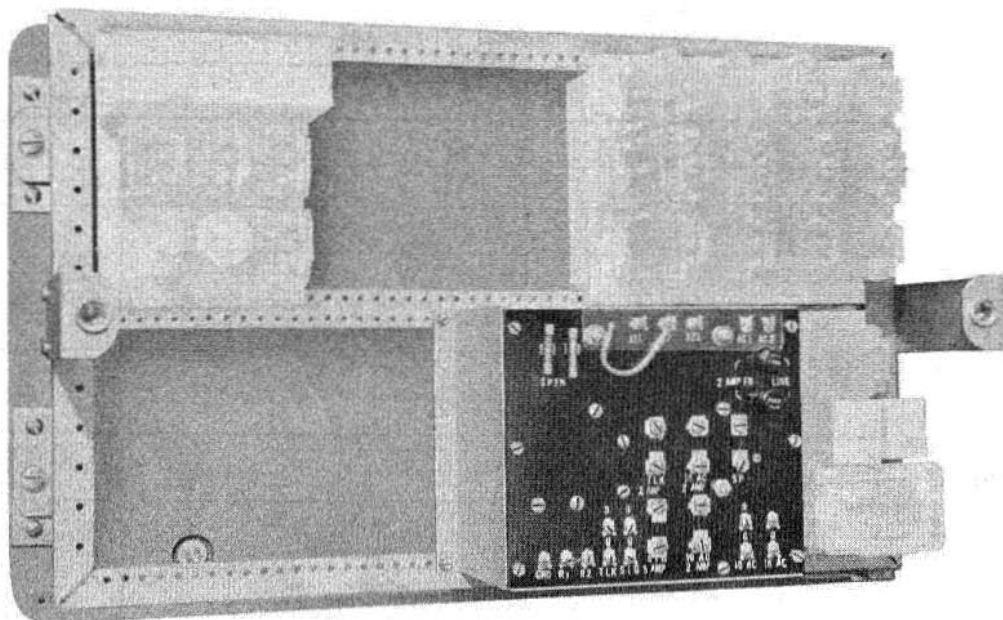


Fig. 4 — J86731D, List 1, Mounted in 16A Apparatus Mounting

4.02 When the 107B frequency generator of the J86731A, List 4 power plant is equipped with a metal faceplate (Fig. 1), a *three-conductor power cord must be used and connected to a grounded power outlet, or a case ground must be provided.* When required to install the cord locally, connect the ground conductor (green) under the cord clip mounting screw inside the power plant.

*Caution: If a plastic cord clip is used instead of a metal cord clip, an unreliable grounding of the ground conductor can occur. Proper grounding should be determined before applying power.*

4.03 When a dry battery reserve is a requirement, connect a KS-5483, L82 relay, as shown in Fig. 10. This relay may be mounted in a KS-5483, L100 box.

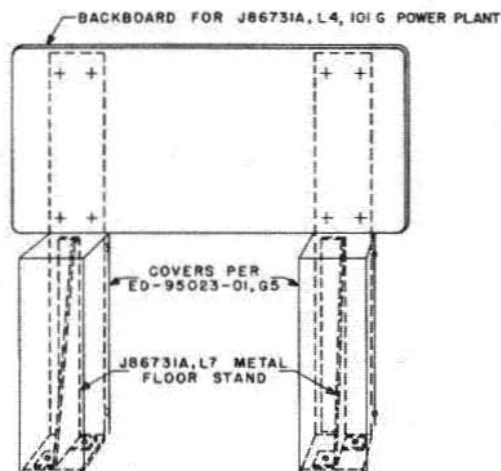


Fig. 5 — Floor Stand for J86731A, List 4, Power Plants

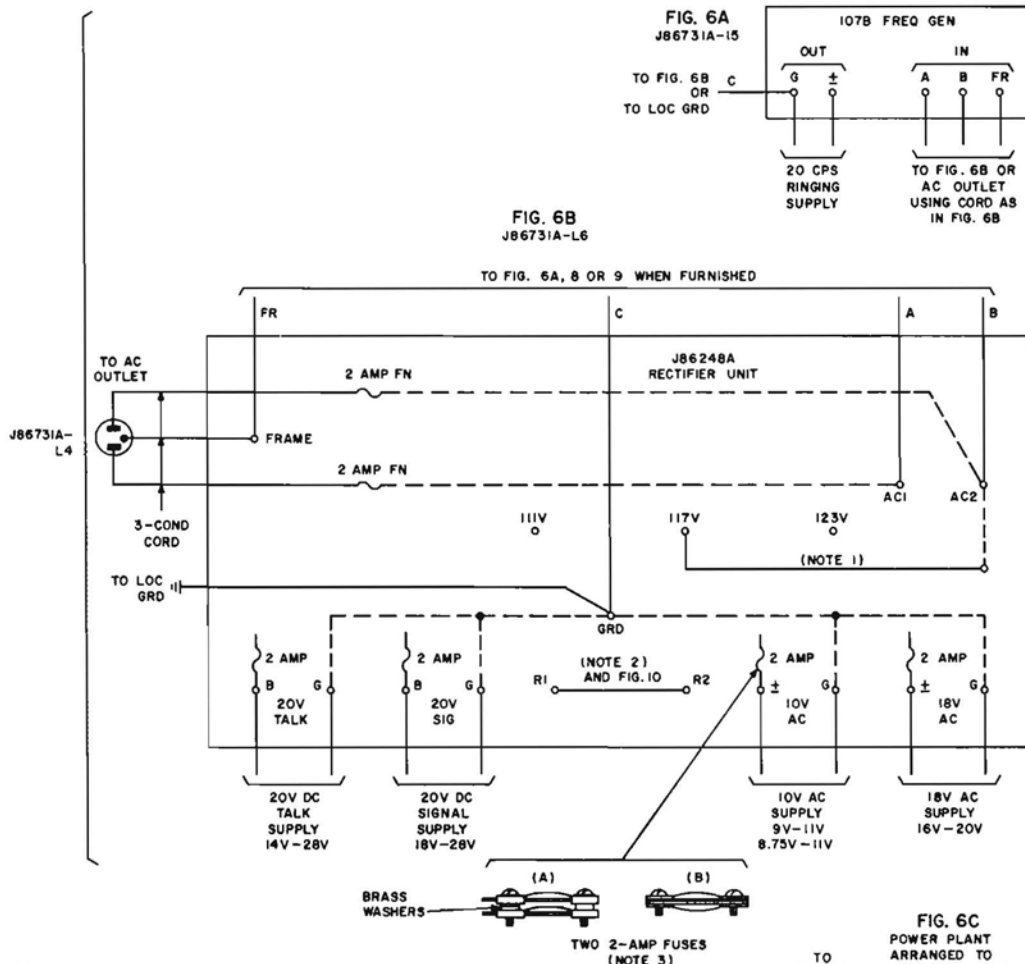
**TABLE A -- OUTPUT AND FEATURES OF 101G POWER PLANTS**  
(with Voltage Input of 111-123  $\pm$ 5%, 60 Hertz)

POWER PLANT	OUTPUT	VOLTAGE RANGE	AMPS	LOAD	MTG.	DIMENSIONS	
J86731A List 1 (Replaced by List 6)	DC (Talk) (Sig)	14-28 18-28	0.9 0.6	No Load to 20 ohms No Load to 32 ohms	Wall	9" High 8-1/4" Wide 5-1/8" Deep	
	AC (60 Hertz)	9-11 16-20	1.4	36 51A Lamps* 36 A3 Lamps			
J86731A List 2 (Replaced by List 4)	DC (Talk) (Sig)	14-28 18-28	0.9 0.6	No Load to 20 ohms No Load to 32 ohms	Wall or Floor	15-7/8" High 8-5/8" Wide 6-7/8" Deep	
	AC (60 Hertz)	9-11 16-20	1.4	36 51A Lamps* 36 A3 Lamps			
	20-Hertz Ringing	75-110	0.05	1-8 High Imp Ringers or 1-2 High Imp Ringers With Capacitors			
J86731A List 3 (Replaced by List 7)	Metal Stand for Floor Mounting J86731A, List 2						
J86731A List 4	The Combined Features of J86731A, List 5 and 6				Wall or Floor	9" High 16-7/8" Wide 5-1/4" Deep	
J86731A List 5	20-Hertz Ringing	75-110	0.05	1-8 High Imp Ringers or 1-2 High Imp Ringers With Capacitors	Wall	9" High 8-1/4" Wide 5-1/4" Deep	
J86731A List 6	DC (Talk) (Sig)	14-28 18-28	0.9 0.6	No Load to 20 ohms No Load to 32 ohms	Wall	9" High 8-1/4" Wide 5-1/4" Deep	
	AC (60 Hertz)	9-11 8.75-11 16-20	1.4 2.8 1.4	36 51A Lamps, or* 72 51A Lamps, or 36 A3 Lamps			
J86731A List 7	Metal Stand for Floor Mounting J86731A, List 4 (See Fig. 5)						
J86731B List 1	AC (60 Hertz)	10-11	17	425 51A Lamps	Wall	9" High 8-1/4" Wide 5-1/4" Deep	
J86731C List 1	20-Hertz Ringing	** 107C	64-90 75-105	0.05	1-8 High Imp Ringers or 1-2 High Imp Ringers With Capacitors	RR or APP CAB.	7" High 9-1/8" Wide Extends 4-1/2" in Front of Mounting
		107D	75-100				
J86731C List 2	Same Features as J86731C, List 1				Wall	9" High 8-1/4" Wide 5-1/4" Deep	
J86731D List 1	Same Features as J86731A, List 6				RR or APP CAB.	7" High 9" Wide Extends 4-1/2" in Front of Mounting	
J86731A* L1, L8; L6, L8 J86731D L1, L2	*** (Talk) DC (Sig)	18-26 20-26	0.6 1.5	SAME AS UNIT WITHOUT ADDED LIST NO. TO DENOTE MODIFICATION			
	AC 60 hertz						
J86731A* L2, L8; L4, L8	*** (Talk) DC (Sig)	18-26 20-26	0.6 1.5				
	AC 60 hertz						
	20-hertz Ringing						

\*See Note 3, Fig. 6. \*\*See Note, Fig. 8. \*\*\*Total DC load not to exceed 1.5 amps.

•Added "L2" or "L8" denotes J86248A L1, 3 or L2, 3 is part of the power plant.





NOTES:

1. CONNECT TO 111V, 117V, OR 123V, DEPENDING ON AC SERVICE VOLTAGE RANGE.
2. REMOVE STRAP WHEN TRANSFER AND RESERVE BATTERY EQUIPMENT IS FURNISHED.
3. WHEN 10V AC LOAD IS TO EXCEED 1.4 AMPERES A SECOND 2-AMPERE FUSE SHOULD BE MOUNTED ON THE SAME FUSE MOUNTING AS THE FIRST, AS FOLLOWS:
  - (A) CONTACT MATERIAL ON BOTH SIDES OF FUSE: WASHERS BETWEEN THE TWO FUSES.
  - (B) CONTACT MATERIAL ON ONE SIDE ONLY: BACK TO BACK, WITH CONTACT MATERIAL OF TOP FUSE AGAINST SCREW AND CONTACT MATERIAL OF LOWER FUSE AGAINST STUD.

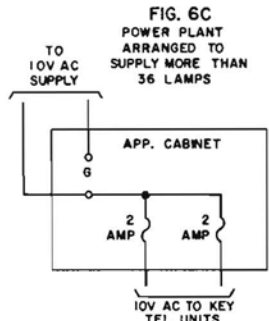


Fig. 6 - 101G (J86731A and D) Power Plants

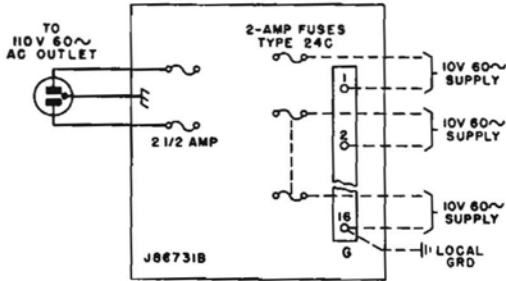


Fig. 7 - 101G (J86731B) Power Plant

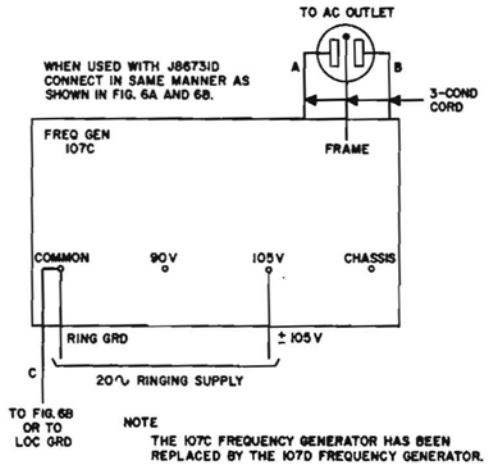


Fig. 8 - 101G (J86731C) Power Plant (107C Frequency Generator)

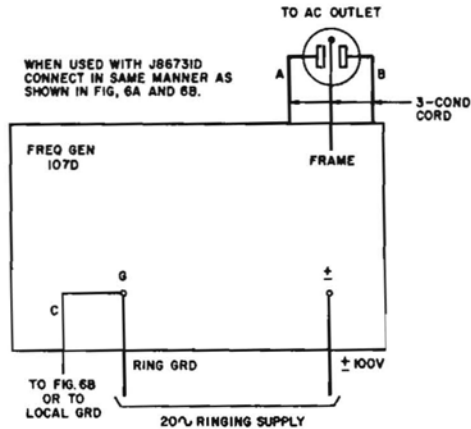
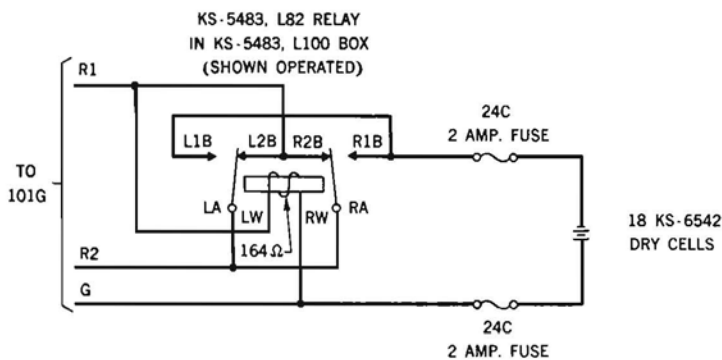


Fig. 9 - 101G (J86731C) Power Plant (107D Frequency Generator)



**Note 1:** Provide 2-ampere fuses in the dry cell supply leads as shown.

**Note 2:** Limit battery lead loop length to 50 feet with a 16-gauge wire.

**Fig. 10 — Wiring Arrangement Using Dry Battery Reserve**



## 19- AND 20-TYPE POWER UNITS

### IDENTIFICATION, INSTALLATION, CONNECTIONS, AND MAINTENANCE

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#### 1. GENERAL

1.01 The 19- and 20-type power units are intended to provide power for talking, relays, lamps, buzzers, and 30-Hz ringing in Key Telephone Systems.

1.02 This section is reissued to:

- Change 19C3 fuse value
- Change Note 6 in Table A to Caution
- Rerate 117A frequency generator to manufactured discontinued (MD) and add the 117B frequency generator
- Require line voltage check
- Update Fig. 5
- Delete Fig. 6 and renumber Fig. 7
- Add 821A diode
- Add new 20C3 power unit.

This issue does not affect the Equipment Test List.

1.03 The 19A1, 19B1, 19C1, 20A1, 20B1, and 20C1 power units are rated MD and are replaced

by the 19A2, 19B2, 19C2, 20A2, 20B2 and 20C2 power units, respectively.

1.04 This issue of the section is based on drawing SD-81824-01, Issue 14B. For a detailed description of the operation, see the corresponding circuit description. If this section is to be used with equipment or apparatus reflecting later issue(s) of drawing(s), reference should be made to the SDs and CDs to determine the extent of the changes and the manner in which the section may be affected.

1.05 The 110-volt ac, 30-Hz output is provided from the 113A, 117A, or 117B frequency generators which are mounted in the power unit case. The 113A and 117A frequency generators are rated MD and replaced by the 117B frequency generator. The 117B frequency generator is electrically and mechanically interchangeable with the 113A and 117A frequency generators.

#### 2. IDENTIFICATION

2.01 The basic unit of the 19- and 20-type power units are designated either the 19A2, 19A2A, or 19A3 power units. When the 113A and 117A frequency generators, rated MD, or the 117B frequency generator is added to the 19A2; the basic unit becomes the 20A2 power unit (see Fig. 1). The units are available for wall of relay rack mounting as follows:

19B2—19A2 with hardware and cover for wall mounting.

19C2—19A2 with hardware for mounting in a Key Service Unit or relay rack.

19C2A—19A2A with hardware for mounting in a Key Service Unit or relay rack.

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19C3—19A3 with hardware for mounting in a Key Service Unit or relay rack (see Fig. 2).

20B2—20A2 with hardware and cover for wall mounting (see Fig. 3)

20C2—20A2 with hardware for mounting in a Key Service Unit or relay rack (see Fig. 4).

20C3—20A3 with hardware for mounting in a relay rack.

2.02 These power units operate on an ac input of 111, 117, or 123 volts  $\pm 5$  percent, 60 hertz. The outputs of the power units and features are shown in Table A. The input power ranges between 105 and 140 watts at 117 volts, 60 hertz.

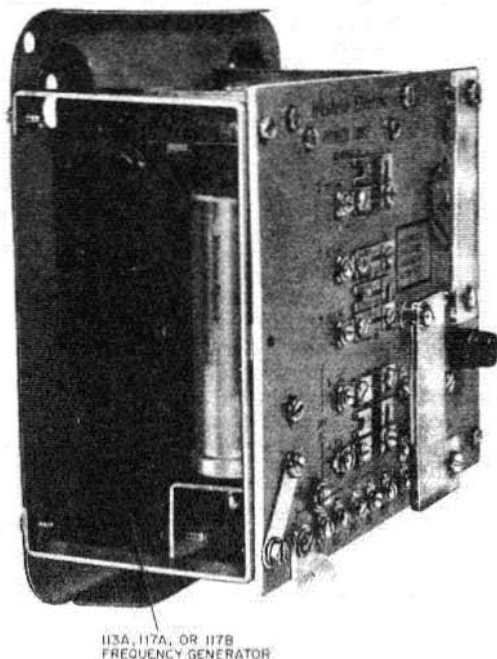


Fig. 1—20A2 Power Unit with Hardware Required for 20B2 Unit Less Cover

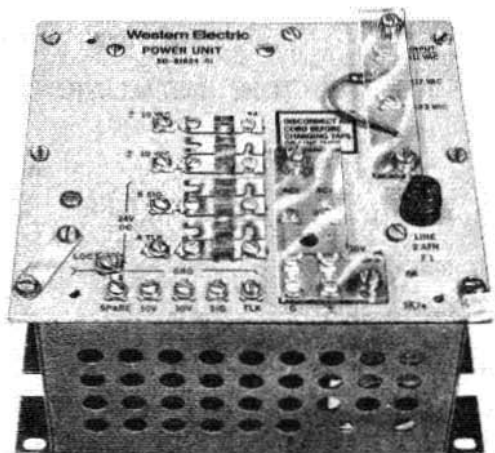


Fig. 2—19C3 Power Unit (Rack Mounted)

2.03 The power units are equipped with a parallel blade ground receptacle. A 3-conductor power cord with male and female standard 3-prong plugs is available for connection to the input receptacle in the power unit (see Fig. 3 and 4). The cords are available in the following lengths and should be ordered separately:

PART NO.	LENGTH (FT)
P-40J326	1-1/2
P-40J327	2
P-40J328	4
P-40J329	6
P-40J099	12

**Caution:** The power cord should not be connected to the ac service receptacle until other wiring has been connected.

2.04 The power units are fused as follows:

**INPUT**—1—2-ampere Bussmann MDL-2 fuse

**OUTPUT**—For 19B2, 19C2, 20B2, 20C2

- 1—24V TALK, 2-ampere No. 24C fuse
- 1—24V SIGNAL, 2-ampere No. 24C fuse
- 2—10V AC, 3-ampere No. 24B fuses
- 1—18V AC, 2-ampere No. 24C fuse.

**OUTPUT—For 19C2A**

- 1—24V TALK, 2-ampere No. 24C fuse
- 1—24V SIGNAL, 3-ampere No. 24B fuse
- 2—10V AC, 5-ampere No. 24F fuses
- 1—18V AC, 2-ampere No. 24C fuse.

**OUTPUT—For 19C3, 20C3**

- 1—24V TALK, 2-ampere No. 24C fuse
- 1—24V SIGNAL, 3-ampere No. 24B fuse
- 2—10V AC, 5-ampere No. 24F fuses

- 2.05** The 47C1 power unit is available for locations requiring reserve power.

### 3. INSTALLATION



**Reference shall be made to Section 167-400-200 for general requirements necessary for the proper installation of the power unit.**

- 3.01** Since the 19B2 and 20B2 power units are the same size, wall mounting procedures are identical. The same is true for the 19C2, 19C2A, 19C3, 20C2, and 20C3 power units for rack mounting. Therefore, only the installation procedures for the 20B2 and 20C2 power units will be covered in this Section.

- 3.02** Install the 20B2 power unit as follows:

**Note:** The power unit must be mounted on a wall in a vertical position with enough open area to allow adequate ventilation. Do not lay objects on the power unit or allow packing crates, etc. to be piled around it as this will cause overheating and failure of the unit.

- (1) Fasten the backboard plate assembly, P33A830, to the wall as covered in Section 463-130-200, or in accordance with local instructions.

- (2) Hang the power unit on the backboard and secure it with the machine screws provided.

- 3.03** The 20C2 power unit is mounted on an equipment rack using the four mounting holes on the metal enclosure (Fig. 4). Fasten with the machine screws provided.

- 3.04** When the 47C1 power unit is used for reserve power, refer to Section 167-449-101 for information on installation procedures.

### 4. CONNECTIONS (Fig. 5)

- 4.01** The instructions that follow are for connecting the 20B2, 20C2, and 20C3 power units to associated telephone equipment. With the exception of connections to the 113A or 117A frequency generator, rated MD, or the 117B frequency generator; the instructions also apply to the 19B2 and 19C2, 19C2A, and 19C3 power units.

- 4.02** The power units have three terminals for adjustment to the ac service voltage level and are shipped with the adjustment lead connected to the 117-volt terminal. With this connection, the unit will perform satisfactorily for line voltages between 111 and 122 volts. The nominal line voltage should be accurately checked before connecting. If the nominal voltage is between 105 and 114 volts, connect the adjustment lead to the 111-volt terminal. If the nominal line voltage is between 123 and 129 volts, connect the adjustment lead to the 123-volt terminal.

- 4.03** Place wiring (supplying telephone equipment) through the plastic grommet at the bottom of the 20B2 unit (Fig. 3) and through the slot provided on the mounting flange on the 20C2 unit (see Fig. 4). Dress the wires along the left side of the panel and below the ground terminals.

- 4.04** Connect ground terminals, station key equipment, and lamp wiring to the appropriate supply as marked on the panel.

- 4.05** Connect LOC GRD as shown in Fig. 5.

**Note:** While the ground terminals on the power unit are connected to a common bus,

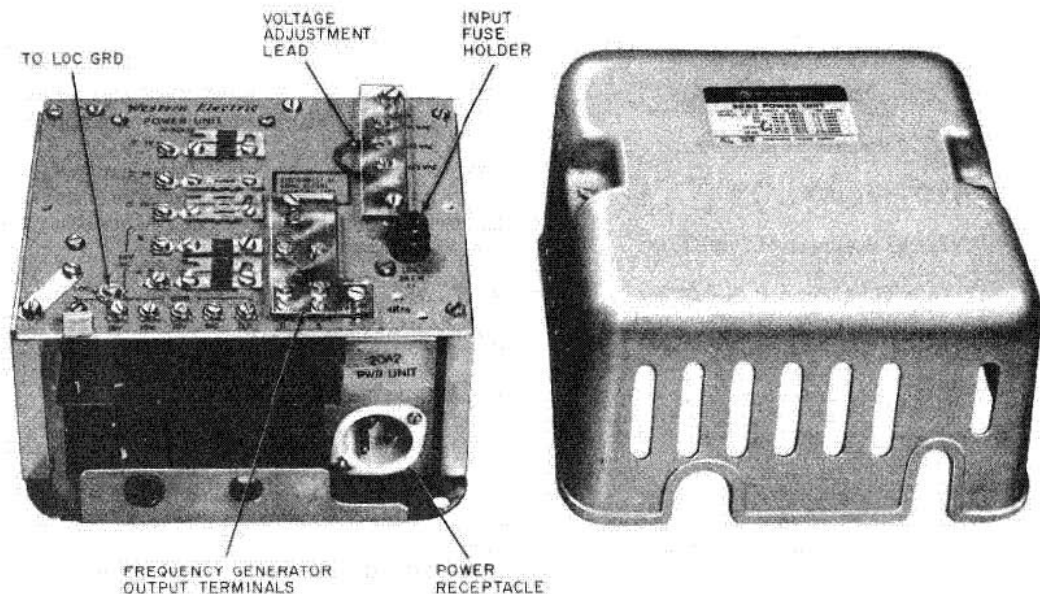


Fig. 3—20B2 Power Unit (Wall Mounted) Cover Removed

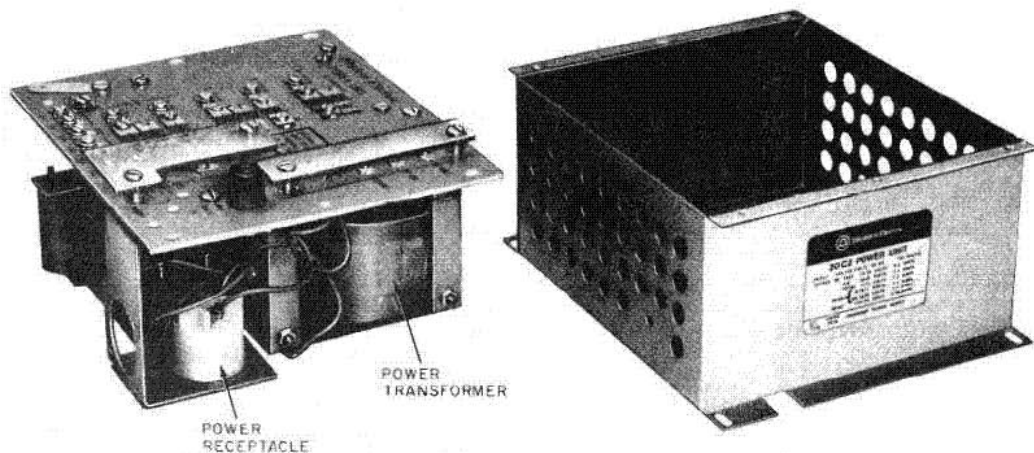


Fig. 4—20C2 Power Unit (Rack Mounted) Enclosure Removed to Show Power Receptacle



TABLE A

## OUTPUT AND FEATURES 19- AND 20- TYPE POWER UNITS

FEATURES		DESCRIPTION AND OUTPUT			POWER UNIT						
		VOLTAGE	AMPS	NOTE	19B2	19C2 AND 19C2A	19C3	20B1 (MD)	20B2	20C2	20C3
DC Output	Talk	18-26	0.6	1	X	X (Note 5)		X	X	X	
	Signal	20-26	1.5								
	Talk	18-27	0.6	2			X			X	
	Signal	20-27	1.9								
AC (60-Hz) Lamp Output		8.75-11	4.5 (Note 6)	3	X	X (Note 5)		X	X	X	
AC Buzzer Output		16-20	1.4								
AC (60-Hz) Lamp Output		8.75-11	5.5				X			X	
AC (30 Hz) Output Ringing Supply)		110-125	Not Specified	4				X	X	X	X
Wall Mounting		9-1/4" High by 8-3/4" wide by 5" deep. Include metal backboard and cover.			X			X	X		
Rack Mounting		7" high by 8-1/2" wide by 5" deep. Mounted on horizontal bars drilled on 7/16" centers and vertically spaced at 7". Requires 20 mounting spaces.				X	X			X	X (Note 7)

**Note 1:** Total DC TALK and DC SIGNAL not to exceed 1.5 amps.

**Note 2:** Total DC TALK and DC SIGNAL not to exceed 1.9 amps.

**Note 3:** Where combinations of the two outputs are used, to determine load-carrying capacity, add twice the current used in 16-20 volt output to the current used in the 8.75-11 volt output. A total of 4.5 amperes is maximum.

**Note 4:** 1 to 16 C4A or H1A RINGERS with or without series diodes (diode matrix). 1 to 6 C4A or H1A ringers with series capacitors.

**Note 5:** The 19C2A is similar to the 19C2 except that the signal fuse is rated at 3 amperes, and the two  $\pm$  10 volt fuses are rated at 5 amperes.

**Note 6:** The 19CA may be operated up to 5.0 amperes for 15 minutes in a 4-hour period.

**Note 7:** The 20C3 power unit may also be mounted on 6-inch vertical centers.

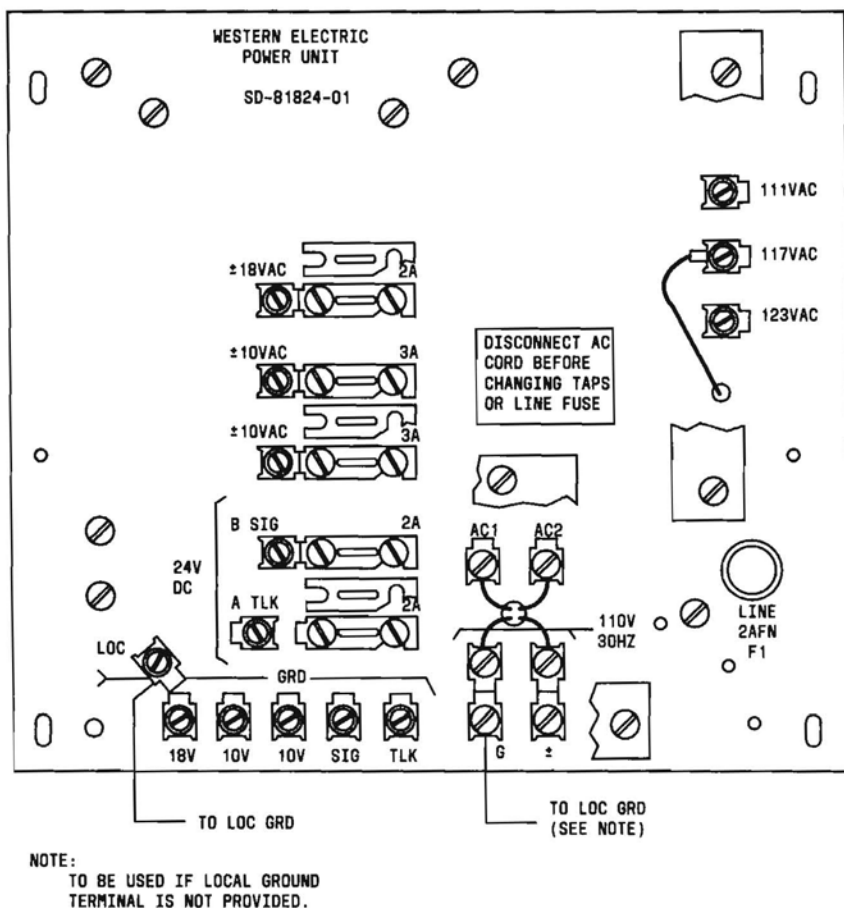


Fig. 5—Wiring Connection for 20A2 Power Unit

the station ground wiring leads should be connected to their *designated* ground terminals (Fig. 5).

**4.06** All ringers powered by the 113A or 117A frequency generator, rated MD, or the 117B frequency generator should be connected in accordance

with Table A, Note 4. The bias spring should be set initially at the high notch position (low sensitivity). If the ringer fails to operate properly, the spring should be set to the low notch.

**4.07** In the event that some remote facility (eg, a ringdown tie line utilizing a carrier link)

fails to operate properly with the 30-Hz ringing frequency, a 19-type power unit with a supplementary 20-Hz ringing supply (101G) should be used. Such difficulty is generally due to the fact that signal converters in the central office (D1B converters, E-type signaling units, etc) contain bandpass filters tuned to 20 Hz. Such units will not respond to 30-Hz signaling.

**4.08** The 19C3 and 20C3 power units are equipped with a spare ground terminal provided for grounding one side of a supplementary 18 VAC supply, when required for use in the system. (Fig. 2.)

**5. MAINTENANCE 20B1 (MD) POWER UNIT (20A1 with Hardware and Cover for Wall Mounting)**

**5.01** Two different diodes, the 487A and the MDA 952-2, were used as the bridge rectifier in the 20B1 (MD) and 20C1 (MD) power units. If the dc output of the unit using the 487A diode becomes short circuited, it may result in a burnout of the diode.

**5.02** To provide a margin of safety, install 24G fuses (1-1/3 amp) in place of the 24C fuse (2-amp) in the 24V TALK and 24V SIGNAL dc outputs of the units using the 487A diode. The following will help in identifying the 20B1 (MD) and 20C1 (MD) power units involved:

- The bridge rectifier is located on the mounting bracket which also supports the power cord receptacle.
- The 487A diode is square and approximately 1 inch on a side. It is fastened with one central mounting screw. See Fig. 6.
- The MDA 952-2 is hexagonal and is slightly larger. It is fastened with two screws. See Fig. 6.

**Note:** Later production units of the 20B2 and 20C2 power units use the 487C and 821A diodes which are square.

**5.03** Upon replacement of the 20B1 power unit, it should be returned to the WEC<sub>o</sub> for modification and recoding to a 20B2 power unit.

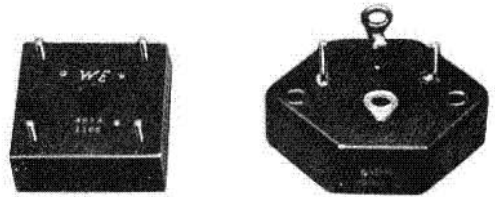


Fig. 6—487A and MDA 952-2 Diodes



# POWER UNITS

## 29- AND 30-TYPE

### IDENTIFICATION, INSTALLATION, AND CONNECTIONS

	CONTENTS	PAGE
1.	<b>GENERAL</b> . . . . .	1
2.	<b>IDENTIFICATION</b> . . . . .	1
3.	<b>INSTALLATION</b> . . . . .	3
4.	<b>CONNECTIONS</b> . . . . .	4

#### 1. GENERAL

1.01 The 29- and 30-type power units are intended to provide power for talking, relays, lamps, buzzers, and ringing in Key Telephone Systems.

1.02 This section is reissued to:

- Change 29E1 fuse value
- Rerate 117A Frequency Generator to Manufacture Discontinued (MD) and add the 117B Frequency Generator
- Require line voltage check
- Update Fig. 1
- Update Table A
- Revise Fig. 2 and 3
- Add Fig. 4 and 5.

This issue does not affect the Equipment Test List.

1.03 This issue of the section is based on the circuit schematic drawing: SD-81877-01, Issue 11B. For a detailed description of the operation, refer to the corresponding circuit description. If this section is to be used with

equipment or apparatus reflecting a later issue of the drawing, reference should be made to the CD and SD to determine the extent of the changes and the manner in which the section may be affected.

1.04 The 110-volt ac, 30-Hz output is provided from the 113A, 117A, or 117B frequency generators that are mounted in the power unit. The 113A and 117A frequency generators are rated MD and replaced by the 117B frequency generator. The 117B frequency generator is electrically and mechanically interchangeable with the 113A and 117A frequency generators. Modification kit D-180277 (Fig. 1), used to equip the 29B1 power unit (Fig. 2) with 30-Hz ringing power, includes a 117B frequency generator.

#### 2. IDENTIFICATION

2.01 The 29- and 30-type power units operate on an ac input of 111, 117, or 123 volts, ±5 percent at 60 Hz. The input power is approximately 320 watts at 117 volts 60 Hz. The outputs of the power units and features are shown in Table A.

2.02 The 29B1 (Fig. 2) and 30B1 power units are fitted with a parallel blade U-grounding receptacle for use with prewired power cords. The 29C1, 29E1, and 30C1 (Fig. 3) power units are fitted with a molded plug and cord for use with the prewired cords. The prewired power cords are available in the following lengths and should be ordered separately.

PART NO.	LENGTH (FT)
P-40J326	1-1/2
P-40J327	2
P-40J328	4
P-40J329	6
P-40J099	12

#### NOTICE

Not for use or disclosure outside the Bell System except under written agreement

**Warning:** The power cord should not be connected to the ac service receptacle until all other wiring has been connected.

- 2.03 The 29B1, 29C1, 30B1, and 30C1 power units are fused as follows:

◆**INPUT**—◆ 1—LINE (F1), 5-ampere Bussmann MDX-5 fuse

◆**OUTPUT**—For 29B1, 29C1, 30B1, 30C1◆

1—24V A TLK, 2-ampere No. 24C fuse

6—24V B SIG, 2-ampere No. 24C fuses

6—10V/11V AC, 3-ampere No. 24B fuses

1—10V AC Interrupter, 2-ampere No. 24C fuse

1—18V AC, 2-ampere No. 24C fuse.

◆**OUTPUT**—For 29E1◆

1—24V A TLK, 2-ampere No. 24C fuse

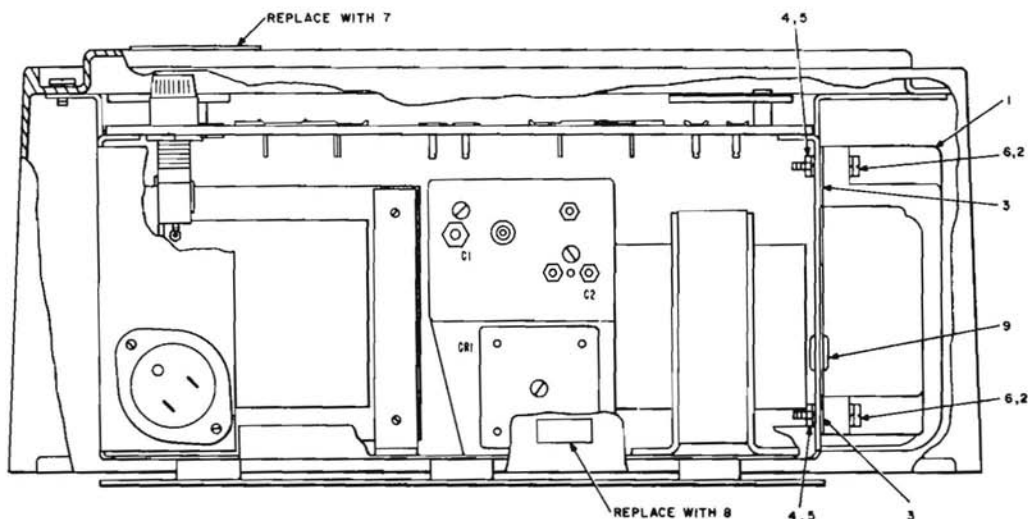
◆5—24V B SIG, 2-ampere No. 24C fuses

1—24V B SIG, 3-ampere No. 24B fuse◆

6—10V/11V AC, 5-ampere No. 24F fuses

1—10V AC Interrupter, 5-ampere No. 24F fuse

1—15/18V AC, 5-ampere No. 24F fuse.



KIT OF PARTS (D-180277)

1. 117B FREQUENCY GENERATOR
2. P-284148 PLAIN WASHER (NO.8) (2 REQD)
3. P-252552 FIBER WASHERS (2 REQD)
4. P-206518 HEX NUT (.164-32) (2 REQD)
5. P-221761 LOCKWASHER (NO.8) (2 REQD)
6. P-181456 BHM SCREW (.164-32 X 5/8) (2 REQD)
7. P-40V023 NAMEPLATE
8. P-40V027 NAMEPLATE
9. GROMMET, NYLON-NO. NMC557-88-NYLON MOULDING CORP., 40 BROWN AVE., SPRINGFIELD, N.J.

Fig. 1—Modification of 29B1 Power Unit to Incorporate 30-Hz Ringing Power

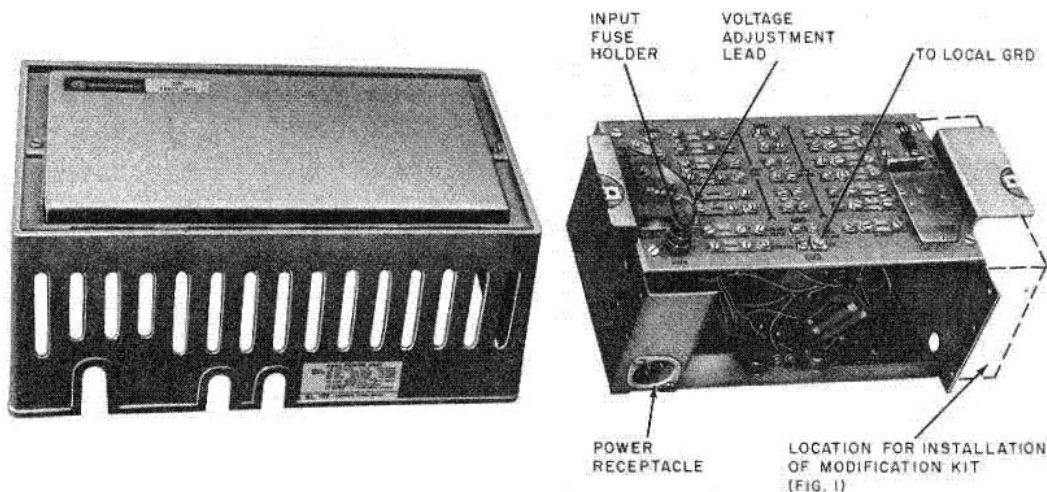


Fig. 2—29B1 Power Unit (Wall Mounted) Cover Removed

2.04 The 29B1 power unit can be modified to include 30-Hz ringing power by adding the D-180277 KIT OF PARTS to the unit as shown in Fig. 1.

After the power unit has been modified in accordance with Fig. 1, connect the frequency generator to the power unit as follows:

FREQUENCY GENERATOR TERMINAL	POWER UNIT TERMINAL
1	AC1
2	AC2
3	$\pm 110V$ 30 Hz
4	GRD

When modified as above, the power unit shall be identified as a 30B1 power unit.

### 3. INSTALLATION



Reference shall be made to Section 167-400-200 for general requirements necessary for the proper installation of the power unit.

3.01 Since the 29B1 and 30B1 power units are identical in size, wall mounting procedures are the same. The same is true for rack mounting 29C1, 29E1, and 30C1 power units. (The 29C1, 29E1, and 30C1 power units differ only in depth requirements. See Table A.) Therefore, only the installation procedures for the 30B1 and 30C1 power units will be covered in this section.

3.02 Install the 30B1 power unit as follows.

**Caution:** The power unit must be mounted on a wall in a horizontal position with enough open area to ensure adequate ventilation. Do not lay objects on the power unit or allow packing crates, etc. to be piled around it as this will cause overheating and failure of the unit.

- Fasten the backboard plate assembly to the wall in accordance with local instructions.
- Hang the power unit on the backboard and secure with the machine screws provided.

3.03 Mount the 30C1 power unit (Fig. 3) on the equipment frame using the four mounting

holes on the metal enclosure of the unit and secure with machine screws.

**Note:** Two 29C1, 29E1, or 30C1 units can be mounted side by side in a standard 23-inch frame.

#### 4. CONNECTIONS

**4.01** The instructions that follow are for connecting the 30B1 (Fig. 4) and 30C1 power units to associated telephone equipment. With the exception of connections to the 113A or 117A frequency generators, rated MD, or the 117B frequency generator, the instructions also apply to the 29B1, 29C1, and 29E1 (Fig. 5) units.

**4.02** The power units have three terminals for adjustment to the ac service voltage level and are shipped with the adjustment lead connected to the 117-volt terminal. With this connection, the unit will perform satisfactorily for line voltages between 111 and 123 volts. The nominal line voltage should be accurately checked before connecting. If the nominal voltage is between 105 and 114 volts, connect the adjustment lead to the 111-volt terminal. If the nominal voltage is between 123 and 129 volts, connect the adjustment lead to the 123-volt terminal.

**4.03** Place wiring (supplying telephone equipment) through the plastic cable guides at the bottom of the 30B1 unit or through the plastic cable guide on the back of the 30C1 unit. Dress the wires below the ground terminals. On 29C1, 29E1, and 30C1 units, place the wires in the loop rings. If the power unit is mounted on the right side of the frame, the rings are mounted on top of the unit. The rings are mounted on the bottom of power units mounted on the left side of the frame.

**Note:** Do not use rings as a tool when skinning wires and do not leave the wires in the rings under tension.

**4.04** Secure the input power cord in the cable clip on the unit.

**4.05** Connect ground terminals, station key equipment, and lamp wiring to the appropriate supply terminals as marked on the panel. See Fig. 4 or 5.

**4.06** Connect local ground to the terminal designated LOC GRD.

**Note:** While the ground terminals on the power unit are connected to a common bus, the station ground wiring leads should be connected to their **designated** ground terminals (18V, 10V/11V, SIG, TLK, etc).

**4.07** All ringers powered by the 113A (MD), 117A (MD), or 117B frequency generator should be connected in accordance with Table A, Note 4. The bias spring should be set initially at the high notch position (low sensitivity). If the ringer fails to operate properly, the spring should be set to the low notch.

**4.08** In the event that some remote facility (e.g., a ringdown tie line utilizing a carrier link) fails to operate properly with the 30-Hz ringing frequency, a 29-type power unit with a supplementary 20-Hz ringing supply (101G) should be used. Such difficulty is generally due to the fact that signal converters in the central office (D1B converters, E-type signaling units, etc) contain bandpass filters tuned to 20 Hz. Such units will not respond to 30-Hz signaling.



TABLE A  
OUTPUTS AND FEATURES 29- AND 30-TYPE POWER UNITS

FEATURES		DESCRIPTION AND OUTPUT			POWER UNIT				
		VOLTS	AMPERES	NOTE	29B1	29C1	29E1*	30B1	30C1
DC OUTPUT	Talk	18-26	0-1	1	X	X	X	X	X
	Signal	20-26	0-4						
AC (60-Hz) Lamp Output		8.75-11 or 9.75-12	0-12	2,3	X	X	X	X	X
		13.25-16.75 or 16-20	0-1.6						
AC Buzzer Output		16-20	0-1.6		X	X		X	X
AC Interrupter Motor Output		8.75-11	0-2	3	X	X	X	X	X
AC (30-Hz) Output (Ringing Supply)		110-125	Not Specified	4	Note 5			X	X
Wall Mounting		14.0" wide by 8.25" high by 6.37" deep Includes Wall Mounting plate and cover.			X			X	
Rack Mounting		10.50" wide by 6.94" high by 5.75" deep				X	X		
		10.50" wide by 6.94" high by 7.88" deep							X

*Note 1:* Total DC TALK and DC SIGNAL not to exceed 4 amperes.

*Note 2:* AC (60-Hz) voltage is normally adjusted at 10 volts. If the system requires higher lamp voltage, the link may be adjusted for 11 volts.

*Note 3:* Combined current (8.75 to 11 or 9.75 to 12 volts) should not exceed 12.0 amperes.

*Note 4:* 1 to 16 C4A or H1A ringers with or without series diodes (diode matrix) or 1 to 6 C4A or H1A ringers with series capacitors.

*Note 5:* When 30-Hz ringing output is added to the 29B1 power unit in accordance with 2.04, the power unit shall be identified as 30B1 power unit.

\* Intended for use in COM KEY II packaged key telephone system.

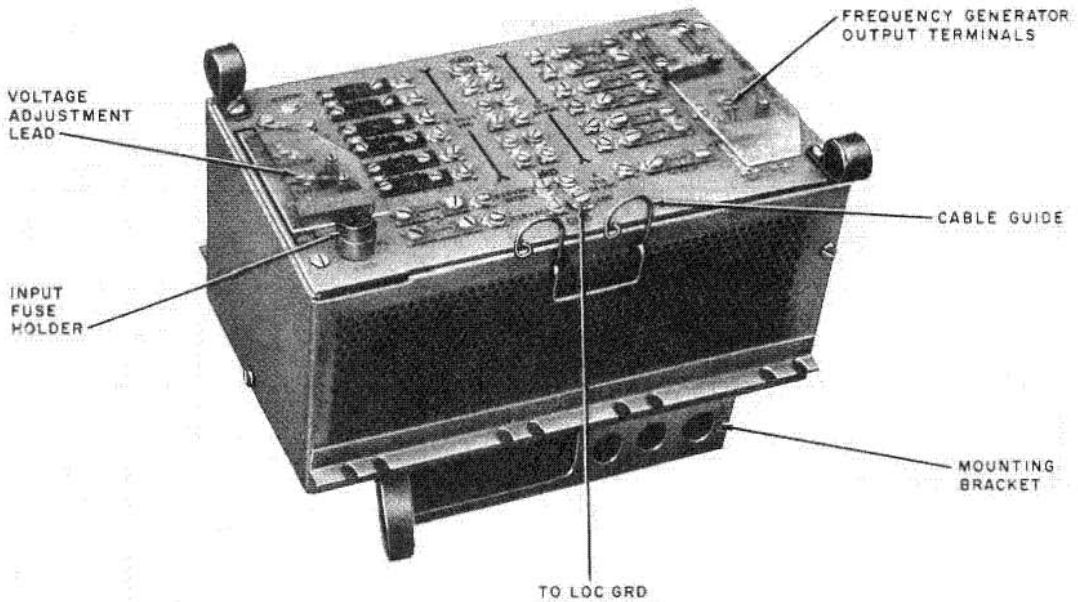


Fig. 3—30C1 Power Unit (Rack Mounted) Cover Installed

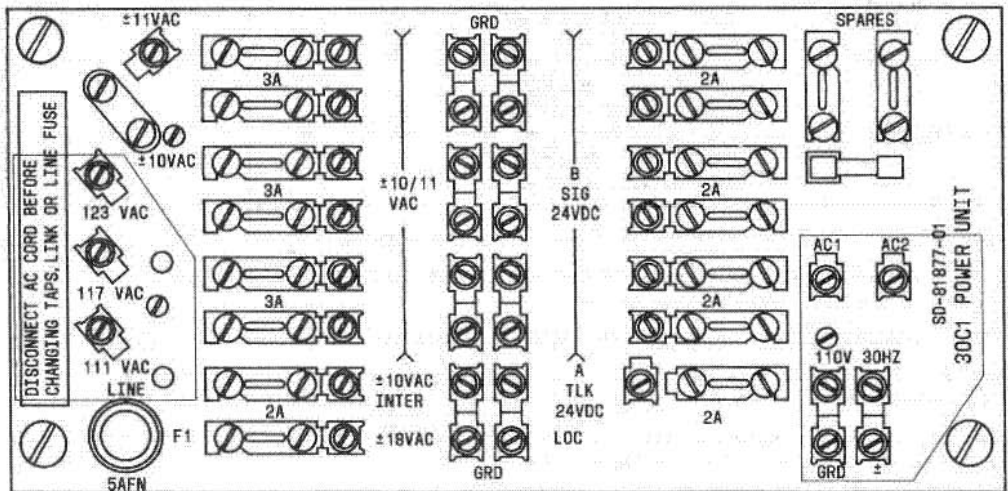


Fig. 4—Wiring Connections For 29B1, 29C1, 30B1, and 30C1 Power Units

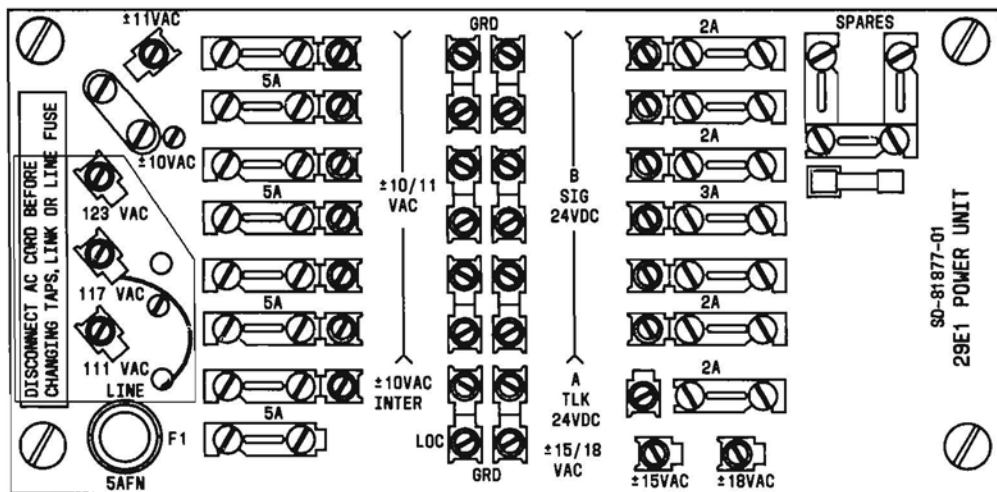


Fig. 5—Wiring Connections For 29E1 Power Unit



## POWER UNITS

### 34B1 AND 34C1

### IDENTIFICATION, INSTALLATION, AND CONNECTIONS

#### 1. GENERAL

1.01 The 34B1 and 34C1 power units are intended to provide interrupter and lamp power in key telephone units.

1.02 The schematic diagram and circuit description for the power units are covered in SD-81904-01 and CD-81904-01, respectively.

#### 2. IDENTIFICATION

2.01 The 34B1 power unit is approximately 14 inches wide by 8-1/4 inches high by 6-3/8 inches deep and is intended for wall mounting. The unit is furnished with a parallel-blade, 3-conductor, input receptacle which will accept an input cord provided with a 3-conductor, parallel-blade, molded plug (see 2.03). A wall mounting plate and fiberglass cover are furnished.

2.02 The 34C1 power unit is approximately 10-1/2 inches wide by 7 inches high by 5-1/2 inches deep and is designed for frame mounting. Two units can be mounted side by side in a standard 23-inch equipment frame. The unit is furnished with an input cord provided with three parallel male blades which will accept a cord with female end (see 2.03).

2.03 An ac input cord is required for each unit and must be ordered separately. Available part numbers and lengths are as follows:

PART NO.	LENGTH (FT)
P-40J326	1-1/2
P-40J327	2
P-40J328	4
P-40J329	6
P-40J099	12

**Caution:** The power cord should not be connected to the ac service receptacle until other wiring has been connected.

2.04 The 34B1 and 34C1 power units operate on an ac input of 111, 117, or 123 volts  $\pm 5$  percent, 60 Hz. The outputs of the power units are as follows:

- (a) **AC Lamp Outputs:** 8.75 to 11 volts or 9.75 to 12 volts (see note); 0 to 25 amperes (0 to 35 amperes intermittent duty).

**Note:** Links are provided to furnish either  $\pm 10$  volts ac or  $\pm 11$  volts ac lamp power, depending upon individual key telephone unit requirements.

- (b) **AC Interrupter Output:** 8.75 to 11 volts.

2.05 The power units are fused as follows:

**Input:** 5-ampere Bussman MDX-5 fuse

**Output:**  $\pm 10/11$  volts ac, 3-ampere, No. 24B fuses;  $\pm 10$  volts ac, 2-ampere, No. 24C fuse.

#### 3. INSTALLATION



**Reference shall be made to Section 167-400-200 for general requirements necessary for the proper installation of the power units.**

3.01 Install the 34B1 power unit as follows.

**Note:** The power unit must be mounted on a wall in a vertical position with enough open area to ensure adequate ventilation.

- (a) Fasten the backboard plate assembly, B-993555, to the wall in accordance with Section 463-130-200.

- (b) Hang the power unit on the backboard plate and secure with the machine screws provided.

**3.02** Mount the **34C1** power unit on an equipment frame using the four mounting holes on the metal enclosure and the machine screws provided.

*Note:* Two 34C1 units may be mounted side by side on a standard 23-inch equipment frame.

#### **4. CONNECTIONS (See Fig. 1)**

**4.01** The instructions that follow are for connecting the 34B1 and 34C1 power units to ac power service and to associated telephone equipment. Procedures apply to both units unless otherwise indicated.

**4.02** The power units have three terminals (111 volts, 117 volts, and 123 volts) for adjustment to the ac service voltage level available. They are shipped with the adjustment lead connected to the 117-volt terminal. With this connection, the units will perform satisfactorily for normal line voltages between 111 and 123 volts. Measure the ac line

voltage. If the voltage is abnormal, connect the adjustment lead to the terminal nearest the average line voltage.

**Caution:** *Disconnect ac power cord before changing taps or line fuse.*

**4.03** AC (60 Hz) lamp voltage links are normally connected for  $\pm 10$  volts. If the system requires higher lamp voltage, the link may be adjusted for  $\pm 11$  volts.

**4.04** Place the input cable in the black support clip provided (34C1 only). Place wiring supplying telephone equipment, connected in accordance with panel stamped designations and SD-81904-01, through the nylon cable clips provided on the power unit panel (bottom center of 34B1 and each end of 34C1).

**4.05** Connect LOC GRD in accordance with Section 167-400-200.

**4.06** Connect the ac input connector to the mating connector on the power unit.

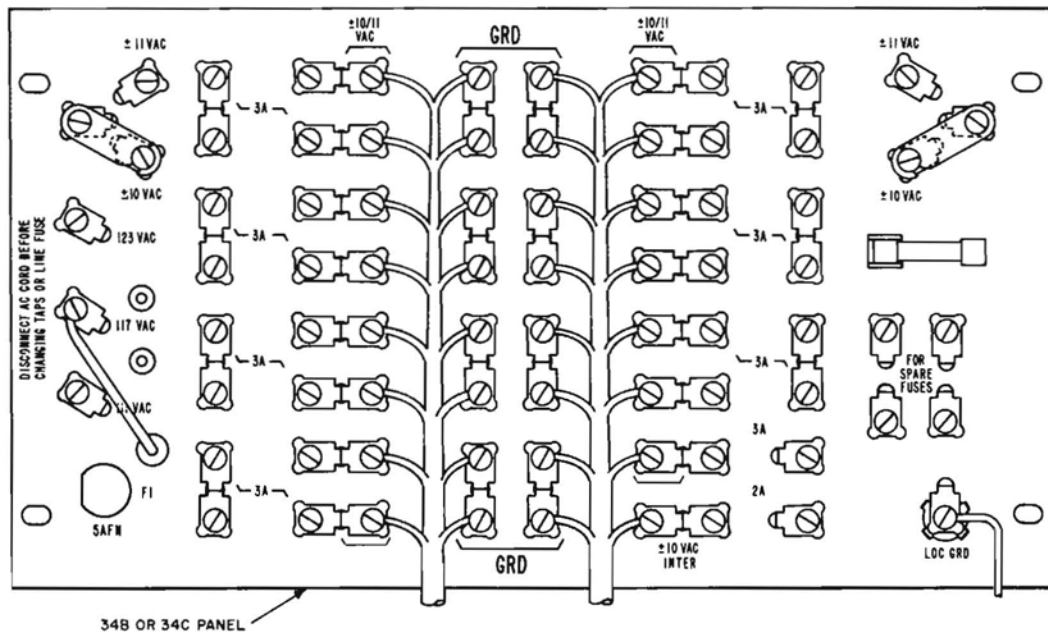


Fig. 1—Wiring Connections for 34-Type Power Units





## 47C POWER UNIT

### IDENTIFICATION, INSTALLATION, AND CONNECTIONS

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4.	CONNECTIONS . . . . .	5
5.	MAINTENANCE . . . . .	5

#### FIGURES

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3.	Wiring Connections for 47C Power Unit . . . . .	4

#### TABLE

A.	Fuse Table . . . . .	4
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#### 1. GENERAL

1.01 The 47C power unit (Fig. 1) is intended to provide emergency power for Key Telephone Service installations during commercial power failures. The power supplied to the Key Telephone Service installations is used for switching circuits, lamps, and an interrupter.

1.02 This section is reissued to add the table of contents, correct paragraph 2.01, correct Table A and change paragraph 3.01 and the associated notes. Revision arrows are used to emphasize the more significant changes. The Equipment Test List is not affected.

1.03 The 47C power unit is arranged for the addition of the 116A frequency generator as an option when a standby ringing generator is

required. The 116A frequency generator must be ordered separately.

1.04 The 47C power unit is arranged for plug-in addition of the KS-20390 L1 battery which must be ordered separately.

1.05 This issue of the section is based on drawing SD-81964-01 ♦Issue 7A1(C). If this section is to be used with equipment or apparatus reflecting later issue(s) of drawings, reference should be made to the SDs and CDs to determine the extent of the changes and the manner in which the section may be affected.♦

#### 2. IDENTIFICATION

2.01 The 47C power unit is approximately 10.50 inches wide by 6.88 inches high (including mounting supports) by ♦7.33♦ inches deep.

2.02 The 47C power unit is interconnected between the standard ac operated power supply and the key telephone equipment. The unit is on standby with the battery on trickle charge, and is brought into operation only during commercial power failure.

2.03 The KS-20390 L1 battery is a nickel-cadmium battery which actually consists of a 24-volt battery and a 10-volt battery in the same package.

2.04 The front panel, containing all the power terminations and fuses, is not hinged but may be swung down for easy access to the plug-in battery package (KS-20390 L1), the GL-1 circuit pack (printed circuit card containing the control circuits), and the optional 116A frequency generator (a dc operated ringing generator). See Fig. 2.

2.05 The optional ringing generator (116A frequency generator) is used when a local ringing supply is required in the key telephone equipment. It is operational only during commercial power failures, and only when ringing power is required.

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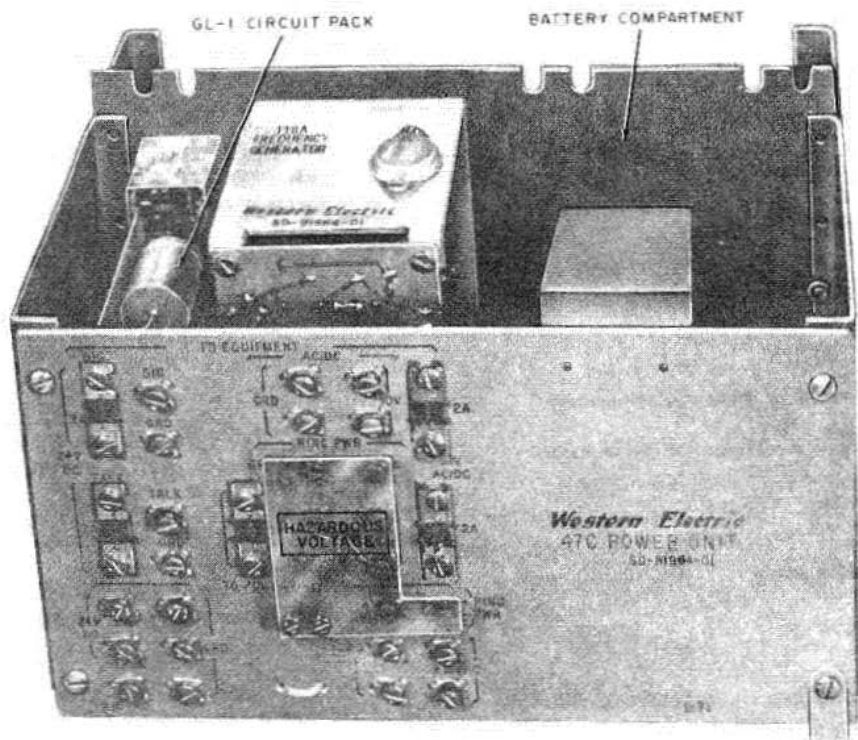


Fig. 1—47C Power Unit

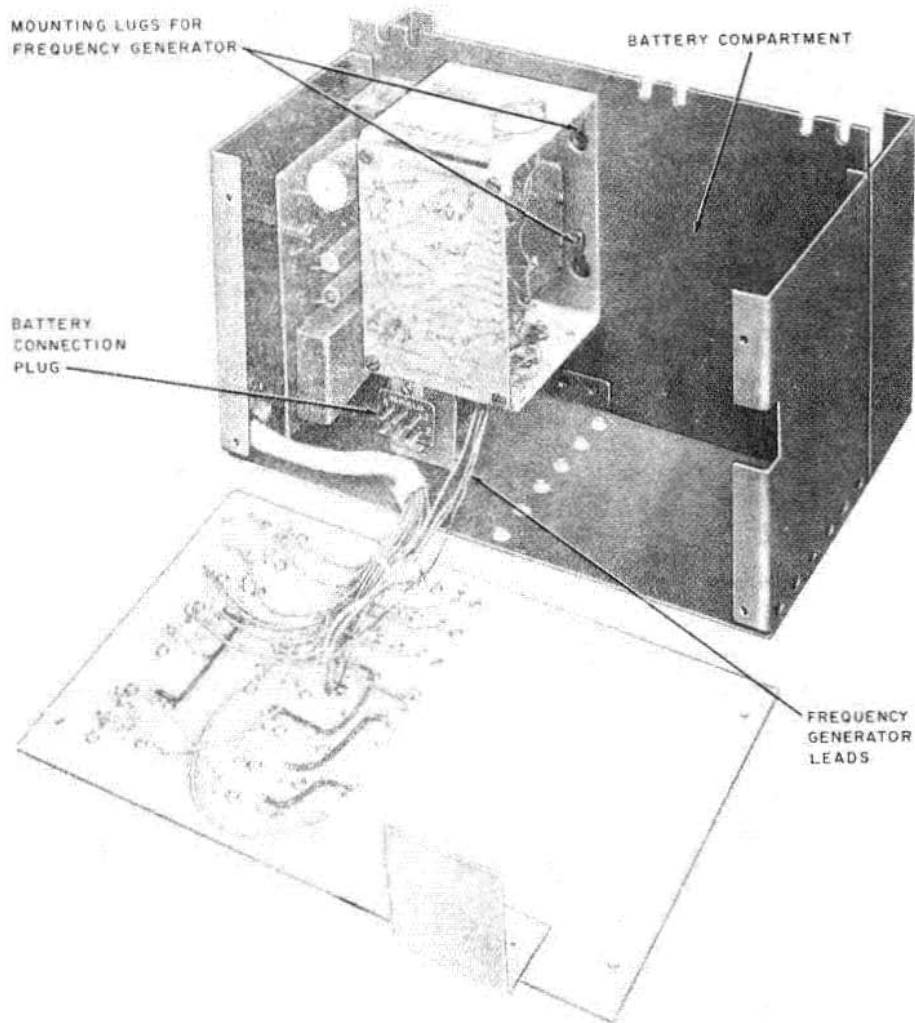


Fig. 2—47C Power Unit (Front Cover Removed)

2.06 The power unit provides the means for the following outputs:

- Negative 24 volts direct current for signal outputs.
- Negative 24 volts direct current for talk output.
- Ten volts alternating current for low voltage lamp output.

2.07 The output of the power unit is fused as shown in Table A.

TABLE A

FUSE FUNCTION	NO. AMPS	FUSE NO.
(F1) $\blacklozenge$ -24V $\blacklozenge$ DC SIGNAL	2	24C
(F2) $\blacklozenge$ -24V $\blacklozenge$ DC TALK	2	24C
(F3) 10V AC LAMP	2	24C
(F4) 10V AC LAMP	2	24C
(F5) FREQ GEN	1-1/3	24G

**Note:** When the 10-volt ac load exceeds 35-51A lamps, the load should be split and connected to both 10V terminals provided on the 47C power unit.

### 3. INSTALLATION



**Reference shall be made to Section 167-400-200 for general requirements necessary for the proper installation of the power plant.**

**Note:** The battery will be shipped in a discharged condition.

3.01 Charge the battery locally for 16 hours before installation. Install the battery in the 47C power unit and connect to a 19-, 20-,  $\blacklozenge$ 29- or 30-type power unit (KSU Power Supply). See Fig. 3.

**Note 1:** When used in conjunction with either the 29- or 30-type power unit, two 47C power units are required. The loads on the two 47C power units, and 116-type frequency generator (if used), must be isolated from each other.

**Note 2:** The ST terminal should be connected to the BY1 lead of the 6A and 1A2 key telephone systems, and the ST lead of either 1A, 1A1, or 1A2 key telephone system line circuit.

**Note 3:** All power leads to and from the 47C power unit are to be paired connections.

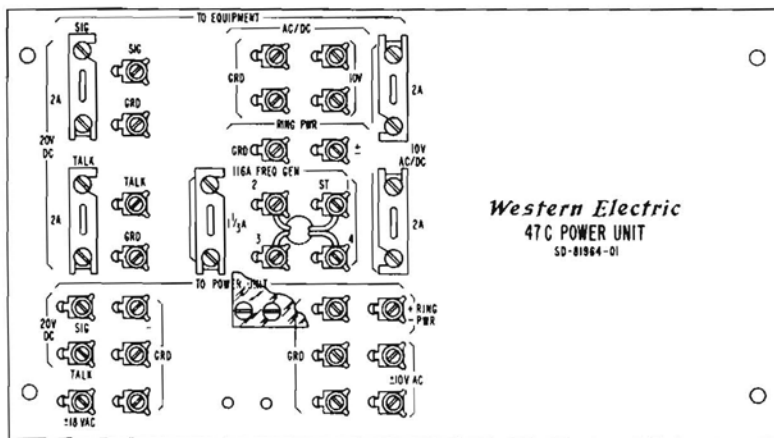


Fig. 3—Wiring Connections for 47C Power Unit

**3.02** Mount the power unit on the equipment rack using the upper and lower mounting supports. Where there is not enough room on the existing equipment rack or cabinet, the 47C power unit may be wall mounted in a 15A apparatus mounting (see Sections 463-140-100).

**3.03** Mount the 116A frequency generator (if used) on the back wall of the 47C power unit.

**3.04** Place the **charged** battery in the right-hand compartment of the 47C power unit.

**3.05** In the Key Service Unit, the 10-volt ac operated KS-15900 interrupter must be replaced with a 24-volt dc operated KS-19384 or KS-19385 interrupter.

**3.06** Do not adjust any potentiometers. They are factory adjusted and sealed.

#### 4. CONNECTIONS

**4.01** All power leads to and from the reserve power supply should be paired with their corresponding leads. For example, the -24V dc SIGNAL and SIGNAL GRD leads should be paired.

**4.02** When the installation contains IA2 and/or 6A Key Telephone Equipment and a 116A frequency generator is provided, connect the BY1 and ST leads to the ST termination on the reserve power plant.

**4.03** Plug the battery connector into the mating connector in the bottom of the 47C power unit.

**4.04** Connect the pigtail leads from the 116A Frequency Generator to terminals on the front panel (see Fig. 3) as follows:

TERMINAL	LEAD
1	Red
2	Red-white
3	Blue
4	Blue-white

**4.05** Record the installation date on the KS-20390 L1 battery. Replace the battery 3 years after installation.

**Note 1:** The installation data shall be recorded locally so that follow-up replacement can be administered.

**Note 2:** The unit should be operated in the system for at least 10 minutes on commercial ac power before the system is tested.

**4.06** Check the installation by removing the ac input to the KSU power supply. The key system should perform in a normal manner upon receipt of a call. If it does not, either the battery is defective or not charged, or the 47C power unit is defective. Use a KS-20538 volt-ohm-milliammeter to check the battery as follows:

MEASURE BETWEEN	READINGS
SIG (-) and GRD (+)	>20.0 Volts
10V and GRD (+)	> 9.0 Volts

If either of the preceding readings is not obtained, the battery should be replaced.

#### 5. MAINTENANCE

**5.01** Keep the 47-type power unit clean and free of all foreign matter to ensure proper operation of the unit.

**5.02** Periodically check the operation of the power unit in accordance with 4.06.



## MARKING PHYSICAL LOCATION OF STATION EQUIPMENT AND CABLE

### 1. GENERAL

1.01 This section covers methods of showing the physical location of key telephone apparatus and equipment and terminating points of station cables using Form E-5826 Write-on Identification Tag.

### 2. E-5826 IDENTIFICATION TAG (FIG. 1)

2.01 This tag consists of a pressure-sensitive plastic adhesive-backed tape, 3/4-inch wide and 3 inches long, mounted on a polyethylene backing. Location information is written on the tag *before* removal of the backing using a pencil, ballpoint pen, KS-spudger, or other pointed object.

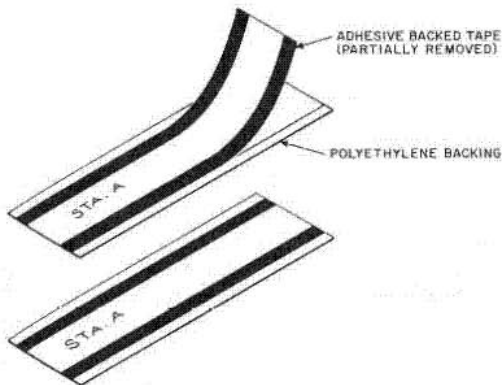


Fig. 1—E-5826 Write-On Identification Tag

2.02 The identification tag is commonly used to do the following:

- Direct installation and maintenance forces to the location of terminal points and equipment (Fig. 2 and 3).

- Identify cable and locate equipment during presurvey of complex rearrangements and changes (Fig. 4).
- Mark locations for telephone and equipment on presurvey of new installations (Fig. 5).
- Mark desks when rearranging telephone sets or lines.
- Identify apparatus when a centralized location serves several different customers or key telephone systems (Fig. 6).

*Note:* These forms may be used for other identifying purposes when desired.

2.03 Form E-5826 is available and can be ordered as follows:

(Quantity) Form E-5826, Write-on Identification Tag.

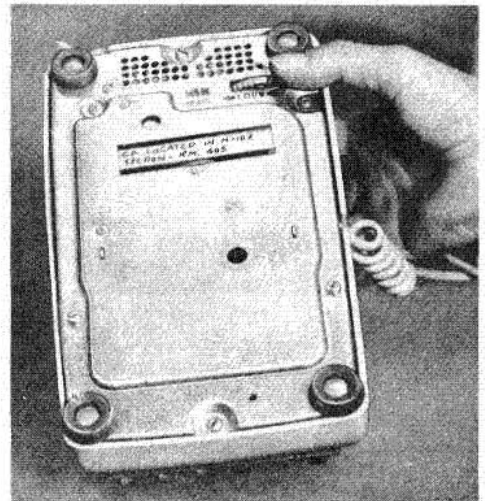


Fig. 2—Marking Cable Location Using Form E-5826



Fig. 3—Marking Equipment Location Using Form E-5826



Fig. 5—Method of Marking New Telephone Locations on Presurvey Using Form E-5826

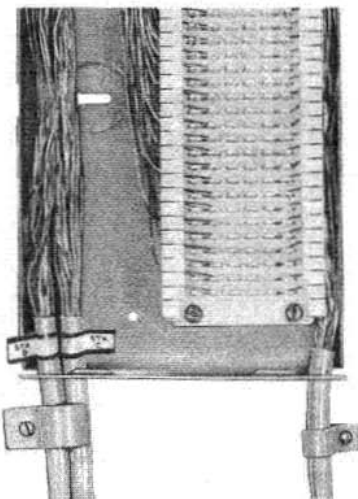
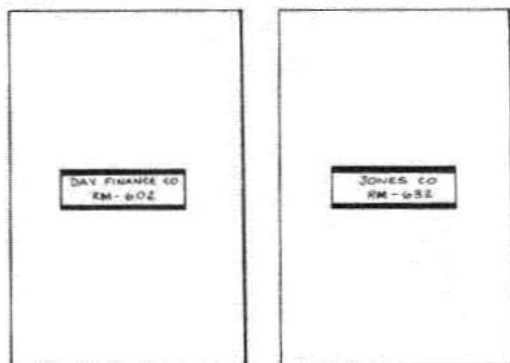


Fig. 4—Identifying Cable Using Form E-5826



KEY SERVICE UNITS OR EQUIPMENT CABINETS

Fig. 6—Marking Key Telephone Equipment Cabinets When a Centralized Location Serves Several Customers Using Form E-5826



## CONNECTOR CABLES IDENTIFICATION

### 1. GENERAL

**1.01** This section provides identification and ordering information for the A- and B-type connector cables used to terminate equipment and apparatus on customer premises.

**1.02** This section is reissued to:

- Add information on the B25G connector cable in Table A and Fig. 11
- Add information on the B50C connector cable in Table A and Fig. 13
- Rate the A25M connector cable MD; recommended replacement cable is A25K (Table A)
- Change Table A to show application of KS-16785,L16 plug and KS-16690,L12 receptacle
- Substitute the word "receptacle" for "connector" when referring to female type connecting devices; "connector" is a general term including both plugs (male) and receptacles (female).

**1.03** The solderless connectors will be supplied with either metal or plastic hoods on the A25B, A25D, A25M, B25A, and B25C cables. These cables will also continue to be manufactured with soldered connectors having metal hoods. The solderless plugs and receptacles are coded as follows:

- KS-21443,L2 (plastic hood) and KS-16689,L18 (metal hood) plug—replace KS-16689,L3
- KS-21442,L2 (plastic hood) and KS-16690,L12 (metal hood) connector—replace KS-16690,L1

**1.04** Adapters, service fittings, terminals, and cover assemblies, for use with connector

cables and cords, are covered in the appropriate section in Division 461.

### 2. IDENTIFICATION

**2.01 Purpose:** To provide a quick means for connecting inside wire cable to telephone apparatus by mating KS-type receptacles to matching plugs (Fig. 1).

**2.02 Design Features:** The A- and B-type connector cables consist of the following:

- 24-gauge conductors that have a tinned or untinned finish
- Vinyl insulation, which conforms to the even-count color-code scheme, on individual conductors
- Outer jackets of light olive gray vinyl
- Cables equipped with 50-contact plug(s) or receptacle(s) except as noted in Table A
- Nylon draw string under vinyl jacket which facilitates removal of the jacket for terminating conductors.



**Plugs and receptacles used on these cables are neither waterproof nor moistureproof. A terminal box, service fitting, or cover assembly should be used at installations where moisture might enter the connectors through mopping operations, condensation, etc.**

**2.03** A-type connector cables are furnished as single-ended (one end equipped, the other raw-ended) or double-ended (both ends equipped with the same KS-type plug or receptacle). B-type cables are furnished double-ended only with a plug at one end and a receptacle on the opposite. The

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## SECTION 461-200-101

exceptions are the B25C and B50B used with 6051-type keys. Refer to Table A for detailed information.

**2.04** Those 12-pair connector cable conductors, which are terminated at the receptacle or plug-in nonstandard color-code sequence, are shown in Table B. Table A is a list of all the cables and their intended use.

**2.05** Certain cables are furnished with plugs at one end and plugs and terminal strips at the other. A view showing the cable terminal strips and numbering arrangement is shown in Fig.

2 through 6. Figures 7 through 13 show the cable plug, terminal strip, and lead color assignments.

**2.06** The B25C connector cable permits use of a 6051-type key (11 pickup and hold) fed through a 25-pair connector cable using a nonstandard cutdown. Refer to Division 512 for wiring.

### **2.07 Ordering Guide:**

- Cable, Connector—Specify proper code number (double- or single-ended) and length in feet. Refer to Table A.

TABLE A

## A- AND B-TYPE CONNECTOR CABLES, SELECTION

CODE	CONDUCTOR FINISH	TOTAL NO. OF CONDUCTORS OR CONTACTS, EACH PLUG OR RECEPTACLE		NO. OF ARMS AT RECP OR PLUG END	NO. OF CONDUCTORS IN EACH ARM	RECEPTACLE OR PLUG	INTENDED USE	STANDARD AVAILABLE LENGTHS (IN FEET)†	
		CONDUCTORS	CONTACTS					SINGLE-ENDED	DOUBLE-ENDED **
A12A‡	Tinned	24	24	1	24	KS-16785-L6 Plug	301 Sw Sys Equip in Airport Towers and Radar Rooms	4 and 8	
A12B‡			50			KS-16785-L8 or KS-16785-L16 Plug			
A12D	Untinned		24			KS-16690-L5 Receptacle	3A Comm Sys	13, 50, and 100	30, 80, 100, and 200
A12E		24	KS-16785-L6 Plug	AUTOVON - No. 309 Sw Sys	4 and 8				
A25A	Untinned*	50	50	1	50	KS-16671-L1 Plug†	6050 Keys	50 and 100	30, 80, 100, and 200
A25B						KS-16690-L1 KS-16690-L12 or KS-21442-L2 Receptacle	564-, 565-, 634-, 2564-, 2565- and 2634-Type Telephone Sets	13, 50, 100, and 200	30, 80, 100, and 200
A25C	Tinned					KS-16785-L8 or KS-16785-L16 Plug	Consoles for Strategic Air Command Installations	Any length as specified	
A25D	Untinned*		KS-16589-L3 KS-16689-L18 or KS-21443-L2 Plug		761A, 762A, and 812A PBX	13, 20, 22, 24, 25, 26 50, 75, 100, 125, 150	3, 6, 9, 25, 50, 75, 100, 125, 150		
A25E	Tinned			2	25	KS-16671-L1 Plug†	6051 Key in Antiaircraft Operations Control System Battery Locations	Any length as specified	
A25F	Tinned			1	50	KS-16671-L1 Plug†	12B and 14B Apparatus Units in 2A and 3A ACD Systems‡	50, 100, and 150	
A25K††			KS-16690-L1 KS-16690-L12 or KS-21442-L2 Receptacle			Shielded Connector Cable for use where RFI encountered in PICTUREPHONE® Installations	50, 100, and 200		
A25M (MD)††							Any length as specified		
A50A	Untinned*	100	50	2	50	KS-16671-L1 Plug†	6051 Keys	50 and 100	30, 80, 100, and 200
A50B						KS-16690-L1 or KS-16690-L12 Receptacle	610A, 635- and 2635-Type Telephone Sets	50, 100, 150, and 200	100 and 200
A50C						KS-16785-L8 or KS-16785-L16 Plug	Telephone Secretarial Service Concentrator-Identifier	50 and 100	

TABLE A (Contd)

## A- AND B-TYPE CONNECTOR CABLES, SELECTION

CODE	CONDUCTOR FINISH	TOTAL NO. OF CONDUCTORS OR CONTACTS, EACH PLUG OR RECEPTACLE		NO. OF ARMS AT RECP OR PLUG END	NO. OF CONDUCTORS IN EACH ARM	RECEPTACLE OR PLUG	INTENDED USE	STANDARD AVAILABLE LENGTHS (IN FEET) <sup>6</sup>	
		CONDUCTORS	CONTACTS					SINGLE-ENDED	DOUBLE-ENDED **
A50D (A&M Only)	Tinned	100	50	2	50	KS-16671-L1 Plug†	12A and 14A Apparatus Units in 2A and 3A ACD Systems §	50, 100, and 150	
A50E							12B and 14B Apparatus Units in 2A and 3A ACD Systems §		
A75A	Untinned*	150		3	50	KS-16690-L1 or KS-16690-L12 Receptacle	630D and 632A Key Tel Set; 584C Panel	6, 50, 100, 150, 200, and 250	30, 80, 100, and 200
A75B	Tinned					KS-16785-L8 or KS-16785-L16 Plug	618D Key and Amflite Indicator in No. 304 Sw Sys (NASA Projects)	50, 100	
A100C	Untinned*	200	50	4	50	KS-16690-L1 or KS-16690-L12 Receptacle	4A and 6A Tel Consoles	50, 100, and 200	
A100D				5	40	KS-16690-L1 Receptacle	608B, 631B, and 637A Key Tel Sets; replaces A100A(MD) Connector Cable		
A100E				4	50	KS-16785-L8 or KS-16785-L16 Plug	2A ACD System §	50	
A100F				Tinned		KS-16690-L1 or KS-16690-L12 Receptacle	3A Communications Systems	100	
A125A	Untinned*	250	50	5	50	KS-16690-L1 or KS-16690-L12 Receptacle	761A PBX Consoles for Hotel-Motel and small Hospital Systems	50, 75, and 100	

TABLE A (Contd)

## A- AND B-TYPE CONNECTOR CABLES SELECTION

CODE	CONDUCTOR FINISH	TOTAL NO. OF CONDUCTORS OR CONTACTS, EACH PLUG OR RECEPTACLE		NO. OF ARMS AT RECP OR PLUG END	NO. OF CONDUCTORS IN EACH ARM	RECEPTACLE OR PLUG	INTENDED USE	STANDARD AVAILABLE LENGTHS (IN FEET) <sup>¶</sup>	
		CONDUCTORS	CONTACTS					SINGLE-ENDED	DOUBLE-ENDED **
A150A	Untinned	300	50	6	50	KS-16690-L1 or KS-16690-L2 Receptacle (6)	Extension Cable for use between Attendant Console and 801A PBX Termination Field	50 and 100	5, 15, 30, 60, and 100
B25A		50	50	1	50	KS-16690-L1, KS-16690-L2, or KS-21442-L2 Receptacle	Extension Cable to Connect Plug-Ended Key Tel Sets to Receptacle or Plug-Equipped Bridging Terminals, Apparatus Cabinets, etc	5-1/2	
B25C						KS-16689-L3, KS-16689-L18, or KS-21443-L2 Plug	No. 6051 Keys, Terminal Strips arranged in tandem (1A1-1A2 KTS Only)		
B25G						Same as B25C except it is equipped with 652A6D jack for adjuncts to 6051 keys			
B50A						KS-16690-L1 Receptacle	Extension Cable for use between 800A PBX and Console		
B50B		100	50	2	50	KS-16689-L3 Plug (2)	No. 6051 Keys, Terminal Strips arranged in tandem	8	
B50C		Same as B50B except it is equipped with 652A6D jack for adjuncts to 6051 keys							
B75A		150	50	3		KS-16690-L1 Receptacle	Extension Cable for use between 800A PBX and Console		
B150A		Untinned	300	50	6	50	KS-16689-L3 Plug (6)	Extension Cable for use between Attendant Console and 801A PBX Termination Field	

\* Previously furnished tinned.

† Each plug is assembled on a terminal frame or strip

‡ Wire braid shield extends over entire length of cable. It is terminated on the plug at one end and twisted into a pigtail at the free end.

§ Automatic Call Distributing Systems.

¶ When specified, any nonstandard length can be furnished.

\*\* Double-ended cables are terminated at both ends in the same type receptacle and/or plug as shown in the RECEPTACLE OR PLUG column.

†† Refer to Section 800-612-164 for additional information on shielded cable.

TABLE B

## A12A, A12B, A12D, AND A12E CONNECTOR CABLE IDENTIFICATION

CONDUCTOR COLOR	PLUG OR RECEPTACLE TERM. NO.			
	A12A	A12B	A12D	A12E
BL-W	1	1	1	1
W-BL	13	26	26	13
O-W	2	3	2	2
W-O	14	28	27	14
G-W	3	5	3	3
W-G	15	30	28	15
BR-W	4	7	4	4
W-BR	16	32	29	16
S-W	5	9	5	5
W-S	17	34	30	17
BL-R	6	11	6	6
R-BL	18	36	31	18
O-R	7	13	7	7
R-O	19	38, 39, 40†	32	19
G-R	8	14	8	8
R-G	20	15	33	20
BR-R	9	16	9	9
R-BR	21	41, 42, 43†	34	21
S-R	10	17	23	10
R-S	22	18	48	22
BL-BK	11	19	24	11
BK-BL	23	44	49	23
O-BK	12	20	25	12
BK-O	*	45	50	24
Shield Pigtail	24	50		

\* Cut off at plug end.

† Terminals strapped in plug.

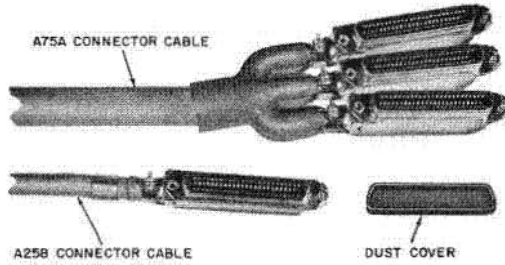


Fig. 1—Typical Cable Connectors With Dust Cover Removed

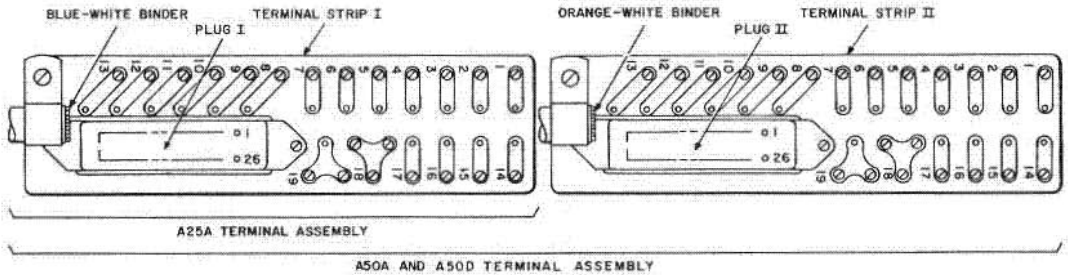


Fig. 2—View of Terminal Strip, Local Wiring Side

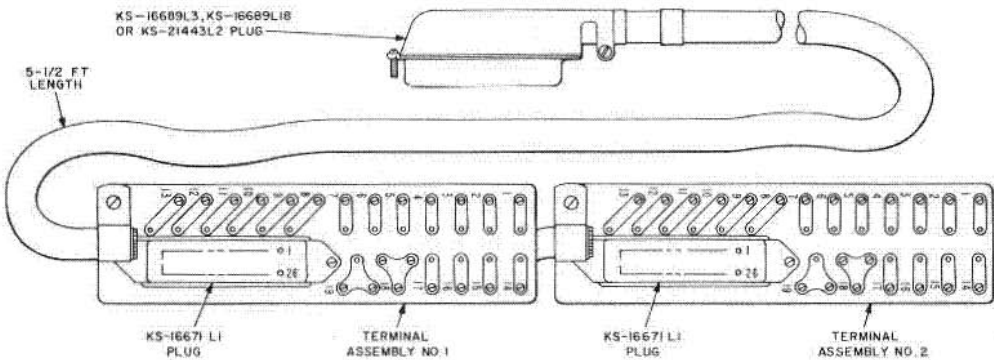


Fig. 3—B25C Connector Cable—View of Terminal Strip, Local Wiring Side

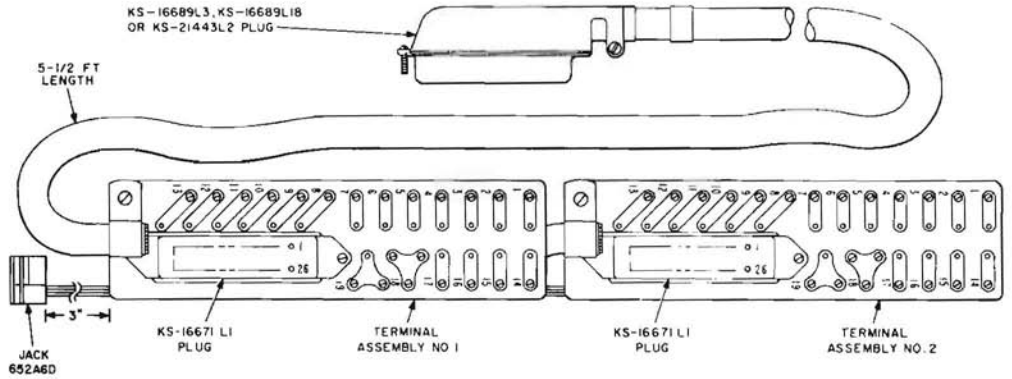


Fig. 4—B25G Connector Cable—View of Terminal Strip, Local Wiring Side

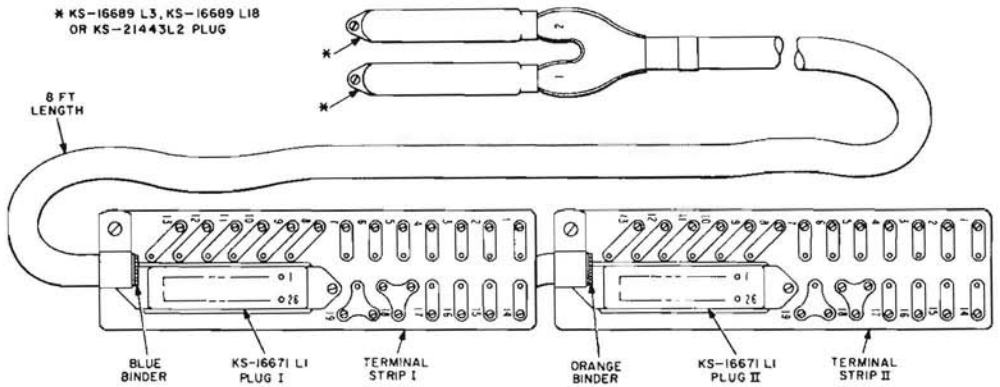


Fig. 5—B50B Connector Cable—View of Terminal Strip, Local Wiring Side



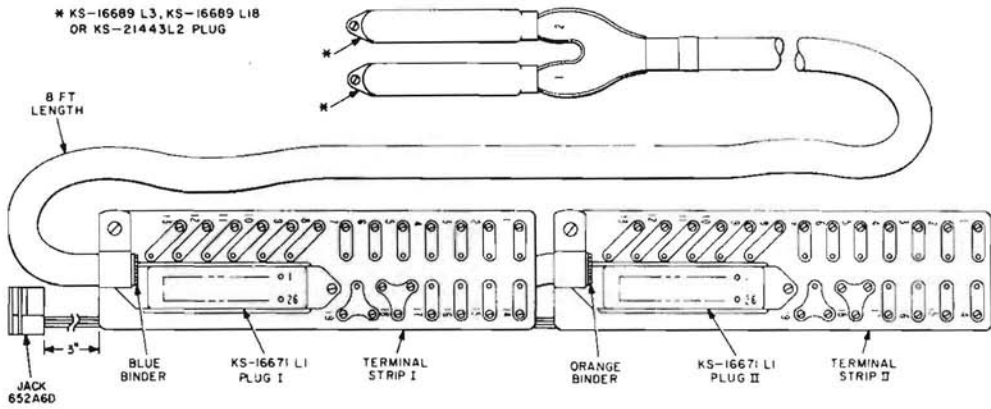


Fig. 6—B50C Connector Cable—View of Terminal Strip, Local Wiring Side



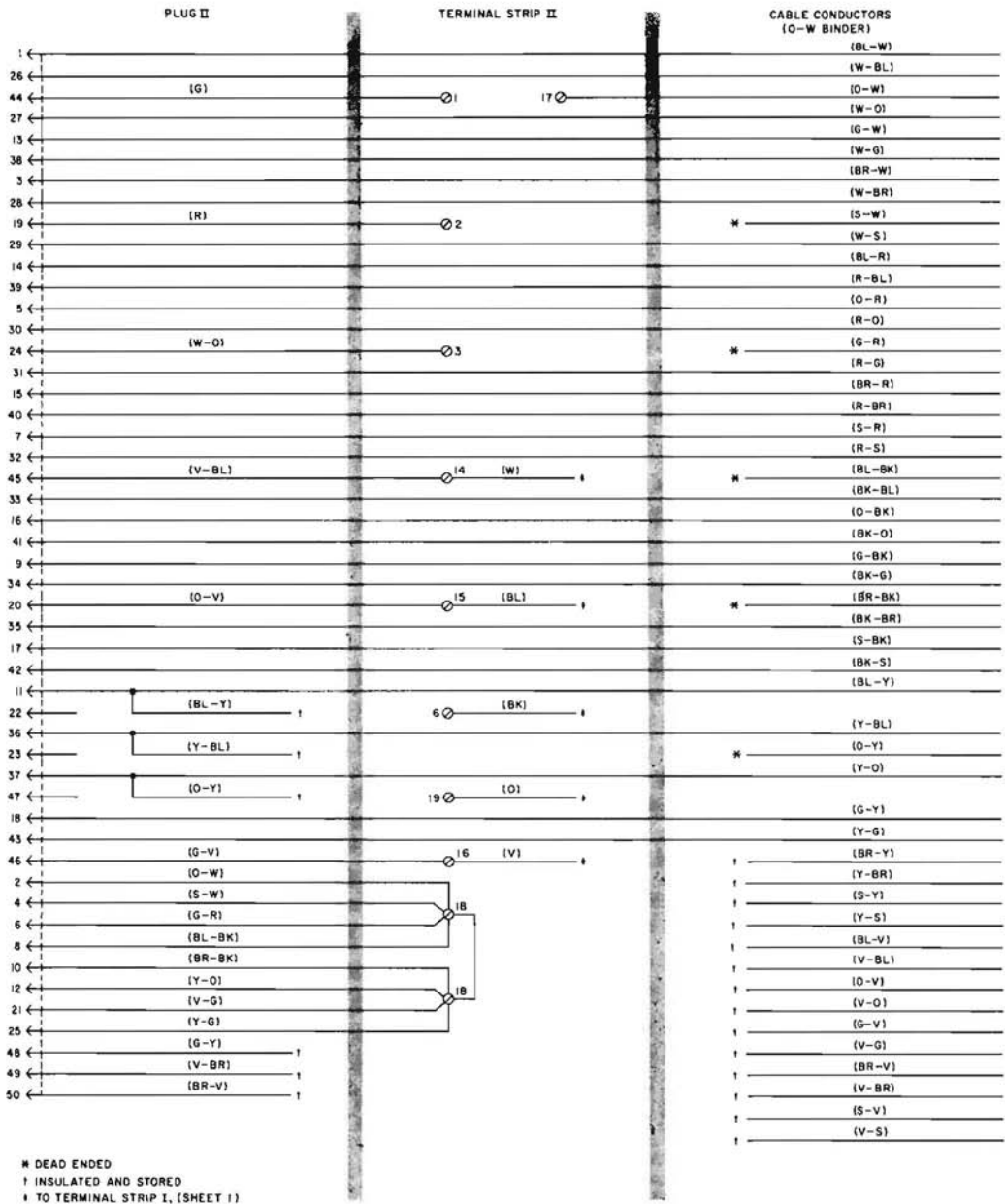


Fig. 7—A50A (O-W Binder) Connector Cable, Connections (Sheet 2 of 2)

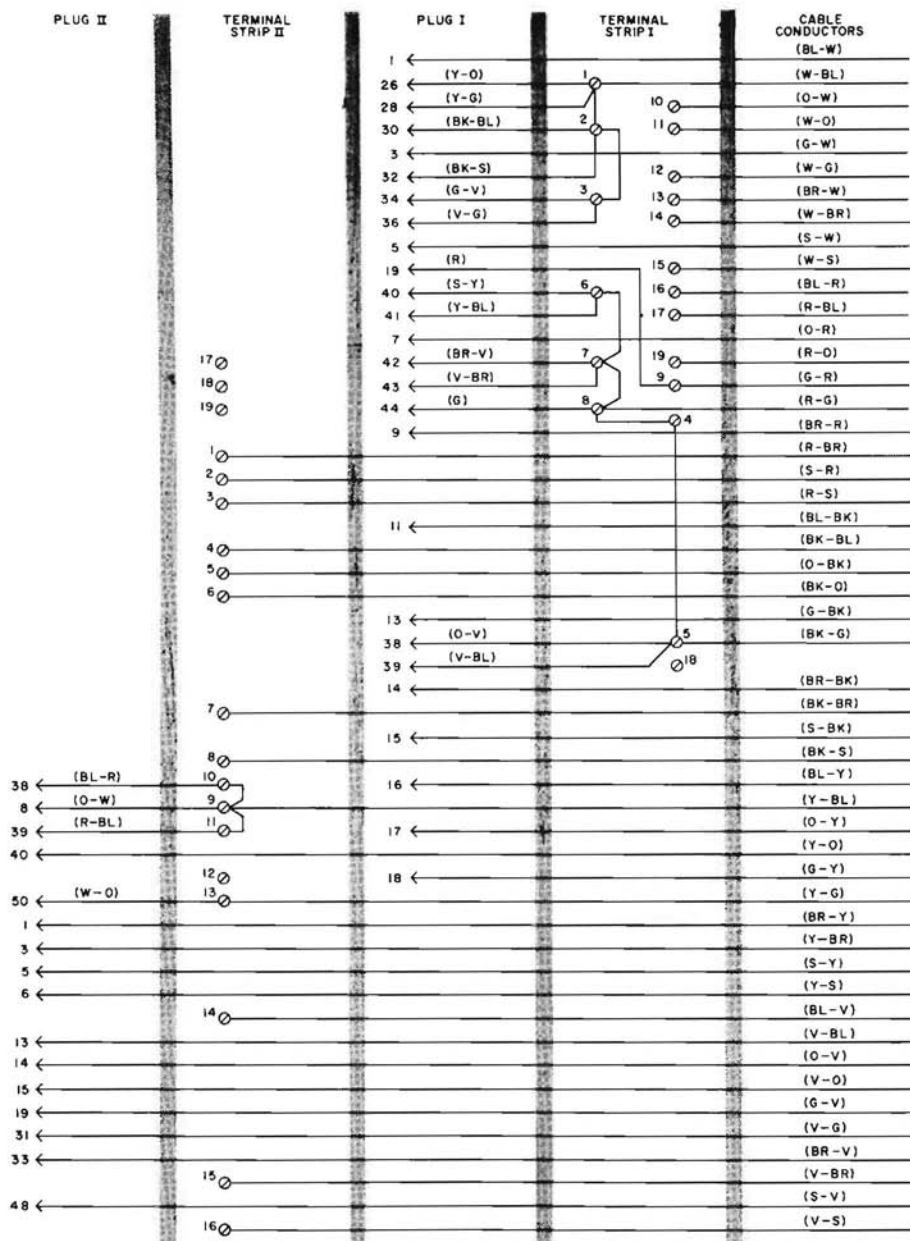


Fig. 8—A25E Connector Cable, Connections

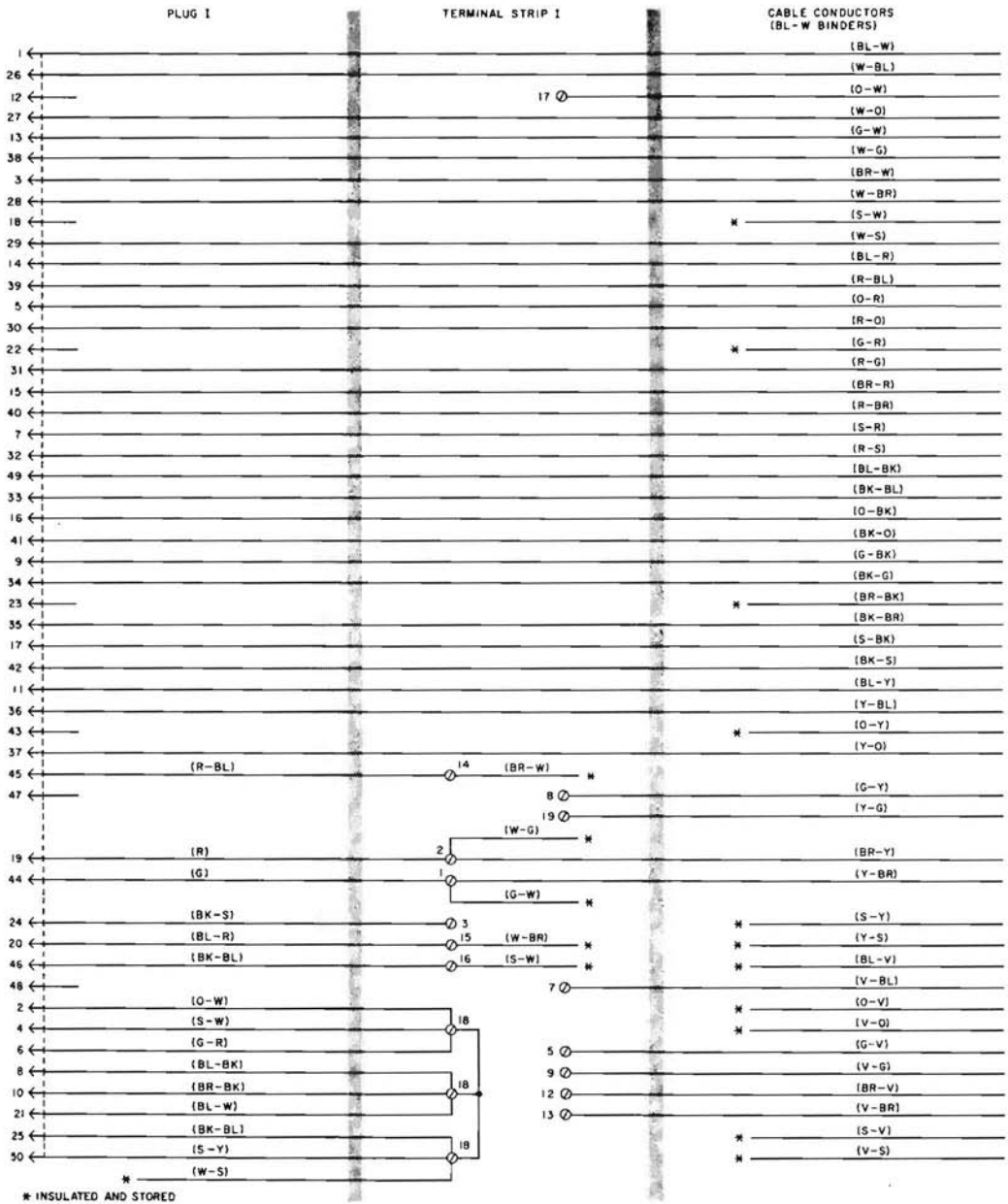


Fig. 9—A50D (BL-W Binder) Connector Cable, Connections (Sheet 1 of 2)

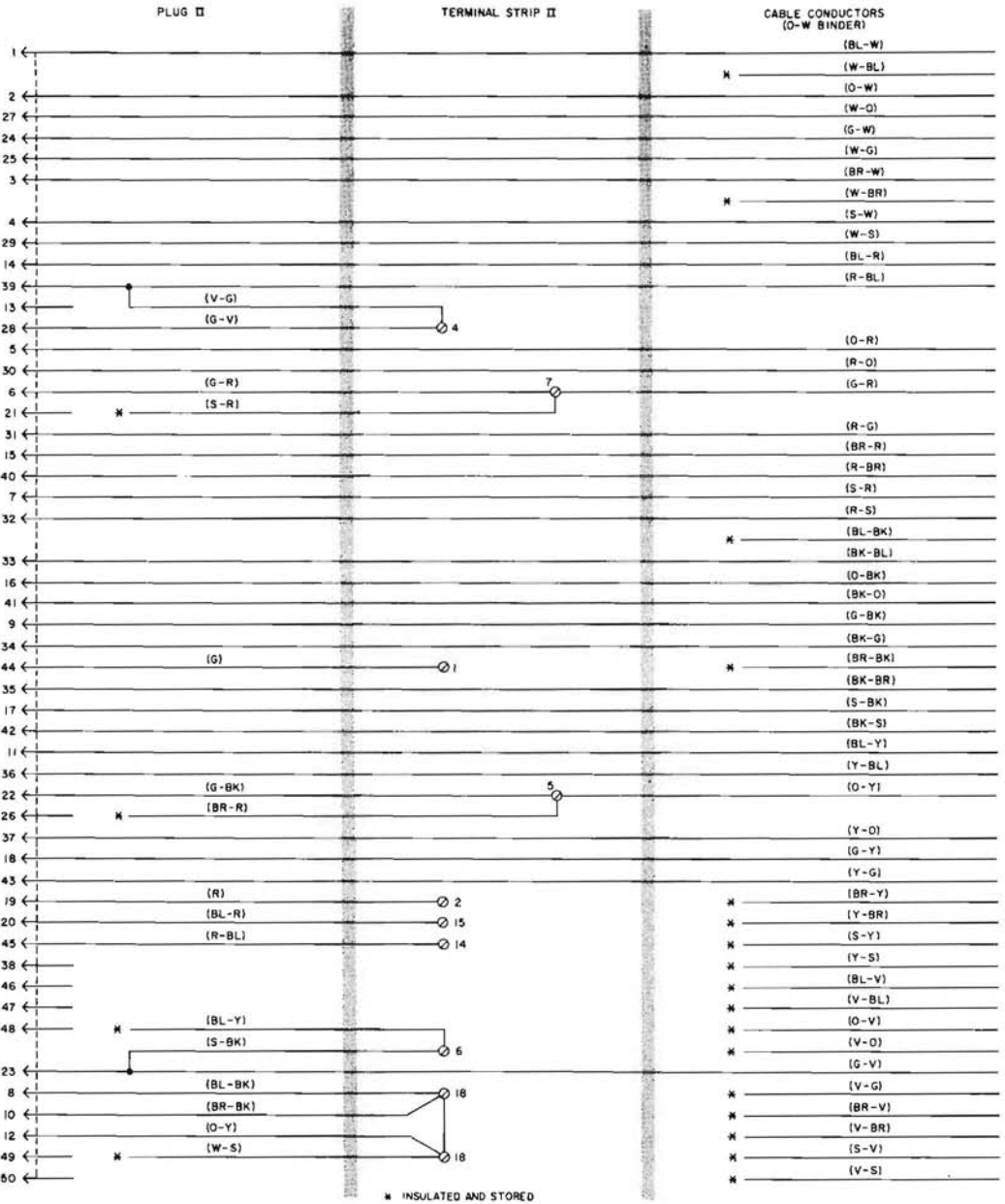


Fig. 9—A50D (O-W Binder) Connector Cable, Connections (Sheet 2 of 2)

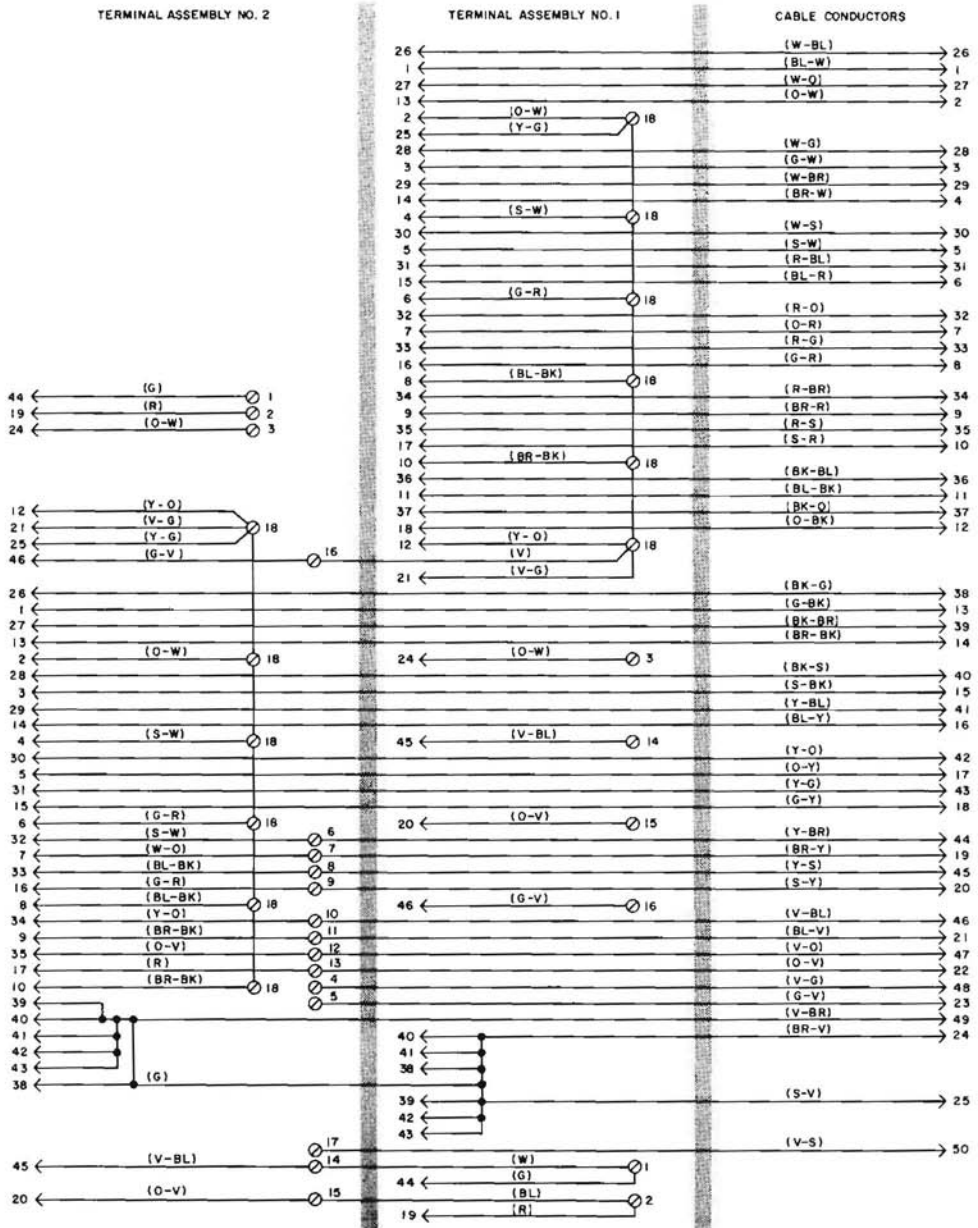


Fig. 10—B25C Connector Cable, Connections

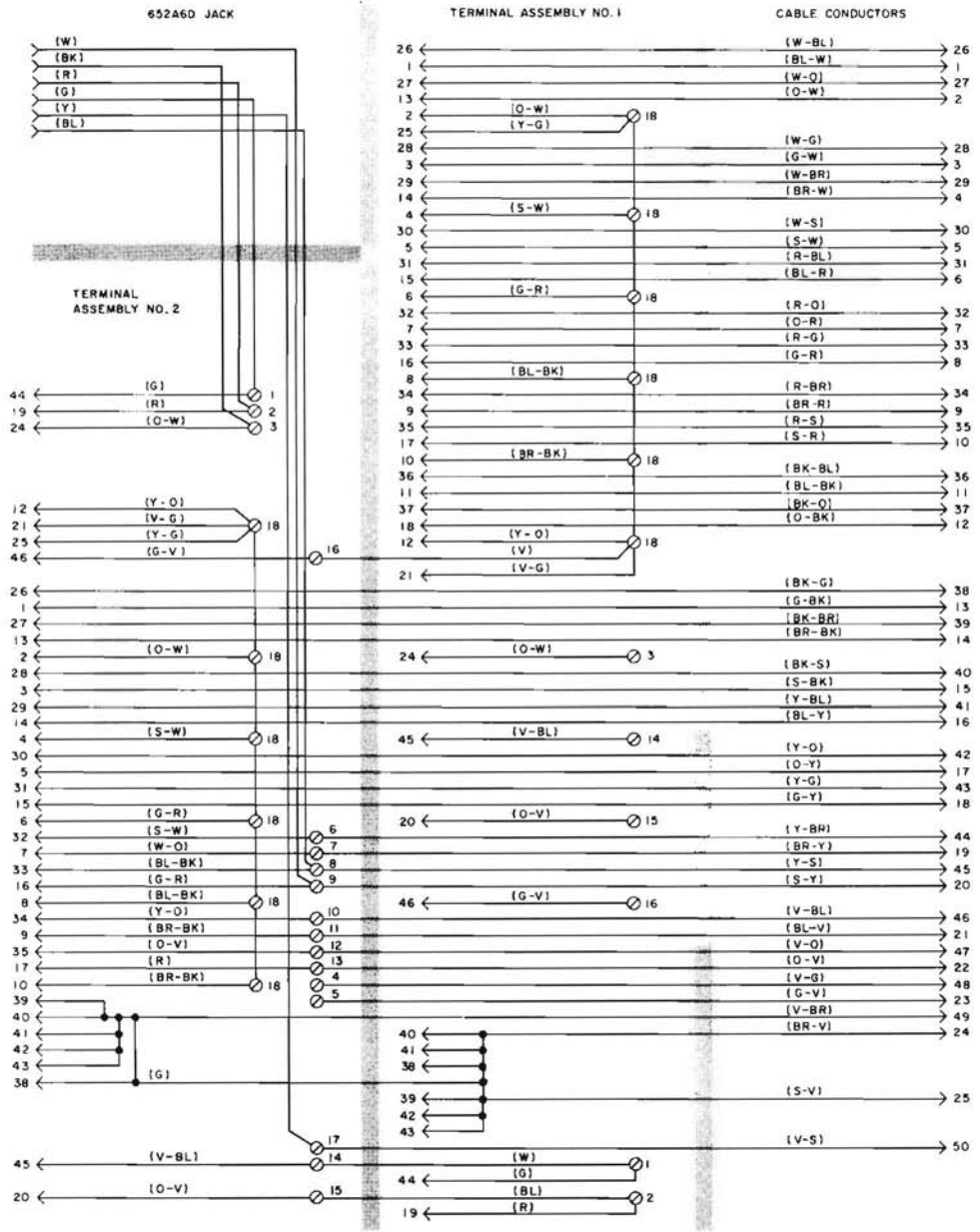


Fig. 11—B25G Connector Cable, Connections



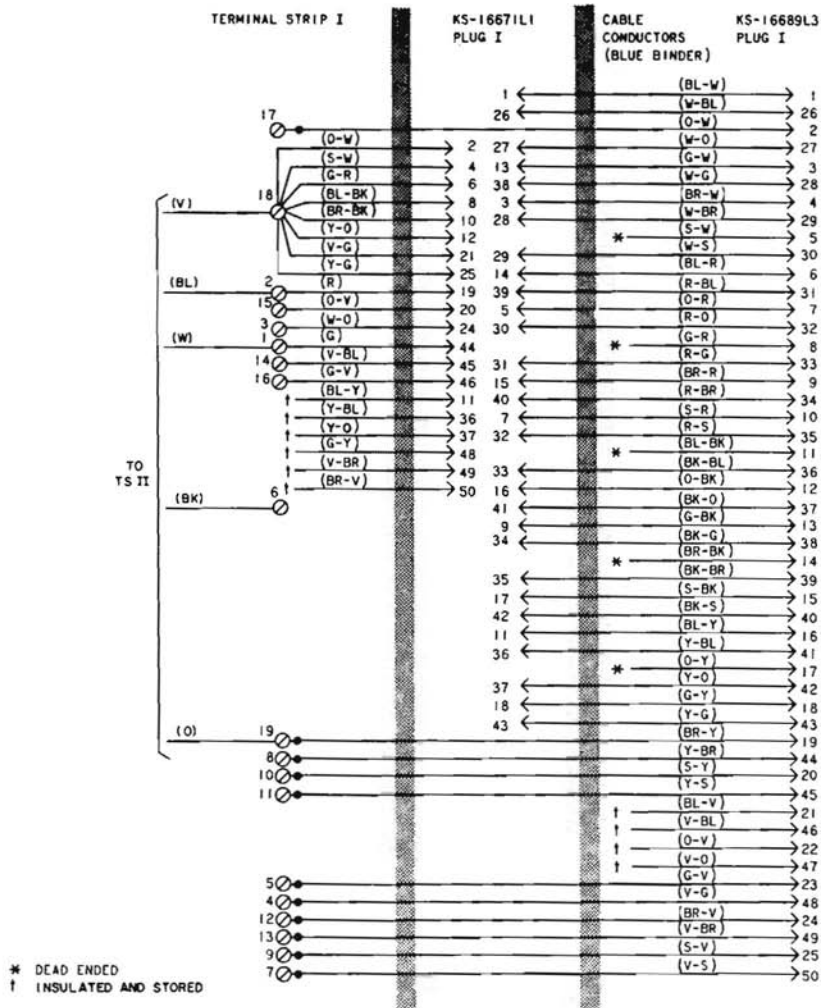


Fig. 12—B50B (BL Binder) Connector Cable, Connections (Sheet 1 of 2)

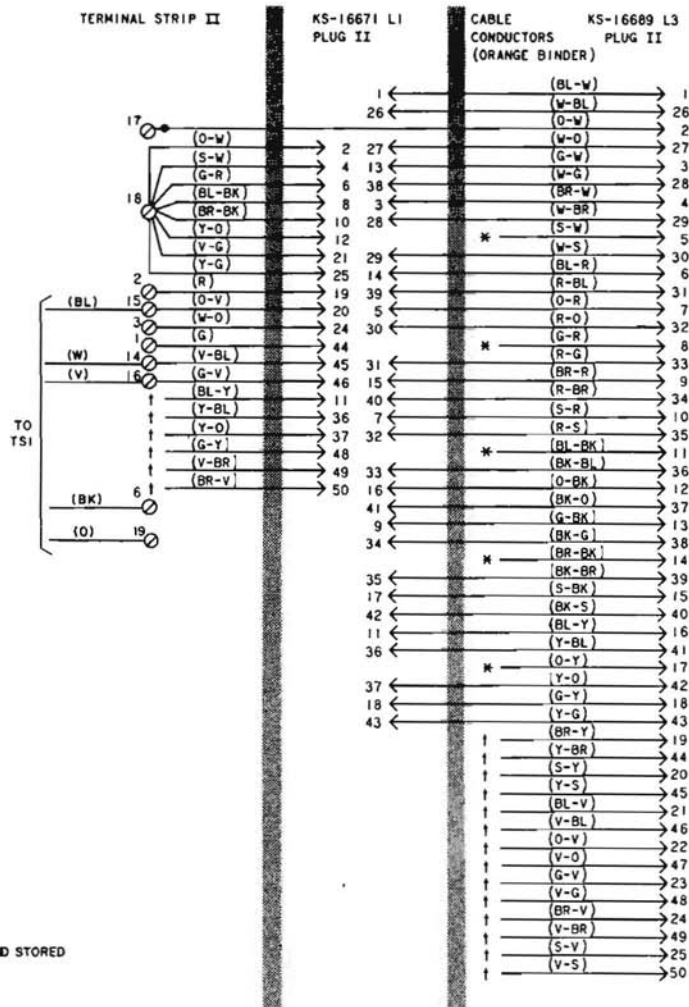


Fig. 12—B50B (0 Binder) Connector Cable, Connections (Sheet 2 of 2)

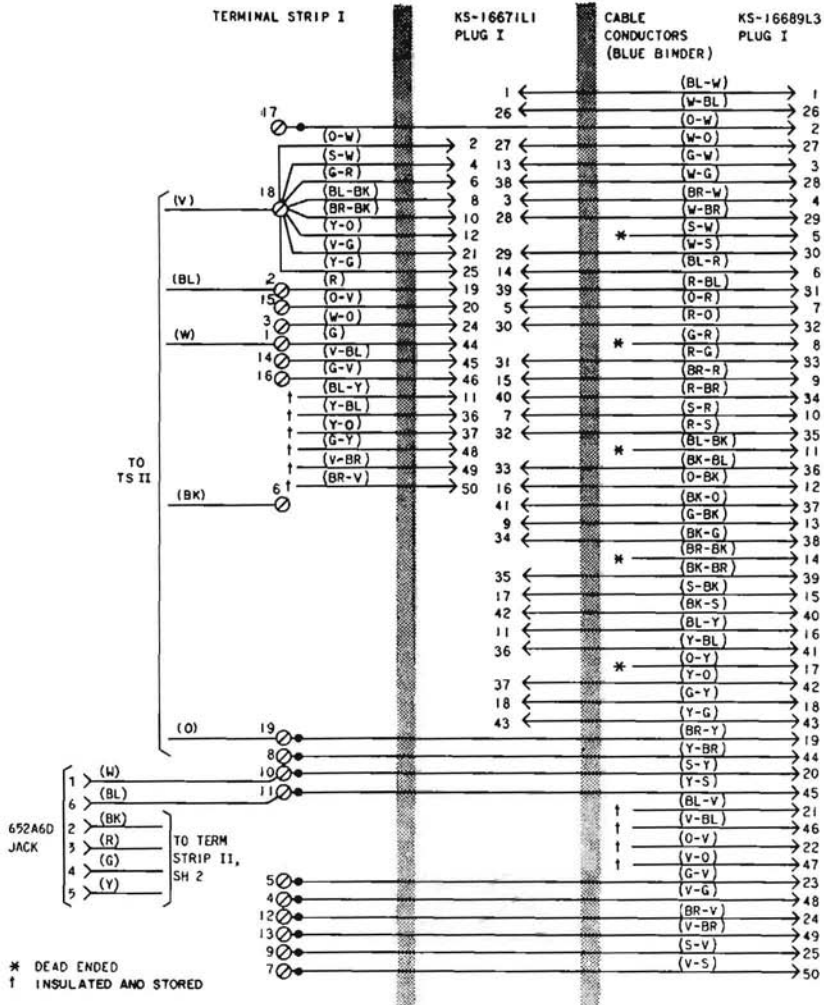


Fig. 13—ØB50C (BL Binder) Connector Cable, Connections (Sheet 1 of 2)Ⓢ

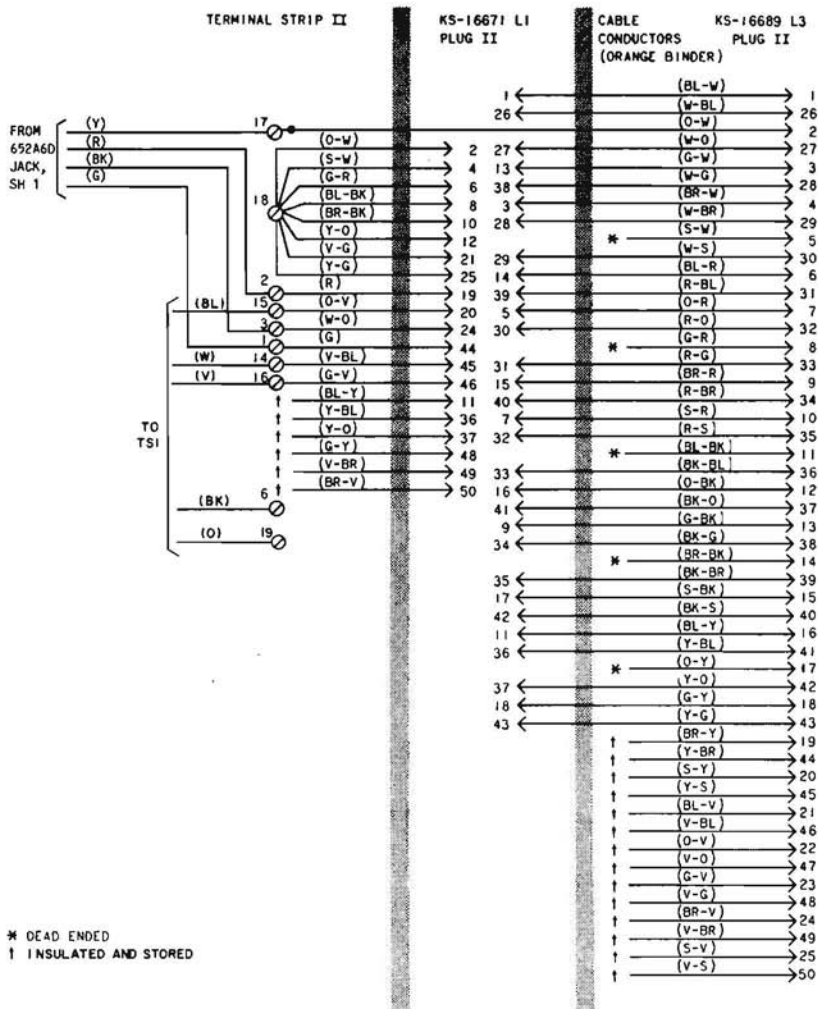


Fig. 13—B50C (0 Binder) Connector Cable, Connections (Sheet 2 of 2)

## ADAPTERS

### FOR USE WITH CONNECTOR CABLES

#### 1. GENERAL

1.001 This addendum supplements Section 461-200-102, Issue 6. Place this pink sheet ahead of Page 1 of the section.

1.002 This addendum is issued to add information on the 153AM3 and 153BM3 adapters.

#### 2. CHANGES TO SECTION

2.001 On Page 8, following the last bullet under the heading 153AM2 and 153BM2 Adapters (Fig. 13), add the following:

##### 153AM3 and 153BM3 Adapters

- The 153AM3 adapter consists of a KS-16689,L31 miniature ribbon plug (male) with a 652B6 modular jack fitted at one end.
- The 153BM3 adapter consists of a KS-16690,L23 miniature ribbon receptacle (female) with a 652B6 modular jack fitted at one end.
- The 153AM3 and 153BM3 adapters are the same as the 153AM1 and 153BM1, respectively, except the plug and receptacle are equipped with solderless (insulation piercing) terminals,

allowing internal wiring changes to be made in the field.

- As supplied from the factory, wiring is the same as the 153AM1 and 153BM1 (Fig. 13).

When wiring changes are required in the field, remove wire from terminal by lifting with a rolling motion, using long-nose pliers as shown in Fig. 13.1 ***Do not pull the wire parallel to the slot as this may damage the terminal so that it cannot be reused.*** Cut off the used portion of the wire and reterminate using a KS-21872 hand-connecting tool as follows:

- (1) Place the pawl of the tool in the Type I position (parallel to the handle).
- (2) Partially insert the wire into the terminal using a KS-6320 orange stick or equivalent.
- (3) Position the tool at the front (contact) side of the connector. Hold the tool so that the blade presses the wire into the terminal while the anvil supports the opposite surface. Squeeze the handles until the wire is fully seated.

2.002 Add new Fig. 13.1.

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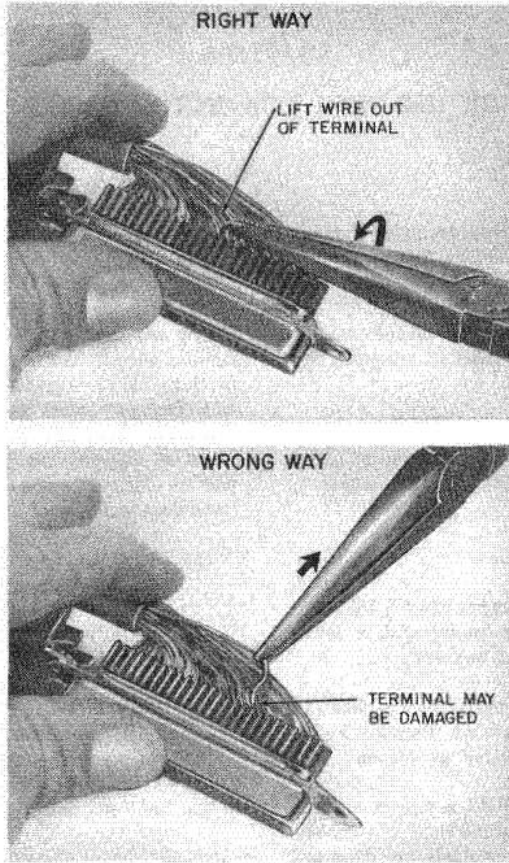


Fig. 13.1—Removing Terminated Wire

## ADAPTERS FOR USE WITH CONNECTOR CABLES

### 1. GENERAL

1.01 This section provides the purpose, design features, schematics, application, and conversion of the following adapters:

- 148A (MD) and B
- 149A (MD) and B
- 153-type
- 258A
- 259A and B
- KS-19252, List 1; List 2, List 3, List 4, and List 5 3-way bridging types.

1.02 This section is reissued to:

- Provide information on the 153AM2 and 153BM2 adapters
- Change Fig. 13 to show the 153AM2 and 153BM2 adapters.

### 2. IDENTIFICATION

#### PURPOSE

- 148-, 149-, 153-, and KS-19252 type adapters connect plug-ended telephone sets to speakerphone equipment, externally mounted lamps and buzzers, and other auxiliary services.
- 153-type adapters are used to avoid cutting off connector cable ends when a multibutton telephone station is "downgraded" to single- or 2-line service.
- 258- and 259-type adapters are intended primarily for connecting Multibutton Electronic

Telephone Sets (METS) to existing 25-pair connector cables.

- KS-19252 type adapters permit multiplying of plug-ended telephone sets with A25B or B25A connector cables.

#### ORDERING GUIDE

- Adapter, 148A-49 (MD) or 148B-49 (MD) or 148B-87
- Adapter, 149A-49 (MD) or 149B-49
- Adapter, 153A, 153B, 153C, 153D, 153AM1, 153BM1, 153AM2 and 153BM2
- Adapter, 258A
- Adapter, 259A or 259B
- Adapter, Bridging, KS-19252 L1-49, L2-49, L3-49, L4-49, or L5-49.

#### DESIGN FEATURES

##### 148A (MD) and 148B Adapters (Fig. 1)

- Consist of a 3-foot length of 39-conductor cord, terminated at one end in a Y-form molded sleeve attached to a 50-contact KS-16689,L2 plug and a KS-16690,L3 receptacle.
- Loose spade-tipped leads at the free end of the cord are arranged for connection to 44-type connecting blocks, including stayhook for anchoring.
- Pins 1 through 20 and 26 through 45 of the 50-contact plug are interwired by strapping to corresponding pins of the 50-contact receptacle through the Y arm of the cord (Fig. 2).

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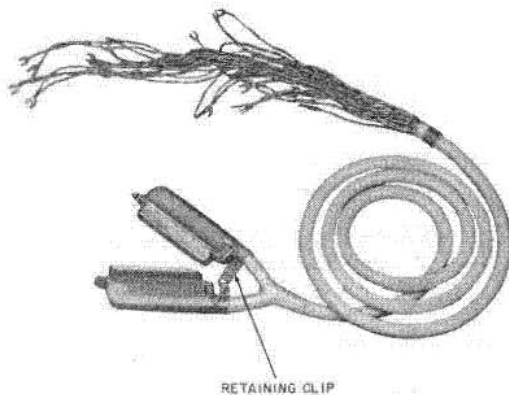


Fig. 1—148A (MD) or 148B Adapter

- The 19 electrically bridged leads have spade-tip insulators to prevent accidental short-circuiting when not terminated beneath connecting block screws.



**Do not use long-nose pliers to pull off insulators. Insulators should be cut and carefully removed with electrical scissors or diagonal pliers.**

- Connectors are held together by a retaining clip (Fig. 1) for protection during shipment.
- The 148B adapter is identical to the 148A (MD) adapter, except that the cordage incorporates the even-count color code. The 148B-87 adapter has replaced the 148B-49 (MD) adapter. The 148B-87 is identical to the 148B-49 (MD) except the 148B-87 is equipped with a satin-silver cord.

#### 149A (MD) Adapter

- Has a removable polystyrene cover (Fig. 3).
- Two holes in the base provide a means for mounting.
- Consists of terminal block (Fig. 4), one KS-16671,L1 plug, and one KS-16672,L1 receptacle assembled on a metal base.

- Provides a locking screw assembly to secure telephone set mounting cord plug and cable receptacle to the adapter.
- The plug and receptacle are wired as shown in Fig. 5. Terminal strip A is wired to pins of the receptacle, and terminal strip B is wired to pins of the plug.



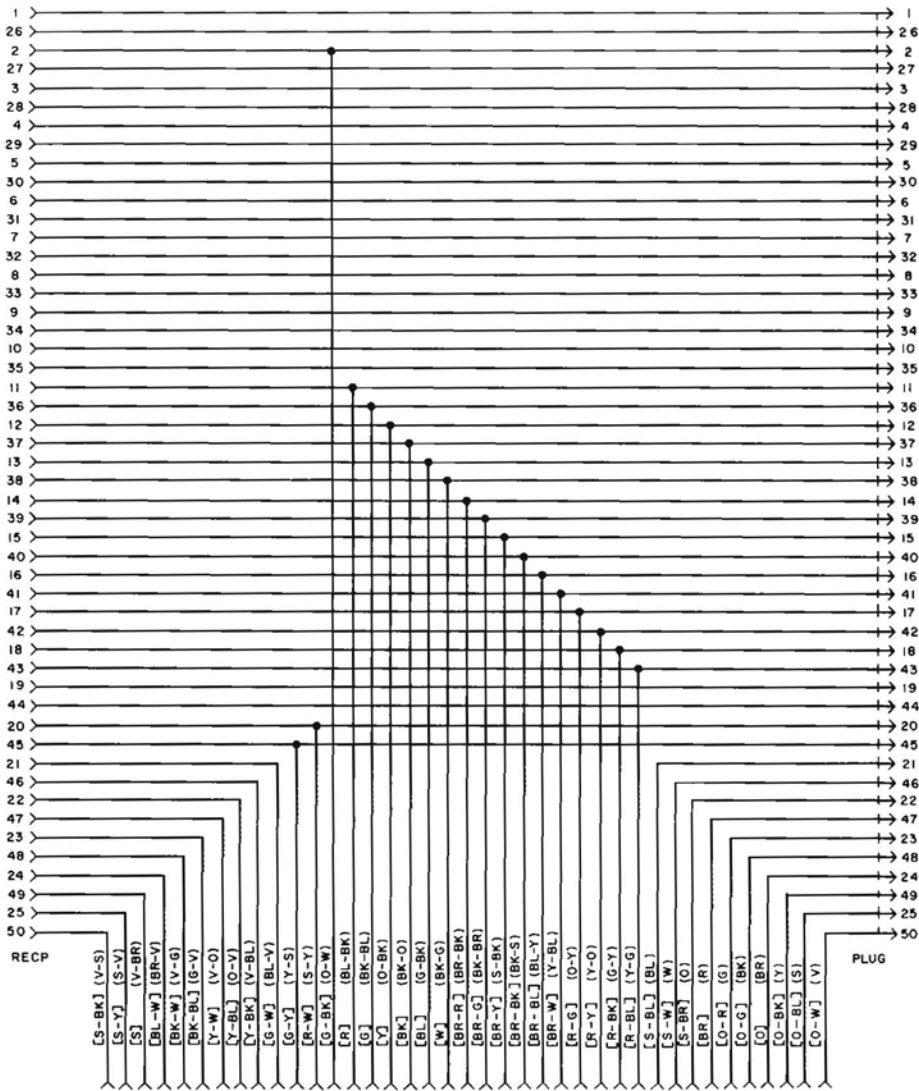
**Since pins 20, 23 through 25, 45, 48 through 50 are not common between plug and receptacle, it may be necessary to strap these leads through on the face of the terminal strip when features in the set use these leads. An example could be the common ringer leads.**

- The wiring diagram is attached to the inside of the cover assembly.

#### 149B Adapter

- Has a removable high-impact polystyrene cover (Fig. 6).
- Is similar to the 149A (MD) adapter except that wiring has been replaced by printed wiring, and the receptacle and plug are mounted on the face of the printed wiring board assembly (Fig. 7).
- Printed wiring board is mounted to a phenolic baseplate.
- Two holes in the baseplate and wiring board provide means for mounting the adapter.
- A reversible locking fixture attached to the inside of the cover (Fig. 6) secures an external plug (KS-16689,L1 plug-ended cord) to the KS-16672,L13 receptacle.
- The external receptacle (KS-16690,L1 receptacle on an A25B connector cable) is secured to the KS-16671,L10 plug by the inside surface of the cover assembly.
- When the cover assembly is put into position, both receptacles and plugs are secured.
- The wiring diagram (Fig. 5) is also molded into the inner surface of the cover assembly (Fig. 6).





[ ] INDICATES MD COLOR CODE - 148A ADAPTER  
 ( ) INDICATES CURRENT COLOR CODE - 148B ADAPTER

Fig. 2—148A (MD) or 148B Adapter, Schematic

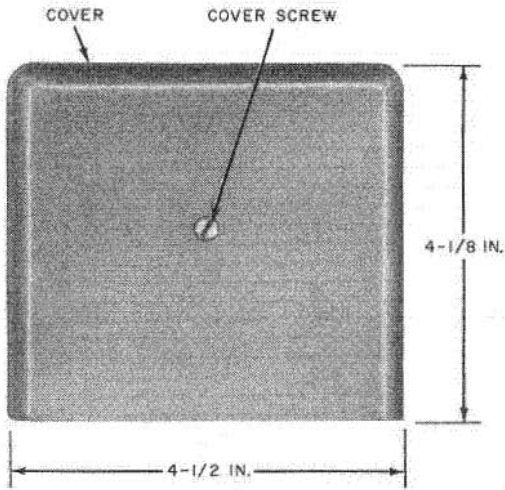


Fig. 3—149A (MD) Adapter Cover (Front View)

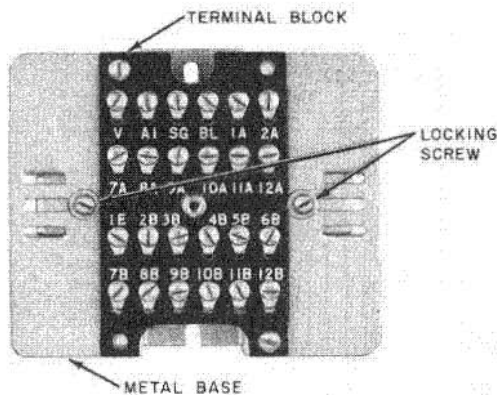


Fig. 4—149A (MD) Adapter, Cover Removed

153A and 153B Adapters (Fig. 8)

- 153A adapter consists of a KS-16689,L6 plug with a terminal block fitted to the back of plug body (Fig. 9).
- 153B adapter consists of a KS-16690,L4 receptacle with a terminal block fitted to the back of the receptacle body.

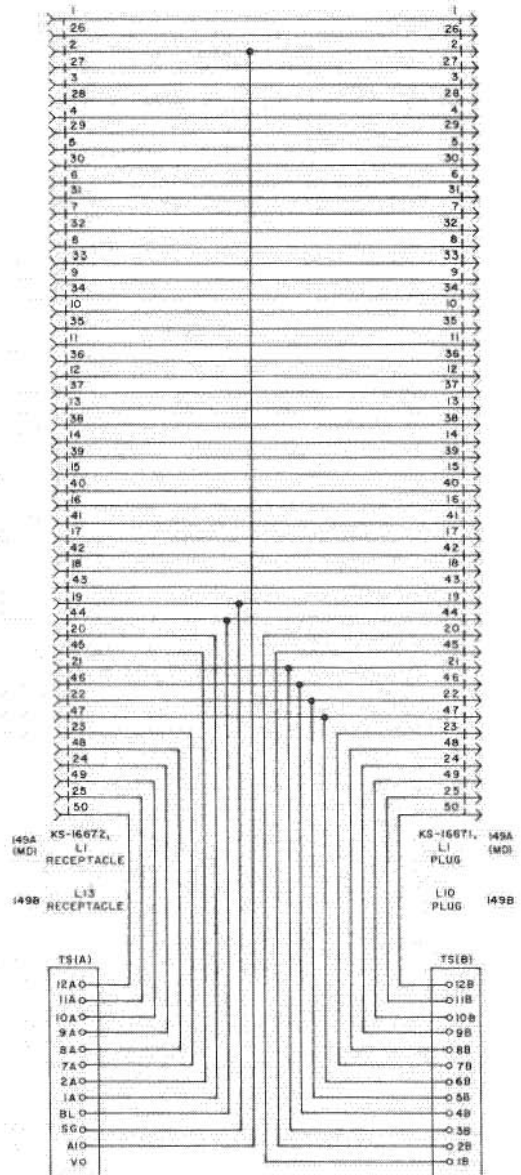


Fig. 5—149A (MD) and 149B Adapter, Schematic

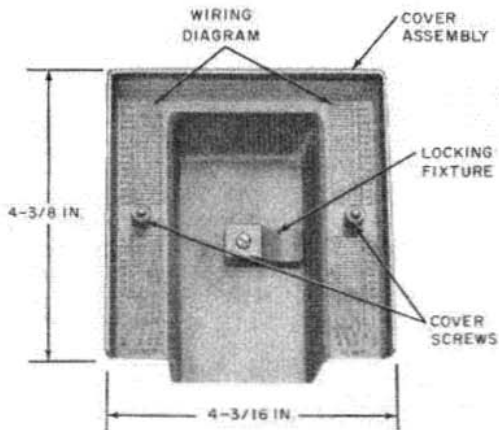


Fig. 6—149B Adapter, Inside Cover

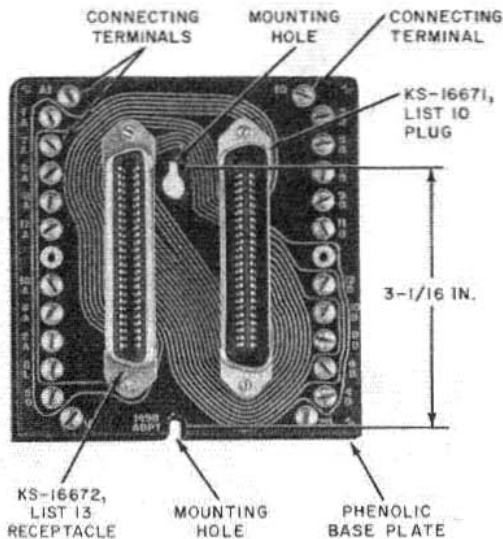


Fig. 7—149B Adapter, Printed Wiring Board Assembly

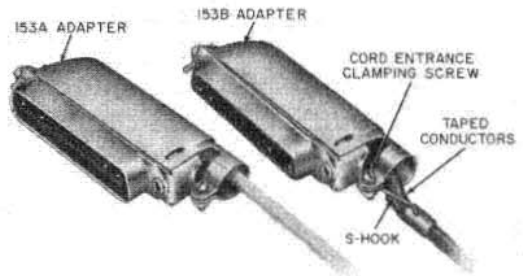


Fig. 8—153A and 153B Adapters

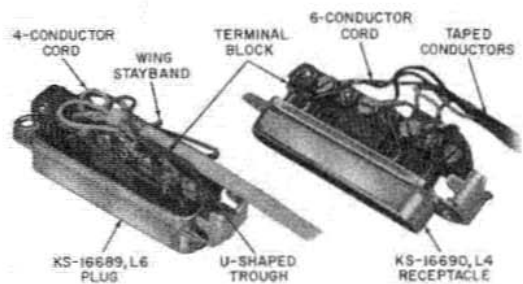


Fig. 9—153A and 153B Adapters, Hood Removed

- The terminal block has eight screw-type terminals wired to terminals of the plug or receptacle. (See Table A.)
- A U-shaped trough on top and at cord entrance end of the terminal block assembly (Fig. 9) serves to retain the wing-type stay-band of cords so equipped.
- The hood has a cord-entrance clamping screw which is used to restrain S-hook terminated cords (Fig. 8), and cords of this design should have the conductors taped about 1-1/2 inches to improve appearance and protection (Fig. 8).
- A removable metal hood (Fig. 10) with a pressed-board liner contains and protects spade-tipped cord leads or wire conductors terminated beneath the screw terminals. If the liner is of early production design and has an opening in the top portion, a piece

TABLE A  
153-TYPE ADAPTER (FACTORY WIRED)

ADAPTER	SCREW TERM. DESIG.	KS-PLUG OR RECP CONTACT	EQUIV. CABLE PAIR NUMBER
153 A&B	1R 1T	1 26	1
	2R 2T	4 29	4
	R B	20 45	20
	X1 X2	25 50	25
153 C&D	1R 1T	1 26	1
	A1 A	2 27	2
	2R 2T	4 29	4
	A1 A	5 30	5

of vinyl tape placed over this opening will provide insulation between conductors and hood.

**Caution:** To avoid damage to the wiring or insulation while assembling the adapter, lower the hood over the block approximately 1/4-inch from the assembled position and slide hood to the rear to engage holding tabs. Secure with hood anchoring screw. When removing hood, reverse procedure.

- The hood anchoring screw holds the hood in place. It in turn fastens into a threaded insert of a mating receptacle or plug to hold the two elements together.
- Early production 153A and B adapters had spare contact springs in the plug and receptacle. These unused contacts have been removed on later production adapters.
- Cords with up to ten conductors (Fig. 9 and 11) may be used with the 153-type

adapter. Only eight spade tips can be terminated. Insulate and store extra spade tips. Due to limited space, use KS-19147, L1 cord tip insulator (Fig. 11).



*In connecting leads to terminal screws, dress spade tips to prevent crosses between terminals. Care should be taken to permit possible contact of spade tips with only one wing of stayband on cord. Spade tips should not touch any exposed factory wiring, other spade tips, or metal part of the connector or plug.*

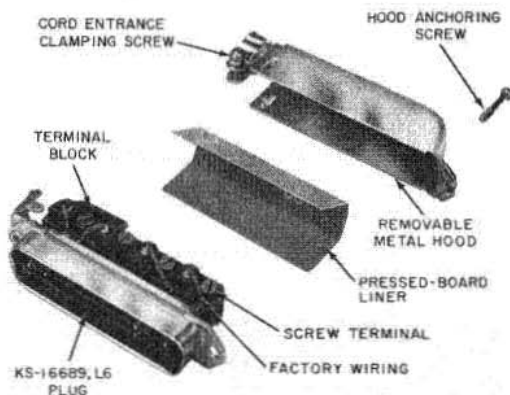


Fig. 10—153A Adapter

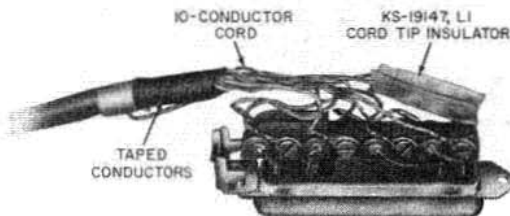
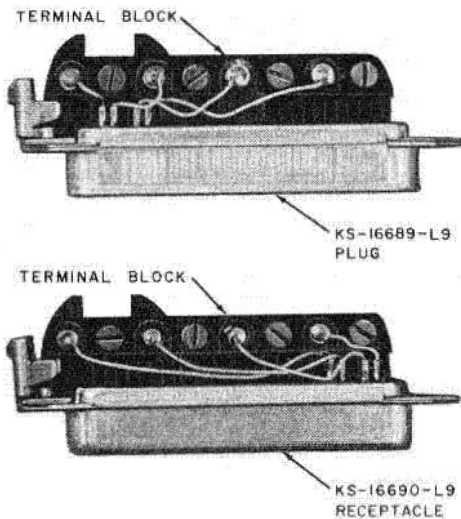


Fig. 11—10-Conductor Cord in 153-Type Adapter

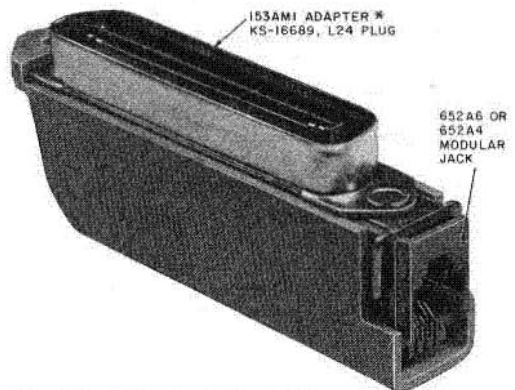
**153C and 153D Adapters (Fig. 12)**

- Physically, the 153C and D adapters are the same as the 153A and B adapters and differ only in the electrical connections.
- The 153C adapter consists of a KS-16689,L9 plug and a terminal block which has screw terminals electrically connected to pins 1, 26, 2, 27, 4, 29, 5, and 30.
- The 153D adapter consists of a KS-16690,L9 receptacle and a terminal block electrically connected to the same pins as the 153C adapter.
- Connection information for the 153C and D adapters is covered in Table A.

**Fig. 12—153C and 153D Adapters****153AM1 and 153BM1 Adapters (Fig. 13)**

- The 153AM1 adapter consists of a KS-16689,L24 miniature ribbon plug with a 652A6 modular jack fitted to one end.

- The 153BM1 adapter consists of a KS-16690,L15 miniature ribbon receptacle (female) with a 652A6 modular jack fitted to one end.
- In both adapters, the six leads of the 652A6 jack are factory-wired to six terminals on the plug or receptacle to provide the required line service. Connection information is shown in the table in Fig. 13.
- The hood can be removed from the adapter for access to the internal wiring.
- The modular mounting cord of the associated telephone set is attached to the adapter by plugging it into the 652A6 jack.



- \* 153BM1 ADAPTER KS-16690, L15 RECEPTACLE
- 153AM2 ADAPTER KS-16689, L28 PLUG
- 153BM2 ADAPTER KS-16690, L20 RECEPTACLE

**INTERNAL FACTORY WIRING**

JACK LEAD	PLUG OR CONNECTOR PIN	DESIGNATION
RED	1	IR
GREEN	26	IT
YELLOW	2	AI
BLACK	27	A
WHITE	25	X1
BLUE	50	X2

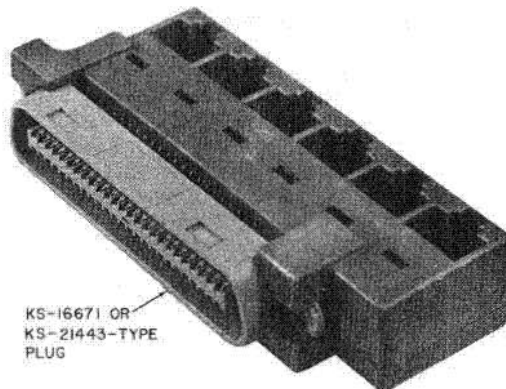
**NOTE:**

THE 153AM2 AND 153BM2 ADAPTER HAS FOUR CONDUCTORS, WHICH ARE THE RED, GREEN, YELLOW AND BLACK LEADS.

**Fig. 13—153AM1, 153BM1, 153AM2, and 153BM2 Adapters**

### 153AM2 and 153BM2 Adapters (Fig. 13)

- The 153AM2 adapter consists of a KS-16689, L28 miniature ribbon plug (male) with a 652A4 modular jack fitted to one end.
- The 153BM2 adapter consists of a KS-16690, L20 miniature ribbon receptacle (female) with a 652A4 modular jack fitted at one end.
- In both adapters, the four leads of the 652A4 jack are factory-wired to four terminals on the plug or receptacle to provide the required line service. Connection information is shown in the table in Fig. 13.
- The hood can be removed from the adapter for access to the internal wiring.
- The modular mounting cord of the associated telephone set is attached to the adapter by plugging it into the 652A4 jack.



### 258A Adapter (Fig. 14)

- Consists of a block with six 8-conductor modular jacks fitted to a KS-16671 or KS-21443 50-pin miniature ribbon plug.
- The jack leads are factory-wired to the plug terminals as shown in Fig. 14.
- A MET (Multibutton Electronic Set) with an 8-conductor modular mounting cord can be plugged into each jack. Standard telephones with 4-conductor modular cords can also be plugged into the jacks when the adapter is used in a nonelectronic system.
- The adapter can be plugged into a 25-pair connector cable or a 66E-type block.

INTERNAL FACTORY WIRING

JACK LEAD	PLUG PIN						DESIGNATION
	1	2	3	4	5	6	
W-BL	26	30	34	38	42	46	TALK TIP (TT)
BL	1	5	9	13	17	21	TALK RING (TR)
W	27	31	35	39	43	47	DATA BUTTON TIP (BT)
Y	2	6	10	14	18	22	DATA BUTTON RING (BR)
R	28	32	36	40	44	48	AUXILIARY TIP (AT)
BK	3	7	11	15	19	23	AUXILIARY RING (AR)
W-BR	29	33	37	41	45	49	DATA LAMP TIP (LT)
BR	4	8	12	16	20	24	DATA LAMP RING (LR)

Fig. 14—258A Adapter

### 259A and 259B Adapters (Fig. 15)

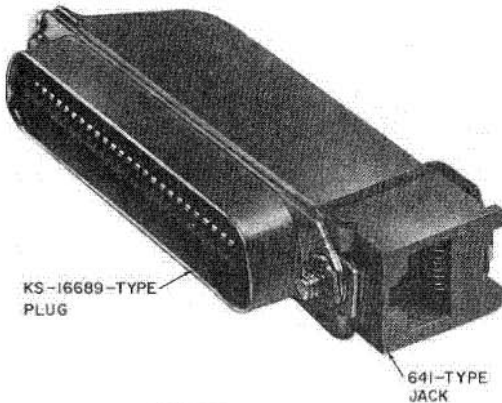
- Both adapters consist of a KS-16689 50-pin miniature ribbon plug with a 641A modular jack fitted to one end.
- The jack leads are factory-wired to the plug terminals as shown in Fig. 15. The 259A is wired to pick up the first 4-pair line in a 25-pair cable. The 259B is wired to pick up the second 4-pair line.

- A MET with an 8-conductor modular mounting cord can be plugged into the jack. If the adapter is used in a nonelectronic system, a standard modular telephone with a 4-conductor cord can be plugged into the jack.

- The adapter can be plugged into a 25-pair connector cable or a 66E-type block.

### KS-19252 Type 3-Way Bridging Adapters

- Each adapter consists of a removable cover with spacer inserts and a base section containing interwired (bridged) 50-contact plug(s) and/or receptacle(s). The inserts may be removed and stored to accommodate



INTERNAL FACTORY WIRING

JACK LEAD	PLUG PIN		DESIGNATION
	259A	259B	
W-BL	26	30	TALK TIP (TT)
BL	1	5	TALK RING (TR)
W	27	31	DATA BUTTON TIP (BT)
Y	2	6	DATA BUTTON RING (BR)
R	28	32	AUXILIARY TIP (AT)
BK	3	7	AUXILIARY RING (AR)
W-BR	29	33	DATA LAMP TIP (LT)
BR	4	8	DATA LAMP RING (LR)

Fig. 15—259A or 259B Adapter

deep-hood plugs. The plugs and/or receptacles are wired standard point-to-point (except List 5, Fig. 21) at the factory and cannot be changed. (Refer to Table B.)

- The KS-19252,L1 is arranged for use with an A25B connector cable and two plug-ended

sets (Fig. 17). It can be converted for use with an A25B and B25A connector cable plus a plug-ended set by pulling two inserts and storing. Normally, in early models, the receptacles were positioned high enough to handle low-hood KS-16689,L1 plugs furnished on cords of telephone sets (Fig. 16 and 17).

- Field conversion of early models permits either or both of the two receptacles to be lowered sufficiently to receive the high-hood KS-16689,L3 plug of B25A (extension-type) connector cables.

## APPLICATION

## 148A (MD) and 148B Adapters

- Used with plug-ended key telephone sets.

## 149A (MD) and 149B Adapters

- Connect a D30B- or D50B-type cord to the KS-16672,L13 receptacle
- Connect an A25B connector cable to the KS-16671,L10 plug
- Used with 6-button telephone sets equipped with plug-ended mounting cord
- Used where external features are provided in addition to key telephone set features.

## 153-Type Adapter

- Connects nonkey telephone sets to cabling systems involving A25B or B25A connector cables.

TABLE B

## 3-WAY BRIDGING ADAPTERS

ADAPTER		COMPONENT ARRANGEMENT
LIST NO.	INSERT POSITION	
KS-19252, L1	A and C	Receptacle Plug Receptacle
KS-19252, L2	B	Plug Receptacle Plug
KS-19252, L3	Storage	Plug Plug Plug
KS-19252, L4	Storage	Receptacle Receptacle Receptacle
KS-19252, L5	Storage	Plug Receptacle Plug



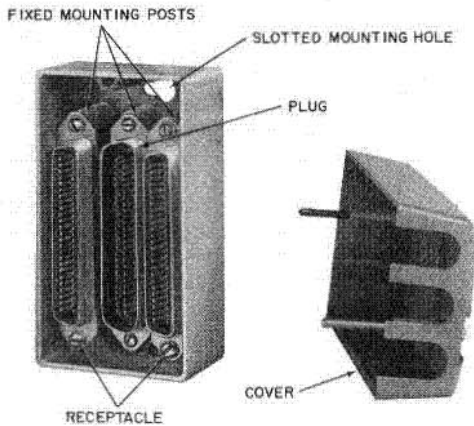


Fig. 16—KS-19252 Bridging Adapter, Nonconvertible

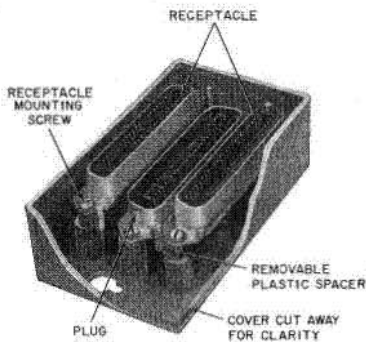


Fig. 17—KS-19252, List 1 Adapter Before Conversion (Early Model)

### 258A, 259A, and 259B Adapters

- Connect METS to cabling systems involving A25B or B25A connector cables or 66E-type blocks.

### KS-19252 Type 3-Way Bridging Adapter

- Used to multiple service provided by plug-ended A- or B-type connector cables.
- The KS-19252 L5-type adapter (Fig. 21) is used in multiple installations of 2025 data

sets to connect 830- or 2830-type telephone sets to 41A data mounting.



*Circuit backup conditions could occur when these bridging adapters are used in key telephone system cabling. This could happen especially where individual station customer services such as station busy lamp, line exclusion, control cutoff key, pushbutton and buzzer, and speakerphone services are to be furnished. It is necessary, in this case, to open the bridged telephone set in order to disconnect and individually insulate and store some of these leads.*

### 3. PROCEDURES FOR CONVERTING THE KS-19252 L1 ADAPTER

#### Adapter Using Spacers

3.01 The receptacle can be positioned deeper within the base of the adapter as follows:

- (1) Loosen receptacle mounting screws sufficiently to permit slipout of the two C-shaped plastic spacers (Fig. 17 and 18) which support the receptacle in base.
- (2) Remove spacers. Receptacle can then be depressed to its lowest mounting position to receive the B25A connector cable plug.
- (3) Place removed spacers on top of the receptacle end tabs (Fig. 19) and tighten receptacle mounting screws.

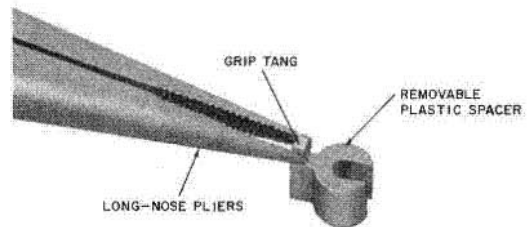


Fig. 18—Spacer



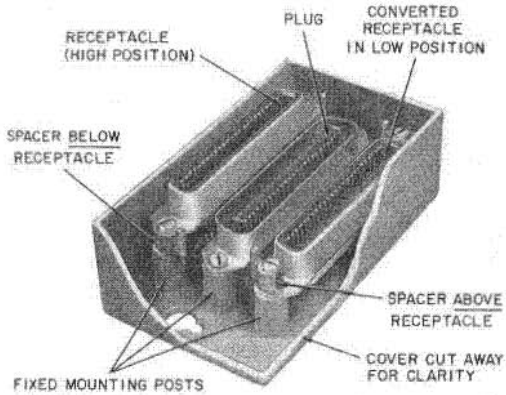


Fig. 19—KS-19252, List 1 Adapter After Conversion  
(Early Model)

### Adapters Using Inserts

3.02 In the current model adapters, the receptacles are stationary and inserts are placed in the cover pockets to accommodate low-hood plugs.

- (1) The List 1 (C-P-C) adapter is arranged to accommodate two low hoods and one high hood. Four inserts are used and are placed in the outside pocket positions (A and C) of the cover. See Fig. 20.
- (2) To convert a List 1 adapter to accommodate two high hoods, remove the inserts from A or C position and place in cover storage pocket.
- (3) In any assembly where a high hood is used, the inserts are not used in that receptacle position and should remain in the storage pocket.

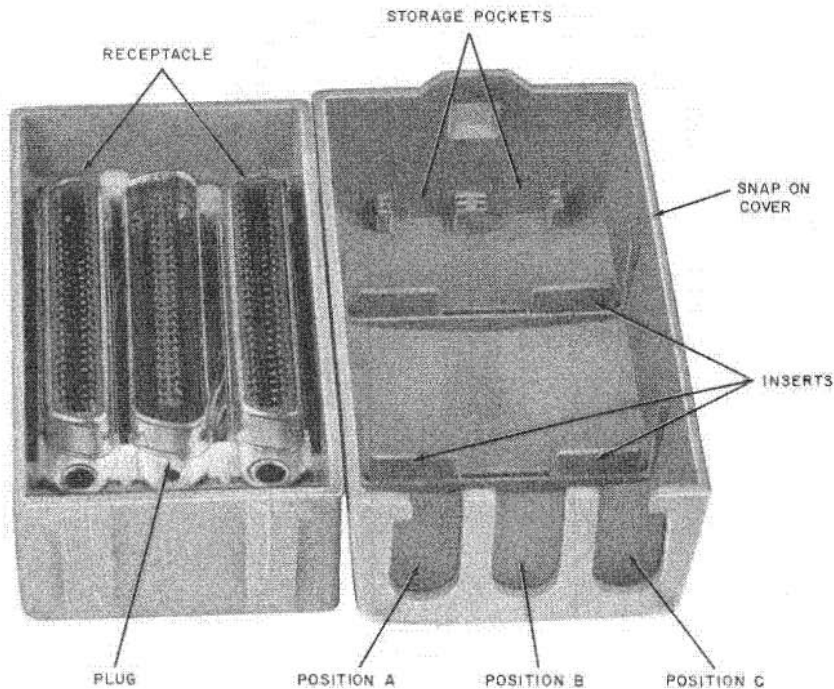


Fig. 20—KS-19252, List 1 3-Way Bridging Adapter (Current Model)

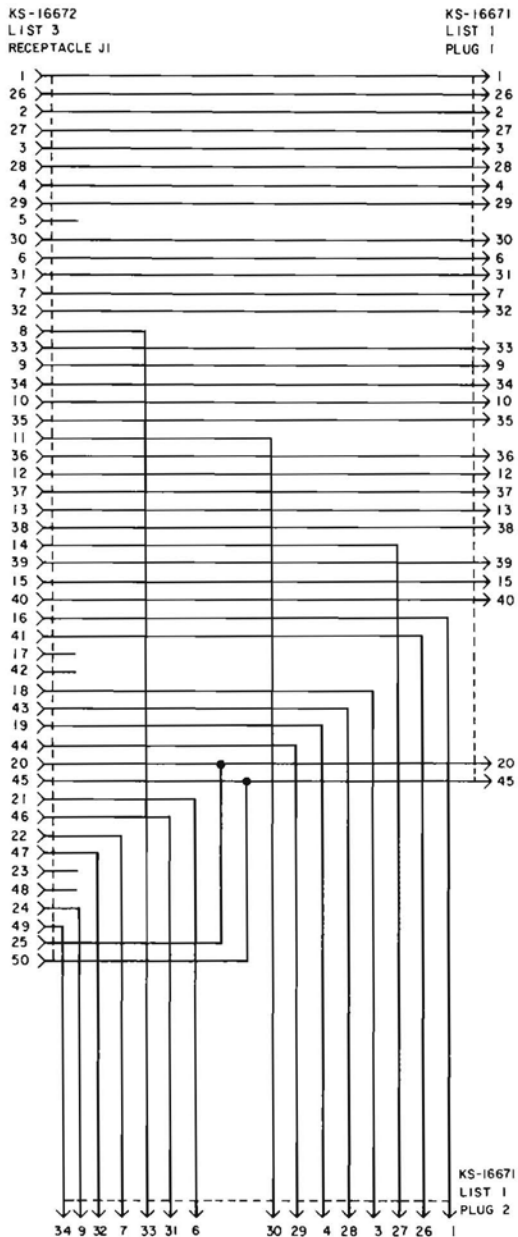


Fig. 21—KS-19252, List 5 3-Way Bridging Adapter Schematic

## CONNECTING BLOCKS

### 66-TYPE

#### TOOLS, TERMINATING, ADAPTERS, AND MAINTENANCE

##### 1. GENERAL

1.001 This addendum supplements Section 461-604-100, Issue 5. Place this pink sheet ahead of Page 1 of the section.

1.002 This addendum is issued to:

- Add an exception to the rule of not terminating 26-gauge wire on 66-type blocks
- Add information on C bridging clip
- Show 31A indicator can be used for determining line polarity.

##### 2. CHANGES TO SECTION

2.001 On Page 3, revise paragraph 3.02 as follows:

3.02 The 66-type connecting blocks will accept 20- to 24-gauge conductors: **do not terminate 26-gauge wire on 66-type blocks except where wiring is permanently terminated on 66M1-50 connecting blocks mounted on 89B brackets.** Other types of installation may result in the breakage of 26-gauge wire with minimum movement of conductors.

2.002 On Page 9, revise Part 5 as follows:

##### 5. BRIDGING CLIPS

5.01 The B (MD) and C bridging clips are spring clips used to electrically interconnect two

adjacent terminals in the same row of 66-type connecting blocks, thereby increasing the multiplying capacity of the block (Fig. 17). The B bridging clip is made of stainless steel while the C clip is made of phosphor bronze. The clips are interchangeable and can be intermixed on the same block.

5.02 No special tools are required to install or remove the clip.

2.003 On Page 10, add the following paragraph:

7.08 Current production of the 31A indicator has a label affixed to the front (designated T-R) which permits its additional use in determining line polarity. In use, the 31A indicator is inserted **momentarily** across the tip and ring terminals on 66-type blocks. If the CO/PBX battery is of proper polarity (battery on ring-ground on tip) the LED will light.

**Note:** Do not leave the indicator connected to line battery any longer than is necessary to determine polarity or damage to the diode may occur.

2.004 On Page 10, Fig. 17 is obsolete. A new Fig. 17 is provided in this addendum.

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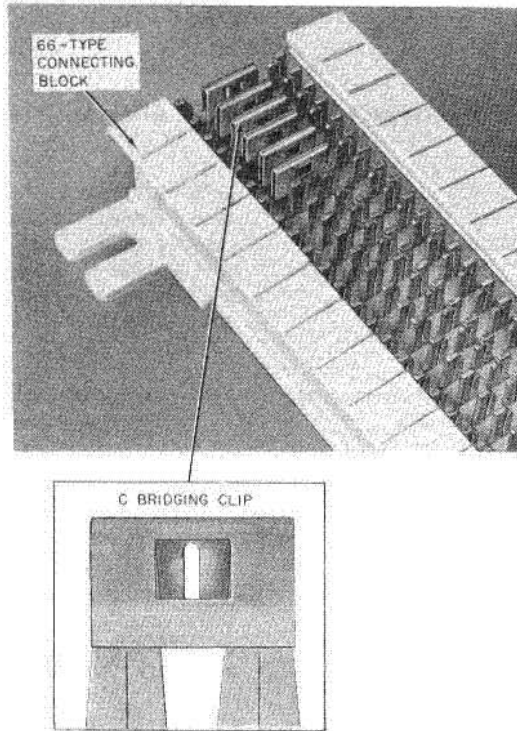


Fig. 17—C Bridging Clip, Installation Detail

## CONNECTING BLOCKS

### 66-TYPE

### TOOLS, TERMINATING, ADAPTERS, AND MAINTENANCE

#### 1. GENERAL

1.01 This section contains information on the operation, maintenance, and testing of tools and adapters used with 66-type connecting blocks.

1.02 This section is reissued to:

- Clarify information on replacement of blades in the D impact tool
- Add information on designation strips used with 66-type connecting blocks. This information was formerly contained in Section 461-600-101.

#### 2. TOOLS

2.01 The D impact tool (Fig. 1), the B impact tool (MD) (Fig. 2), and the 714B tool (Fig. 3) are used to make terminations on 66-type connecting blocks. The D impact tool is recommended for use in installations where numerous cutdowns are required. The 714B is intended for occasional or intermittent use.

**Note:** The blades for the D impact tool, the B impact tool, and the 714B tool are not interchangeable.

##### A. D Impact Tool

2.02 The D impact tool (Fig. 1) consists of a handle with a switchable dual force impact mechanism, a blade release switch, and a cavity for storing a spare blade. The handle is designed to accept three different type blades, one of which is the 8762D-66 blade designed for use with the 66-type connecting block.

2.03 The impact adjustment switch on the handle is labeled "HI" and "LO". In the "HI"

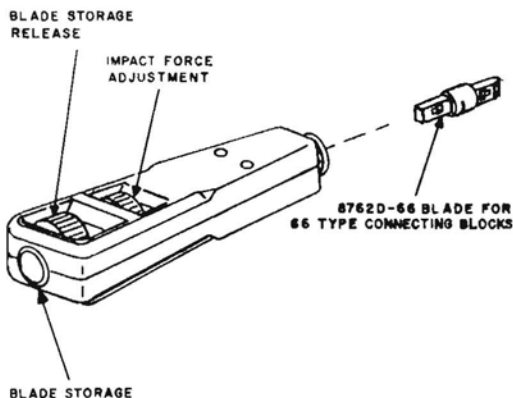


Fig. 1—D Impact Tool

position, the impact tool is set for 22 gauge or larger conductors. When set in the "LO" position, the impact tool is set for 24- or 26-gauge conductors.

2.04 One side of the plastic handle is labeled "CUT"; this identifies the cutting side of the tool.

2.05 ♦To access spare blade storage:

- (1) Hold tool with blade end up.
- (2) Rotate release wheel. Blade will drop out.
- (3) Release wheel.

2.06 To store blade:

- (1) Insert blade in hole.

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- (2) Rotate release wheel until blade drops in. Release wheel to lock.

#### 2.07 To reverse or replace blade:

- (1) Rotate blade 1/4 turn and withdraw from tool.
- (2) Insert new or reversed blade fully into tool, then rotate 1/4 turn to lock. ♦

#### B. B Impact Tool (MD)

2.08 The B impact tool (Fig. 2) consists of a reversible steel blade attached by a single screw to a plastic handle. One end of the blade is used for seating and cutting conductors while the other end is used for seating only. A spring mechanism inside the handle controls the amount of force the installer must exert to terminate and cut wires.

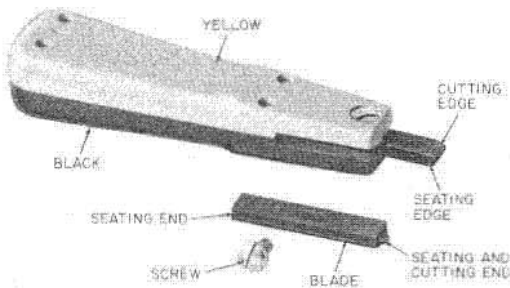


Fig. 2—B Impact Tool (MD)

2.09 An adjustment screw (not shown) for varying the spring tension, combined with an indicator pointer at the large end of the handle, provides the means of controlling the impact. This is necessary to compensate for variations in wire size and insulation thickness.

2.10 One half of the plastic handle is yellow to aid in identifying the cutting side of the tool.

**Note:** While the B impact tool is now rated MD, the blade is not MD and can be ordered separately. ♦Order as Blade, 8762B-66. ♦

#### C. 714B Tool

2.11 The 714B (Fig. 3) is similar to the B impact tool except that it does not have an adjustable impact mechanism. It has a hand shield and is yellow and green instead of yellow and black.

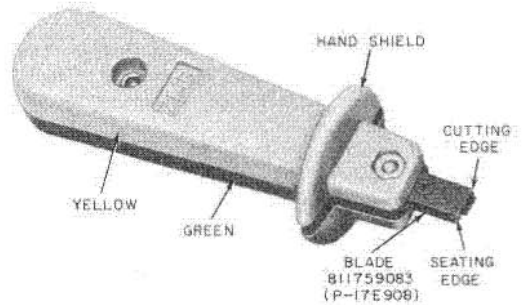


Fig. 3—714B Tool

2.12 To reverse blade of the B impact tool or the 714B tool, perform the following steps:

- (1) Loosen single screw.
- (2) Slide blade out of handle approximately 1/4 to 1/2 inch.
- (3) Reverse blade.
- (4) Slide blade back into handle.
- (5) Tighten screw.

2.13 To replace blade of the B impact tool or the 714B tool, perform the following steps:

- (1) Remove single screw.
- (2) Replace old blade with new. Place blade so that cutting edge will be on yellow side of handle. This is done for ease in identification of cutting side of tool.
- (3) Replace and tighten screw.



**Always carry the B impact tool or the 714B tool with the cutting edge protected or turned into handle.**

#### D. Spring Tension Adjustment (B Impact Tool)

2.14 To adjust tension of the operating spring on the B impact tool, use the screw in the rear of the handle. Turning the screw clockwise reduces tension (indicator moves toward screw). Turning the screw counterclockwise increases tension (indicator moves toward blade).

#### E. 724A Tool

2.15 The 724A tool (Fig. 4) is used to remove conductors from the terminals of 66-type connecting blocks. The tool consists of a 2-pronged fork with an insulated handle. The fork is sized to fit around the beams of the terminal and underneath the seated conductor. Use of the 724A tool reduces the possibility of disturbing or degrading adjacent wire connections during removal of wire.

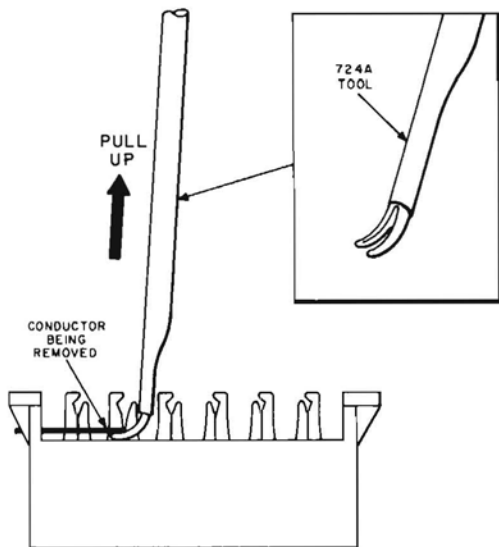


Fig. 4—Removing Conductor With 724A Tool

2.16 Place the 724A tool fingers astride the terminal and under the wire. Grasp the tool and pull the wire from the terminal in a direction perpendicular to the face of the block.

**Note:** Do not use adjacent terminals as leverage points.

2.17 Remove small pieces of insulation remaining around the terminals with an insulated tool.

2.18 To reterminate a wire which has been removed for testing or rearrangement (ended terminations only), perform the following steps.

- (1) Cut off old contact portion.
- (2) Place wire in hook of terminal, using long-nose pliers if necessary.
- (3) Seat and cut with B impact tool or 714B tool.

### 3. TERMINATION

3.01 All terminations on 66-type connecting blocks should be made with a D impact tool or a 714B tool. The B impact tool (MD) can be used if available.

3.02 The 66-type connecting blocks will accept 20- to 24-gauge conductors; **do not use any 26-gauge wire since minimum movement of conductor will easily subject this gauge of wire to breakage.**

The following unskinned 20- to 24-gauge conductors may be terminated on 66-type blocks:

- B service wire\*
- D, F, and G cross-connecting wire
- D inside wiring cable
- D,  $\bullet$ G, or H $\bullet$  station wire
- E inside wiring cable
- SK station wire.\*

\*Do not use the 714B tool or the D impact tool to cut these conductors. See paragraph 3.06.

**Note:** Terminate only one conductor per individual terminal.

**3.03** Wire, other than that listed above, including 18- and 19-gauge and JKT (obsolete) station wire, may be terminated on 66-type connector blocks, but must be skinned and cleaned (if enameled) before terminating.



*Smaller gauge wire cannot be terminated on a terminal that has been used previously with 18- or 19-gauge wire or JKT (obsolete) station wire.*

**3.04** The following two general types of terminations can be made on 66-type connecting blocks.

- (a) **Looping Termination**—The wire or cable continues to another terminal or connecting block.
- (b) **Ended Termination**—The wire or cable does not continue to another terminal or connecting block.

**Note:** The terminating sequence for station wire and cable should follow normal color code sequence.

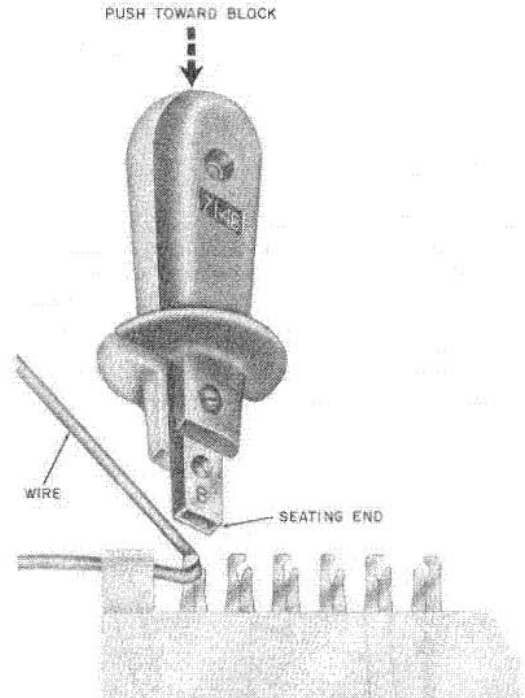
**3.05** To make a **looping termination** on a 66-type connecting block (Fig. 5 and 6), perform the following steps:

**Note:** The 714B tool is shown in Figures 5, 6, 7, and 8; the D impact tool is used in the same way.

- (1) Select wire to be terminated.
- (2) Work wire into fanning strip.
- (3) Place wire in hook of terminal, using fingers or long-nose pliers.
- (4) Place seating end (cutting end of blade turned into handle) of 714B or D impact tool over terminal (Fig. 5).
- (5) Press tool toward block until wire is fully seated (Fig. 6).

**Caution:** Do not use excessive force when seating wire in terminal; this could damage support members of

some 66-type blocks. Push the tool straight over the terminal. (With D impact tool, spring will operate blade when enough pressure is applied). Avoid bending or twisting the terminal.



**Fig. 5—Preparation for Looping Termination**

**3.06** To make an **ended termination** with SK station wire or B service wire, observe the following procedure:

- (1) Perform Steps (1), (2), and (3) of paragraph 3.05.
- (2) Cut the wire with diagonal pliers, allowing for approximately 1/16-inch of wire to protrude through terminal (Fig. 7).

**Caution:** Be careful not to disturb or short out adjacent terminals when



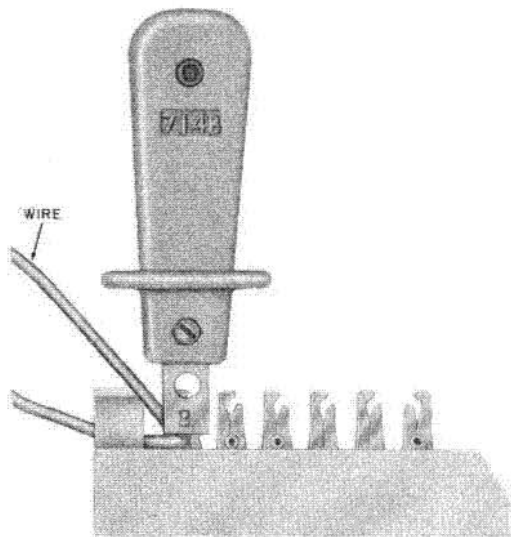


Fig. 6—Looping Termination Completed

using diagonal pliers to cut off wire ends.

- (3) Place seating end of 714B or D impact tool over terminal (Fig. 8).
- (4) Press tool toward block until wire is fully seated.

**Note:** JKT (obsolete) and SK station wire, and B service wires have steel cores which will damage cutting edge of the tool.

**3.07** To make an **ended termination** (Fig. 9 and 10) using the 714B or D impact tool, observe the following procedure:

- (1) Perform Steps (1), (2), and (3) of paragraph 3.05.
- (2) Place cutting end of tool over terminal. Be sure cutting edge of blade is positioned over scrap end of wire.
- (3) Force tool toward block until wire has been severed against face of block.

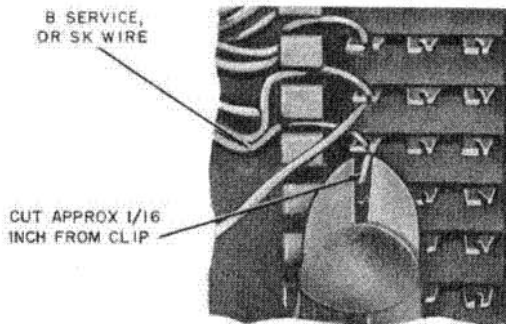


Fig. 7—Cutting B Service or SK Station Wire

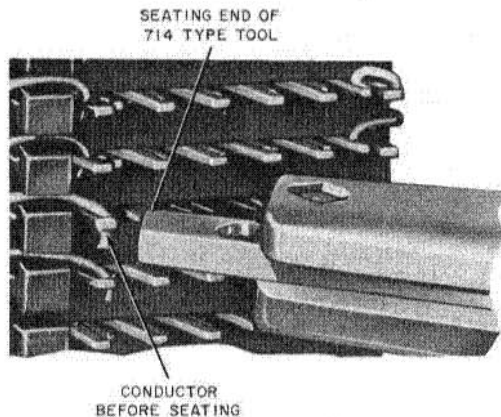


Fig. 8—Seating B Service or SK Station Wire

#### 4. ADAPTERS

##### A. 161A Adapter

**4.01** The 161A adapter (Fig. 11) permits terminating a spade-tipped lead to a terminal of the 66-type connecting blocks. The adapter consists of a formed tin-plated stainless steel detail which grips the terminal and the spade tip. No special tools are required to install or remove the adapter. It can be used on terminals with or without wires seated in them.

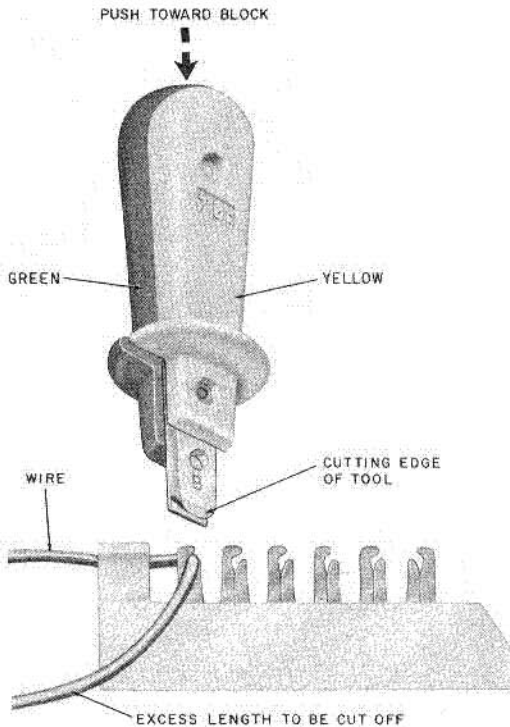


Fig. 9—Preparation for Making Ended Termination



*The larger opening of the adapter grips the terminal and the smaller opening grips the spade tip.*

4.02 Position the adapter over the terminal and press it onto the terminal as far as possible. Insert the spade tip and seat it firmly in the adapter. Figure 12 shows the adapter and spade tip installed.



*Due to limited space between terminals in 66-type connecting blocks, care must be exercised in placement of the adapters.*

4.03 When 161A adapters are used on adjacent connectors, the adapters should be oriented so that possible shorting between connectors is avoided. Figure 12 shows proper and improper

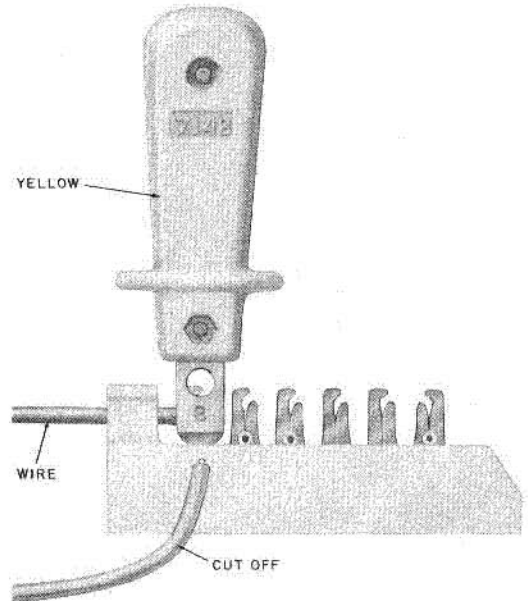


Fig. 10—Ended Termination Completed

orientation of the adapters. On the 66B connecting blocks with 3-terminal connectors, adapters should not be installed adjacent to each other on the middle two terminals due to the possibility of shorting the two individual 3-terminal sections of the row.

**Note:** Spade-tipped mounting cords must be fastened in or near the block to prevent movement of spade-tipped leads. Use appropriate fastening device (ie, clamp, clasp, tape) or tie to existing cables with twine.

#### B. 183-Type Adapters

4.04 The 183A2 adapter (Fig. 13) and 183B2 adapter (Fig. 15) provide additional multiplying capacity for horizontal and vertical terminals, respectively, on 66-type connecting blocks. If more than five adapters per block are needed, consider using additional blocks.

4.05 The adapter is a 2-terminal quick-clip connector with a spring clasp on one side which slips over two adjacent terminals of a 66-type connecting

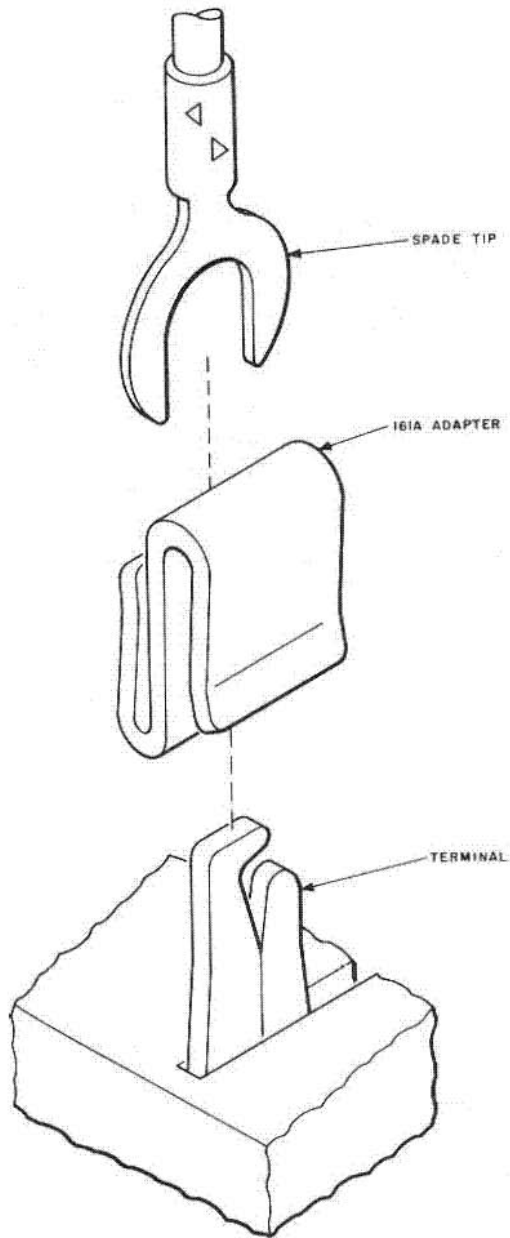
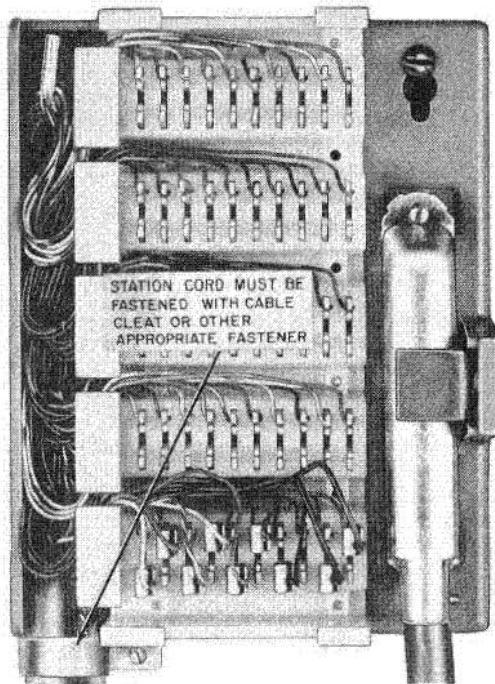


Fig. 11—161A Adapter, Installation Detail



(ABOVE) PROPER ORIENTATION OF ADAPTERS

(BELOW) IMPROPER ORIENTATION OF ADAPTERS

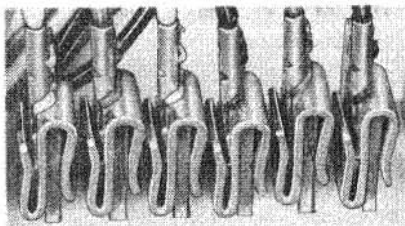


Fig. 12—Typical Installation of 161A Adapter on 66E-Type Connecting Block

block. A plastic block is fitted around the middle to limit the distance a conductor can travel when connected.



*The 183A2 adapter will act as a strapping connector if placed between two connectors.*

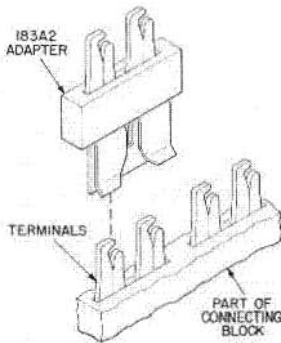


Fig. 13—183A2 Adapter, Installation Detail

**4.06** No special tools are required to install or remove either adapter. Figure 14 shows the 183A2 adapter installed. Install as follows:

- (1) Position adapter over connecting block terminals with spring clasp toward connecting block.
- (2) Fit the spring clasp of the adapter over the connecting block terminals.
- (3) Press adapter toward connecting block until firmly seated.
- (4) Connect the inside wire or cable conductor to the adapter terminal, using a 714B tool or a D impact tool.

**Note:** The installation of these adapters adds height to the connecting block. Due to insufficient clearance between the connecting block and the housing cover, the adapter cannot be used on the following connecting blocks:

- 66B-type, when mounted in a 115-type apparatus box
- 66A2-25, 66A2-50, 66C2-16, and 66C2-32
- 100- or 101-type connecting units used with COM KEY\* 2152.

\*Trademark of AT&T

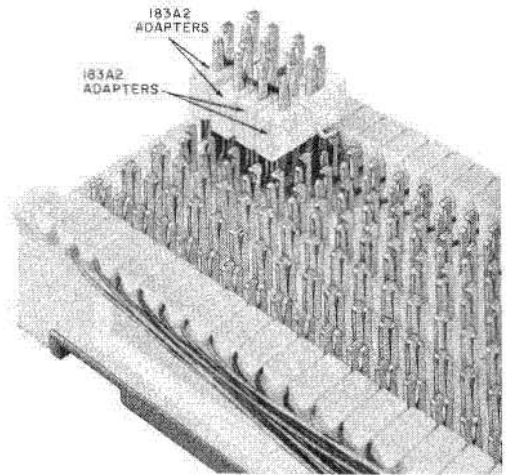


Fig. 14—Typical Installation of 183A2 Adapters on 66B-Type Connecting Block

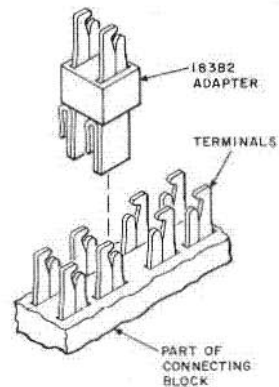


Fig. 15—183B2 Adapter, Installation Detail

### C. 260A Adapter

**4.07** The 260A adapter (Fig. 16) consists of 50 clips wired together in a vertical column and protected with a plastic cover. It is used to strap together up to 50 adjacent terminals in a vertical column on a 66-type block.

**4.08** The adapter can be cut to any desired length with standard diagonal pliers. No special tools are required for installing the 260A adapter; press the clips onto the connecting block column, being careful not to short any terminal to one beside it. Put the plastic cover on the adapter. The 260A adapter does not have to be removed to change strapping.

## 5. B BRIDGING CLIP

**5.01** The B bridging clip (Fig. 17) is a stainless steel spring clip used to electrically interconnect two adjacent terminals in the same row of 66-type connecting blocks, thereby increasing the multiplying capacity of the block.

**5.02** No special tools are required to install or remove the clip.

## 6. DESIGNATION STRIPS

### A. B Designation Strip

**6.01** The B designation strip is designed to mark 66B3-50 and 66B4-25 connecting blocks (Fig. 18).

**6.02** The strip is made of white plastic material, 2-3/16 inches by 3/4 inches, with cutouts for mounting screws. The matte finish permits marking with pen, pencil, or stencil.

**6.03** The designation strip is held in place by the connecting block mounting screws and can be used at either end of a single block, or between end-to-end blocks.

### B. C Designation Strip

**6.04** The C designation strips are available for identification of conductors on 66A- 66B- and 66M-type connecting blocks.

**6.05** The strips are made of white plastic material in three lengths, and any one can be cut shorter with scissors or cutters. The strips are furnished without markings.

**6.06** The strips are installed by snap-fitting to the fanning strip of the connecting block. The matte finish permits marking with pen, pencil, or stencil.

### C. D Designation Strip

**6.07** The D designation strips (Fig. 18) are the same as the C designation strips, except the D strips are furnished with imprinted lines. The lines occur every other row of terminals to indicate pairs (Table A).¶

## 7. MAINTENANCE AND TESTING

**7.01** Terminal beams should not be bent, misaligned, or obviously deformed.

**7.02** Terminals which have been bent or misaligned, as shown in Fig. 19, may be corrected by using long-noise pliers (Fig. 20). The bent beam should be moved until it is aligned with its mate or with other terminals of the same row. Care should be taken not to move beams or terminals in a direction which would spring or open the contact surfaces between the two beams.

**7.03** Terminals which have been damaged or sprung, resulting in an obvious gap between the two contact surfaces (Fig. 21), should not be used. There is no prescribed method for correcting this condition; therefore, the connecting block should be replaced.

**7.04** Field replacement of connectors in 66-type connecting blocks is impractical. Replace connecting blocks having damaged terminals which cannot be repaired.

**Note:** In some cases it may be desirable to use a 183-type adapter instead of replacing the connecting block.

**7.05** The 15AA-25 and 15AB-25 (Fig. 22) terminal blocks are used to test system and station operations. These blocks are made up of cables which are terminated on one end with a 50-pin connector which will plug into a key telephone set cord. The other end is terminated on five 961A- or B-type connectors which can be plugged directly onto a 66-type block.

**7.06** For test purposes, the 15AA-25 (for 66M blocks) or 15AB-25 (for 66B blocks) is plugged onto the row of terminals to be tested. The other end is connected to a key telephone set which allows the necessary tests to be performed.

7.07 The 31A indicator (Fig. 23) provides line status verification. This device consists of a 549L light emitting diode mounted in an encapsulated molded assembly. This assembly plugs onto the lamp (L) and lamp ground (LG) lugs displaying the visual status of the system. The indicator can be used on all codes of 66-type connecting blocks.

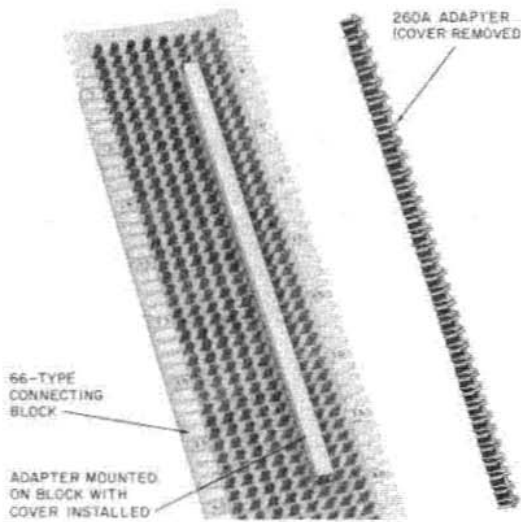


Fig. 16—260A Adapter Installed on 66-Type Connecting Block

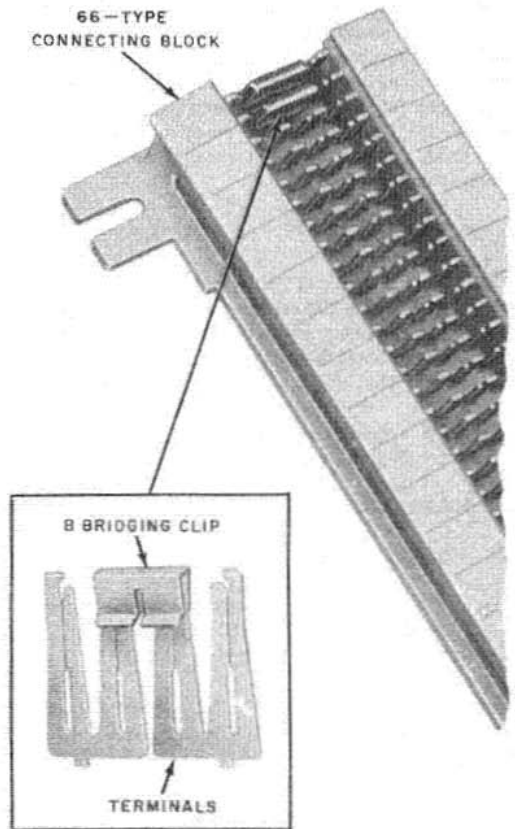


Fig. 17—B Bridging Clip, Installation Detail

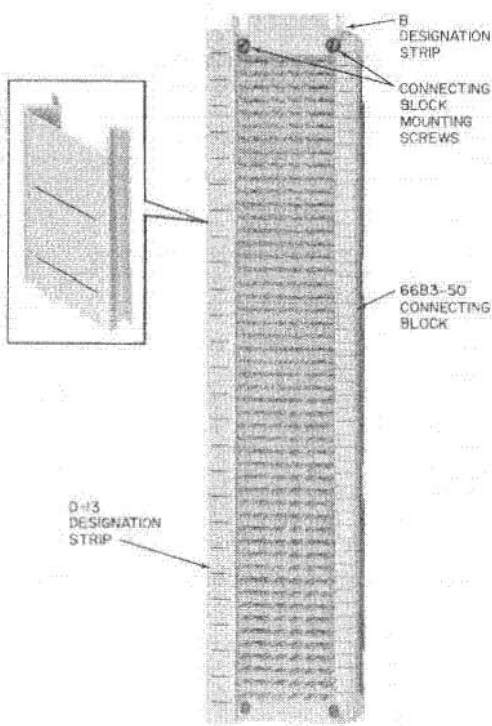


Fig. 18—Designation Strips

TABLE A  
SELECTION AND IDENTIFICATION  
ORDERING GUIDE

TYPE DESIGNATION	TYPE CONNECTING BLOCK	MARKING	DIMENSION (INCHES)
Strip, Designation, B	66B3-50 and 66B4-25	Blank	2-3/16 by 3/4
Strip, Designation, D, 16	66A	Blank	16-1/8 by 9/16
Strip, Designation, D, 16	66A	Lined	
Strip, Designation, C, 13	66B*	Blank	13-1/4 by 9/16
Strip, Designation, D, 13	66B*	Lined	
Strip, Designation, C, 10	66M	Blank	10 by 9/16
Strip, Designation, D, 10	66M	Lined	

\* Can be used on 66C-type blocks but must be cut to proper length.

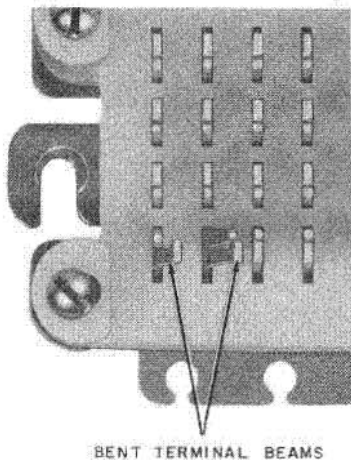


Fig. 19—Misaligned Terminal Beams



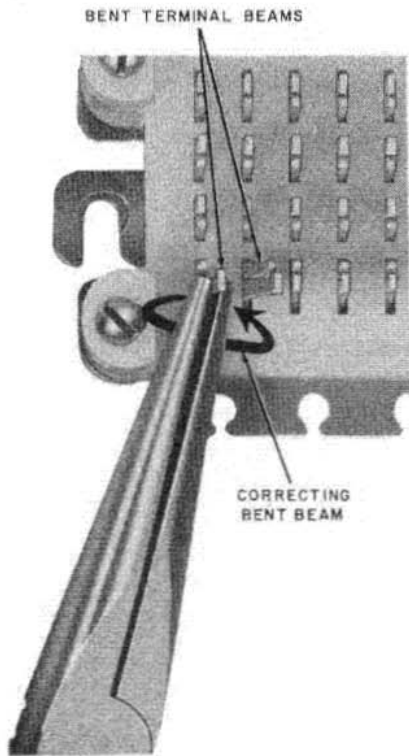
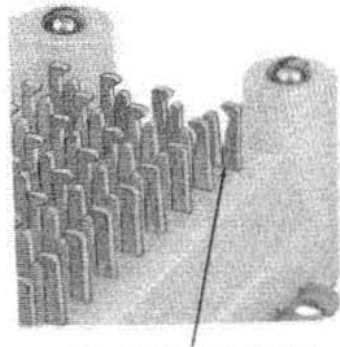


Fig. 20—Straightening Terminal Beam



THESE TERMINAL BEAMS  
CANNOT BE CORRECTED  
AND THE TERMINAL  
MUST NOT BE USED

Fig. 21—Gap Spread Distorted

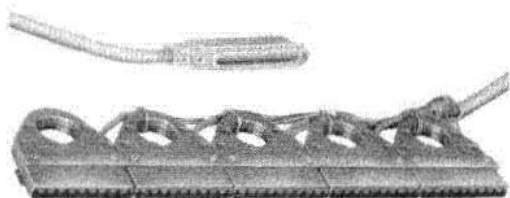


Fig. 22—15-Type Terminal Block

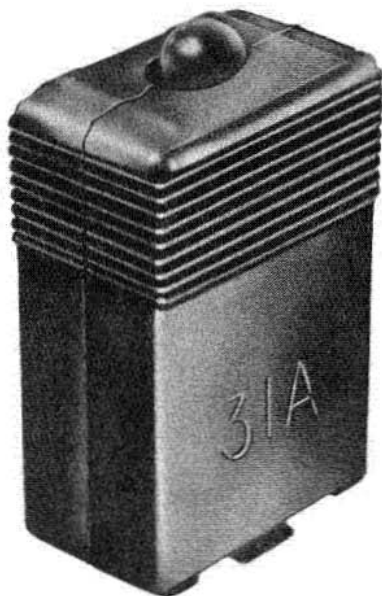


Fig. 23—31A Indicator

## CONNECTING BLOCKS, 66-TYPE NUMBERING AND WIRING PLAN

### 1. GENERAL

1.01 This section provides information on numbering and wiring of 66-type connecting blocks.

1.02 This section is reissued to:

- Delete specific information on 115-type apparatus boxes
- Delete cabling of apparatus boxes
- Add information on 66B4-3 and 66B6-3 connecting blocks
- Add information on 66E8-25 and 66E9-25 connecting blocks
- Add references to appropriate practices for deleted material.

1.03 Incoming CO lines to be installed in compliance with the Federal Communications Commission (FCC) Registration Program must be routed through a standard network interface. Information on approved interfaces is contained in Section 461-604-105, entitled Connecting Blocks, 66M3-50R—Identification, Installation, and Maintenance.†

### 2. NUMBERING

#### 66-Type General Purpose Connecting Blocks

2.01 The connecting block numbering plan is dependent upon the blocks being wall mounted with the long side vertical. The first terminal in the upper left-hand corner is designated 1A.

2.02 Numbering plans for various general purpose connecting blocks are shown in Fig. 1 through

7.

*Note:* The symbols in these figures illustrate the number of connectors and terminals on each connector in a horizontal row, ie, ○○○○ indicates one connector with four terminals; ○○ ○○ indicates two connectors with two terminals each, etc.

2.03 When marking these connecting blocks and fanning strips for terminal identification, use the transfer stenciling kit to stamp and identify the terminals. Refer to Section 081-860-105 for stenciling procedures.

### 3. IDENTIFICATION

3.01 For explicit identification and installation information, see the following sections:

- Section 461-604-102—Connecting Blocks, 66A-, 66B-, 66C-, and 66M-Type
- Section 461-604-103—Connecting Blocks, 66E-Type
- Section 461-604-105—Connecting Block 66M3-50R
- Section 463-121-115—115-Type Apparatus Boxes.

3.02 The 66A-type connecting blocks are manufacture discontinued (MD) and replaced by the 66B-type connecting blocks.

3.03 The 66B-type connecting blocks have six terminals in a row, may have either 6 or 50 horizontal rows assembled in various connector terminal configurations as shown in Fig. 1, 2, 3, and 4.

3.04 The 66B4-25C and 66B3-50C connecting blocks are factory wired so that the wiring sequence is in the proper order when the cable stub and plug are at the top (Table A).

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3.05 The 66B4-25C is furnished with a single 12-inch cable stub and plug, and the 66B3-50C has two 12-inch cable stubs and plugs.

3.06 The 66C-type connecting blocks have four terminals in a row and 32 horizontal rows, each row a solid 4-terminal connector (Fig. 5).

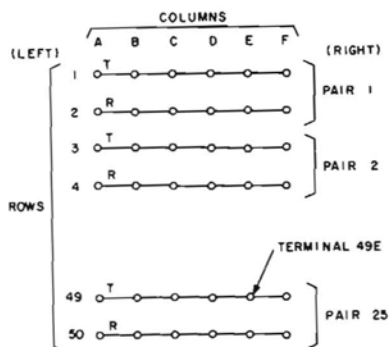
3.07 The 66M-type connecting blocks have four terminals in a row and 50 horizontal rows with two different connector terminal configurations (Fig. 6 and 7).

3.08 The 66E-type connecting blocks have fifty 2-terminal connectors (Fig. 8). The connectors are mounted vertically in ten horizontal rows making five horizontal rows of 2-terminal connectors or ten horizontal rows of terminals.

3.09 The 66E3-25 and 66E4-25 connecting blocks are factory wired to a receptacle as shown in Table B. The wiring sequence will be in proper order when the receptacle is on the right-hand side as the craft person faces the connecting block.

3.10 The 66E8-25 connecting block is wired to two cable stubs, one with a receptacle and one with a plug as shown in Table B. The wiring sequence will be in proper order when the cable and connectors are at the bottom.

3.11 The 66E9-25 connecting block is a special purpose connecting block using a 66E3-25 connecting block. Ten resistors, one capacitor, and one diode are factory wired as shown in Table C.



COLUMN ASSIGNMENT AND TERMINATING SEQUENCE

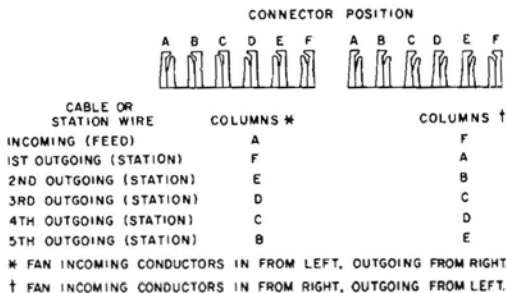
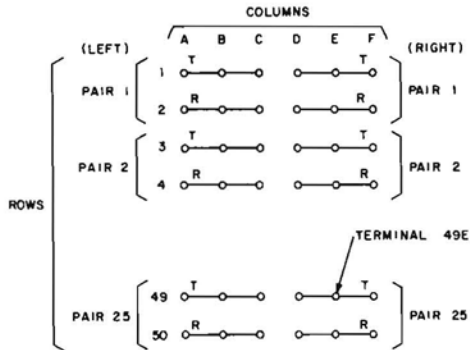
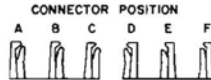


Fig. 1—Numbering and Wiring Plan for 66A1-25 (MD), 66A2-25 (MD), 66A2-50 (MD), 66B1-25 (MD), 66B4-25, and 66B4-25C Connecting Blocks



COLUMN ASSIGNMENT AND TERMINATING SEQUENCE

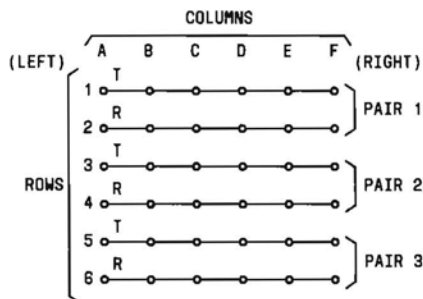


CABLE ON STATION WIRE	COLUMNS *	COLUMNS †
INCOMING (FEED)	A	F
1ST OUTGOING (STATION)	B	E
2ND OUTGOING (STATION)	C	D

\* FAN INCOMING AND OUTGOING CONDUCTORS IN FROM LEFT.

† FAN INCOMING AND OUTGOING CONDUCTORS IN FROM RIGHT.

**Fig. 2—Numbering and Wiring Plan for 66B3-50 and 66B3-50C Connecting Blocks**



COLUMN ASSIGNMENT AND TERMINATING SEQUENCE

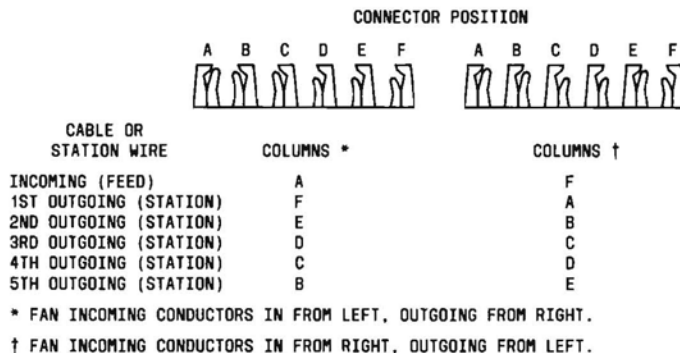
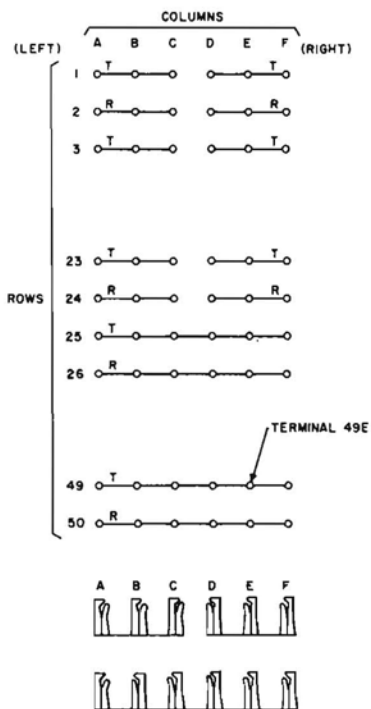


Fig. 3—Numbering and Wiring Plan for 66B4-3 and 66B6-3 Connecting Blocks



NOTE:

SEE FIG. 2 FOR WIRING PLAN FOR ROWS 1 THROUGH 24. FIG. 1 FOR ROWS 25 THROUGH 50.

**Fig. 4—Numbering and Wiring Plan for 66B5-37  
Connecting Blocks**

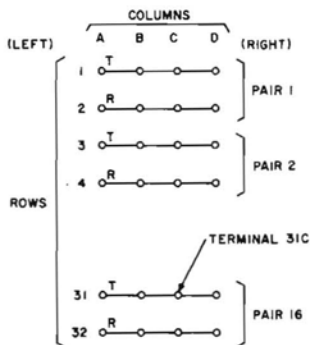
◆ TABLE A ◆

FACTORY WIRING 66B3-50C AND 66B4-25C CONNECTING BLOCKS

PLUG TERMINAL NUMBER	CONNECTING CABLE		CONNECTING BLOCK TERMINAL*		
	PAIR	COLOR	66B4-25C	66B3-50C	
				LEFT CABLE	RIGHT CABLE
26 1	1	W-BL	1A	1A	1F
		BL-W	2A	2A	2F
27 2	2	W-O	3A	3A	3F
		O-W	4A	4A	4F
28 3	3	W-G	5A	5A	5F
		G-W	6A	6A	6F
29 4	4	W-BR	7A	7A	7F
		BR-W	8A	8A	8F
30 5	5	W-S	9A	9A	9F
		S-W	10A	10A	10F
31 6	6	R-BL	11A	11A	11F
		BL-R	12A	12A	12F
32 7	7	R-O	13A	13A	13F
		O-R	14A	14A	14F
33 8	8	R-G	15A	15A	15F
		G-R	16A	16A	16F
34 9	9	R-BR	17A	17A	17F
		BR-R	18A	18A	18F
35 10	10	R-S	19A	19A	19F
		S-R	20A	20A	20F
36 11	11	BK-BL	21A	21A	21F
		BL-BK	22A	22A	22F
37 12	12	BK-O	23A	23A	23F
		O-BK	24A	24A	24F
38 13	13	BK-G	25A	25A	25F
		G-BK	26A	26A	26F
39 14	14	BK-BR	27A	27A	27F
		BR-BK	28A	28A	28F
40 15	15	BK-S	29A	29A	29F
		S-BK	30A	30A	30F
41 16	16	Y-BL	31A	31A	31F
		BL-Y	32A	32A	32F
42 17	17	Y-O	33A	33A	33F
		O-Y	34A	34A	34F
43 18	18	Y-G	35A	35A	35F
		G-Y	36A	36A	36F
44 19	19	Y-BR	37A	37A	37F
		BR-Y	38A	38A	38F
45 20	20	Y-S	39A	39A	39F
		S-Y	40A	40A	40F
46 21	21	V-BL	41A	41A	41F
		BL-V	42A	42A	42F
47 22	22	V-O	43A	43A	43F
		O-V	44A	44A	44F
48 23	23	V-G	45A	45A	45F
		G-V	46A	46A	46F
49 24	24	V-BR	47A	47A	47F
		BR-V	48A	48A	48F
50 25	25	V-S	49A	49A	49F
		S-V	50A	50A	50F

\* Connecting blocks are intended to mount with the cable stub and plug at the top.





COLUMN ASSIGNMENT AND TERMINATING SEQUENCE

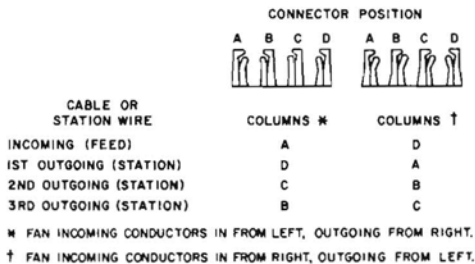
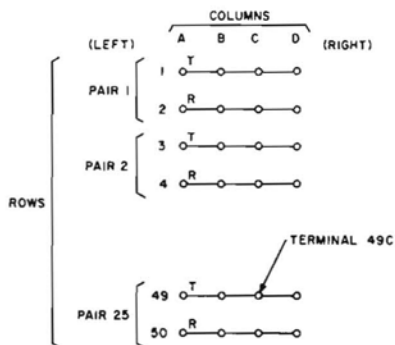


Fig. 5—Numbering and Wiring Plan for 66C1-16, 66C2-16, and 66C2-32 Connecting Blocks



COLUMN ASSIGNMENT AND TERMINATING SEQUENCE

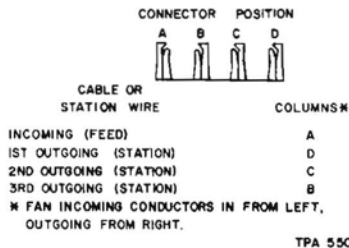
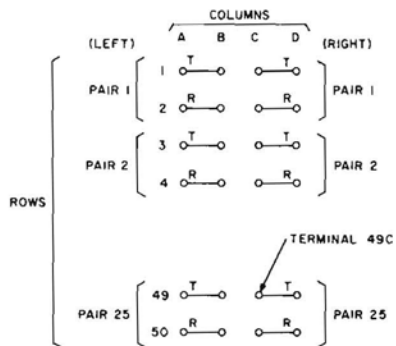
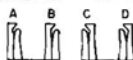


Fig. 6—Numbering and Wiring Plan for 66M1-25 Connecting Blocks



## COLUMN ASSIGNMENT AND TERMINATING SEQUENCE

## CONNECTOR    POSITION



## CABLE OR

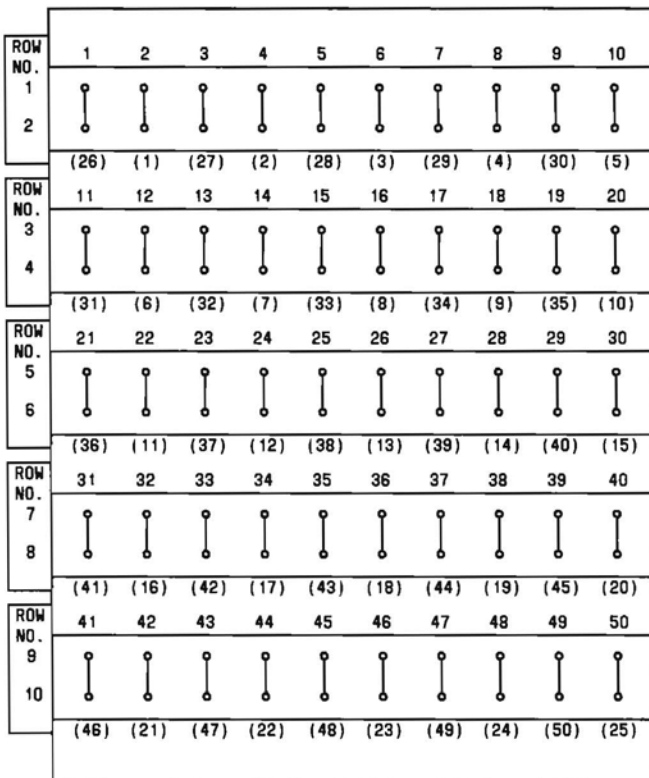
## STATION WIRE

	COLUMNS *	COLUMNS †
INCOMING (FEED)	A	D
OUTGOING (STATION)	B	C

\* FAN INCOMING AND OUTGOING CONDUCTORS IN FROM LEFT.

† FAN INCOMING AND OUTGOING CONDUCTORS IN FROM RIGHT.

**Fig. 7—Numbering and Wiring Plan for 66M1-50 Connecting Blocks**



NOTE:  
NUMBERS IN PARENTHESIS INDICATE INTERNAL CONNECTIONS TO  
PINS OF RECEPTACLE OR PLUG

Fig. 8—Numbering and Wiring Plan for 66E-Type Connecting Blocks

◆ TABLE B ◆

FACTORY INTERNAL WIRING  
66E-TYPE  
CONNECTING BLOCKS

RECEPTACLE OR PLUG TERMINAL NUMBER	CONNECTING CABLE		CONNECTOR TERMINAL
	PAIR	COLOR	
26 1	1	W-BL BL-W	1 2
27 2	2	W-O O-W	3 4
28 3	3	W-G G-W	5 6
29 4	4	W-BR BR-W	7 8
30 5	5	W-S S-W	9 10
31 6	6	R-BL BL-R	11 12
32 7	7	R-O O-R	13 14
33 8	8	R-G G-R	15 16
34 9	9	R-BR BR-R	17 18
35 10	10	R-S S-R	19 20
36 11	11	BK-BL BL-BK	21 22
37 12	12	BK-O O-BK	23 24
38 13	13	BK-G G-BK	25 26
39 14	14	BK-BR BR-BK	27 28
40 15	15	BK-S S-BK	29 30
41 16	16	Y-BL BL-Y	31 32
42 17	17	Y-O O-Y	33 34
43 18	18	Y-G G-Y	35 36
44 19	19	Y-BR BR-Y	37 38
45 20	20	Y-S S-Y	39 40
46 21	21	V-BL BL-V	41 42
47 22	22	V-O O-V	43 44
48 23	23	V-G G-V	45 46
49 24	24	V-BR BR-V	47 48
50 25	25	V-S S-V	49 50

◆ TABLE C ◆

FACTORY EXTERNAL WIRING  
66E9-25  
CONNECTING BLOCKS

ITEM	BETWEEN TERMINALS		ROW
R1	5	7	2
R2	1	3	1
R3	11	13	4
R4	15	17	4
R5	21	23	6
R6	25	27	6
R7	31	33	8
R8	35	37	8
R9	41	43	10
R10	45	47	10
Capacitor	1	10	2
Diode	6	9	1

## CONNECTING BLOCKS

### 66A, B, C, AND M-TYPE

### IDENTIFICATION

#### 1. GENERAL

1.01 The 66-type connecting blocks (Fig. 1 through 11) consist of multiple terminal connectors inserted in molded plastic blocks and held in place by retaining plates.

1.02 This section is reissued to add information on the 66B6-3 connecting block (Fig. 7).

1.03 The 66B6-3 connecting block is a 66B4-3 connecting block equipped with a cover (Fig. 7). On the inside of the cover is a place to list the location of the stations fed by each pair of wires.

1.04 The 66B4-3 block is intended as a connection point to multiple up to three pairs, primarily in residential installations.

1.05 The 66B3-50C connecting block (Fig. 5) replaces the F-57001 connecting block, and the 66B4-25C (Fig. 6) replaces the F-57000 block and can be used in place of the F-56999 block. These new blocks are the same as the F-Spec

blocks, except for 12-inch cable stubs. The KS-16689, List 3 plugs are terminated in standard color-code sequence.

1.06 Information on the F-Spec blocks was formerly contained in Section 461-605-100.

#### 2. IDENTIFICATION

2.01 Table A lists the 66-type connecting blocks and their design features. Table B lists apparatus boxes used in conjunction with these blocks.

2.02 To aid in the identification of the 66B- and M-type connecting blocks, the color coding will be as follows:

66B3-50	White (Fig. 1)
66B4-3	Gray (Fig. 4)
66B4-25	Gray (Fig. 2)
66B5-37 (A&M)	White (Fig. 3)
66M1-25	Gray (Fig. 10)
66M1-50	White (Fig. 10)

#### NOTICE

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Bell System except under written agreement

♦ TABLE A ♦

## 66-TYPE CONNECTING BLOCKS

ORDERING GUIDE	DESIGN FEATURES									
	BLOCK CONNECTING	REPLACED BY	FIG. NO.	HORIZONTAL CONNECTOR ROWS		ARRANGEMENT OF EACH CONNECTOR ROW (SEE NOTE)	HOUSING AND COVER	DIMENSIONS (INCHES)		
								LENGTH	WIDTH	DEPTH
66B3-50*		1	50		o-o-o o-o-o	Can be mounted in a 115A1, 115B1, 115C1 or 115D1 apparatus box (order separately)	13-7/16	2-13/16	1-3/16	
66B4-25*		2								o-o-o-o-o
66B5-37 (A&M)		3	26	o-o-o o-o-o						
			24							
66B3-50C†		5	50		o-o-o-o-o					
66B4-25C‡		6								
66B4-3		4	6		o-o-o-o-o			2-13/32	2-13/16	1-3/16
66B6-3		7					Equipped with plastic cover	3-1/2	3-1/2	1-5/16
66C1-16		8	32		o-o-o-o			9-1/4	2-9/32	1-29/32
66C2-16								4-7/8	2-3/8	
66C2-32	9					Two parallel 66C1-16 connecting blocks	10-5/16	6-3/4		
66M1-25	10	50		o-o-o-o	Can be mounted on an 89B bracket or a 115C1 or 115D1 apparatus box (order separately)	10	2-3/16	1-3/16		
66M1-50				o-o o-o						

◆ TABLE A (Contd) ◆

## 66-TYPE CONNECTING BLOCKS

ORDERING GUIDE		DESIGN FEATURES						
BLOCK CONNECTING	REPLACED BY	FIG. NO.	HORIZONTAL CONNECTOR ROWS	ARRANGEMENT OF EACH CONNECTOR ROW (SEE NOTE)	HOUSING AND COVER	DIMENSIONS (INCHES)		
						LENGTH	WIDTH	DEPTH
66A1-25 (MD)	66B4-25	11	50	o-o-o-o-o	Can be mounted in a 115A1, 115B1, 115C1 or 115D1 apparatus box (order separately)	13-7/16	2-3/16	1-3/16
66A2-25(MD)	One 66B4-25 connecting block and a 115A1 or 115C1 apparatus box				Equipped with a metal housing and cover			
66A2-50(MD)	Two 66B4-25 connecting blocks and a 115B1 or 115D1 apparatus box		Two parallel 66A1-25(MD) connecting blocks					
66B1-25(MD)	66B4-25		50		Can be mounted in a 115A1, 115B1, 115C1 or 115D1 apparatus box (order separately)			

Note: The symbols illustrate the number of connectors and terminals on each connector in a horizontal row, ie, o-o-o-o indicates one connector with four terminals; o-o o-o indicates two connectors with two terminals each, etc.

\* Must be mounted so that full back support is provided.

† Replaces F-57001 connecting block, equipped with two 12-inch cable stubs and two KS-16689, L3 plugs.

‡ Replaces F-56999 and F-57000 connecting blocks, equipped with one 12-inch cable stub and one KS-16689, L3 plug.

TABLE B

## APPARATUS BOX AND CONNECTING BLOCK BASES AND COVERS

APPARATUS	COVER	BASE
115A1 Apparatus Box	811850692 (P-18E069)	811850684 (P-18E068)
115B1 Apparatus Box	811850718 (P-18E071)	811850700 (P-18E070)
115C1 Apparatus Box	811756303 (P-17E630)	834370702 (P-43X070)
115D1 Apparatus Box	811756345 (P-17E634)	834370710 (P-43X071)
66C2-16 Connecting Block	811756311 (P-17E631)	811756295 (P-17E629)
66C2-32 Connecting Block	811850270 (P-18E027)	811850262 (P-18E026)

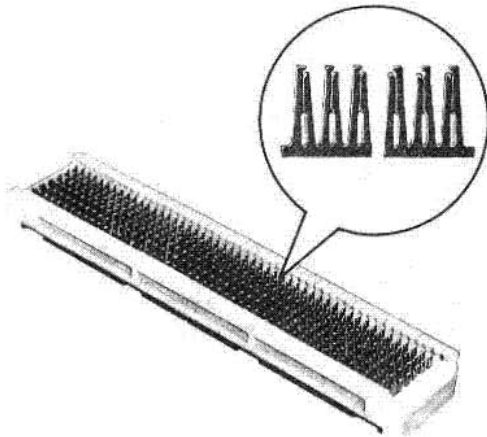


Fig. 1—66B3-50 Connecting Block

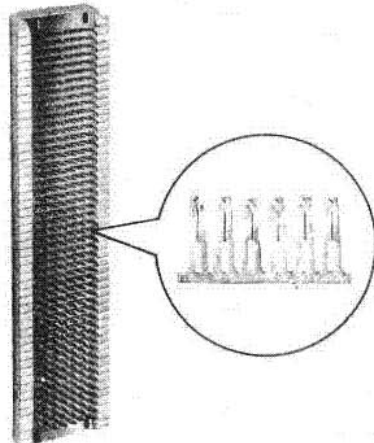


Fig. 2—66B4-25 Connecting Block



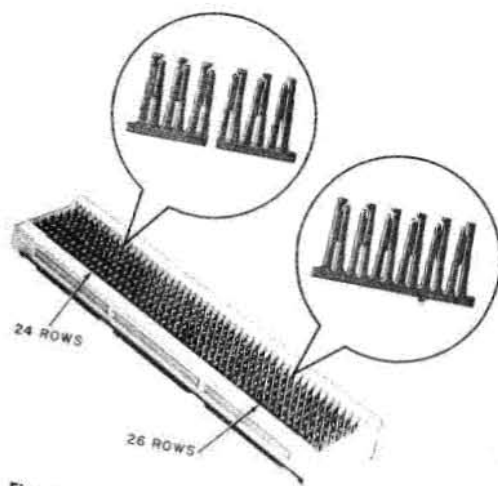


Fig. 3—66B5-37 (A&M) Connecting Block

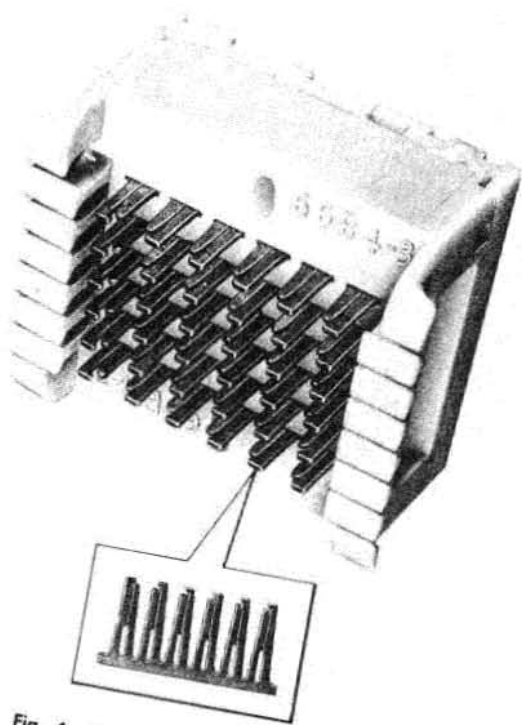


Fig. 4—66B4-3 Connecting Block

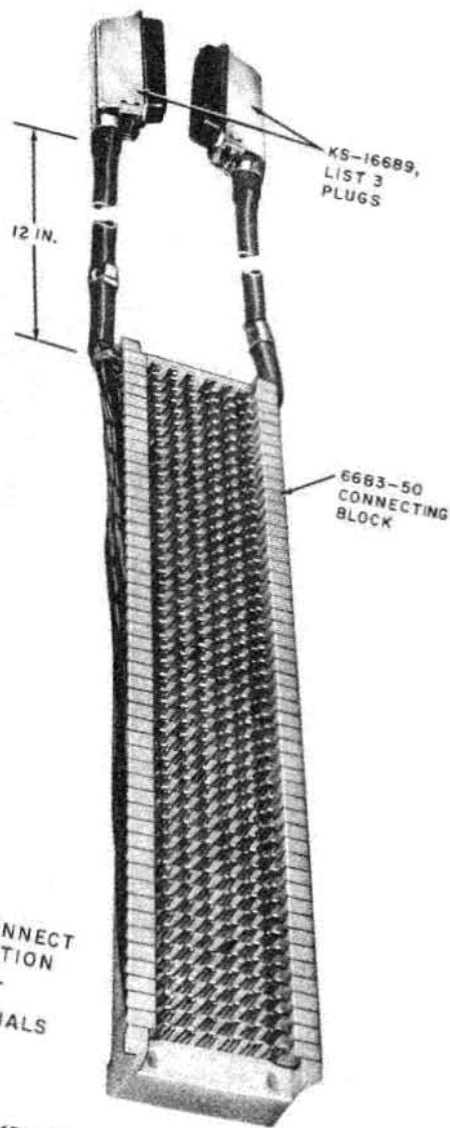


Fig. 5—66B3-50C Connecting Block

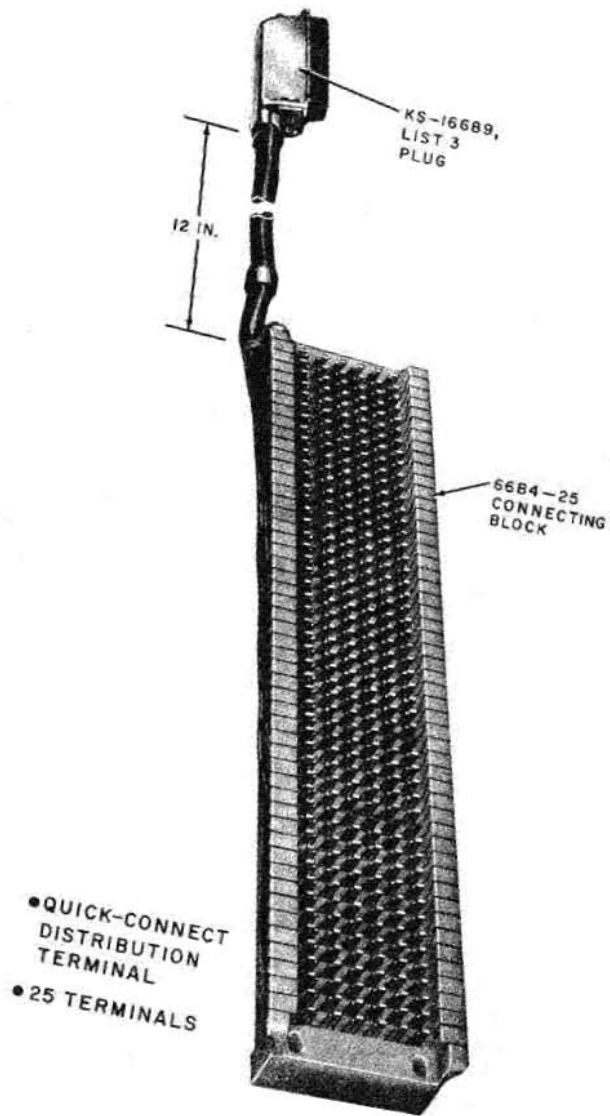
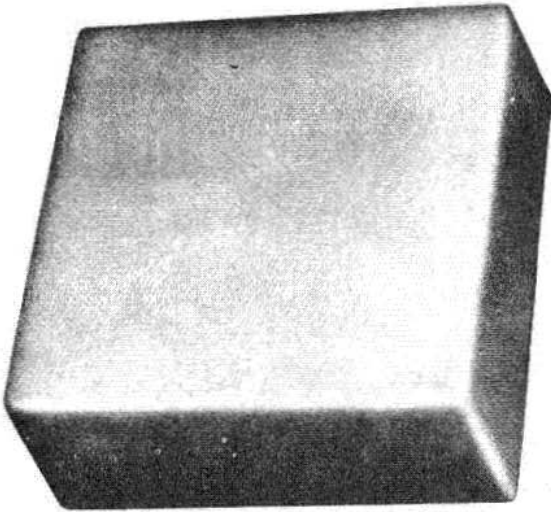
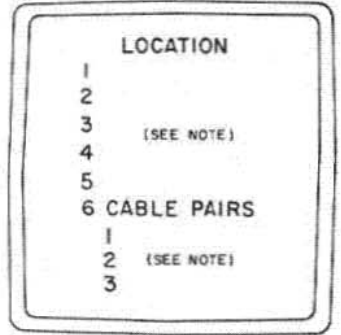


Fig. 6—66B4-25C Connecting Block

NOTE:  
 INFORMATION TO BE FILLED IN  
 BY INSTALLER.



COVER  
 (FRONT VIEW)



COVER  
 (REAR VIEW)

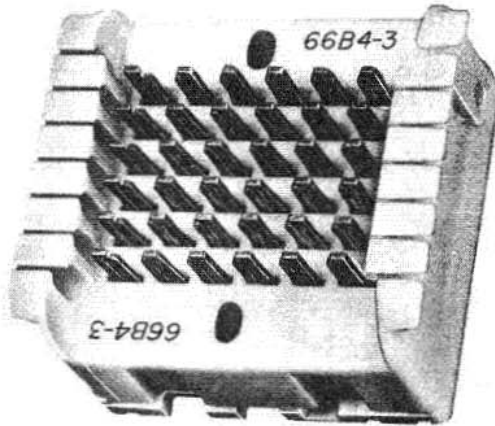


Fig. 7—66B6-3 Connecting Block

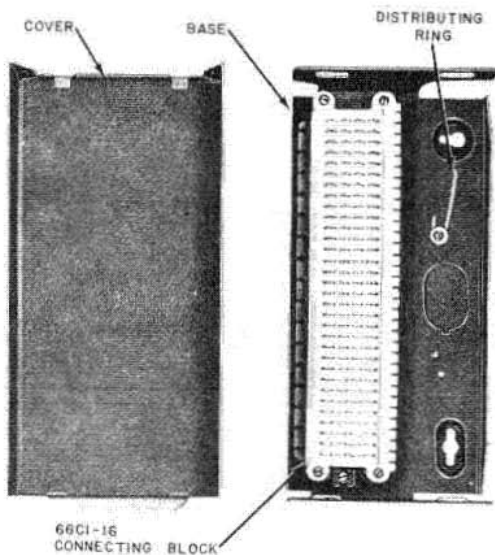


Fig. 8—66C2-16 Connecting Block

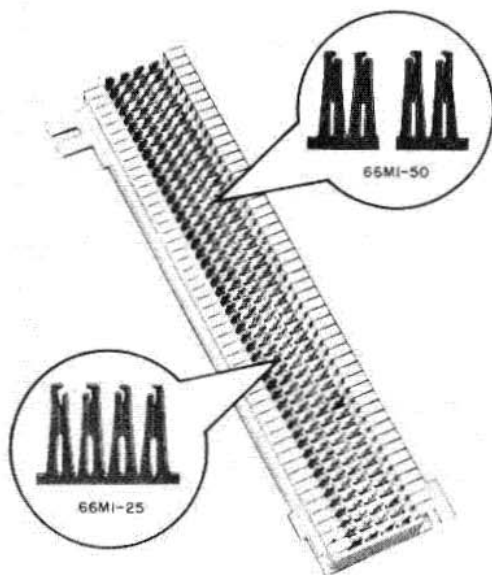


Fig. 10—66M1-Type Connecting Block

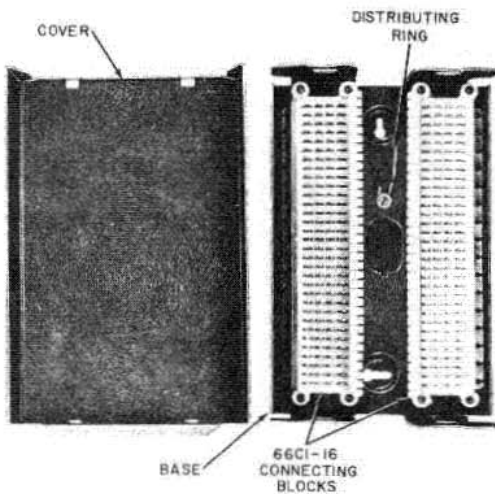


Fig. 9—66C2-32 Connecting Block

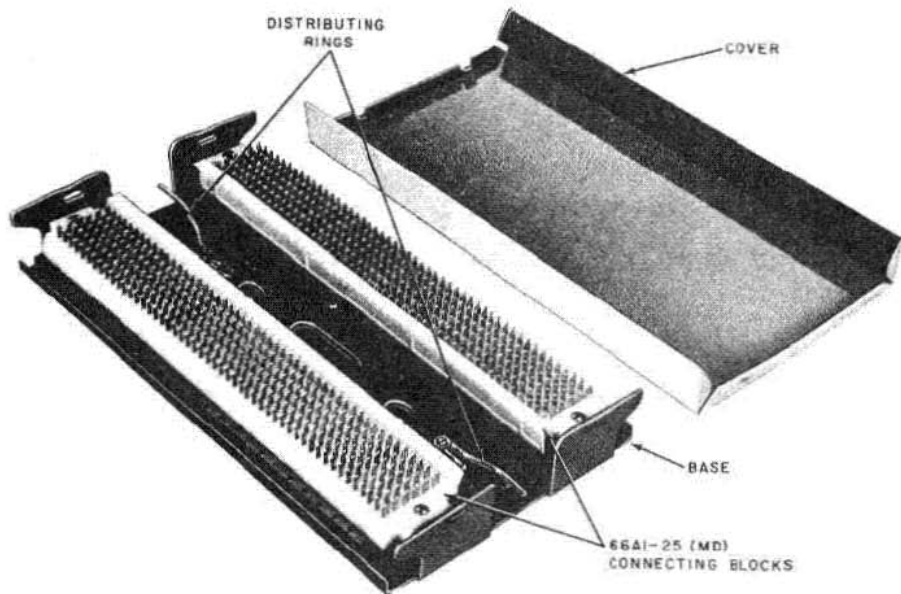


Fig. 11—66A1-25 (MD) Connecting Block



## CONNECTING BLOCKS

### 66E3-25, 66E4-25, AND 66E8-25

### IDENTIFICATION AND INSTALLATION

#### 1. GENERAL

1.01 This section provides identification, ordering, and installation information for the 66E3-25, 66E4-25, and 66E8-25 connecting blocks.

1.02 This section is reissued to:

- Add information on 66E8-25 connecting block
- Add new Fig. 3, 6, and 7.

1.03 Refer to the following sections for related information on connecting blocks:

- 461-600-101—Designation Strips and Methods of Marking
- 461-604-100—Connecting Blocks, 66-Type; Tools, Terminating, Adapters, and Maintenance
- 461-604-101—Connecting Blocks, 66-Type; Numbering, Wiring Plan, and Distribution Terminal Arrangements.

1.04 For information on the 152A adapter, which may be used in mounting a 66E3-25 connecting block, refer to Section 461-200-103.

#### 2. IDENTIFICATION

##### Description

2.01 The 66E3-25 and 66E4-25 connecting blocks each consist of fifty 2-terminal connectors inserted in a molded plastic block and factory-wired to a 50-contact connector.

2.02 ♦The 66E8-25 connecting block consists of fifty 2-terminal connectors inserted in a molded plastic block and factory-wired to two 50-conductor plug-ended stub cables. The 66E8-25

also has two double screw terminals for use as tie points for spade-ended leads from adjuncts. These screw terminals have no electrical connection to the 66-type connecting block and may be used only as tie points (eg, furnishing power to an adjunct such as Hands-Free Answering on Intercom (HFAI)).♦

##### Application

2.03 The 66E3-25 connecting block (Fig. 1) is equipped with a molded plastic housing incorporating a snap-on cover and a cable trough in the base. The block should be mounted on a firm flat surface. Provisions are also made for mounting the block to a standard wall outlet box or overfloor duct by using a 152A adapter.



***DO NOT use the 152A adapter as a substitute for underfloor duct service fittings.***

2.04 The 66E4-25 connecting block (Fig. 2) is equipped with a molded plastic base without cable trough or cover; it incorporates a mounting bracket which allows mounting in commercial type underfloor duct service fittings. ♦Cover for 66E4-25 connecting block must be furnished by customer and should be similar to that shown in Fig. 5.♦

2.05 ♦The 66E8-25 connecting block (Fig. 3) is equipped with a molded plastic base and provides full access to the 50 conductors of the connector cable and mounting cord supplying a telephone set. The connecting block can also be used to gain access to the leads in one finger of larger connector cables and mounting cords such as those for CALL DIRECTORS®. Primary use of the 66E8-25 connecting block is with the 2A transmitter-receiver used to supply HFAI in the 1A1 or 1A2 Key Telephone System.♦

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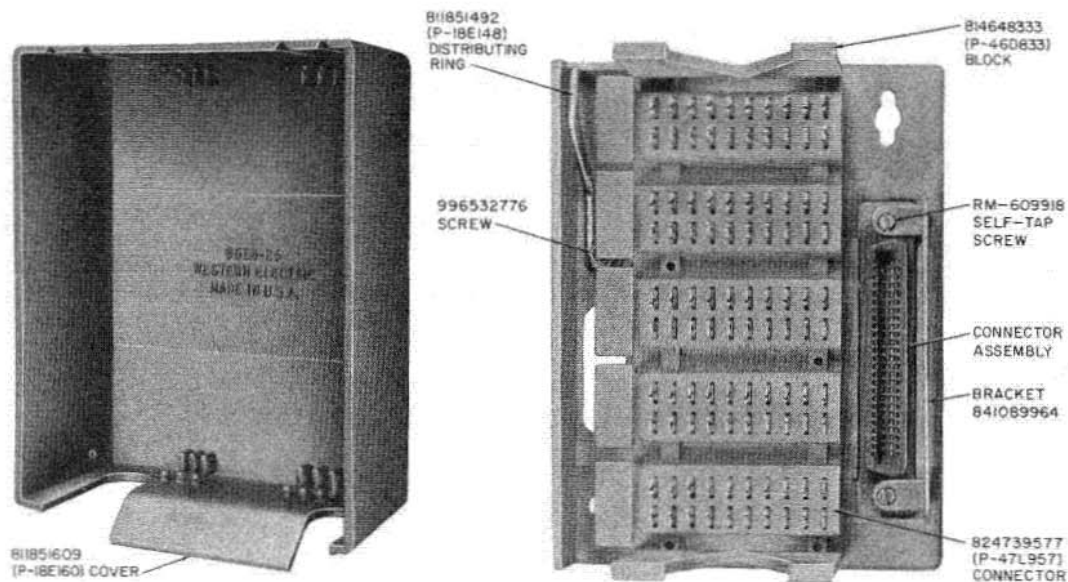


Fig. 1—66E3-25 Connecting Block

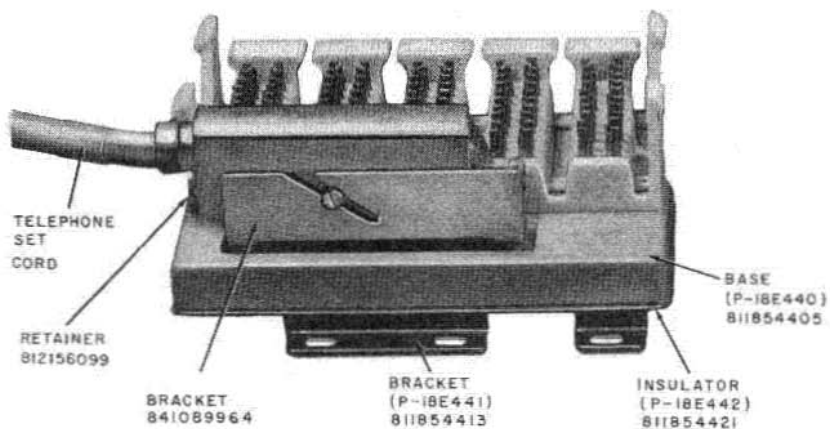


Fig. 2—66E4-25 Connecting Block



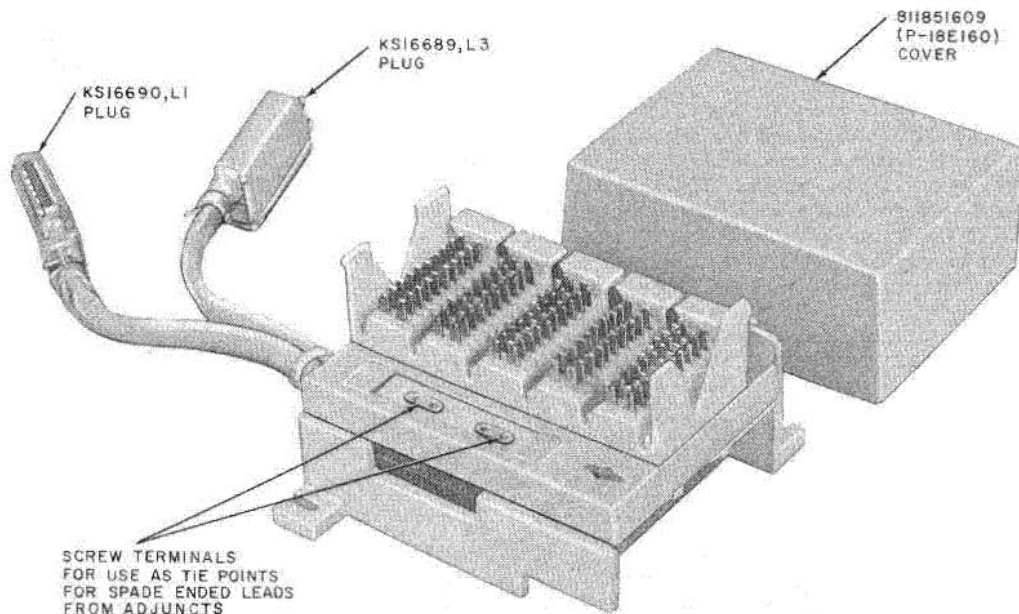


Fig. 3—66E8-25 Connecting Block

**2.06** A new bracket design has been incorporated on the 66E3-25 and 66E4-25 connecting blocks for attaching both the low and high silhouette plug or connectors. The new bracket 841089964 (Fig. 1), which contains a diagonal slot, replaces the present P-21E608 bracket. The new slot provides improved retention of the connector and plug to eliminate accidental disengagement resulting from external movement of the cord or connector cable.

#### Ordering

**2.07** Order as follows:

- Block, Connecting, 66E3-25 (equipped with cover); see Note
- Block, Connecting, 66E4-25 (not equipped with cover—see 2.04); see Note

**Note:** One 834061111 (P-40W111) retainer and screw are shipped loose with each 66E3 and 66E4 connecting block.

- Block Connecting, 66E8-25 (equipped with cover)
- Bracket, 841089964 (see 2.08)

**2.08** The new bracket (841089964) may be ordered as a piecepart to replace the present bracket (P-21E608) on older connecting blocks presently in use. All new 66E3-25 and 66E4-25 connecting blocks come equipped with the new retainer bracket.

### 3. INSTALLATION

**3.01** For mounting instructions, refer to sections covering installation of cable terminal boxes for inside wiring.

#### 66E3-25

**3.02** Install the 152A adapter on electrical outlet box or overfloor duct and mount the 66E3-25 connecting block to the adapter, using the mounting hardware provided (Fig. 4). Terminate the cable conductors on the connecting block pins (Fig. 6),

connect station telephone set to connector assembly, and install snap-on cover.

**66E4-25**

**3.03** This connecting block is designed for use with existing commercial underfloor or overfloor duct service fittings. Fig. 5 shows its use with a commercial service fitting. If tapped holes in the fitting do not line up with holes in the connecting block mounting bracket, drill holes in the fitting to accept No. 8 self-tapping screws.

Terminate the cable conductors on the connecting block pins (Fig. 6), connect station telephone set to connector assembly, and install commercial service fitting.

**66E3-25 and 66E4-25**

**3.04** Elongated mounting holes are provided in the 66E3-25 and 66E4-25 connecting blocks so that slight adjustment of position is possible during installation.

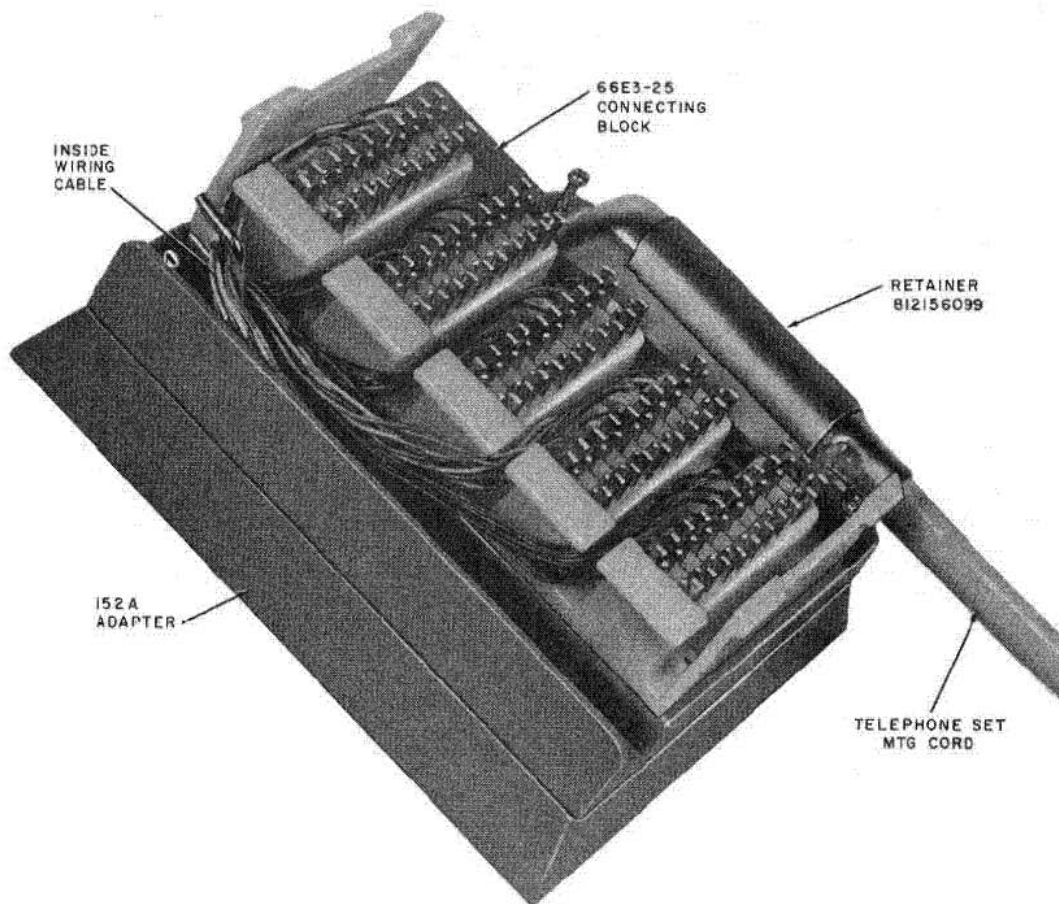


Fig. 4—66E3-25 Connecting Block Installed on 152A Mounting Adapter

3.05 On 66E3-25 and 66E4-25 connecting blocks, field replacement of the old retainer bracket (P-21E608) with the new retainer bracket (841089964) can be accomplished by removing two easily accessible RM-609918 button-head self-tapping screws (Fig. 1), removing the old bracket, installing the new bracket, and replacing the two screws. Attach retainer to bracket with 824634729 (P-46LA72) RD washerhead screw.

#### 66E8-25

3.06 Install the 66E8-25 as follows:

- (a) Mount 66E8-25 connecting block on flat vertical surface.

(b) Connect station telephone set mounting cord to the stub cable equipped with KS-16690, L1 plug and secure in place.

(c) Connect A25B connector cable to stub cable equipped with KS-16689, L3 plug and secure in place.

(d) Terminate adjunct cord on terminals of connecting block using 161A adapters. Refer to Fig. 7 for block numbering and wiring.

(e) When adjunct is equipped with spade-tipped leads for power, tie spade tips of adjunct and leads from power source together, using screw terminals of 66E8-25 connecting block (Fig. 7).♦

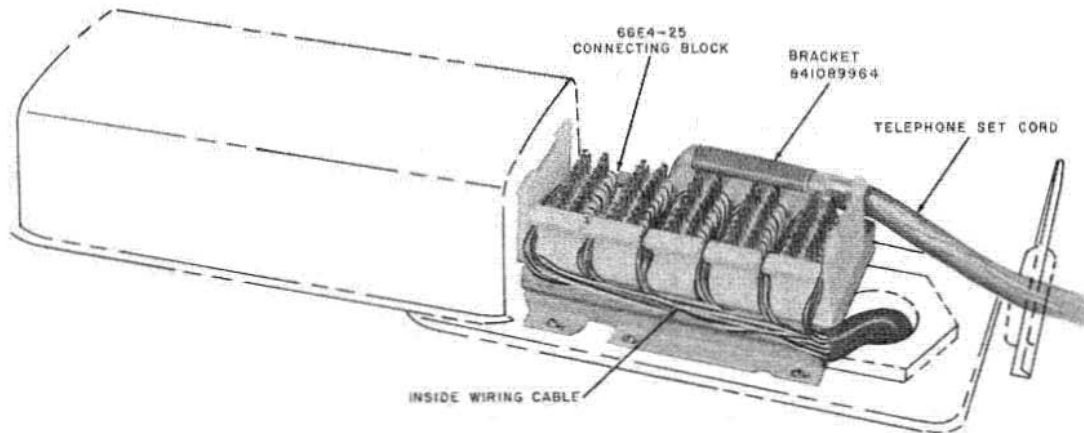
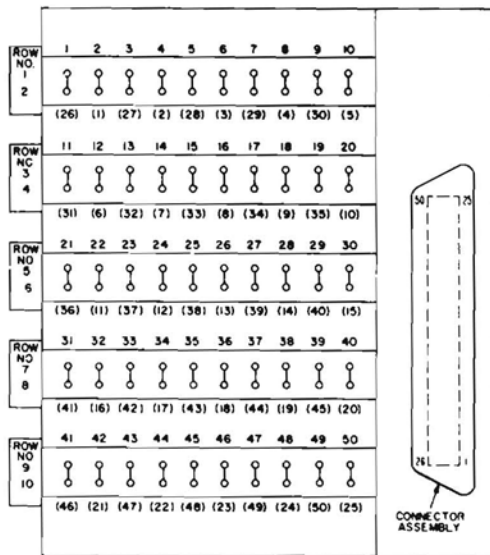
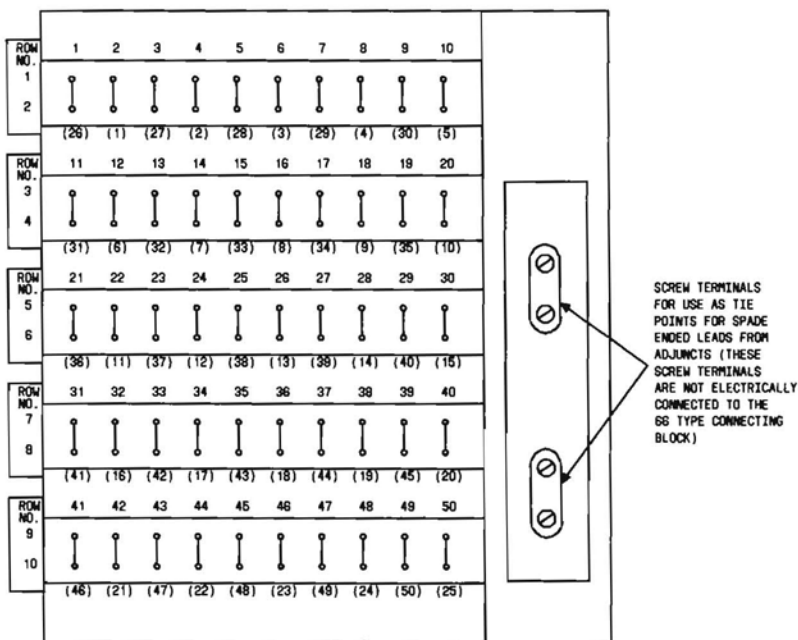


Fig. 5—66E4-25 Connecting Block Installed in Commercial Fitting



NOTE  
NUMBERS IN PARENTHESES INDICATE INTERNAL CONNECTIONS TO  
P-460832 CONNECTOR ASSEMBLY

Fig. 6—Numbering and Wiring Plan for 66E3-25 and 66E4-25 Connecting Block



NOTE:  
NUMBERS IN PARENTHESES INDICATE INTERNAL CONNECTIONS  
TO PINS OF KS16688, L3 AND KS16690, L1 PLUGS

Fig. 7—Numbering and Wiring Plan for 66E8-25 Connecting Block

## CONNECTING BLOCKS 66M3-50R AND 66M4-50R IDENTIFICATION, INSTALLATION, AND MAINTENANCE

### 1. GENERAL

1.01 This section provides information on the 66M3-50R and 66M4-50R connecting blocks.

1.02 This section is reissued to:

- Add information on connector fastener
- Add information on 66M4-50R connecting block
- Indicate connecting blocks should also be used with telephone company provided equipment.

### 2. IDENTIFICATION

2.01 The 66M3-50R connecting block (Fig. 1) is intended to serve as a network interface unit as required for the Federal Communications Commission's (FCC) Registration Program for key telephone systems (except COM KEY\* 416), PBX systems, and other communications systems such as automatic call distributors, switching systems, etc.

2.02 The 66M4-50R connecting block is used where a series connection through registered equipment is required on the tips and rings of multiple lines (maximum of 12 lines per block). The 66M4-50R connecting block is furnished with an attached bridging adapter that must be installed in the KS-16672, L3 connector whenever the plug from the registered equipment is not in place. The 66M4-50R connecting block is used to furnish Registration Interface RJ71C. For more information, refer to Section 463-400-150.

2.03 The 66M3-50R and 66M4-50R connecting blocks (Fig. 2) consist of:

- A 66M2-50R connecting block having three vertical columns of terminals, consisting of

50 single and 50 double quick-connect terminals

- An 89C bracket as a mounting base, without cable trough
- A snap-on cover
- A 50-contact KS-16672, L3 connector factory-wired to the single column (C) of quick-connect terminals.

**Note:** The 66M3-50R and 66M4-50R are very similar in appearance. However, the internal wiring between column C and the connector is different and the blocks are not interchangeable. Do not attempt to use a 66M3-50R in installations requiring a 66M4-50R and vice versa.

### 3. INSTALLATION

3.01 The 66M3-50R connecting block can be used as the initial on-premise cable termination for CO lines. It is required that it be installed within 25 feet of the customer or telephone company provided equipment with which it is to be used. A registered extension cable of 25 feet can also be used. If this requirement cannot be met, refer the problem to your local supervisor.

3.02 The 66M4-50R connecting block should be mounted in a location mutually agreeable to the telephone company and the customer that will permit access for maintenance and connection to the registered equipment.

3.03 The 66M3-50R and 66M4-50R connecting blocks are applicable to color-coded modular backboards (green field), but a size variance will not permit mounting of additional 66-type

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connecting blocks butting directly above or below it.

**3.04** Mount the 66M3-50R or 66M4-50R connecting block vertically, with the KS connector to the lower right, using the two slotted mounting brackets provided on the 89C bracket.

**3.05** Provide CO/PBX lines by placing appropriate CO/PBX feeder cable, D station or cross-connect wire, to selected column A terminals (Fig. 2 or 3).

**Note:** All terminations on the connecting blocks must be made with a 714B tool, or equivalent.

**3.06** Using cross-connect wire or B bridging clips, cross-connect column B to C as required by service order to extend CO/PBX lines to the KS-16672, L3 connector (equipment access point).

**3.07** Cross-connections may be applied in a straight-across (preferred) manner (for example, terminal 1B to 1C) or flexibly (for example, terminal 1B to 3C) to comply with customer requirements.

**3.08** Upon completion of installation, test for tip and ring continuity on column C terminals and secure snap-on cover in place.

**Note:** On the 66M4-50R connecting block, column B must be cross-connected to column C on both the incoming and outgoing pairs to have continuity. In addition, if the plug to the registered equipment is not in place, the bridging adapter must be installed. If the registered equipment plug is in place, continuity must be maintained through the registered equipment.

#### Equipment Access Point

**3.09** The KS-16672, L3 connector serves as the access jack to which a customer or telephone company provided compatible plug is installed to extend the lines to key telephone systems, PBX equipment, or other communications systems. The plug is held in place by a length of hook- and loop-type fastener.

## 4. MAINTENANCE

**4.01** Maintenance of the 66M3-50R and 66M4-50R connecting blocks is limited to:

- Checks of cross-connections
- Continuity testing between terminals, cross-connections, and KS-16672, L3 connector
- Realignment and cleaning of terminals
- Replacement of cover.

**4.02** Bent, misaligned, or obviously deformed terminals, may be corrected by using long-nose pliers. The bent beam should be moved until it aligns with its mate or with other terminals of the same column. Care should be taken not to move beams or terminals in a direction which could spring or open the contact surfaces between the two beams.

**4.03** Terminals which have been damaged or sprung, resulting in an obvious gap between the two contact surfaces, should not be used. There is no prescribed method for correcting this condition; therefore, an assigned circuit must be wired to spare terminals or the connecting block replaced. In either case, the customer may have to be consulted to coordinate the change.

**4.04** Field replacement of terminals or KS connectors in 66M3-50R or 66M4-50R connecting blocks is impractical. Connecting blocks which are damaged and cannot be repaired will have to be replaced.

**4.05** Remove small pieces of insulation and wire-ends remaining at base of terminals with an insulated tool. The 724A tool is designed to remove conductors from 66-type connecting blocks and serves to extract sizable bits of insulation and wire-ends while reducing the possibility of disturbing or degrading adjacent wire connections.

**Note:** Never use pliers to squeeze terminal beams together in an attempt to improve terminal contact or tension. This destroys the terminal for future use.

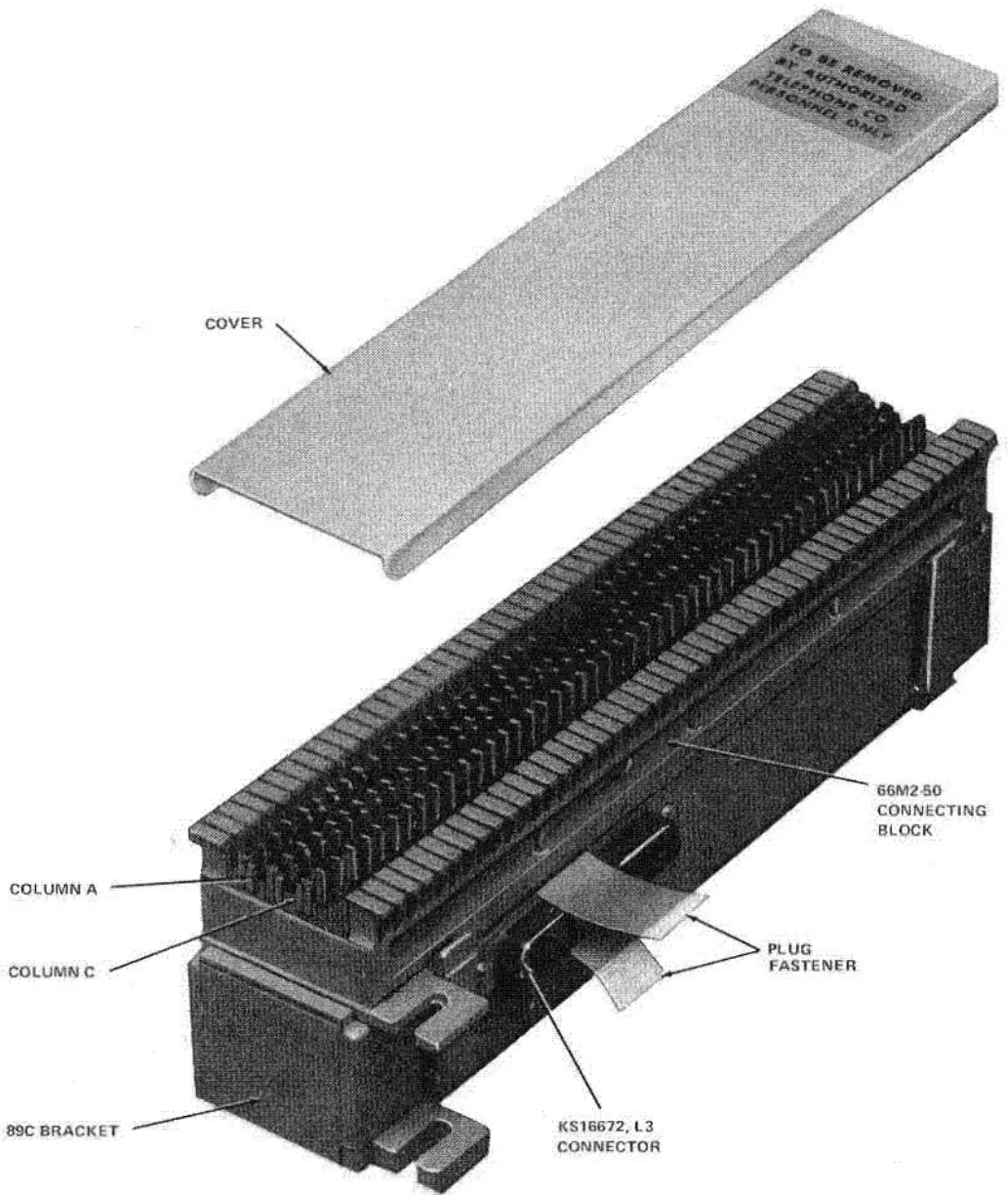


Fig. 1—66M3-50R or 66M4-50R Connecting Block With Cover





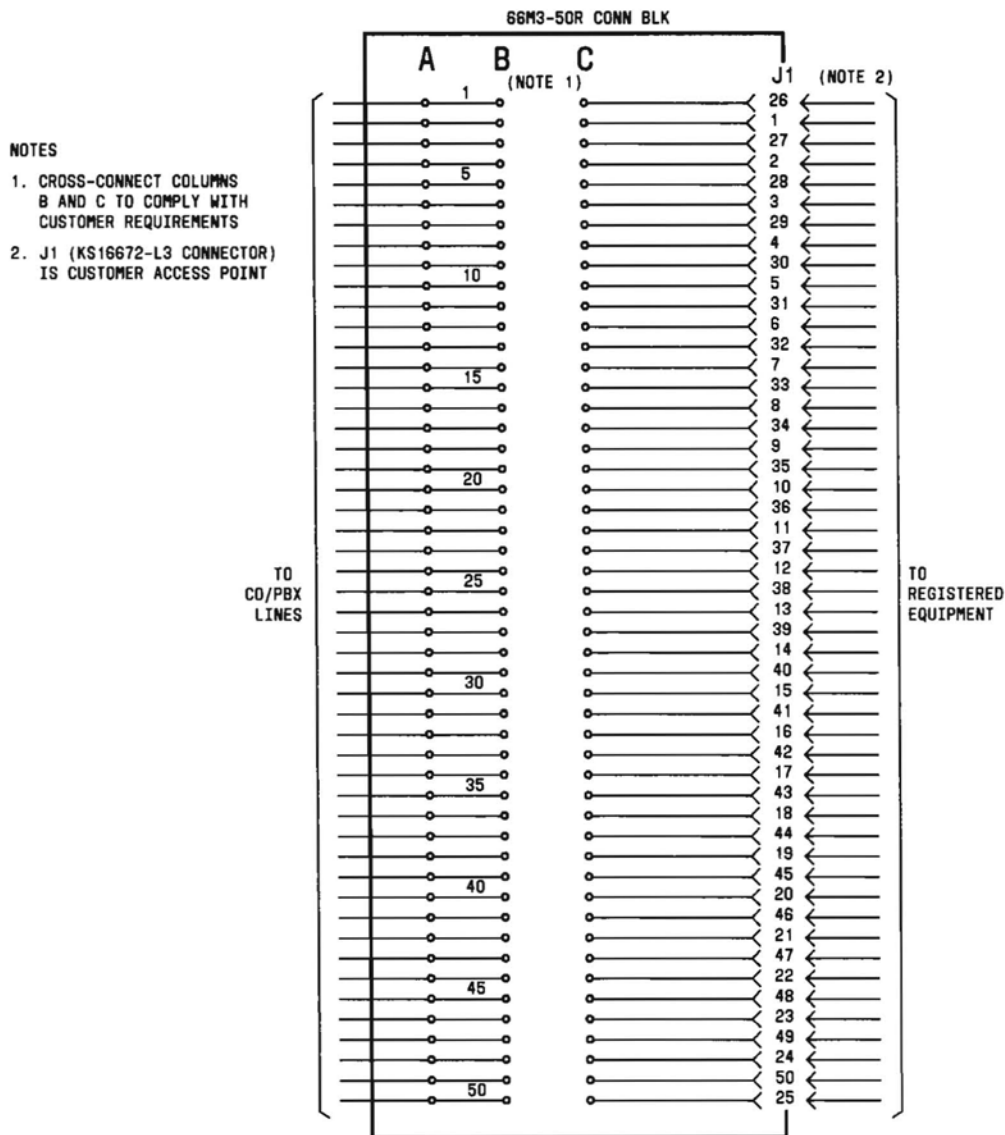


Fig. 2—66M3-50R Connecting Block Terminal Layout

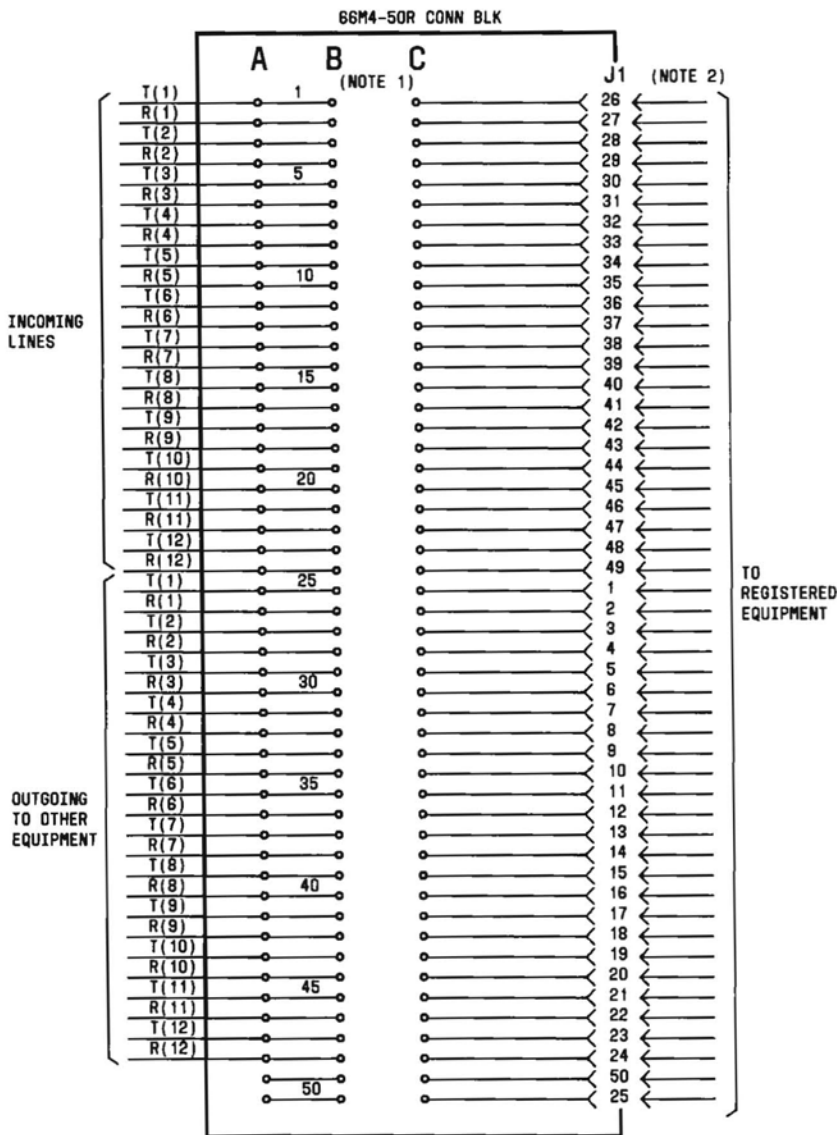
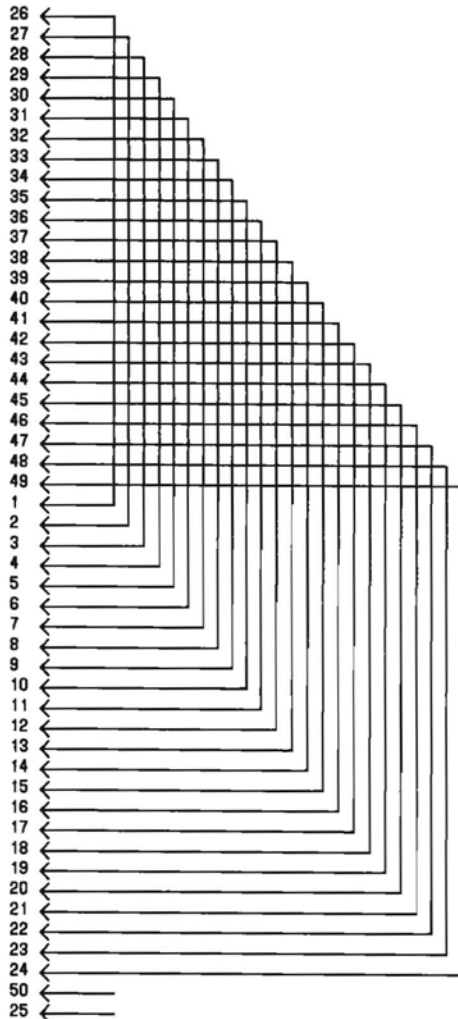


Fig. 3—66M4-50R Connecting Block Terminal Layout (Sheet 1 of 2)

## BRIDGING ADAPTER



## NOTES

1. CROSS-CONNECT COLUMNS B AND C TO COMPLY WITH CUSTOMER REQUIREMENTS
2. J1 (KS16672-L3 CONNECTOR) IS CUSTOMER ACCESS POINT

Fig. 3—#66M4-50R Connecting Block Terminal Layout (Sheet 2 of 2)¶



## CONNECTING BLOCKS AND WIRING BLOCKS—88-TYPE

### 1. GENERAL

**1.01** This section covers the identification, installation, and maintenance of the 88-type wiring blocks and 88-type connecting blocks for terminating inside wiring cables.

**1.02** This section is reissued to:

- Include information on the 88P-type patch cords
- Replace the 788B1 tool (MD) with the 788B2
- Replace the 788D3 tool (MD) with the 788D4
- Add new Fig. 9
- Add new Table B
- Make minor text changes.

**1.03** The 88-type wiring and connecting blocks are compact connecting blocks designed for key telephone systems or similar installations. They may be used at any indoor locations now employing the 66-type blocks and associated backboards. The wiring blocks are modular, with terminations in a 25-pair, even-count, color-code basis. They reduce wall space requirements, installation time, improve pair identification, and permit easy expansion of cross-connect fields. Cables are terminated on the wiring block index strip on a permanent basis; rearrangements and changes are made with cross-connect wire on the top side of the connecting blocks.

**1.04** Information for installing and wiring connecting blocks, using the 88-type connecting and

wiring blocks in Outside Plant application, is not covered in this practice. Refer to Section 631-050-120.

**1.05** For information about protective devices used on special service circuits requiring Special Service Protection or Special Safeguarding Measures, refer to Section 460-110-100.

**1.06** Information on key telephone systems, wiring methods for 88-type wiring blocks, and typical running cable arrangements for key system installations, will be found in Section 518-010-101.

### 2. IDENTIFICATION

#### 88-TYPE WIRING BLOCK

**2.01** The 88-type wiring block (Fig. 1) is made of flame retardant plastic with molded index strips. Separate backboards are not required. Each index strip has 50 slots to accommodate a 25-pair cable or a color binder group for terminating PE or PVC 22-, 24-, 26-gauge wire without removing insulation. The index strips are color-coded white, red, black, yellow, violet, from left to right, in 5-pair segments to match the color coding for tip conductors of even-count cables. The various parts of the wiring block are shown in Fig. 1.

**2.02** The letters and numbers (eg, 88AW1-100) of the complete code designation provide the following information:

- (1) 88—basic type of terminal block.
- (2) The first suffix letter indicates basic style as follows:

A—legs with feet - single connections

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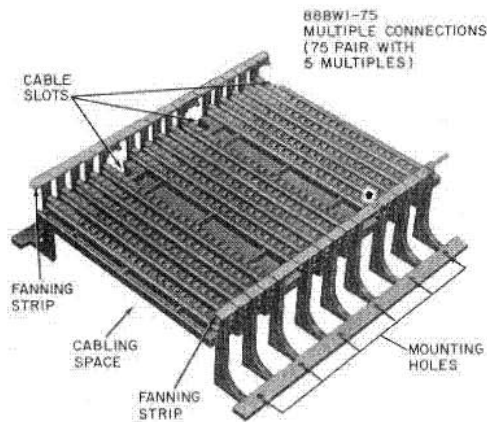
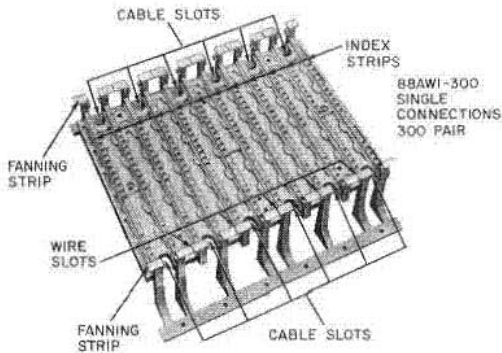


Fig. 1—88-Type Wiring Block

B—legs with feet - 5 connections (multiple).

The A and B styles are for wall mountings on customer premises.

- (3) The second suffix letter denotes color of the wiring block: W—indicating white.

**Note:** All codes of 88-type wiring blocks are supplied in white only. The application of the block is indicated by the use of colored designation strips (separately ordered), which come in blue, red, yellow, green, and purple.

- (4) The third suffix numeral assignment is to identify minor design differences resulting from engineering or manufacturing improvement.

- (5) The number following the dash indicates the number of pairs that can be terminated.

- (6) The letter C following the number of pairs indicates the block is supplied with a factory-wired connector-ended cable 5 feet long (Fig. 2). The blocks are factory-wired to give five multiples for each conductor. On prewired blocks, extra multiples can be provided using the 3-way bridging adapter, KS-19252,L2 (PCP), for no more than ten multiples. Refer to Section 461-200-101 for information on adapters.

2.03 The wiring blocks used in key system applications are shown in Table A.

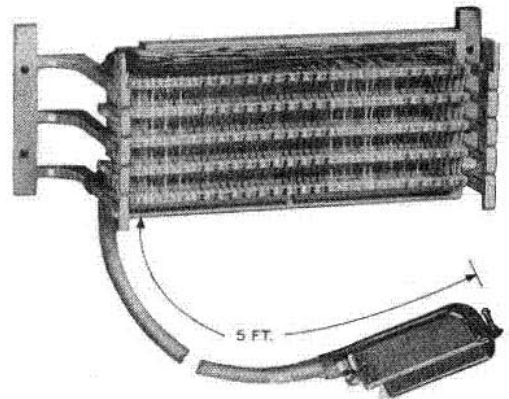


Fig. 2—88-Type Wiring Block With Connector Cable

**88-TYPE CONNECTING BLOCK**

- 2.04 The 88-type connecting block (Fig. 3) consists of a flame retardant, plastic-molded housing equipped with double-ended, quick-clip metal connectors. When mounted on the wiring block, the bottom end makes connection with the cable conductors in the index strip, and the top end provides connections for cross-connect wires. They are available in 3- and 5-pair blocks. The clips for terminating the cables are designed to terminate

TABLE A

## WIRING BLOCKS AND CONNECTING BLOCKS

CODE (NOTE)	COLOR	CAPACITY (PAIRS)	TYPE	APPLICATION	SIZE (INCHES)
88AW1-100	White	100	Wiring Block	All Fields	10-3/4 X 3-1/2
88AW1-300		300			10-3/4 X 10-3/4
88BW1-25		25*		Red Field	10-3/4 X 3-1/2
88BW1-25C		25*			10-3/4 X 3-1/2
88BW1-75		75†			10-3/4 X 10-3/4
88BW1-75C		75†			10-3/4 X 10-3/4
88BSW1-3 88BSW1-5	Slate/White	3 5	Connecting Block	All Wiring Blocks	7/8 X 1-1/2

Note: Code ending in C indicates block is supplied with a 5-foot length of connector cable terminated.

\* Five multiples of one 25-pair cable.

† Five multiples of three 25-pair cables.

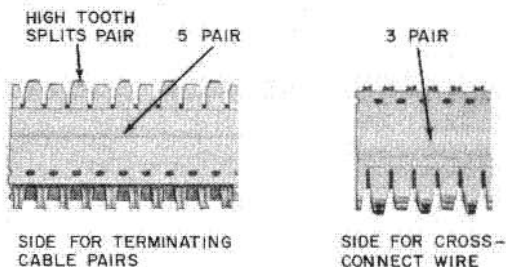


Fig. 3—88-Type Connecting Block

PE or PVC 22-, 24-, or 26-gauge wire without the removal of insulation.

**2.05** The following is the coding arrangement for the 88-type connecting block. The letters and numbers (eg, 88BSW1-5) of the complete code designation provide the following information.

- (1) 88—basic type connecting block.
- (2) The first suffix letter indicates basic style; ie, the letter B indicates that the clips are gold-plated and protrude from one side of the connecting block.

(3) The second and third suffix letters denote color; this is a double letter for two color blocks. The codes presently assigned are SW (Slate White—one side slate, one side white).

(4) The third suffix numeral is assigned to identify minor design difference resulting from engineering or manufacturing improvement.

(5) The number following the dash indicates the number of pairs (three or five pairs).

**2.06** The different colored sides of connecting blocks aid in pair identification when installed on the wiring blocks as outlined in paragraph 3.17. Connecting blocks are shown in Table A.

#### ASSOCIATED APPARATUS

**2.07** The 188B1-type backboard (Fig. 4) is used to provide a horizontal wiring channel for cross-connect wire in large installations. The backboard consists of two plastic distributing rings mounted on a white sheet metal panel 1/2-inch thick by 10-3/4 inches long by 6-1/2 inches wide. The 188B1 backboard replaces the 188A1 which is rated MD.

**2.08** The AT-8660 F clip terminal insulator (Fig. 5) is used to mark special service circuits requiring Special Service Protection or Special Safeguarding Measures. The F clip terminal insulator

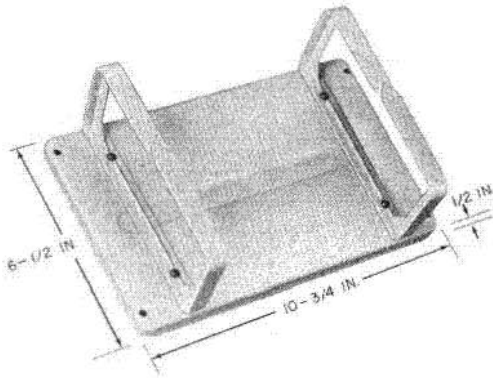
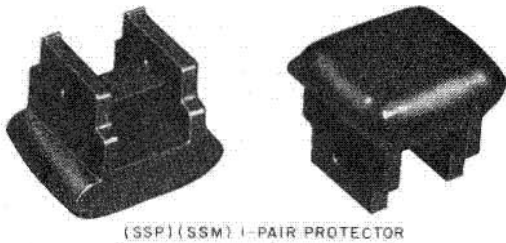


Fig. 4—188B1 Backboard



(SSP) (SSM) 1-PAIR PROTECTOR

Fig. 5—AT-8660 F Clip Terminal Insulator

mechanically protects one pair and may be located in adjacent pair positions without interference to protect any number of pairs.

2.09 The 88A wire retainer (Fig. 6) is used on top- or bottom-mounted blocks to form a fanning strip slot for the cross-connect wire.

2.10 The C test cord (Fig. 7) is attached to a wall-mounted 101B2 wire terminal, located so the cord plug will reach all 88-type blocks, and is left in place for testing purposes. The cord is now made in 4- and 8-foot lengths to facilitate reaching all terminations in large distributing fields.

2.11 The B key equipment test block can be used to test CO/PBX line circuits in 1A1 or 1A2

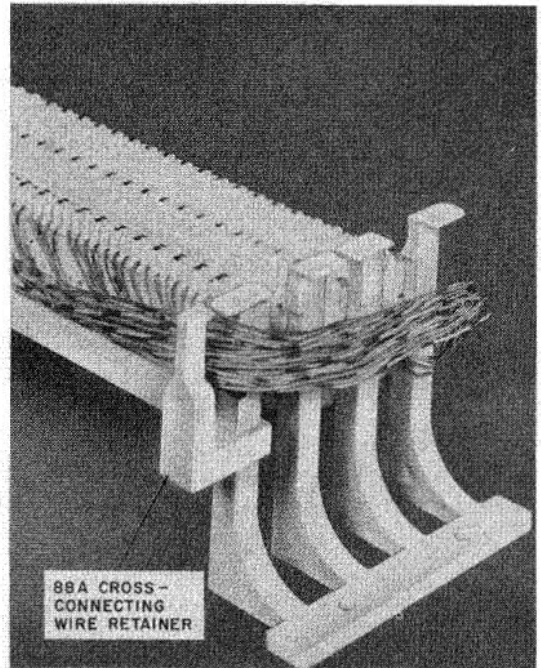


Fig. 6—88A Wire Retainer

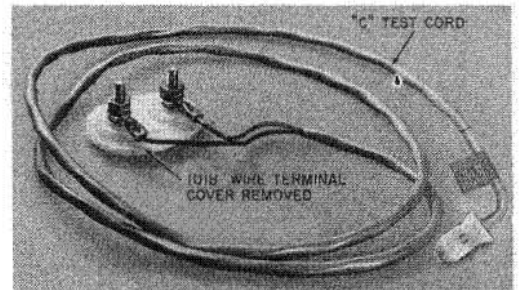


Fig. 7—C Test Cord and Terminal Block

Key Telephone Systems (KTSs). The test block (Fig. 8) can be used on 88-type connecting blocks in the red or blue fields with or without jumpers terminated on the connecting block. Spring-loaded probes make connection with the contacts associated with T, R, A, AI, LG, and L on the station side



of the line circuit. The test block is also equipped with two lamps (T/R and LP), a pushbutton (H), and a 2-position slide switch (TST-TLK). Two terminals on the sides of the test block are provided for connecting a 1013A or equivalent hand test set. Use of the test block is covered in Table D.

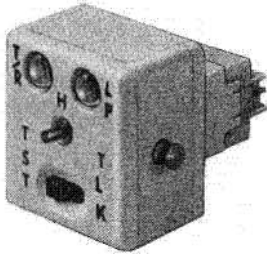


Fig. 8—B Key Equipment Test Block

#### ◆PATCH CORDS

**2.12** The 88P-type patch cords (Fig. 9) are intended primarily for use with the Customer Administered Terminal Move Service (CATMS), but may have applications with other installations of 88-type wiring and connecting blocks. They are available with 1, 2, or 3 pairs in fifteen discrete lengths from 25 to 235 centimeters. Stranded 24-gauge wire with PVC insulation is used. Attached to each end of the patch cord is a fire-resistant plastic connector which plugs into an 88-type connecting block mounted on the front of a wiring block. The connector is designed to fit over the teeth of the connecting block in such a way that pair alignment is maintained. The word "TOP" is visible on the white upper side of each connector to assure that leads are not reversed. The 88P-type patch cords are reusable and require no tools for installation or removal. A complete list of patch cords is contained in Table B.

**2.13** The letters and numbers (eg, 88P4A2A) of the complete code designation provide the following information:

- (1) 88—part of 88 connective system hardware.
- (2) P—CATMS patch panel application.
- (3) Single digit—number of conductors.

- (4) Single letter—major design changes.
- (5) Double or single digits—cord length code.
- (6) Single letter—minor design changes.

**2.14** In addition to the 88P patch cords, the CATMS utilizes special purpose 88-type hardware not covered in this section. Refer to Section 917-454-401 for CATMS ordering information and engineering planning guidelines. Equipment installation instructions are covered in Section 461-617-100.◆

#### TOOLS

**2.15** The 5-pair insertion tool (Fig. 10) consists of the ◆788B2◆ tool head mounted in the 788A1 tool handle. The tool head is used to seat five cable pairs at one time or to insert 3- or 5-pair connecting blocks on the index strip of the wiring block.

**2.16** The 788C1 cutoff tool head (Fig. 11) mounts in the 788A1 tool handle and is used to cut five cable pairs at one time on the index strip after proper insertion.

**2.17** The single pair insertion tool ◆(788D4)◆ is supplied as a combination of the handle and insertion head. The reversible ends of the head provide either insertion/cutoff or insertion only (Fig. 12) of a single cable pair.

**2.18** The 788J1 impact tool (Fig. 13) is used to perform the same functions as the 788B2 and 788C1 tools, but it has a spring-loaded handle designed to supply the proper impact force to seat and cut off conductors or to insert the connecting blocks. The blade section of the head is easily removed for replacement or positioning for wire seating/cutoff or seating only. The 88-type connecting blocks should be placed on the index strips, by hand, before insertion, using the tool. The 788J1 tool replaces the 788H1 which is rated MD.

**2.19** The 788K1 lead retention tool is used when it is necessary to remove the 88-type connecting blocks from the index strips of the wiring blocks. The blade of the tool is used to hold the wires in place in the index strips (Fig. 27) while the connecting block is being removed as shown in paragraph 4.02.

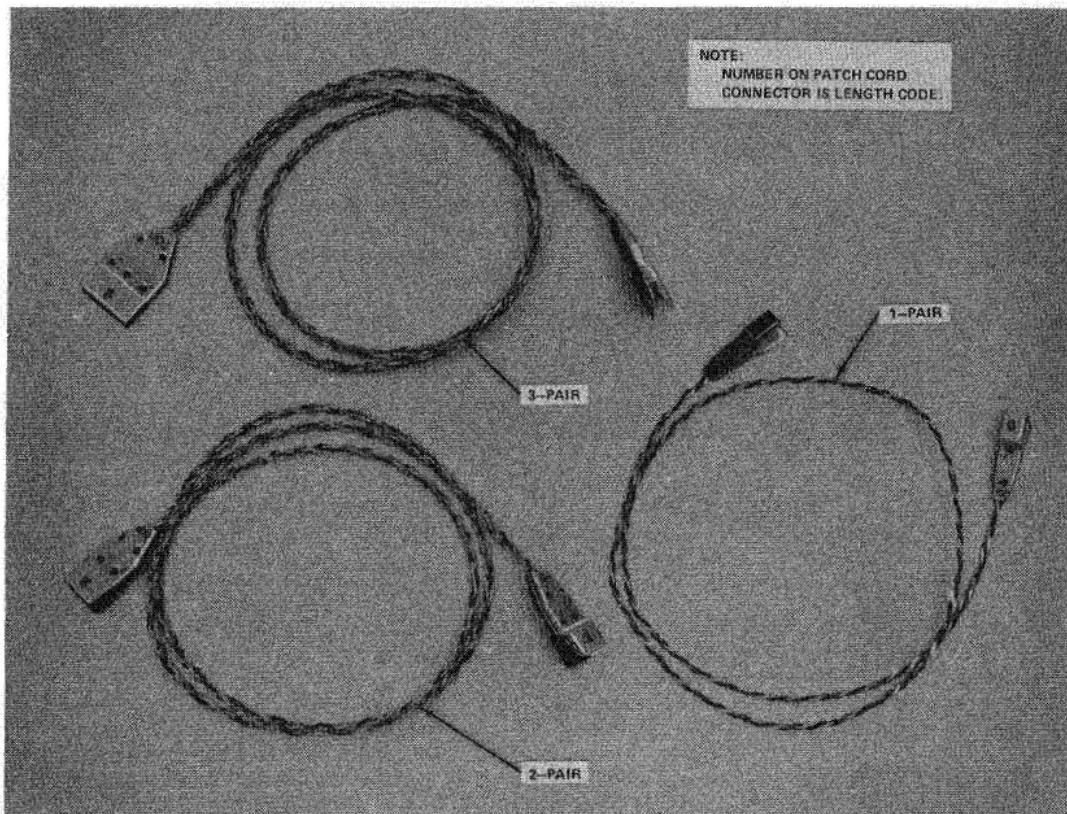


Fig. 9—88P-Type Patch Cords

2.20 The D impact tool (Fig. 14) consists of a handle with an adjustable impact force and a cavity for storing an extra blade. Double-ended blades are available which permit insertion/cutoff or insertion only of single conductors on 88-, 66-, or 630-type connecting blocks. Two knurled wheels are provided in the tool handle—one to adjust the impact force depending on wire gauge and type of connecting block; the other to expose the opening for the extra blade storage. The D impact tool is used to cut off and/or seat single conductors on the connecting blocks.

#### ORDERING GUIDE

##### Blocks and Tools

- Block, Wiring, 88-Type (refer to Table A)
- Block, Connecting, 88-Type (refer to Table A)
- Tools (refer to Table C).

#### Associated Apparatus

- Strip, Designation

188AB1-100 (blue, two per package—predesignated 1 to 100)

188AG1-100 (green, two per package—predesignated 1 to 100)

TABLE B

## PATCH CORDS

COMPLETE APPARATUS CODE DESIGNATION			LENGTH CODE (NOTE)	LENGTH	
1-PAIR (2-CONDUCTOR)	2-PAIR (4-CONDUCTOR)	3-PAIR (6-CONDUCTOR)		CENTIMETERS	INCHES
88P2A00A	88P4A00A	88P6A00A	00	25	9.84
88P2A0A	88P4A0A	88P6A0A	0	65	25.59
88P2A1A	88P4A1A	88P6A1A	1	70	27.56
88P2A2A	88P4A2A	88P6A2A	2	85	33.46
88P2A3A	88P4A3A	88P6A3A	3	95	37.40
88P2A4A	88P4A4A	88P6A4A	4	110	43.31
88P2A5A	88P4A5A	88P6A5A	5	125	49.21
88P2A6A	88P4A6A	88P6A6A	6	140	55.12
88P2A7A	88P4A7A	88P6A7A	7	155	61.02
88P2A8A	88P4A8A	88P6A8A	8	170	66.92
88P2A9A	88P4A9A	88P6A9A	9	185	72.83
88P2A10A	88P4A10A	88P6A10A	10	205	80.71
88P2A11A	88P4A11A	88P6A11A	11	220	86.61
88P2A12A	88P4A12A	88P6A12A	12	235	92.52
88P2A13A	88P4A13A	88P6A13A	13	230	90.55

*Note:* Codes 0 through 13 are used with the Customer Administered Terminal Move Service; code 00 is used with key system patch panels only.



Fig. 10—5-Pair Insertion Tool

- 188BB1—100 (blue, two per package)
- 188BP1—100 (purple, two per package)
- 188BY1—100 (yellow, two per package)
- 188CR1—25 (red, one per package)

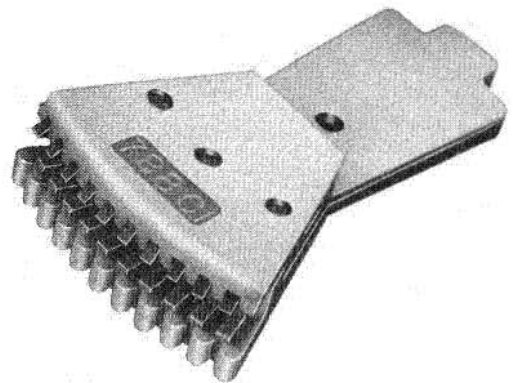


Fig. 11—788C1 Tool, 5-Pair Cutoff Tool

- Insulator, Terminal, Clip F, AT-8660 (as required)
- Retainer, 88A (as required)
- Backboard, 188B1 (as required)
- Cord, Patch, 88P-Type (refer to Table B)

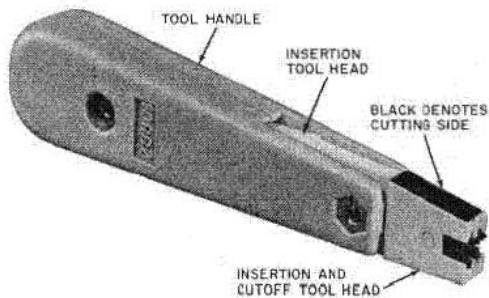


Fig. 12—788D-Type Tool, Single-Pair Insertion/Cutoff

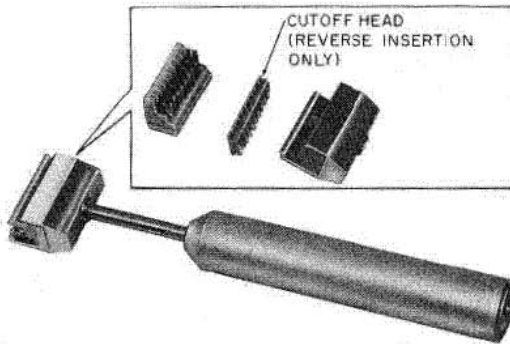


Fig. 13—788J1 Tool, Impact Insertion

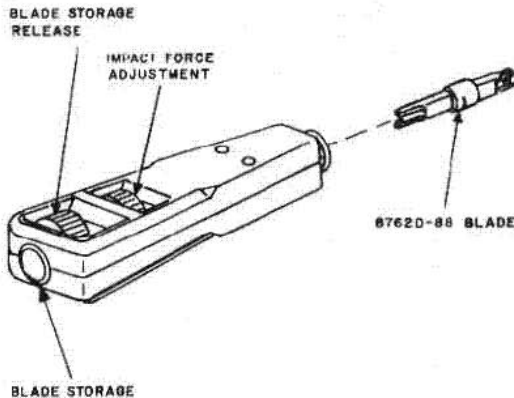


Fig. 14—D Impact Tool

- Cord, Test C, AT-8662, 4 foot or 8 foot (specify length)
- Terminal, Wire, 101B2
- Block, Test, B Key Equipment, AT-8700.

### 3. INSTALLATION

- 3.01** The 88-type wiring blocks are usually arranged so that the direction of expansion, if required, will be horizontal as shown in Section 518-010-101.
- 3.02** Wiring blocks may be added to existing blocks following the pattern established for centralized key telephone installations. Refer to Section 518-010-101.
- 3.03** Mount the 88-type wiring blocks with index strips horizontal on a smooth wall surface using fasteners appropriate for the type of wall surface.
- 3.04** Cables are considered permanent and are always placed on the index strip of the wiring block, never on top of the connecting block. Rearrangements can be made as required with cross-connect wire on top of the connecting blocks.
- 3.05** Cabling can enter the array of wiring blocks from either top or bottom. Fish cables behind installed wiring blocks as follows:
- (1) When station or equipment cable enters from the top, use No. 6 twine with a weight. Drop behind wiring block and use wire hook to fish through proper cable slot. Pull cable down through cable slot.
  - (2) When cable enters from the bottom, drop weighted No. 6 twine through proper cable slot and down behind the wiring blocks. Pull cable up through cable slot.
- 3.06** Cable slots are numbered with the odd numbers on the left and the even numbers on the right, from top to bottom (Fig. 15). In the red field, only the odd number cable slots on the left side are used.
- 3.07** When running 25-pair station cables, leave jacket on until cable has been threaded through the proper cable slot. Start cable 1 through slot 1 to row 1, cable 2 through slot 2 to row 2, etc.

♦ TABLE C ♦

## TOOLS

ORDERING GUIDE	DESCRIPTION	REMARKS
Handle, 788A1	Tool Handle	For 788B2 or 788C1 Tools
Tool, 788B2	5-pair Insertion Tool Head	Order Handle Separately
Tool, 788C1	5-pair Cutoff Tool Head	
Tool, 788D4	1-pair Insertion/Cutoff Tool	Consists of Head and Handle
Tool, 788J1 Tool, 788H1 (MD)	5-pair Insertion Tool	Impact Type
Tool, 788K1	Lead Retention Tool	Used when removing Connecting Blocks
Handle, Tool, Impact, D	Tool Handle	Adjustable Impact Tool
Blade, 8762D-88	Single Lead Insertion or Insertion/Cutoff	For use in D Impact Tool on 88-Type Wiring Blocks*
Tool, 788M1	5-pair Tool Head	Replacement Head for 788J1 Tool

\* Blades are available for 66- or 630-type connecting blocks. For 66-type, order 8762D-66; for 630-type, order 8762D-630.

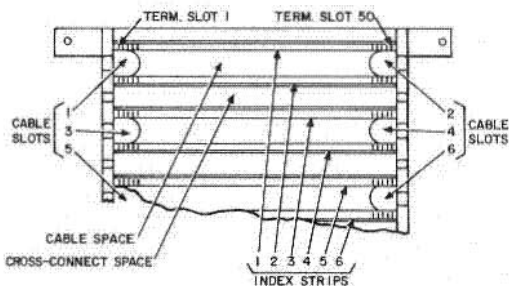


Fig. 15—Numbering Plan for 88-Type Wiring Block

**3.08** Remove the cable sheath for multiple binder cables, approximately twice the length of the wiring block, allowing the sheath end to extend under the backboard. The cable is separated into 25-pair groups with their proper identification (color binder). The 25-pair binder groups are threaded through the cable slots provided in the backboard (blue-white through cable slot number 1 to row 1, orange-white through cable slot number 2 to row 2, green-white through cable slot number 3 to row 3, brown-white through cable slot number 4 to row 4, etc (Fig. 16).

**3.09** The index strips start with number 1 at the top and continue downwards in consecutive order. The index strip slots are numbered

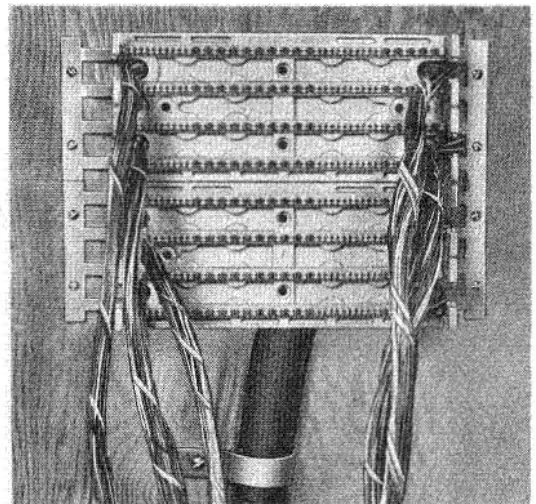


Fig. 16—200-Pair Cable in Cable Slots

consecutively from left to right with number 1 the first slot on the left and number 50 the last slot on the right. Pair number 1 would be seated in slots 1 and 2, and pair number 25 would be in slots 49 and 50.

**3.10** Terminations are made following the sequence outlined in paragraphs 3.11 through 3.24.



3.11 The conductors of a 25-pair cable or a binder group are placed in the index strip slots following the even-count color code starting with white-blue in slot 1, blue-white in slot 2, white-orange in slot 3, etc (Fig. 17). The conductors should not be taut; some slack is desirable. The high tooth on the index strip splits the conductors of a pair. Light finger pressure is sufficient to cause the conductor to be held in the index strip. Place all 25 pairs and check for split pairs, missed slots, etc.

3.12 After all pairs are placed in a pair of index strips adjacent to a cable space, the 788B2 or 788J1 insertion tool is used to seat the conductors in the index strip (Fig. 18). Start at the end of the index strip nearest the cable entrance and work across the block. Make sure conductors are bottomed in the index strip, especially when using larger gauge wire. Use only enough pressure to seat conductors. **Do not hammer on 788B2 insertion tool.**

3.13 On wiring blocks used to provide key line service multiples (red field), the conductors are placed across the five index strips, again using

a light finger pressure to place (Fig. 19). Conductors should not be tight.

3.14 Seat the conductors in the same manner described in paragraph 3.12. **When using the 788J1 tool, be sure that the blades are not exposed.**

3.15 Cut off excess wire using the 4-pair cutoff tool (Fig. 20) or the cutoff side of the 788J1 tool. Conductors should be perpendicular to index strip for ease in cutting.

**Caution: Do not use diagonal pliers or electrician scissors due to the possibility of cutting more than one wire at a time or causing shorts between conductors. Doing so may cause circuit damage to solid-state devices used in key telephone systems or PBXs.**

3.16 The conductors are electrically terminated by placing an 88-type connecting block on the wiring block using the insertion tools. **Properly align connecting block in the index strip**

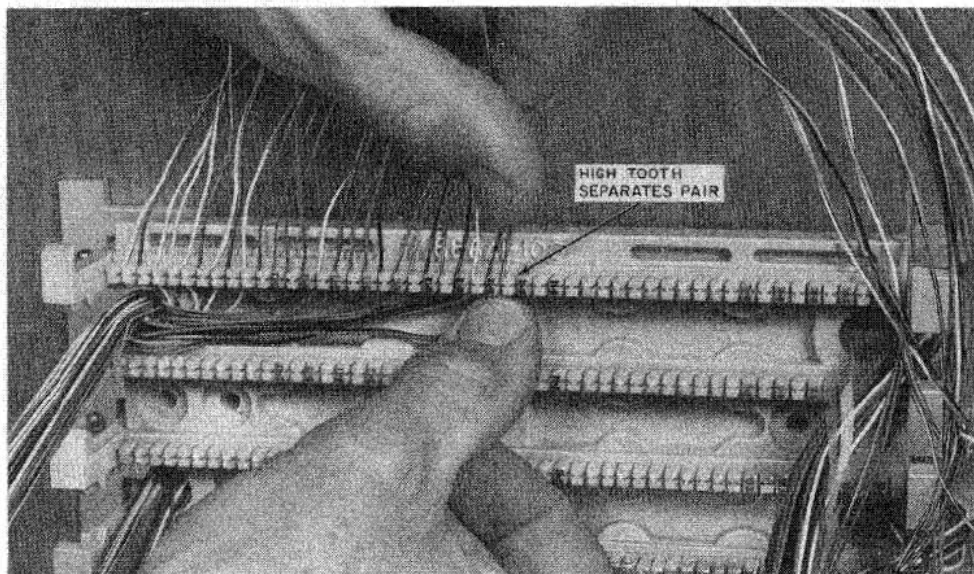


Fig. 17—Placing Conductors in Index Strip

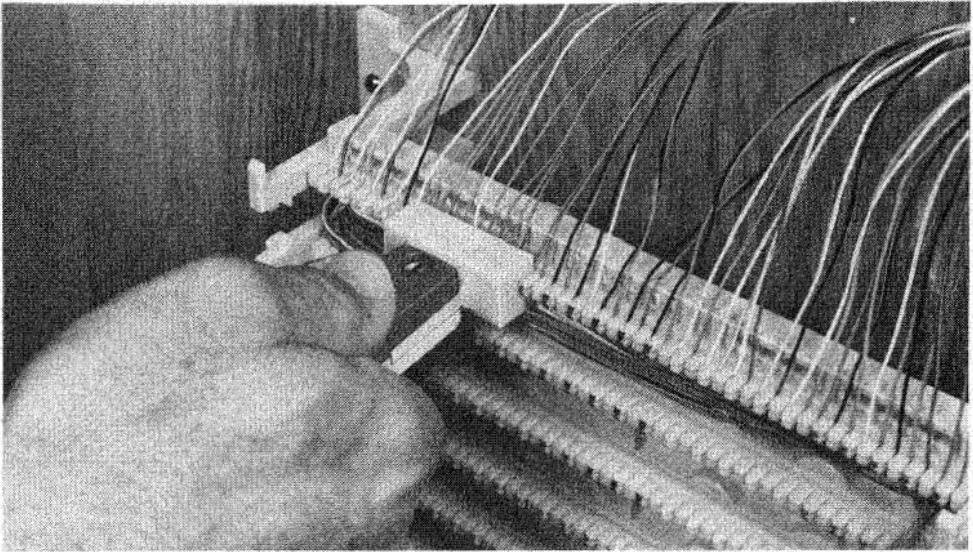


Fig. 18—Seating Conductors in Index Strip

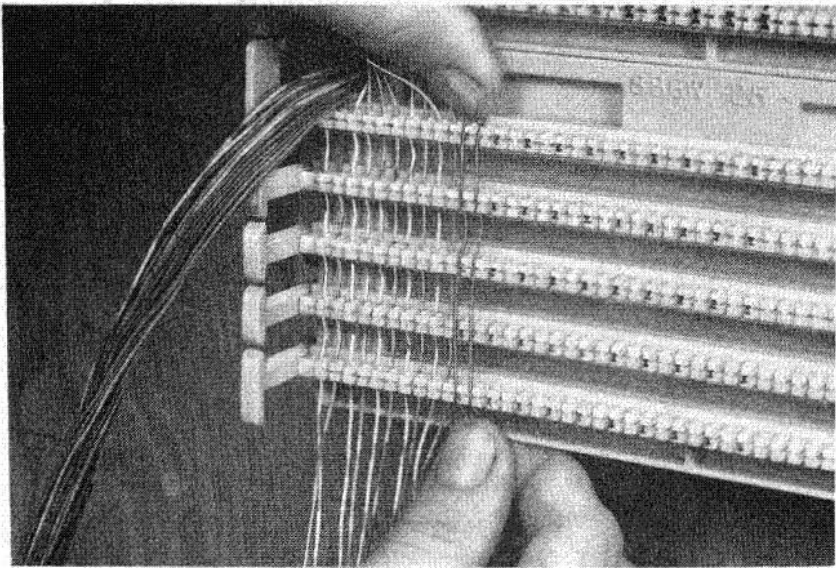


Fig. 19—Multiple Connections in Red Field

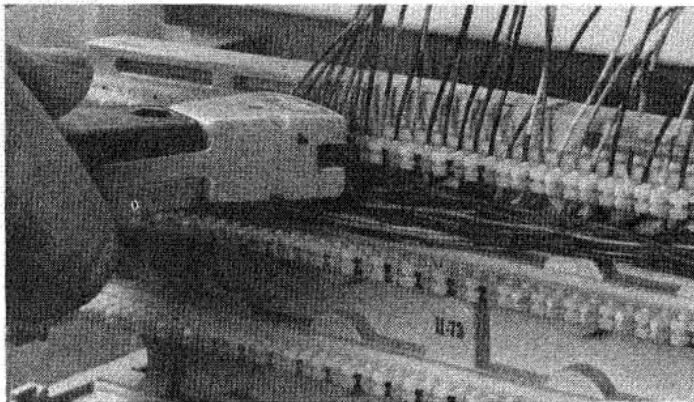


Fig. 20—Cutting Excess Wire

(Fig. 21), by hand, then seat the block with a straightforward motion (do not rock) using the 788B2 or 788J1 tool.

*Caution: 88-type blocks are designed to prevent split pairs. Connecting blocks must be properly located on the index strip to prevent block breakage during insertion. Low teeth of the index strip engage the shallow cavities of the connecting blocks, and high teeth engage the deep cavities. To prevent damage to the conductors and to seat the connecting block with the least effort, it is imperative that proper alignment is made before applying pressure to seat the connecting block. The connecting block is properly seated when the buttons on the index strip are fully engaged by the holes in the connecting block skirt. Do not hammer on insertion tool.*

3.17 The slate-white 88-type connecting blocks aid in pair identification. Place the blocks on the index strip starting with the white side up at the extreme left and alternating slate and white sides for the remainder of the strip (Fig. 22). Use the 5-pair connecting block where it is desirable to identify even-count color groups. Use the 3-pair blocks where the six leads of key system line circuits are terminated such as in the blue field. Place blocks only as required.

3.18 After all connecting blocks have been seated, snap the appropriately colored designation strip in the wiring block (Fig. 23). Mark the designation, as required, for later identification of lines or stations.

3.19 Insert the F-type, 24-gauge cross-connect wire into the connecting block slots as shown in Fig. 24. Light finger pressure is sufficient to insure retention of the wire in its proper location. **Leave 2 inches of slack in the wire for tracing and repairing.** Cross-connect wire may be routed through either fanning strip for shortest wire runs.

3.20 ♦Using the 788D4 tool with the insertion/cutoff head extended, seat and cut off the excess wire as shown in Fig. 25. **The black side of the head must face the scrap end of the wire, which may be on the top side or the bottom side of the connecting block.** The D impact tool can also be used for this operation (using the proper blade), **but the 788C1 or 788J1 should not be used.**♦

3.21 When using the D impact tool to make connections to the connecting block, make sure the proper blade is being used (S762D-88) and the proper end of the blade is exposed, depending on whether or not the wire is to be cut off. The impact should be adjusted to the "LO" position.



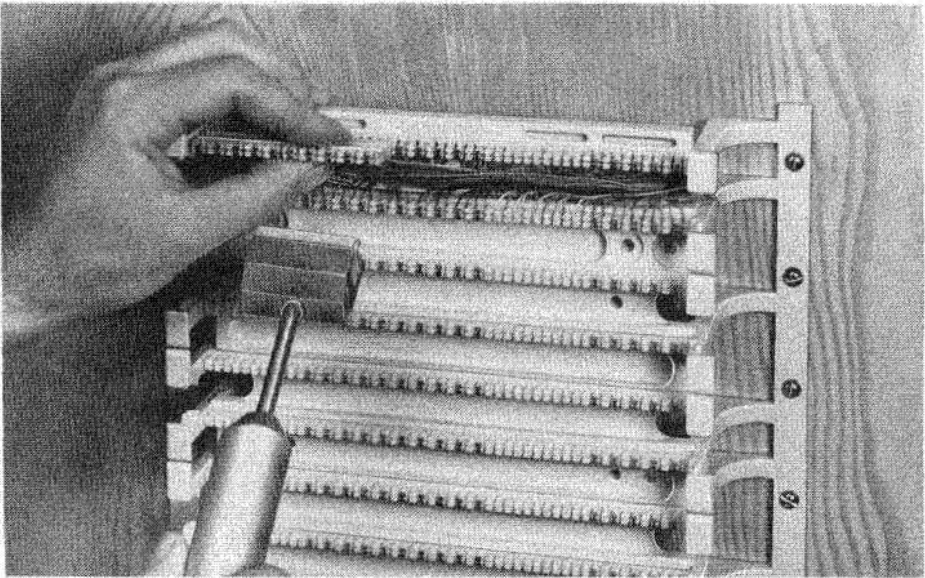


Fig. 21—Connecting Block Placed on Index Strip

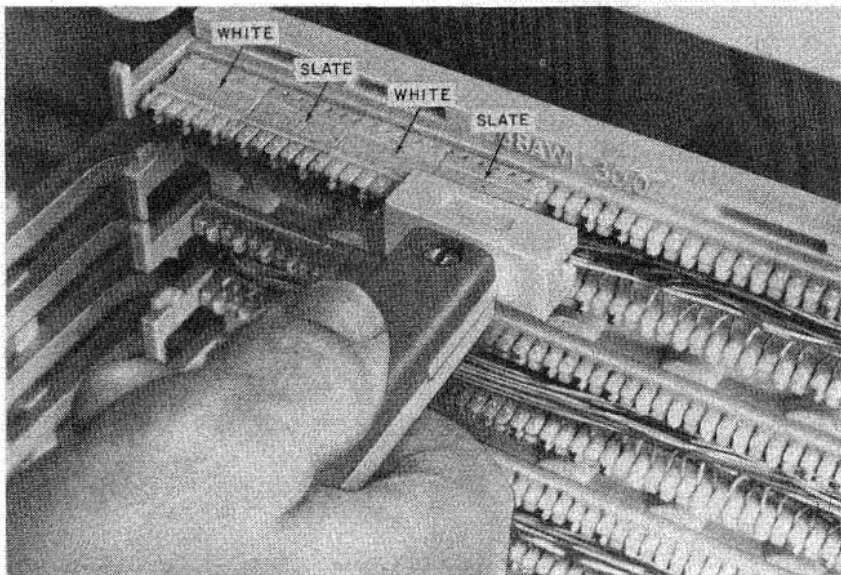


Fig. 22—Seating Connecting Block on Index Strip

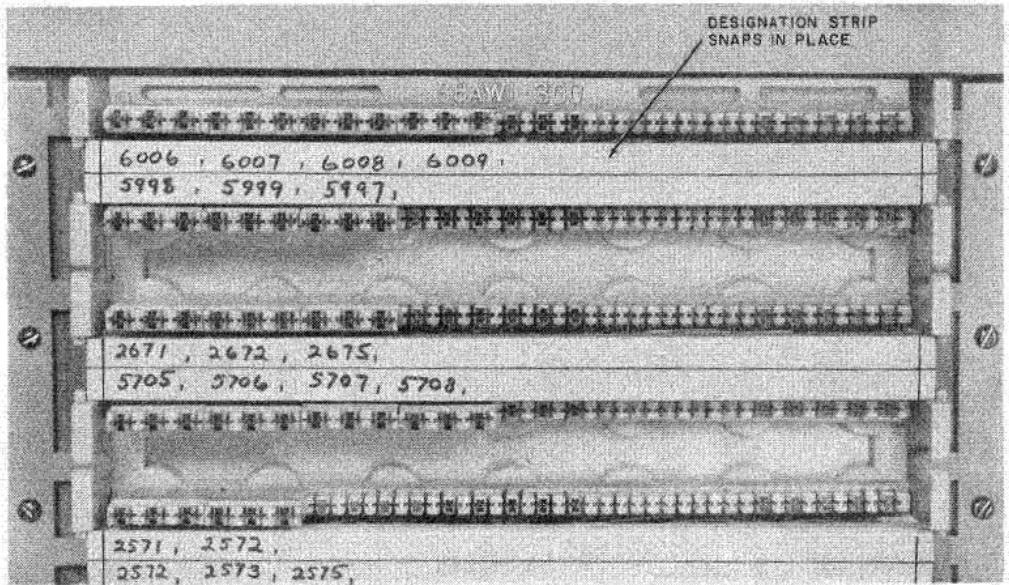


Fig. 23—Marked Designation Strips on Wiring Block

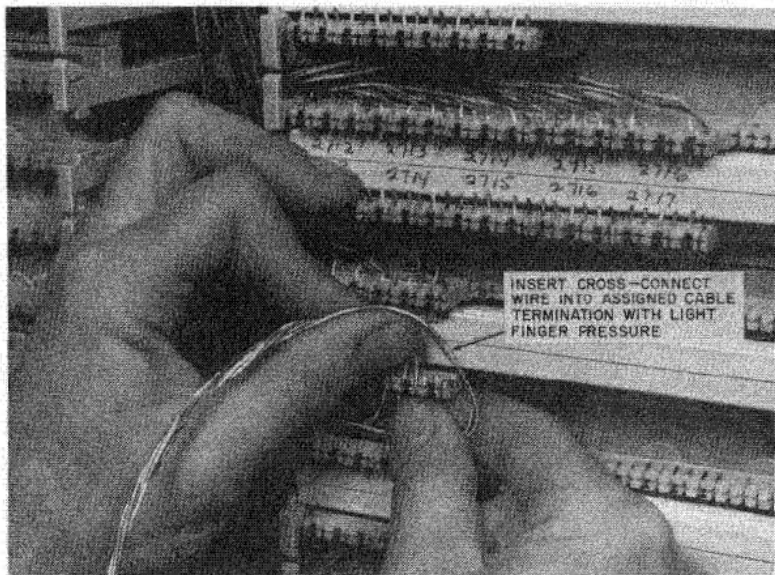


Fig. 24—Inserting Cross-Connect Wire

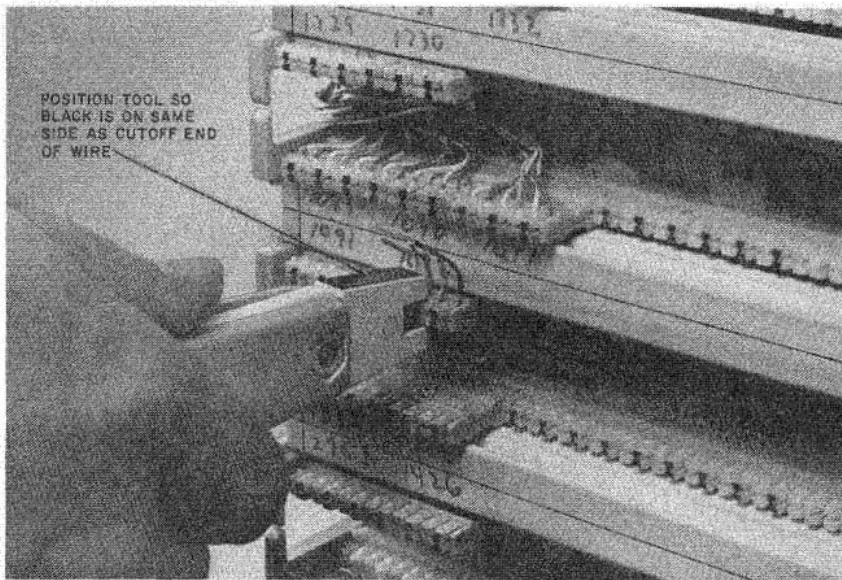


Fig. 25—Terminating Cross-Connect Wire

**3.22** Use only 24-gauge F cross-connect wire on the top of the connecting blocks. The wire may be reterminated as often as necessary as long as a new bite is taken at the connector each time it is reterminated.

**3.23** To remove a cross-connect wire, use long-nose pliers to grip the wire where it enters the connecting block (Fig. 26) and pull straight out. Remove any fragments of insulation remaining on the clip or its cavity using a KS-6320 orange stick.

**3.24** To reterminate a wire which has been removed for rearrangement or testing, cut off the old contact area, pull a small amount of slack and repeat paragraphs 3.19 and 3.20 using long-nose pliers to place wire in connecting block.

**3.25** D station wire (22 gauge) is treated as station cable and fanned into the index strip. Where D station wire is used, it should be kept to a minimum.

**3.26** Never terminate drop or block wiring on 88-type wiring blocks; always terminate on

protectors or other blocks, and cross-connect using 24-gauge wire to 88-type hardware.

**3.27** More than five multiples of a given feature can be provided, when required, using one of the following methods:

(a) Use a KS-19252,L2 (PCP) bridging adapter and the precabled wiring blocks (88BW1-25C or 88BW1-75C) to obtain ten multiples. Refer to Section 461-200-101 for information on the bridging adapter.

(b) If the need for additional multiples is known at the time the blocks are cabled, 15 multiples can be provided using an 88BW1-75 wiring block and placing the cable end in all 15 index strips.

(c) Where additions require more multiples than available, use one of the multiples to jumper to an unused or added wiring block. The jumpers should originate in the last appearance of the initial wiring block and terminate in the index strips of the new wiring block.

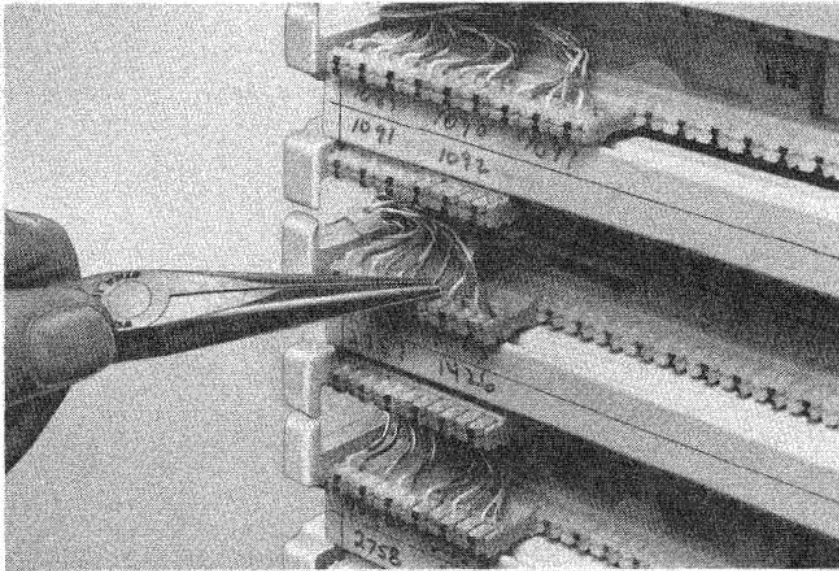


Fig. 26—Removing Cross-Connect Wire

#### 4. MAINTENANCE

4.01 Connecting blocks would normally not be removed from wiring blocks except as follows:

- (a) When the cable is being removed.
- (b) To repair a cable conductor on the wiring block.
- (c) To replace a defective connecting block.

Always tag and identify all cables and their next point of termination. **Do not remove a connecting block during routine trouble shooting. Use appropriate test tools to isolate a fault. In most cases, the fault location will not be under the connecting block.**

4.02 There is no prescribed method of repairing a damaged connecting block; the connecting block must be replaced as follows:

- (1) Tag and remove the cross-connect wires from the connecting block.

- (2) Remove the designation strip from the wiring block.

- (3) Position the blade end of the 788K1 tool at the base of the connecting block over the cable pairs to retain them in the index strip while the connecting block is being removed (Fig. 27).

- (4) Using a pair of combination or side-cutting pliers, grip the 88-type connecting block firmly in the center as shown in Fig. 27, then gently pull with a slight up-and-down motion to release the connecting block from index strip. **Do not reuse connecting block.**

- (5) If the cable conductors were pulled out of the index strip on the wiring block, replace them as follows after cutting off old contact portion of wire:

- (a) Using a pair of long-nose pliers, grip each removed conductor individually and pull to obtain slack; then reposition the conductors in their original position on the index strip (be careful not to split pairs). If enough

slack cannot be obtained to reposition the conductor in the index strips, it will be necessary to piece out the conductor (use wire having the same colored insulation and gauge; splice with Bell System or other approved connectors).

(b) Using the 788D4 or D impact tool, seat the conductor firmly in the bottom of the index strip (Fig. 28).

(6) Place a new 88-type connecting block as outlined in Part 3 and replace the designation strip.

(7) Replace the tagged cross-connect wires in their original position as outlined in Part 3 after cutting off old contact part of wire.

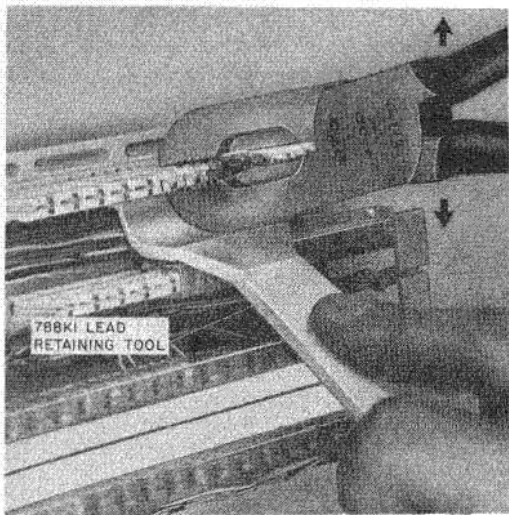


Fig. 27—788K1 Lead Retention Tool

4.03 The B key equipment test block can be used as an aid in isolating trouble in CO/PBX lines or for testing newly installed circuits. Table C lists the various tests that can be made and the test results expected. The test block may be used on the equipment wiring blocks with or without jumpers in place. Care must be taken to align the block on the T, R, A, A1, LG, and L terminals for the line being tested.

4.04 The lamps in the test block can be replaced as follows:

- (1) Use a straightened paper clip or equivalent to eject the lamp by inserting the clip in the small hole in the rear of the block, directly behind the lamp.
- (2) Insert the new lamp from the front, making sure the proper voltage lamp is used. The voltage of the lamp is marked directly above the ejection hole.

Replacement lamps can be obtained from Sylvania Electrical Products, Incorporated. For the 12-volt lamp (LP), use a 12ESB indicator lamp, code 31255-0. For the 48-volt lamp (T/R), use a 48ESB, code 34861-0.

4.05 In the event it becomes necessary to replace a cable due to trouble or rearrangements, follow the procedures in the following paragraphs:

**Caution: Do not cut a working cable. Doing so may cause system troubles or cause surge currents that can damage electronic components.**

4.06 One method of cable rearrangement requires an unused index strip as follows:

- (1) Cut off existing inside wiring cable at the blue wiring block and remove designation strip.
- (2) Replace cable, using old cable to pull in new if in duct.
- (3) Remove sheath of new cable and cut down on a vacant index strip.
- (4) Install new connecting blocks on index strip in same position as old index strip.
- (5) At the cable cutoff in (1) above, trace each 3-pair jumper back to its origin on the red wiring block.
- (6) Remove the old jumpers, one at a time, and run new jumpers to the connecting blocks mounted on the new index strip.
- (7) Replace designation strip, marking as required.



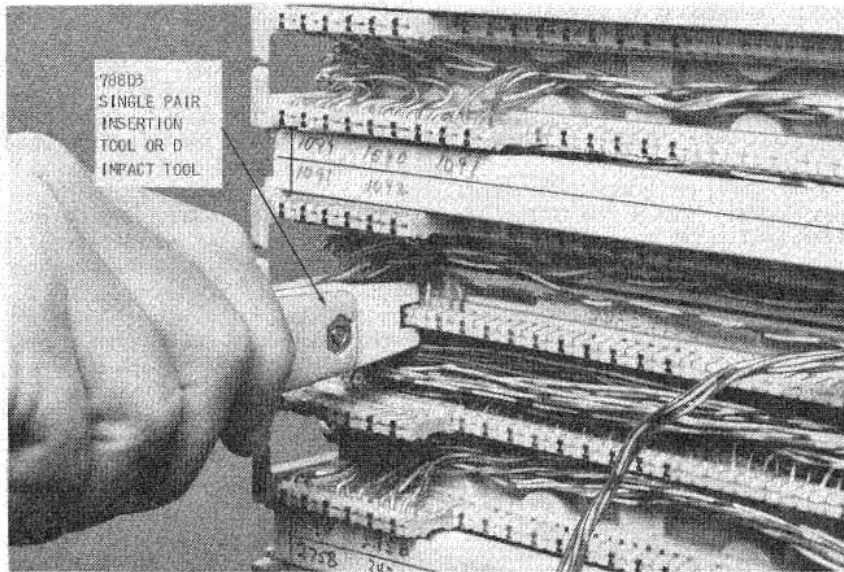


Fig. 28—Seating Conductors With Single-Pair Insertion Tool

- (8) Remove connecting blocks and IW cable from old index strip. This strip can be used in future rearrangements.
- 4.07** An alternate method of cable rearrangement uses the existing index strip as follows:
- (1) Cut off the IW cable at the blue wiring block and remove the designation strip.
  - (2) Replace cable, using old cable to pull in new cable if in duct.
  - (3) Remove each 3-pair jumper from the connecting blocks, tagging each with its location.
  - (4) Remove the connecting blocks and the stub ends of the cutoff cable.
  - (5) Cut down the new cable on the index strip and install new connecting blocks in the same positions, as required.
  - (6) Rerminate jumpers in proper position on connecting blocks, making sure to cut off old contact area.
  - (7) Replace designation strip, re-marking if required.

TABLE D

## B KEY EQUIPMENT TEST BLOCK OPERATION

SWITCH POSITIONS		LAMP INDICATIONS		TEST RESULTS
H	TST-TLK	T/R	LP	
Normal	Test	On	On	Normal—KTU OK, CO/PBX line OK
		Off	On	KTU OK—CO/PBX line open or short
		On	Off	KTU defective (A lead)—CO/PBX line OK
		Off	Off	KTU defective, missing or miswired
Depressed	Test	Off	Wink	Normal—if key system is wired for wink-on-hold
		Off	Steady	Station off-hook or short on line (Note 1)
		On	Off	KTU defective or faulty power supply
		Off	Off	KTU defective, missing or miswired
Normal	Talk	Off	On	Normal (Note 2)
		Off	Off	KTU defective, missing or miswired
Depressed	Talk	Off	Off	Normal
		Off	On	Station off-hook or short on line

*Note 1:* Normal if key system is wired for steady lamp on hold.

*Note 2:* If CO/PBX line is connected, it should be possible to dial out using hand test set connected to terminals.





## MATRIX BLOCK—1A1

### IDENTIFICATION, INSTALLATION, WIRING, AND MAINTENANCE

#### 1. GENERAL

1.01 This section provides identification, installation, wiring and maintenance information for the 1A1 Matrix Block when used in key telephone systems to provide for diode control of station audible signals (Fig. 1).

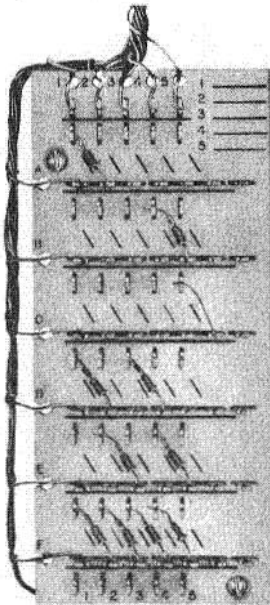


Fig. 1—1A1 Matrix Block—Typical Diode Installation

1.02 This section is reissued to change 2.05, 3.03, and 4.01 and Fig. 7 and 8.

#### 2. IDENTIFICATION

2.01 The 1A1 Matrix Block consists of a molded plastic block equipped with horizontally and vertically aligned rows of terminal connectors

(commonly referred to as clip terminals) arranged to receive pigtailed 446F diodes.

**Note:** The diodes are not supplied with matrix block and must be ordered separately.

2.02 Overall dimensions of the block are approximately 6-3/8 inches long, 2-13/16 inches wide, and 1-1/4 inches thick including the projection of the clip terminals.

2.03 The various components used in the assembly of a complete 1A1 Matrix Block are shown in Fig. 2. It will be noted that the cross-grid or "matrix" array consists of five vertically positioned rows of a 8-clip terminal (8-terminal connector). The uppermost clip is for the termination of connecting circuit leads. The bottom (end) clip serves as a multiplying point for extending the capacity of the matrix unit. Six rows of a 7-clip terminal (7-terminal connector) are positioned at right angles to these. The left-hand clip on each serves to terminate external circuit leads. The right side (clip) serves as a multiplying point for extending the horizontal capacity (Fig. 3, 4, and 5).

2.04 Vertical rows of terminals are *numbered* 1 through 5 at the top of the block. Space is provided in the upper right-hand corner of each block for designating each of these five rows as desired. Horizontal rows of terminals are labeled *alphabetically* A through F with ample area available to the left of each row for circuit identification.

2.05 Depending on the diode placement (polarity direction), one matrix block can be used to control six rings *less capacitors* from five separate key system line circuit units or vice versa. This, then, can be called a "6 by 5" or "5 by 6" matrix unit, capacity-wise.



**For proper circuit operation, diode controlled rings must be properly poled and connected without capacitors.**

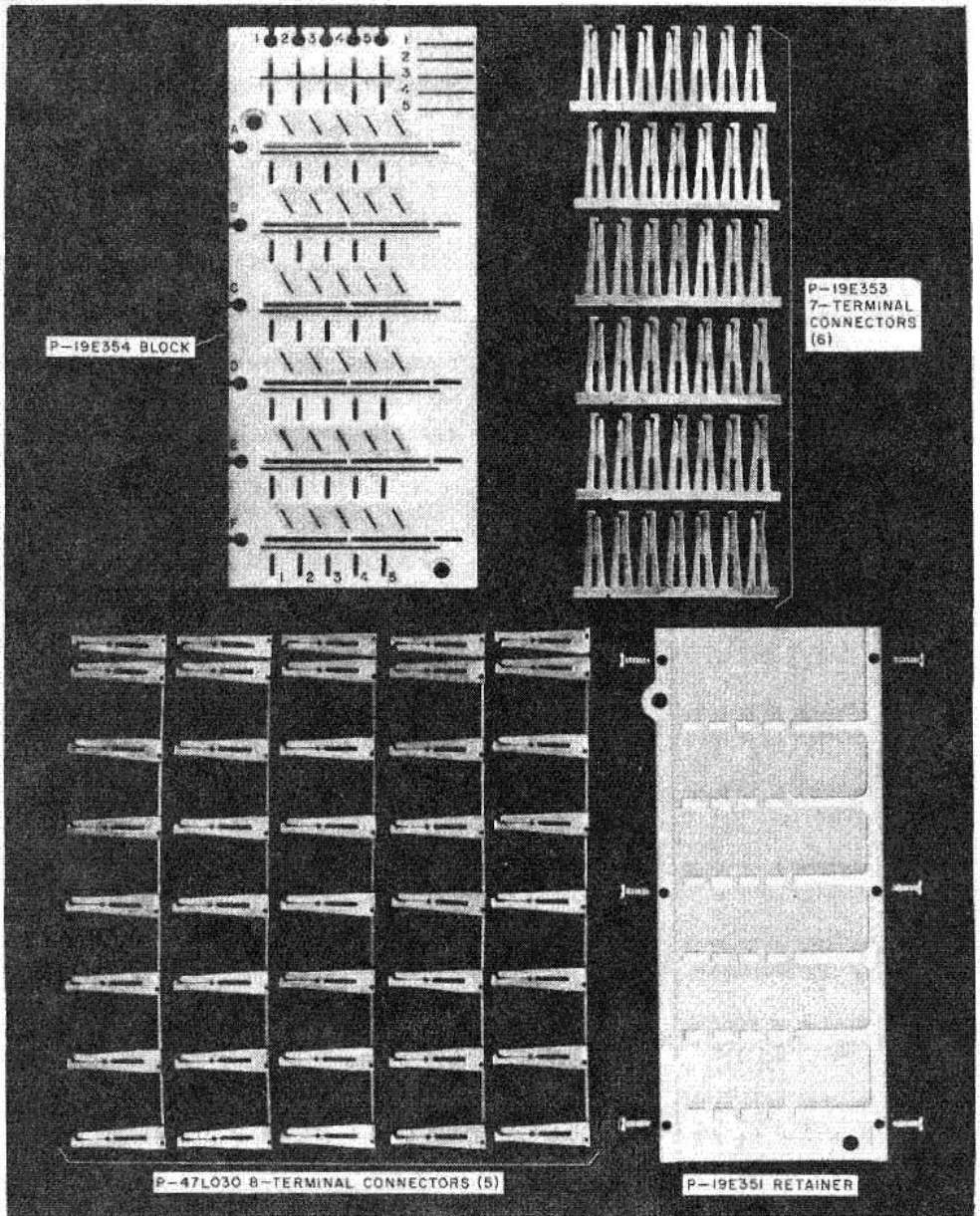


Fig. 2—1A1 Matrix Block—Components

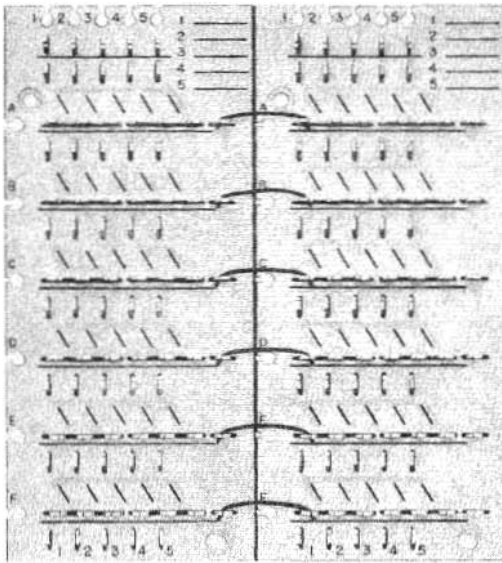


Fig. 3—Modular Array (Multiplied Horizontally)

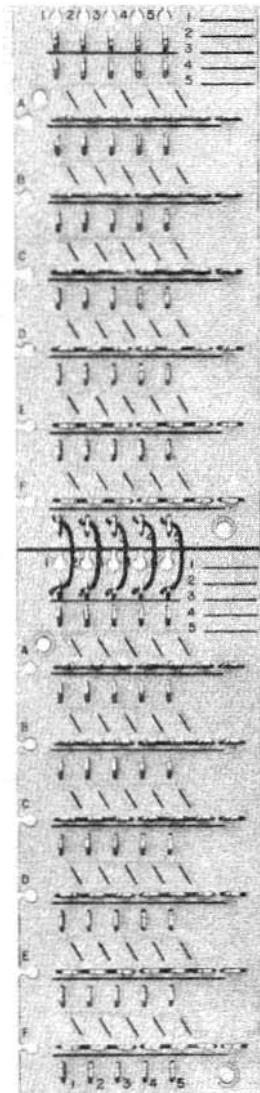


Fig. 4—Modular Array (Multiplied Vertically)

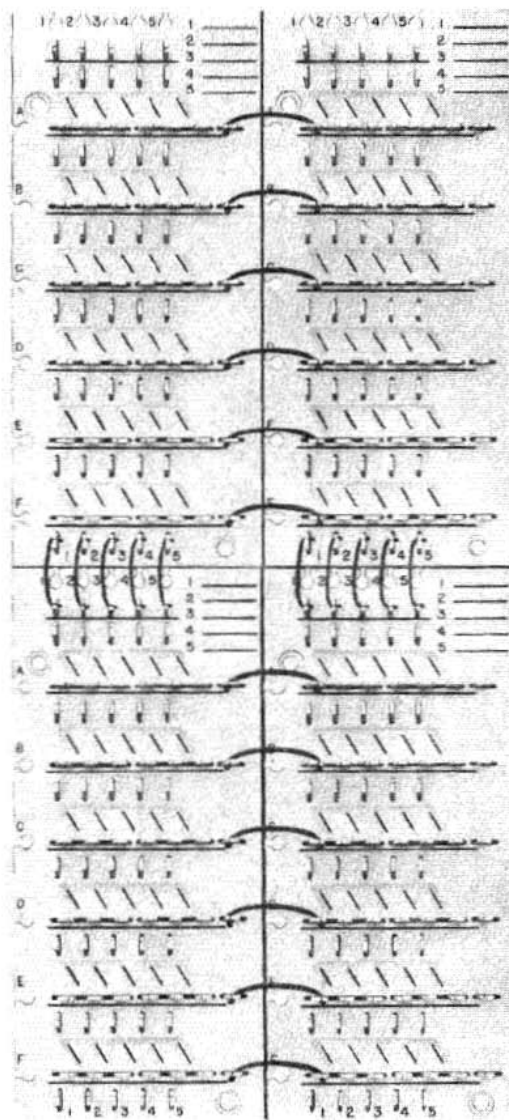


Fig. 5—Modular Array (Multiplied Horizontally and Vertically)

### 3. INSTALLATION

3.01 The 1A1 Matrix Block should be mounted on a flat surface, using mounting holes

provided. Where extended capacity beyond one block is necessary, modular arrays (Fig. 3, 4, and 5) may be employed. Respectively, these offer the following additional capacities:

FIGURE	CAPACITY
3	10 by 6 or 6 by 10
4	5 by 12 or 12 by 5
5	10 by 12 or 12 by 10

3.02 Diodes are installed using the 714B tool.

For ease of installation, it is recommended that the first pigtail termination be made in the **lettered** (horizontal) terminal clip, with the remaining pigtailed end seated and cut in the **numbered** (vertical) clip associated with the given matrix crosspoint (indicated by the diagonal marking on the face of the block). These two operations are shown in Fig. 6.



*When seating and cutting conductor, push the tool straight over the clip. Avoid bending or twisting the clip.*

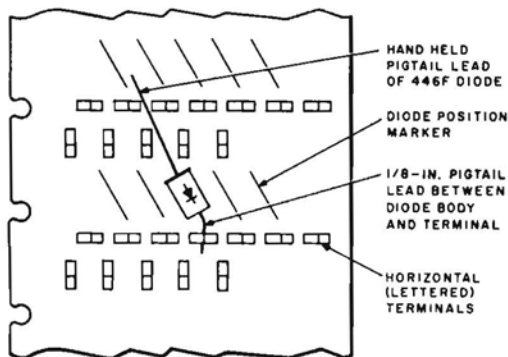
3.03 To allow for proper seating of the diodes onto the undercut face of the block, a 1/8-inch length of pigtail lead should exist between the body of the diode and the clip terminal.

### 4. WIRING

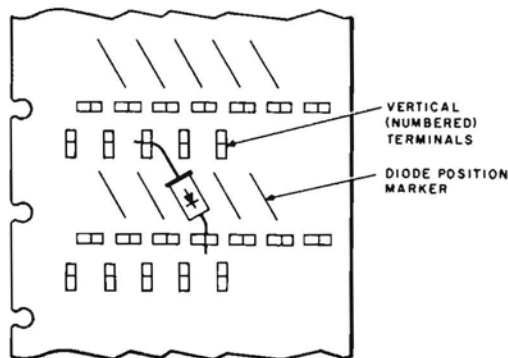
4.01 As previously noted, the 1A1 Matrix Block can be used to control station ringers, through the use of 446F diodes, from 5 (or 6) key system line circuit units. Using the 1A2 Systems 400D KTU as an example, its "ringing control" (RC) lead would be terminated on one of the top clips on the matrix block (vertical row 1, 2, 3, 4, or 5). Station ringers to be activated, when the line circuit is rung, are then "cross-connected" by means of diodes on the face of the block (to stations A, B, C, D, E, and F, as required). Fig. 7 illustrates a typical block schematic layout of this sort.



*JKT, SK, and B service wires have steel cores which will damage the cutting edge of the 714B tool. It is necessary to cut these wires with diagonal pliers, leaving approximately 1/16 inch of wire protruding through*



FIRST OPERATION

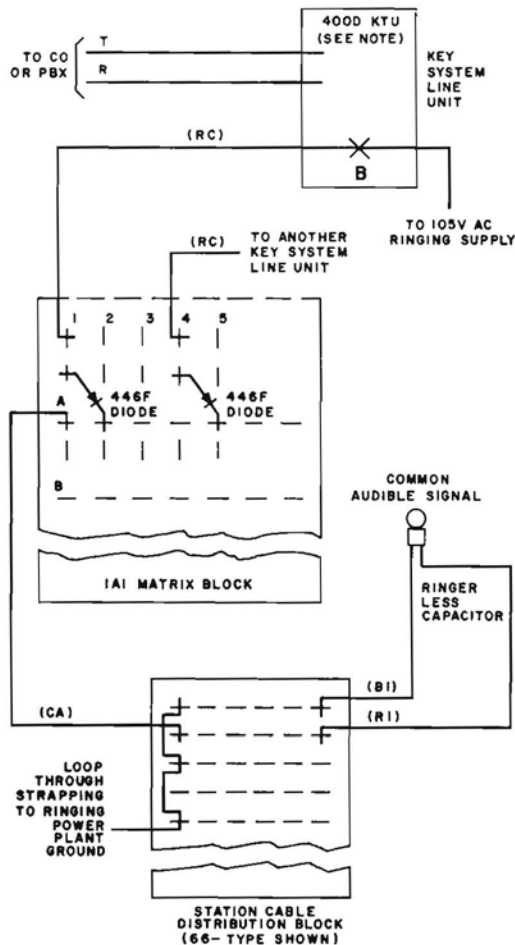


SECOND OPERATION

Fig. 6—Diode Installation

*clip, then terminate with seating end of 714B tool.*

**4.02** The arrangement of the wiring and positioning of the diodes on the block are further amplified in Fig. 8. Installations can be of either polarity, but no block can have a mixture of both. Fig. 8A, for instance, shows the ringing control (RC) leads from the line circuits connected at the top, with the common audible (CA) leads associated with the station ringers connected at the side. The diode should always be pointed (diode symbol apex) toward the station ringer—in this case, all diode arrows pointed downward.



RC = RINGING CONTROL LEAD  
CA = COMMON AUDIBLE CONTROL LEAD  
BI = GROUNDED SIDE, STATION RINGER  
RI = RINGER OPERATING POTENTIAL

## NOTE:

FOR IAI KTS: B RELAY SYMBOL BECOMES (R); RC BECOMES (RI). COMPARABLE DESIGNATIONS APPLY WHEN ASSOCIATED WITH OTHER SIMILAR CIRCUITS.

TPA 48392I

◆ Fig. 7—Block Schematic Layout ◆

**4.03** Proper audible signal control requires the use of a diode per line, per ringer. In cases where only one ringer is to be connected to one line, a bare wire strap can be substituted for a

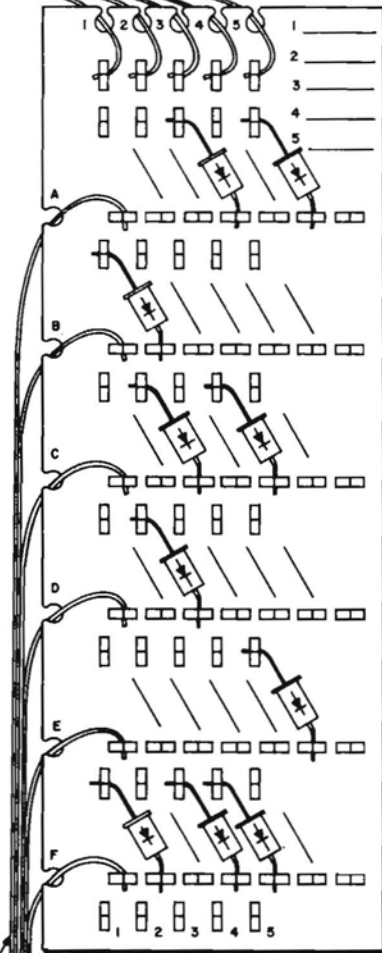
RINGING CONTROL LEADS (5)

COMMON AUDIBLE LEADS (5)  
(TO STATIONS)

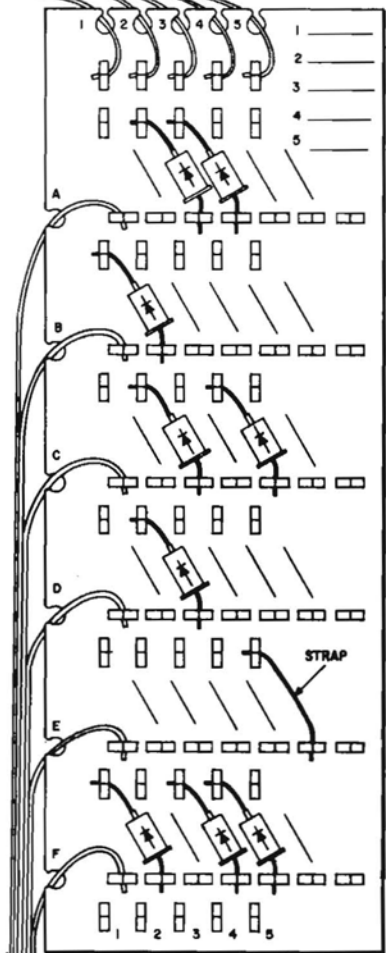
COMMON AUDIBLE LEADS (6)  
(TO STATIONS)

RINGING CONTROL LEADS (6)

TPA 483922



A  
FIVE LINE CIRCUITS—SIX STATIONS



B  
SIX LINE CIRCUITS—FIVE STATIONS

⚡ Fig. 8—Wiring Arrangement and Diode Orientation ⚡

diode at the proper crosspoint on the matrix block. However, when additional ringers are to be associated with that line, or where other lines are to ring that common audible signal, the wire strap must be removed and 446F diodes placed at the proper coordinate points. To illustrate using Fig. 8B as a given matrix block installation:

LINE CIRCUIT (RC LEAD)	OPERATES STATION RINGER
A	2 and 3
B	1
C	2 and 4
D	2
E	5 (note strap)
F	1, 3, and 4

## 5. MAINTENANCE

**5.01** Maintenance procedures for the 1A1 Matrix Block are the same as for the 66-type connecting blocks. For terminal alignment and adjustment see Section 461-604-100.

**5.02** Field replacement of connectors in these blocks is not recommended. Replace matrix blocks having terminal damage which cannot be corrected.





## BACKBOARDS

### IDENTIFICATION AND INSTALLATION

#### 1. GENERAL

**1.001** This addendum supplements Section 463-130-100, Issue 12. Place this pink sheet ahead of Page 1 of the section.

**1.002** This addendum is issued to:

- Add information to Table A
- Add information on the locating of the 191C backboard
- Replace Fig. 35.

#### 2. CHANGES TO SECTION

**2.001** On Page 2, after paragraph 3.03, add the following note.

**Note:** When a 191C backboard is used where a 554BMP telephone set is mounted on a 630A4 connecting block, the 191C backboard snaps onto the 1034A mounting plate and the telephone set is hung on the headed rivets.

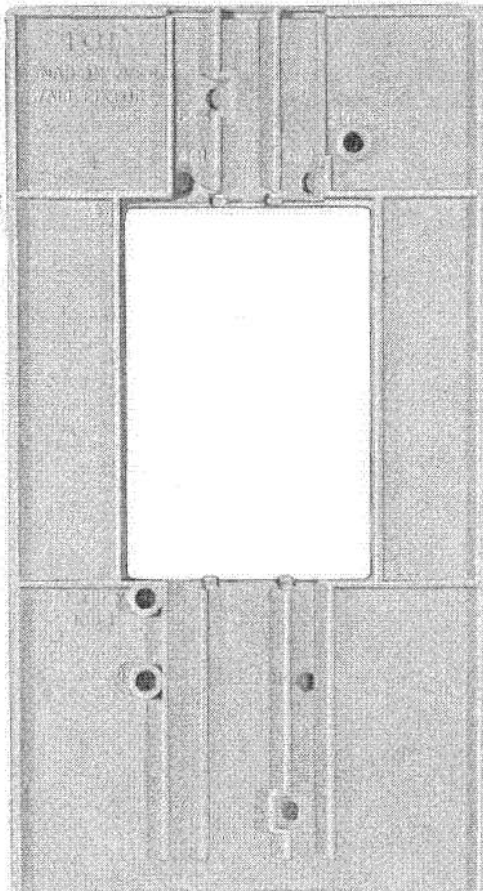
**2.002** On Page 19, add new Fig. 35.

**2.003** The following change applies to Table A.

		BACKBOARD			
CODE	COLOR	168D 168E 168F	172C*	182B	191C
-104	Brown				•
-124	Rust				•

#### NOTICE

Not for use or disclosure outside the  
Bell System except under written agreement



- PLASTIC 0.295 IN. THICK
- SNAPS OVER CBMA CONNECTING BLOCK (PLUG-IN WALL SET MOUNTING) FOR DECOR PURPOSES
- MOUNTS 150, EARLY 1550, OR 2550 SERIES MODULAR WALL SET, OR AC1 BASE
- DRILL-OUT MOUNTING HOLES AND CORRESPONDING SET CODES MOLDED IN BACK
- REPLACES 1821 AND 1918 BACKBOARD
- COLOR, SEE TABLE A

Fig. 35—191C Backboard

## BACKBOARDS

### IDENTIFICATION AND INSTALLATION

#### 1. GENERAL

1.01 This section provides information on common use backboards and related devices. Refer to Division 506 for information on backboards for coin collectors and coin telephone sets.

1.02 This section is reissued to:

- Add 198A backboard (Fig. 37)
- Rate the 191C-59, -61, and -64 backboards MD (Table A).

#### 2. IDENTIFICATION

2.01 The purpose of these backboards is to provide adequate mounting surfaces for the installation of telephone sets, connecting blocks, and various other apparatus.

2.02 When terminating and cross-connecting cables on customer premises, especially in large buildings, it is recommended that the backboards installed in these locations be standardized. These backboards are now available in several sizes and colors and should follow the color scheme plan outlined in Section 518-010-101.

#### 2.03 Ordering Guide:

CODE NO.	FIG. NO.
Backboard, 79	1
Backboard, 81	2
Backboard, 147A	3
Backboard, 154A	4
Backboard, 155A (MD)	5
Backboard, 156A (MD)	6
Backboard, 163A	7
Backboard, 164A	8
Backboard, 165A	9

Backboard, 166A	10
Backboard, 168D*	11
Backboard, 168E*	12
Backboard, 168F*	13
Backboard, 169A (MD)	14
Backboard, 171A	15
Backboard, 172C* (MD)	16
Backboard, 173A	17
Backboard, 173B	18
Backboard, 176A	19
Backboard, 177A	20
Backboard, 180A	21
Backboard, 181A	22
Cover, Screen, D-180313	22
Backboard, 182B*	23,24
Backboard, 183A1, A2, A4, or A5†	25
Backboard, 183B1, B2, B3, B4, or B5†	26
Backboard, 184A1†	27
Backboard, 184B1†	28
Backboard, 184B2†	29
Backboard, 185A1†	30
Backboard, 186A†	31
Backboard, 187B1†	32
Backboard, 188A1 (MD)	33
Backboard, 188B1	34
Backboard, 191C*	35
Backboard, 197A	36
• Backboard, 198A	37♦
Backboard, KS-5796, L1 or L7	38
Backboard, KS-5796, L2 or L8	39
Backboard, KS-5796, L3 or L9	40
Assembly, Backboard, ED-69368-50, Group 1	41
Trough, Wiring, 840348288	42

\* Add desired color code selected from Table A.

† Refer to appropriate figures for size and color information.

#### NOTICE

Not for use or disclosure outside the  
Bell System except under written agreement

2.04 *Color:*

♦TABLE A♦

COLOR ORDERING GUIDE

CODE	COLOR	BACKBOARD			
		168D, 168E, 168F	172C*	182B	191C
-03	Black		•	•	•
-49	Light Olive Gray	•			
-50	Ivory	•	•	•	•
-51	Green		•	•	•
-53	Red		•	•	•
-56	Yellow		•	•	•
-58	White		•	•	•
-59	Rose Pink		•	•	*
-60	Light Beige		•	•	•
-61	Light Gray		•	•	*
-62	Aqua Blue			•	•
-64	Turquoise		•	•	*

\* MD

## 3. INSTALLATION

**3.01** Use colored backboards on customer premises where installations are to be standardized according to the color plan. In other applications, employ backboards for mounting apparatus or equipment only when one or more of the following conditions exist:

- Mounting surface is uneven.
- Mounting surface is damp.
- A secure mounting could not be obtained otherwise.
- It is necessary to insulate special apparatus from current-conducting surfaces.

- It is necessary to avoid drilling too many holes.

**3.02** Backboards used on customer premises where standardization is important should follow the color scheme plan in Section 518-010-101 where all central office cables terminate on the same color backboards, key equipment on same color, etc, regardless of terminating area terminal room, apparatus closet, etc.

**3.03 Locating:** Location of a backboard is dependent upon apparatus to be mounted thereon; however, select a location which will not expose craft personnel or equipment to injury or damage.

### 3.04 **Installing:**

(a) Refer to Table B for proper fastening device and quantity to be used for each backboard dependent upon:

- Type of surface
- Strength and rigidity of base material
- Weight to be supported.

(b) Refer to appropriate section on attachments and fasteners in 080 Division for method of installing fasteners.

**Note:** When fasteners extend into or through a surface, avoid damaging existing equipment and wiring.

(c) When a particular backboard is not listed in Table B, refer to backboard most similar for mounting information.

(d) If existing mounting holes in backboards do not align when securing mounting, drill additional holes with proper tools.

(e) If backboards are located on an uneven surface, shim to obtain a firm mounting. Use fasteners 1/2-inch longer than specified in Table B.

(f) Backboards located outdoors should be secured with rust-proof fasteners such as galvanized screws or bolts.

(g) If backboard must be mounted on a finely finished surface, such as glazed tile or marble which would be expensive to repair, consult supervisor and obtain instructions before proceeding.

(h) When backboard is mounted on plaster on wood lath, all screws must enter laths or studding (see Fig. 3).

(i) When mounting buzzer on wooden backboards, countersink backboard mounting screws to prevent screwheads from contacting buzzer base (see Fig. 8).

(j) The B beam clip and the B insulator support can be installed on I beams and angle irons 1/8- to 1/2-inch thick to fasten backboards at

indoor locations. The B beam clip will accept a 10-24 or a 1/4-20 size screw. The B insulator support will accept a 10-24 screw. (See Fig. 43, 44, and 45.)

(k) Holes designated by bosses (Fig. 24) on the rear of a 182B or 191C backboard must be drilled to permit mounting 500-type wall sets. Use an 11/64-inch drill bit when drilling the bosses.

(l) A small section of the thin wall at the top or bottom edge of the 182B or 191C backboard may be broken out to allow entry of inside wiring (Fig. 24).

(m) The telephone set is not fastened to a 182B or 191C backboard; instead, the backboard is held in place by the fasteners which support the telephone set.



**To prevent damage to line switch assembly when installing set on a 182B or 191C backboard:**

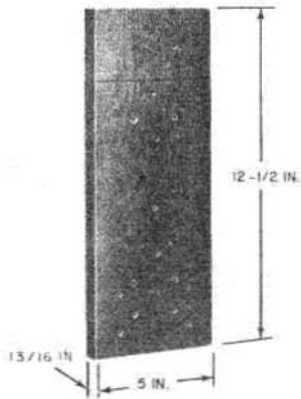
- **Place fasteners through backboard into supporting surface.**
- **Run up threads until head of fastener is 1/16-inch from backboard.**
- **Place the telephone set on fasteners using keyhole slots.**
- **Support screwdriver and tighten fasteners (Fig. 46).**

### 3.05 **Removing:**

(a) Carefully remove all wire, screws, bolts, and other fasteners used in mounting backboard.

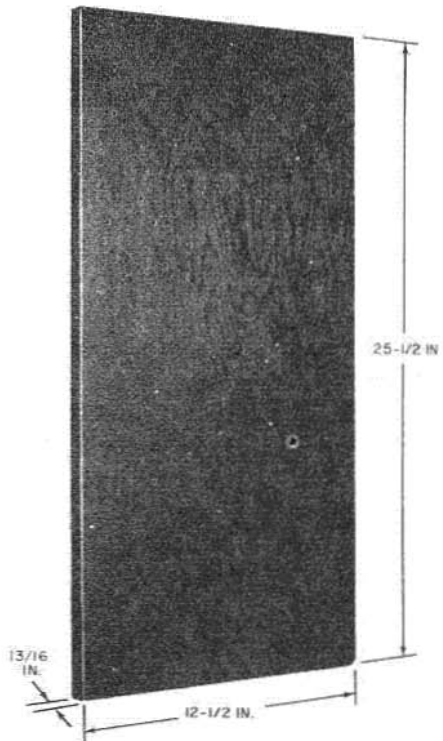
(b) In case backboard tends to stick to wall after fasteners have been removed, press palm of one hand tightly against backboard and tap upper end of backboard with a hammer.

(c) Whenever it is necessary to leave a backboard in place, remove all fasteners which hold the apparatus to the backboard. This prevents the possibility of personnel injury, damage to furniture, etc.



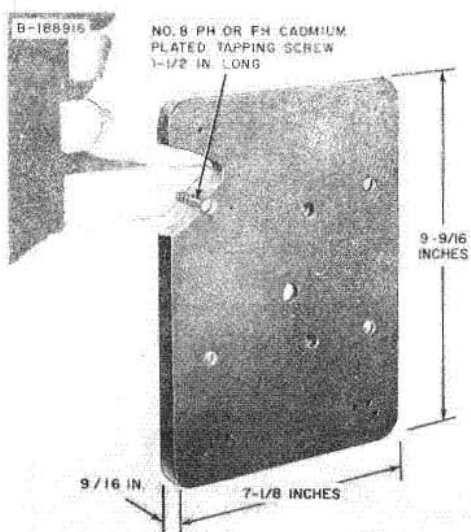
- WOOD, BLACK
- MOUNTS ONE 58-, 98-, OR 106-TYPE STATION PROTECTOR, OR TWO IIIA STATION PROTECTORS

Fig. 1—79 Backboard



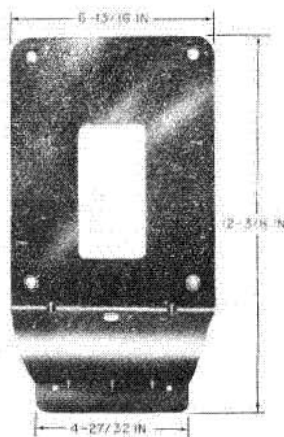
- WOOD, BLACK
- MOUNTS FIVE 58-, 98-, OR 106-TYPE STATION PROTECTORS

Fig. 2—81 Backboard



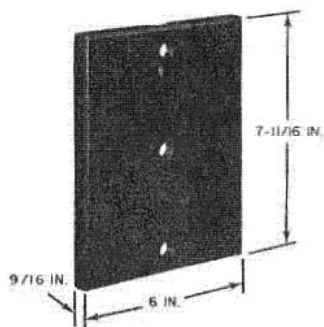
- WOOD, GRAY
- MOUNTS A J86205H RECTIFIER, 634-, OR 653-TYPE SUBSCRIBER SET

Fig. 3—147A Backboard Mounted on Plaster and Lath



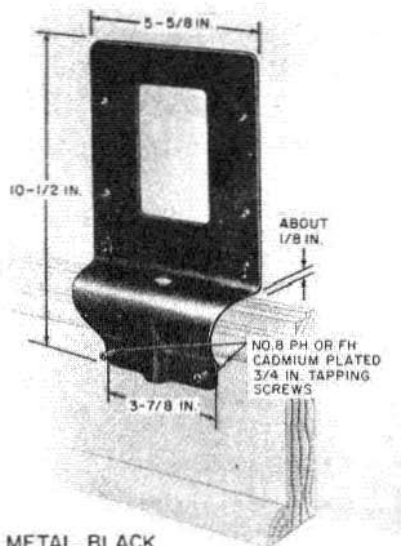
- METAL, BLACK
- MOUNTS 534-OR 634-TYPE SUBSCRIBER SET ON WOODEN BASEBOARD TO AVOID MOUNTING ON MASONRY OR TILE
- SCREWS PROVIDED

Fig. 5—155A (MD) Backboard



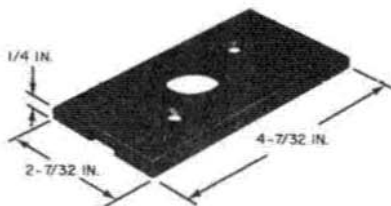
- WOOD, GRAY
- MOUNTS 584-, 684-, 685-, 686-, OR 687-TYPE SUBSCRIBER SET ON WALL OR OVER AN OUTLET

Fig. 4—154A Backboard



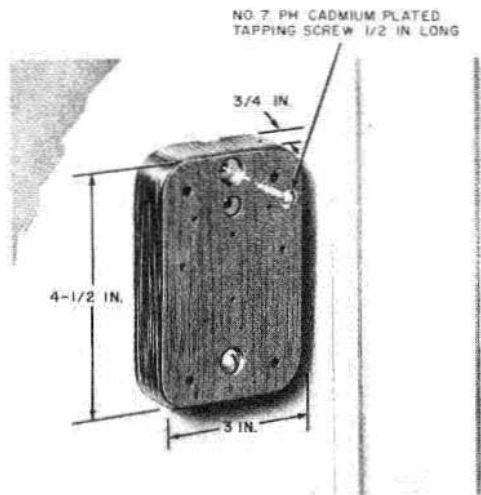
- METAL, BLACK
- MOUNTS 584-OR 684-TYPE SUBSCRIBER SET ON WOODEN BASEBOARD TO AVOID MOUNTING ON MASONRY OR TILE
- SCREWS PROVIDED

Fig. 6—Mounting 156A (MD) Backboard on Wooden Baseboard



- PHENOL FIBER, GRAY
- MOUNTS 14A- OR 20A-TYPE INDICATOR
- SCREWS PROVIDED FOR MOUNTING INDICATOR AND BACKBOARD

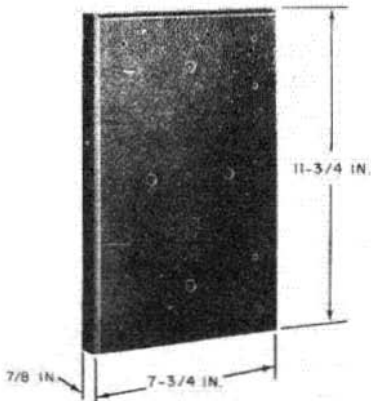
Fig. 7—163A Backboard



- WOOD, BLACK
- MOUNTS C- OR G-TYPE HAND TELEPHONE SET MOUNTINGS, OR 7-TYPE BUZZERS AND BELLS ON OTHER THAN WOOD SURFACES
- REPLACES 157A BACKBOARD

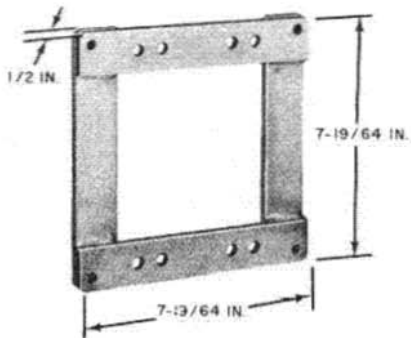
Fig. 8—164A Backboard Mounted on Metal Panel





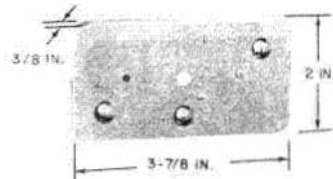
- WOOD, GRAY
- MOUNTS KS-5250, J86205A OR B RECTIFIERS, OR 50-TYPE RECORDER CONNECTOR

Fig. 9—165A Backboard



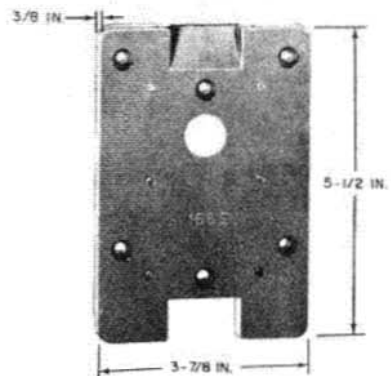
- METAL, GALVANIZED
- MOUNTS 320-TYPE TELEPHONE SET
- BOLTS PROVIDED

Fig. 10—166A Backboard



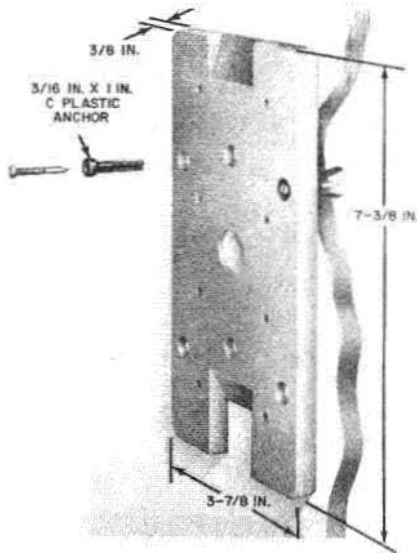
- PLASTIC
- MOUNTING ONE 42A OR 44A CONNECTING BLOCK
- COLOR, SEE TABLE A

Fig. 11—168D Backboard



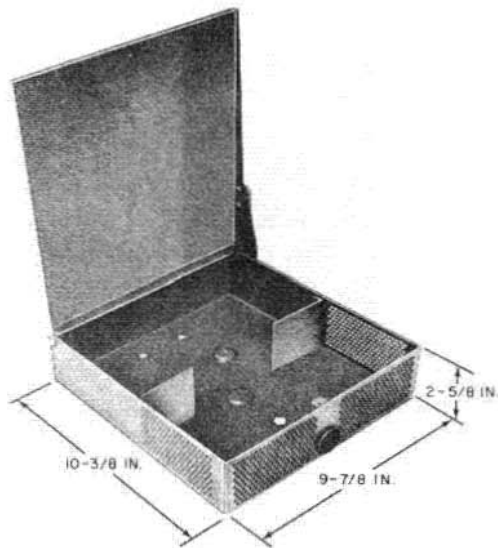
- PLASTIC
- MOUNTS TWO OR THREE 44A CONNECTING BLOCKS
- COLOR, SEE TABLE A

Fig. 12—168E Backboard



- PLASTIC
- MOUNTS FOUR 44A CONNECTING BLOCKS
- COLOR, SEE TABLE A

**Fig. 13—168F Backboard**



- METAL, STEEL GRAY
- MOUNTS 592-TYPE SUBSCRIBER SET
- PROVIDES PROTECTION FROM WEATHER AND MECHANICAL INJURY
- HINGED COVER
- SCREWS PROVIDED
- REPLACED BY 181A-49

**Fig. 14—169A (MD) Backboard**

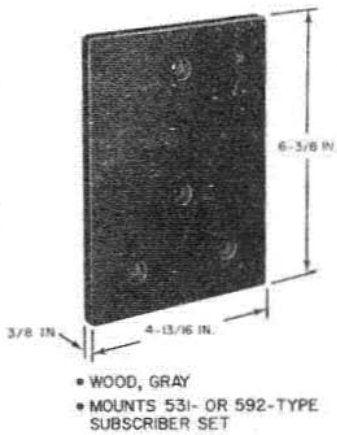


Fig. 15—171A Backboard

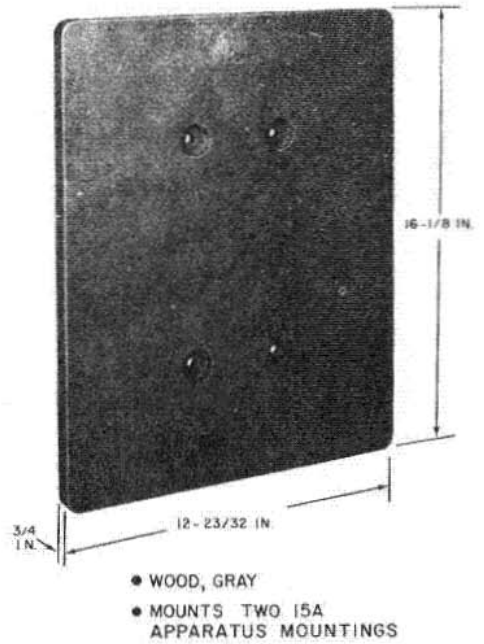


Fig. 17—173A Backboard

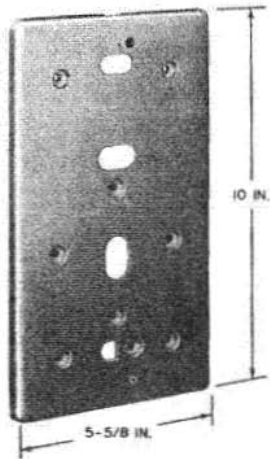


Fig. 16—172C (MD) Backboard

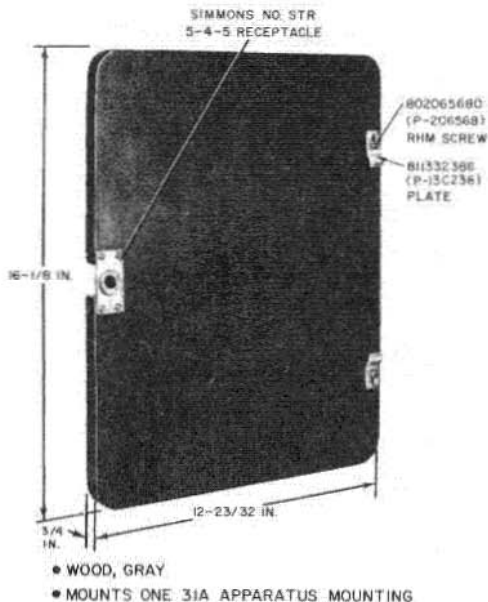


Fig. 18—173B Backboard

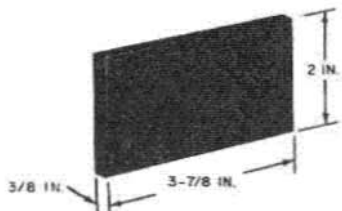


Fig. 19—176A Backboard

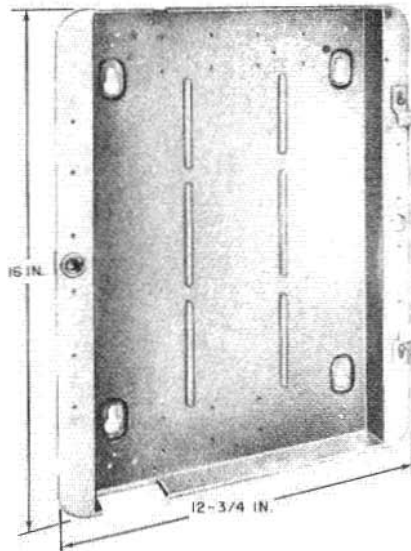


Fig. 20—177A Backboard

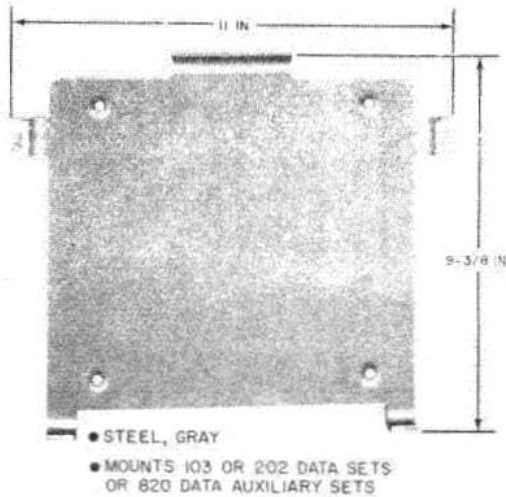


Fig. 21—180A Backboard

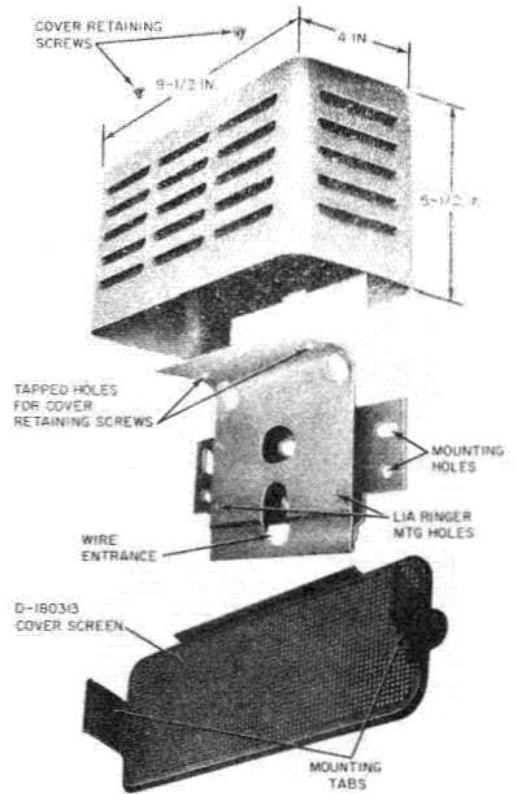
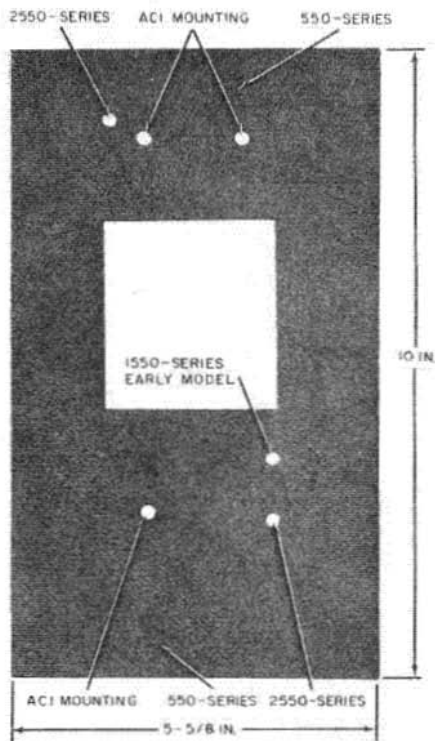


Fig. 22—181A Backboard, Exploded View



- PLASTIC 9/32 -IN. THICK
- MOUNTS 550-2550-SERIES WALL SET, OR ACI TELEPHONE BASE
- MAY BE USED TO MASK UNSIGHTLY WALL CONDITIONS EXITING WHEN LARGER WALL SETS ARE REPLACED BY SMALLER SETS
- COLOR, SEE TABLE A

Fig. 23—182B Backboard

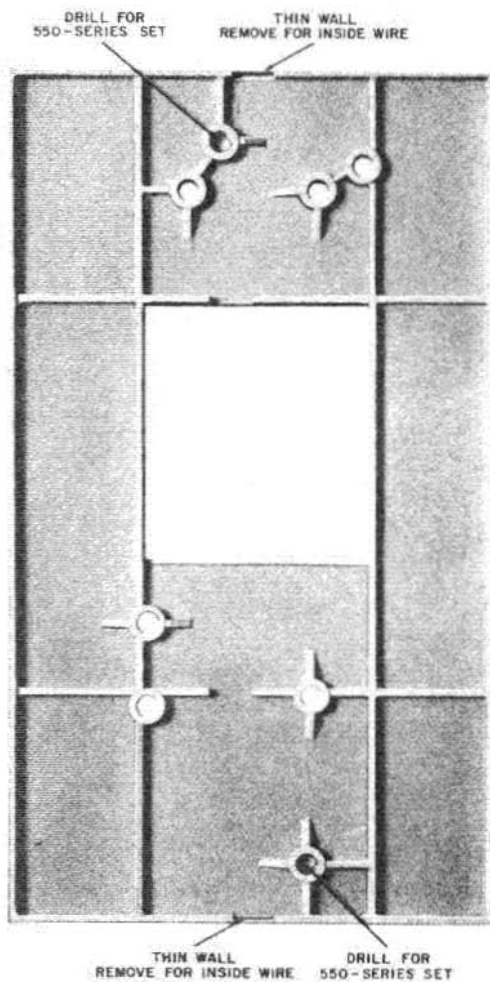
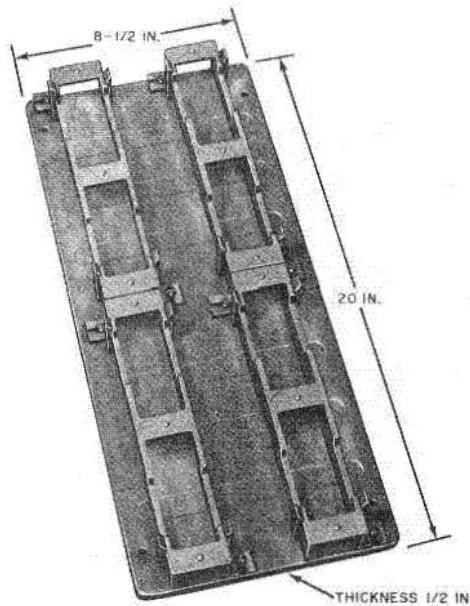
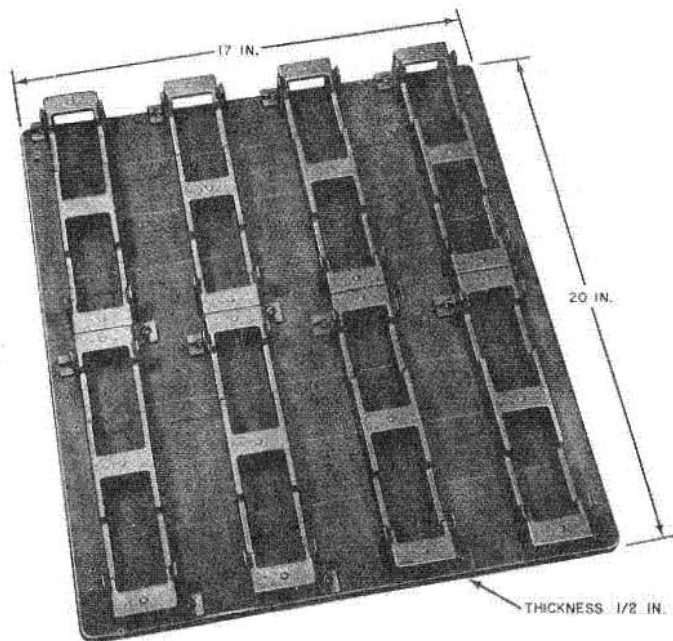


Fig. 24—182B Backboard, Rear View



- BLUE 183A1, GREEN 183A2, PURPLE 183A4, YELLOW 183A5.
- CONSISTS OF METAL BOARD AND FOUR PLASTIC 89B BRACKETS SECURED BY TWO SCREWS EACH.
- MOUNTS FOUR 66-TYPE CONNECTING BLOCKS ORDERED SEPARATELY.
- USEFUL IN MODULAR CONNECTING BLOCK ARRANGEMENT FOR TERMINATING AND CROSS CONNECTING ON CUSTOMER'S PREMISES, REFER TO SECTION 518-010-101.

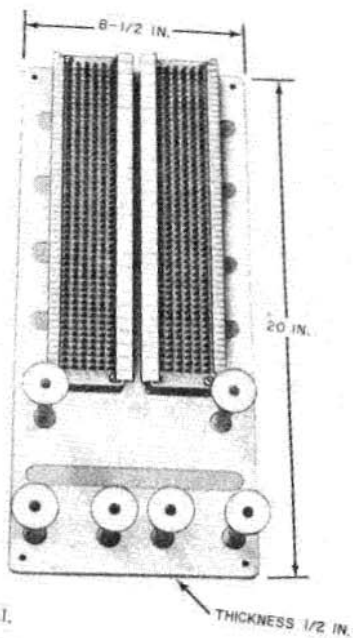
**Fig. 25—183A1, A2, A4, or A5 Backboard**



- BLUE 183B1, GREEN 183B2, RED 183B3, PURPLE 183B4, YELLOW 183B5.
- CONSISTS OF METAL BOARD AND EIGHT PLASTIC 89B BRACKETS SECURED BY TWO SCREWS EACH.
- MOUNTS EIGHT 66-TYPE CONNECTING BLOCKS, ORDERED SEPARATELY.
- USEFUL IN MODULAR CONNECTING BLOCK ARRANGEMENT FOR TERMINATING AND CROSS CONNECTING ON CUSTOMER'S PREMISES, REFER TO SECTION 518-010-101.

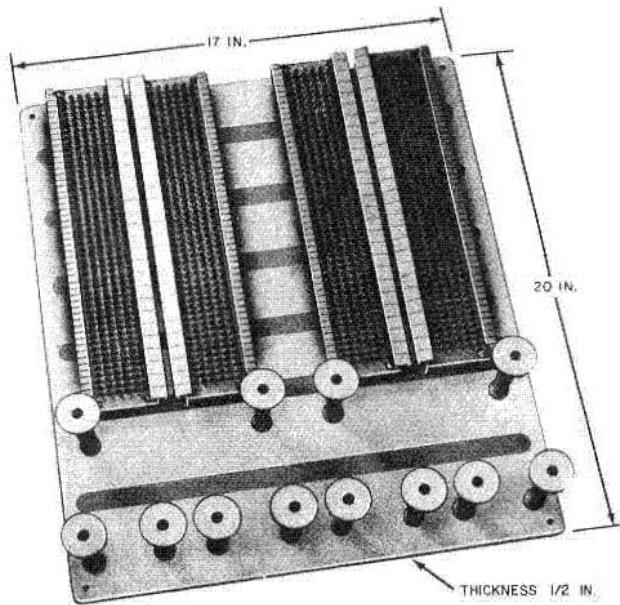
**Fig. 26—183B1, B2, B3, B4, or B5 Backboard**





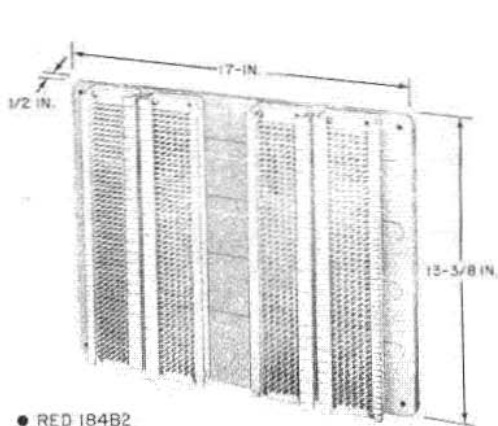
- RED 184A1.
- CONSISTS OF METAL BOARD, TWO 66B4-25 CONNECTING BLOCKS, AND SIX 834372377 (P-43X237) DISTRIBUTING RINGS.
- USEFUL IN MODULAR CONNECTING BLOCK ARRANGEMENT FOR TERMINATING AND CROSS CONNECTING ON CUSTOMER'S PREMISES, REFER TO SECTION 518-010-101.

Fig. 27—184A1 Backboard



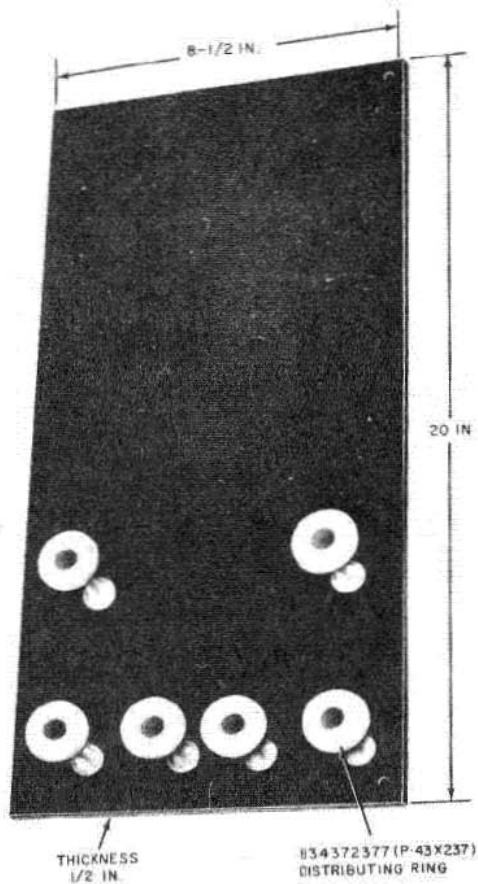
- RED 184B1.
- CONSISTS OF METAL BOARD, FOUR 66B4-25 CONNECTING BLOCKS, AND TWELVE 834372377 (P-43 X237) DISTRIBUTING RINGS.
- USEFUL IN MODULAR CONNECTING BLOCK ARRANGEMENT FOR TERMINATING AND CROSS CONNECTING ON CUSTOMER'S PREMISES, REFER TO SECTION 518-010-101.

**Fig. 28—184B1 Backboard**



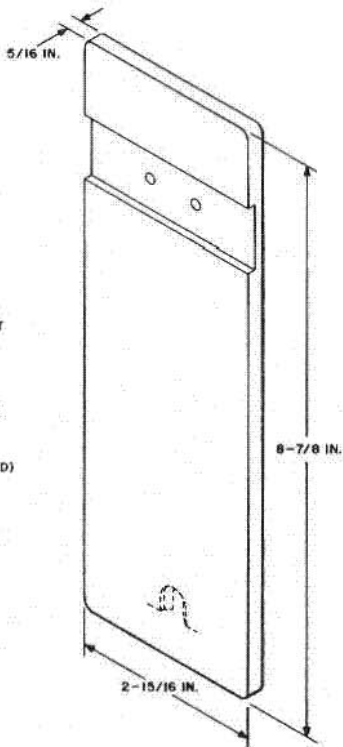
- RED 184B2
- CONSISTS OF METAL BOARD AND FOUR 66B4-25 CONNECTING BLOCKS.
- USEFUL IN MODULAR CONNECTING BLOCK ARRANGEMENT FOR TERMINATING AND CROSS CONNECTING ON CUSTOMER'S PREMISES, REFER TO SECTION 518-010-101.

Fig. 29—184B2 Backboard



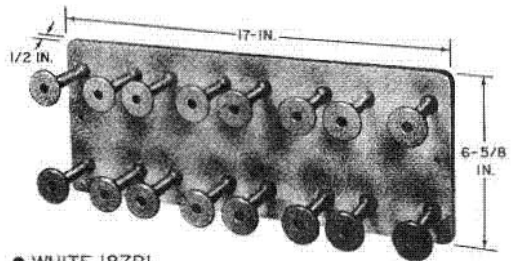
- WOOD, YELLOW
- CONSISTS OF A BOARD AND SIX DISTRIBUTING RING ASSEMBLIES SECURED BY ONE SCREW EACH
- USEFUL IN MODULAR CONNECTING BLOCK ARRANGEMENT FOR TERMINATING AND CROSS CONNECTING ON CUSTOMER'S PREMISES REFER TO SECTION 518-010-101

Fig. 30—185A1 Backboard



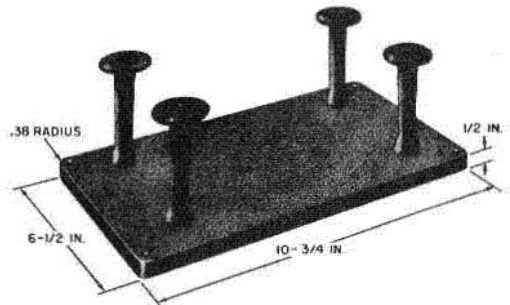
- PLASTIC
- MOUNTS 10A-HANDSET HANGER
- AVAILABLE IN -3, -6I COLORS
- SLOT ON REAR OF BACKBOARD FOR 1 INCH. NO. 8 PH OR FH CADMIUM PLATED TAPPING SCREW (SCREW FURNISHED WITH 186A BACKBOARD)

Fig. 31—186A Backboard



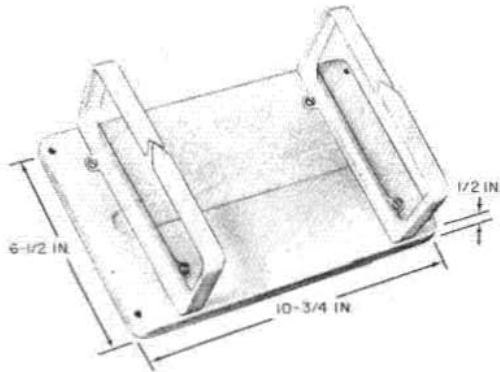
- WHITE 187B1
- CONSISTS OF WOOD BOARD AND SIXTEEN 834372377 (P-43 X 237) DISTRIBUTING RINGS
- USEFUL IN MODULAR CONNECTING BLOCK ARRANGEMENT FOR TERMINATING AND CROSS CONNECTING ON CUSTOMER'S PREMISES, REFER TO SECTION 518-010-101.

Fig. 32—187B1 Backboard



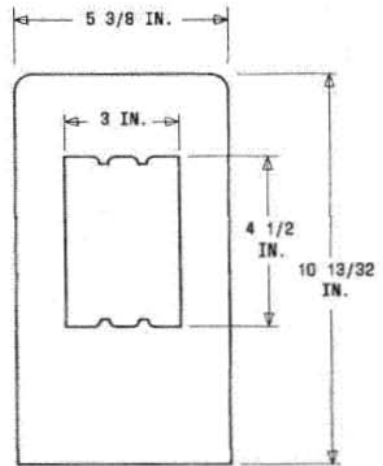
- WHITE STAMPED METAL PANEL WITH FOUR 834372377 (P-43 X 237) DISTRIBUTING RINGS
- USED WITH 98-TYPE MODULAR CONNECTING BLOCKS TO RETAIN CROSS-CONNECT WIRES

Fig. 33—188A1 (MD) Backboard



- WHITE STAMPED METAL PANEL WITH TWO 842139248 (COMCODE) DISTRIBUTION RINGS.
- USED WITH 88-TYPE MODULAR CONNECTING BLOCKS TO RETAIN CROSS-CONNECTING WIRES.

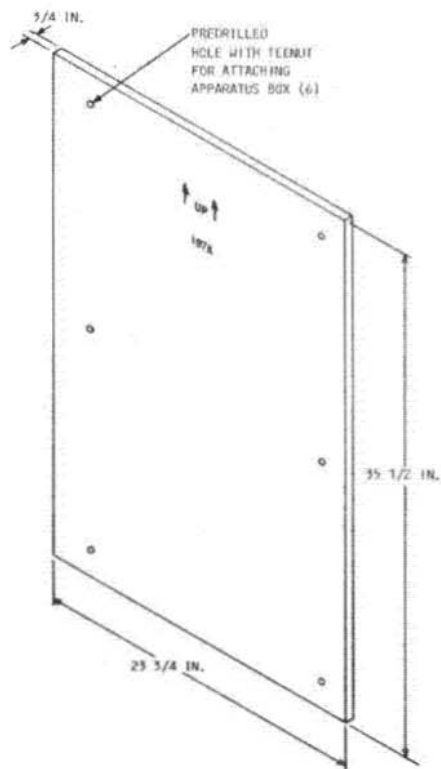
**Fig. 34—188B1 Backboard**



**FRONT VIEW**

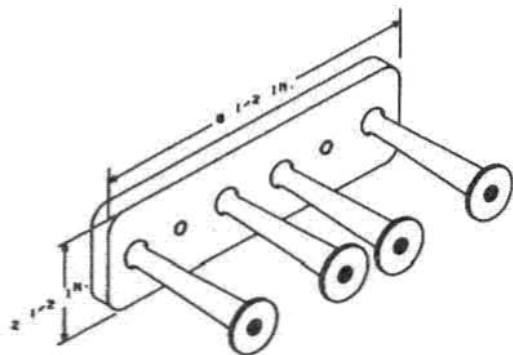
- PLASTIC 0.235 IN. THICK
- SNAPS OVER 630A4 CONNECTING BLOCK (PLUG-IN WALL SET MOUNTING) FOR DECOR PURPOSES
- MOUNTS 550-, EARLY 1550-, OR 2550-SERIES MODULAR WALL SET, OR AC1 BASE
- KNOCK-OUT MOUNTING HOLES AND CORRESPONDING SET CODES MOLDED IN BACK
- REPLACES 182B AND 191B BACKBOARD
- COLOR, SEE TABLE A

**Fig. 35—191C Backboard**



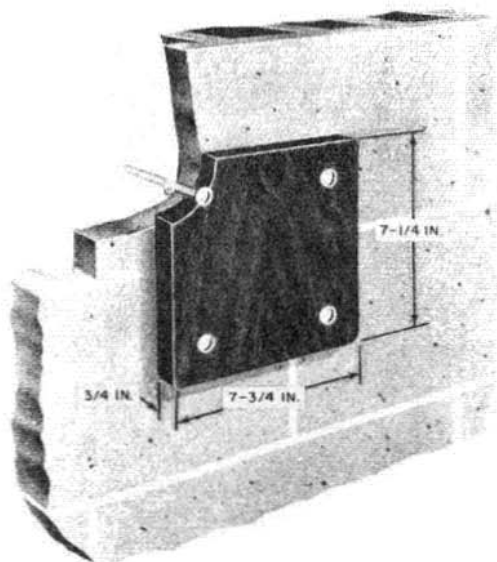
- 4000, LIGHT OLIVE GRAY
- INTENDED FOR WALL MOUNTING OF 121-TYPE APPARATUS BOX
- INCLUDES SIX SCREWS FOR ATTACHING APPARATUS BOX TO BACKBOARD
- WALL MOUNTING HOLES MUST BE DRILLED AND COUNTERSUNK BY INSTALLER
- MOUNT ON WALL WITH AT LEAST SIX FLATHEAD SCREWS

Fig. 36—197A Backboard



- STEEL PANEL, WHITE FINISH
- FOR CROSS-CONNECT WIRE WHERE MODULAR PANELS ARE STACKED VERTICALLY

Fig. 37—198A Backboard



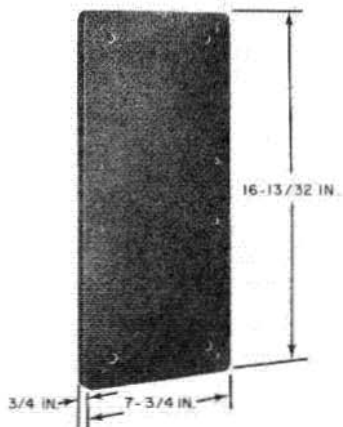
## LIST 1

- WOOD, BLACK
- MOUNTS ONE IO5A APPARATUS BOX
- REPLACES I60A

## LIST 7

- WOOD, BEIGE-GRAY
- MOUNTS ONE IO5B APPARATUS BOX

Fig. 38—KS-5796, List 1 or List 7 Backboard Mounted on Cinder Block



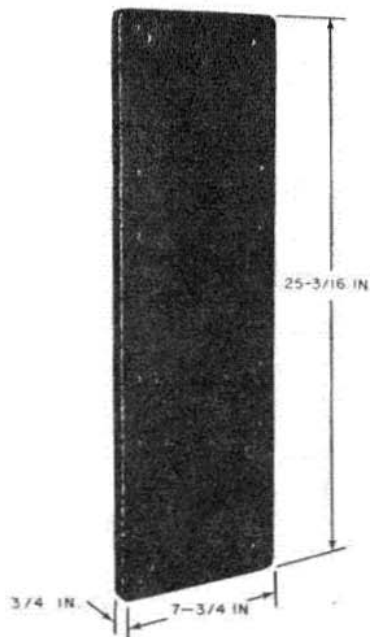
## LIST 2:

- WOOD, BLACK
- MOUNTS TWO IO5A APPARATUS BOXES
- REPLACES I61A

## LIST 8:

- WOOD, BEIGE-GRAY
- MOUNT TWO IO5B APPARATUS BOXES

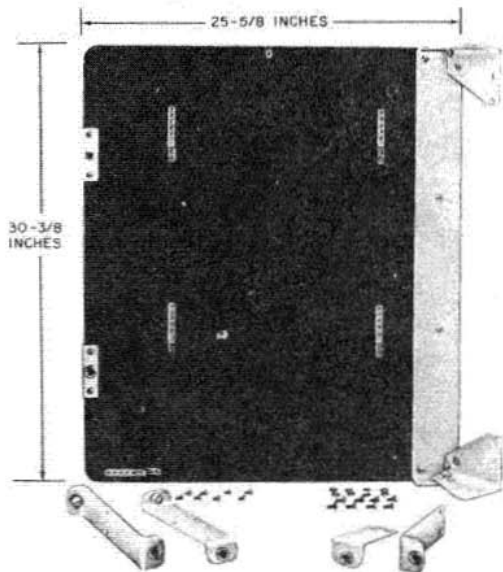
Fig. 39—KS-5796, List 2 or List 8 Backboard



- LIST 3
- WOOD, BLACK
  - MOUNTS THREE 105A APPARATUS BOXES
  - REPLACES 162A

- LIST 9
- WOOD, BEIGE-GRAY
  - MOUNTS THREE 105B APPARATUS BOXES
  - REPLACES A-2857

Fig. 40—KS-5796, List 3 or List 9 Backboard



- WOOD, LIGHT OLIVE GRAY
- MOUNT ONE 26A APPARATUS MOUNTING AND ONE ED-69366-50, G3 TERMINAL PLATE ASSEMBLY
- CAN BE EQUIPPED WITH ED-69368-50, G2 COVER

Fig. 41—ED-69368-50, Group 1 Backboard Assembly



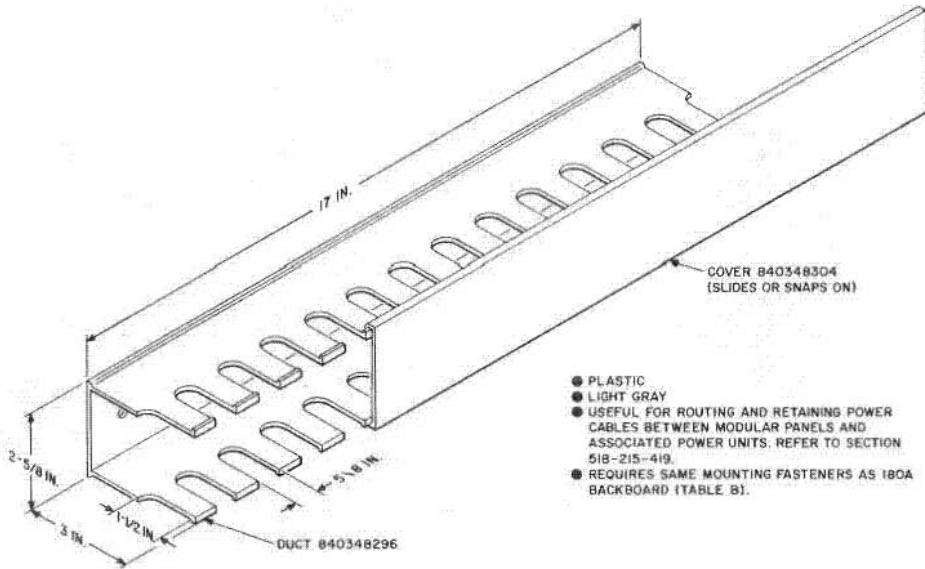


Fig. 42—Wiring Trough, 840348288

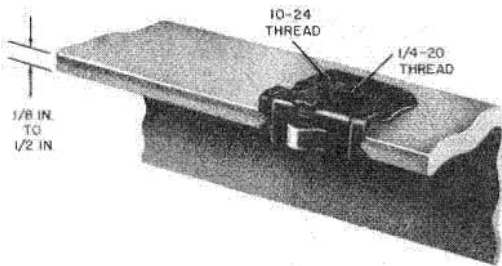


Fig. 43—B Beam Clip Mounted on Angle Iron

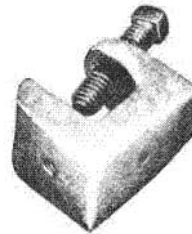


Fig. 44—B Insulator Support

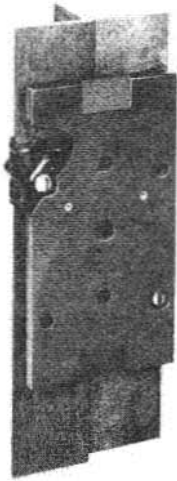


Fig. 45—Typical Installation of Backboard Using B Beam Clip

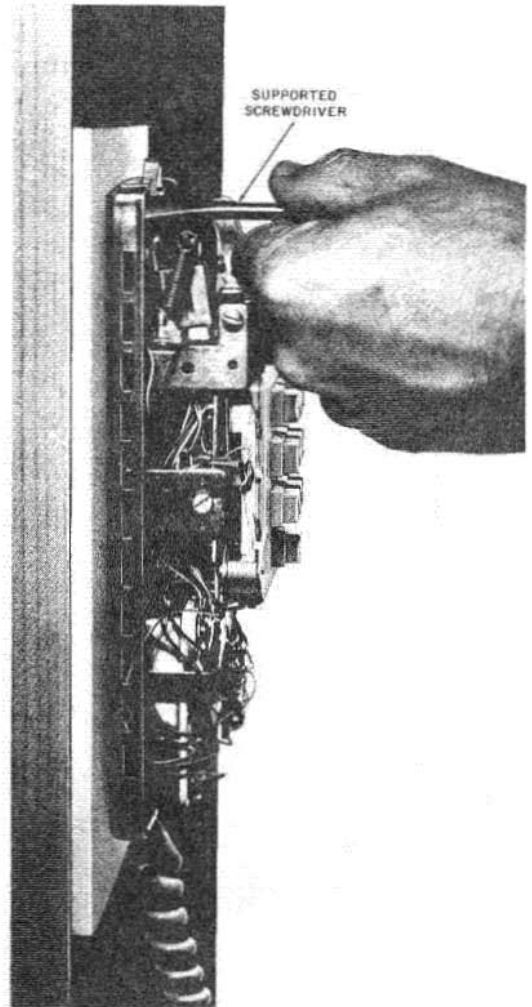


Fig. 46—Tightening Fasteners Which Support Telephone Set and 182B or 191C Backboard

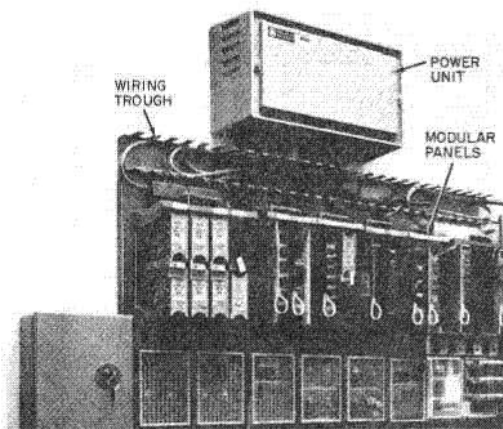


Fig. 47—Typical Installation of 840348288 Wiring Trough (Cover Removed)

**TABLE B**  
**FASTENERS USED IN MOUNTING BACKBOARDS**

BACK-BOARD	MOUNTING SURFACES						HOLE SIZE REQD	FASTENERS	
	TYPE	SOFT-WOOD	HARD-WOOD	MASONRY * (CONCRETE, BRICK)	LATH AND PLASTER†	PLASTER, CINDER BLOCK, HOLLOW TILE, METAL LATH, PLASTER-BOARD‡		METAL (DESK OR PANELING)	SIZE AND TYPE (NOTE 2 AND 3)
79, 81	•						3/32 or No. 33	1-1/2 Inch No. 8 FH Cadmium Plated Tapping Screw	4
		•						1-1/2 Inch No. 8 PH or FH Cadmium Plated Tapping Screw	
				•			None	B Masonry Fastener, Size 6	
							3/16	1-1/2 Inch No. 8 FH Cadmium Plated Tapping Screw in No. 10 Plastic Anchor	
					•		1/4	Wall Screw Anchor, 1/4 Inch	
							3/32 or No. 33	1-1/2 Inch No. 8 FH Cadmium Plated Tapping Screw	
						•	None	B Masonry Fastener, Size 8	
							1/4	Wall Screw Anchor, 1/4 Inch	
147 154	•						3/32 or No. 33	1-1/2 Inch No. 8 PH or FH Cadmium Plated Tapping Screw	4
		•						1-1/4 Inch No. 8 PH or FH Cadmium Plated Tapping Screw	
				•			None	B Masonry Fastener, Size 5	
							3/16	1-1/2 Inch No. 8 PH or FH Cadmium Plated Tapping Screw in No. 10 Plastic Anchor	
					•		1/4	Wall Screw Anchor, 1/4 Inch	
							3/32 or No. 33	1-1/2 Inch No. 8 PH or FH Cadmium Plated Tapping Screw	
						•	None	B Masonry Fastener, Size 6	
							1/4	Wall Screw Anchor, 1/4 Inch	
155, 156	•						3/32 or No. 33	3/4-Inch No. 8 PH or FH Cadmium Plated Tapping Screw	2
		•						1-1/2 Inch No. 8 PH or FH Cadmium Plated Tapping Screw	
	•							1-1/4 Inch No. 8 PH or FH Cadmium Plated Tapping Screw	
163	•						3/32 or No. 33	1-1/2 Inch No. 8 PH or FH Cadmium Plated Tapping Screw	4
		•						1-1/4 Inch No. 8 PH or FH Cadmium Plated Tapping Screw	

TABLE B (Contd)  
FASTENERS USED IN MOUNTING BACKBOARDS

BACK-BOARD	MOUNTING SURFACES						HOLE SIZE REQUIRED	FASTENERS	
	SOFT-WOOD	HARD-WOOD	MASONRY* (CONCRETE, BRICK)	LATH AND PLASTER†	PLASTER, CINDER BLOCK, HOLLOW TILE, METAL LATH, PLASTER-BOARD‡	METAL (DESK OR PANELING)		SIZE AND TYPE (NOTE 2 AND 3)	QTY (NOTE 1)
163							None	B Masonry Fastener, Size 5	4
			•				3/16	1-1/2 Inch No. 8 PH or FH Cadmium Plated Tapping Screw in No. 10 Plastic Anchor	
			•				1/4	Wall Screw Anchor, 1/4 Inch	
				•			3/32 or No. 33	1-1/2 Inch No. 8 PH or FH Cadmium Plated Tapping Screw	3
					•		None	B Masonry Fastener, Size 6	
							1/4	Wall Screw Anchor, 1/4 Inch	
							1/2	1/8- by 4-Inch BH Toggle Bolt	
						•	No. 33	1-Inch No. 8 RH Self-Tapping Screw	
164	•						3/32 or No. 33	1-1/4 Inch No. 8 PH or FH Cadmium Plated Tapping Screw	4
		•						1-Inch No. 8 RH Blued Wood Screw	
			•				None	B Masonry Fastener, Size 6	
							3/16	1-1/2 Inch No. 8 PH or FH Cadmium Plated Tapping Screw in No. 10 Plastic Anchor	
				•			1/4	Wall Screw Anchor, 1/4 Inch	
							3/32 or No. 33	1-1/4 Inch No. 8 PH or FH Cadmium Plated Tapping Screw	
					•		None	B Masonry Fastener, Size 8	
							1/4	Wall Screw Anchor, 1/4 Inch	
						1/2	1/8- by 4-Inch BH Toggle Bolt		
					•	No. 33	5/8-Inch No. 8 RH Self-Tapping Screw		
165	•						3/32 or No. 33	2-1/2 Inch No. 8 RH Galvanized Wood Screw	4
		•						2-1/2 Inch No. 8 RH Galvanized Wood Screw	
			•				None	B Masonry Fastener, Size 8	
							3/16	2-1/2 Inch No. 8 RH Galvanized Wood Screw in No. 10 Plastic Anchor	
				•			7/16	Wall Screw Anchor, 7/16 Inch	
						3/32 or No. 33	2-1/2 Inch No. 8 RH Galvanized Wood Screw		

TABLE B (Contd)

## FASTENERS USED IN MOUNTING BACKBOARDS

BACK-BOARD TYPE	MOUNTING SURFACES						HOLE SIZE REQUIRED	FASTENERS	
	SOFT- WOOD	HARD- WOOD	MASONRY * (CONCRETE, BRICK)	LATH AND PLASTER†	PLASTER, CINDER BLOCK, HOLLOW TILE, METAL LATH, PLASTER- BOARD†	METAL (DESK OR PANELING)		SIZE AND TYPE (NOTE 2 AND 3)	QTY (NOTE 1)
165					•		None	B Masonry Fastener, Size 10	4
							7/16	Wall Screw Anchor, 7/16 Inch	
							5/8	3/16- by 4-Inch BH Toggle Bolt	
166						•	No. 33	1-1/4 Inch No. 8 RH Self-Tapping Screw	4
	•						3/32 or No. 33	1-1/2 Inch No. 14 RH Galvanized Wood Screw	
		•						1-Inch No. 14 RH Galvanized Wood Screw	
			•				5/16	1-1/4 Inch No. 14 RH Galvanized Wood Screw in No. 16 Plastic Anchor	
				•			7/16	Wall Screw Anchor, 7/16 Inch	
					•		1/8 or No. 30	1-1/2 Inch No. 14 RH Galvanized Wood Screw	
						•	7/16	Wall Screw Anchor, 7/16 Inch	
168							3/4	1/4- by 4-Inch RH Toggle Bolt	4
	•						1/4	12-24 by 9/16-Inch RH Galvanized Iron Machine Screw	
		•					3/32 or No. 33	1-Inch No. 8 PH or FH Cadmium Plated Tapping Screw	
			•				None	B Masonry Fastener, Size 4	
							3/16	1-1/4 Inch No. 8 PH or FH Cadmium Plated Tapping Screw in No. 10 Plastic Anchor	
							3/16	C Plastic Anchor, /16 by 1 Inch	
				•			1/4	Wall Screw Anchor, 1/4 Inch	
					•		3/32 or No. 33	1-Inch No. 8 PH or FH Cadmium Plated Tapping Screw	
						•	None	B Masonry Fastener, Size 5	
							1/4	Wall Screw Anchor, 1/4 Inch	
						1/2	1/8- by 4-Inch BH Toggle Bolt		
						3/16	C Plastic Anchor, 3/16 by 1 Inch		
						No. 33	5/8-Inch No. 8 RH Self-Tapping Screw		
					•	3/16	C Plastic Anchor, 3/16 by 1 Inch		

TABLE B (Contd)  
FASTENERS USED IN MOUNTING BACKBOARDS

BACK-BOARD	MOUNTING SURFACES						HOLE SIZE REQUIRED	FASTENERS	
	SOFT-WOOD	HARD-WOOD	MASONRY * (CONCRETE, BRICK)	LATH AND PLASTER†	PLASTER, CINDER BLOCK, HOLLOW TILE, METAL LATH, PLASTER-BOARD‡	METAL (DESK OR PANELING)		SIZE AND TYPE (NOTE 2 AND 3)	QTY (NOTE 1)
169	•						1/8 or No. 30	1-1/2 Inch No. 14 RH Galvanized Wood Screw	4
		•						1-Inch No. 14 RH Galvanized Wood Screw	
			•				None	C Masonry Fastener, Size 42	
							5/16	1-Inch No. 14 RH Galvanized Wood Screw in No. 16 Plastic Anchor	
				•			1/4	Wall Screw Anchor, 1/4 Inch	
							1/8 or No. 30	1-1/2 Inch No. 14 RH Galvanized Wood Screw	
					•		None	C Masonry Fastener, Size 52	
						•	3/8	Wall Screw Anchor, 3/8 Inch	
171							3/32 or No. 33	1-Inch No. 8 PH or FH Cadmium Plated Tapping Screw	4
	•							3/4-Inch No. 8 PH or FH Cadmium Plated Tapping Screw	
		•					None	B Masonry Fastener, Size 4	
			•				3/16	1-Inch No. 8 PH or FH Cadmium Plated Tapping Screw in No. 10 Plastic Anchor	
							3/16	C Plastic Anchor, 3/16 by 1 Inch	
							1/4	C Plastic Anchor, 3/16 by 1 Inch	
				•			1/4	Wall Screw Anchor, 1/4 Inch	
							3/32 or No. 33	1-Inch No. 8 PH or FH Cadmium Plated Tapping Screw	
					•		None	B Masonry Fastener, Size 5	
							1/4	Wall Screw Anchor 1/4 Inch	
172							3/32 or No. 33	1-1/2 Inch No. 8 PH or FH Cadmium Plated Tapping Screw	4
	•							1-1/4 Inch No. 8 PH or FH Cadmium Plated Tapping Screw	
		•					1/2	1/8- by 4-Inch BH Toggle Bolt	
							3/16	C Plastic Anchor, 3/16 by 1 Inch	
							3/16	C Plastic Anchor, 3/16 by 1 Inch	
							No. 33	5/8-Inch No. 8 RH Self-Tapping Screw	
					•		1/2	1/8- by 4-Inch BH Toggle Bolt	
							3/16	C Plastic Anchor, 3/16 by 1 Inch	

TABLE B (Contd)

## FASTENERS USED IN MOUNTING BACKBOARDS

BACK-BOARD TYPE	MOUNTING SURFACES						HOLE SIZE REQUIRED	FASTENERS	
	SOFT- WOOD	HARD- WOOD	MASONRY* (CONCRETE, BRICK)	LATH AND PLASTER†	PLASTER, CINDER BLOCK, HOLLOW TILE, METAL LATH, PLASTER- BOARD†	METAL (DESK OR PANELING)		SIZE AND TYPE (NOTE 2 AND 3)	QTY (NOTE 1)
172			•				None	B Masonry Fastener, Size 5	4
							3/16	1-1/2 Inch No. 8 PH or FH Cadmium Plated Tapping Screw in No. 10 Plastic Anchor	
				•			1/4	Wall Screw Anchor, 1/4 Inch	
							3/32 or No. 33	1-1/2 Inch No. 8 PH or FH Cadmium Plated Tapping Screw	3
					•		None	B Masonry Fastener, Size 6	
							1/4	Wall Screw Anchor, 1/4 Inch	
							1/2	1/8- by 4-Inch BH Toggle Bolt	
					•	No. 33	1-Inch No. 8 RH Self-Tapping Screw		
173	•						1/8 or No. 30	2-1/2 Inch No. 14 FH Cadmium Plated Tapping Screw with 5/16- by 3/4-Inch Round Washer	4
		•						1-1/4 Inch No. 14 FH Cadmium Plated Tapping Screw with 5/16- by 3/4-Inch Round Washer	
			•				None	B Masonry Fastener, Size 6	
							5/16	1-3/4-Inch No. 14 FH Cadmium Plated Tapping Screw with 5/16- by 3/4-Inch Round Washer in No. 16 Plastic Anchor	
				•			7/16	Wall Screw Anchor, 7/16 Inch	
							1/8 or No. 30	1-3/4 Inch No. 14 FH Cadmium Plated Tapping Screw with 5/16- by 3/4-Inch Round Washer	
					•		None	B Masonry Fastener, Size 8	
						7/16	Wall Screw Anchor, 7/16 Inch		
						3/4	1/4- by 4-Inch RH Toggle Bolt with 5/16- by 3/4-Inch Round Washer		
176	•						3/32 or No. 33	1-Inch No. 8 PH or FH Cadmium Plated Tapping Screw	4
		•						3/4-Inch No. 8 PH or FH Cadmium Plated Tapping Screw	
			•				None	B Masonry Fastener, Size 4	
							3/16	1-1/4 Inch No. 8 PH or FH Cadmium Plated Tapping Screw in No. 10 Plastic Anchor	
							3/16	C Plastic Anchor, 3/16 by 1 Inch	



**TABLE B (Contd)**  
**FASTENERS USED IN MOUNTING BACKBOARDS**

BACK-BOARD	MOUNTING SURFACES						HOLE SIZE REQUIRED	FASTENERS		
	TYPE	SOFT-WOOD	HARD-WOOD	MASONRY * (CONCRETE, BRICK)	LATH AND PLASTER†	PLASTER, CINDER BLOCK, HOLLOW TILE, METAL LATH, PLASTER-BOARD‡		METAL (DESK OR PANELING)	SIZE AND TYPE (NOTE 2 AND 3)	QTY (NOTE 1)
176					•			3/16	C Plastic Anchor, 3/16 by 1 Inch	4
								1/4	Wall Screw Anchor, 1/4 Inch	
								3/32 or No. 33	1-Inch No. 8 PH or FH Cadmium Plated Tapping Screw	
						•		None	B Masonry Fastener, Size 5	
								1/4	Wall Screw Anchor, 1/4 Inch	
								1/2	1/8- by 4-Inch BH Toggle Bolt	
								3/16	C Plastic Anchor, 3/16 by 1 Inch	
							•	No. 33	5/8-Inch No. 8 RH Self-Tapping Screw	
							3/16	C Plastic Anchor, 3/16 by 1 Inch		
177	•							1/8 or No. 30	1-1/2 Inch No. 14 FH Cadmium Plated Tapping Screw	4
		•							1-Inch No. 14 FH Cadmium Plated Tapping Screw	
				•				5/16	1-1/4 Inch No. 14 FH Cadmium Plated Tapping Screw in No. 16 Plastic Anchor	
						•		None	C Masonry Fastener, Size 52	
							3/4	1/4- x 3- or 4-Inch Toggle Bolt		
180A	•							3/32 or No. 33	1-Inch No. 8 PH or FH Cadmium Plated Tapping Screw	4
		•							3/4-Inch No. 8 PH or FH Cadmium Plated Tapping Screw	
				•				None	B Masonry Fastener, Size 5	
								3/16	1-1/2 Inch No. 8 PH or FH Cadmium Plated Tapping Screw in No. 10 Plastic Anchor	
					•			1/4	Wall Screw Anchor, 1/4 Inch	
								3/32 or No. 33	1-Inch No. 8 PH or FH Cadmium Plated Tapping Screw	
						•		1/4	Wall Screw Anchor, 1/4 Inch	
								1/2	1/8- by 4-Inch BH Toggle Bolt	
						•	No. 33	3/4-Inch No. 8 RH Self-Tapping Screw		
181	•							1/8 or No. 30	1-1/2 Inch No. 14 RH Galvanized Wood Screw	4
		•							1-Inch No. 14 RH Galvanized Wood Screw	

♦ TABLE B (Contd) ♦

## FASTENERS USED IN MOUNTING BACKBOARDS

BACK-BOARD TYPE	MOUNTING SURFACES						HOLE SIZE REQUIRED	FASTENERS	
	SOFT-WOOD	HARD-WOOD	MASONRY * (CONCRETE, BRICK)	LATH AND PLASTER†	PLASTER, CINDER BLOCK, HOLLOW TILE, METAL LATH, PLASTER-BOARD‡	METAL (DESK OR PANELING)		SIZE AND TYPE (NOTE 2 AND 3)	QTY (NOTE 1)
181			•				None	C Masonry Fastener, Size 42	4
							5/16	1-Inch No. 14 RH Galvanized Wood Screw in No. 16 Plastic Anchor	
				•			1/4	Wall Screw Anchor, 1/4 Inch	
							1/8 or No. 30	1-1/2 Inch No. 14 RH Galvanized Wood Screw	3
					•		None	C Masonry Fastener, Size 52	
						•	3/8	Wall Screw Anchor, 3/8 Inch	
						5/8	3/16- by 4-Inch BH Toggle Bolt		
						•	1/4	12-24 by 9/16-Inch RH Galvanized Iron Machine Screw	
182, 191	•						3/32 or No. 33	1-1/4 Inch No. 8 PH or FH Cadmium Plated Tapping Screw	2
		•						1-Inch No. 8 PH or FH Cadmium Plated Tapping Screw	
			•				None	B Masonry Fastener, Size 5	
							3/16	1-1/2 Inch No. 8 PH or FH Cadmium Plated Tapping Screw in No. 10 Plastic Anchor	
				•			1/4	Wall Screw Anchor, 1/4 Inch	
							3/32 or No. 33	1-1/4 Inch No. 8 PH or FH Cadmium Plated Tapping Screw	
					•		None	B Masonry Fastener, Size 6	
							1/4	Wall Screw Anchor, 1/4 Inch	
							1/2	1/8- by 4-Inch BH Toggle Bolt	
						•	No. 33	1-Inch No. 8 RH Self-Tapping Screw	
						•	3/16	C Plastic Anchor, 3/16 by 1 Inch	
183, 184, 185, 187‡, 188, 198‡	•						3/32 or No. 33	1-1/2 Inch No. 8 PH or FH Cadmium Plated Tapping Screw	4
		•						1-1/4 Inch No. 8 PH or FH Cadmium Plated Tapping Screw	
			•				None	B Masonry Fastener, Size 5	
							3/16	1-1/2 Inch No. 8 PH or FH Cadmium Plated Tapping Screw in No. 10 Plastic Anchor	
				•			1/4	Wall Screw Anchor, 1/4 Inch	
							3/32 or No. 33	1-1/2 Inch No. 8 PH or FH Cadmium Plated Tapping Screw	

◆ TABLE B (Contd) ◆

## FASTENERS USED IN MOUNTING BACKBOARDS

BACK-BOARD	MOUNTING SURFACES						HOLE SIZE REQUIRED	FASTENERS	
	TYPE	SOFT-WOOD	HARD-WOOD	MASONRY* (CONCRETE, BRICK)	LATH AND PLASTER†	PLASTER, CINDER BLOCK, HOLLOW TILE, METAL LATH, PLASTER-BOARD†		METAL (DESK OR PANELING)	SIZE AND TYPE (NOTE 2 AND 3)
183 184. 185. 187‡, 188 198‡							None 1/4 1/2	B Masonry Fastener, Size 6 Wall Screw Anchor, 1/4 Inch 1/8- by 4-Inch BH Toggle Bolt	4
							No. 33	1-Inch No. 8 RH Self-Tapping Screw	
186		•					3/32 or No. 33	1-Inch No. 8 FH Cadmium Plated Tapping Screw	2
			•				None	B Masonry Fastener, Size 5	
							3/16	1-1/2 Inch No. 8 FH Cadmium Plated Tapping Screw in No. 10 Plastic Anchor	
					•		1/4	Wall Screw Anchor, 1/4 Inch 1-Inch No. 8 FH Cadmium Plated Tapping Screw	
						•	No. 33	1-Inch No. 8 FH Cadmium Plated Tapping Screw	
KS-5796, L1, 2, 3, 7, 8, 9	•						3/32 or No. 33	1-1/4 Inch No. 8 PH or FH Cadmium Plated Tapping Screw	4
		•						1-Inch No. 8 RH PH or FH Cadmium Plated Tapping Screw	
							None	B Masonry Fastener, Size 4	
				•			1/4	1-1/4 Inch No. 8 PH or FH Cadmium Plated Tapping Screw in No. 10 Plastic Anchor	
							3/16	C Plastic Anchor, 3/16 by 1 Inch C Plastic Anchor, 3/16 by 1 Inch	
					•			1/4	
							3/32 or No. 33	1-1/4 Inch No. 8 PH or FH Cadmium Plated Tapping Screw	
								None	
						•	1/4	Wall Screw Anchor, 1/4 Inch	
							1/2	1/8- by 4-Inch BH Toggle Bolt	
							3/16	C Plastic Anchor, 3/16 by 1 Inch	
							•	No. 33	
						3/16		C Plastic Anchor, 3/16 by 1 Inch	

TABLE B (Contd)

## FASTENERS USED IN MOUNTING BACKBOARDS

BACK-BOARD	MOUNTING SURFACES						HOLE SIZE REQUIRED	FASTENERS	
	TYPE	SOFT-WOOD	HARD-WOOD	MASONRY* (CONCRETE, BRICK)	LATH AND PLASTER†	PLASTER, CINDER BLOCK, HOLLOW TILE, METAL LATH, PLASTER-BOARD‡		METAL (DESK OR PANELING)	SIZE AND TYPE (NOTE 2 AND 3)
ED-69368-50, G-1	•						1/8 or No. 30	2-1/2 Inch No. 14 FH Cadmium Plated Tapping Screw with 5/16 x 3/4 and 7/16 x 1-Inch Flat Washers under screwhead	6
		•						2-1/2-Inch No. 14 FH Cadmium Plated Tapping Screw with 5/16 x 3/4 and 7/16 x 1-Inch Flat Washers under screwhead	
				•			5/16	2-1/2-Inch No. 14 FH Cadmium Plated Tapping Screw with 5/16 x 3/4 and 7/16 x 1-Inch Flat Washers under screwhead in No. 16 Plastic Anchor	6
						•	5/8	3/16 x 3 or 4-Inch BH Toggle Bolt with 5/16 x 3/4 and 7/16 x 1-Inch Flat Washers under bolt head	
197	Refer to Section 518-450-111								

## Notes:

- Additional fasteners may be placed to ensure mounting.
  - When using toggle bolts, cut off excess length.
  - Size shown for wall screw anchors is diameter only. Length will be determined by wall thickness.
- \* When mounting on plastered masonry, use fasteners 1/2-inch longer than specified.
  - † When mounting on plasterboard, plaster on lath, etc, fasteners must be embedded in stud at least 1 inch.
  - ‡ Requires only 2 fasteners.

## EQUIPMENT CABINETS AND APPARATUS MOUNTINGS IDENTIFICATION

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### NOTICE

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## 1. GENERAL

1.01 This section covers the identification of apparatus boxes, equipment cabinets, apparatus mountings, and associated hardware.

1.02 This section is reissued to add information on the 34C, 34D, and 50A cabinets and the 117C, 154A, and 154B covers.

1.03 Some items in this section are available in different specifications. These are shown as group numbers added to the ED number on drawings or in supplies catalogs. Footnotes are provided throughout this section to draw attention to this. Refer to ED drawings or supplies catalogs for different specifications that are desired.

1.04 Table A lists mounting plate and key telephone unit mounting information for certain apparatus mountings and cabinets.

## 2. APPARATUS BOXES

### A. 105-Type Apparatus Box

2.01 The 105-type apparatus box (Fig. 1) is a metal base with a cover designed to mount four single- or two double-space angle-bracket type key telephone units (KTUs). Two fanning rings are furnished with each box.

2.02 The fiber dust-sealing guard has been replaced by a single piece 813080025 (P-30H002) plastic dust guard. Two dust guards are shipped with each 105-type apparatus box and will slip into the cable entrance openings in the top and bottom of the cover to minimize dust seepage. The plastic dust guard can be cut to fit around entering wires or cables as necessary.

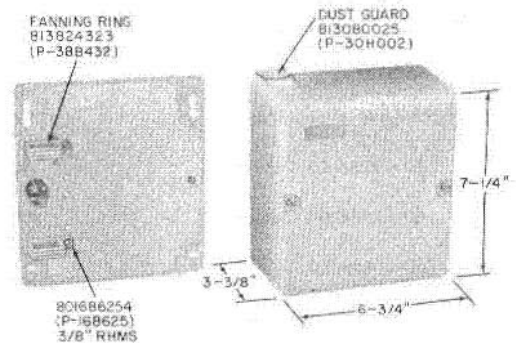


Fig. 1—105-Type Apparatus Box

TABLE A

APPARATUS	WILL ACCOMMODATE							
	MOUNTING PLATES				KTU TYPE			
	WIDTH (INCHES)		LENGTH (INCHES)					
	1-3/4	2	19	23	ANGLE BRACKET	STRIP	PANEL*	PLUG-IN
QUANTITY		19	23	ANGLE BRACKET	STRIP	PANEL*	PLUG-IN	
105-Type Apparatus Box					•			
15A Apparatus Mounting					• Note 1		•	
31A Apparatus Mounting					• Note 1		•	
31B Apparatus Mounting					• Note 1		•	
16A Apparatus Mounting	6 Note 1	6	• Note 1	•	• Note 1	• Note 1	•	•
16C Apparatus Mounting	6 Note 1	6	• Note 1	•	• Note 1	• Note 1	•	•
26A Apparatus Mounting	12 Note 1	13†	•	•	• Note 1	• Note 1	•	
4-Plate Equipment Cabinet per 91472-70‡	4		•		• Note 1	•		
11-Plate Apparatus Cabinet per ED-91194-01‡	11	9	• Note 2	•	• Note 1	• Note 2	• Note 2	•
18-Plate Apparatus Cabinet per ED-91180-01‡	18	15	• Note 2	•	• Note 1	• Note 2	• Note 2	•
26-Plate Apparatus Cabinet per ED-92185-01‡	26	23	• Note 2	•	• Note 1	• Note 2	• Note 2	•
45-Plate Apparatus Cabinet per ED-91981-01‡	45	40	• Note 2	•	• Note 1	• Note 2	• Note 2	
Wall Relay Rack per ED-69463-50‡	40 Note 1	34 Note 1	• Note 1	• Note 1	• Note 1	• Note 1	• Note 1	•
Floor-Supported Cabinet per ED-69366-50 Group 1	Two 26A Apparatus Mountings on Roller Slides.							
Floor Stand per ED-69462-50 Group 1	Mounting for one 177A backboard or 300-type key service unit.							
Floor-Supported Cabinet per ED-69488-50 Group 1	One 26A Apparatus Mounting on Roller Slide.							
Floor-Supported Cabinet per ED-69489-50 Group 1	Two 26A Apparatus Mountings on Roller Slide.							

Note 1: Requires adapter, mounting bars, or group number.

Note 2: Depending on group number, may require adapter(s).

\* See SD-69288-0101 for the mounting space required for different sizes of 200-type key telephone units.

† By removing three bars.

‡ Before ordering see ED drawing or, where available, catalog of supplies for appropriate group number.

## B. 115-Type Apparatus Box

2.03 The 115-type apparatus box (Fig. 2) is intended for use as a terminating and distributing point in buildings. It is equipped with a snap-on cover, distributing ring(s), and screws for mounting 66-type connecting blocks which must be ordered separately. For further information on the 115-type apparatus box, refer to Sections 461-604-101, 461-604-102, and 463-121-115.

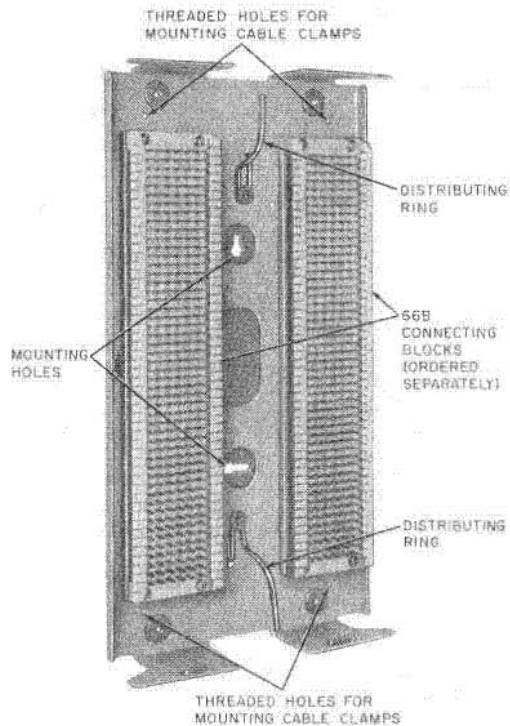


Fig. 2—Typical 115-Type Apparatus Box With Distributing Rings and Connecting Blocks Installed

## 3. APPARATUS MOUNTINGS

### A. 15A Apparatus Mounting

3.01 The 15A apparatus mounting (Fig. 3) is a hinged metal framework primarily used to

mount panel-type 200-series KTUs. It can also be used to mount angle bracket KTUs using 813722048 (P-37B204) brackets which must be ordered separately. The apparatus mounting is furnished with an 811910058 (P-19A005) catch and screws for fastening the catch and the apparatus mounting to a 173A backboard. One or two mountings on a backboard can be covered with a 116A cover. The apparatus mounting can be arranged to hinge on either the left or right side.

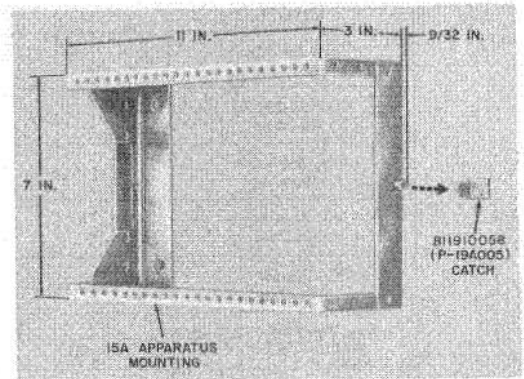


Fig. 3—15A Apparatus Mounting

### B. 16-Type Apparatus Mounting

3.02 The 16A (MD) apparatus mounting (Fig. 4) is a hinged metal framework plus backboard used primarily for panel-type 200-series KTUs. It has twice the capacity of the 31A (MD) or 31B apparatus mounting and can be wall-mounted or floor-supported (using ED-95023-70 metal stand). For attaching the hinged gate of the 16A (MD) apparatus mounting to a metal backboard, use the D-179863 kit assembly. This kit consists of a die-cast aluminum backboard as used with the 16C apparatus mounting, a U-channel detail, and two 66B1-25 connecting blocks.



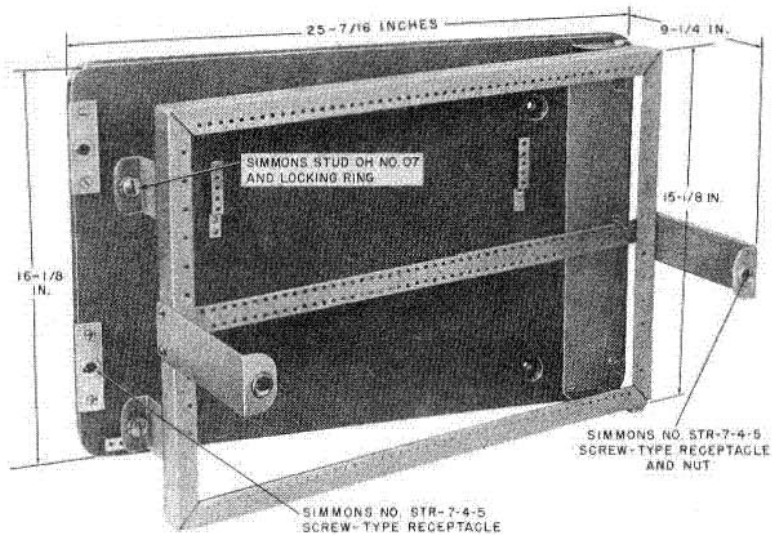


Fig. 4—16A (MD) Apparatus Mounting

3.03 The 16C apparatus mounting (Fig. 5) is a hinged metal framework comparable to the 16A apparatus mounting. The molded fiberglass backboard is drilled to handle 66-type connecting blocks. On mountings manufactured after July 1973, the mounting key holes are slotted at both ends and a second cable entry hole has been added to allow the apparatus to be mounted with the gate hinges at either left or right. Cable rings should be installed in the apparatus mounting after deciding which edge is top and bottom. The 16C apparatus mounting is primarily intended to mount 200-series KTUs but can also be used for the following:

- Angle bracket KTUs using 813722048 (P-37B204) brackets.
- 19- or 23-inch mounting plate. The 19-inch plates require 813622099 (P-36B209) adapters.
- 69-type apparatus mountings (Fig. 6), or 601A, 602A, or 603A panel on 99-type brackets.

- 583-, 584-, 597-, or 598-type panel.

**Note:** Mounting three 584-type panels in a 16C apparatus mounting is not recommended. The center 584 panel is restricted due to the cover support brackets interfering with the KTUs in the first and last positions of the panel. However, if the cover and cover support brackets are not needed and can be left off, the center panel can be used. If they are needed, the first line KTU cannot be used or a 412 KTU inserted or removed without removing the 13th line KTU.

The 99-type bracket consists of two 23-inch bars which mount on the 16C apparatus mounting frame. The upper bar has cable supports to retain the connector cables. All brackets or adapters must be separately ordered.

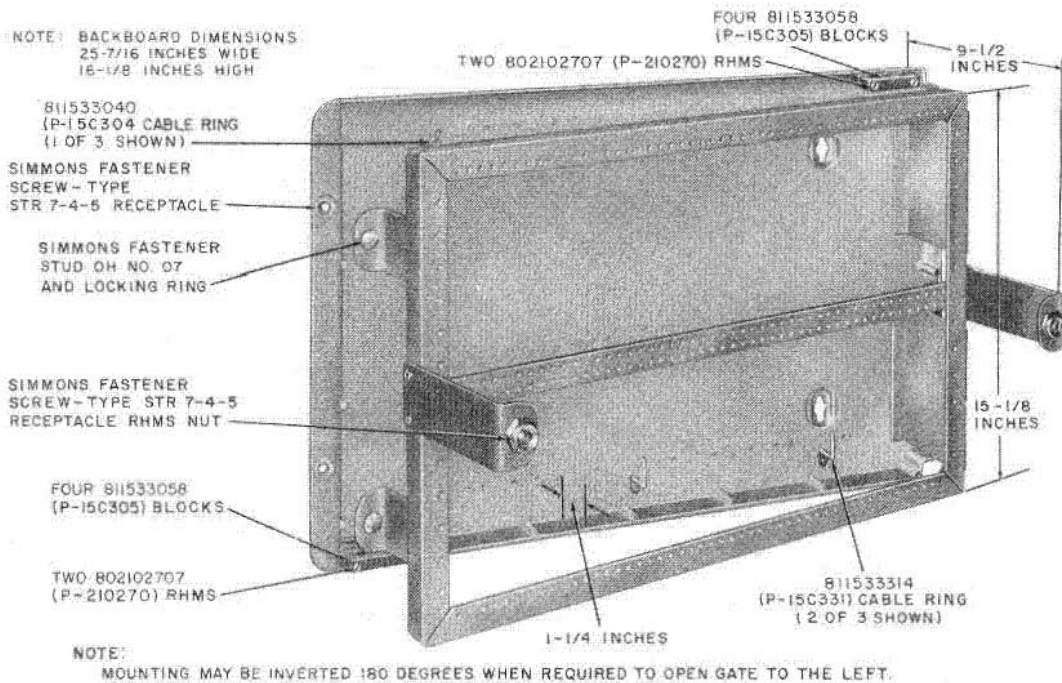


Fig. 5—16C Apparatus Mounting

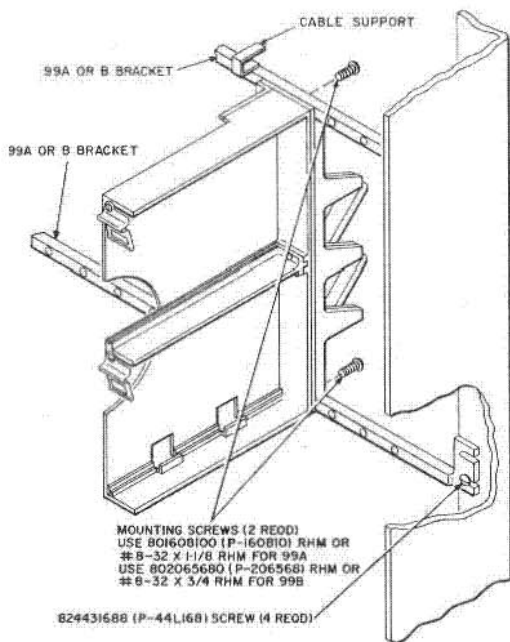


Fig. 6—69-Type Apparatus Mounting on a 99-Type Bracket

### C. 26A Apparatus Mounting

3.04 The 26A apparatus mounting (Fig. 7) is a metal framework primarily used for panel-type 200-series KTUs. It is approximately twice the size of the 16-type apparatus mountings. The 26A may be mounted as follows:

- On 23-inch relay racks
- In 18-plate (with gate handle removed) or 45-plate apparatus cabinets
- In ED-69366-50, Group 1 floor-supported cabinet (using ED-69366-50, Group 2 bracket assembly)
- Directly to the floor when equipped with an ED-69366-50, Group 2 bracket assembly
- On an ED-69368-50, Group 1 or Group 3 backboard (may be enclosed with an ED-69368-50, Group 2 cover).

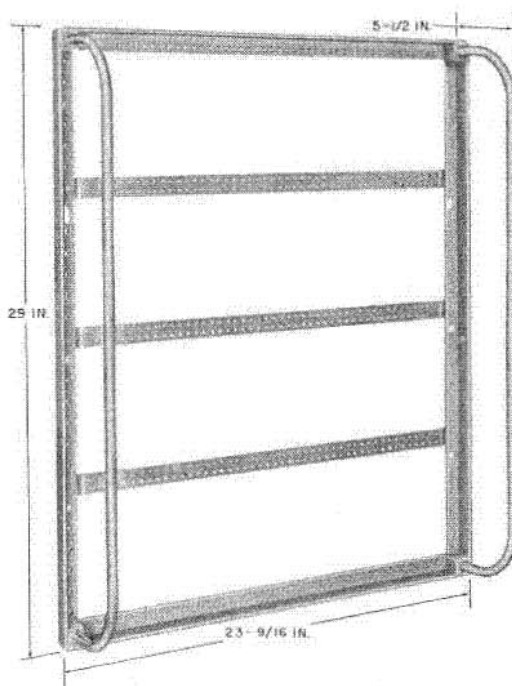


Fig. 7—26A Apparatus Mounting

### D. 31-Type Apparatus Mounting

3.05 The 31A (MD) apparatus mounting (Fig. 8) is a hinged metal framework approximately twice the size of a 15A apparatus mounting. It is primarily used to mount panel-type 200-series KTUs, mounts on a 173B backboard, and may be enclosed with a 116A cover. The 31A (MD) apparatus mounting framework, less welded hinge and quick fastener details, is obtainable as an 811331131 (P-13C113) frame assembly and may be mounted singly or in pairs on 23-inch span frames with the aid of two 813538733 (P-35C873) mounting bars. The 31A (MD) apparatus mounting may also be mounted on a 177A backboard by using a D-179862 kit assembly.

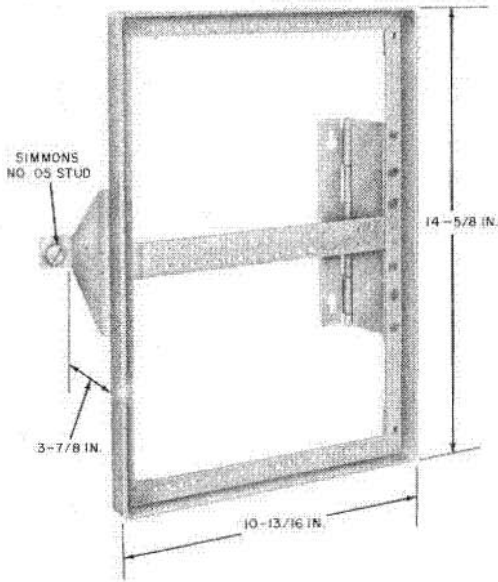


Fig. 8—31A (MD) Apparatus Mounting

**3.06** The 31B apparatus mounting (Fig. 9) is a die-cast aluminum hinged framework comparable to the 31A (MD) apparatus mounting. Primarily used to mount panel-type 200-series KTUs, the 31B apparatus mounting is designed for use with the 177A backboard and can be arranged to open either to left or right. The unit can be protected with a 116A cover. The 814863056 (P-48F305) and 811533090 (P-15C309) bracket assemblies and associated fasteners must be ordered separately. (The 814863056 contains a Simmons fastener oval head stud No. 5.)

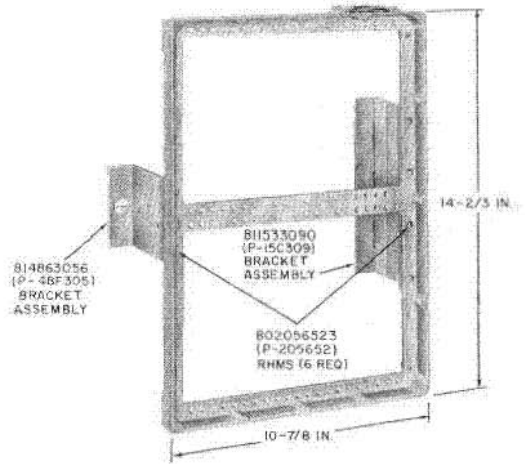


Fig. 9—31B Apparatus Mounting

#### E. 77-Type Apparatus Mounting

**3.07** The 77B (MD) apparatus mounting is a floor-type nonanchored metal stand (preformed steel tubing) adjustable for mounting 513-, 515-, and 570-type (with 2-piece backboard) key service units (KSUs) when wall mounting is not available. The width is determined by how far the base legs are inserted into the spacer (Fig. 10).

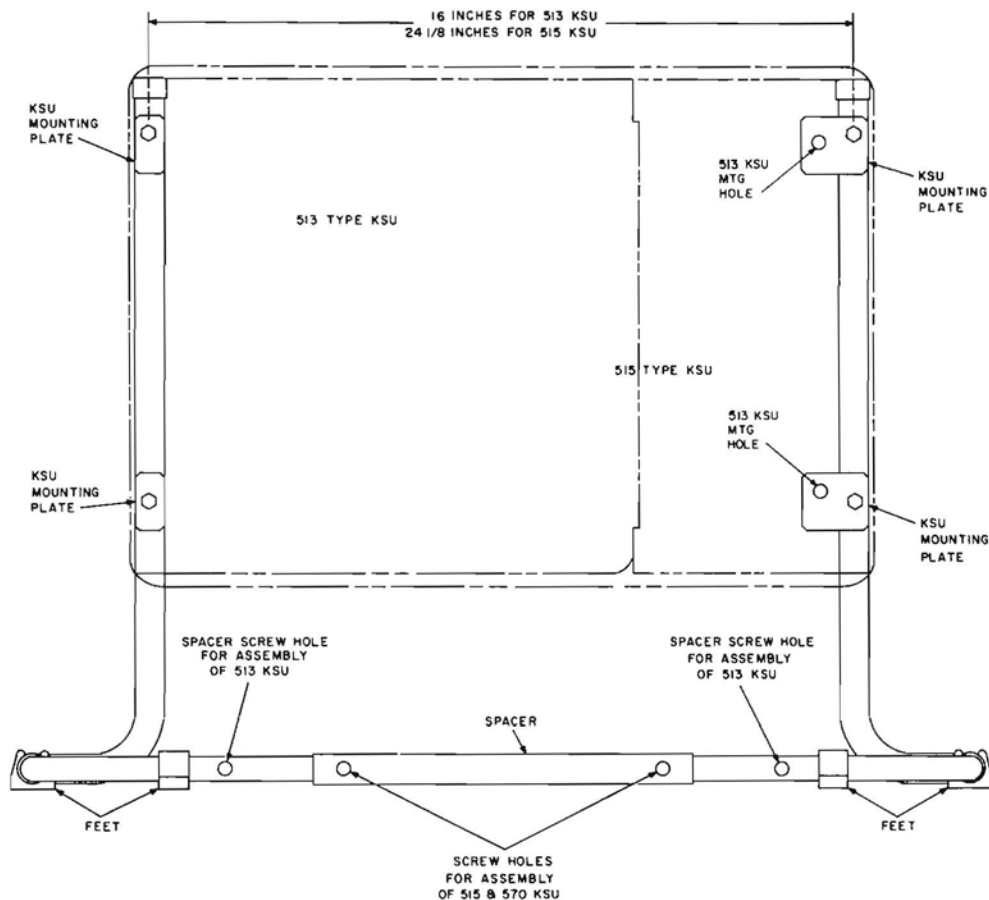
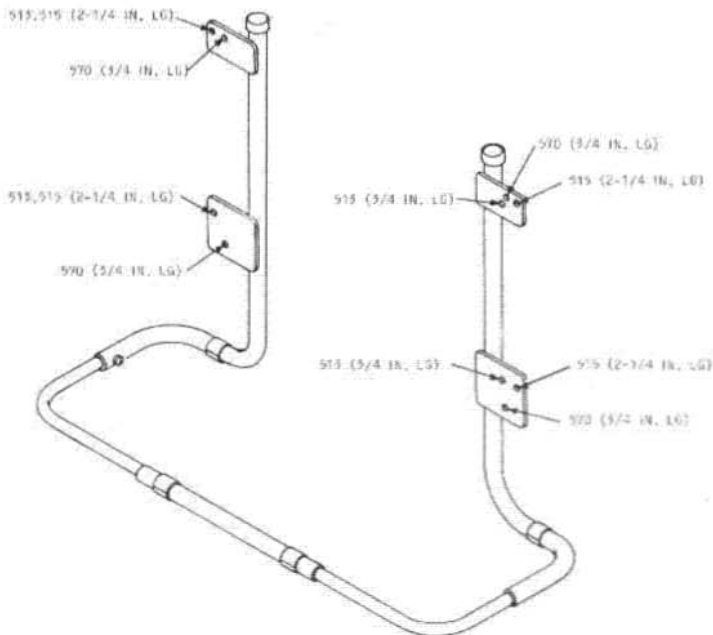


Fig. 10—77B (MD) Apparatus Mounting

3.08 The 77C apparatus mounting (Fig. 11) is similar to the 77B (MD) except the mounting plates have been enlarged to provide extra holes for mounting 570-type KSUs with one-piece backboards. The new holes will be circled in

yellow. The 77C apparatus mounting will also accept the 513- and 515-type KSUs or 570-type with 2-piece backboard. The holes used for each KSU and the length of 1/4-20 screws required are shown in Fig. 11.



NOTE:  
HOLES FOR 570-TYPE NSU WITH DIE-PIECE BACKFORD ARE KIRKED 15° FROM AT FACTORY.

Fig. 11—77C Apparatus Mounting

#### 4. EQUIPMENT CABINETS

##### A. ED-69366-50 Cabinet

4.01 The floor-supported cabinet per ED-69366-50,

Group 1 (Fig. 12) is a steel cabinet with light olive gray sides and top. Two front doors are hinged at the bottom so that, when lowered, they provide tracks upon which 26A apparatus mountings roll. The top, side, and rear panels are removable. Two ED-69366-50, Group 3 terminal plate assemblies (Fig. 39) may be mounted within the cabinet. One or two 26A apparatus mountings must be ordered separately. The ED-69366-50, Group 1 cabinet has been replaced by the ED-69489-50 cabinet.

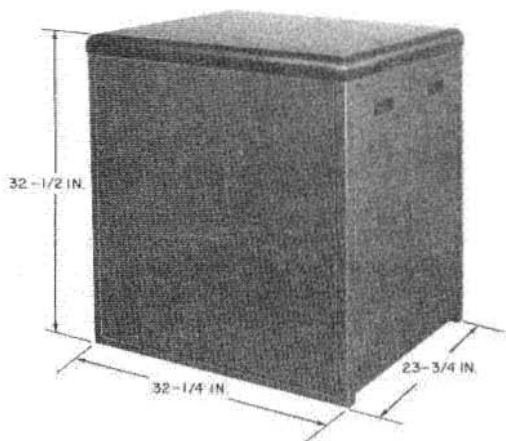
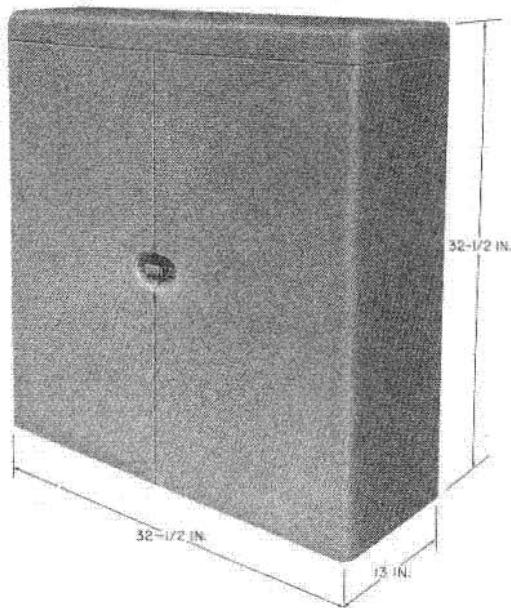


Fig. 12—Floor-Supported Cabinet per ED-69366-50, Group 1

**B. ED-69488-50 Cabinet**

**4.02** The floor-supported cabinet per ED-69488-50, Group 1 (Fig. 13) is a steel cabinet, light olive gray in color, designed to take one 26A apparatus mounting and ED-69366-50, Group 3 terminal plate assembly. It can be ordered with or without apparatus mounting and terminal plate assembly. The terminal plate assembly is mounted on top of the apparatus mounting. The sides and ends are removable in two halves by removing the lift-off top and releasing a spring catch on each set. This allows lowering of hinged tracks on which the apparatus mounting rolls. Approximately 30 inches of clear space in front of the cabinet are required to allow complete lowering of track. Provision is made for floor mounting when required.



**Fig. 13—Floor-Supported Cabinet per ED-69488-50, Group 1**

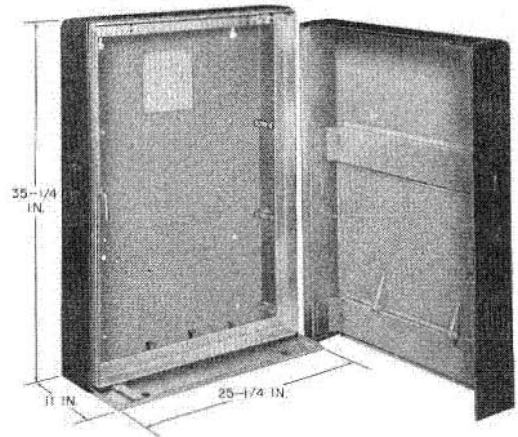
**C. ED-69489-50 Cabinet**

**4.03** The floor-supported cabinet per ED-69489-50, Group 1 is similar to the ED-69488-50 except

that it has a capacity of two 26A apparatus mountings, two terminal plate assemblies, and is 24-3/8 inches wide.

**D. ED-91180-70 Cabinet**

**4.04** The 18-plate equipment cabinet per ED-91180-70\* (Fig. 14) is a metal cabinet with a lift-off cover and hinged gate structure. It is drilled for wall or floor mounting.



**Fig. 14—18-Plate Equipment Cabinet per ED-91180-70**

**E. ED-91194-70 Cabinet**

**4.05** The 11-plate equipment cabinet per ED-91194-70\* is similar in construction to the ED-91180-70, but has less mounting plate capacity. It is 23-1/8 inches high, 25-1/4 inches wide, and 11 inches deep. The matching wooden base for floor mounting is available for either the 18- or 11-plate cabinet.

**F. ED-91472-70 Cabinet**

**4.06** The 4-plate equipment cabinet (MD) per ED-91472-70\* (Fig. 15) is a metal cabinet with a hinged steel gate and removable metal cover. The cabinet is drilled for wall or floorstand mounting.

\*Available in several different specifications. See ED drawing or, where available, catalog of supplies for group number.

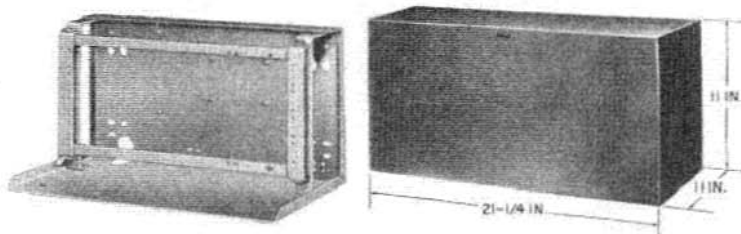


Fig. 15—4-Plate Cabinet per ED-91472-70 (MD)

#### G. ED-91981-70 Cabinet

4.07 The 45-plate apparatus cabinet per ED-91981-70\* (Fig. 16) is a metal cabinet with a hinged door in front and back. The cabinet is drilled for floor mounting. It is shown in Fig. 16 as a housing for storage batteries.

#### H. ED-92185-70 Cabinet

4.08 The 26-plate apparatus cabinet per ED-92185-70\* (Fig. 17) is a metal cabinet with a fixed mounting frame having a hinged door in front and lift-off panel in back. It is drilled for floor mounting.

\*Available in several different specifications. See ED drawing or, where available, catalog of supplies for group number.

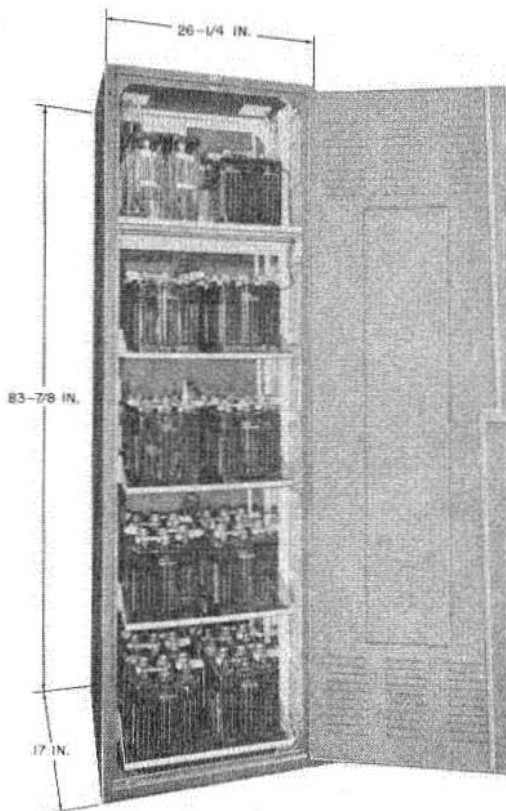


Fig. 16—45-Plate Apparatus Cabinet per ED-91981-70



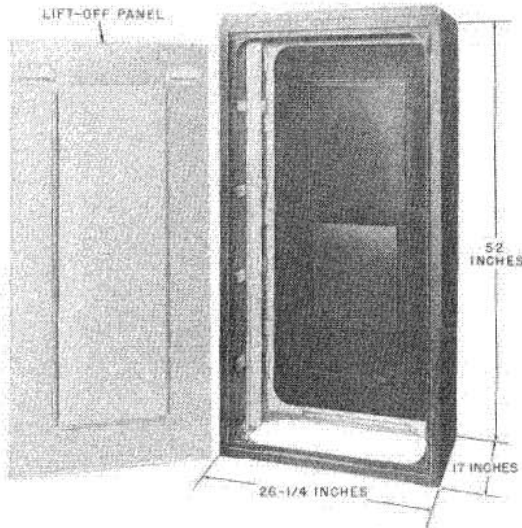


Fig. 17—26-Plate Apparatus Cabinet per ED-92185-70

#### I. #34-Type Cabinet

4.09 The 34C cabinet (Fig. 18) is a general use, floor-standing unit consisting of a steel bottom and back and a hinged carrier gate. A caster supports the weight of the gate when it is open. Glides or optional casters (D-180700 Kit of Parts) are attached to the bottom corners of the cabinet for easy moving. The back provides a mounting surface for 100-, 101-, and 102-type connecting units; the gate provides a mounting space for a 2-type power panel and one or two 702- or 703-type panels. With a 154A cover installed, the cabinet is 20 inches wide, 19.6 inches deep, and 39.4 inches high overall.⚡

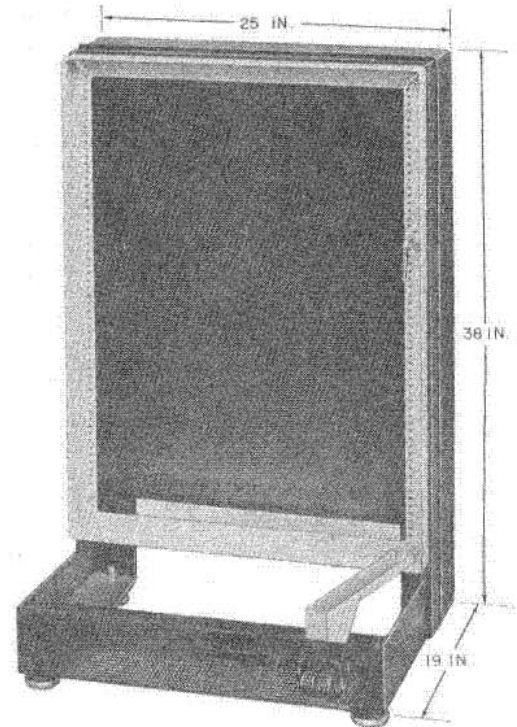


Fig. 18—#34C Cabinet⚡

4.10 ⚡The 34D cabinet is similar to the 34C in function and appearance but somewhat larger. The gate is supported by two casters, and the base has four casters permanently attached to the corners. With a 154B cover installed, the cabinet is 26 inches wide, 21 inches deep, and 43 inches high overall.⚡

#### J. #50A Cabinet

4.11 The 50A cabinet (Fig. 19) is specifically intended for holding 18SP-type terminal blocks and 188-type backboards in installations of the Customer Administered Terminal Move Service (CATMS) where wall mounting is not desired. It consists of a modular frame and optional front/rear doors, side panels, and top cover to convert the open frame to an enclosed cabinet. Two full-size terminal blocks and one backboard can be mounted in the 50A cabinet. It can be installed in free-standing

arrangements or adjacent to PBX cabinets; it is compatible in appearance with the DIMENSION®

PBX system. The 50A cabinet can also be used for holding 66-type connecting blocks.†

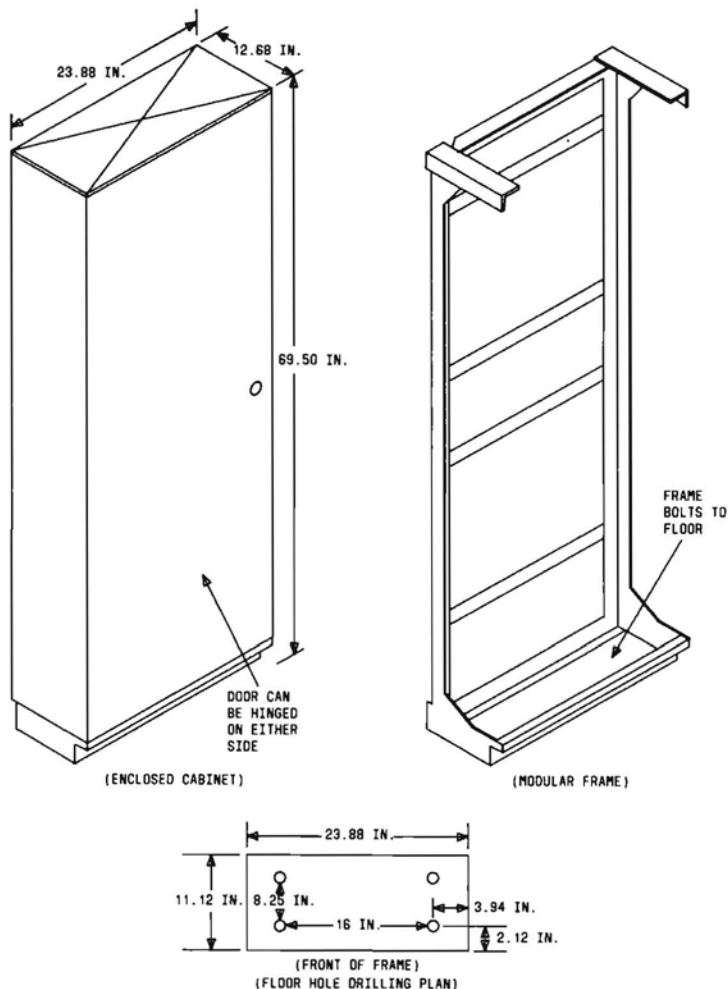


Fig. 19—50A Cabinet†

## 5. BACKBOARDS AND BASES

### A. 173-Type Backboard

- 5.01 The 173A backboard (Fig. 20) is designed to mount one or two 15A apparatus mountings.

The backboard is made of wood and finished in light olive gray.

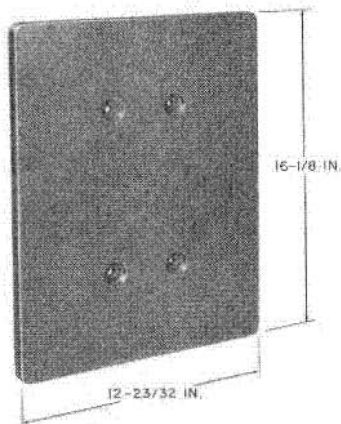


Fig. 20—173A Backboard

5.02 The 173B backboard (Fig. 21) is also finished in light olive gray and is designed to mount one 31A (MD) apparatus mounting.

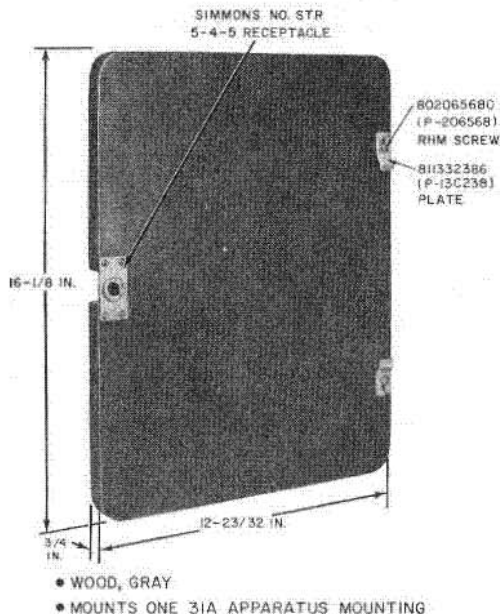


Fig. 21—173B Backboard

## B. 177A Backboard

5.03 The 177A die-cast aluminum (Fig. 22) backboard has been replaced by a fiberglass (Fig. 23) backboard. The fiberglass type requires self-tapping screws while the aluminum type requires machine screws for attachment. The 177A backboard is designed for use with the 31B apparatus mounting. A shallow dish-shaped recess provides space for mounting 66-type connecting block. The 811537976 (P-15C797) plates, drilled and tapped to permit right or left hinging of 31B apparatus mounting, may be mounted on either side to hold the gate in an open position. To adapt the 177A backboard for use with the 31A (MD) apparatus mounting, use the D-179862 kit assembly. It consists of a 177A backboard, two metal details, and two 66B1-25 connecting blocks.

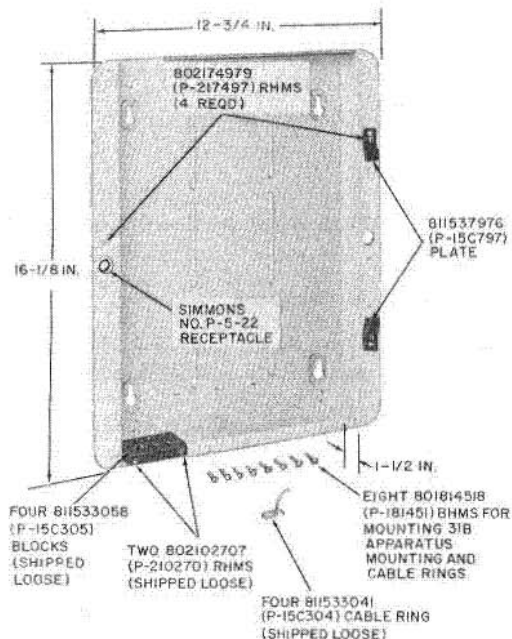


Fig. 22—177A Aluminum Backboard Assembly (MD)

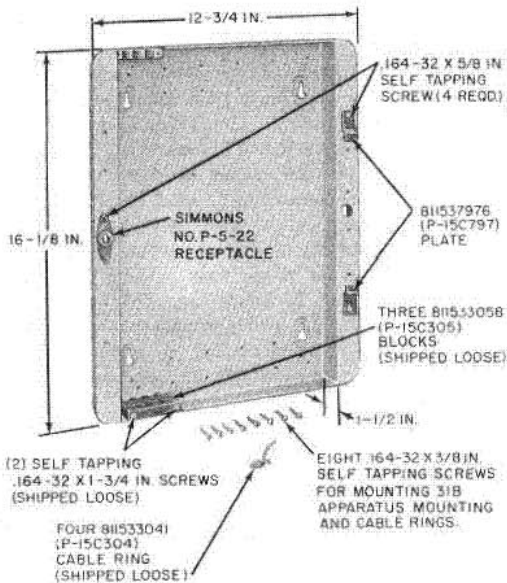


Fig. 23—177A Fiberglass Backboard Assembly

### C. KS-5796 Type Backboard

5.04 The KS-5796, List 9 backboard (Fig. 24) is a backboard with a light olive gray finish.

- List 7 mounts one 105-type apparatus box.
- List 8 mounts two 105-type apparatus boxes.
- List 9 mounts three 105-type apparatus boxes.

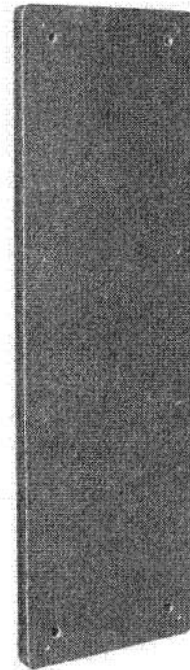


Fig. 24—KS-5796, List 9 Backboard

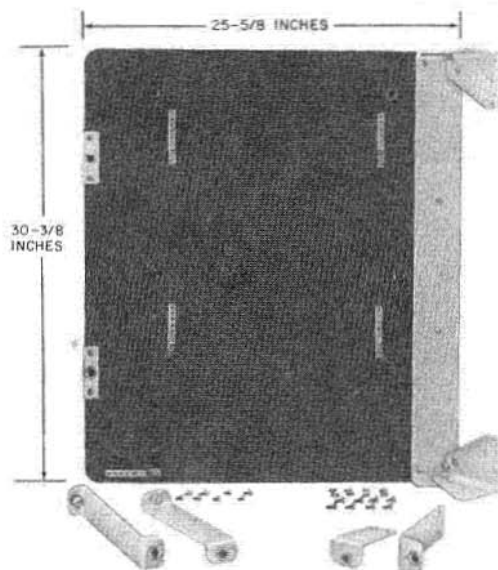
### D. ED-69368-50 Backboard

5.05 The ED-69368-50, Group 1 backboard (Fig. 25) is designed to mount one 26A apparatus mounting and one ED-69366-50, Group 3 terminal plate assembly. The backboard has a light olive gray finish. To mount the terminal plate, four 824124788 (P-41K478) brackets, four 802056515 (P-205651) RHM screws, and eight 802065680 (P-206568) RHM screws must be ordered separately.

**Note:** Counterbored mounting holes and/or segmented butt-joined backboard could require the use of D-179860 parts (below) for strengthening and reinforcing purposes.



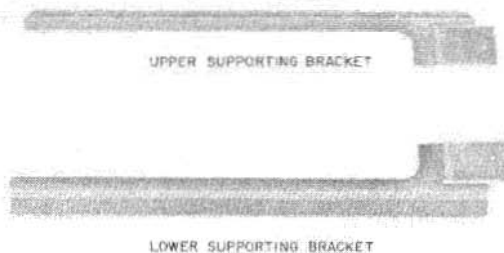
*To avoid injury or damage resulting from falling 26A apparatus mounting, check and tighten shoulder screws before attempting to open gate. Shoulder screws used to fasten 26A apparatus mounting to end support of ED-69368-50, Group 1 backboard may become unscrewed gradually by opening and closing of gate.*



- WOOD, LIGHT OLIVE GRAY
- MOUNT ONE 26A APPARATUS MOUNTING AND ONE ED-69366-50, G3 TERMINAL PLATE ASSEMBLY
- CAN BE EQUIPPED WITH ED-69368-50, G2 COVER

**Fig. 25—Backboard per ED-69368-50, Group 1**

**5.06** The D-179860 kit (Fig. 26), designed to fit over the upper and lower edge of an ED-69368-50, Group 1 backboard, consists of two light olive gray finished, Z-shaped, 1/6-inch steel supporting brackets, and four No. 14 RHW screws. Four holes and a slot are provided in each bracket for fastening to the backboard and wall surface. These brackets may be used, as desired locally, to strengthen or reinforce existing or new backboard installations.



**Fig. 26—D-179860 Kit**

#### **E. ED-91180-70 Base**

**5.07** The insulating base per ED-91180-70\* (Fig. 27) is a wooden base for 11- and 18-plate cabinets.

#### **F. ED-91472-70 Base**

**5.08** An insulating base per ED-91472-70\* is used as a backboard for the 4-plate apparatus cabinet or as a base for the floor-mounting stand per ED-91296-01\*.

\*Available in several different specifications. See ED drawing or, where available, catalog of supplies for group number.

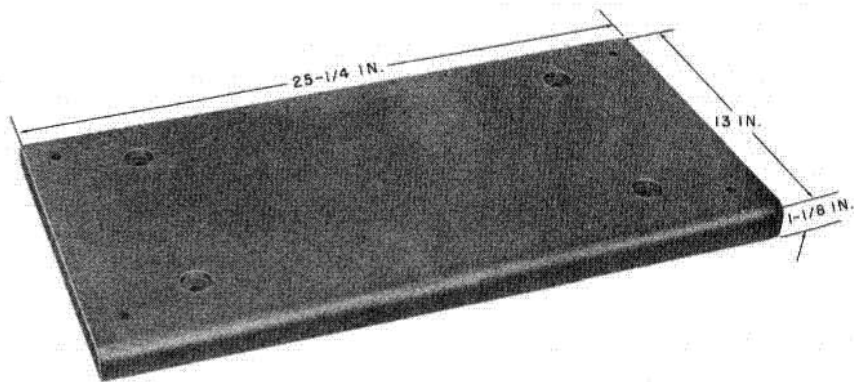


Fig. 27—Insulating Base per ED-91180-70

## 6. FLOOR STANDS

### A. ED-69462-50 Floor Stand

6.01 The floor stand per ED-69462-50, Group 1 (Fig. 28) is a steel floor stand designed to hold a 177A backboard or equivalent. An auxiliary gate is included for mounting a J86731D, List 1 power plant (or physical equivalent). The floor stand may be wall mounted, if desired, by means of slotted holes provided for the purpose.

**Note:** For unattached installation, the ED-69462-50, Group 3 floor board can be used for added stability.

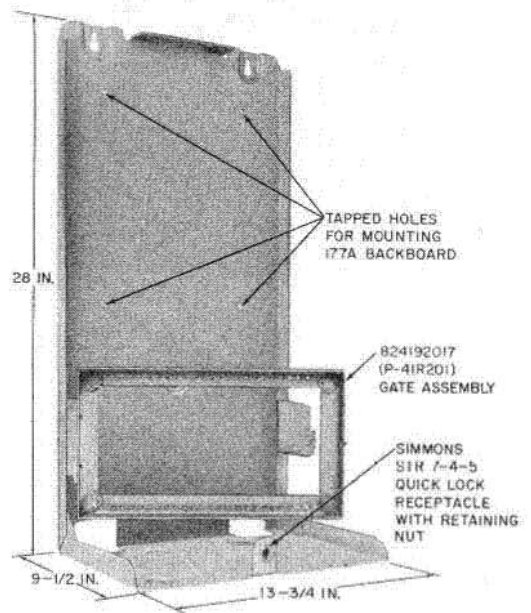


Fig. 28—Floor Stand per ED-69462-50, Group 1

### B. ED-91296-70 Floor Stand

6.02 The floor stand per ED-91296-70† (Fig. 29) is a metal stand for mounting two 4-plate apparatus cabinets, one over the other.

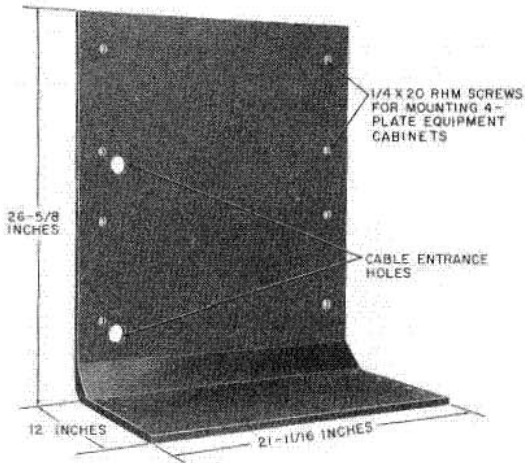


Fig. 29—Floor Stand per ED-91296-70

### C. ED-95023-70 Floor Stand

6.03 The metal stand per ED-95023-70† (Fig. 30) has two leg assemblies used to mount one 16A apparatus mounting, or one J86731A, List 4 power plant, and may be used with the 16C apparatus mounting when redrilled locally. It is furnished with four RHM screws, four hex nuts, and four washers.

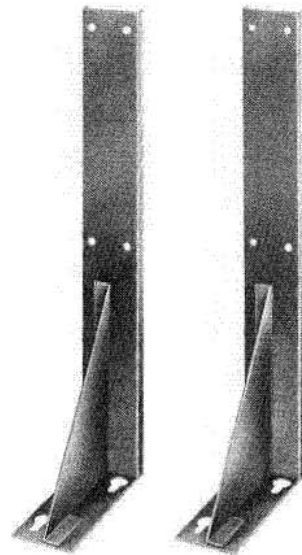


Fig. 30—Metal Stand per ED-95023-70

6.04 The auxiliary leg per ED-95023-70† (Fig. 31) has two extension leg assemblies used to mount the J86731A, List 4 power plant above the 16-type apparatus mounting.

6.05 The covers per ED-95023-70† (Fig. 32) are used to conceal the exposed portion of ED-95023-01 metal stands where appearance is important. Eight RHM screws are furnished with the covers.

†See ED drawing or, where available, catalog of supplies for group number.

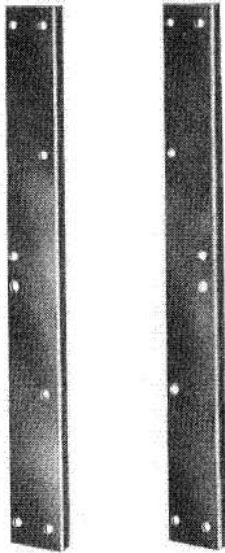


Fig. 31—Auxiliary Leg per ED-95023-70

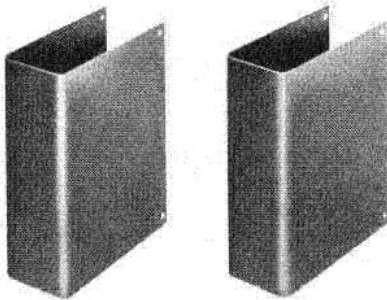


Fig. 32—Covers per ED-95023-70

## 7. WALL RACKS

### ED-69463-50 Wall Racks

7.01 The wall relay rack per ED-69463-50, Group 1 (MD) (Fig. 33) and ED-69463-50, Group 8 (Fig. 34) are steel relay racks designed for centralized installations of key telephone equipment. They consist of two gates hinged on the right side and mounted on a steel frame. Each gate may be

swung open independently after the rack is securely fastened. Rear of frame is covered with a 3/4-inch plywood backboard for mounting cable distribution rings, connecting blocks, etc.

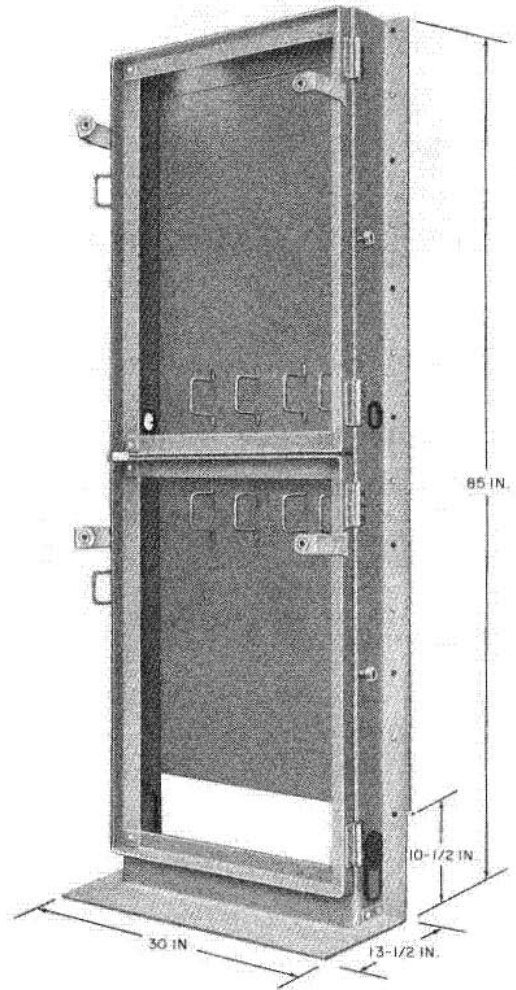


Fig. 33—Wall Relay Rack per ED-69463-50, Group 1 (MD)



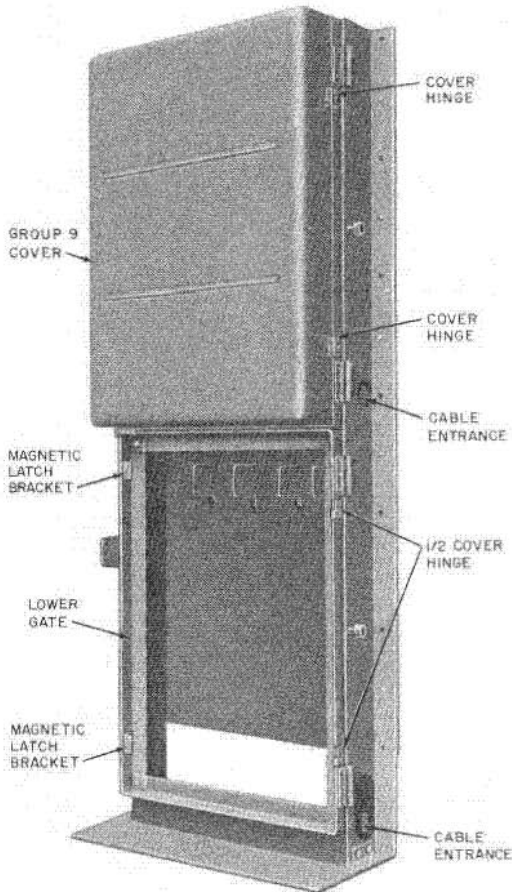


Fig. 34—Wall Relay Rack per ED-69463-50, Group 8, With One Group 9 Cover on Upper Gate

7.02 Multiple installations are possible, either back-to-back or side-by-side. In the latter arrangement, sufficient space must be left between racks to allow opening of the gates after equipment has been installed. Approximately 30 inches, measured from wall surface, are required at front of relay rack to allow full opening of gates. The relay rack weighs approximately 200 pounds unequipped. Care must be taken to ensure safe floor loading and proper anchoring. With the addition of other group assemblies, the rack has a capacity of forty 1-3/4 inch mounting plates or

thirty-four 2-inch mounting plates. The group assemblies are designed for the mounting of combinations of mounting plates and terminal strips. See Section 463-140-200 entitled Equipment Cabinets and Apparatus Mountings—Installation.

## 8. COVERS

### A. 116A Cover

8.01 The 116A cover (Fig. 35) is designed to enclose:

- One or two 15A apparatus mountings mounted on a 173A backboard
- One 31A (MD) apparatus mounting mounted on a 173B backboard
- One 31B apparatus mounting on a 177A backboard.

**Note:** Two 811910082 (P-19A008) cover supports and eight RHM screws are furnished with cover.

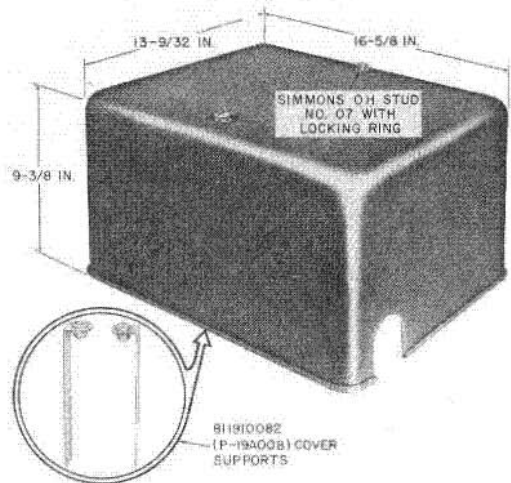


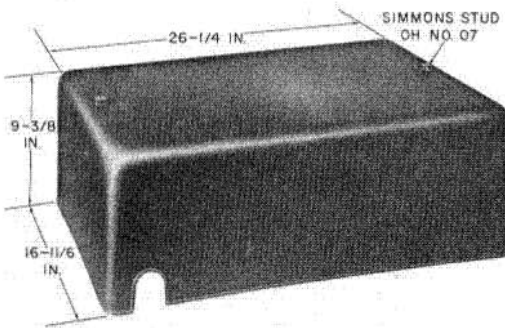
Fig. 35—116A Cover

**B. 117-Type Cover**

**8.02** The 117A cover (Fig. 36) is designed to enclose:

- One 16A (MD) or 16C apparatus mounting
- Two 31A (MD) apparatus mountings mounted on two 173B backboards
- Two 31B apparatus mountings mounted on two 177A backboards
- Three or four 15A apparatus mountings mounted on two 173A backboards.

**Note:** When used to enclose the 15A, 31A (MD), or 31B apparatus mounting, two 811910082 (P-19A008) cover supports and eight 802056523 (P-205652) RHM screws must be ordered separately.



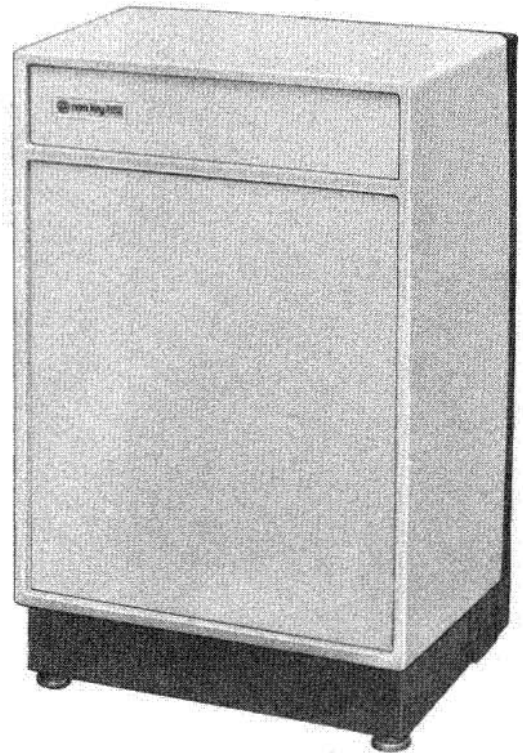
**Fig. 36—117A Cover**

**8.03** ♦The 117C cover is a general use fiberglass cover with the same applications as the 117A cover but having a more decorative appearance. The 117C cover is 26 inches wide, 16 inches deep, and 18-1/2 inches high.♦

**C. ♦154-Type Cover**

**8.04** A 154A cover (Fig. 37) can be used with a 34C cabinet, or a 154B cover with a 34D cabinet, to provide a more finished appearance in

a business office installation. They are made of fiberglass and extend over the top, sides, and front of the associated cabinet.♦



**Fig. 37—♦154A Cover on 34C Cabinet♦**

**D. ED-69368-50 Cover**

**8.05** The cover per ED-69368-50, Group 2 (Fig. 38) is designed to enclose one 26A apparatus mounting on an ED-69368-50, Group 1 or 3 backboard.

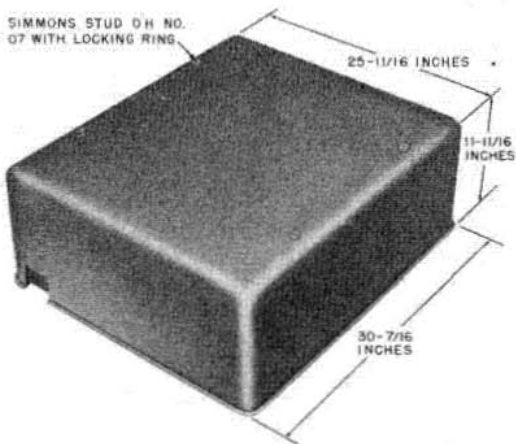


Fig. 38—Cover per ED-69368-50, Group 2

#### E. ED-69462-50 Cover

8.06 The cover per ED-69462-50, Group 2 (Fig. 39) is a fiberglass cover designed for use with ED-69462-01, Group 1 floor stand.

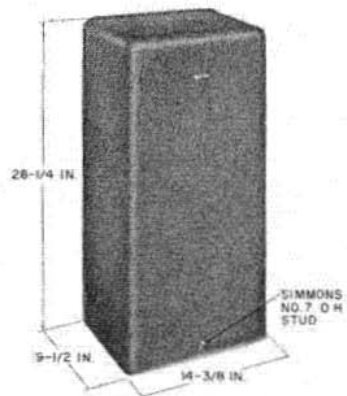


Fig. 39—Cover per ED-69462-50, Group 2

#### F. ED-69463-50 Cover

8.07 The cover per ED-69463-50, Group 6 (A&M Only) shown in Fig. 40 is a matted fiberglass cover designed to enclose one ED-69463-50 Group 1 (MD) wall relay rack. The cover is shown as it appears when assembled. It is shipped as a flat panel with top, center, and bottom panels, and must be formed on the job.

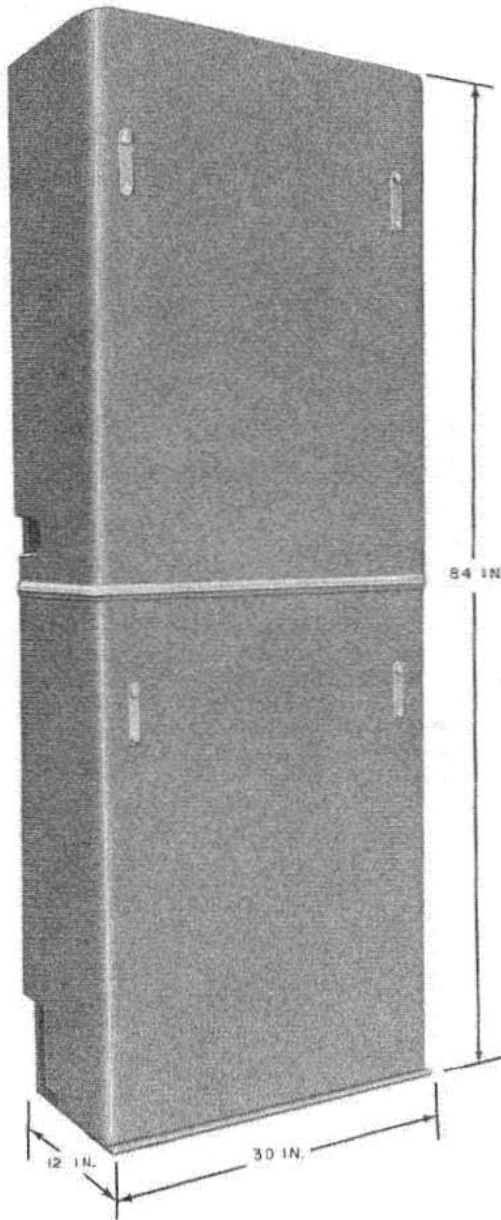


Fig. 40—Cover per ED-69463-50, Group 6 (A&M Only)

8.08 The ED-69463-50, Group 9 (Fig. 41) cover is a formed plastic cover hinged on the right side and held closed by magnetic catches. The hinges are the lift-away type to simplify installation and removal for maintenance. The keepers for the magnetic catches are mounted on the left side of the gate. The cover becomes part of the gate and the gate can be opened without disturbing the cover. Two Group 9 covers are required for one Group 8 relay rack. Half of the hinges mount on the relay rack gate and the other halves are riveted to the Group cover.

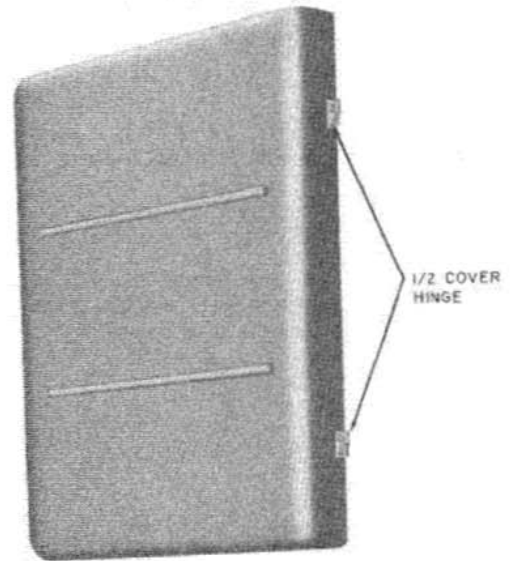
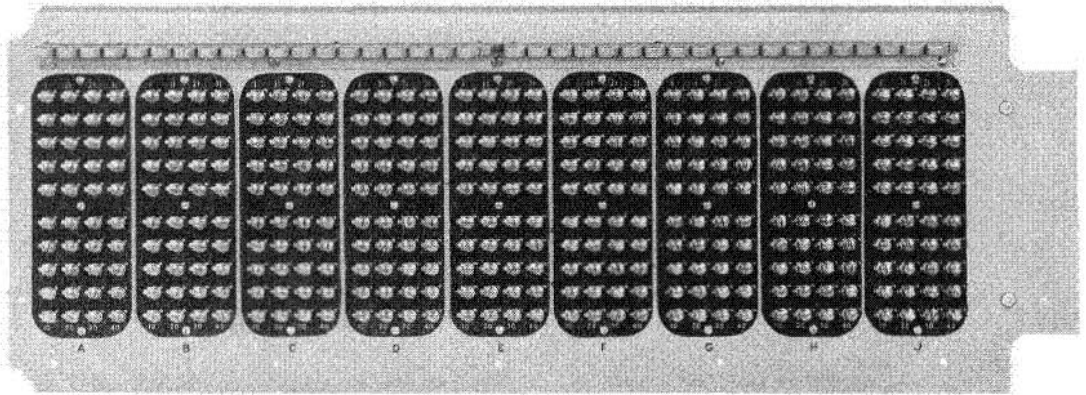


Fig. 41—Cover per ED-69463-50, Group 9

**9. TERMINAL PLATE AND WALL BOX****A. ED-69366-50 Terminal Plate Assembly**

**9.01** The terminal plate assembly per ED-69366-50, Group 3 (Fig. 42) is used primarily as a distribution terminal for the 26A apparatus mounting.

It has a capacity of 360 terminals which provide for wire-wrapped connections on the back and screw terminal connections on the face. This assembly fastens into a floor-supported cabinet per ED-69366-50, onto a terminal wall box per ED-69391-50, or on a backboard per ED-69368-50.

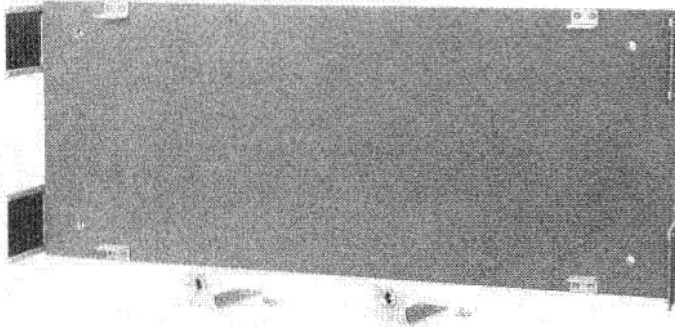


**Fig. 42—Terminal Plate Assembly per ED-69366-50, Group 3**

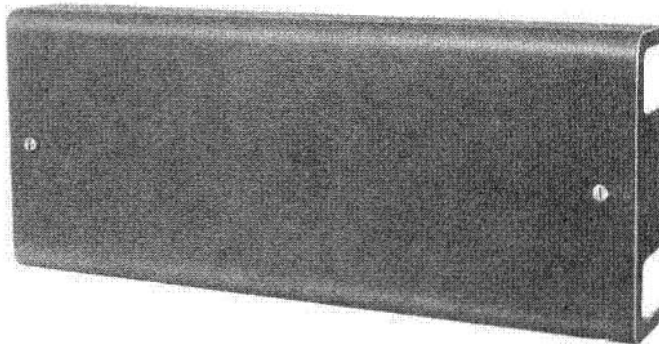
**B. ED-69391-50 Terminal Wall Box**

9.02 The terminal wall box per ED-69391-50, Group 1 (Fig. 43 and 44) consists of a particle

board backboard and a cover, plus hardware needed to hold one terminal plate assembly per ED-69366-50, Group 4.



**Fig. 43—Terminal Wall Box per ED-69391-50, Group 1**



**Fig. 44—Terminal Wall Box per ED-69391-50, Group 1 (Cover)**

## 10. ADAPTERS, BRACKETS, AND MOUNTING BARS

## ADAPTERS

## A. 262A Adapter

10.01 The 262A adapter is used to mount a 20-type power unit in a 16C apparatus mounting with two 615A panels using 99-type brackets (Fig. 45). All necessary screws and

hardware are supplied with the adapter but the 99-type brackets must be separately ordered.

## B. 813622099 (P-36B209) Adapter

10.02 The 813622099 (P-36B209) adapter (Fig. 46) consists of two extensions required for mounting one 1-3/4 by 19-inch mounting plate on 23-inch gates and relay racks.

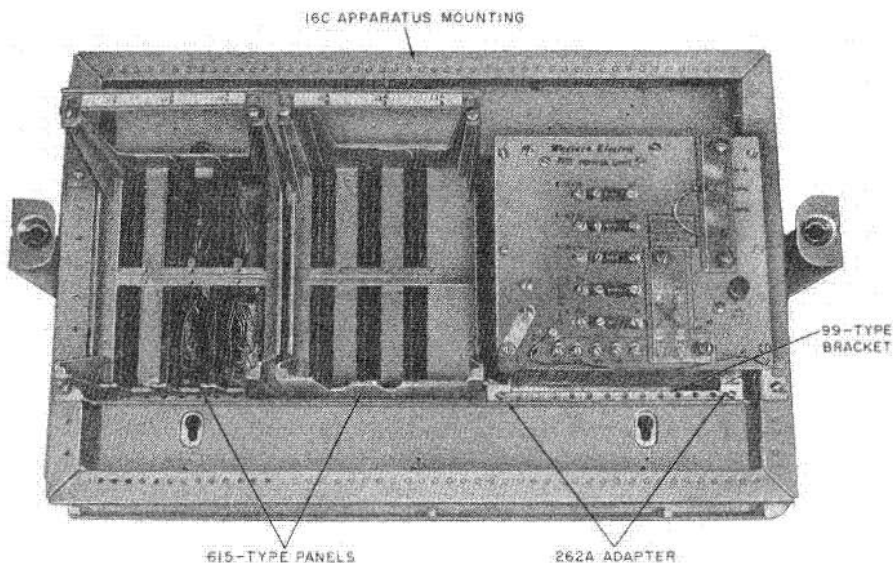


Fig. 45—16C Apparatus Mounting With 615A Panels Mounted on 99-Type Brackets and 20-Type Power Unit Mounted on 262A Adapter

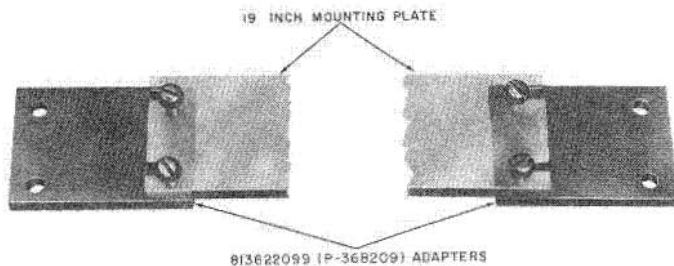


Fig. 46—813622099 (P-36B209) Adapter

## BRACKETS

## A. 67-Type Bracket

10.03 The 67A (19-inch) and 67B (23-inch) brackets are used to mount panel-type KTUs on relay racks or in 11-, 18-, 26-, and 45-plate apparatus cabinets. The 67A bracket replaces the 813718236 (P-37A823) mounting bar; the 67B bracket replaces

the 813715026 (P-37A502) mounting bar (see Fig. 47).

**Note:** Frames, gates, or mountings drilled on 1-inch centers for 2-inch mounting plates require an 813719010 (P-37A901) mounting bar assembly in addition to either the two 67A or two 67B brackets needed for accommodating panel-type KTUs.

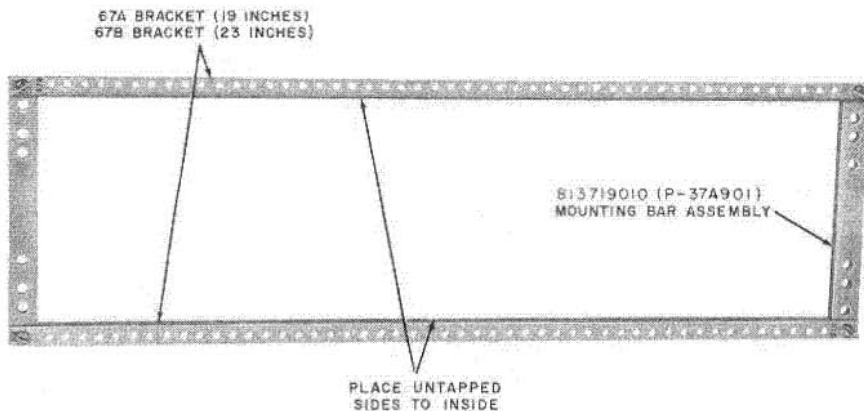
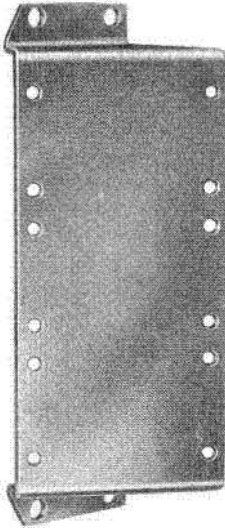


Fig. 47—67-Type Brackets for Mounting Panel Type 200-Series Key Telephone Units



**B. 813722048 (P-37B204) Bracket**

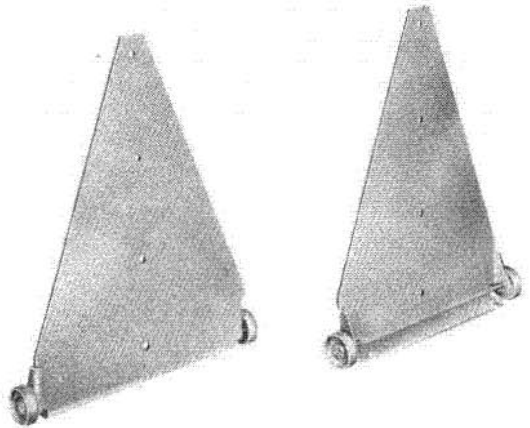
**10.04** The 813722048 (P-37B204) bracket (Fig. 48) is used to mount angle-bracket type KTUs on 15A, 16-type, 26A, and 31-type apparatus mountings. Twelve tapped holes permit front and rear mounting of single- and double-space KTUs. Furnished with four 803535012 (P-353501) SPLHM screws for attaching to the apparatus mounting.



**Fig. 48—813722048 (P-37B204) Bracket**

**C. ED-69366-50 Bracket**

**10.05** The bracket assembly per ED-69366-50, Group 2 (Fig. 49) has two wheel-equipped support plates needed to install a 26A apparatus mounting on the floor or in the floor-supported cabinet per ED-69366-50, Group 1. Eight RHM screws are furnished with the assembly. Nylon wheels are replaceable as Simmons Fastener Corp. Springlock Roller Assembly G-1300A-1343.



**Fig. 49—Bracket Assembly per ED-69366-50, Group 2**

**MOUNTING BARS**

**A. 811238245 (P-12C824) Mounting Bar**

**10.06** The 811238245 (P-12C824) mounting bar has slotted ends and can be used as a substitute for 67B brackets in 11-, 18-, 25-, and 45-plate apparatus cabinets.



**B. 813538733 (P-35C873) Mounting Bar**

**10.07** The 813538733 (P-35C873) mounting bar (Fig. 50) has two bars needed to mount one or two 811331131 (P-13C113) frame assemblies [31A (MD) apparatus mounting less welded hinge and fastener details] on a 23-inch wide relay rack. It is furnished with four 803534468 (P-353446) RHM screws.

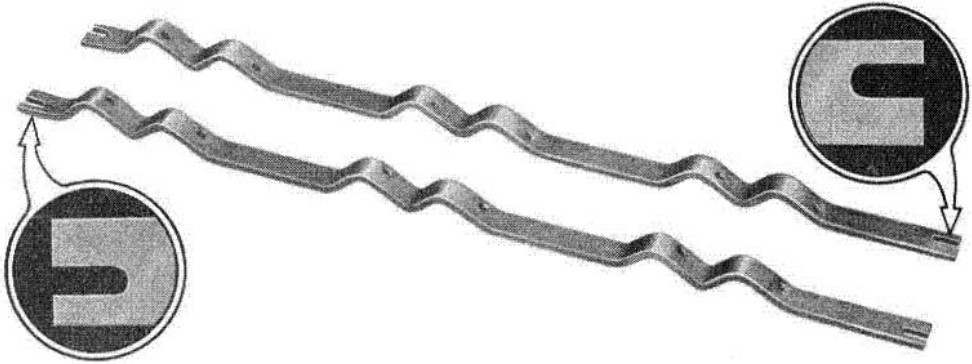


**Fig. 50—813538733 (P-35C873) Mounting Bar**

**C. ED-69143-70 Mounting Bar**

**10.08** The bent mounting bars per ED-69143-70† (Fig. 51) are used to mount angle-bracket KTUs on 23-inch relay racks and in 4-, 11-, 18-, 26-, and 45-plate apparatus cabinets.

† See ED drawing or, where available, catalog of supplies for group number.



**Fig. 51—Bent Mounting Bars per ED-69143-70**



## LAMP INDICATORS

### IDENTIFICATION AND INSTALLATION

#### 1. GENERAL

1.01 This section provides information on the identification and installation of lamp indicators.

1.02 This section is reissued to:

- Add 426M diode to neon indicators when used on higher than 48-volt line circuits.

#### 2. IDENTIFICATION

##### A. Purpose

2.01 The purpose is to give line and station busy indications.

##### B. Ordering Guide

2.02 Order as follows:

- Base, Indicator (Table A)
- Indicator, Lamp (Table A)
- Lens, Indicator (Table A)
- Kit of Parts, D-180380 (Table A).

##### C. Application

2.03 Used with key stations, PBX systems, and similar station systems.

#### 3. INSTALLATION

3.01 Avoid locating indicators in direct sunlight or areas of high illumination.

3.02 To install indicator in a fixed position, use 3/4-inch, No. 6 or 8 RH wood or metal screws.

3.03 For mounting on plastic, metal, or masonry surfaces, use proper size backboard and install in accordance with accepted procedures.

3.04 For concealed wiring installations, bring wires through mounting surface and hole cut in composition base of indicator.

3.05 The 1A base separates into two parts which normally fit together with interlocking lip and grooves. This separation allows the insertion of one or more supplementary lamp units [use 2A base to create multiple lamp indicators (Fig. 3)].

3.06 To install unattached mounting:

- (1) Equip with mounting cord and attach nonskid pad to indicator base
- (2) Fasten cord on connecting block to rear of desk or table, mounted in knee well, or behind center drawer
- (3) Fold or fasten excess cordage securely to avoid creating a safety hazard.

3.07 When attaching mounting cords to indicators, take care to dress conductor leads properly in the available space. This avoids electrical short circuits, interference with positioning of housing, and blanking out the lamp signal.

3.08 Position lamps properly in their sockets.

3.09 Snap indicator housings to bases making certain they are firmly positioned.

3.10 The 358A tube in the 21-type indicator will flash as follows:

- (a) The 358A tube should flash near the top on superimposed ringing. If it does not, reverse the tip and ring conductors of the mounting cord (or inside wire) at the most accessible point.

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(b) In cases where pure ac ringing current is used, the 358A tube will flash both top and bottom.

3.11 A combination of 1A indicator base and D-180380 Kit of Parts can be used in lieu of the 21C-49 "beehive" lens indicator. ♦The GE-K1D neon lamp glows when ringing current is applied.♦ Install the kit on the base per Fig. 5 and 6.

♦**Caution: The GE-K1D and 358A neon indicators are designed for operation in 48-volt central office circuits. If the neon indicator glows continually, a higher voltage is present [eg, 72-volt metallic facility terminal (MFT) circuit] and a 426M diode must be installed (Fig. 14 and 15).**♦

TABLE A  
ORDERING GUIDE

NAME	CODE OR NUMBER	COLOR	NO. OF LAMP POSITIONS	COLOR OF LENS FURNISHED	MOUNTING CORD†	FIG. NO.	DESIGN FEATURES
Indicator Base*	1A	Light olive gray (-49)	1		Inside Wire	1 and 3	Basic indicator unit with a 1-type lens, must be rigidly mounted, may be used with one or more 2A indicator bases to form a multiple indicator.
	2A		1			2 and 3	Supplementary lamp unit which mates with the 1A indicator base.
Indicator Lens	1A	White				4	One lens required for each indicator base (must be ordered separately).
	1B	Blue					
	1C	Green					
	1D	Amber					
	1E	Red					
	1F	Clear					
Kit	D-180380	—	1	Clear		5 and 6	An adapter which enables the 1A or 2B indicator base to use a GE-K1D neon glow lamp in place of the 51A incandescent lamp. Includes one 1F lens.
Lamp Indicators ‡	14B	Light olive gray (-49)	3	White Green Red	D4BD-49	7	Nonflush type, may be mounted in horizontal or vertical fixed position, may be terminated on a mounting cord and mounted without fastening on a horizontal surface; a nonskid pad is furnished for use when the indicator is not mounted in a fixed position.
	15D		1	White	D3BP-49	8	
	15E			Red			
	15F			Green			
	15G			Amber			
16A		3	White Green Red	NONE	9	Flush type mounting, may be mounted in standard outlet box or can be flush mounted in the same manner used for station jacks.	

TABLE A (Contd)

## ORDERING GUIDE

NAME	CODE OR NUMBER	COLOR	NO. OF LAMP POSITIONS	COLOR OF LENS FURNISHED	MOUNTING CORD†	FIG. NO.	DESIGN FEATURES	
Lamp Indicators ‡ (Contd)	17C	Light olive gray (-49) (Contd)	2	Green Red	D3BP-49	10	Nonflush type, may be mounted in horizontal or vertical fixed position, may be terminated on a mounting cord and mounted without fasten- fastening on a horizontal surface, a nonskid pad is furnished for use when the indicator is not mounted in a fixed position.	
	17D			White Red	D4BD-49			
	17E			Red Red				
	17F			White Amber				
	18B		3	White Green Red	D4BD-49	11		
	18C			Green Amber Red				
	20B		4	Red White Green Amber	D6W-49	12		
	21B (MD)		1	Clear	D3BP-49	13		Contains a 2-element cold cathode tube which operates on ringing voltage and provides a visual line lamp during ringing interval.
	21C							

\* Use 51A lamps with 10-volt power supply and 52A lamps with 24-volt power supply. Lamps must be ordered separately.

† Associated mounting cord, when required, must be ordered separately.

‡ Use a switchboard lamp or key equipment lamp. Lamp must be ordered separately.



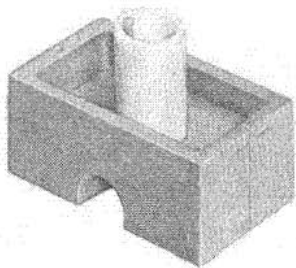


Fig. 1—1A Indicator Base

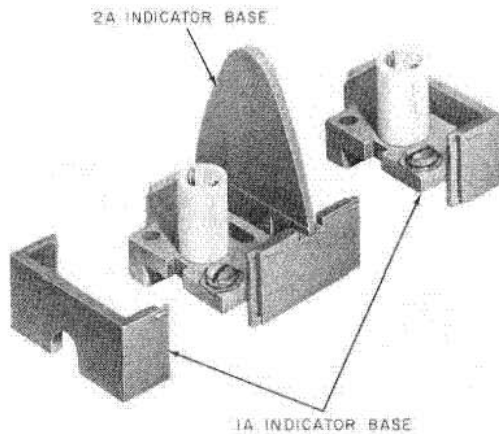


Fig. 3—1A and 2A Indicator Bases Used to Form a 2-Lamp Indicator

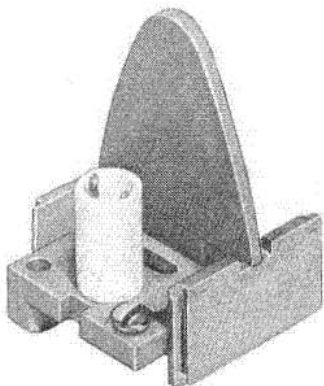


Fig. 2—2A Indicator Base

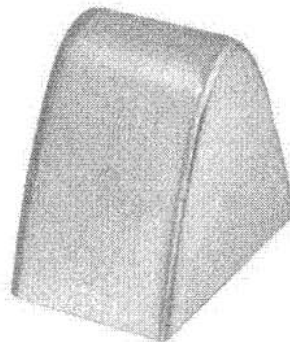


Fig. 4—1-Type Indicator Lens

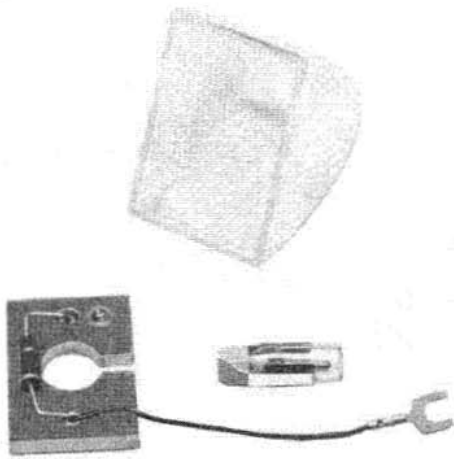


Fig. 5—D-180380 Kit of Parts

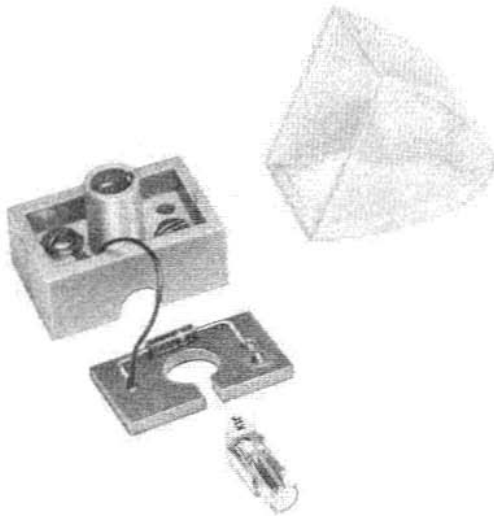
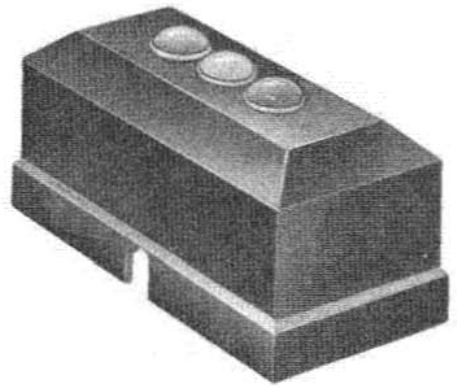


Fig. 7—14B Indicator

Fig. 6—D-180380 Kit of Parts and 1A Indicator Base  
(Can be Used in Place of 21C Indicator)

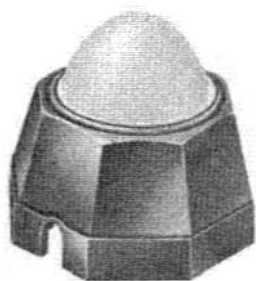


Fig. 8—15-Type Indicator

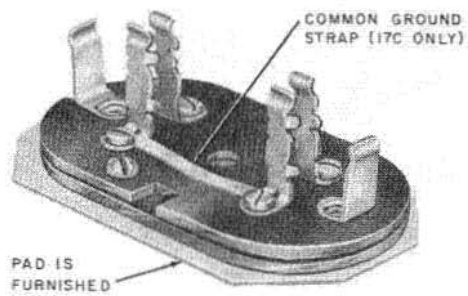
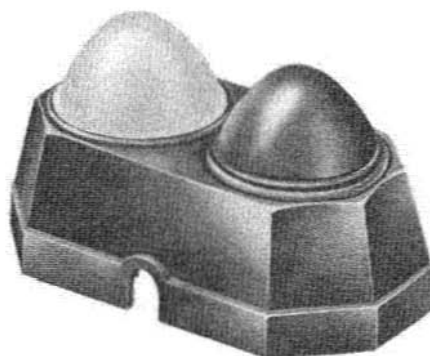


Fig. 10—17-Type Indicator

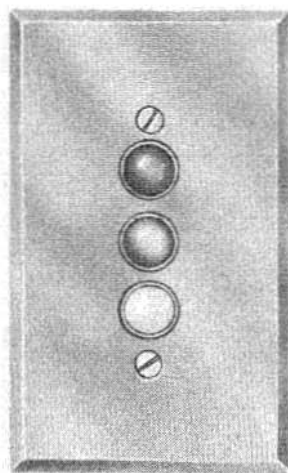
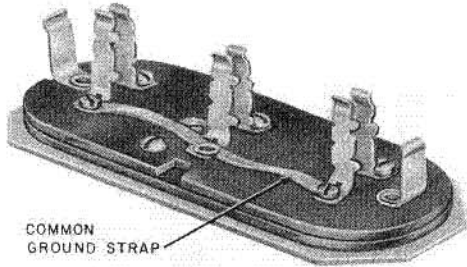
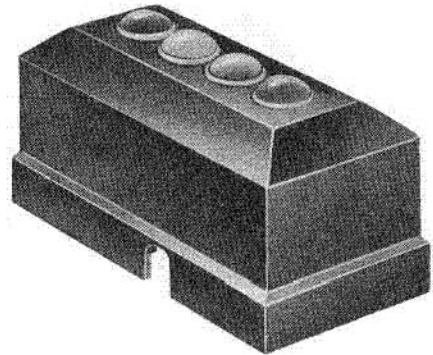
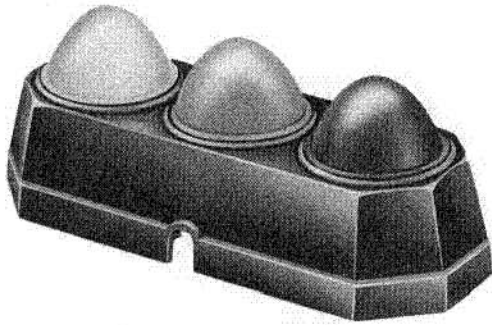
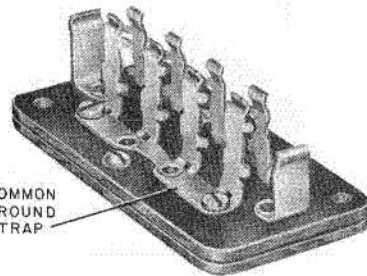


Fig. 9—16A Indicator



COMMON  
GROUND STRAP

**Fig. 11—18-Type Indicator**



COMMON  
GROUND  
STRAP

**Fig. 12—20B Indicator**

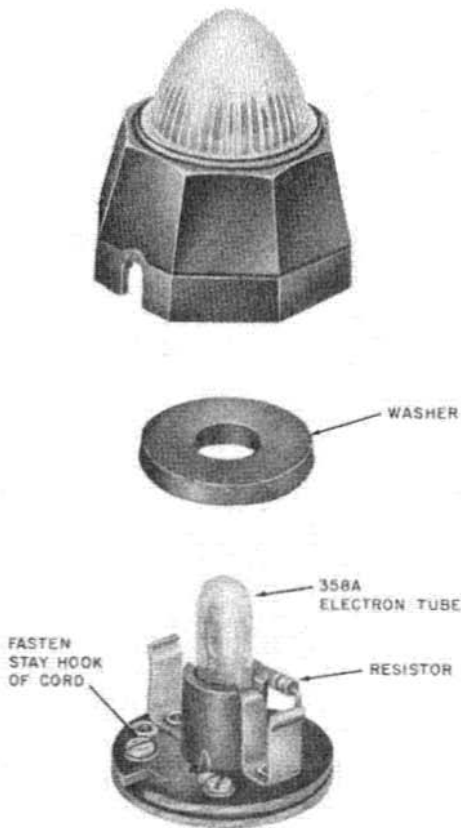


Fig. 13—21-Type Indicator

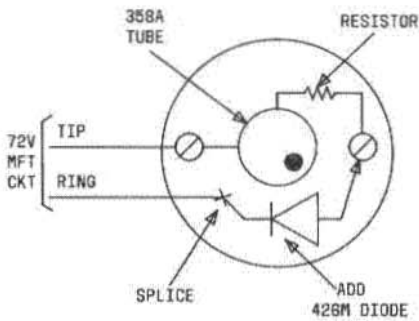


Fig. 14—21C Indicator Circuit With Diode Application for 72-Volt MFT Circuit

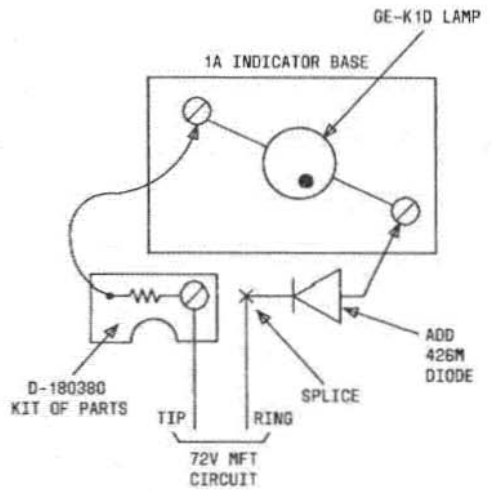


Fig. 15—1A Indicator Base With D-180380 Kit of Parts and Diode Application for 72-Volt MFT Circuit



## REFERENCE

### BUZZERS AND BELLS

#### IDENTIFICATION, INSTALLATION, MAINTENANCE, LIMITATIONS, AND CONNECTIONS

##### 1. GENERAL

1.01 This section contains information on low voltage buzzers and bells used in ac or dc signaling circuits and high resistance buzzers that may be used on ac ringing current circuits.

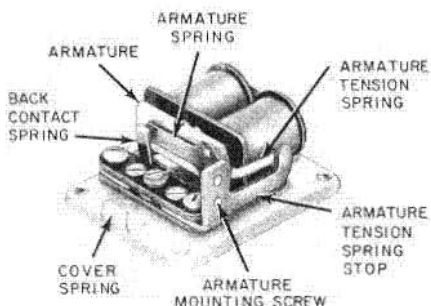


Fig. 1—7F Buzzer

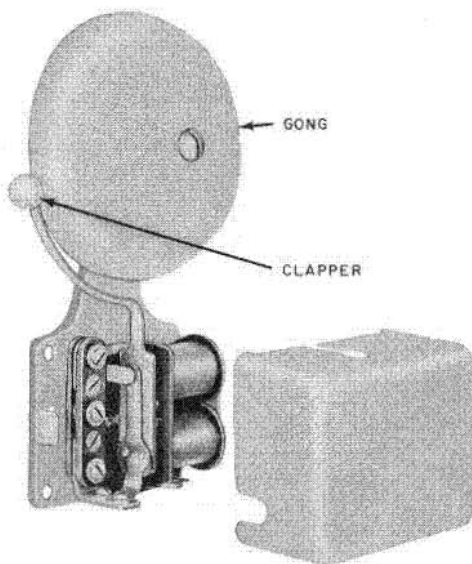


Fig. 2—7-Type Bell

1.02 This section is reissued to show intended use of 9B and 9C buzzers and revise Table B.

1.03 The 4-type buzzers are rated MD and are replaced by the 9- or KS-type buzzers.

1.04 The 7-type buzzers, except for 7F, are rated MD and are replaced by the KS-type buzzers.

##### 2. IDENTIFICATION

###### A. Purpose

2.01 To provide low voltage audible signals for stations or key systems.

###### B. Ordering Guide

2.02 Refer to Table A for low voltage buzzers and bells.

2.03 Refer to Table B for high resistance buzzers (ac operation only).

###### C. Design Features

2.04 The 7F buzzer (A&M Only) (Fig. 1) and the 7-type bell (Fig. 2) have the same design features except the bell is equipped with a clapper and 3-inch gong.

#### NOTICE

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**TABLE A**  
**LOW VOLTAGE AC AND DC SIGNALS**

ORDERING GUIDE			OPERATING FEATURES				
SIGNAL	CODE	REPLACED BY	VOLTAGE RANGE (SEE NOTE)		APPROX DC RES*	APPROXIMATE AC CURRENT IN MA	
			DC (VOLTS)	50-60 CYCLES AC		MIN	MAX
Bell	7A-49	—	14-40	25-50	270	32	75
	7C-49	—	2-5	4-9	2.6	135	200
	7D-49	—	3-10	6-18	15.8	80	185
	7E-49	—	10-20	18-30	105	85	125
	7F-49†	—	24-60	35-60	682	26	50
Buzzer	7F-49†	—	20-60	20-60	682	15	40
	KS-8108L2	—	3-4	3-4	.5	540	770
	KS-8109L2	—	14-30	14-30	55	150	400
	KS-8110L2	—	24-50	24-50	300	45	125
	KS-20419L1	—	—	6-10	60	70	125

\* Multiply these values by 3 when computing dc current drain, except for 7F buzzer or bell.

† May also be operated with 16- to 20-cycle ringing current. Effective impedance is then 850 ohms and approximately 3500 ohms in series with 2- $\mu$ f capacitor.

**Note:** In compliance with Part 68 of the FCC rules, hazardous voltages shall not be routed through the same cables, connectors, or mounting cords as those containing the ring and tip pair or auxiliary interface leads. Accordingly when hazardous voltages used to power these devices, route power through a separate pair. (Hazardous voltages are defined as those which exceed 42 volts ac peak (30V RMS), 80 volts dc, or combined ac and dc voltages with the dc component between 21 and 80 volts, ac voltages less than (55-0.6XVdc) peak. Voltages used for network signaling and control tringing, talk battery, etc.) are not classified as hazardous voltages.

**2.05** The armature and contacts of the 7F buzzer and 7-type bell are protected by a snap-on cover. With this cover installed, the signaling unit protrudes 1-1/2 inches from the mounting surface.

**2.06** The 7F buzzer and 7-type bell have three screw type terminals designated A, C, and D for conductor terminations.

**2.07** The gong of the 7-type bell (Fig. 2) has its mounting hole drilled off-center. The eccentricity of the mounted gong provides for adjustment of the bell's volume by rotating the gong to increase or decrease the travel distance between the clapper and the gong.

**2.08** The 9-type buzzer (Fig. 3, 4, and 5) is composed of a G1C ringer motor, P-type armature, and 64A plastic gong (cover).



◆ TABLE B ◆

## HIGH RESISTANCE BUZZERS

ORDERING GUIDE	OPERATING VOLTAGE	
	24 VOLT DC	AC RINGING CURRENT
9A		•
9B*		•
9C†		•
KS-8109L2 or KS-8110L2	•	•

\* Consists of 9A buzzer plus 219B adapter and mounting screws (Fig. 4). This buzzer for ac operation only.

† Consists of 9A buzzer plus 220A adapter and mounting screws (Fig. 5).

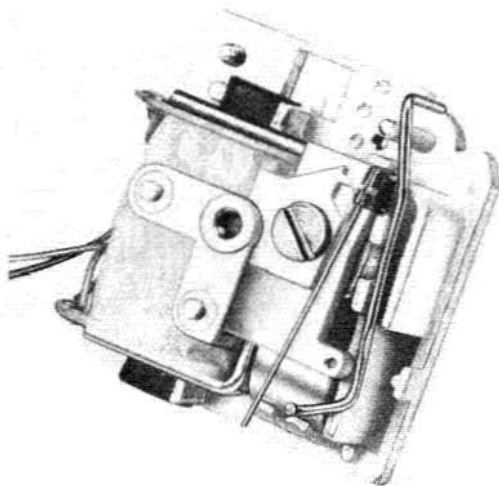


Fig. 3—9A Buzzer With Cover (64A Gong) Removed

2.09 The KS-8108L1, KS-8109L1, and KS-8110L1 buzzers have either a single or double coil and should be used for dc operation only. They are rated MD.

2.10 The KS-8108L2, KS-8109L2, and KS-8110L2 buzzers (Fig. 6) replace the List 1 buzzers. They have a single coil only and may be used for ac or dc operation (Fig. 24). With dc operation, the Lists 1 and 2 buzzers are interchangeable.

2.11 The volume on KS-8108, KS-8109, and KS-8110 type buzzers can be set with the adjusting screw (Fig. 6).

2.12 The miniature KS-20419L1 buzzer (Fig. 7) is 3/4-inch in diameter, 1/2-inch thick, and is equipped with two spade-tipped leads 7-1/2 inches long.

2.13 The KS-20419L1 buzzer has a mounting bracket secured to the buzzer housing. The bracket is slotted and 1-1/4 inches in length and can be attached to a single screw at suitable location inside the telephone set.



*The screw in the center of the buzzer is not intended for volume adjustment.*

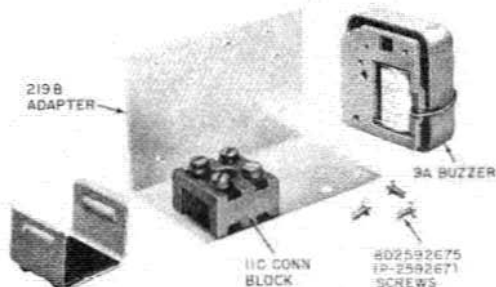


Fig. 4—9B Buzzer

2.14 The KS-13783L1 (MD) bell has been manufactured in two different models.

- Earlier models have a square base with a groove which permitted entry of exposed wiring.
- Later models have a round base with a groove for entry of exposed wiring.

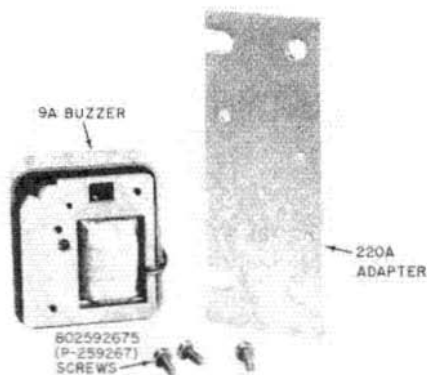


Fig. 5—9C Buzzer

(c) The KS-13783L1 bell has a 4-inch gong and the KS-13783L2 bell has a 6-inch gong.

(d) The KS-13783L1 and L2 bell are rated MD and are replaced by KS-16301L20 and KS-20375L1 signals. For information on the KS-16301L20 and KS-20375L1, refer to Division 463 section entitled Auxiliary Signals—Identification.

#### D. Application

2.15 The 7-type buzzer or bell may be used on 6A selective intercommunicating systems, common line intercommunicating system with button and buzzer signaling, or dial intercommunicating feature of the 1A2 key telephone system.

2.16 The 9-type buzzer can be used as a distinctive common signal for central office or PBX stations working behind key equipment.



*Except for 9-type buzzers, none of the bells or buzzers are to be connected directly across tip and ring leads.*

#### E. Operating Features

2.17 When using a 7F buzzer, make dc connections to terminals D and C and ac connections to terminals A and C. When using a 7-type bell,

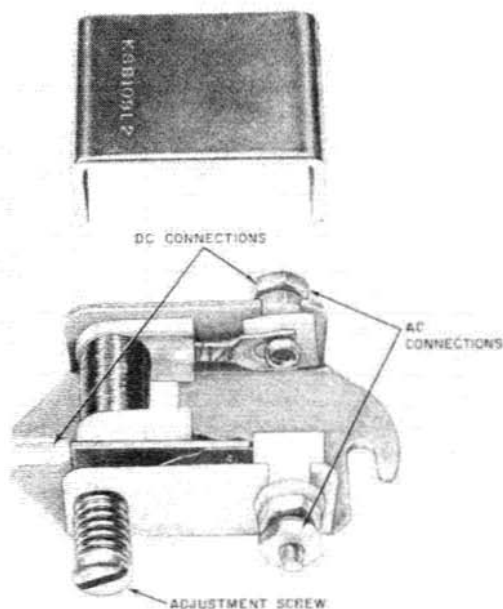


Fig. 6—KS-8109L2 Buzzer

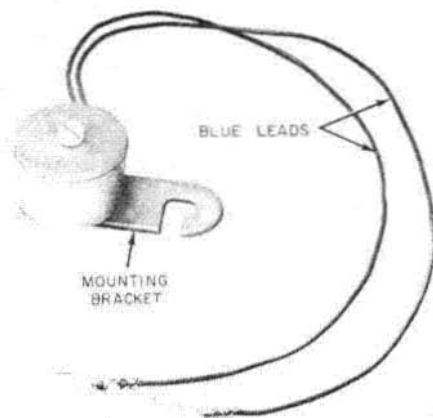


Fig. 7—KS-20419L1 Buzzer

make ac or dc connections to terminals D and C. This provides more positive clapper action.

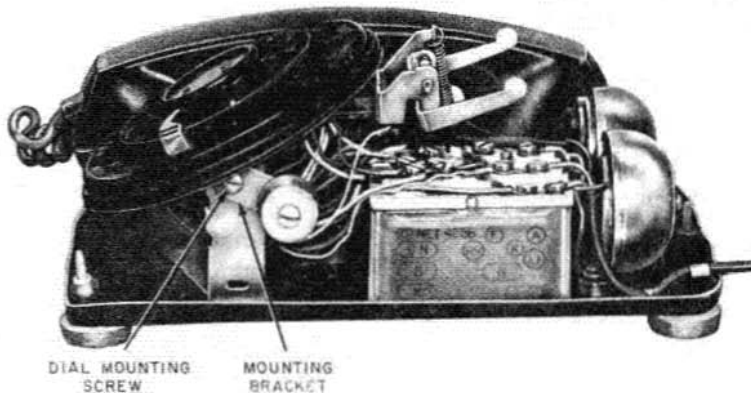


Fig. 8—KS-20419L1 Buzzer Mounted in 500-Type Telephone Set

2.18 When using KS-8108, KS-8109, and KS-8110 type buzzers for de operation the case becomes part of the circuit and should be insulated from any metal mounting surfaces.

2.19 The KS-20419L1 buzzer operates on 6-10 volt ac only.

### 3. INSTALLATION

#### A. Planning

3.01 Consider the following when locating buzzers and bells.

- (a) Use appropriate bracket when placing buzzers in telephone set.
- (b) Locate where signal will be clearly heard.
- (c) The 7-type bells may be mounted on horizontal or vertical surfaces. On vertical surfaces mount bell with gong at top or bottom.
- (d) Locate buzzers and secondary connecting blocks high in desk knee well to avoid disfiguring desks.
- (e) The 7F buzzer (Fig. 1) may be mounted in any position. A preferable position for

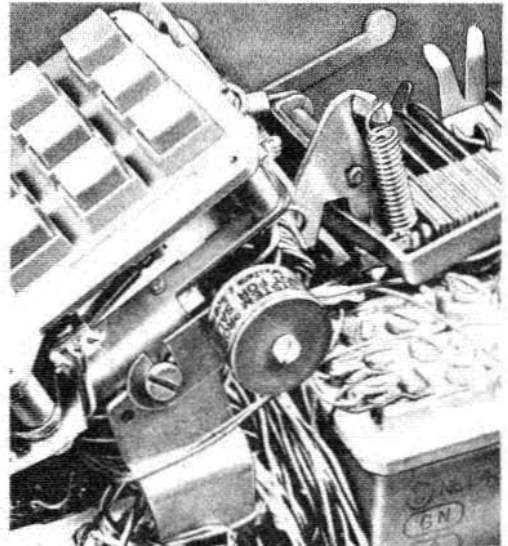


Fig. 9—KS-20419L1 Buzzer Mounted on TOUCH-TONE® Dial Mounting Screw

mounting on vertical surfaces is with armature hanging vertically from hinged end to reduce amount of dust settling on contacts.

- (f) Locate a minimum of 1-foot from any equipment with an unshielded induction coil, to reduce magnetic pickup.
- (g) Do not mount KS-8108, KS-8109, and KS-8110 type buzzers on metal surfaces unless a backboard is used, since metal base forms part of operating circuit. Countersink backboard mounting screws to prevent screwheads from contacting buzzer base.
- (h) Place the KS-20419L1 buzzer inside the telephone set where it will not interfere with electrical or mechanical operation of the telephone set (Fig. 8 and 9). The buzzer circuit is insulated from the case and bracket so that the buzzer can be attached to metal parts of the set.
- (i) A 176A-49 backboard is suitable for use on metal desks or other surfaces requiring a backboard.
- (j) Use a buzzer where fixed volume buzzer tone is required. Use a bell where a distinctive or louder signal is desired.
- (k) The KS-type buzzers are more suitable in CALL DIRECTOR® sets, as they have less induction than the 7-type buzzers.

## B. Mounting

- 3.02 When mounting buzzers directly to a surface use No. 8 pan-head type AB screws of suitable length.
- 3.03 Refer to Division 461 for information on mounting buzzers in floorduct.
- 3.04 See Table C for brackets associated with mounting buzzers in telephone sets and to 168-type backboards.
- 3.05 When mounting KS-8108, KS-8109, and KS-8110 type buzzers on a 70B bracket (Fig. 12) position the buzzer so that it will not interfere with the electrical or mechanical operation of the telephone set, and so the buzzer adjustment screw is accessible.

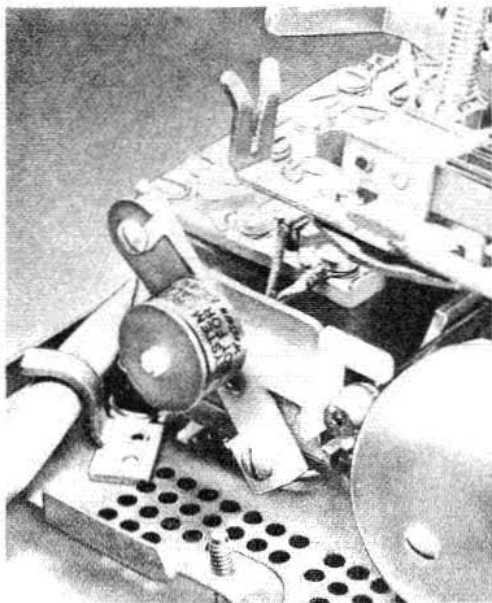


Fig. 10—KS-20419L1 Buzzer Mounted on Bracket of H1A Ringer

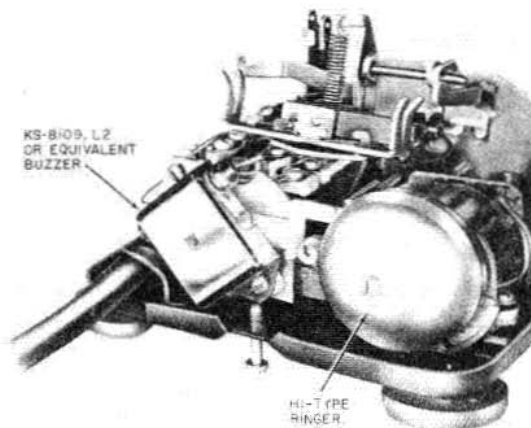


Fig. 11—KS-8109 Type Buzzer Mounted on Bracket of H1A Ringer

♦ TABLE C ♦

## MOUNTING BRACKETS OR ADAPTERS

BUZZER	BRACKET CODE	PARTS FURNISHED WITH BRACKET	INTENDED USE	RESTRICTED USE
7F and No. 152A Capacitor	44B	½(2) Screws to mount buzzer and 152A cap. (2) Screws for mounting bracket	All 500 Series Tel. Sets	44A (MD) bracket not for use with 540-, 560-, and 592-type tel. sets
7F	60A (Note 1)	(2) Screws to mount buzzer to bracket	168-type Backboard	
7F or KS-8109L2	65A (Note 3)	(2) Buzzer mounting screws (2) Insulating washers	600 Series <i>CALL DIRECTOR</i> sets	Not for use in 636-, 637-, 638-, and 639-type
KS-8109L2 or KS-20419 L1	70B (Note 2)	(2) Buzzer mounting screws	500 or 2500 Series Tel Sets	Not for use in 500- or 2500-Series sets E/W exclusion switch (Note 4)
7F, KS-8109L2, or KS-20419 L1	71A (Note 3)	(2) Nylon buzzer mounting screws (2) Insulating washers	636-, 637-, 638-, and 639-Type <i>CALL DIRECTOR</i> sets	Mount 7F buzzer (less cover)
9A	219B*	(3) Screws to mount buzzer to adapter plate 11C conn blk	Create 9B buzzer for 322C-03 telephone set	
	220A*	(3) Screws to mount buzzer to adapter plate	Create 9C buzzer for No. 14 local test desk	

## Notes:

1. The mounting screws used to secure the 168-type backboard also hold the 60A bracket (Fig. 16).
2. 70B bracket mounts astride ringer coil and is fastened with the same screws that hold core to ringer frame. The spade-tipped leads on F terminal contact with the buzzer case. Boss is also provided on the 70B bracket to ensure adequate clearance.
3. The 65A (Fig. 14) and 71A (Fig. 15) mount on the dial mounting plate with a dial mounting screw.
4. Where both ringer and buzzer signals are needed in these sets replace the C4A ringer with an H1A ringer. Mount KS-type buzzers per (Fig. 10 and 11).

- Adapters

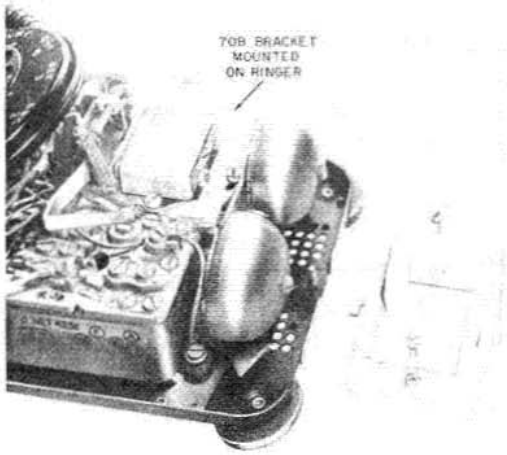


Fig. 12—70B Bracket

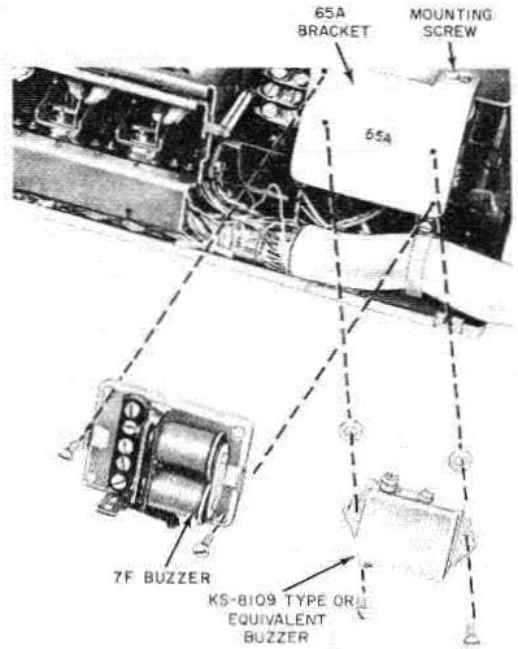


Fig. 14—65A Bracket

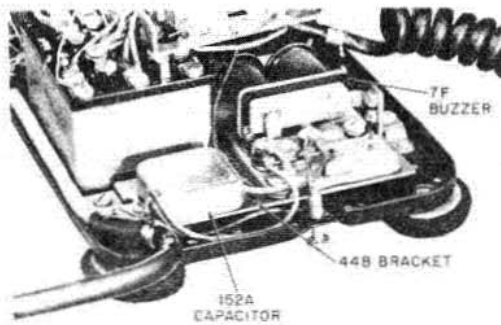


Fig. 13—7F Buzzer and 152A Capacitor Mounted on 44B Bracket

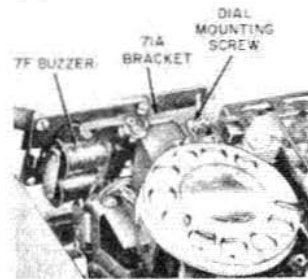


Fig. 15—71A Bracket

#### 4. MAINTENANCE

4.01 Buzzer and bell failure is usually due to one or more of the following:

- Dirty contacts or gummy parts
- Loose connections or poorly soldered terminals
- Insufficient airgap between armature and pole face at hinged end
- Excessive or insufficient armature spring tension
- Armature out of parallel with pole faces.

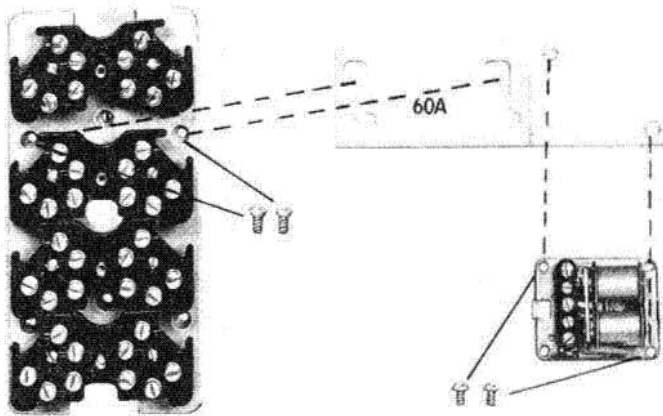


Fig. 16—60A Bracket

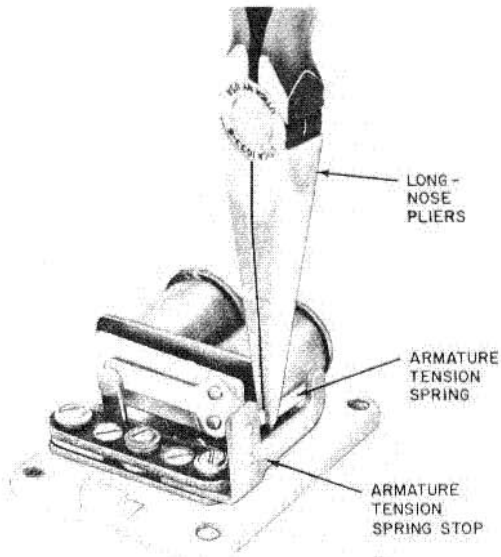


Fig. 17—Adjusting Armature Tension Spring

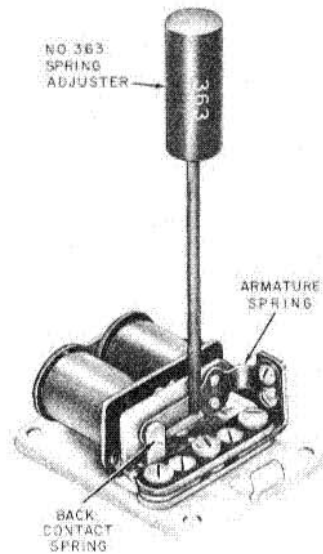


Fig. 18—Adjusting Armature Spring

**4.02** Clean buzzers and bells as follows.

- (1) Brush out interior with No. 7 sash tool or equivalent.
- (2) To clean point between armature tension spring and armature tension spring stop, insert strip of Bell Seal bond or other approved cleaning paper between points, and withdraw while pressing them together.
- (3) Repeat operation until clean paper shows no sign of dirt.
- (4) Burnish contacts with 265C tool.

**4.03** Buzzers and bells are shop adjusted to operate within the voltage ranges as shown in Table A. Check circuit voltage and if necessary correct.**4.04** Inspect signal for loose connections or poorly soldered terminals.**4.05** There must be a perceptible airgap between armature and pole face at hinge end on 7-type buzzers and bells when the armature stop disc is against other pole face.**4.06** Insufficient armature airgap may be corrected on 7-type buzzer and bell as follows.

- (1) Loosen armature mounting screws, when provided, and slightly shift armature away from pole faces.
- (2) If necessary, turn armature until parallel, then tighten armature mounting screws securely. (Contact of spring must fall wholly within contact disc on armature.)

**4.07** Buzzers and bells of later manufacture have armature fastened with rivets instead of screws. To adjust this type, grip armature spring at a point near rivets with long-nose pliers, and bend armature slightly away from pole face.**4.08** After adjusting armature, check armature travel and spring tension. Adjust as outlined in paragraphs 4.09 and 4.11.**4.09** Excessive armature travel may be checked by placing tip of long-nose pliers slightly against armature, moving armature nearer pole face. If this improves tone, reduce armature travel

by adjusting back contact spring toward the armature with long-nose pliers. Check contact separation.

**4.10** The contact separation of buzzer and bell operated on direct current is approximately 0.005 inch when armature is held manually against pole face. Adjust as required by applying a No. 363 spring adjuster close to base of the spring as shown in Fig. 18. Give adjuster a slight twist in direction desired. Take care not to kink spring.**4.11** Armature spring tension may be adjusted as follows.

- (a) To increase tension, place long-nose pliers on armature tension spring as shown in Fig. 17 and adjust spring in direction away from coils. This will raise sound pitch of buzzer.
- (b) To decrease tension, adjust spring in direction toward coils. This will lower sound pitch of buzzer.
- (c) Retain airgap between armature and pole face near hinge.

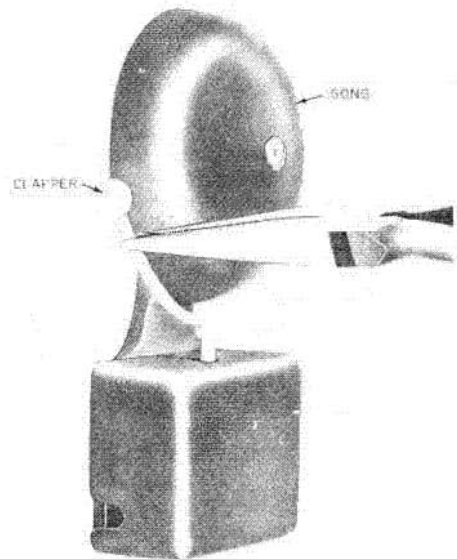


Fig. 19—Adjusting Clapper Movement



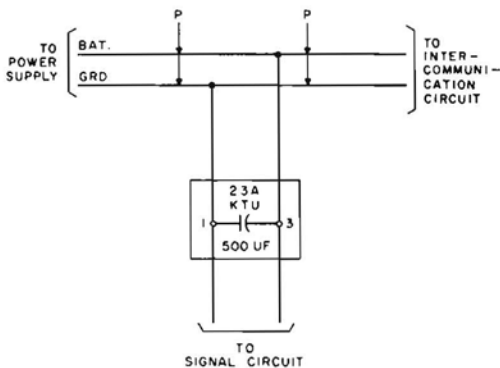


Fig. 20—Noise Suppression Filter

(d) After adjusting, see that armature tension spring rests against armature tension spring stop when armature is in unoperated position (Fig. 17).

**Caution:** Do not adjust armature spring stop, as this may adversely affect the buzzer or bell operation.

4.12 When in place, the cover must not make contact with armature or its mounting bracket. If cover is not held snugly in place, adjust cover springs with long-nose pliers.

4.13 If 7-type bell armature vibrates satisfactorily, but the clapper does not strike gong or clapper arm strikes cover, adjust with long-nose pliers (Fig. 19).

4.14 Armature travel and contact separation of the KS-8108, KS-8109, and KS-8110 type buzzers are controlled by the adjustable contact screw which is provided.

4.15 The bias spring tension is a two position control on the 9-type buzzer. The bias spring is factory set in the high tension notch. Bias adjustment is made through opening in 64A gong.

4.16 Except for voltage adjustment the KS-20419L1 buzzer is maintenance free.

## 5. LIMITATIONS

5.01 The number of audible signals operated in multiple by a common pushbutton or 6021-type key is subject to limitations.

5.02 Relay equipment may be used to operate a number of audible signals in multiple. Do not exceed maximum load of relay contacts.

5.03 Buzzers or bells should be of the same type throughout a pushbutton and buzzer system.

### 2012A(MD), 2012C, or KS-16184 Transformer

5.04 Either a 2012A, 2012C, or KS-16184 transformer may be used for small pushbutton and buzzer systems requiring not more than 1/4 amp.

5.05 Where a common battery feeder is used for intercommunicating and signaling, connect a 23A KTU across the signal circuit (Fig. 20).

## 6. CONNECTIONS

6.01 A simplified method of connecting buzzers, bells, and pushbutton keys is to be used on all systems. This method ensures the pairing of all key and buzzer leads throughout the system (Fig. 21 and 22).

6.02 Subsequent changes and additions may be made with a minimum of wiring changes.

6.03 Pairing of all leads will reduce the possibility of interference in adjacent talking circuits.

6.04 Where 7-type bells are connected to 60-cycle alternating current, bell operation may be more satisfactory if the dc terminals are used.

6.05 Connect 7-type buzzers or bells as shown in Fig. 23.

6.06 Where radio frequency induction is caused by a sparking buzzer or bell contact, operating power should be ac and connections should be to the ac terminals. A 152A capacitor should be used across buzzer contacts when power supply is dc (Fig. 23).

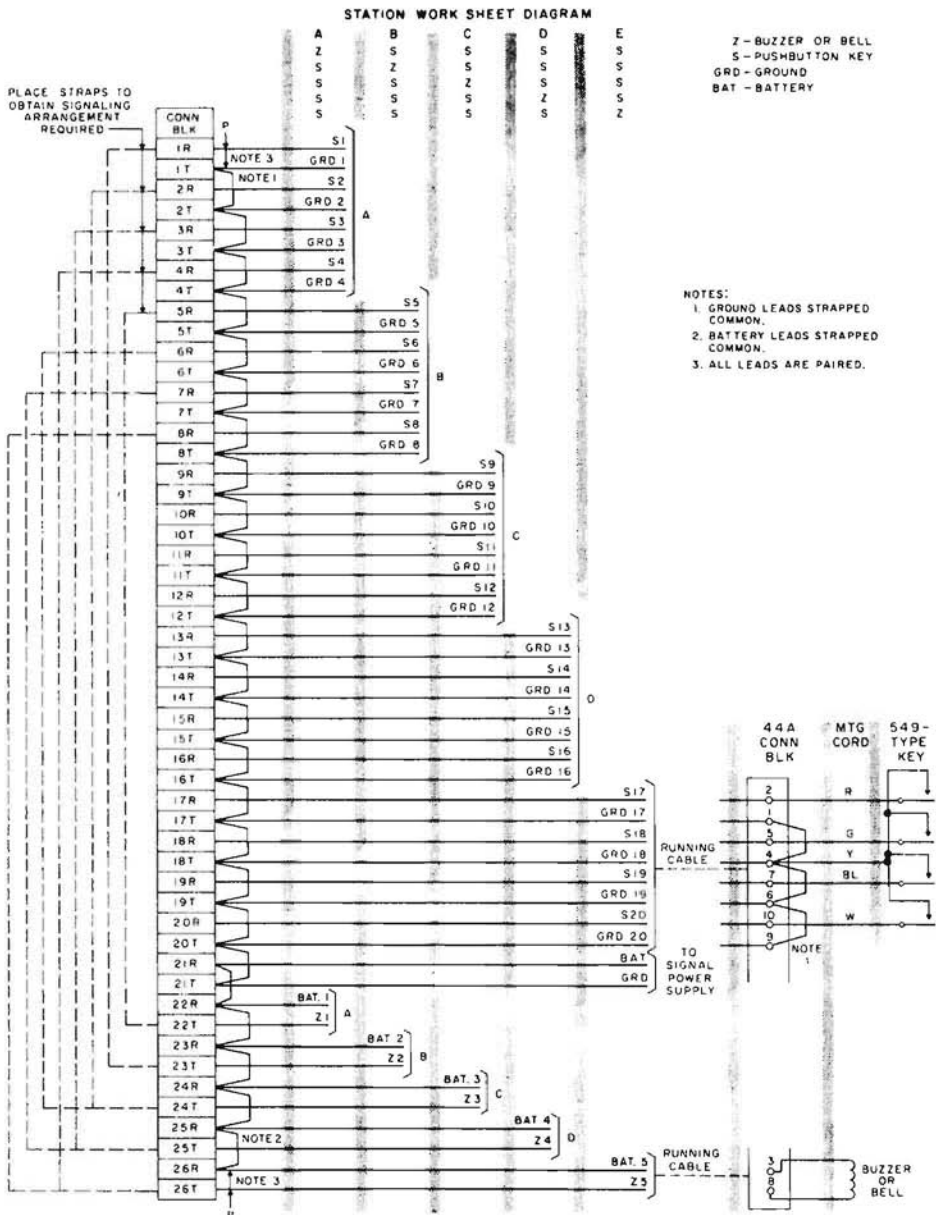


Fig. 21—Large Pushbutton and Buzzer System

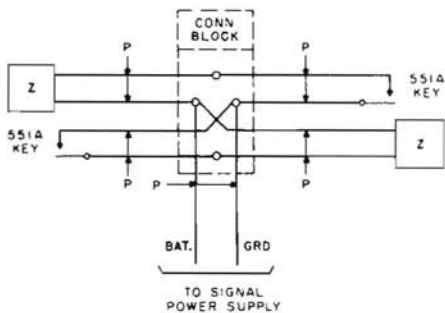


Fig. 22—Small Pushbutton and Buzzer System

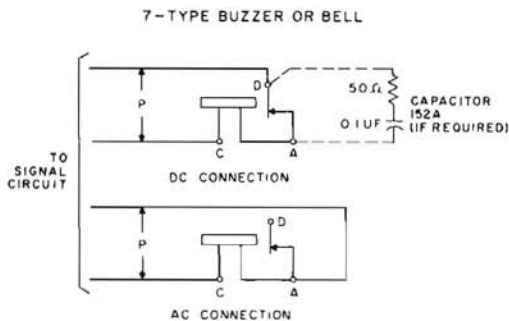


Fig. 23—AC and DC Connections

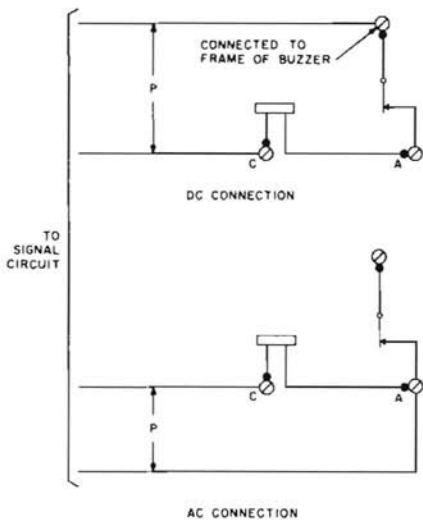


Fig. 24—KS-8108, KS-8109, and KS-8110 Type Buzzer Connections



## DESIGNATION STRIPS AND CARDS

### 1. GENERAL

1.01 Designation strips and cards are used to indicate on which key or pushbutton a particular PBX extension, central office line, or other service appears on multibutton telephone sets or keys.

1.02 This section is reissued to:

- Revise Table A to include current modular telephone sets
- Remove designation strips and "E" form information on telephone consoles and keys
- Delete Table D on miscellaneous apparatus

Since this reissue covers a general revision, arrows ordinarily used to indicate changes have been omitted.

### 2. IDENTIFICATION

2.01 Table A list designation strips and telephone sets on which they are used. Table B lists keys which are not equipped with designation card holders.

2.02 Refer to appropriate section on keys, key mountings, consoles, lamp sockets, subscriber sets, etc. for information covering "E" forms and designation strips for these items.

#### NOTICE

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Bell System except under written agreement

TABLE A

## DESIGNATION STRIPS FOR TELEPHONE SETS

TEL SET	DESIG STRIP, CARD FORM, OR PART NUMBER	FIG. NO.	REMARKS
543-type	812758837 (P-27E883)	1	
563-type 564-type 565-type 566-type 568-type	E-4227-G	1	
575AM	E-4227-G		
609B	811452770 (P-14E277)	2	
	811452778 (P-14E278)		
	811452796 (P-14E279)		
	811452804 (P-14E280)		
	811452812 (P-14E281)	3	Use with 617 A key
617B-type 618B-type 619A-type 623A3	814451290 (P-44E129)	4	
624A10-type	814453783 (P-44E378)	5	
625A1	814455093 (P-44E509)	6	
630-series	E-4646 or E-5837	7,8	E-4646 (Rectangular) E-5837 (Square)
643A3	812161792 (P-21F179)	9	
680A-type 681A-type 682AA,AAM 683AA,AAM	814451290 (P-44E129)	4	
830CM	E-5837	8	(1) Required
830DM	E-5837 and E-6672	8,10	(1) Each Required
831CM	E-5837	8	(2) Required
831DM	E-5837 and E-6672	8,10	(2) E-5837 and (1) E-6672 Required
832BM, CM, 832DM, EM	E-5837 and E-6672	8,10	(1) Each Required
833BM,CM 833DM,EM	E-5837 and E-6672	8,10	(2) E-5837 and (1) E-6672 Required
836 AM 837 AM	E-6559	14	
851CM 852AM 872A1M	E-5837	8	
981A01 983A02	E-6723	12	E-6723 for line keys and standard DSS keys
	E-6873	17	E-6873 for code busy DSS keys

TABLE A (Cont)

## DESIGNATION STRIPS FOR TELEPHONE SETS

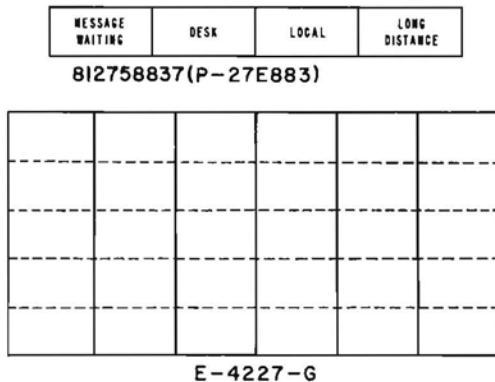
TEL SET	DESIG STRIP, CARD FORM, OR PART NUMBER	FIG. NO.	REMARKS
2563 2564 2565-type 2568-type 2675AM	E-4227-G	1	
2623A3 2626A1	814451290 (P-44E129)	4	
2630-series	E-4646 or E-5837	7,8	E-4646 (Rectangular E-5837 (Square)
2660A1M 2662A-type 2664 A-type	814451290 (P-44E129)	4	
2682 AA,AAM 2683AA,AAM	814451290 (P-44E129)	4	
2684A-type 2685A-type	814451290 (P-44E129) 814451308 (P-44E130)	4 13	Use 814451308 (P-44E130) strip if tel set is equipped with 617A key
2752A&B	E-5253	11	Use when key is equipped with rectangular buttons
2754A&B	E-5837	8	Use when key is equipped with square buttons
2830CM	E-5837	8	(1) Required
2830DM	E-5837 and E-6672	8,10	(1) Each Required
2831CM	E-5837	8	(2) Each Required
2831DM	E-5837 and E-6672	8,10	(2) E-5837 and (1) E-6672 Required
2832BM,CM 2832DM,EM	E-5837 and E-6672	8,10	(1) Each Required
2833BM,CM 2833DM,EM	E-5837 and E-6672	8,10	(2) E-5837 and (1) E-6672 Required
2836 AM 2837 AM	E-6559	14	
2851CM 2852AM 2872A2M	E-5837	8	
2981 A01	E-6723	12	E-6723 for line keys and standard DSS keys
2983 A02	E-6873	17	E-6873 for code busy DSS keys
2991-,2992-, 2993-, and 2994-type	E-6980-1 and E-6980-2	15,16	(1) 6980-1 for 5- and 10-button sets (1) 6980-1 and (1) 6980-2 for 20-button sets (1) 6980-1 and (2) 6980-2 for 30- and 40-button sets
3568-type	E-5253	11	
3623A3	814451290 (P-44E129)	4	
3640 A-type 3641 A-type 3666A1 A-type 3666A1B-type 3673A1 3673A7	E-5253	11	

**TABLE B**  
**DESIGNATION STRIPS FOR KEYS NOT EQUIPPED WITH**  
**DESIGNATION CARD HOLDERS**

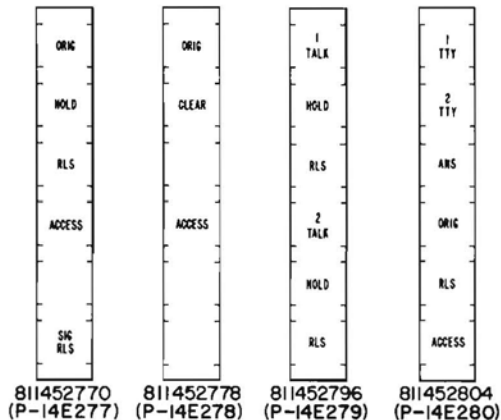
KEY	DESIG STRIP CODE	WINDOW PIECE PART	APPROXIMATE SIZE OF DESIG CARD*
			INCHES
6002	8AG	804670472 (P-467047)	2 by 5/8
6009	8AF	804670463 (P-467046)	3-15/16 by 3/4
6011	8AG	804670472 (P-467047)	2 by 5/8
6012	8AE	804670463 (P-467046)	3-15/16 by 3/4
6017	98A	804670346 (P-467034)	9/16† by 5/16
6019	8AD	804670454 (P-467045)	5-5/16 by 3/4
6030	98A	804670346 (P-467034)	9/16† by 5/16

\* The designation card should be the same size as the acetate window. Any good grade of paper may be used. Supplied locally.

† Use designation card 804768828 (P-476882).



**Fig. 1—Designation Cards**



**Fig. 2—Designation Strips**



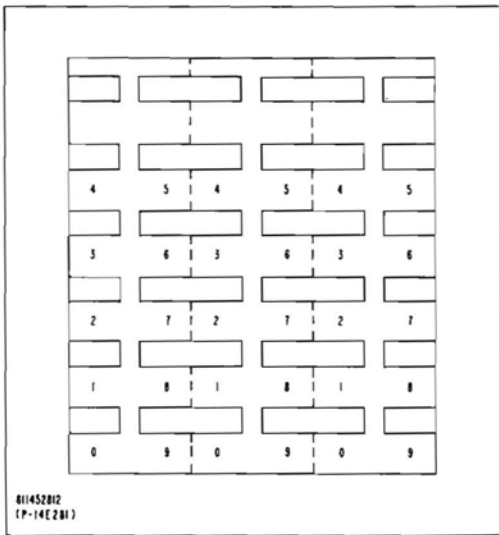


Fig. 3—811452812 (P-14E281) Designation Strip

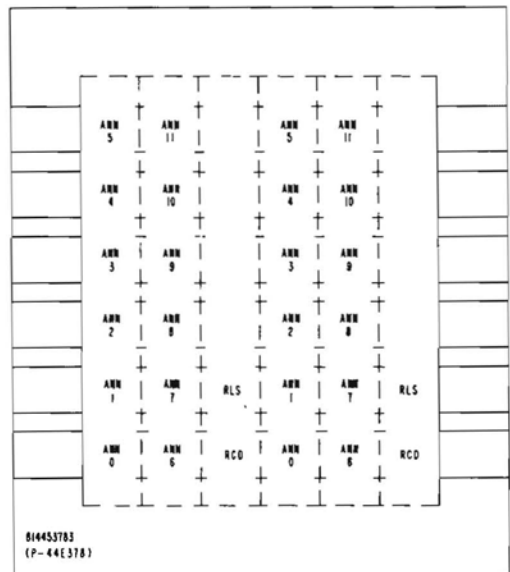


Fig. 5—814453783 (P-44E378) Designation Strip

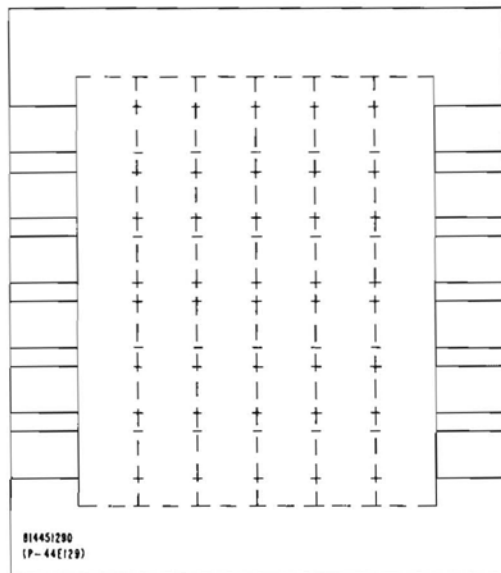


Fig. 4—814451290 (P-44E129) Designation Strip

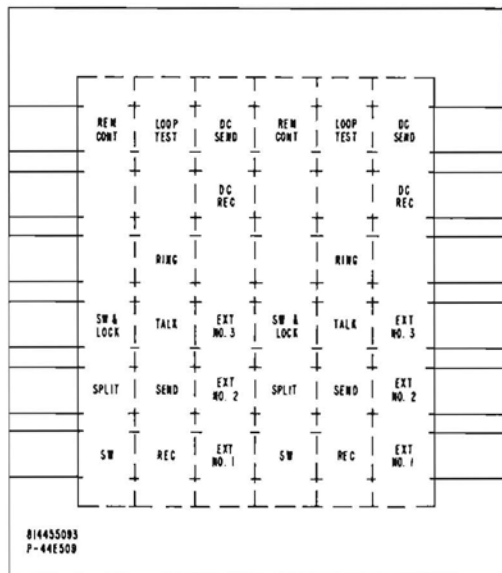


Fig. 6—814455093 (P-44E509) Designation Strip

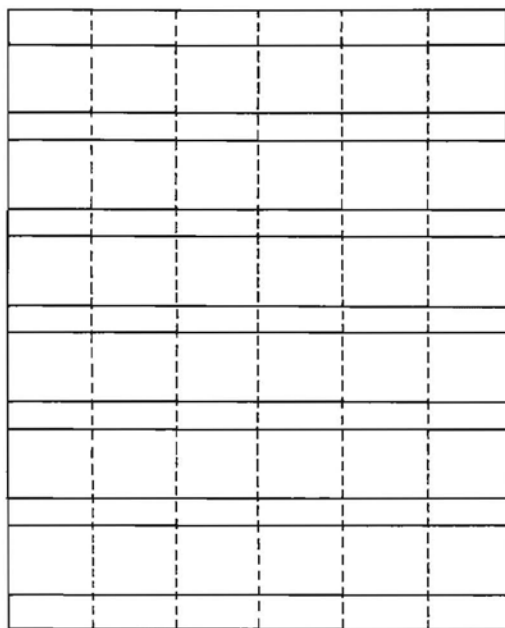


Fig. 7—E-4646 Designation Strip

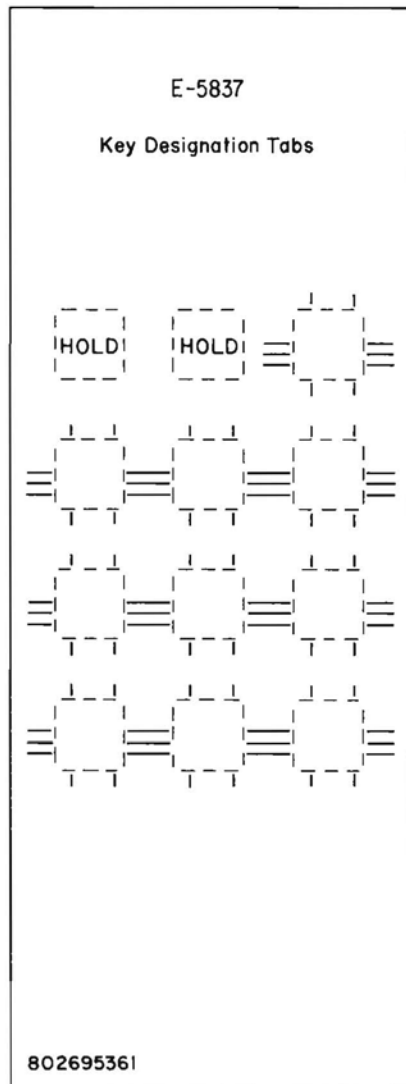


Fig. 8—802695361 (E-5857) Designation Tabs

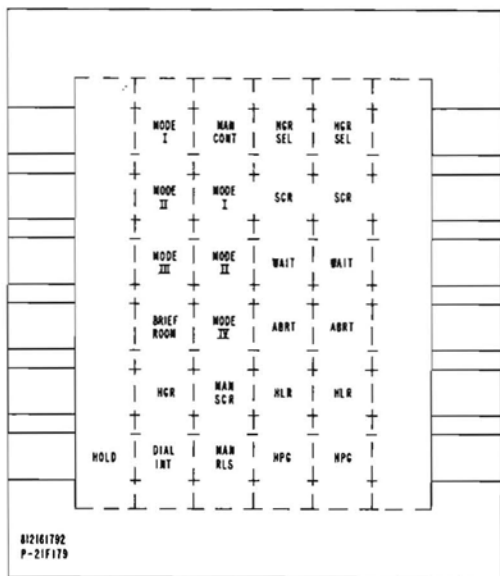


Fig. 9—812161792 (P-21F179) Designation Strip

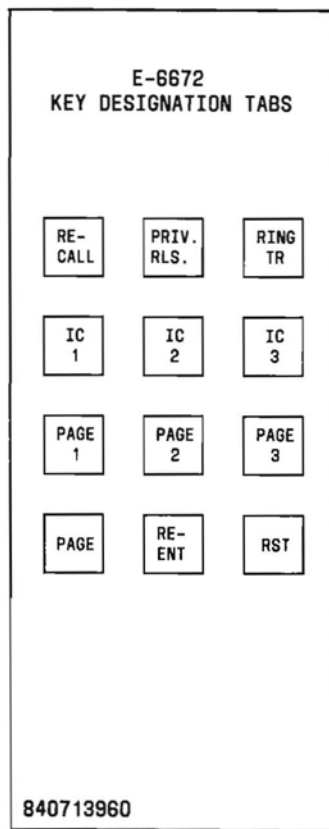


Fig. 10—840713960 (E-6672) Designation Tabs

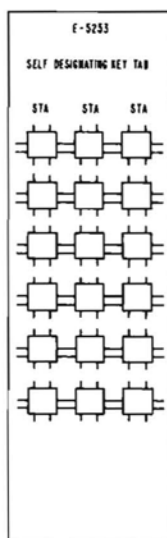
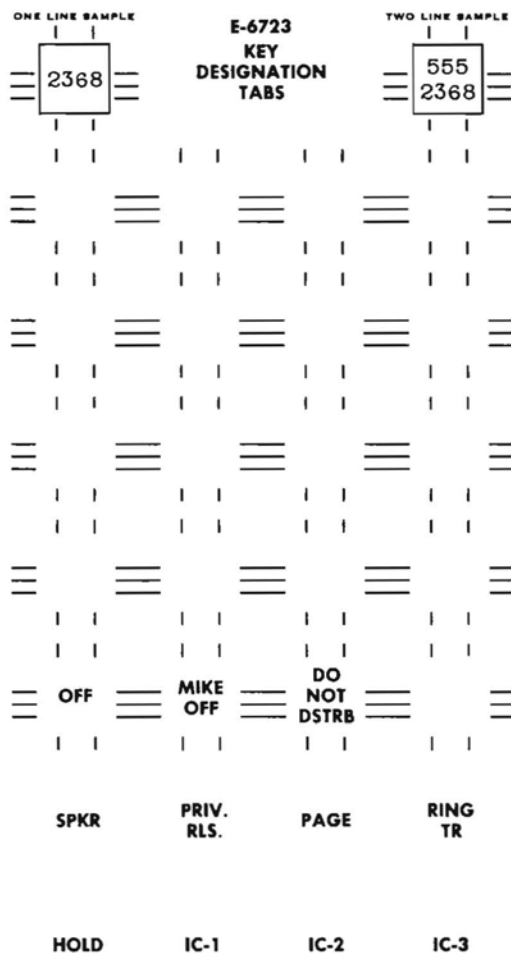


Fig. 11—E-5253 Designation Tabs



841009111

Fig. 12—841009111 (E-6723) Designation Tabs

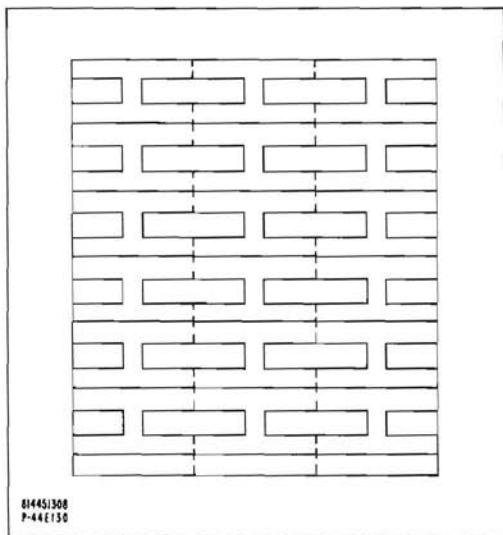


Fig. 13—814451308 (P-44E130) Designation Strip

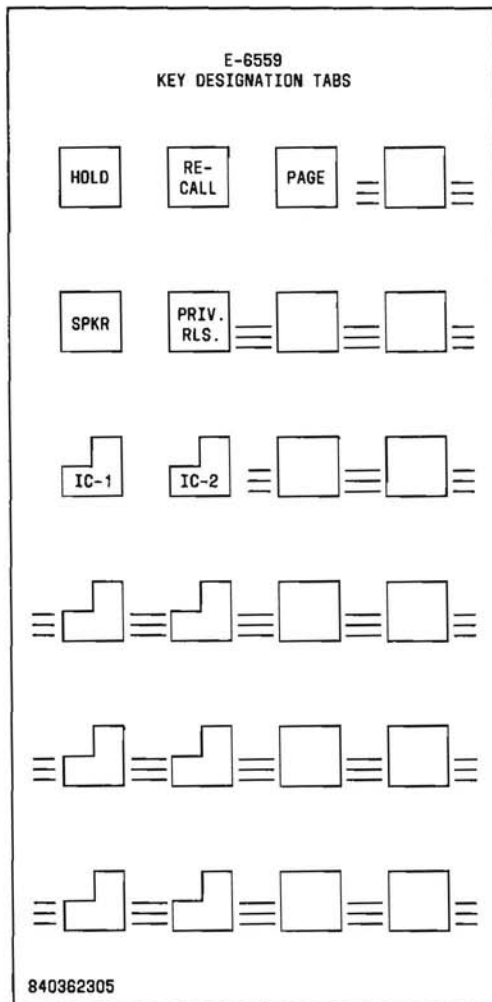


Fig. 14—840362305 (E-6559) Designation Tabs



E-6873  
KEY DESIGNATION TABS

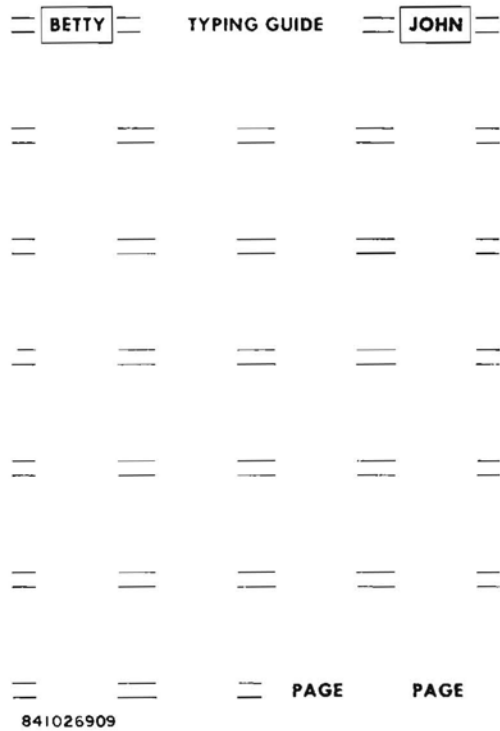


Fig. 17—841026909 (E-6873) Designation Tabs





**KEY TELEPHONE SETS**  
**STANDARD FEATURES AND OPTIONS**  
**BASIC WIRING REQUIREMENTS**

**1. GENERAL**

**1.01** This section contains standard configurations of the various service features available in key telephone systems and note the conditions or limitations in their application.

**1.02** This section is reissued to:

- Include 4A speakerphone information
- Revise all figures and section references
- Show 3-type speakerphone MD.

**1.03** For clarity, the schematics show only that portion of the circuit involved and in some instances, such as the TOUCH-TONE® dial or a network, in an abbreviated form. Detached contact format is used throughout.

**1.04** In addition, terminals, lead colors, contacts, etc. have been designated only where there is assurance the designation is common in all cases. Where designations are not shown, variations exist and it will be necessary to refer to the Bell System Practice, SD, or other related data of the telephone set or apparatus involved.

**1.05** Additional information on the various features can be found in the following:

- Multiline Exclusion—CD- and SD-69489-01, ♦Section 518-215-401♦
- ♦3-Type (MD) Speakerphone—CD- and SD-69403-01♦
- ♦4A Speakerphone—CD- and SD-69909-01♦
- Station Busy Lamp—CD- and SD-69241-01, CD- and SD-69580-01

- Supplementary Hold—CD- and SD-69530-01
- Signaling—CD- and SD-69203-01
- Add-on Conference Circuit—CD- and SD-69561-01, ♦Section 518-215-401♦
- Combining 1A and 1A1 or 1A2 KTS Line Circuits in CALL DIRECTOR® sets equipped with 590- and 650-Series Keys—CD- and SD-69495-01, CD- and SD-69497-01

For telephone set connections, refer to the section covering the specific set involved.

**2. FEATURES**

**A. Exclusion**

**2.01** Two types of exclusion are available (Fig. 1)—single line using the exclusion switch in the telephone set and multiline using a 428A or 405A (MD) KTU. The KTU will handle two CO or PBX lines associated with 1A1 or 1A2 KTS.

**2.02** Both methods of exclusion are under control of the line switch of the control station eliminating the possibility of the station being accidentally left excluded.

**2.03** With either arrangement, A1 ground must be supplied directly to the excluded station(s) rather than under control of the exclusion feature to permit access to other lines that are not excluded.

**2.04** Refer to ♦Section 518-215-401♦ or SD-69489-01 for excluded station connections when furnishing the multiline feature.

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**B. Polarity Guard**

**2.05** Polarity guards should be inserted when authorized by local instructions to prevent reversal of line current in end-to-end signaling.

**2.06** Polarity guards should be inserted in the telephone circuit as shown in Fig. 2 to prevent damage to the surge protector if the set dial has been disconnected for maintenance reasons, and the set is off-hook and connected to a line.

**C. Speakerphone**

**2.07** Connections shown for speakerphone are divided into those showing transmission leads (Fig. 3 and 4) and control leads (Fig. 5 and 6).

**2.08** Certain functions are performed in the dial of a speakerphone set that are not required in nonspeakerphone sets. In a rotary dial set this involves the second set of off-normal dial contacts terminated on the yellow leads which prevent clicks in the loudspeaker during on-hook dialing. In the TOUCH-TONE dial, the s, t contacts connect negative line voltage to the oscillator for on-hook dialing and the q, p contacts open to remove the shunt across the level limiting resistor in series with the tip side of the line (T1 lead).

**2.09** Certain wiring precautions must be observed when multiplying sets wired for speakerphone. The T1, R1, IT or P3, IR or P4, LK and AG leads should be disconnected at or as close as possible to the set in those stations not having speakerphone. Even though none of the multiplied sets have speakerphone, the leads involved should be disconnected. Failure to do so may result in:

- Tip and ring cross through the T1 and R1 leads (Fig. 7)
- False operation of an A relay through the AG lead (Fig. 8)
- Shorting the receive input to the speakerphone unit, disabling the loudspeaker through the P3 and P4 leads (Fig. 9).

**2.10** Separate speakerphone leads must be supplied to each station.

**2.11** For full speakerphone connections, refer to Division 512 for the particular telephone set involved.

**D. Station Busy Lamp**

**2.12** This feature furnishes a visual indication to other locations anytime the station is off-hook or the speakerphone is turned on (Fig. 10).

**2.13** The A1 ground (1A1 or 1A2 KTS) or SG ground (1A KTS) is supplied to the BL lead under control of the line switch to light the lamp directly or to operate an auxiliary relay (17B KTU) when it is desired to use 10 volt ac to light the lamp. Use of an auxiliary relay makes changing out of a line lamp in key telephone sets unnecessary. In the case of speakerphone operation the ground is returned over the AG lead.

**2.14** At 1A1 or 1A2 KTS installations, false operation of the busy lamp is possible if the station, though idle, has a line button depressed and another station having access to the same line grounds the A lead. To prevent this, all sets having busy lamp (except headset jack equipped CALL DIRECTOR telephone sets) must be equipped with a diode as shown in Fig. 10A.

**2.15** The CALL DIRECTOR sets having headset jacks require the addition of a Printed Wiring Board Assembly instead of the diode (Fig. 11). If the set is not designed for concentrator use, the kit of parts is mounted in the set. Where a concentrator is used, the kit of parts is installed in the 235- or 236-type KTU and connected as shown in Section 518-310-405.

**E. Signaling**

**2.16** Several forms of signaling are possible using the convertible line pickup buttons on key telephone sets. The first is regular signaling in which the line button is converted to nonlocking, one set of contacts being used as a pushbutton to operate a signal control circuit (Fig. 12). With this arrangement a separate button(s) is required for the intercommunicating circuit.

**2.17** Common signaling (Fig. 13) uses one converted line button to signal over several intercom circuits. The A1 or SG ground used to operate the signal circuits should be under control of the line switch to prevent false signaling if the customer

is toying with the common signaling key even though on-hook.

**2.18** When the A1 ground is used for signaling arrangements, it cannot be used to operate an ac or dc buzzer directly. Instead the ground should be used to operate a signal control relay whose contacts in turn control the device.

#### F. Supplementary Hold

**2.19** In 1A1 or 1A2 key systems, the standard hold is operated by removing the A1 ground at the hold key, giving a steady lamp or lamp wink visual signal. The supplementary hold requires a 429A or 406A (MD) KTU and a 430A or 408A (MD) KTU, and furnishes a distinctive lamp flutter signal which interrupts the lamp circuit 12 times per second.

**2.20** Two versions of supplementary hold can be furnished.

(a) "I" hold is supplied on a station basis so that only that station initiating the special hold receives the distinctive lamp signal. Any telephone set whose hold key can be rewired to transfer the A lead from ground to -24 vdc on the SP lead as shown in Fig. 14A and B can be used for "I" hold. The 599H, 657H, or 657L key is not required for this function but can be used. A separate detector circuit [one-half of the 429A or 406A (MD) KTU] must be supplied for each station having "I" hold.

(b) Priority Hold, supplied on a per line basis so that all stations with access to the same line will receive the distinctive signal when that line is placed on hold. Priority Hold can only be supplied in these sets that can be modified as follows:

- Addition of a D-180411 Kit of Parts in sets equipped with 635-type keys (Fig. 14C)
- Replacement of 590- or 650-series keys with 599H, 657H, or 657L key (Fig. 14D).

#### G. Cutoff

**2.21** Some telephone sets are equipped with a two position turnbutton as part of the 6-button key which has two sets of transfer contacts. The key can be used in any application requiring

circuit connection, cutoff, or transfer, some samples of which are shown in Fig. 15. The key is not self-restoring and does not short the disconnected circuit as true exclusion does, therefore cutoff circuits stand the chance of being accidentally disconnected if the control key is not manually restored. For this reason it may be better to use the exclusion key to perform these functions.

**2.22** Some CALL DIRECTOR sets do not have all the cutoff key contacts wired to mounting cord conductors thereby limiting its use. In this case it may be necessary to use the cutoff key to operate an auxiliary relay (Fig. 15D) with sufficient contacts to perform the desired functions.

#### H. Conferencing

**2.23** Conferencing permits add-on of a third party to a conversation without operator assistance. The circuit is designed to be used with PBX lines. Use on CO lines may result in poor transmission. The two PBX lines used must be wired to the controlling station as shown in Fig. 16.

**2.24** After connection to the third party is established using the second PBX line, the two lines are conferenced by operating a signal key which can optionally be a converted pickup key, external pushbutton or the set exclusion key.

**2.25** The circuit permits the control station to either hold or disconnect without affecting conversation of the remaining two parties.

#### I. Combining 1A and 1A1 or 1A2 KTS Line Circuits

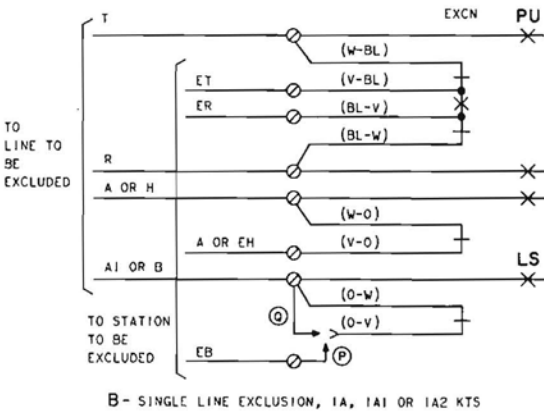
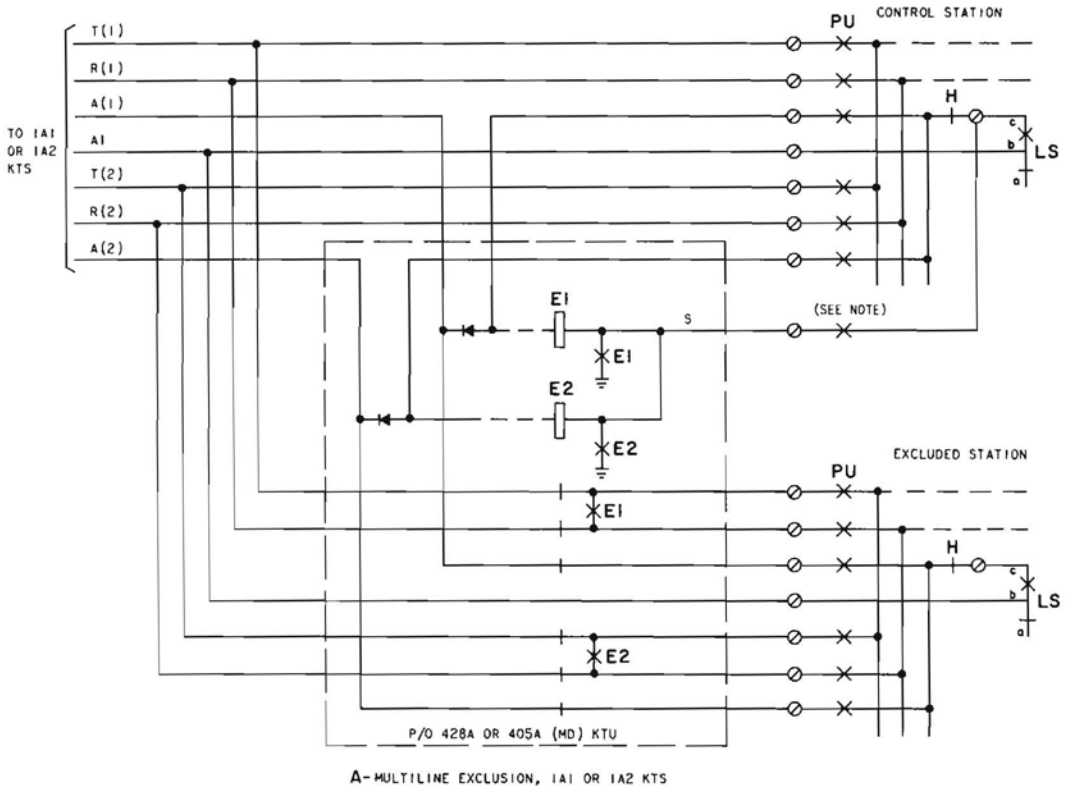
**2.26** Sets equipped with a single 6-button key cannot have 1A KTS line circuits intermixed on the key with 1A1 or 1A2 KTS because of the different hold operation.

**2.27** General purpose CALL DIRECTOR sets, however, are wired to permit mixing of circuits within the set but only under the following conditions.

- 1A line circuits cannot be mixed with 1A1 or 1A2 on the same 6-line key unit.
- With mixed line circuits, the 1A1 or 1A2 circuits must appear on the first key units (from left to right as required) and the 1A circuits on succeeding key units.

- 1A1 KTS circuits should not be mixed with 1A2 circuits on the same CALL DIRECTOR set because of the difference in time-out functions.

**2.28** The CALL DIRECTOR sets equipped with 590- or 650-series keys (Fig. 17) must be modified differently than the newer sets equipped with 635-type keys (Fig. 18).

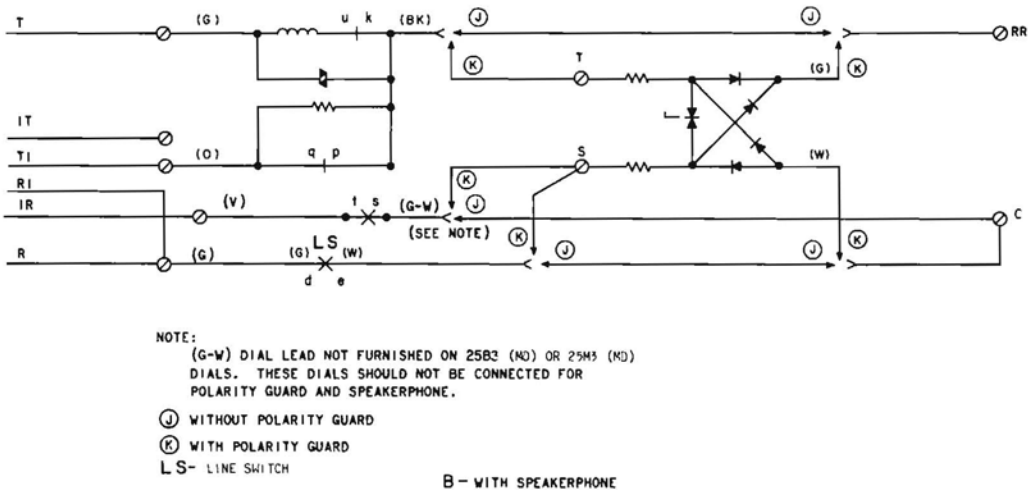
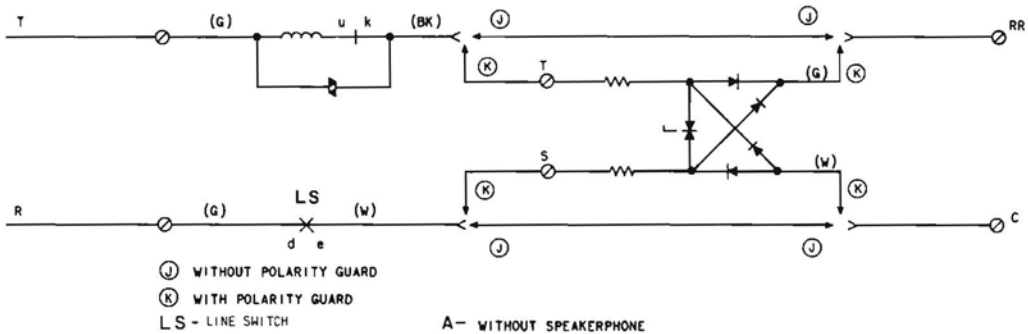


- Ⓟ 1A KTS
- Ⓞ 1A1 OR 1A2 KTS SUPPLY AI GRD DIRECTLY TO EXCLUDED STATION

LS- LINE SWITCH  
 H- HOLD KEY  
 PU- PICKUP KEY

NOTE:  
 CONTACT USED IN S LEAD CAN BE LOCKING OR NON-LOCKING PICKUP KEY, TURNBUTTON, EXCLUSION SWITCH IN SET OR EXTERNAL KEY.

Fig. 1—Exclusion Feature



NOTE:  
 (G-W) DIAL LEAD NOT FURNISHED ON 25B2 (ND) OR 25M3 (ND)  
 DIALS. THESE DIALS SHOULD NOT BE CONNECTED FOR  
 POLARITY GUARD AND SPEAKERPHONE.

Fig. 2—Polarity Guard Connections



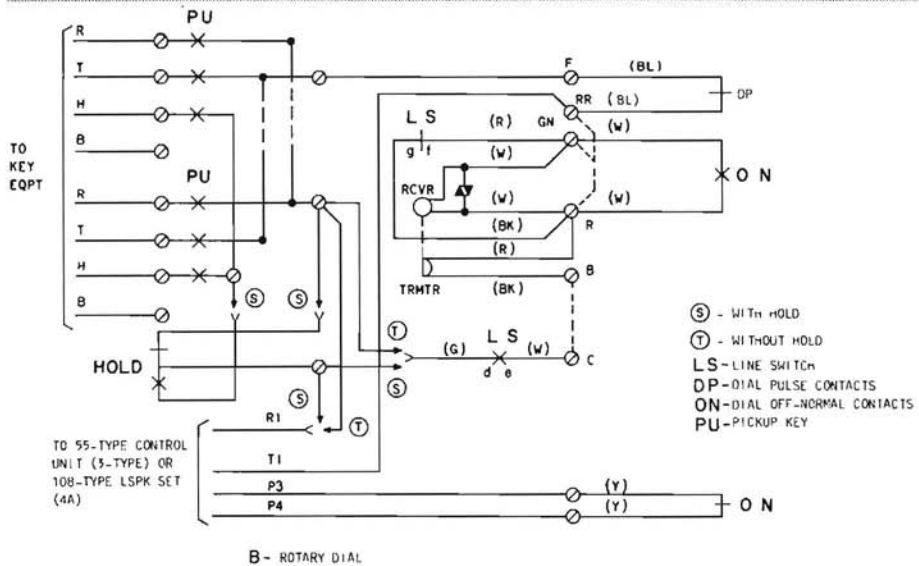
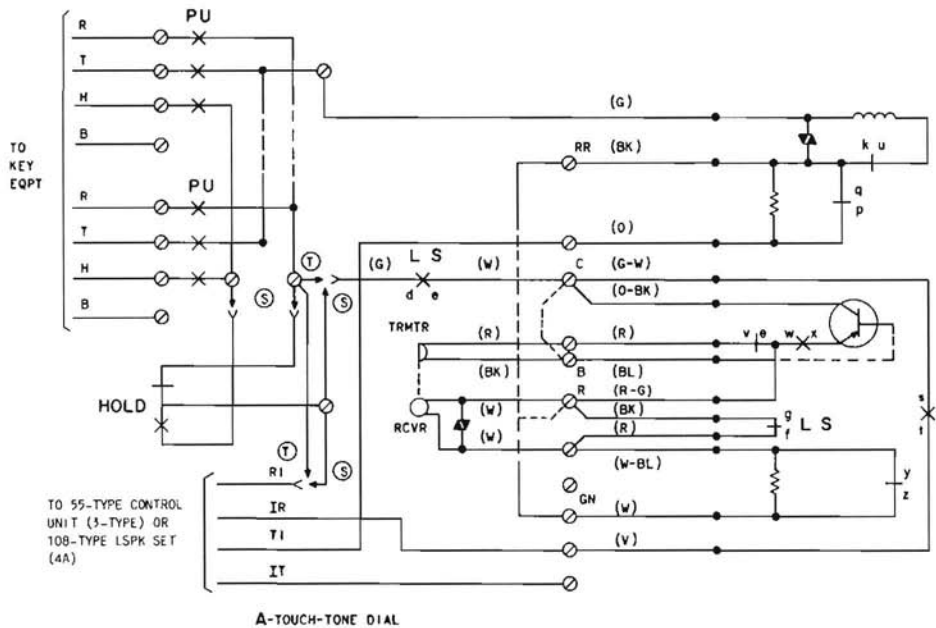


Fig. 4—Transmission Path with Speakerphone, 1A KTS#



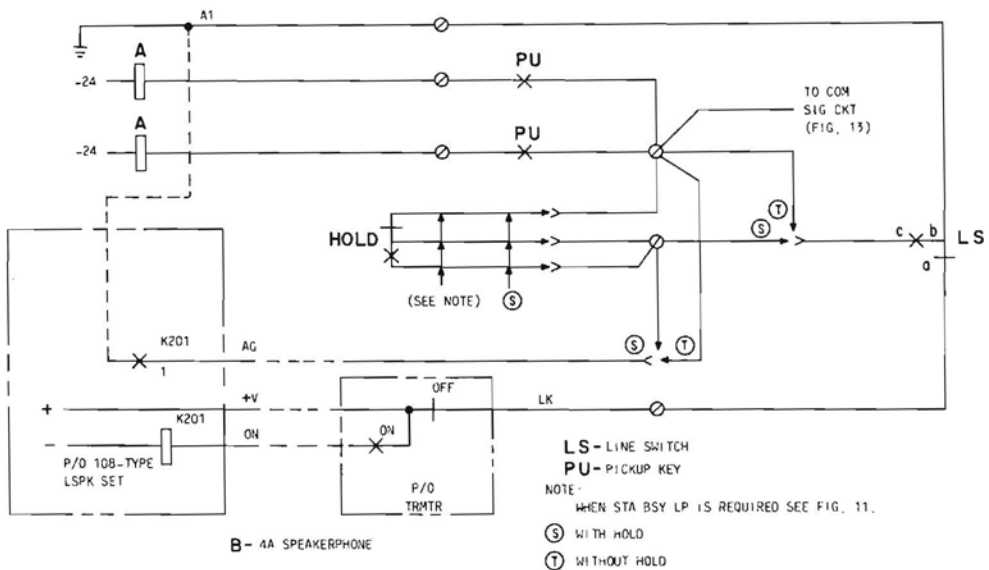
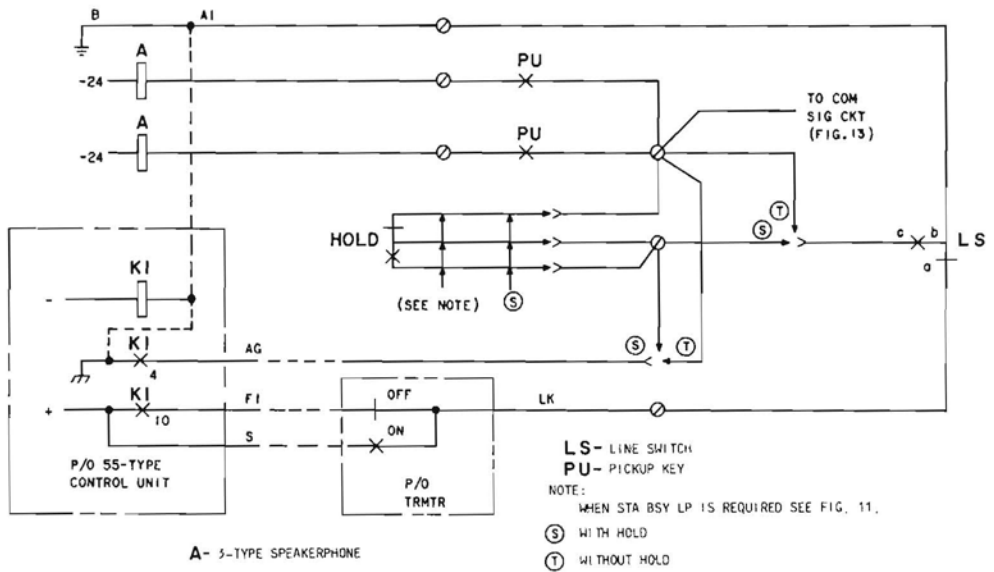


Fig. 5—A Lead and Speakerphone Control 1A1 or 1A2 KTS

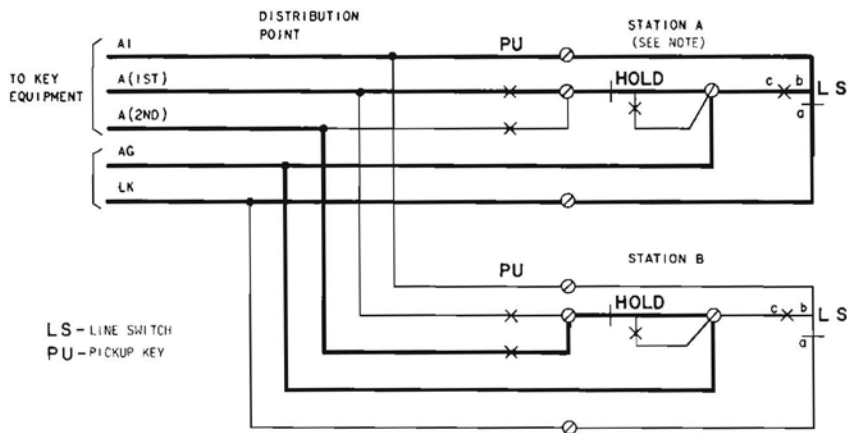


Fig. 8—Trouble Encountered When AG and LK Leads are Multiplexed

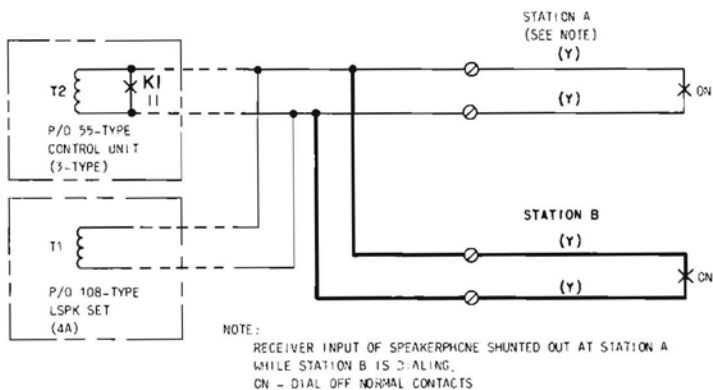


Fig. 9—Trouble Encountered When P3 and P4 Leads are Multiplexed



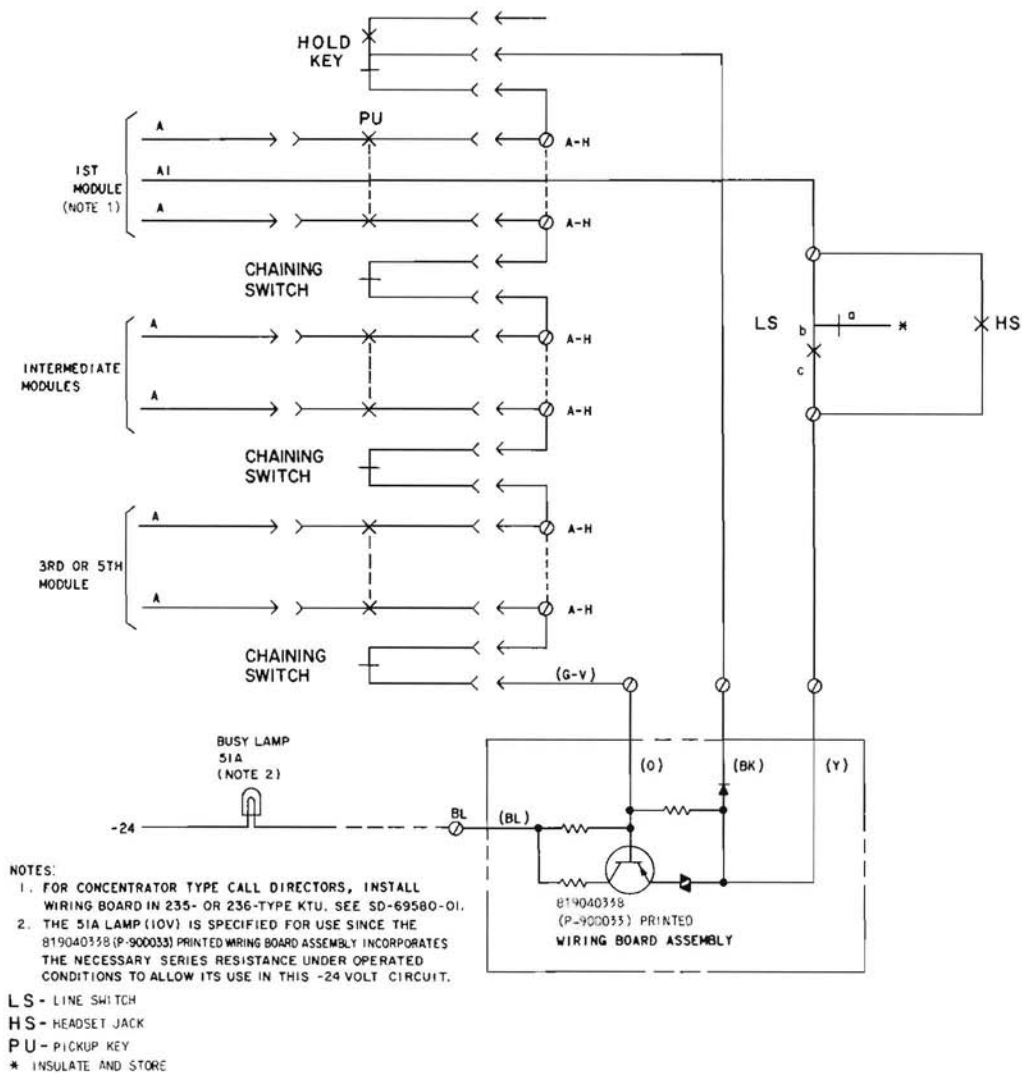
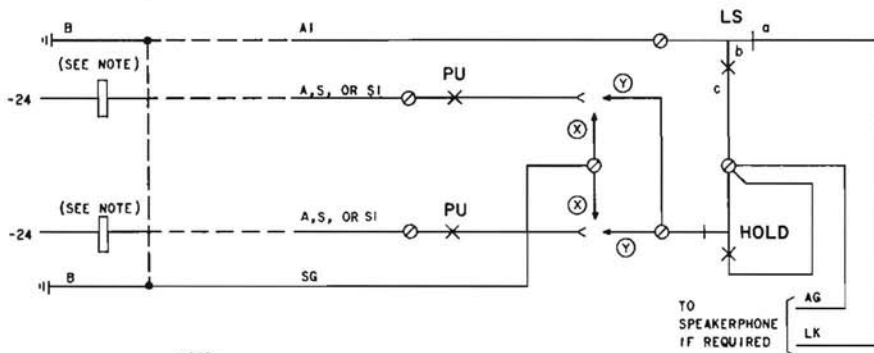


Fig. 11—Station Busy Lamp Circuit for Headset Jack Equipped CALL DIRECTOR Sets



NOTE:

A RELAY IN LINE CIRCUIT OR SIGNAL CONTROL RELAY (SD-69203-01)

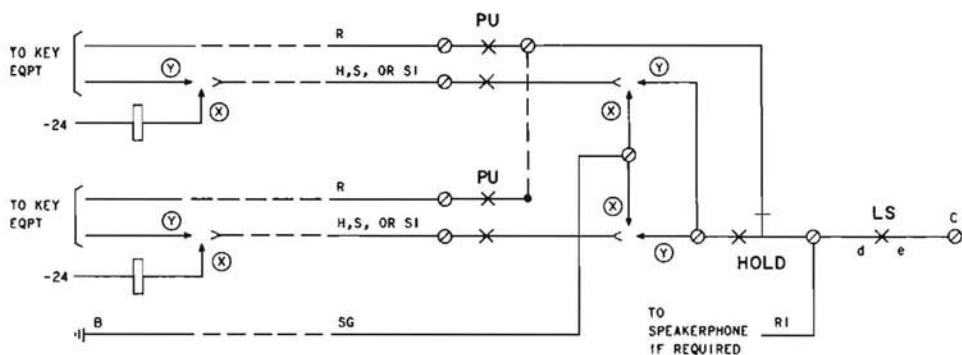
(X) SIGNALING-CONVERT KEY INVOLVED TO NON-LOCKING  
(USE SIGNAL CONTROL RELAY)

(Y) A LEAD CONTROL

LS - LINE SWITCH

PU - PICKUP KEY

A. 1A1 OR 1A2 KTS



(X) SIGNALING-CONVERT KEY INVOLVED  
TO NON-LOCKING

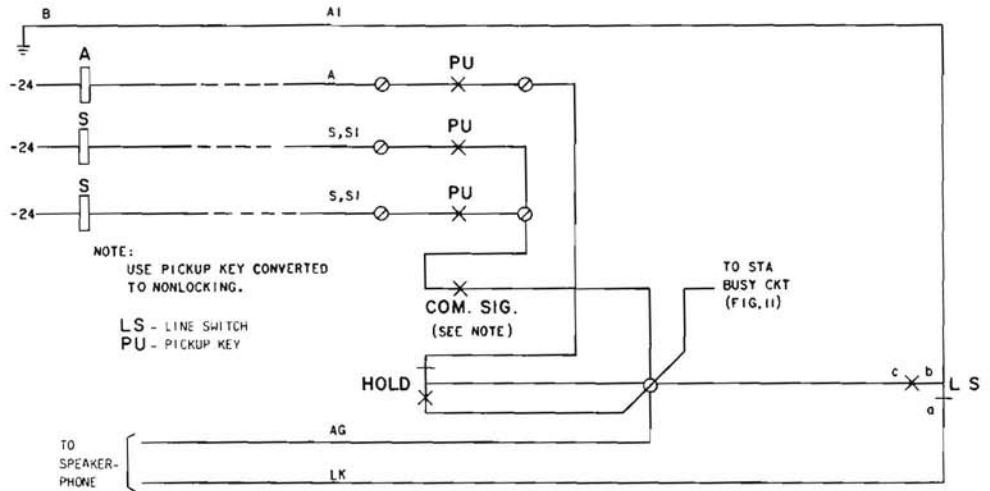
(Y) HOLD

LS - LINE SWITCH

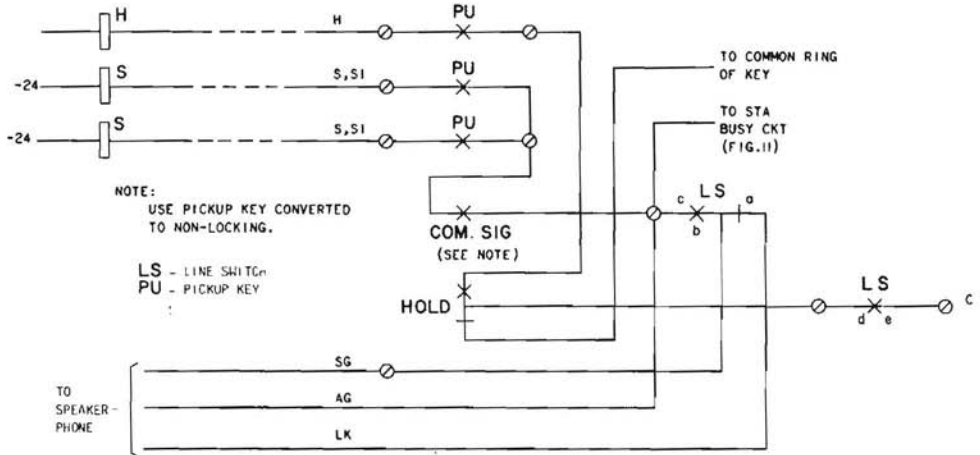
PU - PICKUP KEY

B. 1A KTS

Fig. 12—♦Signaling, Using Converted Line Pickup Buttons♦



A- 1A1 OR 1A2 KTS



B- 1A KTS

Fig. 13—Common Signaling Key Arrangements

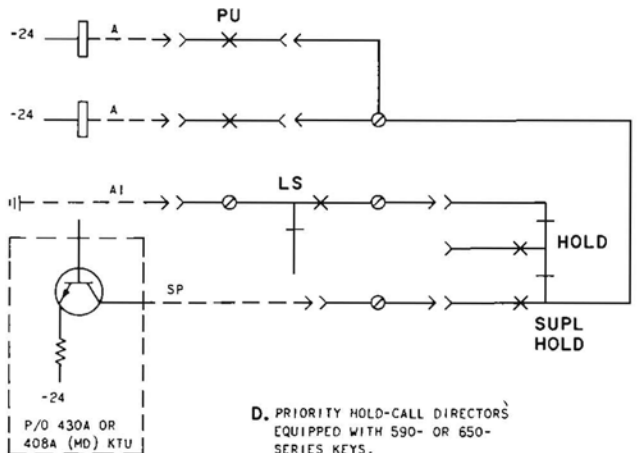
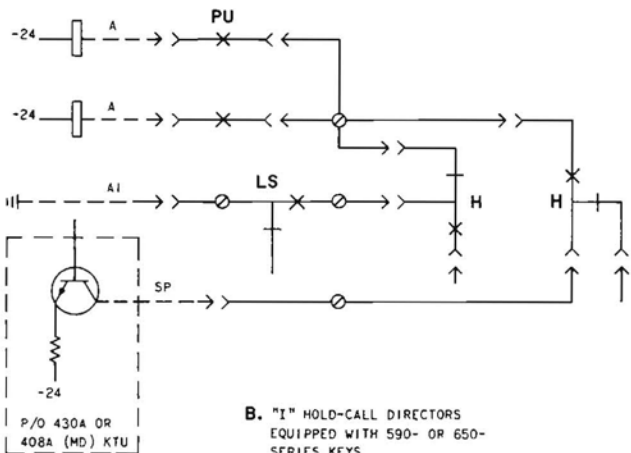
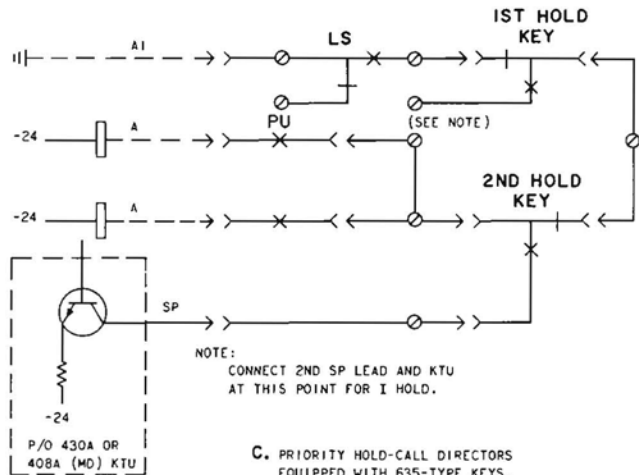
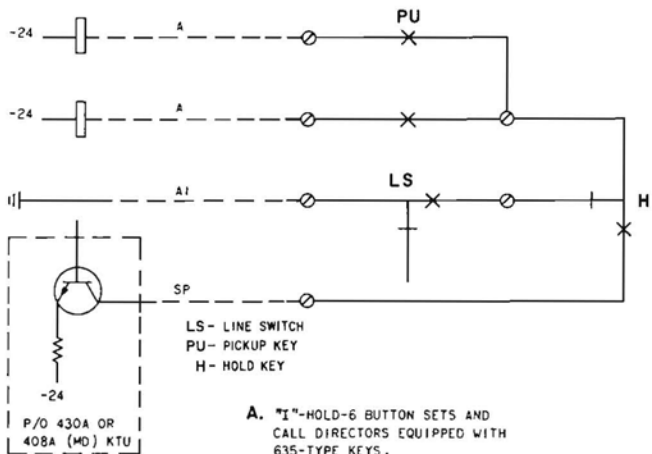
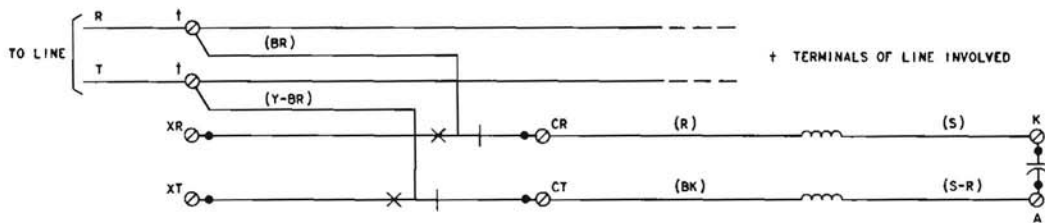
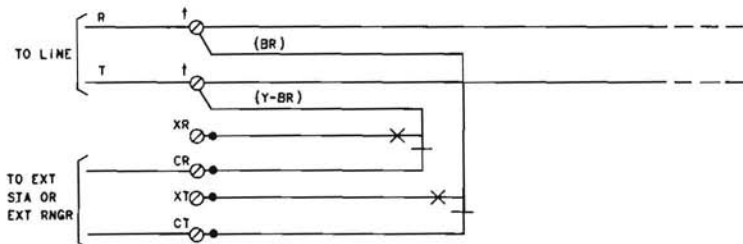


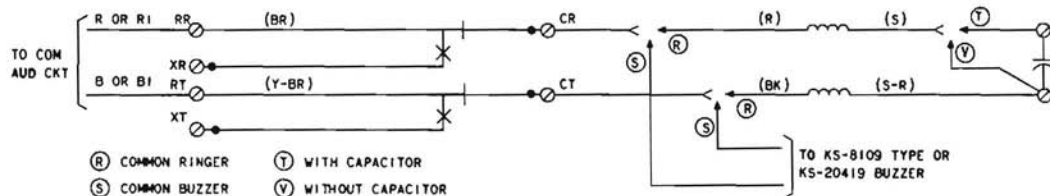
Fig. 14—Supplementary Hold Options



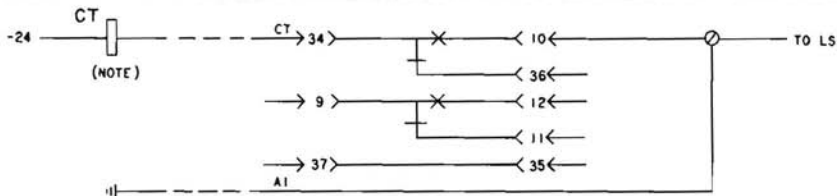
A. CUTOFF OF RINGER IN SET WHEN USED AS A LINE RINGER



B. CUTOFF OF EXTENSION STATION OR EXTENSION RINGER



C. CUTOFF OF COMMON AUDIBLE RINGER OR BUZZER IN SET



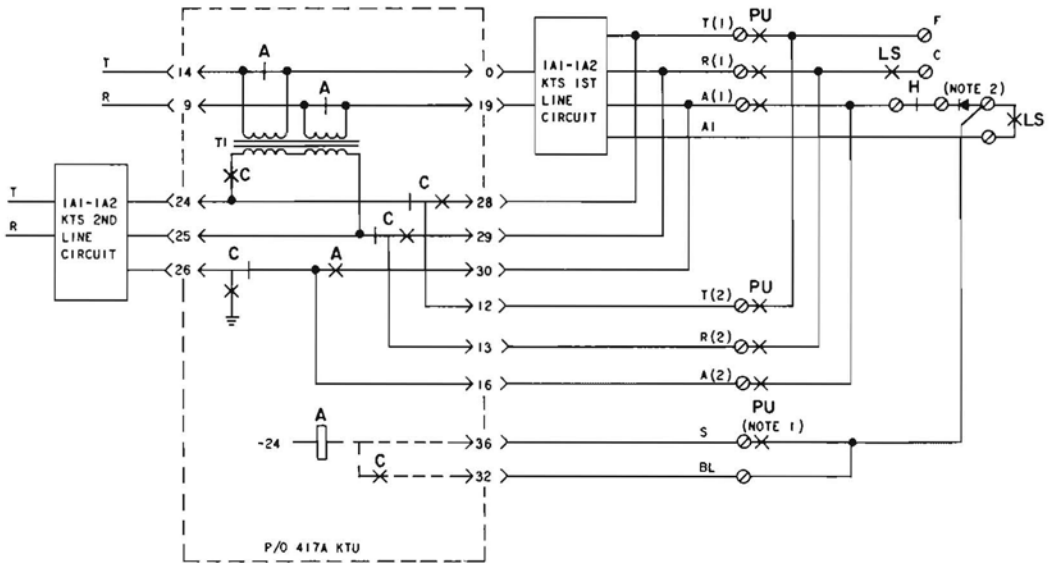
NOTE:  
USE AUX RELAY SUCH AS 29A, 227- TYPE, OR 421A KTU; CONNECT LEADS FROM BUZZER OR BELL AND KTS TO CONTACTS OF KTU.

LS - LINE SWITCH

D. TURNBUTTON (599B OR 657B) IN CALL DIRECTOR USED AS CUTOFF

Fig. 15—Typical Turnbutton Circuit Arrangements





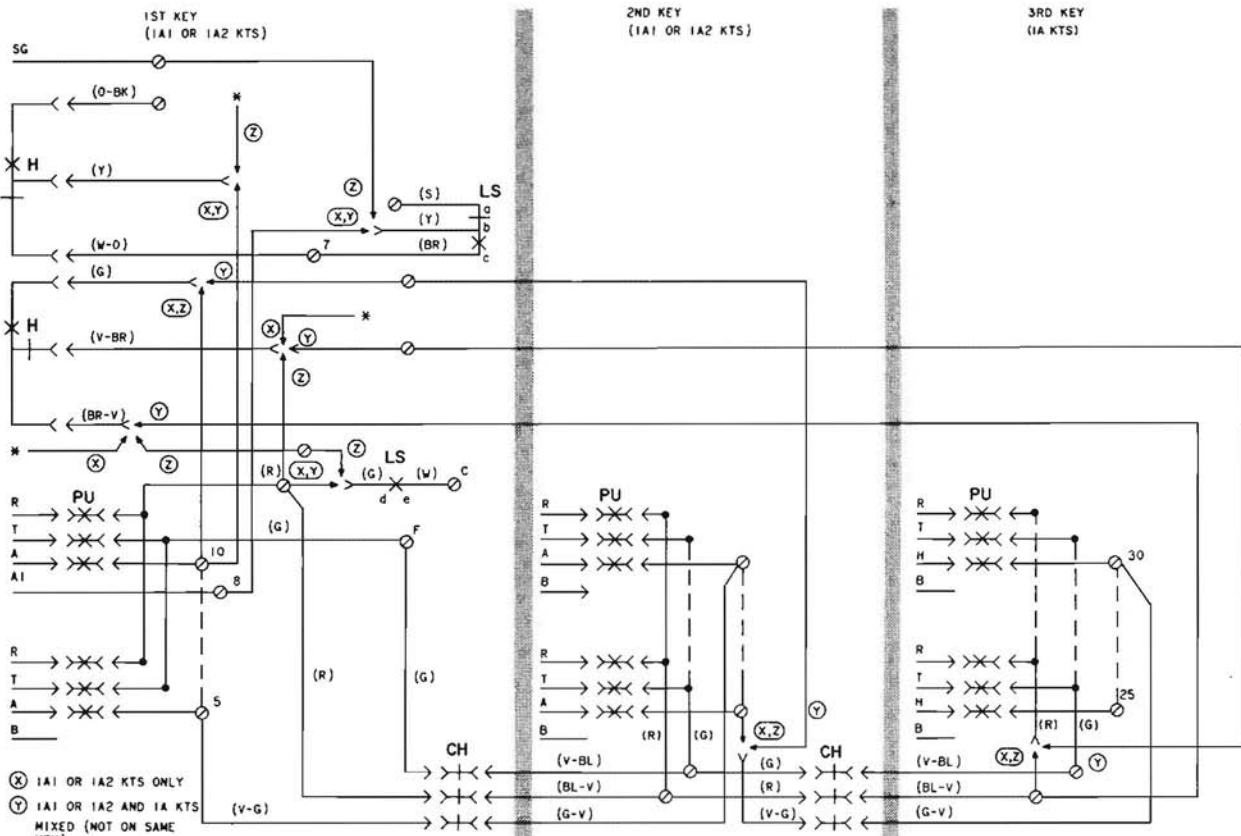
## NOTES:

1. USE PICKUP KEY CONVERTED TO NON-LOCKING
2. CONNECT DIODE PER BUSY LAMP CONNECTIONS FOR SET INVOLVED.

LS - LINE SWITCH  
 PU - PICKUP KEY  
 H - HOLD KEY

Fig. 16—Add-on Conference Circuit (PBX Lines)†





- ⊗ 1A1 OR 1A2 KTS ONLY
- ⊙ 1A1 OR 1A2 AND 1A KTS MIXED (NOT ON SAME KEY)
- ⓪ 1A KTS ONLY
- LS - LINE SWITCH
- PU - PICKUP KEY
- H - HOLD KEY
- CH - CHAINING SWITCH
- \* - INSULATE AND STORE

Fig. 18—Combining 1A and 1A1 or 1A2 KTS Line Circuits in CALL DIRECTOR Sets Equipped with 635-Type Keys



## NONKEY TELEPHONE SETS

### CONVERSION FOR USE WITH 1A1 OR 1A2 KEY TELEPHONE SYSTEMS

#### 1. GENERAL

1.001 This addendum supplements Section 502-110-102, Issue 4. Place this pink sheet ahead of Sheet 1 of this section.

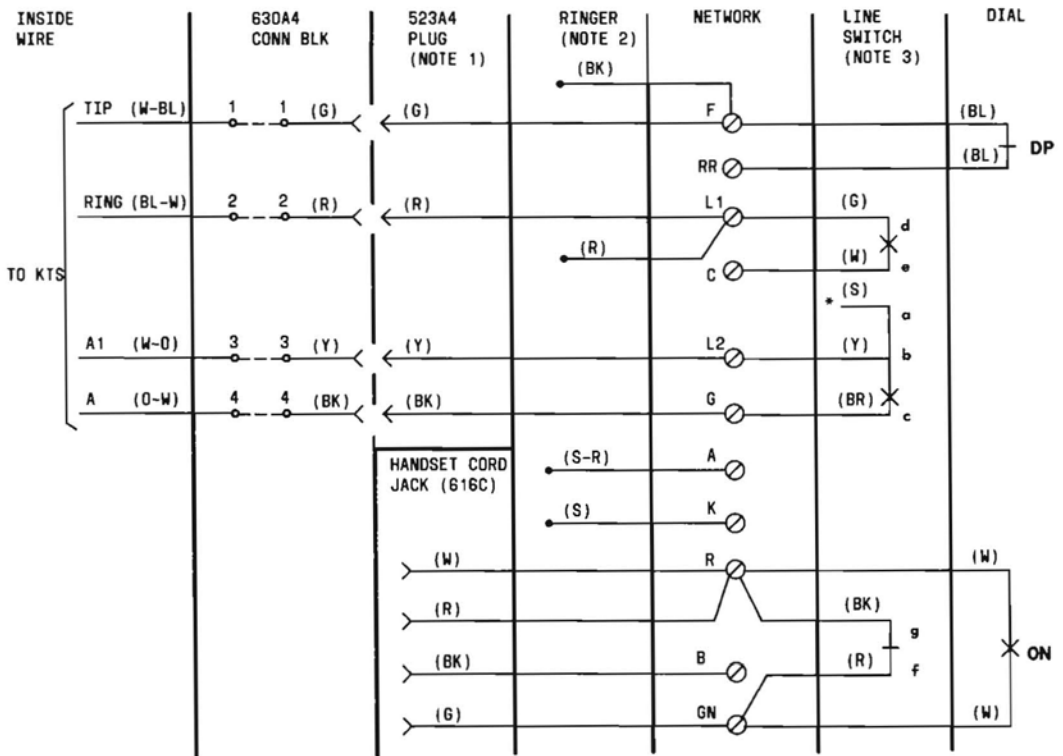
1.002 This addendum is issued to revise Fig. 5.

#### 2. CHANGES TO SECTION

2.001 On Page 8 revise Fig. 5 as shown in this addendum.

#### NOTICE

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SET MODIFICATION

LEAD	COLOR	FROM	TO
523A4 PLUG	G		F
	R		L1
	Y		L2
	BK		G
RINGER	BK	L1	F
	R	L2	L1
LINE SWITCH	W	F	C
	BR	C	G
	S	L2	*

NOTES:

1. REPLACE 523A3 PLUG WITH 523A4 PLUG, ORDERED SEPARATELY.
2. WIRED FOR INDIVIDUAL OR BRIDGED RINGING.
3. TO PREVENT FALSE HOLD CONDITION WHEN GOING ON-HOOK, THE TIP AND RING CONTACTS OF THE LINE SWITCH MUST BREAK BEFORE "A" LEAD CONTACTS. (FIELD ADJUSTMENT OF LINE SWITCH NOT RECOMMENDED).

\* INSULATE AND STORE

DP - DIAL PULSE CONTACTS

ON - DIAL OFF-NORMAL CONTACTS

Fig. 5-554BMP Telephone Set, Connections for Use With 1A1 or 1A2 KTS

## NONKEY TELEPHONE SETS CONVERSION FOR USE WITH 1A1 OR 1A2 KEY TELEPHONE SYSTEMS

### 1. GENERAL

1.01 This section contains connections and conversion of nonkey general purpose sets to A lead control to permit their use with 1A1 or 1A2 key telephone systems.



*All AC1 and AD1 telephone bases manufactured prior to 10-1-72 and any base which is opened for any reason should be rewired as shown in Table A before proceeding with connections shown in Tables B, C, and D.*

1.02 This section is reissued to:

- Update connection information to show current 220- and 2220-type hand telephone sets with current AC- and AD-type telephone bases
- Show modular version connections to 554-, 702-, 2554-, 2660-, and 2702-type telephone sets

Since this reissue covers a general revision, arrows ordinarily used to indicate changes have been omitted.

1.03 Sets that are factory-wired for A lead control such as the 500L/M or 2500M are not included since no conversion is required.

1.04 The sets included in this section are equipped with line switches adjusted to break the line circuit before the A lead when going on-hook to

prevent false hold conditions. Field adjustment of line switch is not recommended. If these conditions can not be met, the set should be replaced.

### 2. CONNECTIONS

2.01 Connections shown provide for a separate ringer circuit when possible. This is necessary with older types of 1A1 KTS line circuits where tip and ring are not available for incoming signals at the telephone set.

2.02 At installations equipped with 1A1 or 1A2 KTS line circuits where tip and ring are continuous to the telephone set and only one line is picked up, the R-R1 and B-B1 leads may not be required and the ringer can be connected across the line in the set. When used as an individual line ringer, the capacitor must be in the ringer circuit with the ringer poled as a ring station.

2.03 Some sets included in this section also have the capability of other services such as speakerphone, requiring additional connections and leads. For information on these features, refer to the Reference Section of the set involved.

2.04 For connection of the sets to separately mounted keys, refer to Division 512.

2.05 In sets having a dial light (TRIMLINE® or PRINCESS® type) A1 ground should not be common with one of the transformer leads. This is necessary to prevent feedback of ac to the A relay in the case of accidental grounding of the transformer leads.

### NOTICE

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TABLE A

CONVERSION OF EARLY AC1 AND AD1  
TELEPHONE BASES  
MANUFACTURED PRIOR TO 10-1-72  
(SEE READ IN 1.01)

WIRE OR LEAD (SEE NOTE)	COLOR	REMOVE FROM	CONNECT TO
Ringer Lead	BL	B	*
	S	*	B
	BK†	G	L1
Strap from A	BK	A	L2

\* Insulate and store.

† AD1 base only.

Note: Early model AC1 and AD1 bases, the leads from pins 1 and 5 of the mounting and handset cord jacks are (W) and (Y), respectively. In current model, the leads from pins 1 and 5 are (Y) and (W), respectively.

TABLE B

CONVERSION FOR 1A1 OR 1A2 KTS  
USING 220B (MD), 220C, 220AL, OR 2220C HAND  
TELEPHONE SET (FIG. 11)  
(SEE READ IN 1.01)

WIRE OR LEAD	COLOR	TERMINAL BOARD	
		REMOVE FROM	CONNECT TO
Line Switch	BR	C	3
	S	A	C
	Y	L2	1
Handset Cord Jack in Base	R	C	L2

TABLE C  
CONVERSION FOR 1A1 OR 1A2 KTS WITHOUT DIAL  
LIGHT USING 220A (MD) OR 2220B HAND TELEPHONE  
SET (FIG. 12) (SEE READ IN 1.01)

WIRE OR LEAD	COLOR	TERMINAL BOARD	
		REMOVE FROM	CONNECT TO
Line Switch	BR	C	3
	S	A	C
	Y	L2	1
Hand Tel Set Cord Jack in Base	R	C	L2
	Y	3	*
	BK	4	*

\* Insulate and store.



TABLE D

CONVERSION OF AD2 OR AD2 BASES FOR  
1A1 OR 1A2 KTS WITH DIAL LIGHT (NOTE 2)  
USING 220A (MD) OR 2220B HAND TEL SET (FIG. 13)  
(SEE READ IN 1.01)

WIRE OR LEAD	LEAD DESIG	COLOR	74D CONN. BLK TERM. BD	BASE TERM. BOARD		
				REMOVE FROM	CONNECT TO	
Inside Wire at 74D Conn Blk (Note 1)	Tip		1			
	Ring		2			
	TRNSF		3			
	TRNSF		4			
	A		6			
	A1		5			
623T6 Jack (Note 1)		R			L2	
		G			L1	
		Y			3	
		BK			1	
		BL			B	
		W			G	
Line Switch	A1	BR			B	
	A	Y			L2	G
		S			A	C
Ringer		S			*	
		S-R			G	*
Strap		BK			A	L2
Handset Cord Jack in Base		R			C	L2
		W			B	†

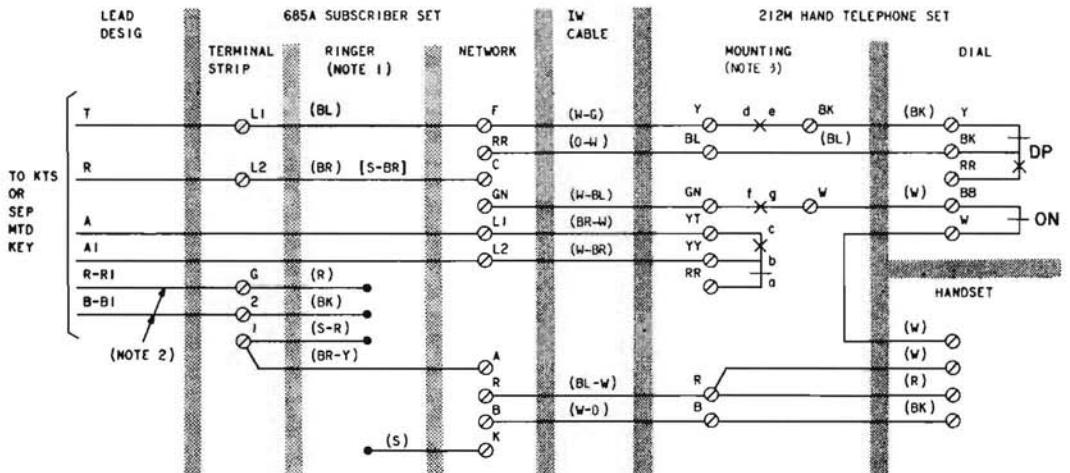
\* Insulate and store.

† Insulate and store (AD2 only).

**Notes:**

1. The 623T6 jack, 74D connecting block, and D6AM mounting cord must be ordered separately.
2. AC1P or AC2P bases cannot be wired for 1A1 or 1A2 KTS with dial light.





## NOTES:

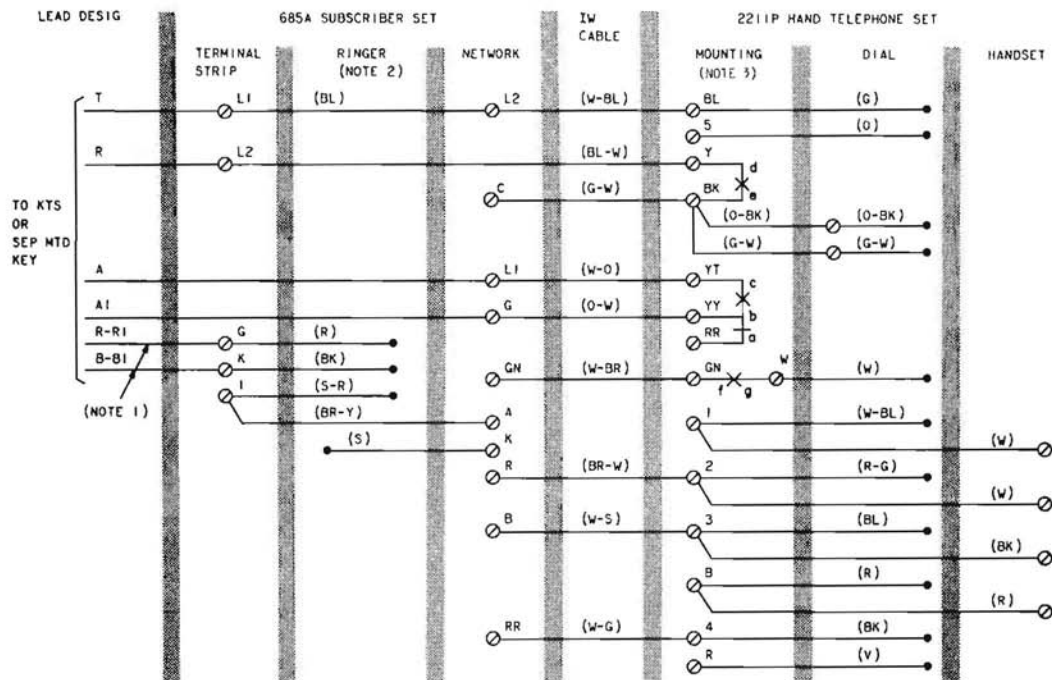
1. FOR COMMON RINGER WITHOUT CAPACITOR, MOVE (S) RINGER LEAD TO A.
2. CONNECT R-RI AND B-BI LEADS FOR COMMON OR LINE RINGER AT EQUIPMENT OR KEY AS REQUIRED.
3. TO PREVENT FALSE HOLD CONDITION WHEN GOING ON-HOOK, THE TIP AND RING CONTACTS OF THE LINE SWITCH MUST BREAK BEFORE "A" LEAD CONTACTS. (FIELD ADJUSTMENT OF LINE SWITCH NOT RECOMMENDED).

( ) CURRENT COLOR CODE  
 [ ] MD COLOR CODE  
 DP - DIAL PULSE CONTACT  
 ON - OFF NORMAL CONTACT

## SET MODIFICATION

LEAD	COLOR	FROM	TO
RINGER	R	L2	G
	BK	L1	2

Fig. 2— 212MR (MD) Hand Telephone Set, Connections for Use with 1A1 or 1A2 KTS



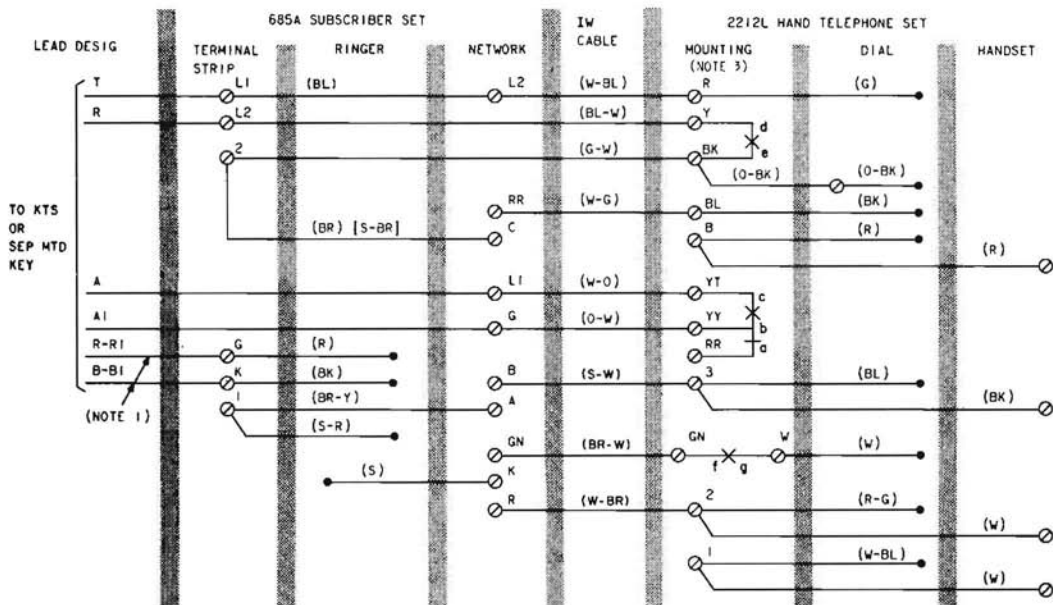
## NOTES:

1. CONNECT R-RI AND B-BI LEADS FOR COMMON OR LINE RINGER AT EQUIPMENT OR KEY AS REQUIRED.
2. FOR COMMON RINGER WITHOUT CAPACITOR, CONNECT (S) RINGER LEAD TO A.
3. TO PREVENT FALSE HOLD CONDITION WHEN GOING ON-HOOK, THE TIP AND RING CONTACTS OF THE LINE SWITCH MUST BREAK BEFORE "A" LEAD CONTACTS. (FIELD ADJUSTMENT OF LINE SWITCH NOT RECOMMENDED).

## SET MODIFICATION

LEAD	COLOR	FROM	TO
RINGER	(R)	L2	G
	(BK)	L1	K

Fig. 3— 2211P (MD) Hand Telephone Set, Connections for Use with 1A1 or 1A2 KTS



## NOTES:

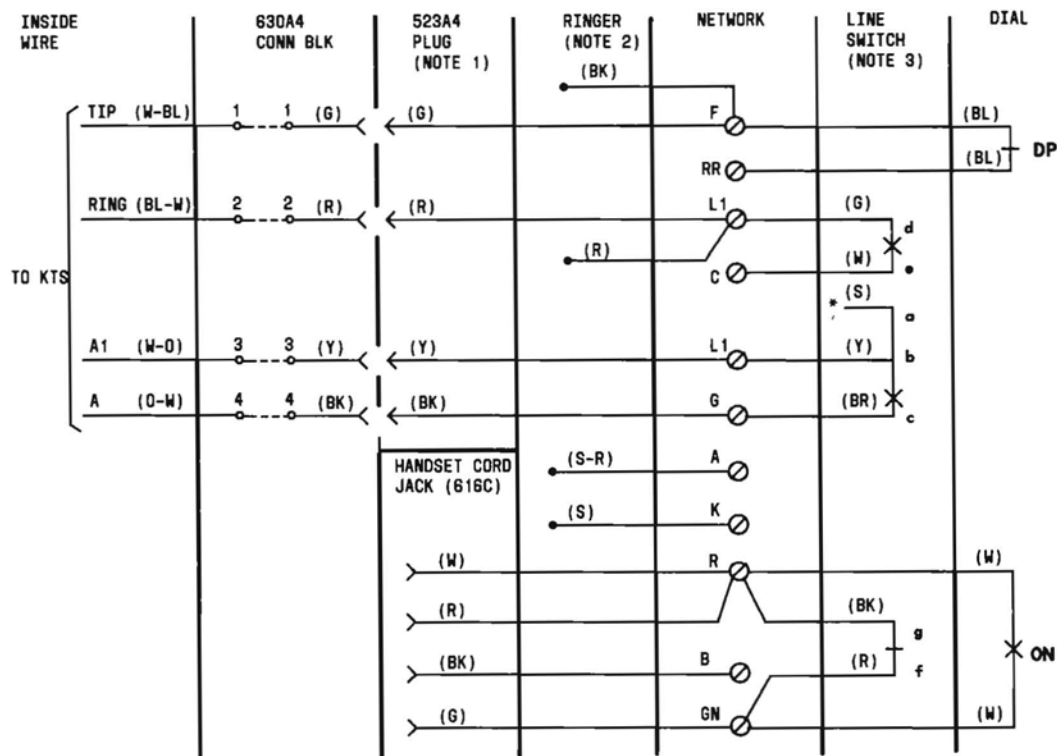
1. CONNECT R-R1 AND B-B1 LEADS FOR COMMON OR LINE RINGER AT EQUIPMENT OR KEY AS REQUIRED.
2. FOR COMMON RINGER WITHOUT CAPACITOR, CONNECT (S) RINGER LEAD TO A.
3. TO PREVENT FALSE HOLD CONDITION WHEN GOING ON-HOOK, THE TIP AND RING CONTACTS OF THE LINE SWITCH MUST BREAK BEFORE "A" LEAD CONTACTS. (FIELD ADJUSTMENT OF LINE SWITCH NOT RECOMMENDED)

## SET MODIFICATION

LEAD	COLOR	FROM	TO
RINGER	(R) (BK)	L2 L1	G K

( ) CURRENT COLOR CODE  
 [ ] MD COLOR CODE

Fig. 4— 2212L (MD) Hand Telephone Set, Connections for Use with 1A1 or 1A2 KTS



## SET MODIFICATION

LEAD	COLOR	FROM	TO
523A4 PLUG	G		F
	R		L1
	Y		L2
	BK		G
RINGER	BK	L1	F
	R	L2	L1
LINE SWITCH	W	F	C
	BR	C	G
	S	L2	*

## NOTES:

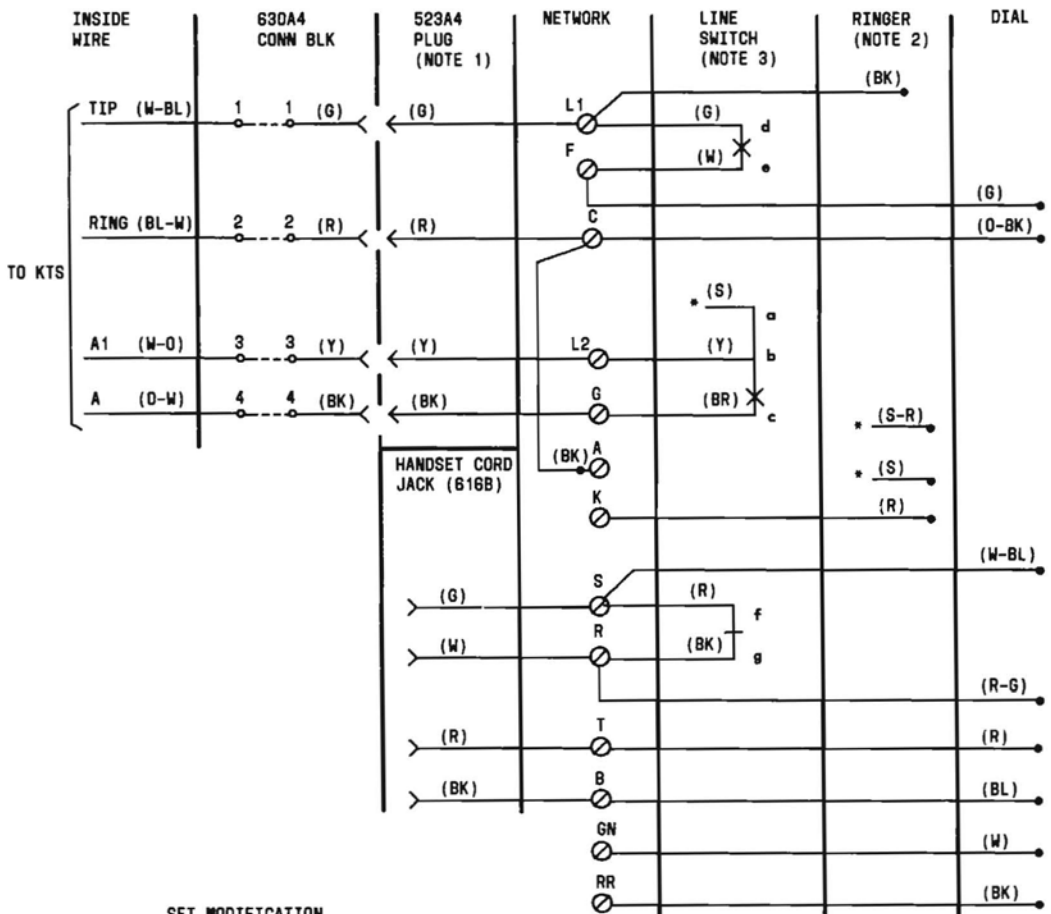
1. REPLACE 523A3 PLUG WITH 523A4 PLUG, ORDERED SEPARATELY.
2. WIRED FOR INDIVIDUAL OR BRIDGED RINGING.
3. TO PREVENT FALSE HOLD CONDITION WHEN GOING ON-HOOK, THE TIP AND RING CONTACTS OF THE LINE SWITCH MUST BREAK BEFORE "A" LEAD CONTACTS. (FIELD ADJUSTMENT OF LINE SWITCH NOT RECOMMENDED).

\* INSULATE AND STORE

DP - DIAL PULSE CONTACTS

ON - DIAL OFF-NORMAL CONTACTS

Fig. 5— 554BMP Telephone Set, Connections for Use with 1A1 or 1A2 KTS



SET MODIFICATION

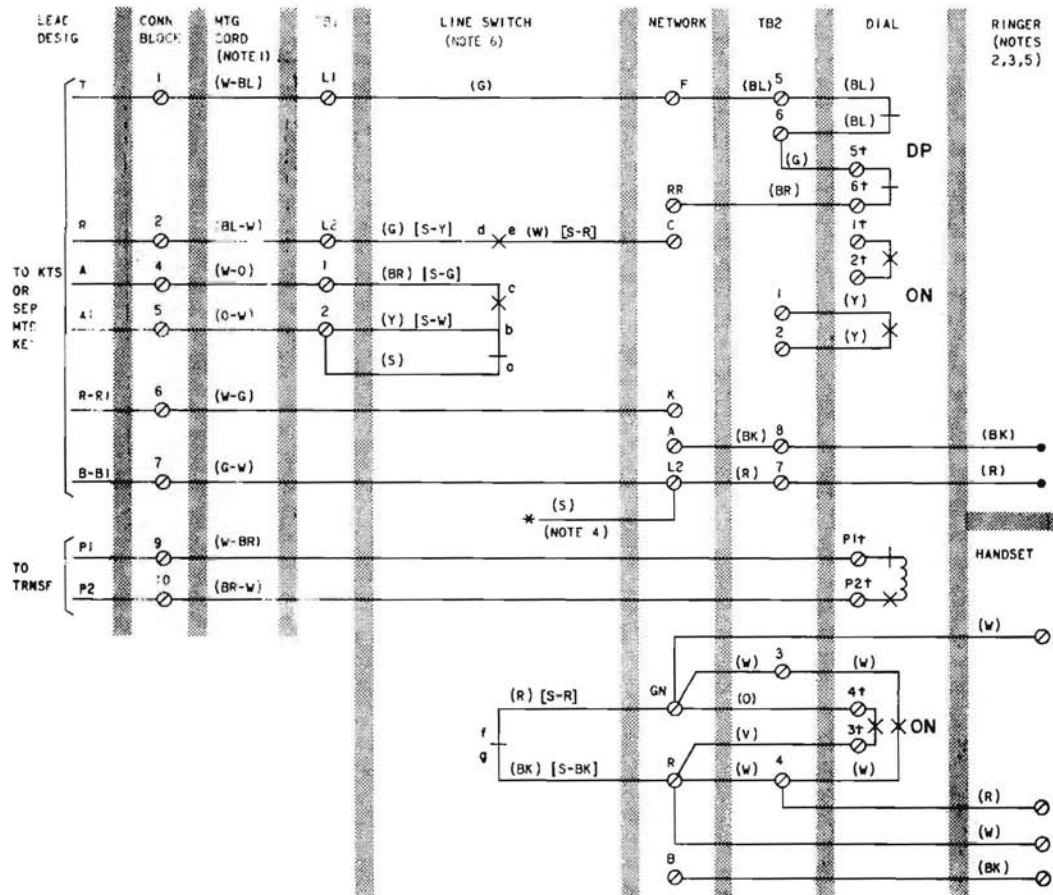
LEAD	COLOR	FROM	TO
523A4 PLUG	G		L1
	R		C
	Y		L2
	BK		G
LINE SWITCH	S	L2	*
	BR	C	G
STRAP	BK	L2	C

## NOTES:

1. REPLACE 523A3 PLUG WITH 523A4 PLUG, ORDERED SEPARATELY.
2. WIRED FOR INDIVIDUAL OR BRIDGED RINGING.
3. TO PREVENT FALSE HOLD CONDITION WHEN GOING ON-HOOK, THE TIP AND RING CONTACTS OF THE LINE SWITCH MUST BREAK BEFORE "A" LEAD CONTACTS. (FIELD ADJUSTMENT OF LINE SWITCH NOT RECOMMENDED).

\* INSULATE AND STORE

Fig. 6— 2554BMP Telephone Set, Connection for Use with 1A1 or 1A2 KTS



## NOTES:

1. REPLACE D6AF MTG CORD WITH D1OR.
2. CONNECT R-R AND B-B LEADS FOR COMMON OR LINE RINGER AS REQUIRED.
3. FOR COMMON RINGER WITHOUT CAPACITOR, CONNECT (W-G) MTG CORD LEAD TO A.
4. REMOVE FROM TB1-L2, INSULATE AND STORE.
5. CONNECTIONS SHOWN ARE FOR C4B RINGER, IF C4A IS USED, WIRE AS FOLLOWS:
 

RINGER	STRAP
• (R) TO TB2-7	• (R) TB2-7 TO L2 OF NETWORK
• (BK) TO TB2-8	• (BK) TB2-8 TO G OF NETWORK
• (S) TO TB2-9	• (S) TB2-9 TO K OF NETWORK
• (S-R) TO TB2-10	• (S-R) TB2-10 TO A OF NETWORK

 CONNECT (W-G) MTG CORD LEAD TO G
6. TO PREVENT FALSE HOLD CONDITION WHEN GOING ON-HOOK, THE TIP AND RING CONTACTS OF THE LINE SWITCH MUST BREAK BEFORE "A" LEAD CONTACTS. (FIELD ADJUSTMENT OF LINE SWITCH NOT RECOMMENDED).

( ) CURRENT COLOR CODE  
[ ] MD COLOR CODE

\* INSULATE AND STORE

† TERMINALS AND CONTACTS ON 41-TYPE DIAL

DP DIAL PULSE CONTACTS

ON OFF NORMAL CONTACTS

## SET MODIFICATION

LEAD	COLOR	FROM	TO
STRAP	(G)	L1	F
	(S)	TB1-L2	*
LINE SWITCH	(G) [S-Y]	L1	L2
	(W) [S-R]	F	C
	(BR) [S-G]	C	TB1-1
	(Y) [S-W]	TB1-L2	TB1-2
	(S)	TB1-L2	TB1-2

Fig. 7— 660A1M (MD) Telephone Set, Connections for Use with 1A1 or 1A2 KTS



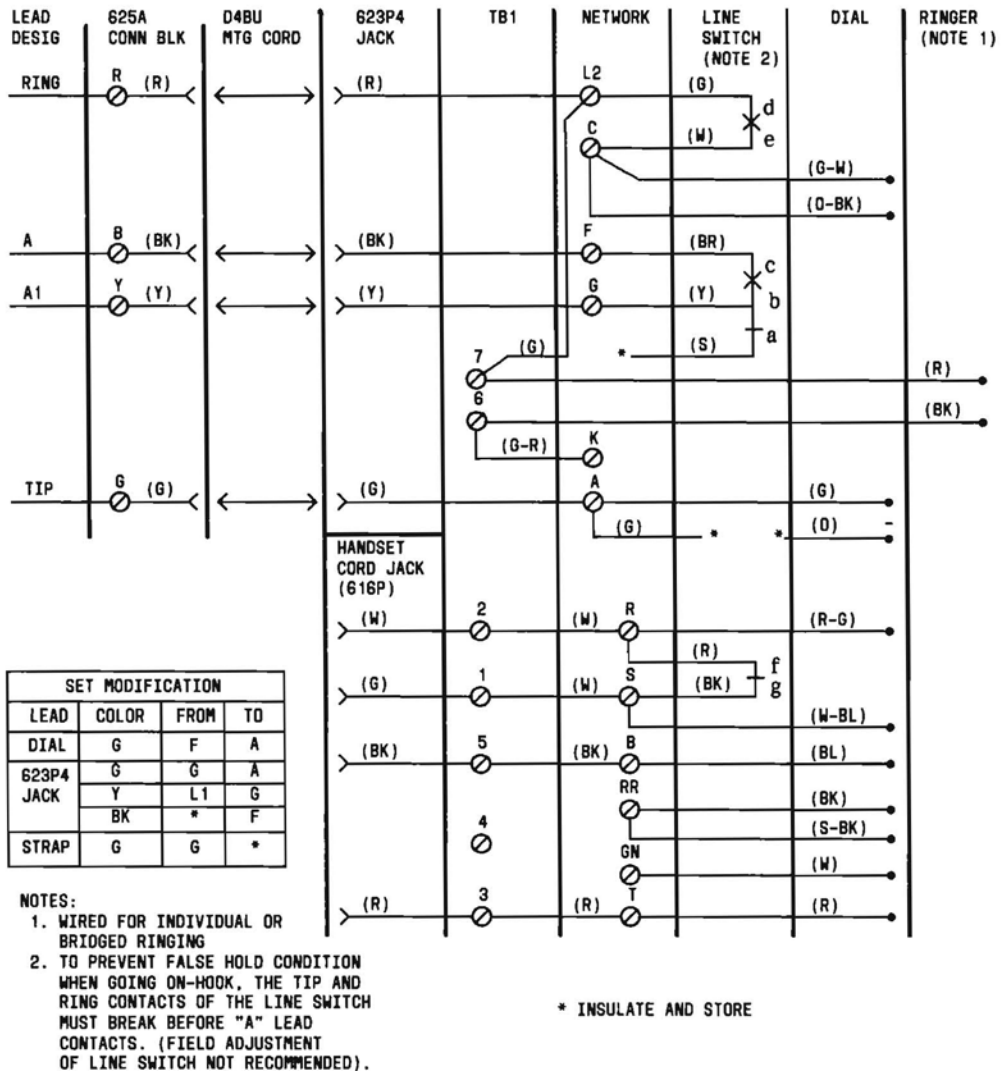


Fig. 8— 2660A1M Telephone Set, Connections for Use with 1A1 or 1A2 KTS

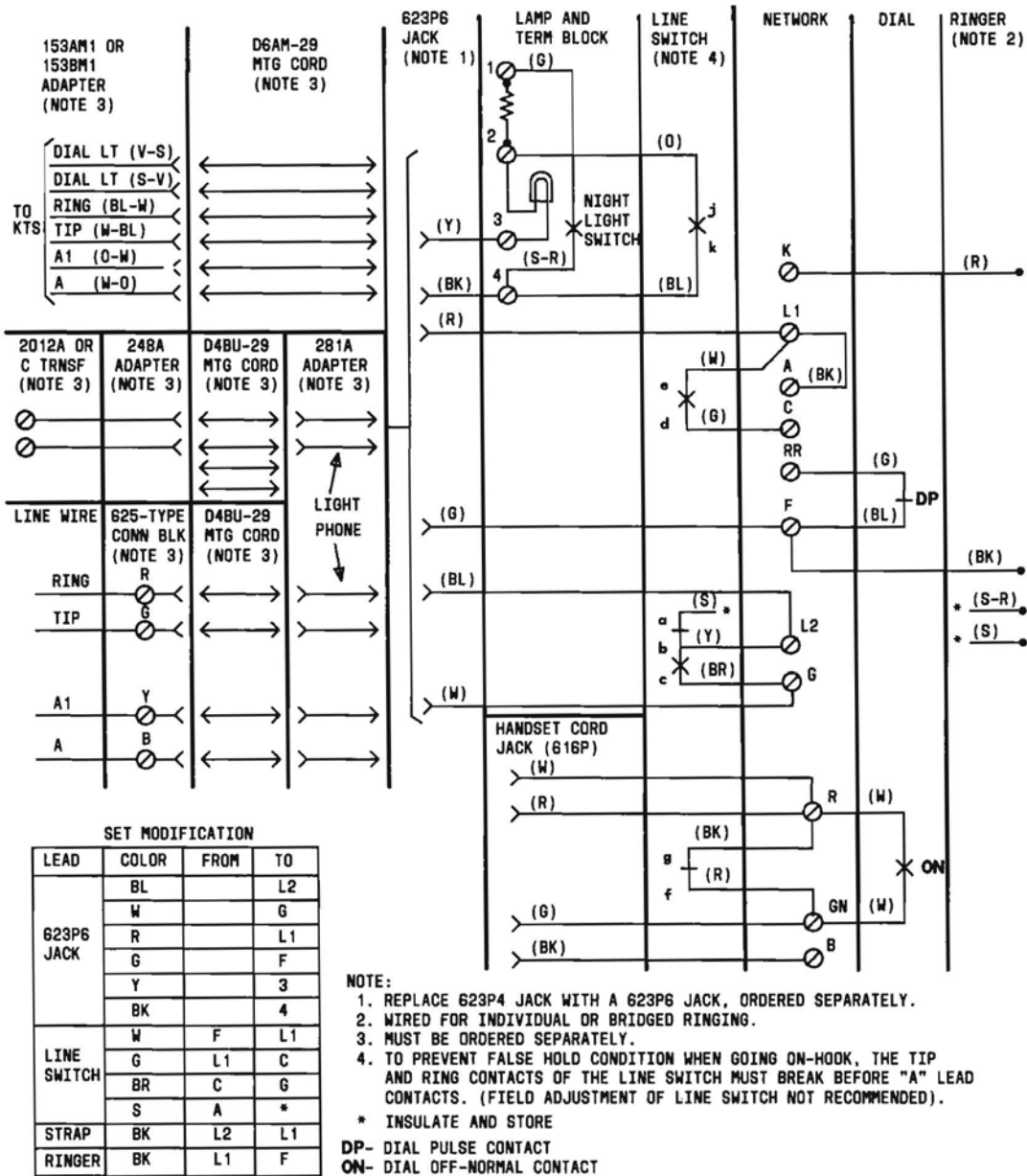


Fig. 9— 702BM Telephone Set, Connections for Use with 1A1 or 1A2 KTS

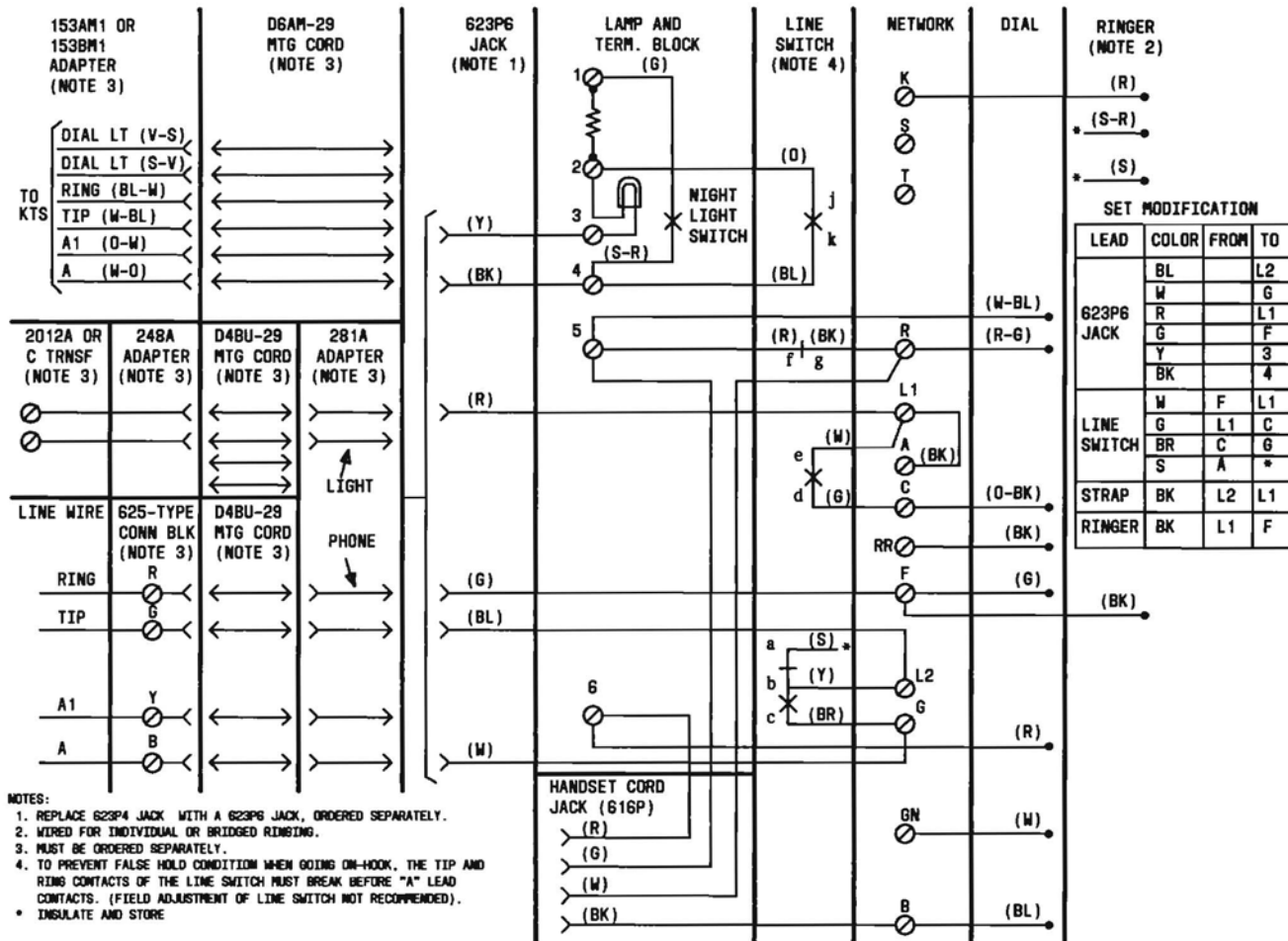
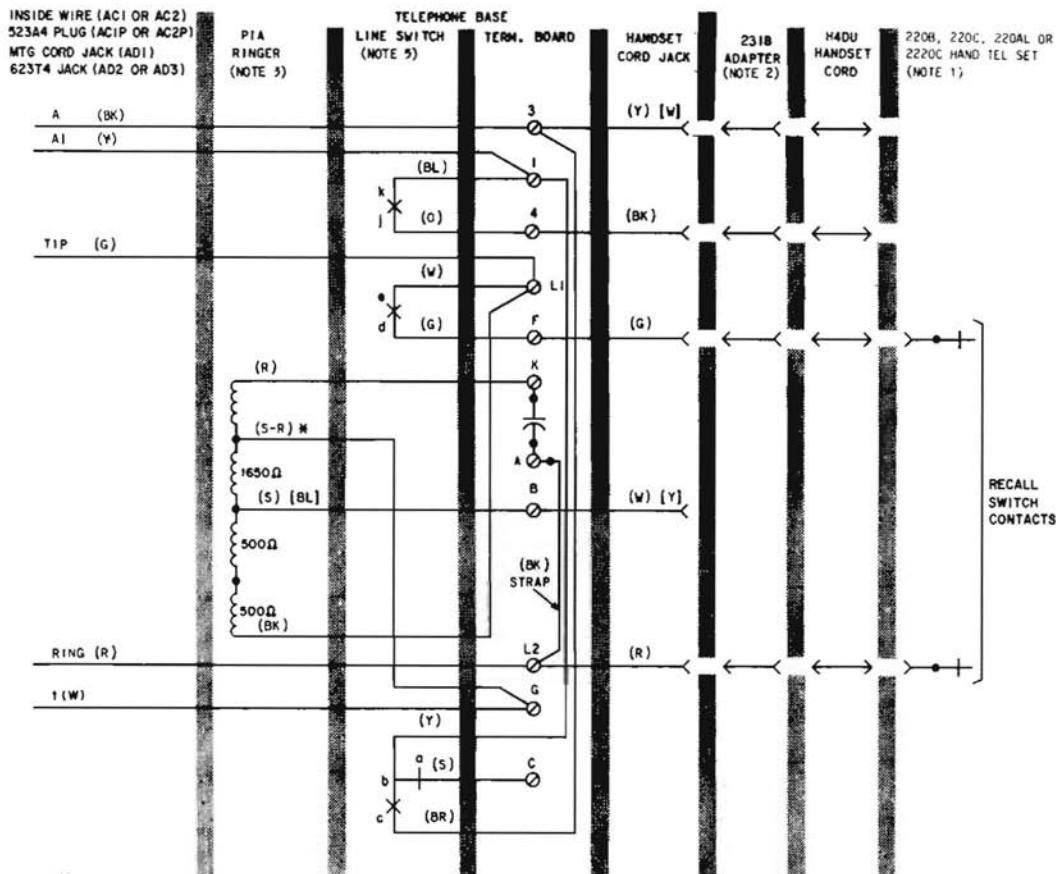


Fig. 10— 2702BM Telephone Set, Connections for Use with 1A1 or 1A2 KTS

## SECTION 502-110-102



## NOTES:

1. DIAL LIGHT TRANSFORMER NOT REQUIRED; DIAL LIGHTING IS PROVIDED BY LIGHT EMITTING DIODES (LED) IN THE HAND TELEPHONE SET WHICH IS POWERED BY C.O. BATTERY OVER THE INCOMING LINE.
2. THE 231B ADAPTER NOT REQUIRED ON AC2, AC2P, OR AD3 BASE.
3. SET WIRED FOR BRIDGED RINGING; FOR KTS REFER TO TABLE B.
4. REFER TO READ IN 1.01 AND TABLE A FOR ADDITIONAL INFORMATION ON WIRING ARRANGEMENT AND LEAD COLORS OF AC1 AND AD1 BASES MANUFACTURED PRIOR TO 10-1-72.
5. TO PREVENT FALSE HOLD CONDITION WHEN GOING ON-HOOK, THE TIP AND RING CONTACTS OF THE LINE SWITCH MUST BREAK BEFORE "A" LEAD CONTACTS. (FIELD ADJUSTMENT OF LINE SWITCH NOT RECOMMENDED).

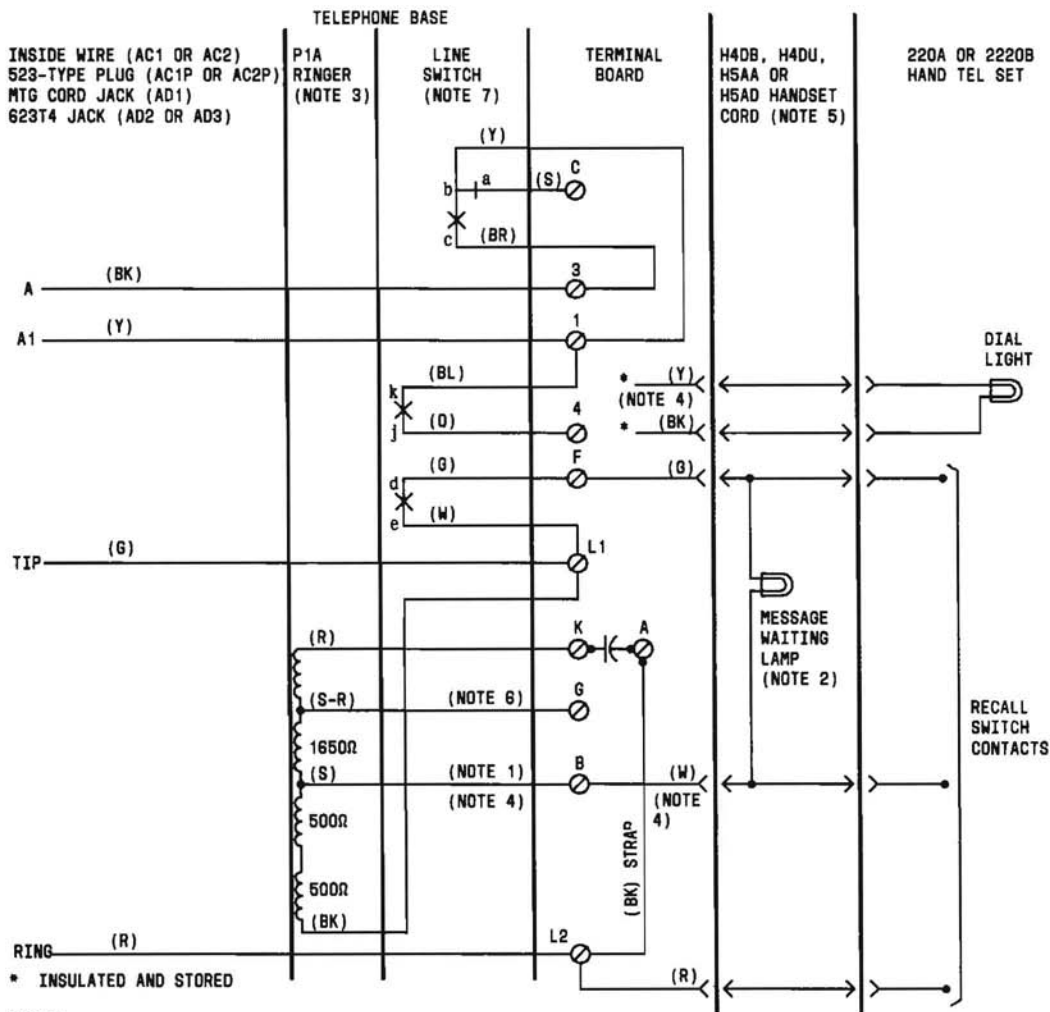
( ) CURRENT COLOR CODE

{ } EARLY COLOR CODE

\* INSULATED AND STORED (AD1 ONLY)

† AD1 BASE ONLY

Fig. 11— AC1 (MD), AC2 (MD), AC1P, AC2P, AD1 (MD), AD2, or AD3 Telephone Base Connections, Wired for 1A1 or 1A2 KTS with 220B (MD), 220C, 220AL, or 2220C Hand Telephone Set


**NOTES:**

1. WHEN H5AA HANDSET CORD IS PROVIDED, DISCONNECT (S) LEAD FROM TERMINAL B, INSULATE AND STORE.
2. LAMP AND RESISTOR ARE PART OF H5AD HANDSET CORD REQUIRED FOR MESSAGE WAITING FEATURE ON AC1 BASE ONLY.
3. SET WIRED FOR BRIDGED RINGING. FOR KTS REFER TO TABLE C.
4. REFER TO READ IN 1.01 AND TABLE A FOR ADDITIONAL INFORMATION ON WIRING ARRANGEMENT AND LEAD COLORS OF AC1 AND AD1 BASES MANUFACTURED PRIOR TO 10-1-72.
5. WHEN H4DU CORD IS PROVIDED A 227D AND 231B ADAPTER IS REQUIRED ON AC1 BUT 227D ADAPTER ONLY IS REQUIRED ON AC2.
6. INSULATED AND STORED ON EARLY VERSION AC1 AND ALL AD1 BASES
7. TO PREVENT FALSE HOLD CONDITION WHEN GOING ON-HOOK, THE TIP AND RING CONTACTS OF THE LINE SWITCH MUST BREAK BEFORE "A" LEAD CONTACTS. (FIELD ADJUSTMENT OF LINE SWITCH NOT RECOMMENDED).

Fig. 12— AC1 (MD), AC2 (MD), AC1P, AC2P, AD1 (MD), AD2, or AD3 Telephone Base Connections, Wired for 1A1 or 1A2 KTS without Dial Light using 220A (MD) or 2220B Hand Telephone Set

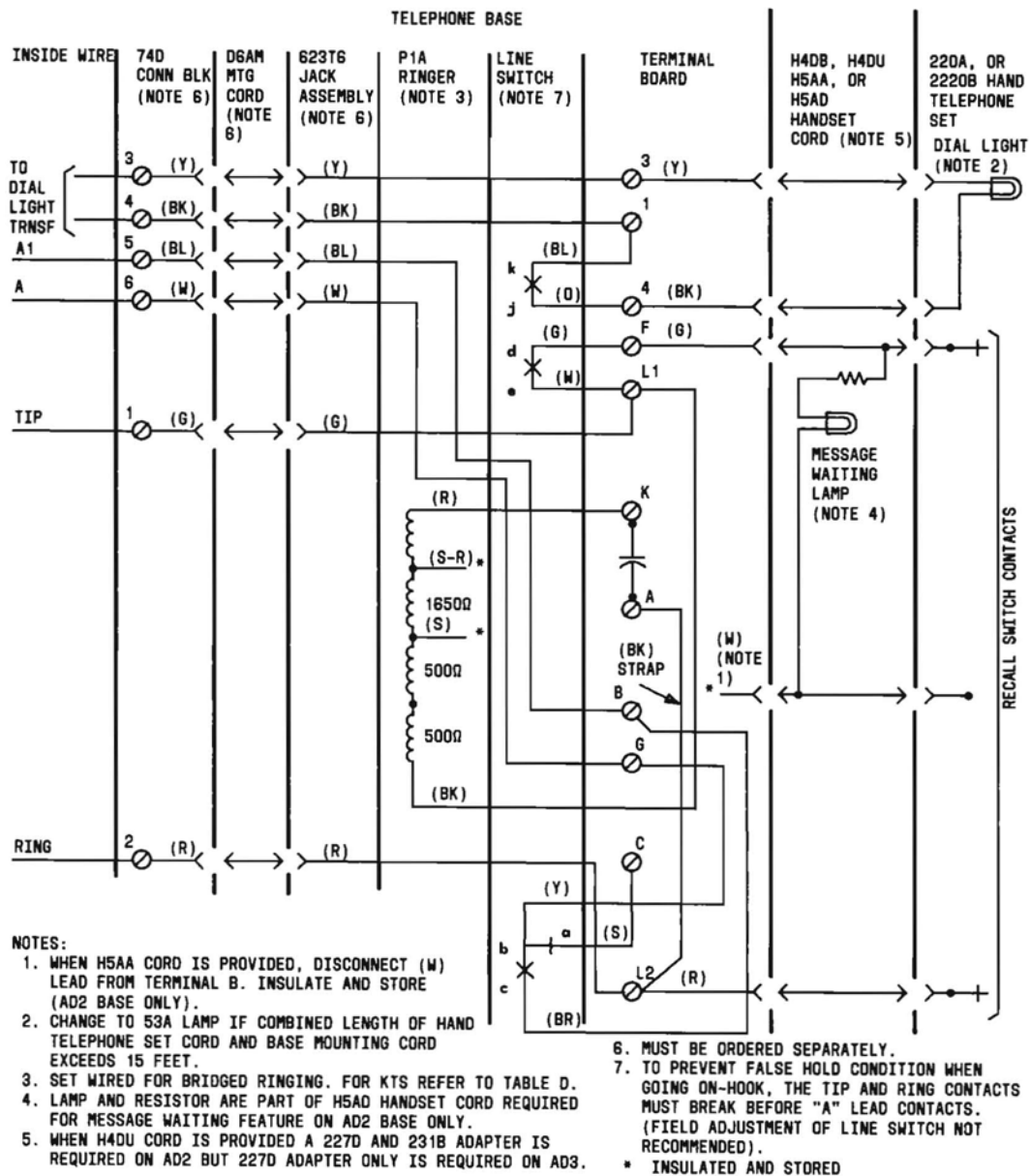


Fig. 13— AD2 or AD3 Telephone Base Wired for 1A1 or 1A2 KTS with Dial Light using 220A (MD) or 220B Hand Telephone Set

## TELEPHONE SETS

### 540, 560, 1560, AND 2560 SERIES

### COMMON INSTALLATION AND MAINTENANCE INFORMATION

#### 1. GENERAL

**1.01** This section contains common installation and maintenance information on 4- and 6-button key telephone sets.

**1.02** This section is reissued to add information on the 563HBM, 564HLM, 565GKM, HKM, LKM, 566MDM, 568HAAM, 569NBM, 2563HBM, 2564HLM, 2565GKM, HKM, LKM, and 2568HAAM (modular) telephone sets.

**1.03** When installing or repairing any telephone set, *all* connections should be checked for tightness in order to prevent trouble reports.

#### 2. INSTALLATION

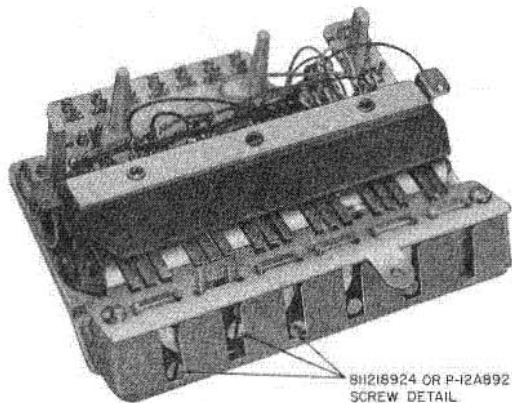
##### *Keys*

**2.01** The 636-type key (Fig. 1) has a terminal board arrangement to accommodate matching cord terminal wafers, so that any line connected to the set can be interchanged readily to appear on any five line pickup keys. See Fig. 2 and 3 for terminal designations on the 636A and 636B, respectively.

**2.02** Lamps associated with the buttons may have common or individual grounds. See sections covering connections of individual telephone sets for lamp connections.

**2.03** Certain pickup buttons on 4- and 6-button sets are arranged for conversion to signaling. To convert, remove #811218924 (P-12A892) screw detail (Fig. 1) and make necessary wiring changes. Table A shows key and associated telephone sets with convertible buttons.

**2.04** Unused buttons, either round or square style, may be blocked with an #811218585



**Fig. 1—636A Key, Bottom View**

(P-12A858) blocking ring. Insert as shown in Fig. 4.

##### *Lamp Retainer*

**2.05** In early telephone sets equipped with a 636A or B key, the 51A lamp contact springs are susceptible to losing their tension. An adjunct 840362347 lamp retainer (Fig. 5) is available and can be installed between the spring contacts of the lamps. The retainer must be ordered separately as D-180557 Kit of Parts.

##### *Exclusion Switch Assembly*

**Note:** When exclusion feature is provided the A25B connector cable must be used.

**2.06** The 565- and 1565-type telephone sets manufactured prior to May 1967 provided an exclusion plunger in the housing. Other

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♦ TABLE A ♦  
PICKUP BUTTON CONVERSION

KEY	TEL. SETS	CONVERTIBLE BUTTONS
636B	2565GK* 2565GKM 1565GK* 565GK* 565GKM	PPPPsPsPs
636A	2565HK* 2565HKM 2564HL* 2564HLM 2563HB* 2563HBM 1565HK* 1564HK* 1564HL* 1563HB* 565HK* 565HKM 564HL* 564HLM 563HB* 563HBM	HPPPsPsPs
589AJ	2565LK* 2565LKM 1565LK* 565LK* 565LKM	HPPPPsC
589AN	566MD* 566MDM	HPPPPPL
589Y*	564HK*	HPPPsPsPs
589L	566MB*	HPPPPPL
589K*	565LA/LB* 565LD*	HPPPsPsPs
589J*	565GA/GB*	PPPPsPsPs
589H	565HA/HB* 565HD* 564HA/HB* 564HD	HPPPsPsPs
588B	544BA/BB* 545BA/BB*	HPPPs

\* MD.

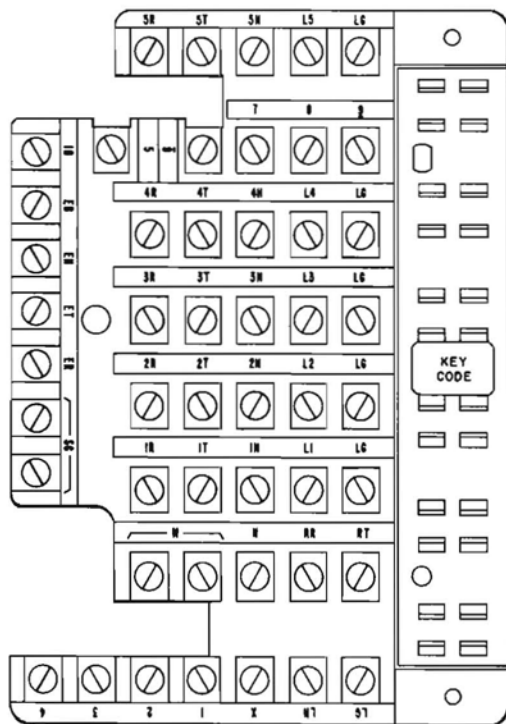


Fig. 2—Terminal Board for the 636A and 589Y Key

components of the exclusion assembly were part of a D-179935 Kit of Parts. Current manufactured sets no longer include the plunger in the housing. The plunger is now included in the D-179935 Kit of Parts (ordered separately and field installed).

**2.07** Components of the D-179935 Kit of Parts are:

- 803448596 (P-344859) bracket
- 803405604 (P-340560) spring
- 801809229 (P-180922) screw
- 812551182 (P-25E118) exclusion switch
- 811416130 (P-14A613) exclusion plunger



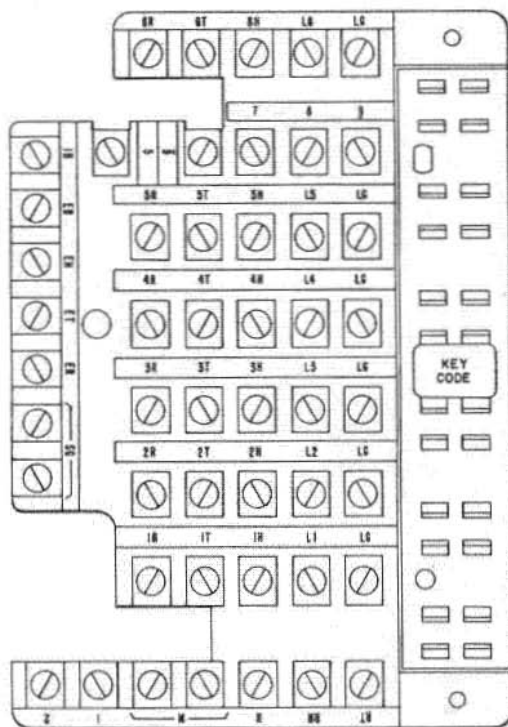


Fig. 3—Terminal Board for the 636B Key

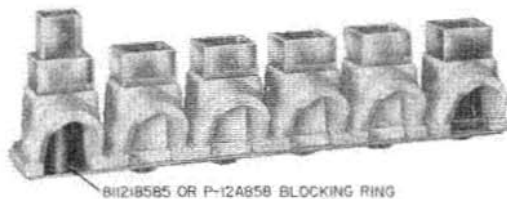


Fig. 4—811218585 (P-12A858) Blocking Ring, Installed

2.08 Install exclusion kit as follows:

- (1) Insert the 803448596 (P-344859) bracket into the two T slots precut in the line switch bracket (Fig. 6).

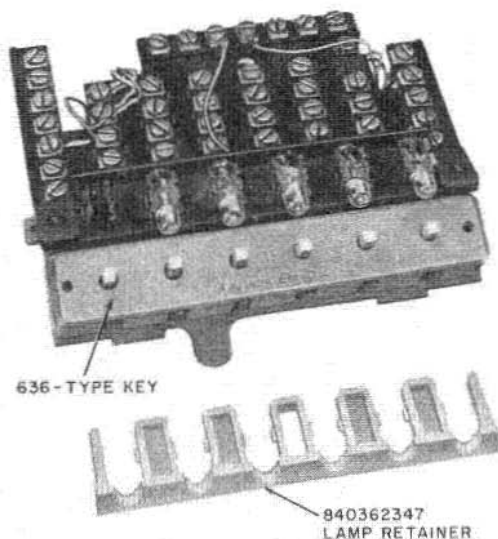


Fig. 5—Installing D-180557 Kit of Parts

- (2) Tighten the 801809229 (P-180922) screw which holds the bracket in the T slots.
- (3) Mount the exclusion switch assembly on the bracket (Fig. 6) and fasten in place using the 803405604 (P-340560) spring.
- (4) Remove the 811359538 (P-13F953) plunger from the left side of the telephone set housing and replace it with the 811416130 (P-14A613) exclusion plunger.



*Replace the telephone set housing before making any tests. The housing serves to orient the exclusion switch and tilts the spring pile-up so that it will not short to the bracket.*

2.09 The exclusion switch assembly must meet the following requirements:

- (a) The exclusion plunger should remain in the oriented position when pulled up to the full extent of its stroke. It should hold in position when 50 grams of force or less are applied to the center of the plunger.

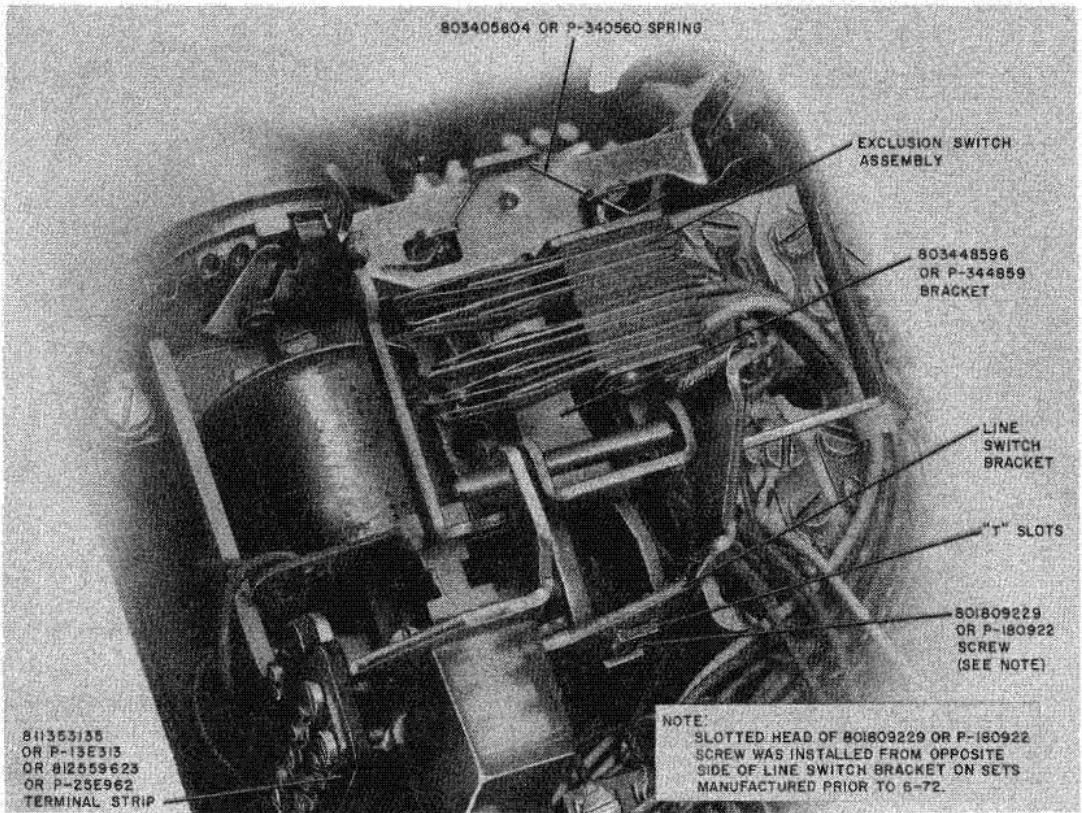


Fig. 6—D-179935 Exclusion Kit, Installed

(b) The plunger should release from its upper (locked) position when the handset is dropped from a distance of 1/4-inch above the plunger.

2.10 The 812551182 (P-25E118) exclusion switch assembly terminates in individual and wafer strip spade-tipped conductors (Fig. 7). This allows adaption of the exclusion feature to any one of the pickup buttons.

2.11 Exclusion switch connections are found in sections covering the appropriate telephone set.

### Buzzers

2.12 A KS-8109L2 or equivalent buzzer may be mounted to the H1-type ringer bracket (Fig. 8).

2.13 A second buzzer can be installed on a 70-type bracket (ordered separately) mounted on top of the H1-type ringer coil in nonexclusion switch equipped sets.

2.14 A KS-20419L1 buzzer (10 volt AC only) may be mounted in any convenient location (screw must be provided). In current production 565- and 2565-type sets (except the GK), this buzzer is

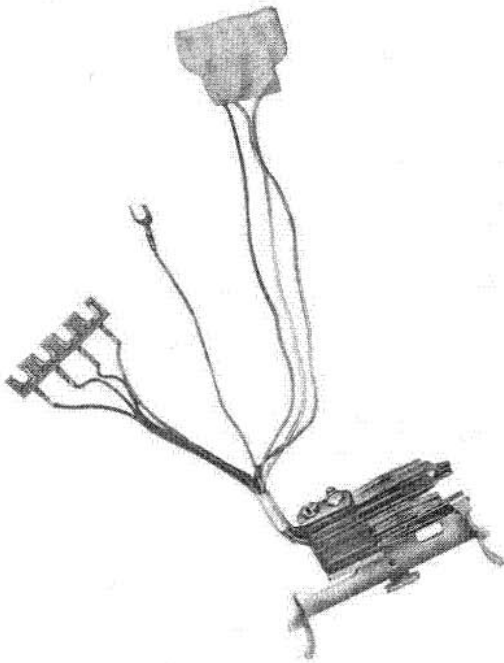


Fig. 7—812551182 (P-25E118) Exclusion Switch

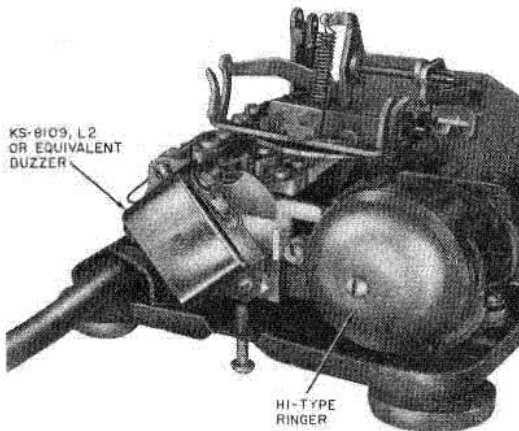


Fig. 8—Location of KS-8109L2 Buzzer

furnished from the factory and mounted on the left dial mounting bracket screw.

### Mounting Cords

- 2.15** Mounting cords on 540-type and earlier models of the 560-type telephone sets have spade-tipped leads and terminate at 44A connecting blocks.
- 2.16** Plug-ended mounting cords terminate at 66E3 or 66E4 connecting blocks or connect to A20B or A25B connector cables. A B20A or B25A connector cable can be used to extend mounting cords where a plug is needed on the equipment end.
- 2.17** The set ends of mounting cord conductors are furnished with individual spade tips or wafers for terminating on 588-, 589-, or 636-type keys (Fig. 9, 10, and 11).
- 2.18** Terminating methods are shown in sections covering connecting blocks.

### Ringer

- 2.19** The ringers may be connected as individual line ringer or common audible signals. Refer to the Service section for the appropriate telephone set connections.
- 2.20** Current production models are manufactured equipped with a C4B or H1B (one-coil) ringers. These ringers can also be used as maintenance replacements for the C4A and H1A ringers. When wiring changes are necessary refer to the Service section for the appropriate telephone set.
- 2.21** Volume control cams project through the base of the telephone set when equipped with C4A, B, or H1-type ringers, and through the lower left side of the housing on telephone sets equipped with N1A ringers.
- 2.22** Volume is adjustable to loud, soft, and off by either type volume control ringer.
- 2.23** For ringer cutoff on sets with volume control cams, remove housing and move the detent spring from its slot and rotate the cam to the off position.

**2.24** For ringer cutoff on sets with volume control arms, it is not necessary to remove the housing. Rotate and exert pressure on the arm to overcome the detent action to reach the off position.



*Volume control lever detent action of current N-type ringers has been improved by making it more difficult to inadvertently operate the control lever to the off position.*

### Terminal Strips

**2.25** The 589Y and 636A use 814319836 (P-43A983) terminal board (Fig. 2). The 636B uses the 814454005 (P-44E400) terminal board (Fig. 3).

**2.26** Additional terminal for connecting auxiliary equipment in 6-button sets must be ordered separately as follows:

- 589-type keys require an 811353135 (P-13E313) terminal strip.
- 636-type keys require an 812559623 (P-25E962) terminal strip.

**2.27** These auxiliary terminal strips are attached to the line switch bracket as shown in Fig. 6.

### TOUCH-TONE® Dial

**2.28** The 1560 and 2560 series telephone sets have 25-type 10-button and 35-type 12-button TOUCH-TONE dials, respectively.

**2.29** These dials must be connected so the green dial lead is positive (+) and the orange-black lead is negative (-).

**2.30** After completing installation, check the dial operation on each line using the central offices dial test circuits. Refer to the appropriate dial section in Division 501.

### Handsets

**2.31** When special conditions exist the G3A-type or G15A handset may be replaced by the following:

- G6AR (MD) or G6B handset for impaired hearing

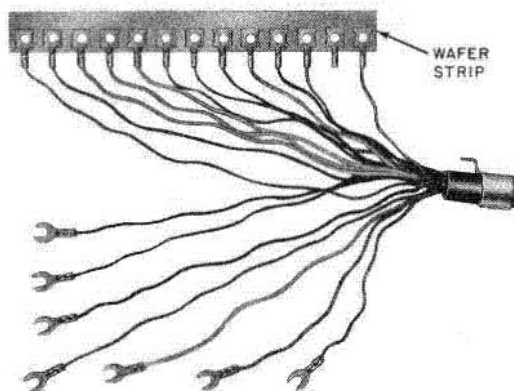
- G7AR handset for weak speech

- G8A or G8B handset for noisy locations

### Polarity Guard

**2.32** Polarity guards should be installed in TOUCH-TONE sets only when specified by local instruction for end-to-end signaling when battery and ground reversals are encountered.

**2.33** Mount the 819040528 (P-90D052) guard assembly to the right dial mounting bracket as shown in Fig. 12.



**Fig. 9—Non-slotted Wafer Strip End of Mounting Cord, Early Type**

**2.34** A polarity guard can not be mounted in a 1563 or 2563 series telephone set.

### 1P2 Lamps

**2.35** The 1P2 key telephone system requires the use of a dual envelope lamp (KS-20673) on PICTUREPHONE lines to indicate whether an audio or video call is being processed.

**2.36** The same pair of wires is used to control the KS-20673 lamp as is used for the 51A lamp. The voltages are under the control of the PICTUREPHONE line circuit. The lamp is inserted so that the white lamp is illuminated on audio calls (-10 volt DC from the line circuit) and the red lamp on video calls (+10 volt DC from the line).

circuit). This test should be made by the installer before fully inserting the lamp.

### **Speakerphone**

**Note:** When speakerphone feature is provided the A25B connector cable should be used.

**2.37** In nonspeakerphone installations, it is necessary to disconnect the speakerphone leads (V-G, G-V, V-BR, BR-V, V-S, and S-V) when these sets are multiplexed with other sets providing speakerphone.

## **3. MAINTENANCE**

### **Components**

**3.01** Maintenance of handsets, dials, and ringers are outlined in sections covering these components.

### **Removing and Replacing Housing**

**3.02** Sets without exclusion:

- To remove housing, loosen captive screws in base of set. Lift housing up and toward front of set.
- To replace housing, guide lower front of housing over pushbuttons, align housing with base of set, and gently press housing into place. Tighten captive screws in base of set.

**3.03** Sets with exclusion:

- To remove housing, pull up exclusion plunger to its operated position, loosen captive screws in base of set, and lift housing up and toward the front of set.
- To replace housing, guide lower front portion of housing over pushbuttons, align housing with base of set, and gently press housing in place.
- Depress exclusion plunger. With slight pressure it should snap into its unoperated position.
- Operate exclusion plunger several times to insure proper operation. Tighten captive screws in base of set.

### **Exclusion Switch**

**3.04** Perform no field maintenance on exclusion switch and plunger other than cleaning contacts with a 265C tool.

**3.05** Replace set or exclusion switch assembly if any of the following exclusion switch requirements cannot be met:

- Exclusion plunger should remain in the operated position when pulled up to the full extent of its stroke.
- The plunger should return to the fully depressed position when handset is replaced.
- With housing removed, normally closed contacts of the exclusion switch should have perceptible follow when operated manually.
- With housing removed, open contacts of the exclusion switch should have minimum separation of 1/64-inch; gauge by eye.

### **Mounting Cords**

**3.06** Replace mounting cords of early manufacture (Fig. 9) as follows:

- (1) Remove dial from its mounting bracket.
- (2) Remove terminal screws.
- (3) Disconnect spade-tipped conductors and wafer sections.
- (4) Disengage cord stay hook from right leg of dial mounting bracket.

**3.07** Mounting cords of late manufacture feature a slotted wafer strip (Fig. 10) to facilitate replacement.

**3.08** Still later manufactured cords, designed for use with 636-type key assemblies, feature slotted wafer sections for each line appearance (Fig. 11). This allows easy arrangement of lines to pickup buttons.



***No field maintenance should be performed on the plug end of plug-ended mounting cords.***

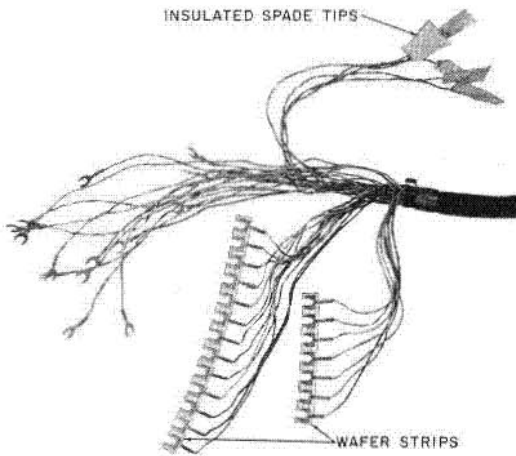


Fig. 10—Slotted Wafer Strip End of Mounting Cord, Later Type

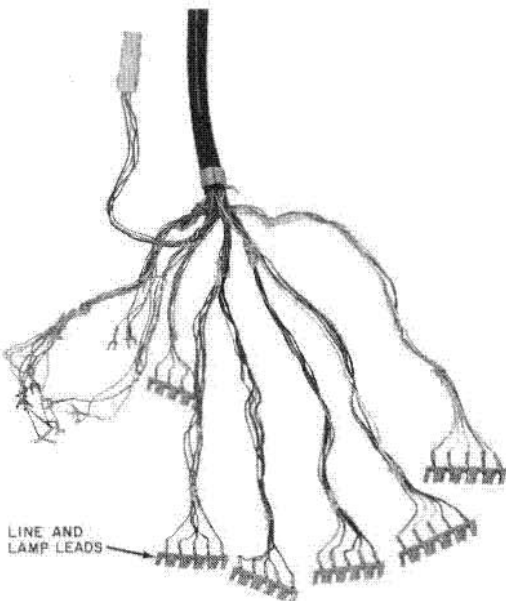


Fig. 11—Mounting Cord Used With 636-Type Key

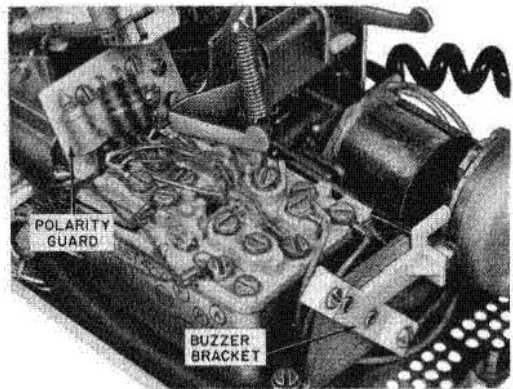


Fig. 12—819040528 (P-90D052) Guard Assembly, Installed

### Lamps and Pushbuttons

**3.09** Replace cracked pushbuttons or collars. Remove accumulated dirt or film from lamps, collars, and pushbuttons with a water dampened cloth. **DO NOT USE SOLVENTS OF ANY KIND.** If cleaning does not correct binding of pushbuttons, replace button and collar assembly.

**3.10** To replace defective lamp:

- (1) Remove dial from mounting bracket.
- (2) Carefully lift lamp from socket with KS-6320 orange stick.
- (3) Align lamp contact surfaces when placing new lamp in socket.
- (4) Remount dial.

**3.11** The button and collar assembly should be carefully aligned to avoid interference with removal or replacement of housing.

### Loose Number Card Retainers

**3.12** Current production TOUCH-TONE sets are equipped with 812558039 (P-25E803) and 802695619 (P-269561) card retainers, which cannot be adjusted.



**3.13** If the ♦812557858♦ (P-25E785) (MD) number card retainer becomes so loose on the faceplate that the number card or key designation strip slips, it can be tightened as follows:

- (1) Remove faceplate from set.
- (2) Remove card retainer from faceplate.
- (3) Bend the four arms of the retainer so that more pressure will be applied to the number card and designation strip. The bends should be made approximately 1/2-inch in from the tabs on the ends of the arms and in the opposite direction from the factory bent tabs.
- (4) Install the card retainer on the faceplate and insert the number card and key designation strip.
- (5) Install faceplate on telephone set.

**Note:** If adjusting the arms of the retainer does not result in sufficient holding power, replace the number card retainer.

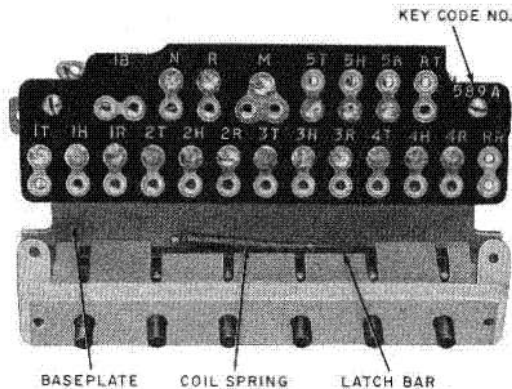
### 589- and 636-Type Keys

**3.14** Field maintenance of the 589- and 636-type keys (Fig. 1, 13, and 14) consist of:

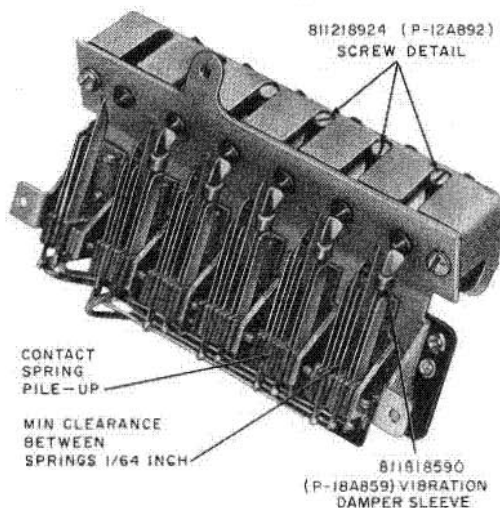
- Adjusting contacts with a 363 tool.
- Cleaning contacts with a 265C tool.
- Replacing loose or missing damper studs with ♦811818590♦ (P-18A859) vibration damper sleeves (Fig. 14). Later 589-type keys do not require this vibration damper.

**3.15** Contact follow and separation is obtained by using a 363 tool at a point adjacent to contact spring pile-up (Fig. 14). When adjusting springs:

- There should be a minimum spring clearance of 1/64-inch between contact springs and those parts of the key which do not make contact with springs (Fig. 14).
- Normally open contacts should make with perceptible follow on locking keys before key plunger assumes locked position.



**Fig. 13—589-Type Key, Top View**



**Fig. 14—589-Type Key, Bottom View**

**3.16** Replace set if the following requirements cannot be met:

- When depressed, locking plunger should release any previously locked plunger on its downstroke.
- When any pushbutton plunger is released from its operated position, it should return with a snap to its nonoperated position.

- An operated key plunger should not release during downstroke of hold button.
- An operated key plunger should release from its operated position on the upstroke of the hold button.
- A turnbutton operated plunger, when rotated 90 degrees clockwise, should maintain its operated position.
- When rotated counterclockwise from its operated position, it should be self-restoring the last 30 degrees of rotation.

### 241-Type Amplifier

- 3.17 Used in telephone sets with headset jacks to amplify the output of the headset transmitter. **NO FIELD MAINTENANCE SHOULD BE ATTEMPTED ON 241-TYPE AMPLIFIERS.**
- 3.18 The 241A "Series II" (MD) or 241B amplifier must be used on all 563HB (MD), HBM, 1563HB (MD), 2563HB (MD), and HBM sets to

eliminate mechanical interference with the exclusion plunger.

- 3.19 Replace a 241-type amplifier if it is suspected of being defective (as evidenced by poor or no transmission).

### TOUCH-TONE Dial

- 3.20 Check line polarity if no tones are heard in the receiver when a button is depressed.



*The 25- and 35-type dial will function only when the green dial lead is positive (+) and when the orange-black lead is negative (-).*

- 3.21 A hand test set connected to line terminations can be used to test for defective dials.



*Do not attempt repair of TOUCH-TONE dials in the field. Replace defective dials.*



## 554BMS AND 2554BMS TELEPHONE SETS

### IDENTIFICATION, INSTALLATION, AND MAINTENANCE

#### 1. GENERAL

1.01 This section contains information for the 554BMS and 2554BMS telephone sets. These telephone sets are intended solely for use with the DIALOG\* Intercom System and should not be directly connected to the public telephone switch network. For additional information on DIALOG Intercom Systems refer to Section 518-411-100—*not for general telephone use.*

1.02 Whenever this section is reissued, the reason(s) for reissue will be listed in this paragraph.

1.03 The 554BMS (Fig. 1) and 2554BMS (Fig. 2) telephone sets look similar to the 554BMP and 2554BMP telephone sets except the BMS telephones do not have the 523A3 plug. They must be hard-wired to the DIALOG Intercom System. Internally the sets come equipped with a KS-20419L1 buzzer and a C4B (554BMS) or a P1B (2554BMS) ringer, and are wired for A lead capability.

#### 2. IDENTIFICATION

##### A. Ordering Guide

2.01 Order as follows:

- Set, Telephone, 554BMS-†
- Set, Telephone, 2554BMS-†.

##### B. Replaceable Components

2.02 The following are replaceable components:

- Dial, 35Y3D (2554BMS)
- Dial, 9CA (554BMS)
- Buzzer, KS-20419L1

- Handset, G15A †
- Cord, Handset H4DU
- Handset cord, Jack 616C (554BMS)
- Handset cord, Jack 616B (2554BMS)
- Housing, 2554B2-†
- Housing, 554B2-†.

##### C. Design Features

2.03 These sets have the following design features:

- 812161966 Terminal Board for set connections (554BMS)
- 840996698 Terminal Board for set connections (2554BMS)
- KS-20419L1 Buzzer mounted in set
- C4B Ringer (554BMS)
- P1B Ringer (2554BMS)
- G15A Handset
- H4DU-† Modular Handset Cord Arrangement (cord must be ordered separately).

##### D. Application

2.04 These sets are intended for use solely on DIALOG Intercom Systems.

\*Trademark of American Telephone and Telegraph Company

† Refer to Table A for color.

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Fig. 1—554BMS Telephone Set

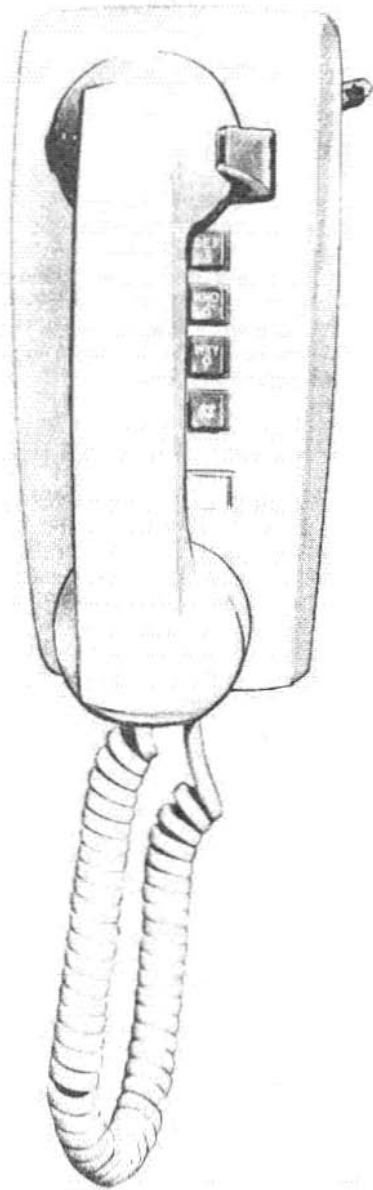


Fig. 2—2554BMS Telephone Set

TABLE A  
COLOR ORDERING GUIDE

COLORS	SUFFIX	554BMS HOUSING COMCODES	2554BMS HOUSING COMCODES
Black	-03	818064032	841019649
Ivory	-50	818064503	841019656
Green	-51	818064511	841019664
Red	-53	818064537	841019672
Yellow	-56	818064560	841019680
White	-58	818064586	841019698
Lt. Beige	-60	818064502	841019706
Aqua Blue	-62	818064628	841019704

### 3. INSTALLATION

**3.01 Planning:** When installing the 554BMS or 2554BMS telephone set and its optional services, consider the following:

- Safety for yourself, customer, and maintenance personnel
- Distance between apparatus and associated equipment
- Space requirements
- General appearance of installation.

**3.02** Install the set as follows.

- (a) To remove the set housing on the 2554BMS telephone loosen the two screws under number plate. To remove the housing on the

554BMS telephone, depress the spring catch located where the handset cord enters the set.

(b) Mount set to wall as follows.

- (1) For fastening to wood, use pan head or flathead self-tapping screws.
- (2) For hollow wall construction use toggle bolts or B wall screw anchors.
- (3) For concrete and masonry surfaces, use C plastic anchors.

(c) Six line conductors are required to activate all features.

(d) Hard wire leads to terminal board in set as shown in Fig. 3 or 4.

(e) Assure connections are correct and tight.

(f) Test, reassemble, and place number designation on set.

### 4. MAINTENANCE

**4.01** If telephone fails to operate properly check the following.

(a) Use hand test set or meter, check for incoming battery across appropriate terminals shown in Fig. 3 and 4.

(b) If buzzer fails to operate check for appropriate signal as shown in Fig. 3 and 4. Also check to make sure no leads are touching the buzzer.



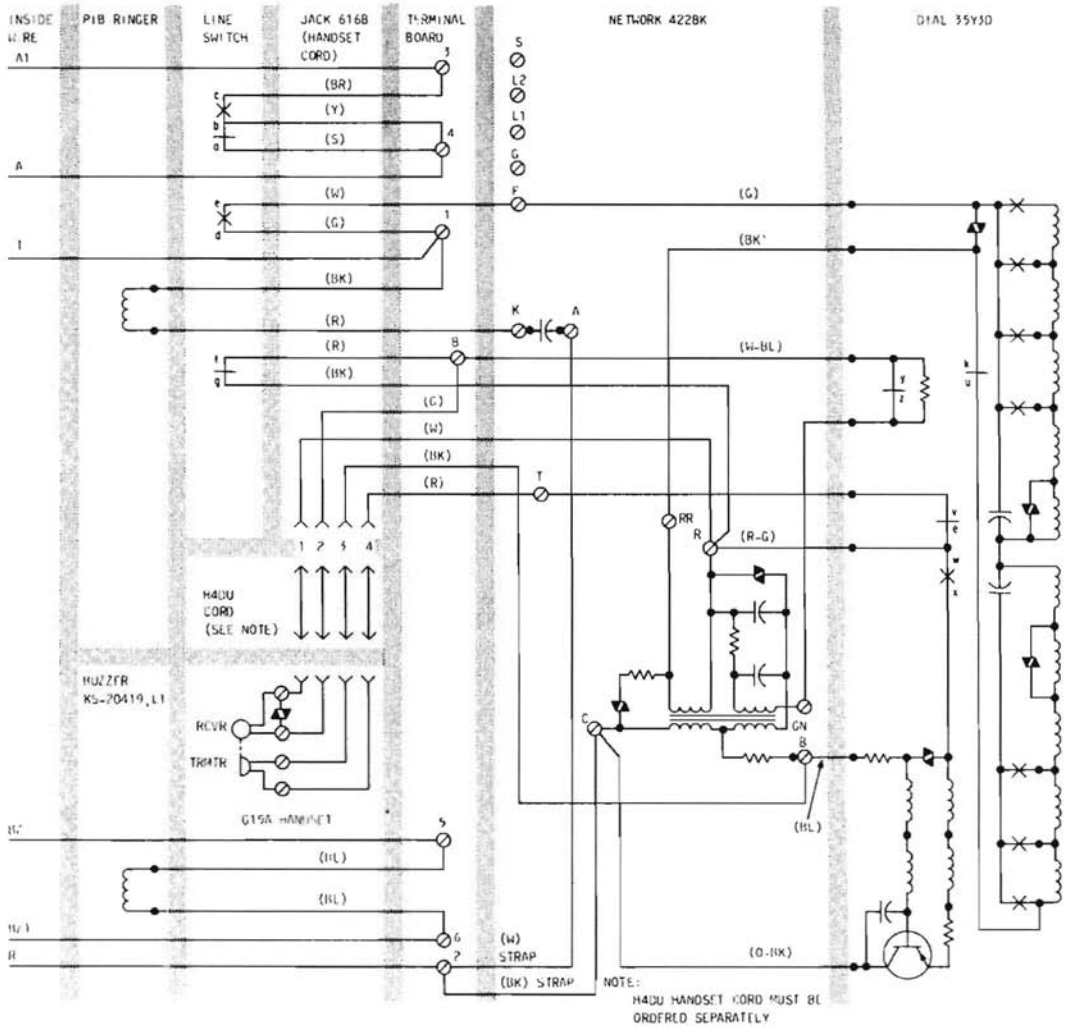


Fig. 4—2554BMS Telephone Set Wiring Diagram



## SERVICE

### 564HD TELEPHONE SET

#### 1. GENERAL

##### 1.01 Reissued to:

- Revise Fig. 1, 2, 3, and 4
- Remove maintenance information

##### 1.02 This section contains connection information for the 564HD (MD) telephone set.

##### 1.03 Refer to the appropriate Reference section in Division 502 for identification and ordering information.

##### 1.04 For installation and maintenance information for these sets refer to Division 502, section entitled Telephone Sets—540, 560, 1560, and 2560 Series—Common Installation and Maintenance Information.

#### 2. CONNECTIONS

**2.01** The 564HD (MD) telephone sets are factory-wired for use with 1A1, 1A2, or 6A key telephone system (KTS). These sets can be modified for use with 1A KTS (Fig. 3) but are not intended for exclusion or speakerphone use.

**2.02** Telephone sets wired with the black and red ringer leads on the RT and RR terminals will have a (+) sign after the code number on the base of the set.

**2.03** If the station termination is made on a 66E3-25 or 66E4-25 connecting block, loop-through straps can be installed on connecting block clip terminals 5, 11, 17, 23, and 29 to add the necessary lamp ground copper for lamps 2, 3, 4, and 5. In all cases, full pairs should be brought to the connecting block from connecting key system apparatus via inside wiring or A-type connector cables.

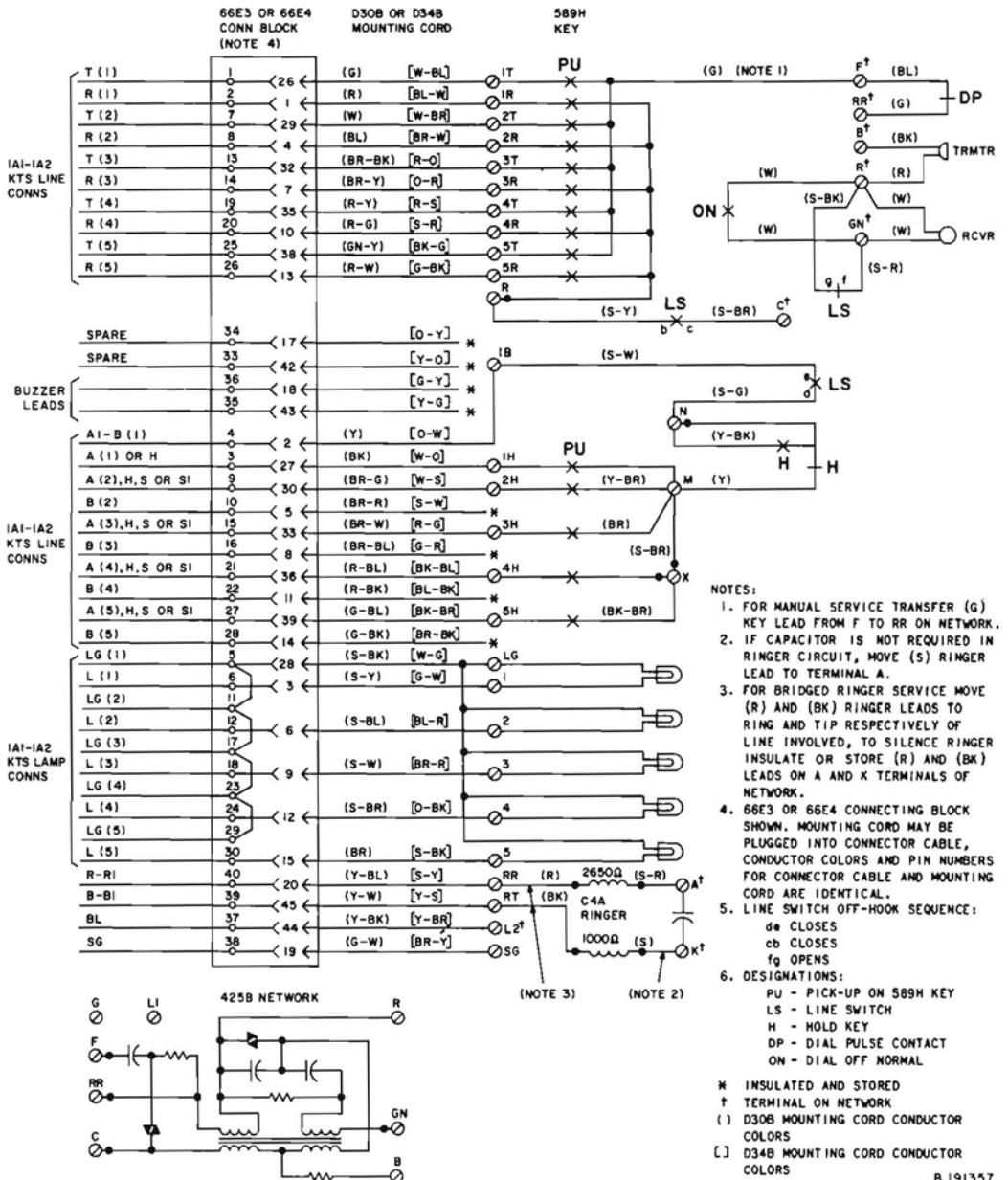
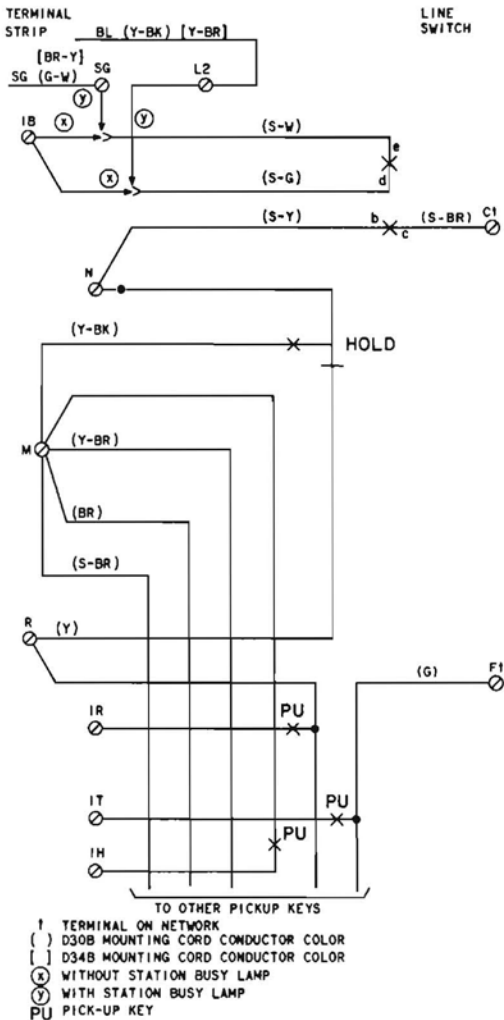


Fig. 1—564HD (MD) Telephone Set, Connections

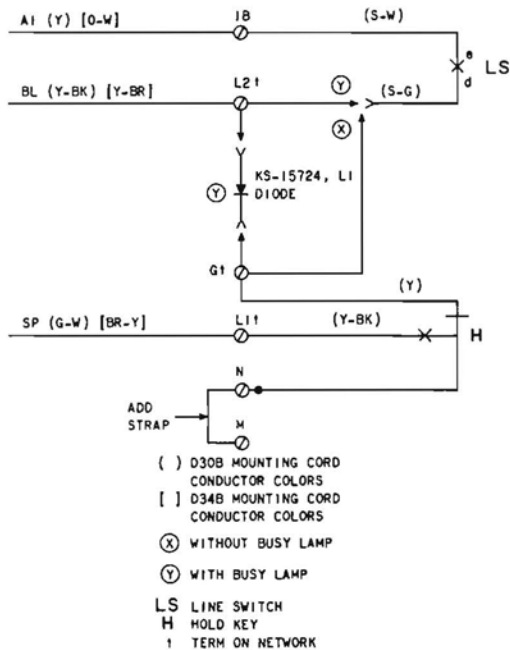






MODIFICATION			
LEAD	FROM	TO	
		WITH BUSY LAMP	WITHOUT BUSY LAMP
(S-W)	IB	SG	IB
(S-G)	N	L2†	IB
(S-Y)	R	N	N
(Y-BK)	N	M	M
(Y)	M	R	R

Fig. 3—564HD (MD) Telephone Set Modified for Use With 1A KTS



MODIFICATION			
LEAD	FROM	TO	
		WITH BUSY LAMP	WITHOUT BUSY LAMP
(S-G)	N	L2†	G†
(Y)	M	G†	G†
(Y-BK)	N	L1†	L1†
(G-W) [BR-Y]	SG	L1†	L1†
STRAP		M-N	M-N
DIODE		L2†	G†

Fig. 4—Hold Arrangement With or Without Station Busy Lamp

## SERVICE

### 564HK, 564HL, 564HLM AND 564HLMS TELEPHONE SETS CONNECTIONS AND MAINTENANCE

#### 1. GENERAL

1.01 This section contains information on the 564HK (MD), 564HL (MD), 564HLM (MD), and 564HLMS telephone sets.

1.02 This section is reissued to:

- Add 564HLMS telephone set, Fig. 5
- Show 564HLM telephone set MD.

1.03 ♦The 564HLMS telephone set is similar to the 564HLM (MD) telephone set except a new line switch assembly is provided in the 564HLMS which breaks both the tip and ring sides of the line. The MD sets only opened the ring side of the line.♦

#### 2. MAINTENANCE

2.01 The 564HK (MD) set with D30C cord may be subject to poor key button illumination in multiple station, long loop situations due to the omission of lamp ground straps on the cord plug.

2.02 When investigating poor key button illumination involving 564HK (MD) telephone sets.

(a) If the station termination is made on a 66E3-25 or 66E4-25 connecting block, loop-through straps can be installed on connecting block clip terminals 5, 11, 17, 23, and 29 to add the necessary lamp ground copper connections for lamps 2, 3, 4, and 5. In all cases, full pairs should be brought to the connecting block from connecting key system apparatus via inside wiring or A-type connector cables.

(b) If station termination is made via A20B connector cable, or at a 3-way bridging adapter, or equivalent, it is impractical to

field-modify either the plug of the D30C telephone set cord or its mating connector on the A-type connector cable. Therefore, the 564HK (MD) should be replaced with a 564HLMS.

2.03 Remove and replace housing as follows.

- (1) To remove housing, loosen captive screws in base of set. Lift housing up and toward front of set.
- (2) To replace housing, guide lower front of housing over pushbuttons, align housing with base of set, and gently press housing into place. Tighten captive screws in base of set.

2.04 Replace cracked pushbuttons or collars. Remove accumulated dirt or film from lamps, collar, and pushbuttons with a water dampened cloth. **DO NOT USE SOLVENTS OF ANY KIND.** If cleaning does not correct binding of pushbuttons, replace button and collar assembly.

2.05 Maintenance of handsets, dials, and ringers is outlined in sections covering these components.

2.06 When replacing a defective lamp use a KS-6320 orange stick to extract the lamp from its socket, and install the new lamp with its contact surfaces properly aligned with the lamp socket.

2.07 Maintenance of the 636-type key consists of cleaning contacts with a 265-type tool, and checking for loose or broken connections.



**No field maintenance should be performed on the plug-ended mounting cords.**

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2.08 Replace set if the following requirements cannot be met.

- When any button is depressed, the locking plunger should on its downstroke, release any previously locked button.
- When any key button plunger is released from its operated position, it should return with a snap to its nonoperated position.
- An operated key plunger should not release during downstroke of hold button.
- An operated key plunger should release from its operated position on the upstroke of the hold button.

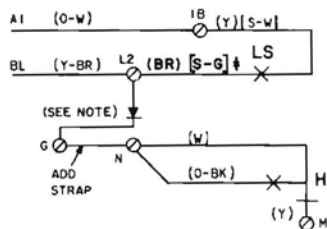
### 3. CONNECTIONS

3.01 The 564HK (MD), 564HL (MD), 564HLM (MD), and 564HLMS telephone sets are factory-wired for use with 1A1, 1A2, or 6A key telephone systems (KTS). These sets are not equipped or intended for use with exclusion, speakerphone, or 1A KTS.

3.02 The 564HL (MD), 564HLM (MD), and 564HLMS telephone sets are factory-equipped with a KS-20419L1 (10 volt ac only) buzzer.

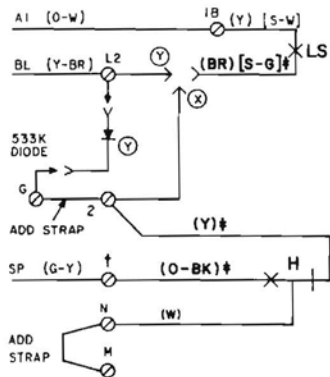
3.03 Current models of the 564HL (MD), 564HLM (MD), and 564HLMS telephone sets are furnished with the H1B ringer.

3.04 The ringer circuit is factory-wired to terminals RR and RT. Refer to notes in Fig. 3 or 4 for ringer connection when bridged ringing on a particular line is desired.



NOTE:  
 ADD 533K DIODE  
 ( ) CURRENT COLOR CODE  
 [ ] MD COLOR CODE  
 † INDICATES LEAD INVOLVED IN MODIFICATION

Fig. 1—Station Busy Lamp (Without 1 Hold Feature)



† SPARE TERMINAL OR D-161488 CONNECTOR  
 † LEADS INVOLVED IN MODIFICATION  
 (X) WITHOUT STATION BUSY LAMP  
 (Y) WITH STATION BUSY LAMP  
 LS LINE SWITCH  
 H HOLD KEY  
 ( ) CURRENT COLOR CODE  
 [ ] MD COLOR CODE

Fig. 2—1 Hold Arrangement

→ TABLE A ←

PICKUP-SIGNAL KEY CONVERSION  
564HK (MD), 564HL (MD), 564HLM (MD), AND 564HLMS

CONVERTIBLE KEY OPTIONS (NOTE 1 & 2)	KEY LEADS			
	BR	Y-BR	S-R	BR-BK
HPPPPP	M	M	M	X
HPPPPS	M	M	M	SG
HPPPSS	M	M	SG	X
HPPSSS	X	M	SG	X
HPPP*P*S*	X	M	5H	N
HPP*P*P*S*	X	X	5H	N

*Note 1.* All convertible key positions are arranged in the factory as pickup positions. To convert a key position from pickup (locking) to signaling (nonlocking), remove the 811218924 (P-12A892) screw detail from plunger at the key position to be converted. Make necessary connection changes as shown in Table A. To convert a key position from nonlocking to locking, insert 811218924 (P-12A892) screw detail.

*Note 2.* When keys are converted for signaling, the S lead of key involved provides the signal circuit and SG lead provides the common signal ground.

\* These pickup key options are used on private or intercommunicating lines with the signal key common to each line. The signal key, under control of the line switch, will operate the signal circuit of each line when associated pickup key is depressed. Use S lead on 2nd, 3rd, or 4th pickup key as required.

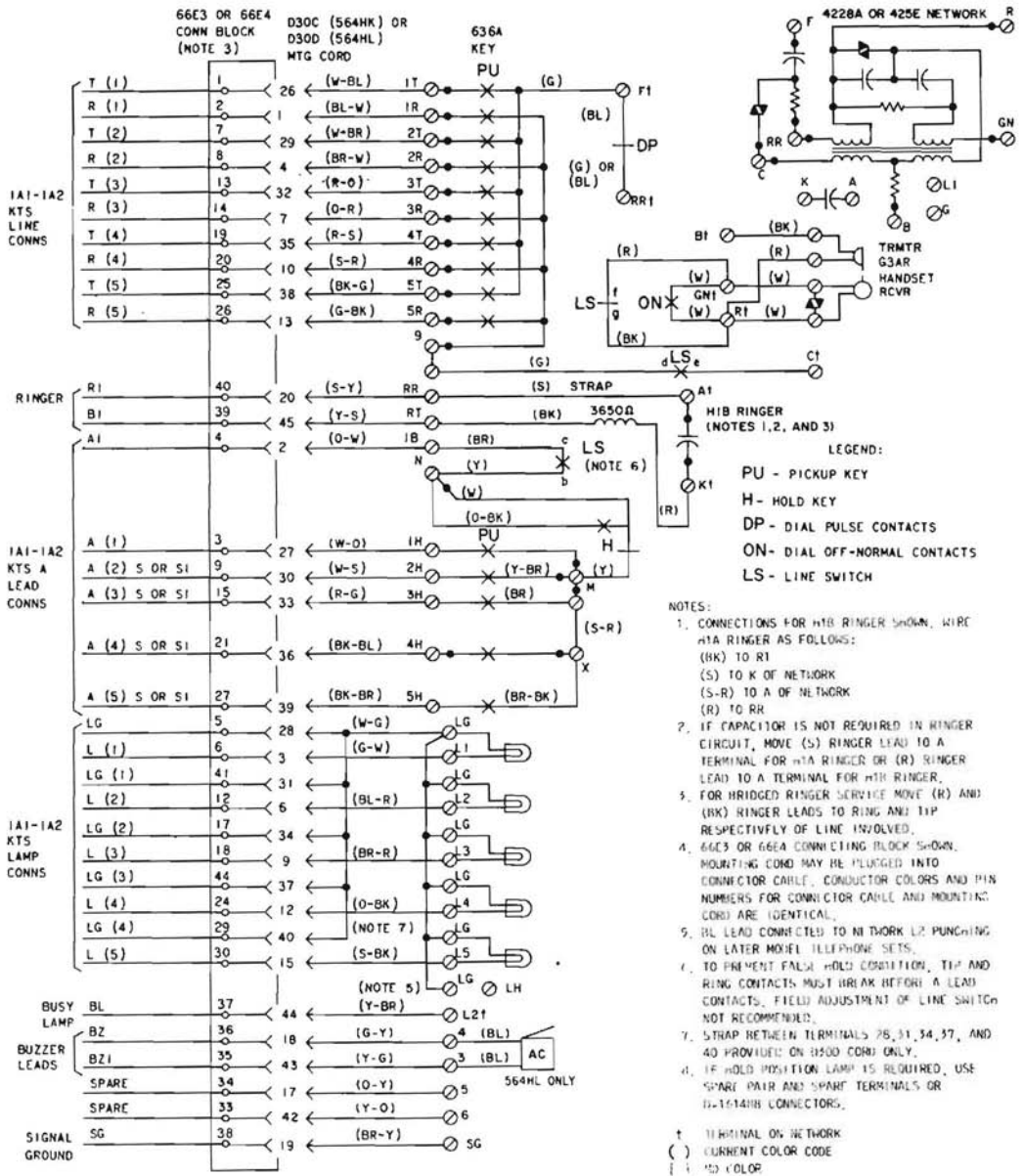


Fig. 3—564HK (MD) and 564HL (MD) Telephone Set, Connections

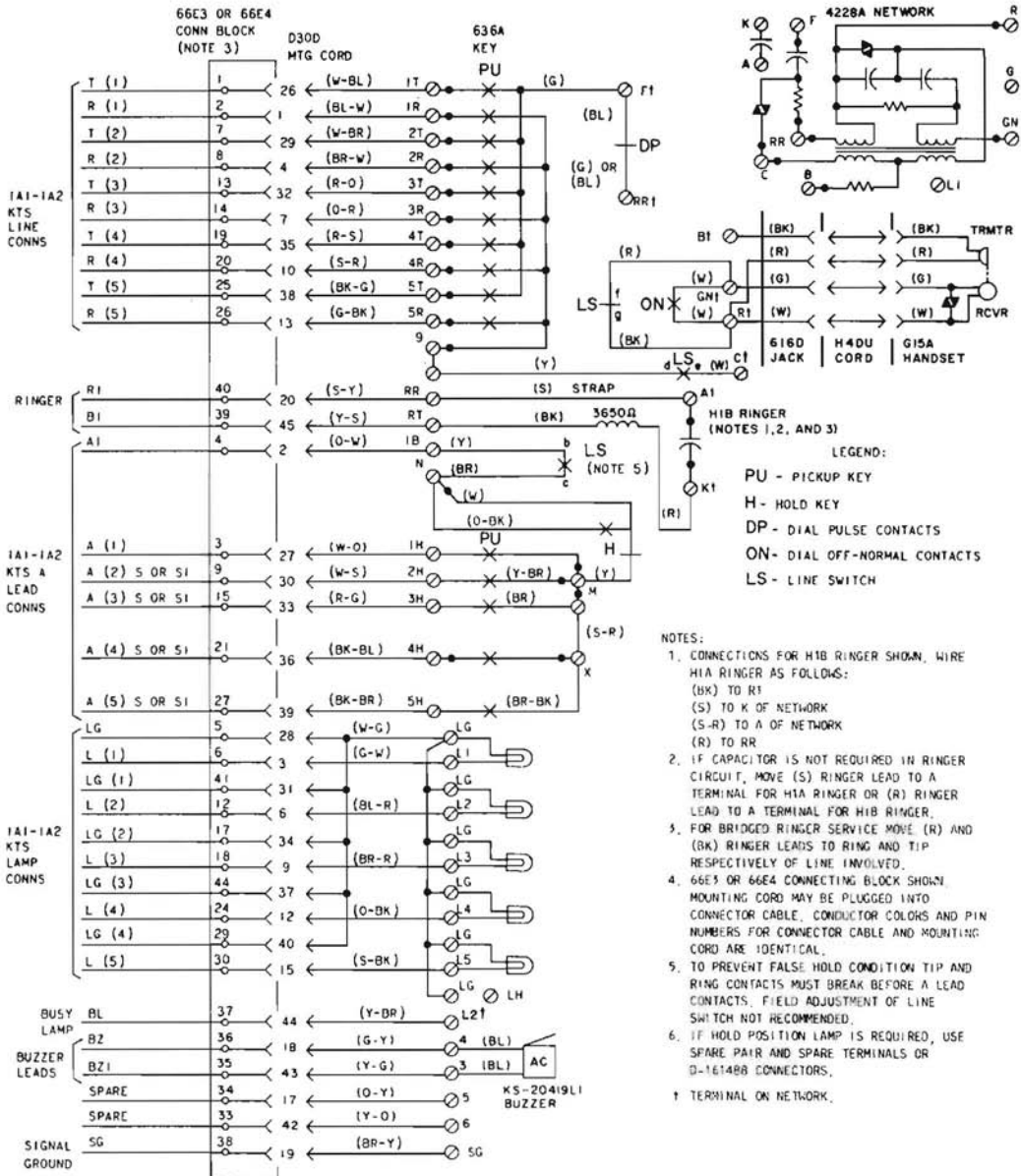


Fig. 4—564HLM (MD) Telephone Set, Connections

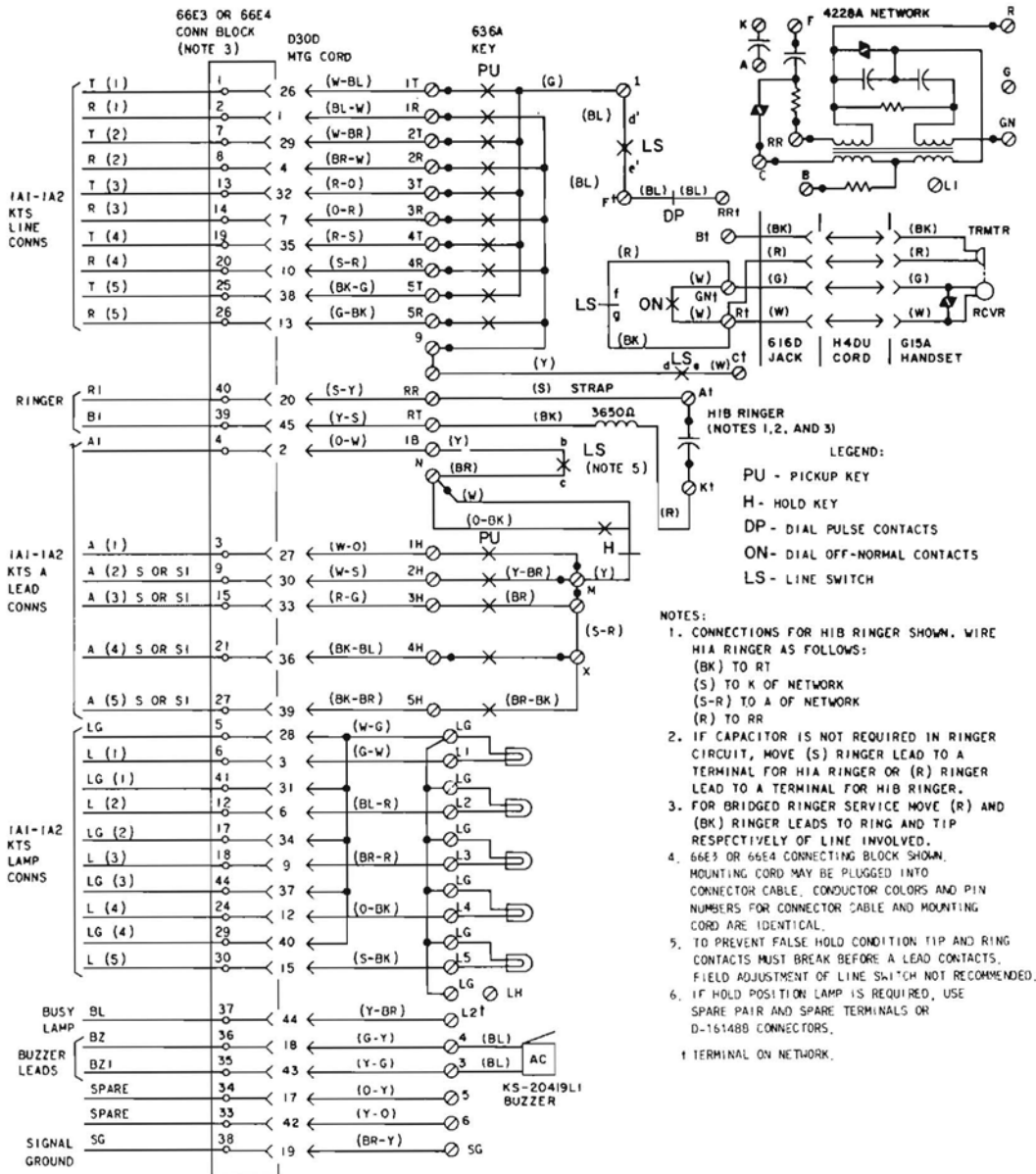


Fig. 5—564HLMS Telephone Set, Connections



## SERVICE

### 565HD TELEPHONE SET

#### 1. GENERAL

1.01 This section provides connection information for the 565HD (MD) telephone set.

1.02 Reissued to:

- Change Fig. 1
- Remove maintenance information
- Revise Fig. 2, Optional Features

1.03 Refer to Section 502-500-120 for maintenance information.

#### 2. CONNECTIONS

2.01 Exclusion and speakerphone leads must be disconnected and stored using KS-19147.L1 cord insulators when two or more 565HD (MD) sets are connected in multiple. This avoids interference with working circuits. The lead designations of leads to be removed are as follows; T1, P3, P4, LK, AG, R1, T, R, A or H, and B.

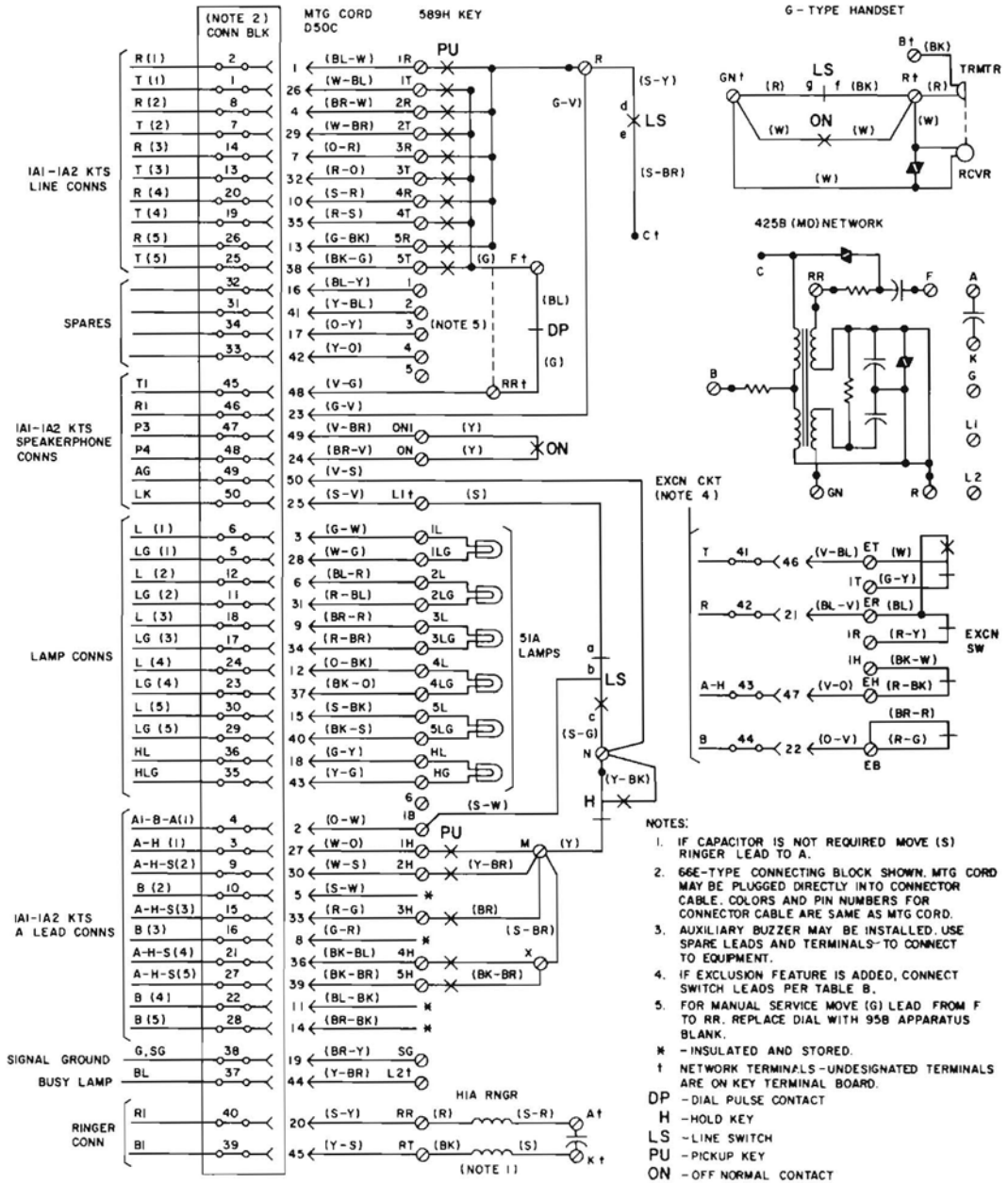
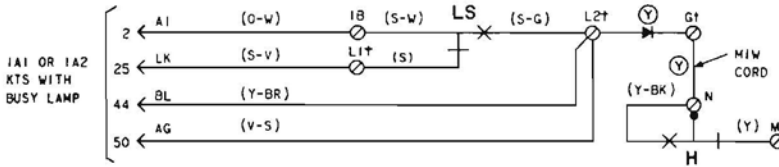
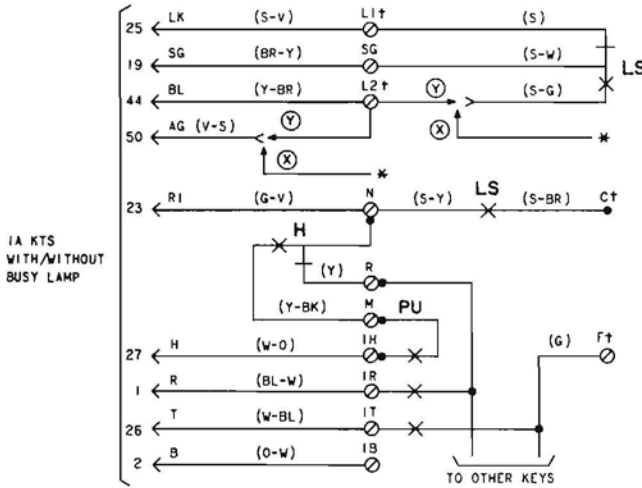


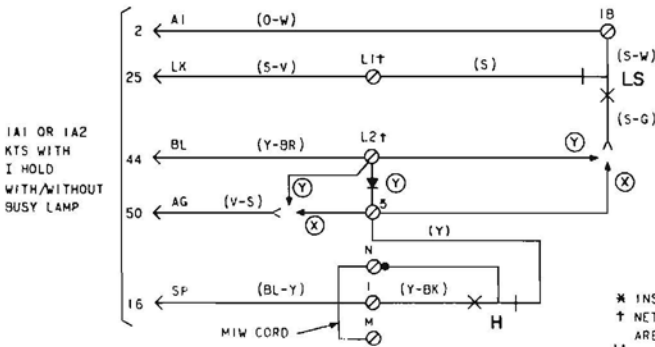
Fig. 1—565HDR (MD) Telephone Set



MODIFICATION		
LEAD	FROM	TO
(S-G)	N	L2
MIW CORD		G TO N
DIODE		L2 TO G
(V-S)	N	L2



MODIFICATION		
LEAD	FROM	TO
(S-W)	1B	SG
(S-G)	N	(X) *
		(Y) L2
(V-S)	N	(X) *
		(Y) L2
(G-V)	R	N
(S-Y)	R	N
(Y)	M	R
(Y-BK)	N	M



MODIFICATION		
LEAD	FROM	TO
(S-G)	N	(X) 5
		(Y) L2
(V-S)	N	(X) 5
		(Y) L2
(Y-BK)	N	I
(Y)	M	5
MIW CORD		N TO M
DIODE		L2 TO 5

\* INSULATED AND STORED  
† NETWORK TERMINALS-UNDESIGNATED TERMINALS  
ARE ON KEY TERMINAL BOARD.

H HOLD KEY

PU PICKUP KEY

LS LINE SWITCH

(X) WITHOUT BUSY LAMP

(Y) WITH BUSY LAMP (K5-15724, L1 DIODE)

TPA 543034

◆ Fig. 2—Optional Features for 565HDR (MD) Telephone Set ◆

TABLE A

## PICKUP SIGNAL KEY CONVERSION

KEY TEL SET	CONVERTIBLE KEY OPTIONS	KEY LEADS			
		Y-BR	BR	S-BR	BK-BR
565HDR (MD)	HPPPPP	M	M	M	X
	HPPPPS	M	M	M	SG
	HPPPSS	M	M	SG	X
	HPPSSS	M	X	SG	X
	HPPP*P*S*	M	X	5H	N
	HPP*P*P*S*	X	X	5H	N

\* These pickup key options are used on private or intercommunicating lines with the signal key common to each line. The signal key will operate the signal circuit of each line when associated pickup key is depressed. Use *S* lead on 2nd, 3rd, or 4th pickup key as required, and *G* lead for common signal ground.

TABLE B

## LINE EXCLUSION

EXCLUSION	KEY TEL SYS	EXCLUSION KEY LEADS			
		R-Y	G-Y	BR-R	BK-W
On Any Line	1A	R*	T*	1B†	H*
	1A1	R*	T*	EB	H*

\* Terminal of line involved.

† When other than line 1 is excluded, remove O-W mounting cord conductor from terminal 1B; insulate and store. Connect balance lead cord conductor of line involved to terminal 1B.

## SERVICE

### 565GK, 565GKM, AND 565GKMS TELEPHONE SETS

### CONNECTIONS

#### 1. GENERAL

1.01 This section contains information for the 565GK (MD), 565GKM (MD), and 565GKMS telephone sets.

1.02 This section is reissued to:

- Add information on 565GKMS telephone set, Fig. 2
- Show 3-type speakerphone components MD
- Show 565GKM telephone set MD
- Update information, Fig. 1, 3, and 4
- Change paragraph 2.07 to include lead colors
- Show 533K diode replacing KS-15724L1 diode (Station Busy Lamp circuit), Fig. 3 and 4.

1.03 The 565GKM modular telephone set is similar to the 565GK except the modular G15A handset with its associated H4DU cord and 616D jack assembly is used in place of the hard wired G3A-type handset.

1.04 ♦The 565GKMS telephone set is similar to the 565GKM except for a new line switch assembly which breaks both tip and ring sides of the line instead of only the ring side.♦

#### 2. CONNECTIONS

2.01 These sets are factory-wired for use with 1A1 or 1A2 KTS, 3-type (MD) or 4A

speakerphone, and individual or common line ringer. Hold feature is not provided.

2.02 All convertible key positions are supplied as pickup keys. To convert from pickup (locking) to signaling (nonlocking), remove the 811218924 (P-12A892) screw detail from key positions involved. Make necessary wiring changes as shown in Table A.

2.03 When used with 1A KTS, modify set as shown in Fig. 3.

2.04 ♦These sets are furnished from the factory equipped with H1-type ringer. Provision is also made for the installation of a buzzer which must be ordered separately. Use spare pair and terminals to connect buzzer.♦

2.05 An 812559623 (P-25E962) auxiliary terminal strip is available for auxiliary services such as buzzers, lamps, etc. It must be ordered separately.

2.06 A D-179935 Kit of Parts can be installed in the set when the exclusion feature is required. It must be ordered separately.

2.07 ♦When a 565GK (MD), 565GKM (MD), or 565GKMS telephone set is not used as a speakerphone set and is multiplied with any other set furnishing speakerphone feature, the speakerphone leads must be disconnected, insulated, and stored either at the telephone set or at the multiplying point. If not disconnected, the speakerphone leads will provide a common path between the circuits of the multiplied telephone sets. The leads to be removed are as follows: T1 (V-G), R1 (G-V), P3

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(V-BR), P4 (BR-V), AG (V-S), and LK (S-V). Speakerphone connections are shown in Division 512.4

**2.08** For installation of optional items such as exclusion, auxiliary terminal strips etc, and

maintenance information common to 6-button sets refer to Reference section in Division 502.

**2.09** Use an A20B connector cable when speakerphone and exclusion features are not provided.

**TABLE A**  
**PICKUP-SIGNAL KEY CONVERSION**

KEY TEL SET	CONVERSION OPTIONS (NOTE)	636B KEY LEADS		
		(BR)	(Y)	(BR-BK)
565GK (MD),	PPPPPP	M	M	M
	PPPPPS	M	M	SG
565GKM (MD), or	PPPPSS	M	SG	SG
	PPSSSS	SG	SG	SG
565GKMS	PPPPP*S*	M	6H	†
	PPPP*P*S*	6H	6H	†

**Note:** To convert from pickup (locking) to signal (nonlocking), remove 811218924 (P-12A892) screw from the plunger at key position being converted.

\* These arrangements use line switch controlled ground for common signal key used with private or intercommunicating lines. Common signal should be used to operate a common signal relay. Do not wire directly to a buzzer.

† Connect with the (BR) line switch lead using the terminal shown for proper option and KTS required.

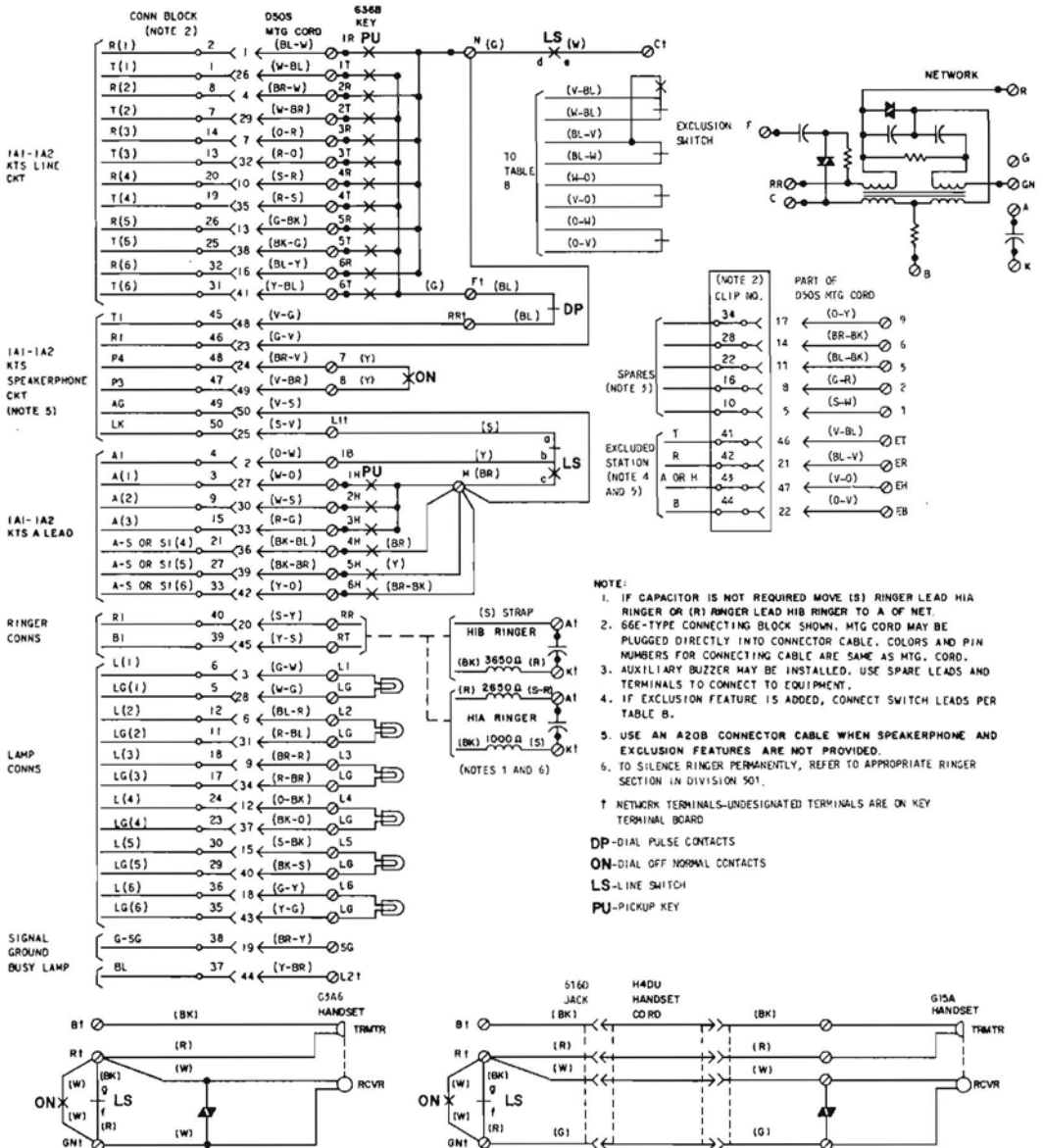


Fig. 1—565GK (MD) and 565GKM (MD) Telephone Set, Connections

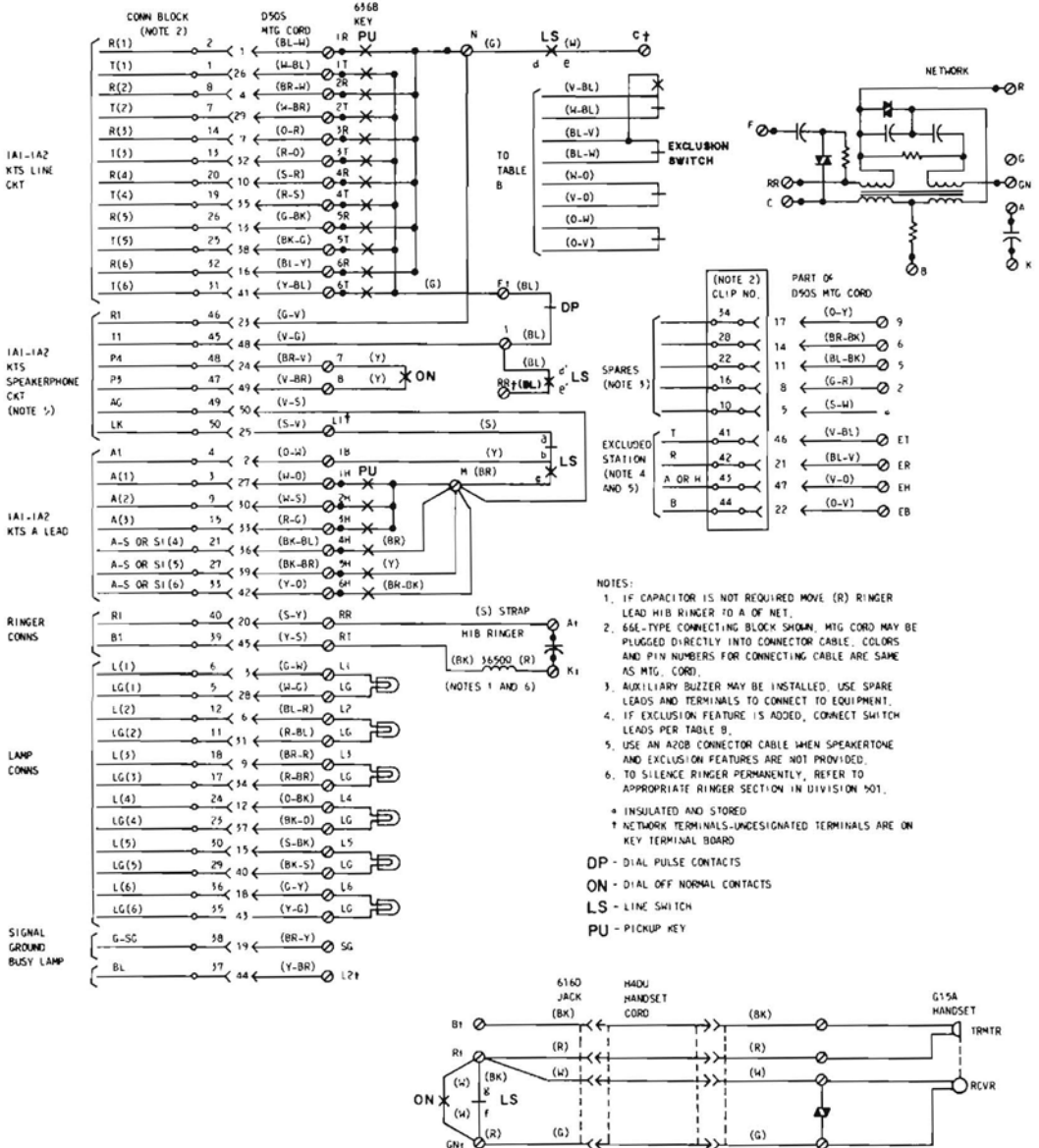


Fig. 2—565GKMS Telephone Set, Connections



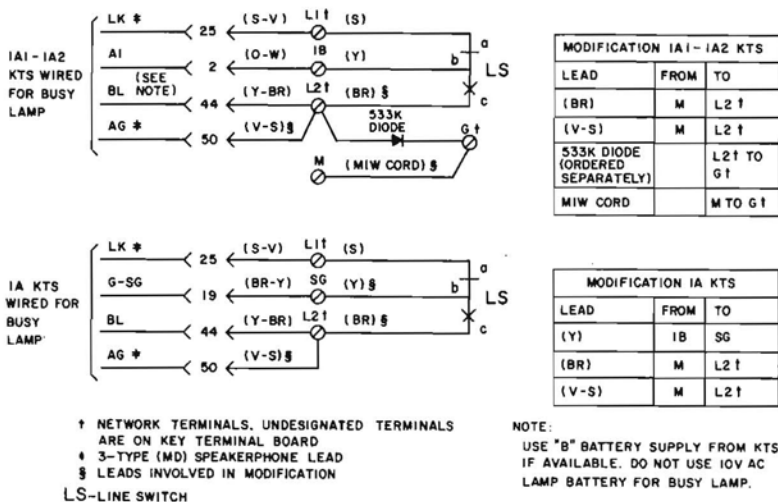


Fig. 3—Station Busy Lamp Circuit with 3-Type (MD) Speakerphone

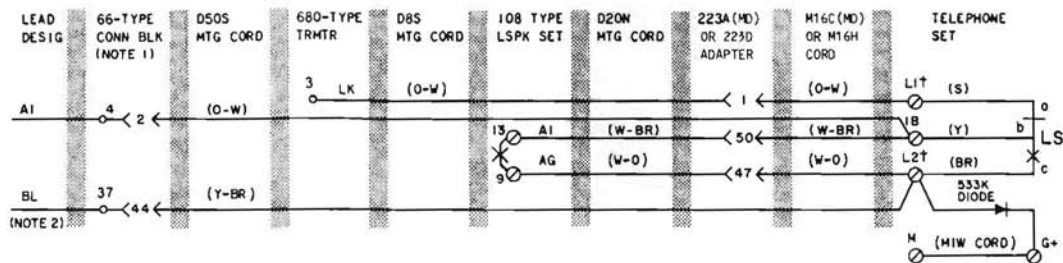
TABLE B  
EXCLUSION KEY CONNECTIONS

EXCLUSION	KEY TEL SYS	EXCLUSION KEY LEADS							
		BL-W	W-BL	O-W	W-O	BL-V	V-BL	O-V	V-O
On any line	1A	R*	T*	1B†	H*	ER	ET	EB	EH
	1A1 or 1A2	R*	T*	EB	H*	ER	ET	EB	EH

\* Terminal of line involved.

† When other than line 1 is excluded on 1A KTS, disconnect, insulate, and store O-W mounting cord conductor from terminal 1B; connect balance lead conductor from line involved to 1B.

**Note:** If exclusion feature is used, remove all B leads except one being used from key terminal board; insulate and store.

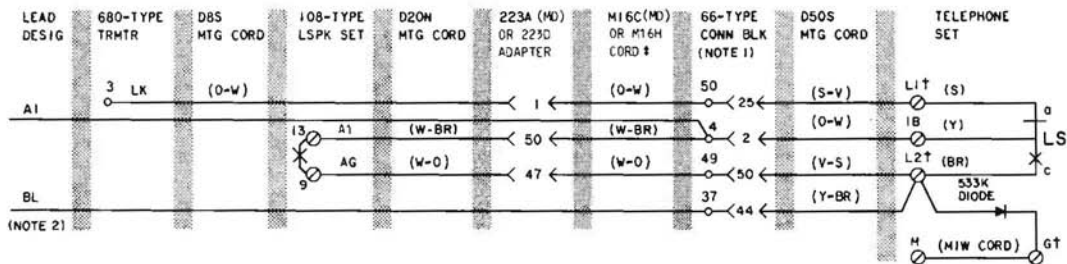


MODIFICATION 1A1-1A2 KTS		
LEAD	FROM	TO
(BR)	M	L2†
(W-0)	M	L2†
533K DIODE (ORDERED SEPARATELY)		L2† TO G†
MIW CORD		M TO G†
(S-V)	LI†	*
(V-S)	M	*

## NOTES:

- 66-TYPE CONNECTING BLOCK SHOWN. MTG CORD MAY BE PLUGGED DIRECTLY INTO CONNECTOR CABLE. COLORS AND PIN NUMBERS FOR CONNECTOR CABLE ARE SAME AS MTG CORD.
- USE "B" BATTERY SUPPLY FROM KTS IF AVAILABLE. DO NOT USE 10V AC LAMP BATTERY FOR BUSY LAMP.

A. 1A1-1A2 KTS WIRED FOR BUSY LAMP WITH M16C (MD) OR M16H CORD TERMINATED IN TEL SET



MODIFICATION 1A1-1A2 KTS		
LEAD	FROM	TO
(BR)	M	L2†
(V-S)	M	L2†
533K DIODE (ORDERED SEPARATELY)		L2† TO G†
MIW CORD		M TO G†

\* INSULATE AND STORE

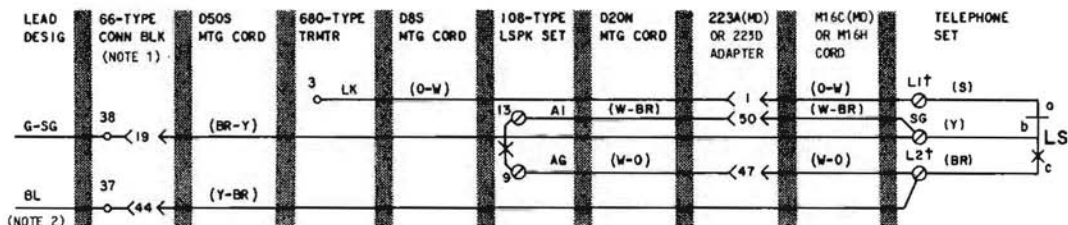
† NETWORK TERMINAL-UNDESIGNATED TERMINALS ARE ON KEY TERMINAL BOARD

‡ 161A ADAPTERS REQUIRED TO CONNECT M16C (MD) OR M16H CORD AT 66-TYPE CONN BLK

LS LINE SWITCH

B. 1A1-1A2 KTS WIRED FOR BUSY LAMP WITH M16C (MD) OR M16H CORD TERMINATED AT 66-TYPE CONN BLK

Fig. 4—Station Busy Lamp Circuit with 4A Speakerphone (Sheet 1 of 2)

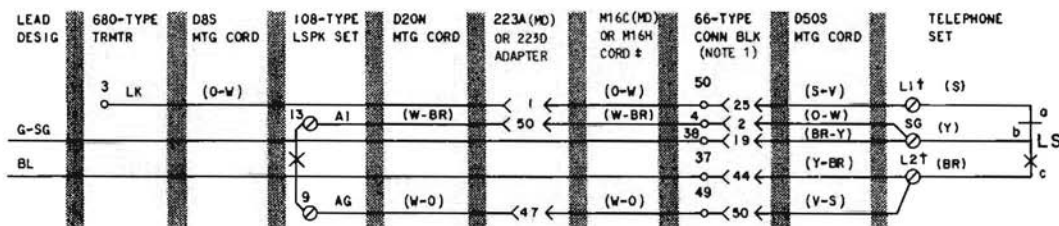


MODIFICATION 1A KTS		
LEAD	FROM	TO
(Y)	IB	SG
(BR)	M	L2†
(W-0)	M	L2†
(S-V)	L1†	*
(V-S)	M	*
(W-BR)	IB	SG

## NOTES:

- 66-TYPE CONNECTING BLOCK SHOWN. MTG CORD MAY BE PLUGGED DIRECTLY INTO CONNECTOR CABLE. COLORS AND PIN NUMBERS FOR CONNECTOR CABLE ARE SAME AS MTG CORD.
- USE "B" BATTERY SUPPLY FROM KTS IF AVAILABLE. DO NOT USE 10V AC LAMP BATTERY FOR BUSY LAMP.

A. 1A KTS WIRED FOR BUSY LAMP WITH M16C (MD) OR M16H CORD TERMINATED IN TEL SET



MODIFICATION 1A KTS		
LEAD	FROM	TO
(Y)	IB	SG
(BR)	M	L2†
(V-S)	M	L2†
(O-W)	IB	SG

\* INSULATE AND STORE

† NETWORK TERMINAL-UNDESIGNATED TERMINALS

ARE ON KEY TERMINAL BOARD

‡ 161A ADAPTERS REQUIRED TO CONNECT M16C CORD AT 66-TYPE CONN BLK

LS LINE SWITCH

B. 1A KTS WIRED FOR BUSY LAMP WITH M16C (MD) OR M16H CORD TERMINATED AT 66-TYPE CONN BLK

Fig. 4—Station Busy Lamp Circuit with 4A Speakerphone (Sheet 2 of 2)†



## SERVICE

### 565HK, 565HKM, AND 565HKMS TELEPHONE SETS

### CONNECTIONS

#### 1. GENERAL

1.01 This section contains information for the 565HK (MD), 565HKM (MD), and 565HKMS telephone sets (Fig. 1, 2, and 3).

1.02 Reissued to:

- Show 565HKM telephone set MD
- Show 3-type speakerphone MD
- Add information on the 565HKMS telephone set
- Add information on 533K diode.

1.03 ♦The 565HKMS modular telephone set is similar to the 565HKM (MD) except for a new line switch which breaks both the tip and ring side of the line.♦

#### 2. CONNECTIONS

2.01 These sets are factory-wired for use with 1A1 or 1A2 KTS, 4A speakerphone, and individual or common line ringer (Fig. 1, 2, and 3).

2.02 When used with 1A KTS and optional features, modify set wiring as shown in Fig. 4 or 5.

2.03 The hold key position can be illuminated, but 51A lamp is not furnished with set and must be ordered separately.

2.04 All convertible key positions are supplied as pickup keys. To convert from pickup

(locking) to signaling (nonlocking), remove the 811218924 (P-12A892) screw detail from key positions involved. Make necessary wiring change as shown in Table A.

2.05 Early model 565HK (MD) sets were furnished from the factory with H1A (MD) ringer, current sets have H1B ringer.

2.06 The sets are factory-equipped with a KS-20419L1 (10 volt ac only) buzzer.

2.07 A 812559623 (P-25E962) auxiliary terminal strip (ordered separately) is available for auxiliary services such as buzzers, lamps, etc.

2.08 A D-179935 Kit of Parts (ordered separately) can be installed in the set when the exclusion feature is required. Connections are made in accordance with Table B.

2.09 When a 565HK (MD) or 565HKM [(MD) Manufactured prior to July 20, 1979] telephone set is not used as a speakerphone set and is multiplied with any other set furnishing speakerphone feature, the T1 (V-G) and R1 (G-V) speakerphone leads must be disconnected, insulated and stored at the telephone set. If not disconnected, these speakerphone leads will provide a common path between the circuits of the multiplied telephone sets. Speakerphone connections are shown in Division 512.

2.10 Installation of optional items such as exclusion, auxiliary terminal strips, etc., and maintenance information common to 6-button sets can be found in Section 502-500-120.

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◆TABLE A◆

## PICKUP-SIGNAL KEY CONVERSION

KEY TEL SET	CONVERTIBLE KEY OPTIONS	KEY LEADS			
		BR	Y-BR	S-R	BR-BK
565HK(MD), 565HKM(MD), and 565HKMS	HPPPPP	M	M	M	X
	HPPPPS	M	M	M	SG
	HPPSSS	M	M	SG	X
	HPPSSS	X	M	SG	X
	HPPP*P*S*	X	M	5H	N
	HPP*P*P*S*	X	X	5H	N

\* These pickup key options are used on private or intercommunicating lines with the signal key common to each line.

TABLE B  
EXCLUSION SWITCH CONNECTIONS

EXCLUSION	KEY TEL SYS	EXCLUSION SWITCH LEADS							
		BL-W	W-BL	O-W	W-O	BL-V	V-BL	O-V	V-O
On any line	1A	R*	T*	1B†	H*	ER	ET	EB	EH
	1A1 or 1A2	R*	T*	EB	H*	ER	ET	EB	EH

\* Terminal of line to be excluded.

† When other than line 1 is excluded on 1A KTS, disconnect, insulate, and store O-W mounting cord conductor from terminal 1B; connect balance lead conductor from line involved to 1B.

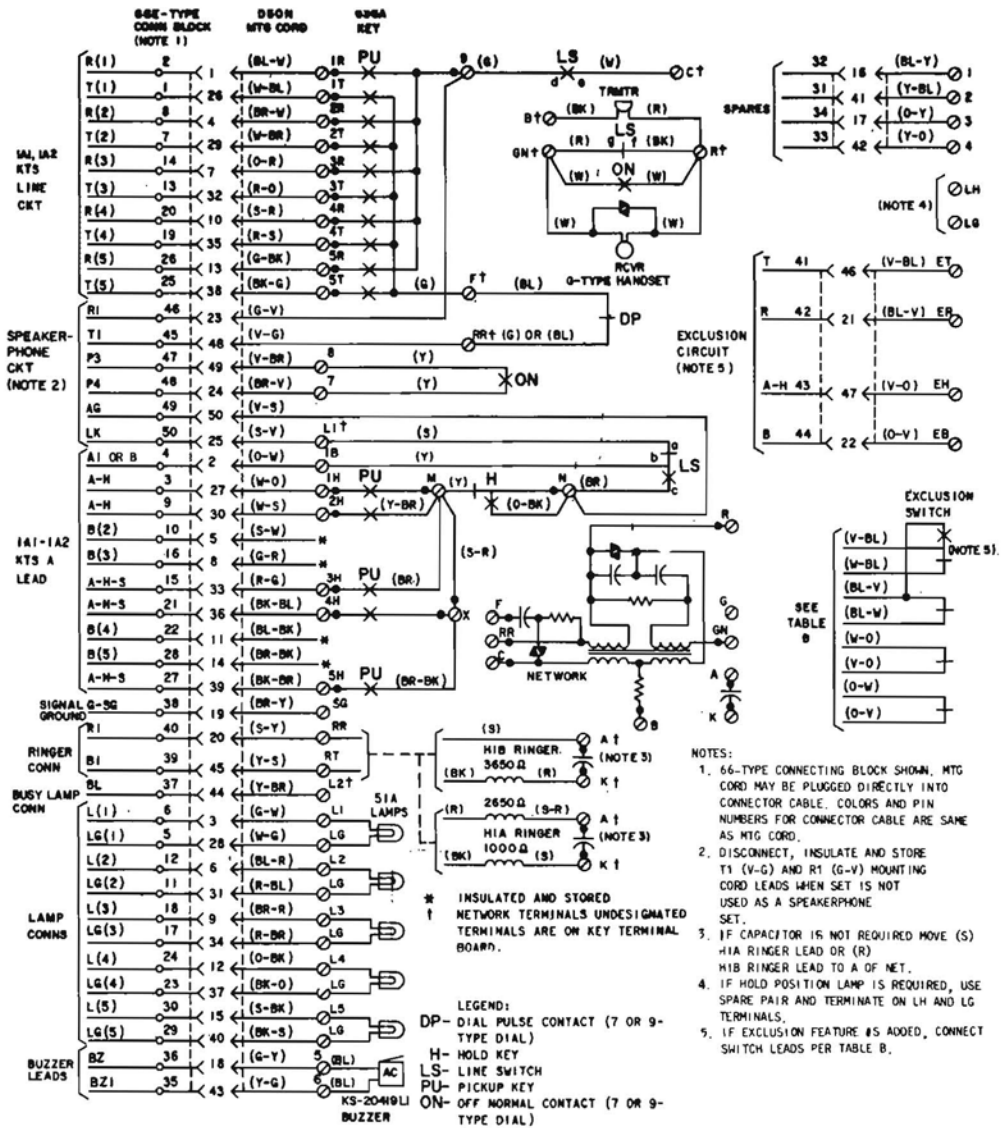


Fig. 1—565HK (MD) Telephone Set, Connections

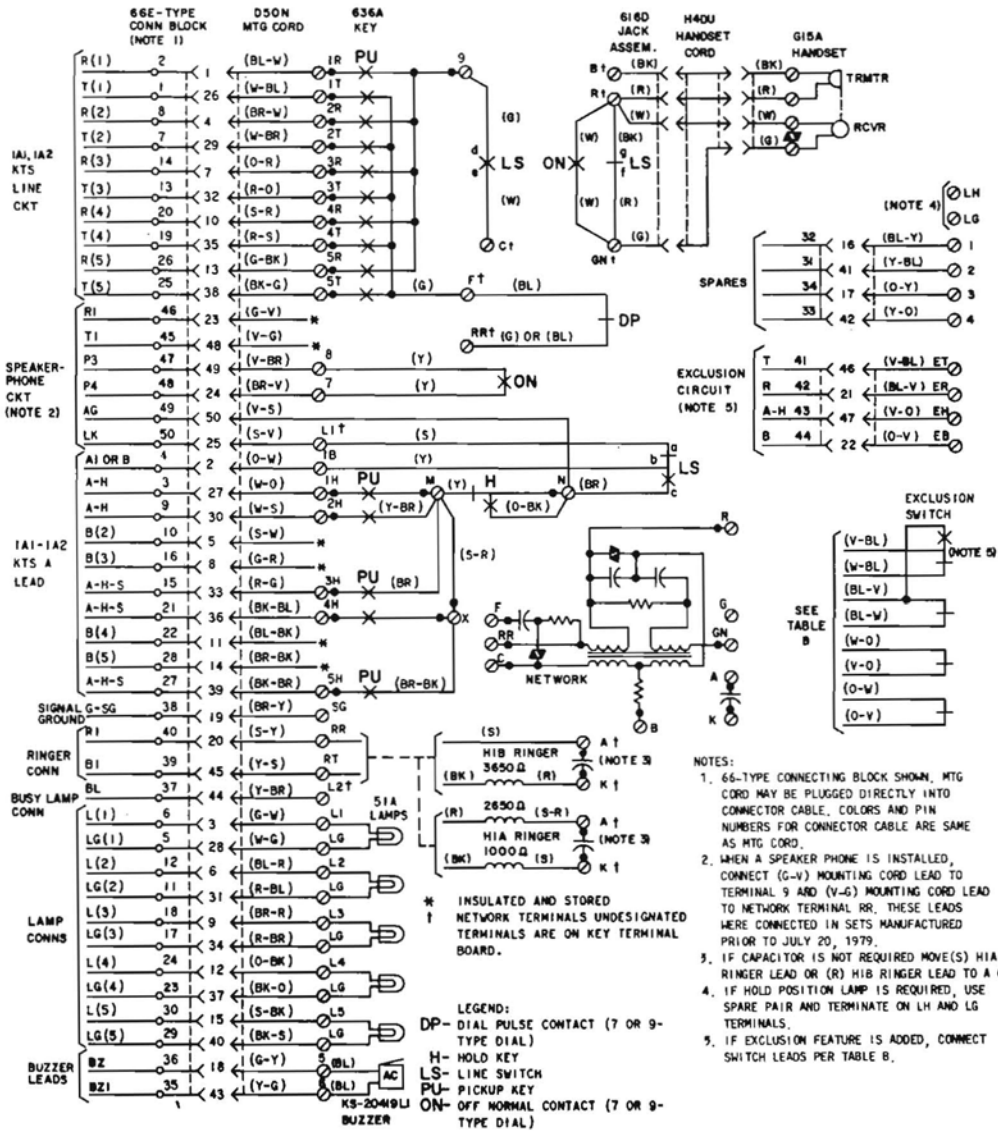


Fig. 2—565HKM (MD) Telephone Set (Manufactured After July 20, 1979), Connections



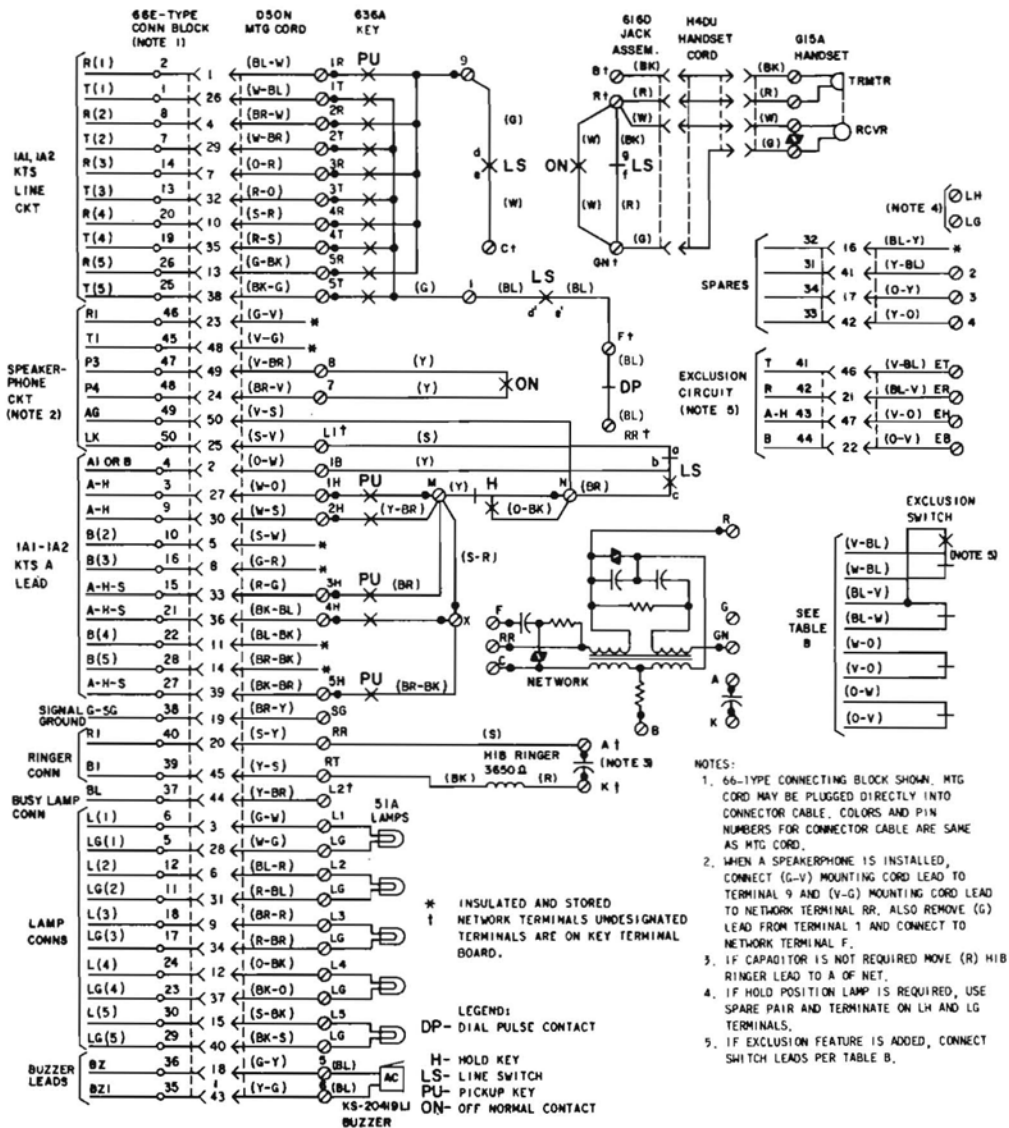
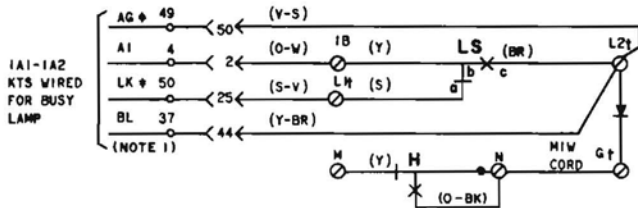
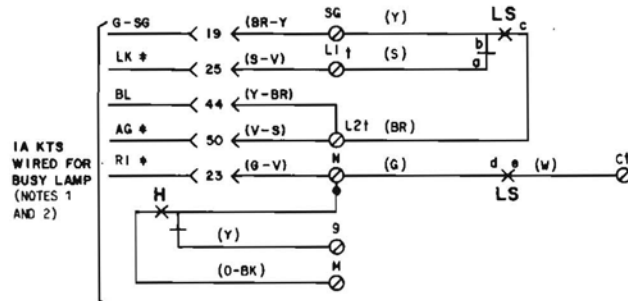


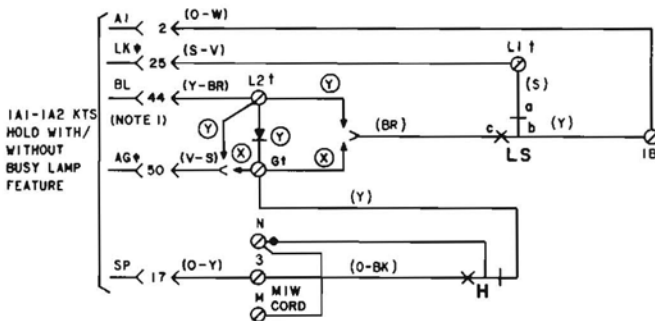
Fig. 3—565HKMS Telephone Set, Connections



STATION BUSY LAMP MODIFICATION IA1-IA2 KTS		
LEAD	FROM	TO
(BR)	N	L2†
(V-S)	N	L2†
533K DIODE (ORDERED SEPERATELY)		L2† TO G†
MIW CORD		N TO G†



STATION BUSY LAMP MODIFICATION IA KTS		
LEAD	FROM	TO
(Y)	1B	9G
(BR)	N	L2†
(V-S)	N	L2†
(G-V)	9	N
(Y)	M	9
(O-BK)	N	M



STATION BUSY LAMP I HOLD IA1-IA2 KTS			
	LEAD	FROM	TO
WITH BUSY LAMP	(BR)	N	L2†
	(V-S)	N	L2†
	533K DIODE (ORDERED SEPERATELY)		L2† TO G†
	(O-BK)	N	3
OPTION	(Y)	M	G†
	MIW CORD		N TO M
WITHOUT BUSY LAMP	(BR)	N	G†
	(V-S)	N	G†
	(O-BK)	N	3
	(Y)	M	G†
OPTION	MIW CORD		N TO M

NOTES:

- FOR ADDITIONAL CONNECTION INFORMATION ON STATION BUSY LAMP, REFER TO SECTION 502-110-100.
- FOR IA KTS WITHOUT BUSY LAMP, INSULATE AND STORE (Y-BR) 050N MTG CORD LEAD.

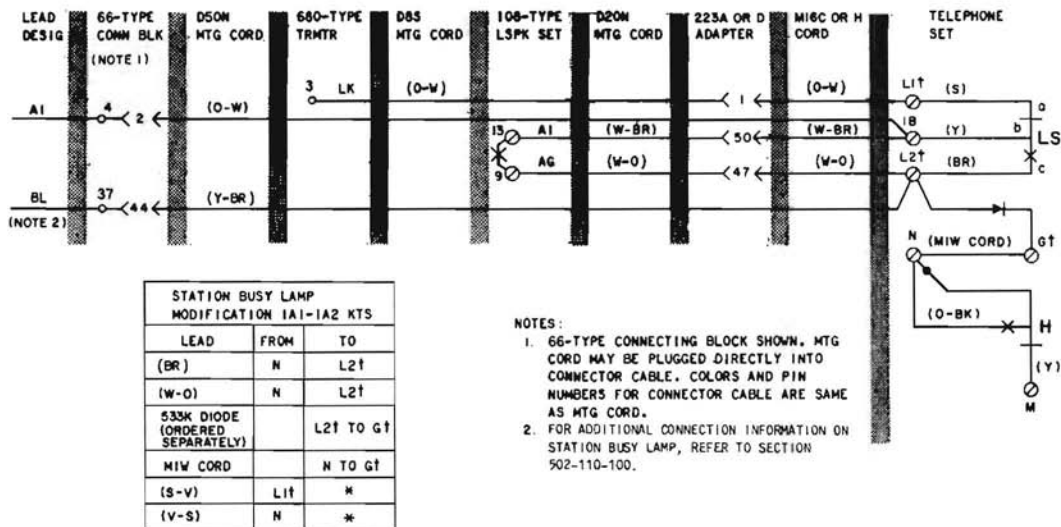
- NETWORK TERMINALS-UNDESIGNATED TERMINALS ARE ON KEY TERMINAL BOARD

♦ 3-TYPE SPEAKERPHONE LEAD

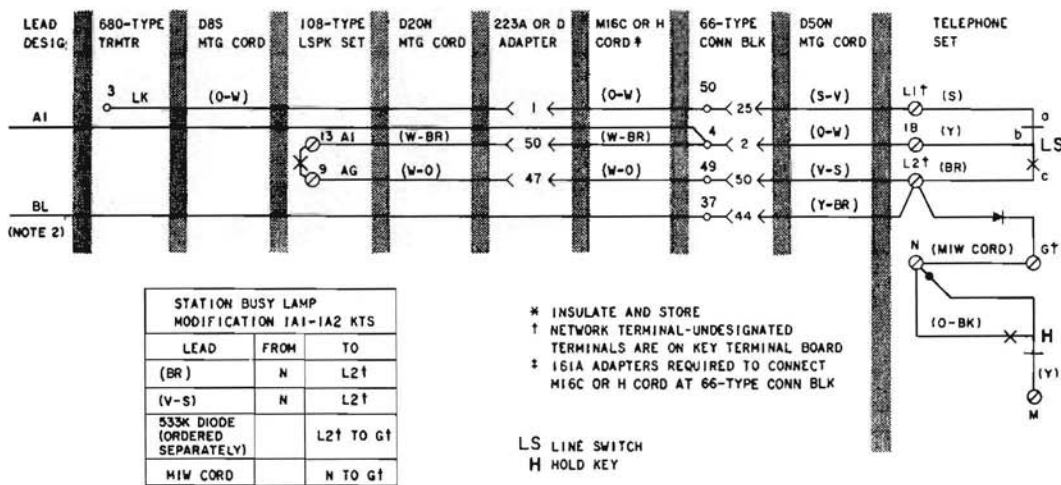
H-HOLD KEY

LS-LINE SWITCH

Fig. 4—Optional Features with 3-Type (MD) Speakerphone

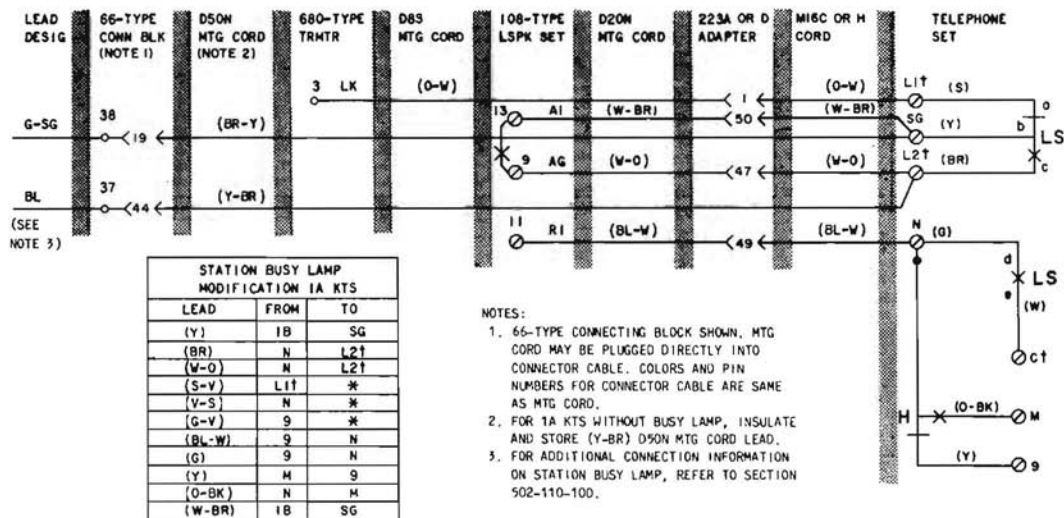


A. 1A1-1A2 KTS WIRED FOR BUSY LAMP WITH M16C OR H CORD TERMINATED IN TEL SET

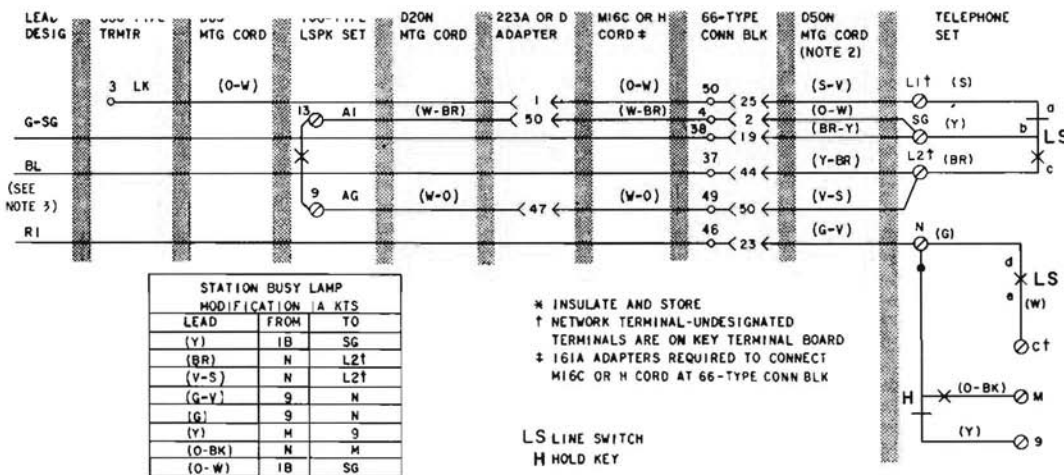


B. 1A1-1A2 KTS WIRED FOR BUSY LAMP WITH M16C OR H CORD TERMINATED AT 66-TYPE CONN BLK

Fig. 5—Optional Features with 4A Speakerphone (Sheet 1 of 3)†

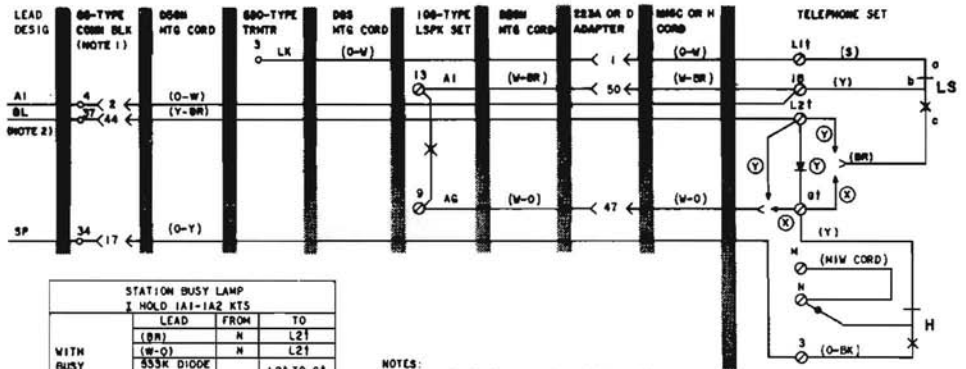


A. IA KTS WIRED FOR BUSY LAMP WITH M16C OR H CORD TERMINATED IN TEL SET



B. IA KTS WIRED FOR BUSY LAMP WITH M16C OR H CORD TERMINATED AT 66-TYPE CONN BLK

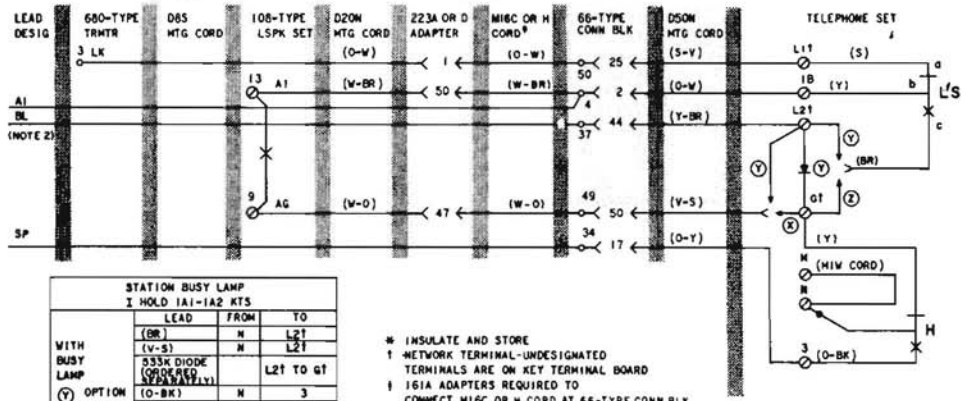
Fig. 5—Optional Features with 4A Speakerphone (Sheet 2 of 3)†



STATION BUSY LAMP I HOLD 1A1-1A2 KTS		LEAD	FROM	TO
WITH BUSY LAMP (Y) OPTION	(BR)	N	L2†	
	(W-O)	N	L2†	
	533K DIODE (ORDERED SEPARATELY)		L2† TO G†	
	(O-BK)	N	3	
	(Y)	M	G†	
WITHOUT BUSY LAMP (X) OPTION	M1W CORD		N TO M	
	(BR)	N	G†	
	(W-O)	N	G†	
WITH OR WITHOUT BUSY LAMP	(O-BK)	N	3	
	(Y)	M	G†	
	M1W CORD		N TO M	
(S-V)	L1†	N		
(V-S)	N	N		

- NOTES:
- 66-TYPE CONNECTING BLOCK SHOWN. MTG CORD MAY BE PLUGGED DIRECTLY INTO CONNECTOR CABLE. COLORS AND PIN NUMBERS FOR CONNECTOR CABLE ARE SAME AS MTG CORD.
  - FOR ADDITIONAL CONNECTION INFORMATION ON STATION BUSY LAMP, REFER TO SECTION 502-110-100.

A. 1A1-1A2 KTS WIRED FOR BUSY LAMP AND I HOLD WITH M16C OR H CORD TERMINATED IN TEL SET



STATION BUSY LAMP I HOLD 1A1-1A2 KTS		LEAD	FROM	TO
WITH BUSY LAMP (Y) OPTION	(BR)	N	L2†	
	(V-S)	N	L2†	
	533K DIODE (ORDERED SEPARATELY)		L2† TO G†	
	(O-BK)	N	3	
	(Y)	M	G†	
WITHOUT BUSY LAMP (X) OPTION	M1W CORD		N TO M	
	(BR)	N	G†	
	(V-S)	N	G†	
WITH OR WITHOUT BUSY LAMP	(O-BK)	N	3	
	(Y)	M	G†	
	M1W CORD		N TO M	

- \* INSULATE AND STORE  
 † NETWORK TERMINAL-UNDESIGNATED TERMINALS ARE ON KEY TERMINAL BOARD  
 ‡ 161A ADAPTERS REQUIRED TO CONNECT M16C OR H CORD AT 66-TYPE CONN BLK

LS LINE SWITCH  
 H HOLD KEY

B. 1A1-1A2 KTS WIRED FOR BUSY LAMP AND I HOLD WITH M16C OR H CORD TERMINATED AT 66-TYPE CONN BLK

Fig. 5—Optional Features with 4A Speakerphone (Sheet 3 of 3)†



## SERVICE

### 565LK, 565LKM, AND 565LKMS TELEPHONE SETS

### CONNECTIONS

#### 1. GENERAL

1.01 This section contains information for the 565LK (MD), 565LKM (MD), and 565LKMS telephone sets (Fig. 1 and 2).

1.02 Reissued to:

- Show 565LKM telephone set MD
- Show 3-type speakerphone MD
- Add information on 565LKMS telephone set
- Add information on 533K diode.

1.03 ♦The 565LKMS telephone set is similar to the 565LKM except a new line switch is provided to break both the tip and ring side of the line.♦

#### 2. CONNECTIONS

2.01 These sets are factory-wired for use with 1A1 or 1A2 KTS, 4A speakerphone, and individual or common line ringer.

2.02 When used with 1A KTS and optional features, modify set as shown in Fig. 3 or 4.

2.03 The hold key position can be illuminated, but 51A lamp is not furnished with set and must be ordered separately.

2.04 The 4th key position is convertible from line pickup (locking) to signaling (nonlocking) by removal of the 811218924 (P-12A892) screw detail. Arrange wiring as shown in Table A.

2.05 These telephone sets are factory-equipped with a KS-20419L1 (10 volt ac only) buzzer.

2.06 Cutoff of internal station ringer or buzzer can be made using the cutoff key on the 589AJ key. Arrange wiring as shown in Table B. To cutoff an external circuit, arrange wiring as shown in Table C.

2.07 The 565LK sets were furnished from the factory with H1A (MD) ringer; 565LKM and 565LKMS sets have H1B ringer.

2.08 A 812559623 (P-25E962) auxiliary terminal strip (ordered separately) is available for auxiliary services such as buzzers, lamps, etc.

2.09 A D-179935 Kit of Parts (ordered separately) can be installed in the set when the exclusion feature is required. Connections are made in accordance with Table D.

2.10 When a 565LK or 565LKM (manufactured prior to July 20, 1979) telephone set is not used as a speakerphone set and is multiplied with any other set furnishing speakerphone feature, the T1 (V-G) and R1 (G-V) speakerphone leads must be disconnected, insulated, and stored at the telephone set. If not disconnected, these speakerphone leads will provide a common path between the circuits of the multiplied telephone sets. Speakerphone connections are shown in Division 512.

2.11 Installation of optional items such as exclusion, auxiliary terminal strip, etc., and maintenance information common to 6-button sets can be found in Section 502-500-120.

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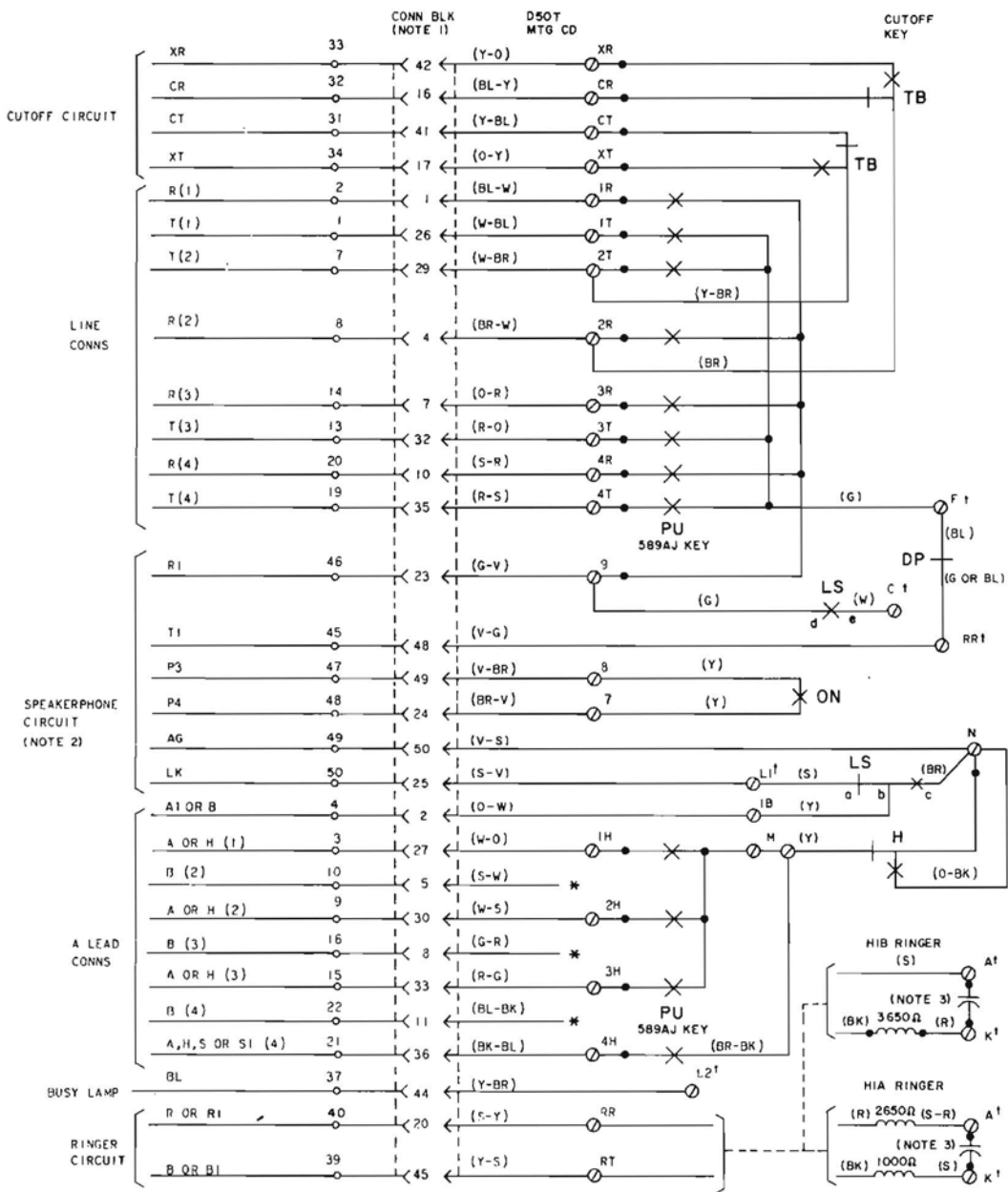
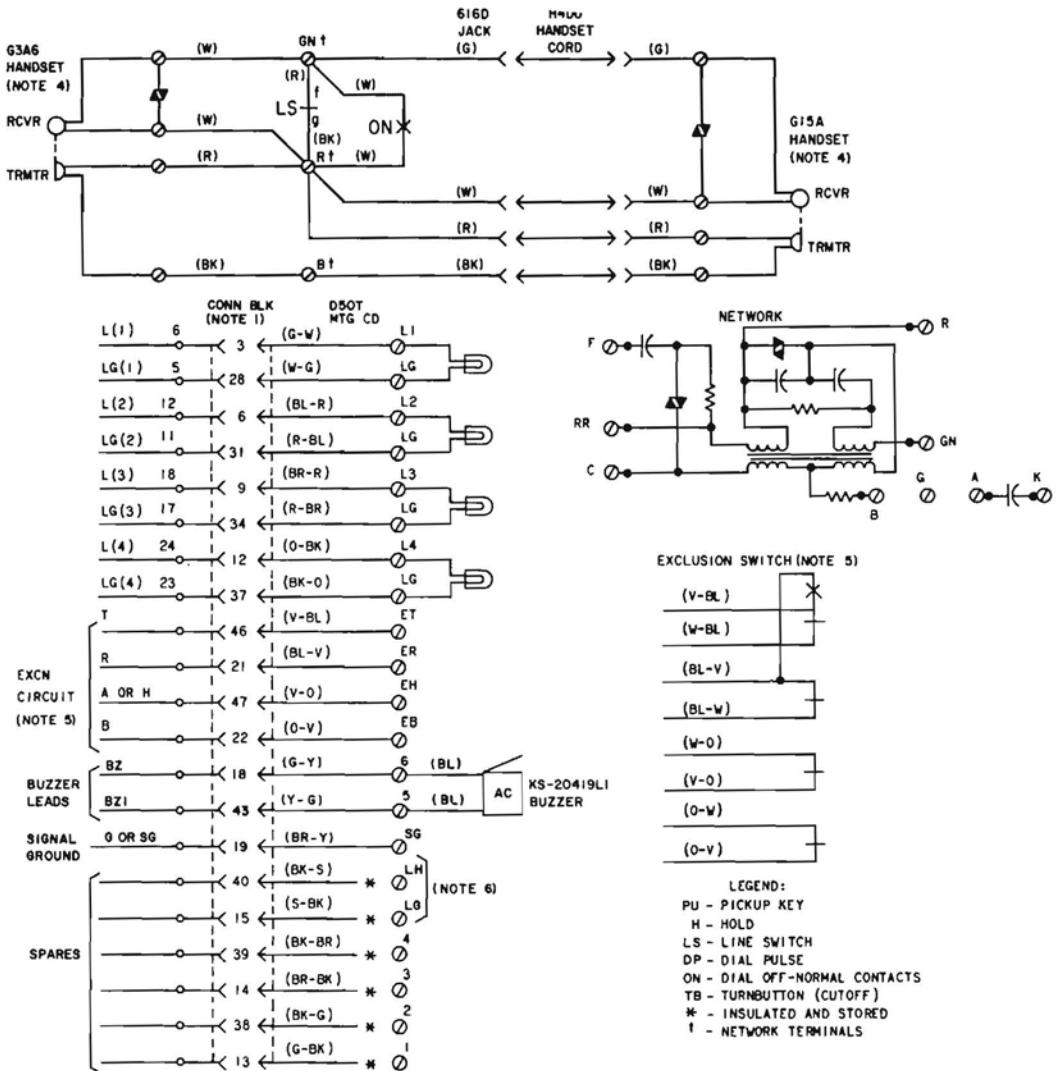


Fig. 1—565LK (MD) or 565LKM [(MD) Manufactured Prior to July 20, 1979] Telephone Set, Connections (Sheet 1 of 2)¶





- NOTES:
1. 66E-TYPE CONN BLK SHOWN. MTG CD MAY BE PLUGGED DIRECTLY INTO CONN CABLE. COLORS AND PIN NOS FOR CONN CA ARE SAME AS MTG CD.
  2. DISCONNECT, INSULATE AND STORE T1, (V-G) AND R1 (G-V) MOUNTING CORD LEADS WHEN SET IS NOT USED AS A SPEAKER-PHONE SET. THESE LEADS ARE INSULATED AND STORED IN 565LKM SETS MANUFACTURED AFTER JULY 20, 1979.
  3. IF CAPACITOR IS NOT REQUIRED IN RINGER CKT MOVE(S) H1A RINGER LEAD OR (R) H1B RINGER LEAD TO A OF NET
  4. 565LK SETS ARE EQUIPPED WITH G3A6 HANDSET AND CORD. 565LKM SETS ARE EQUIPPED WITH G15A HANDSET, H4DU HANDSET CORD, AND 616D JACK ASSEMBLY.
  5. IF EXCLUSION FEATURE IS ADDED, CONNECT SWITCH LEADS PER TABLE D.
  6. IF HOLD POSITION LAMP IS REQUIRED, USE SPARE PAIR AND TERMINATE ON LH AND LG TERMINALS.

Fig. 1—565LK (MD) or 565LKM ((MD) Manufactured Prior to July 20, 1979) Telephone Set, Connections (Sheet 2 of 2)

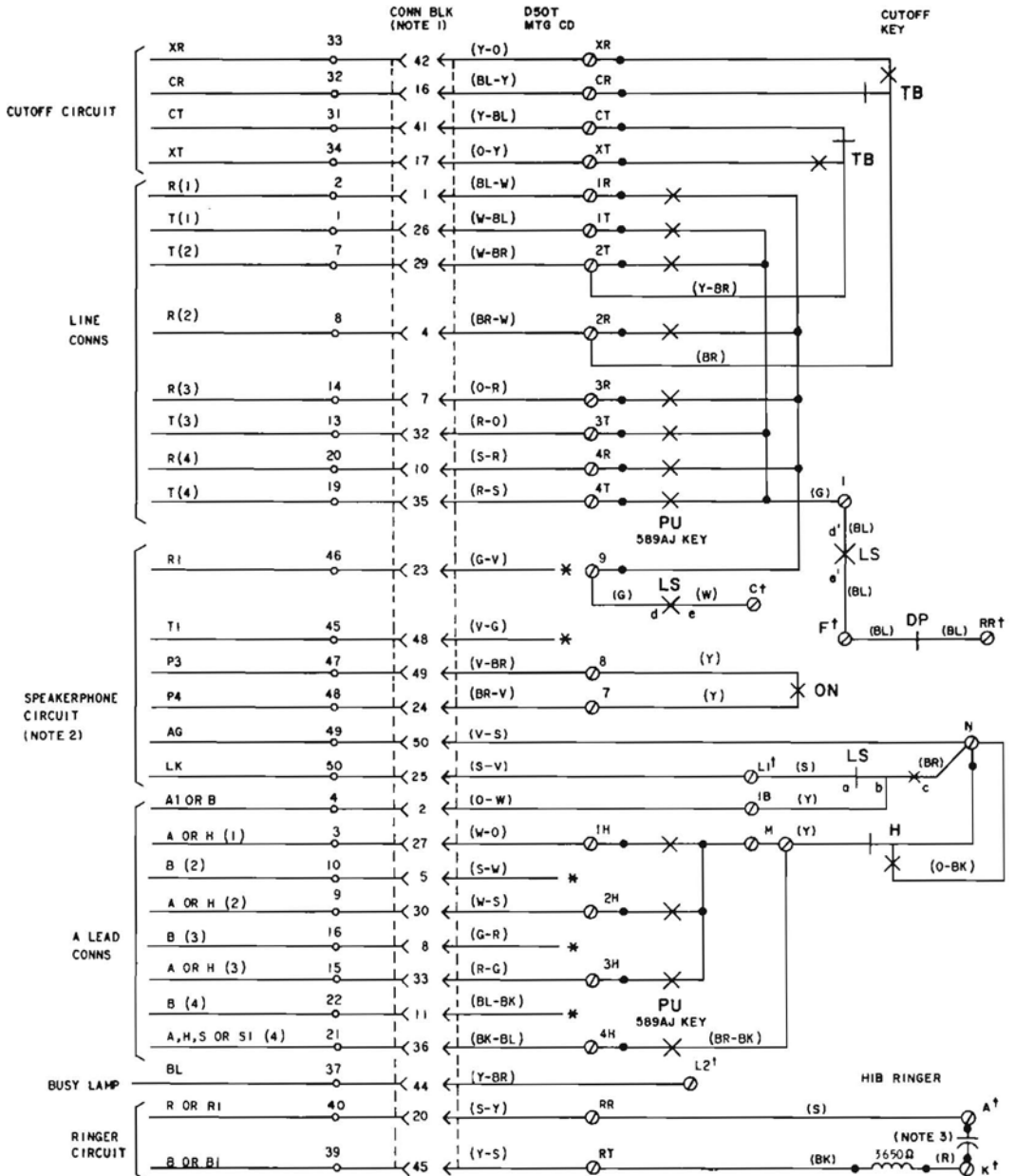


Fig. 2—565LKMS Telephone Set, Connections (Sheet 1 of 2)

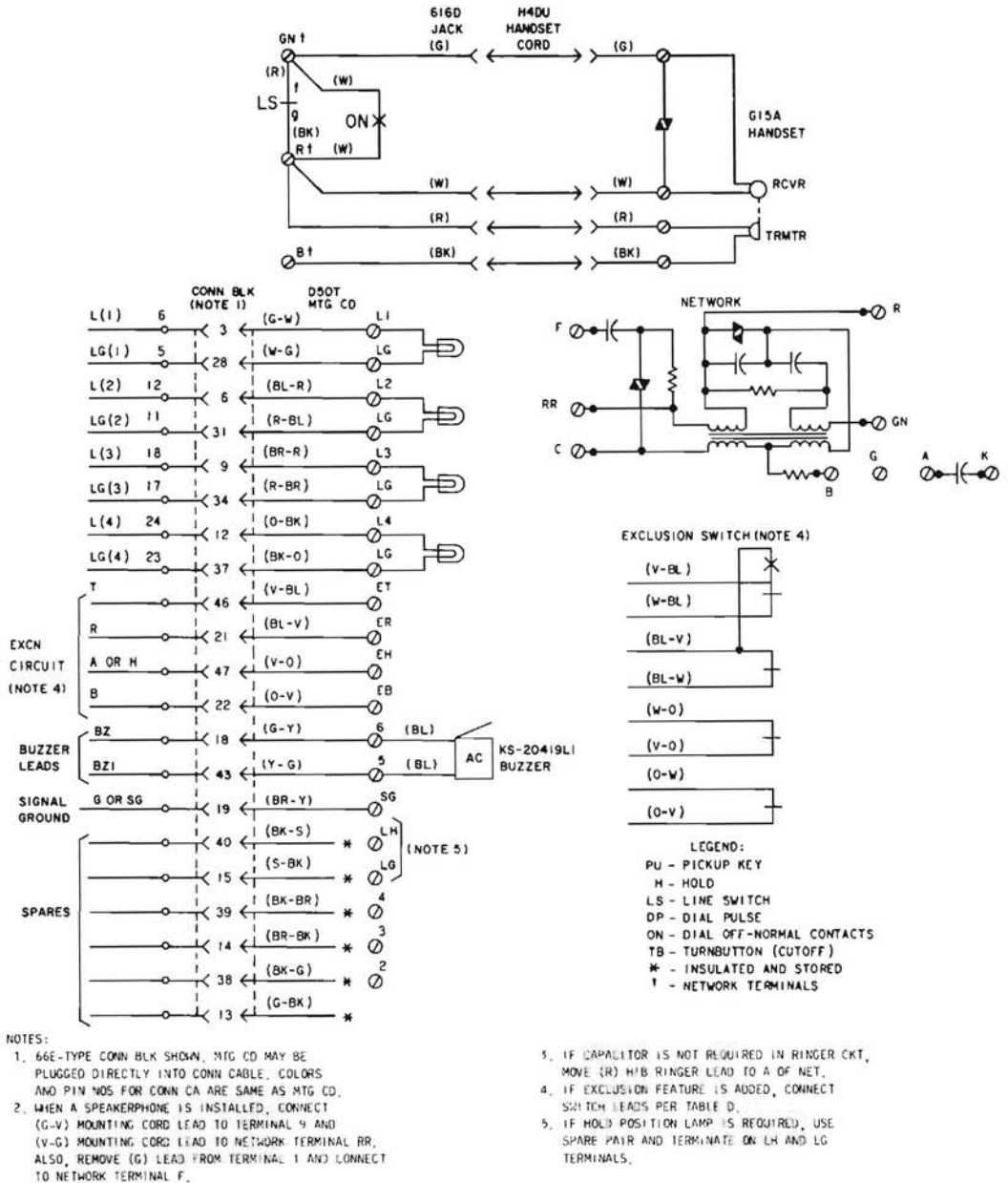
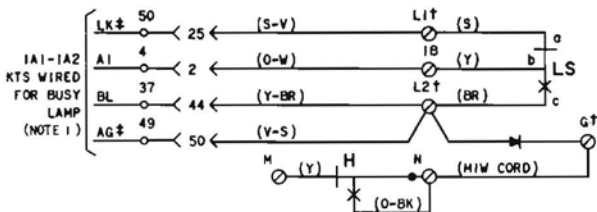
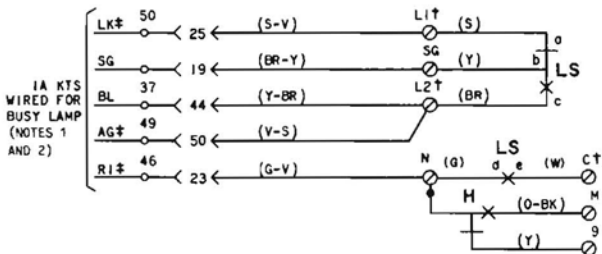


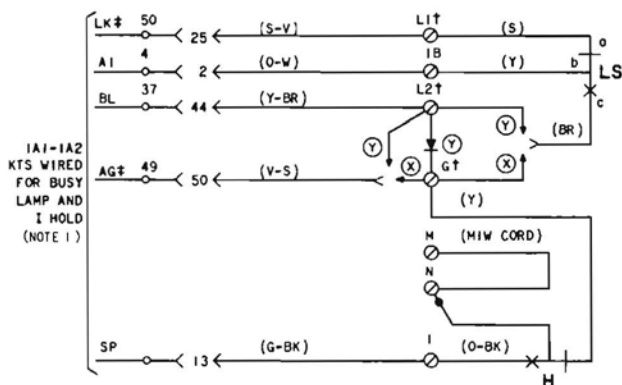
Fig. 2—565LKMS Telephone Set, Connections (Sheet 2 of 2)Ⓢ



MODIFICATION 1A1-1A2 KTS		
LEAD	FROM	TO
(BR)	N	L2†
(V-S)	N	L2†
533K DIODE (ORDERED SEPARATELY)		L2† TO G†
MIW CORD		G† TO N



MODIFICATION 1A KTS		
LEAD	FROM	TO
(Y)	IB	SG
(BR)	N	L2†
(V-S)	N	L2†
(G-V)	9	N
(G)	9	N
(Y)	M	9
(0-BK)	N	M

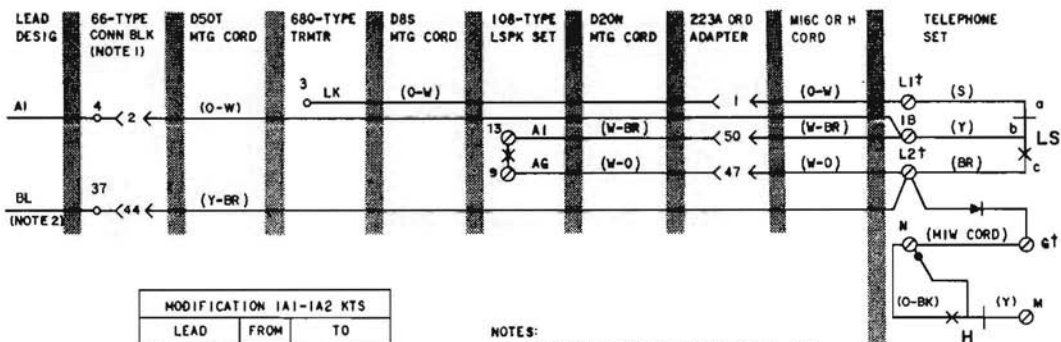


MODIFICATION 1A1-1A2 KTS STATION BUSY LAMP AND I HOLD			
	LEAD	FROM	TO
WITH BUSY LAMP Ⓢ OPTION	(BR)	N	L2†
	533K DIODE (ORDERED SEPARATELY)		L2† TO G†
	(V-S)	N	L2†
	(Y)	M	G†
	(0-BK)	N	I
	MIW CORD		N TO M
WITHOUT BUSY LAMP Ⓧ OPTION	(BR)	N	G†
	(V-S)	N	G†
	(Y)	M	G†
	(0-BK)	N	I
MIW CORD		N TO M	

- NOTES:
1. FOR ADDITIONAL CONNECTION INFORMATION ON STATION BUSY LAMP, REFER TO SECTION 502-110-100.
  2. FOR 1A KTS WITHOUT BUSY LAMP, INSULATE AND STORE (Y-BR) D50T MTG CORD LEAD.

† NETWORK TERMINAL—UNDESIGNATED  
TERMINALS ARE ON KEY TERMINAL BOARD  
‡ 3-TYPE SPEAKERPHONE LEAD  
LS - LINE SWITCH  
H - HOLD KEY

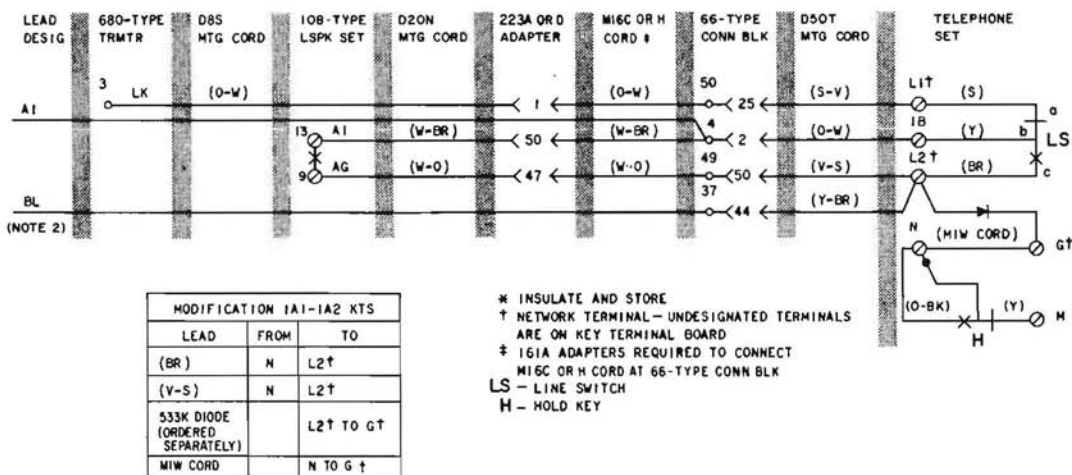
Fig. 3—Optional Features with 3-Type (MD) Speakerphone†



## NOTES:

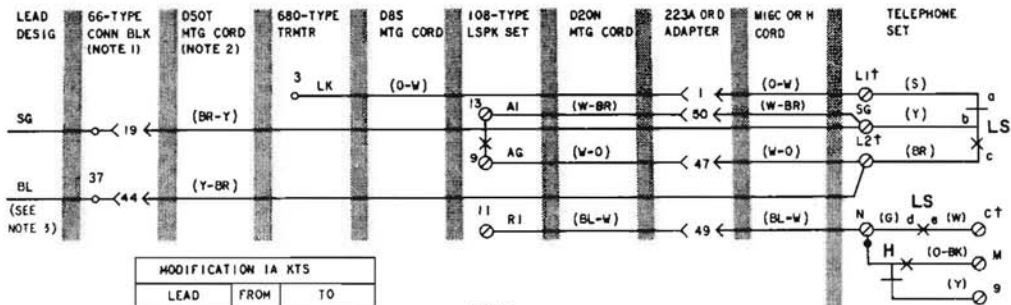
- 66-TYPE CONNECTING BLOCK SHOWN. MTG CORD MAY BE PLUGGED DIRECTLY INTO CONNECTOR CABLE. COLORS AND PIN NUMBERS FOR CONNECTOR CABLE ARE SAME AS MTG CORD.
- FOR ADDITIONAL CONNECTION INFORMATION ON STATION BUSY LAMP, REFER TO SECTION 502-110-100.

A. IA1-IA2 KTS WIRED FOR BUSY LAMP WITH M16C OR H CORD TERMINATED IN TEL SET



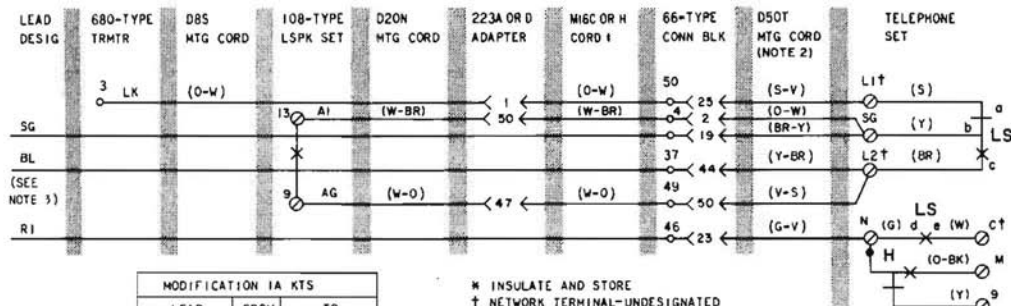
B. IA1-IA2 KTS WIRED FOR BUSY LAMP WITH M16C OR H CORD TERMINATED AT 66-TYPE CONN BLK

Fig. 4—Optional Features with 4A Speakerphone (Sheet 1 of 3)‡



- NOTES:
- 66-TYPE CONNECTING BLOCK SHOWN. MTG CORD MAY BE PLUGGED DIRECTLY INTO CONNECTOR CABLE. COLORS AND PIN NUMBERS FOR CONNECTOR CABLE ARE SAME AS MTG CORD.
  - FOR 1A KTS WITHOUT BUSY LAMP, INSULATE AND STORE (Y-BR) D50T MTG CORD LEAD.
  - FOR ADDITIONAL CONNECTION INFORMATION ON STATION BUSY LAMP, REFER TO SECTION 502-110-100.

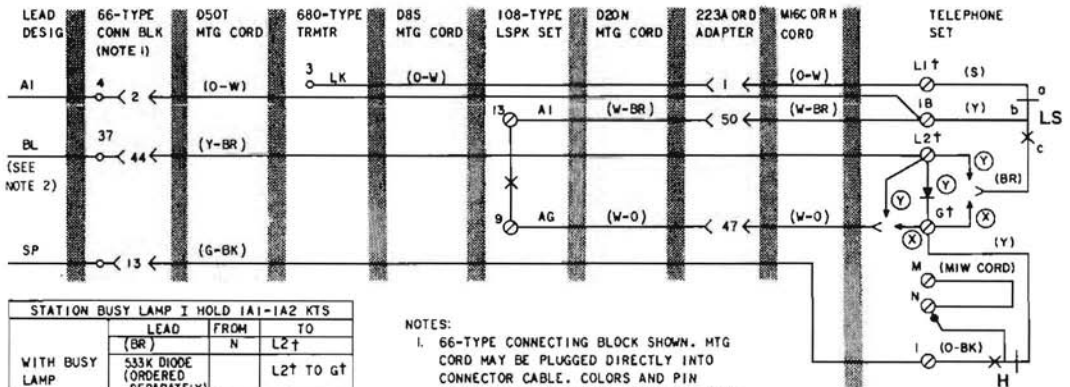
A. IA KTS WIRED FOR BUSY LAMP WITH M16C OR H CORD TERMINATED IN TEL SET



- \* INSULATE AND STORE  
 † NETWORK TERMINAL-UNDESIGNATED TERMINALS ARE ON KEY TERMINAL BOARD  
 ‡ 161A ADAPTERS REQUIRED TO CONNECT M16C OR H CORD AT CONN BLK  
 LS - LINE SWITCH  
 H - HOLD KEY

B. IA KTS WIRED FOR BUSY LAMP WITH M16C OR H CORD TERMINATED AT 66-TYPE CONN BLK

Fig. 4—Optional Features with 4A Speakerphone (Sheet 2 of 3)¶

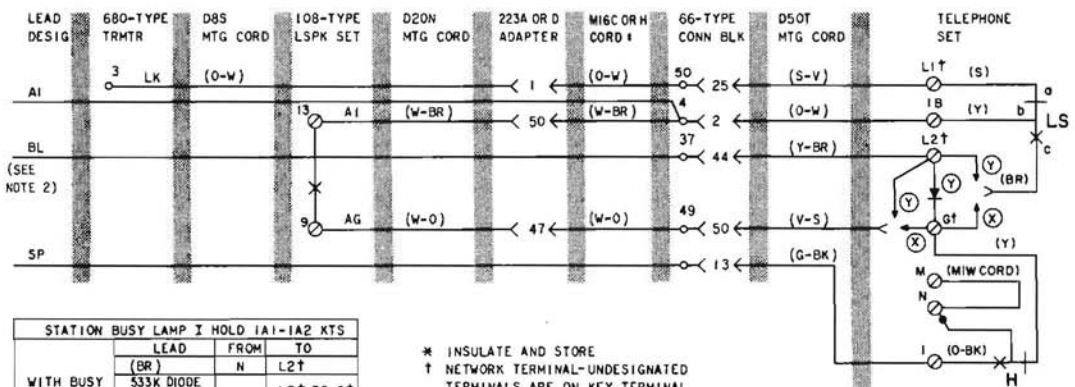


STATION BUSY LAMP I HOLD IA1-IA2 KTS			
	LEAD	FROM	TO
WITH BUSY LAMP (Y) OPTION	(BR)	N	L2†
	533K DIODE (ORDERED SEPARATELY)		L2† TO G†
	(W-0)	N	L2†
	(Y)	M	G†
	(O-BK)	N	I
WITHOUT BUSY LAMP (X) OPTION	M1W CORD	N TO M	
	(BR)	N	G†
	(W-0)	N	G†
	(Y)	M	G†
WITH OR WITHOUT BUSY LAMP	(O-BK)	N	I
	M1W CORD	N TO M	
	(S-V)	L1†	*
	(V-S)	N	*

## NOTES:

- 66-TYPE CONNECTING BLOCK SHOWN. MTG CORD MAY BE PLUGGED DIRECTLY INTO CONNECTOR CABLE. COLORS AND PIN NUMBERS FOR CONNECTOR CABLE ARE SAME AS MTG CORD.
- FOR ADDITIONAL CONNECTION INFORMATION ON STATION BUSY LAMP, REFER TO SECTION 502-110-100.

A. IA1-IA2 KTS WIRED FOR BUSY LAMP WITH M16C OR H CORD TERMINATED IN TEL SET



STATION BUSY LAMP I HOLD IA1-IA2 KTS			
	LEAD	FROM	TO
WITH BUSY LAMP (Y) OPTION	(BR)	N	L2†
	533K DIODE (ORDERED SEPARATELY)		L2† TO G†
	(V-S)	N	L2†
	(Y)	M	G†
	(O-BK)	N	I
WITHOUT BUSY LAMP (X) OPTION	M1W CORD	N TO M	
	(BR)	N	G†
	(V-S)	N	G†
	(Y)	M	G†
WITH OR WITHOUT BUSY LAMP	(O-BK)	N	I
	M1W CORD	N TO M	
	(S-V)	L1†	*
	(V-S)	N	*

- \* INSULATE AND STORE  
 † NETWORK TERMINAL-UNDESIGNATED TERMINALS ARE ON KEY TERMINAL BOARD  
 ‡ 161A ADAPTERS REQUIRED TO CONNECT M16C OR H CORD AT 66-TYPE CONN BLK

LS - LINE SWITCH  
 H - HOLD KEY

B. IA1-IA2 KTS WIRED FOR BUSY LAMP WITH M16C OR H CORD TERMINATED AT 66-TYPE CONN BLK

Fig. 4—Optional Features with 4A Speakerphone (Sheet 3 of 3)†

**TABLE A**  
**PICKUP-SIGNAL KEY CONVERSION**

CONVERTIBLE KEY OPTIONS	KEY LEAD (BR-BK)
HPPPPC	M
HPPPSC	SG

**TABLE B**  
**INTERNAL RINGER OR BUZZER CUTOFF**

CUTOFF		H1A RINGER LEADS				H1B RINGER LEADS			BUZZER LEADS		CUTOFF-KEY LEADS	
		R	BK	S	S-R	S †	BK	R	BL	BL	BR	Y-BR
Bridged Ringer On Any Line		CR	CT	K	A	CR ↔ A	CT	K			R*	T*
Common or Private Line Ringer or Buzzer	With Cap.	CR	CT	K	A	CR ↔ A	CR	K			RR	RT
	With- out Cap.	CR	CT	A	A	CR ↔ A	CT	A	CR	CT	RR	RT
Bridged Line Ringer When Used With Feature 1 On Table C		XR	XT	K	A	XR ↔ A	XT	K			R*	T*

\* Terminal of line involved.

† Move end of (S) strap connected to terminal RR only.



**TABLE C**  
**EXTERNAL CIRCUITS CUTOFF**

CUTOFF	CUTOFF-KEY LEADS	
	BR	Y-BR
Ring and Tip of Any Line	R*	T*
Head Receiver, Used as Listening-In Set	R†	GN†
Controlled 1A1, 1A2 Key Tel. Sys Sta	CT	XT

\* Terminal of line involved.

† Terminal on network.

**TABLE D**  
**EXCLUSION SWITCH CONNECTIONS**

EXCLUSION	KEY TEL SYS	EXCLUSION SWITCH LEADS							
		BL-W	W-BL	O-W	W-O	BL-V	V-BL	O-V	V-O
On any line	1A	R*	T*	1B†	H*	ER	ET	EB	EH
	1A1 or 1A2	R*	T*	EB	H*	ER	ET	EB	EH

\*Terminal of line to be excluded

† When other terminal involved is excluded on 1A KTS, disconnect, insulate, and store O-W mousing cord conductor from terminal 1B; connect balance lead conductor from line involved to 1B.



## SERVICE

### 2565GK AND 2565GKM TELEPHONE SETS

### CONNECTIONS

#### 1. GENERAL

- 1.01 This section contains information for the 2565GK (MD) and 2565GKM telephone sets.
- 1.02 This section is reissued to:
- Show 2565GK telephone set MD
  - Show 3-type speakerphone components MD
  - Update information, Fig. 1, 2, and 3
  - Change paragraph 2.05 to include lead designation and colors.
- 1.03 The 2565GKM modular set is similar to the 2565GK except the modular G15A handset with its associated H4DU handset cord and 616D jack assembly is used in place of the hard-wired G3A-type handset and cord.

#### 2. CONNECTIONS

- 2.01 These sets are factory-wired for use with 1A1 or 1A2 KTS, 3-type (MD) or 4A speakerphone, and individual or common line ringer. Hold feature is not provided.
- 2.02 When used with 1A KTS and speakerphone, modify sets as shown in Fig. 2.
- 2.03 Early model sets were furnished from the factory with H1A (MD) ringer, current models have H1B ringer. Provision is made for buzzer, ordered separately. Use spare pair and terminals to connect to equipment. When power failure feature is provided in the KTS, audible signal must be wired with capacitor in circuit.

2.04 If speakerphone (3-type) control unit MD is located near the telephone set, the mounting cord conductors can be extended to the control unit by using a 149-type adapter or 66E-type connecting block. If control unit is located at the key equipment, extend the leads through an A25B connector cable or inside wiring cable.

2.05 When a 2565GK (MD) or 2565GKM telephone set is not used as a speakerphone set and is multiplied with any other set furnishing speakerphone feature, speakerphone leads must be disconnected, insulated, and stored either at the telephone set or at the multiplying point. If not disconnected, the speakerphone leads will provide a common path between the circuits of the multiplied telephone sets. The leads to be removed are as follows: T1 (V-G), R1 (G-V), IT (V-BR), IR (BR-V), AG (V-S), and LK (S-V). Speakerphone connections are shown in Section 512-720-405.

- 2.06 Exclusion can be provided by the addition of a D-179935 Kit of Parts which must be ordered separately. Connect as shown in Table A.
- 2.07 Use an A20B connector cable when speakerphone and exclusion features are not provided.
- 2.08 When a polarity guard is required with these sets, install and connect as shown in Table B.
- 2.09 An 812559623 (P-25E962) terminal strip assembly is available when additional terminating points are required for auxiliary services such as buzzers, lamps, etc. Assembly must be ordered separately.
- 2.10 Installation instructions for the exclusion switch, polarity guard, and auxiliary terminal strip are given in Reference Section 502-500-120.

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**SECTION 502-543-403**

**2.11** All convertible key positions are supplied as pickup keys. To convert from pickup (locking) to signaling (nonlocking), remove the screw detail from key positions involved. Make necessary wiring changes as shown in Table C.



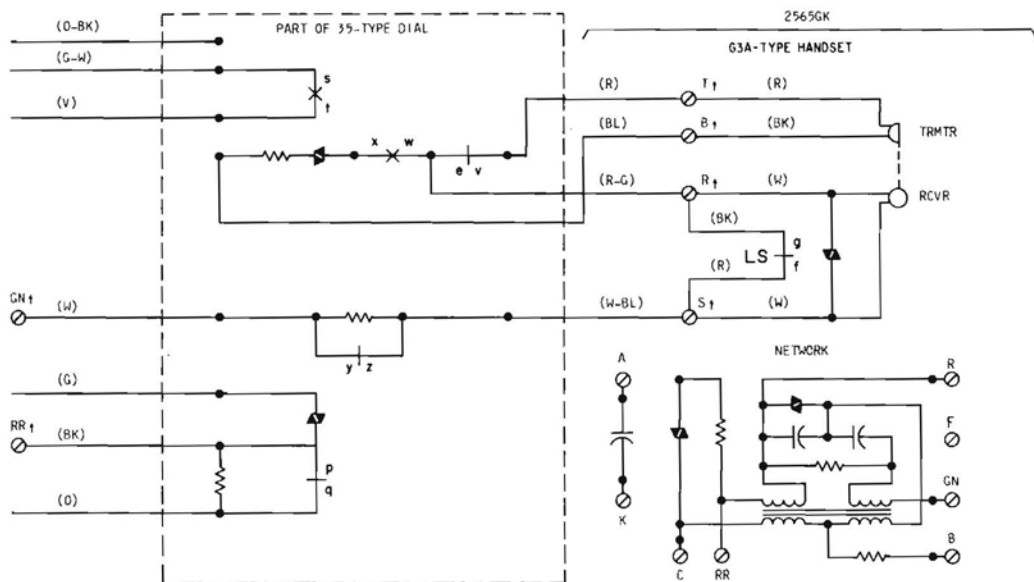
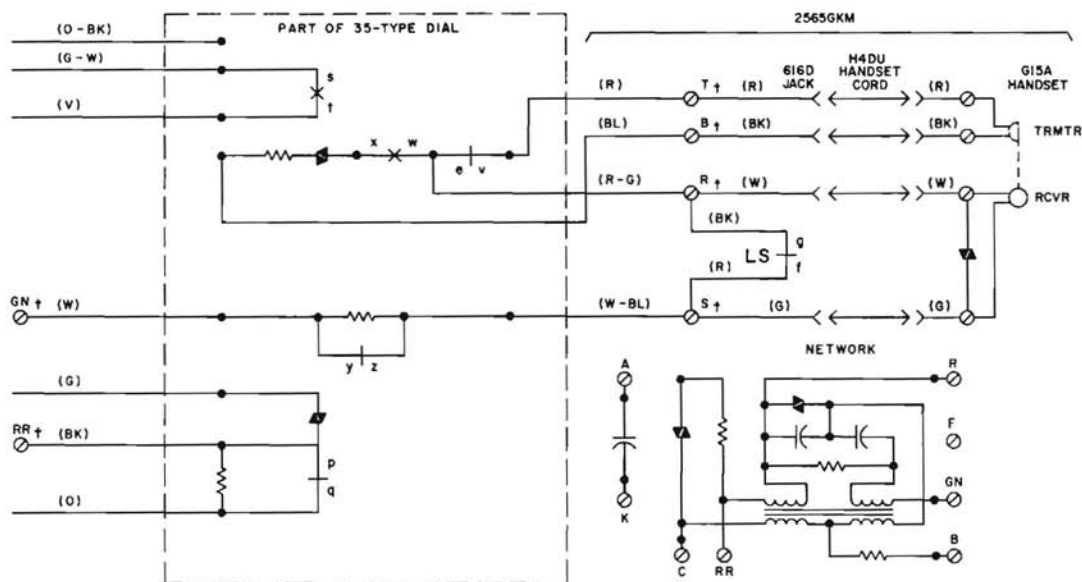


Fig. 1—2565GK (MD) or 2565GKM Telephone Set, Factory-Wired for 1A1 or 1A2 KTS and Speakerphone Connections (Sheet 2 of 3)



## NOTES:

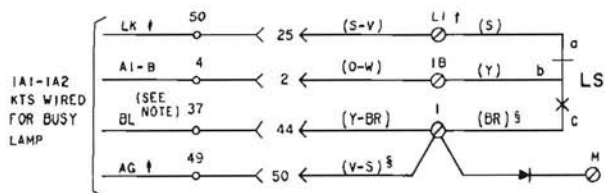
- 66E-TYPE CONNECTING BLOCK SHOWN. MOUNTING CORD MAY BE PLUGGED DIRECTLY INTO CONNECTOR CABLE. COLORS AND PIN NUMBERS FOR CONNECTOR CABLE ARE SAME AS MOUNTING CORD.
- AUXILIARY BUZZER MAY BE INSTALLED. USE SPARE LEADS AND TERMINALS TO CONNECT TO EQUIPMENT.
- IF EXCLUSION FEATURE IS ADDED, CONNECT SWITCH LEADS PER TABLE A.
- DISCONNECT T1, R1, IT, IR, AG, AND LK LEADS WHEN SETS NOT EQUIPPED WITH 3-TYPE (M) SPEAKERPHONE ARE MULTIPLIED. DISCONNECT AT THE SET.
- FOR BRIDGED RINGER ON ANY LINE USING H1A RINGER, CONNECT (R) RINGER LEAD TO RING AND (BK) RINGER LEAD TO TIP OF LINE INVOLVED. FOR BRIDGED RINGER ON ANY LINE USING H1B RINGER, REMOVE (S) STRAP LEAD FROM RR (KEY TERMINAL BOARD) AND CONNECT TO RING AND (BK) RINGER LEAD TO TIP OF LINE INVOLVED.
- IF CAPACITOR IS NOT REQUIRED IN RINGER CIRCUIT, MOVE (S) RINGER LEAD TO A OF NETWORK FOR H1A RINGER AND (R) RINGER LEAD TO A OF NETWORK FOR H1B RINGER.
- TO SILENCE RINGER PERMANENTLY, REFER TO APPROPRIATE SECTION IN DIVISION 501.
- TO PREVENT A FALSE HOLD CONDITION WHEN GOING ON HOOK THE TIP AND RING LINE SWITCH CONTACTS MUST BREAK BEFORE "A" LEAD CONTACTS BREAK.
- USE AN 120B CONNECTOR CABLE WHEN SPEAKERPHONE AND EXCLUSION FEATURES ARE NOT PROVIDED.

LS- LINE SWITCH

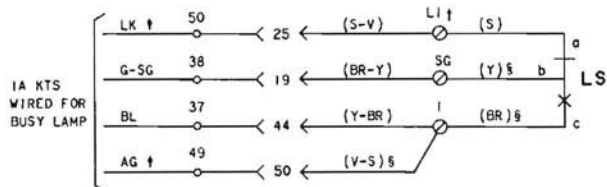
PU- PICKUP KEY

† - NETWORK TERMINAL, UNDESIGNATED TERMINALS ARE ON KEY TERMINAL BOARD.

Fig. 1—2565GK (MD) or 2565GKM Telephone Set, Factory-Wired for 1A1 or 1A2 KTS and Speakerphone Connections (Sheet 3 of 3)¶



MODIFICATION IA1-IA2 KTS		
LEAD	FROM	TO
(BR)	M	I
(V-S)	M	I
KS-15724LI DIODE		I TO M



MODIFICATION IA KTS		
LEAD	FROM	TO
(Y)	IB	SG
(BR)	M	I
(V-S)	M	I

## NOTE:

USE "B" BATTERY SUPPLY FROM KTS IF AVAILABLE. DO NOT USE 10V AC LAMP BATTERY FOR BUSY LAMP.

† NETWORK TERMINAL, UNDESIGNATED TERMINALS ARE ON KEY TERMINAL BOARD.

‡ 3-TYPE (MD) SPEAKERPHONE LEAD

§ LEADS INVOLVED IN MODIFICATION

LS - LINE SWITCH

Fig. 2—Station Busy Lamp Circuit with 3-Type (MD) Speakerphone



**TABLE A**  
**EXCLUSION KEY CONNECTIONS**

EXCLUSION	KEY TEL SYS	EXCLUSION KEY LEADS							
		BL-W	W-BL	O-W	W-O	BL-V	V-BL	O-V	V-O
On any line	1A	R*	T*	1B†	H*	ER	ET	EB	EH
	1A1 or 1A2	R*	T*	EB	H*	ER	ET	EB	EH

\* Terminal of line involved.

† When other than line 1 is excluded on 1A KTS, disconnect, insulate, and store O-W mounting cord conductor from terminal 1B; connect balance lead conductor from line involved to 1B.

**Note:** If exclusion feature is used, remove all B leads except one being used from key terminal board; insulate and store.

**TABLE B**  
**POLARITY GUARD CONNECTIONS**  
(819040528 OR P-90D052 GUARD ASSEMBLY)

LEAD		REMOVE FROM		CONNECT TO	
		NET.		NET.	POLARITY GUARD
Dial	BK G-W	RR C			T S
Line Switch	W	C			S
Polarity Guard	G W		RR C		

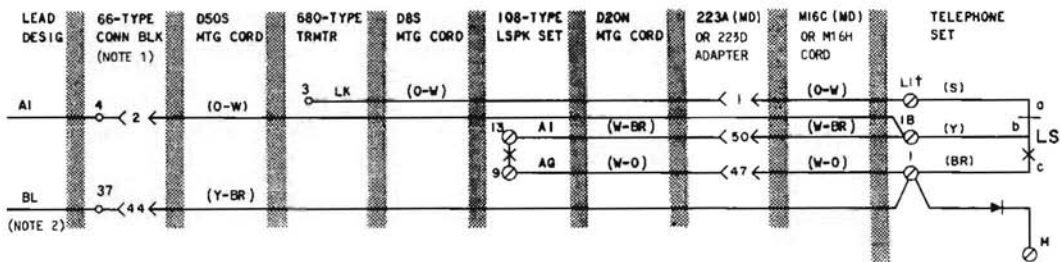
**TABLE C**  
**PICKUP-SIGNAL KEY CONVERSION**

KEY TEL SET	CONVERSION OPTIONS (NOTE)	636B KEY LEADS		
		(BR)	(Y)	(BR-BK)
2565GK (MD) or 2565GKM	PPPPPP	M	M	M
	PPPPPS	M	M	SG
	PPPPSS	M	SG	SG
	PPPSSS	SG	SG	SG
	PPPPP*S*	M	6H	†
	PPPP*P*S*	6H	6H	†

**Note:** To convert from pickup (locking) to signal (nonlocking), remove 811218924 (P-12A892) screw from the plunger at key position being converted.

\* These arrangements use line switch controlled ground for common signal key used with private or intercommunicating lines. Common signal should be used to operate a common signal relay. Do not wire directly to a buzzer.

† Connect with the (BR) line switch lead using the terminal shown for proper option and KTS required.

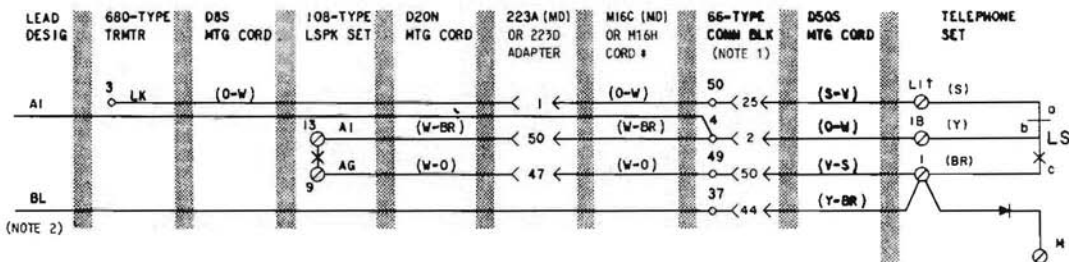


MODIFICATION 1A1-1A2 KTS		
LEAD	FROM	TO
(BR)	M	I
(W-O)	M	I
KS-15724L1 DIODE		I TO M
(S-V)	LIT†	*
(V-S)	M	*

NOTES:

- 66-TYPE CONNECTING BLOCK SHOWN. MTG CORD MAY BE PLUGGED DIRECTLY INTO CONNECTOR CABLE. COLORS AND PIN NUMBERS FOR CONNECTOR CABLE ARE SAME AS MTG CORD.
- USE "B" BATTERY SUPPLY FROM KTS IF AVAILABLE. DO NOT USE 10V AC LAMP BATTERY FOR BUSY LAMP.

A. 1A1-1A2 KTS WIRED FOR BUSY LAMP WITH M16C (MD) OR M16H CORD TERMINATED IN TEL SET



MODIFICATION 1A1-1A2 KTS		
LEAD	FROM	TO
(BR)	M	I
(V-S)	M	I
KS-15724L1 DIODE		I TO M

\* INSULATE AND STORE

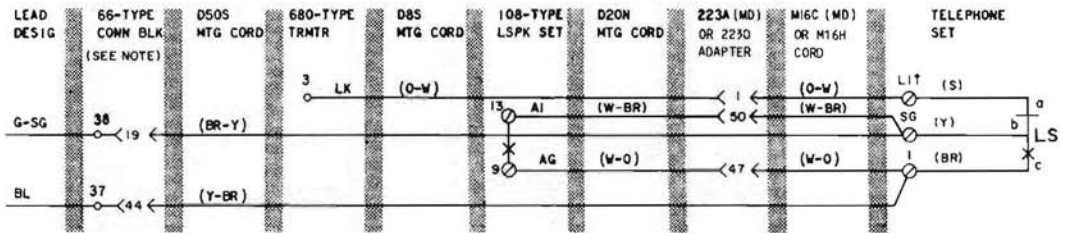
† NETWORK TERMINAL UNDESIGNATED TERMINALS ARE ON KEY TERMINAL BOARD

‡ 161A ADAPTERS REQUIRED TO CONNECT M16C (MD) OR M16H CORD AT 66-TYPE CONN BLK

LS LINE SWITCH

B. 1A1-1A2 KTS WIRED FOR BUSY LAMP WITH M16C (MD) OR M16H CORD TERMINATED AT 66-TYPE CONN BLK

Fig. 3—Station Busy Lamp Circuit with 4A Speakerphone (Sheet 1 of 2)

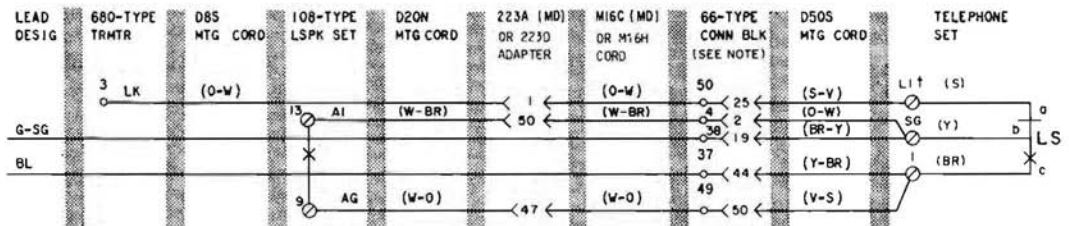


MODIFICATION IA KTS		
LEAD	FROM	TO
(Y)	IB	SG
(BR)	M	I
(W-0)	M	I
(S-V)	LIT	*
(V-S)	M	*
(W-BR)	IB	SG

## NOTE:

66-TYPE CONNECTING BLOCK SHOWN. MTG CORD MAY BE PLUGGED DIRECTLY INTO CONNECTOR CABLE. COLORS AND PIN NUMBERS FOR CONNECTOR CABLE ARE SAME AS MTG CORD.

A. IA KTS WIRED FOR BUSY LAMP WITH M16C (MD) OR M16H CORD TERMINATED IN TEL SET



MODIFICATION IA KTS		
LEAD	FROM	TO
(Y)	IB	SG
(BR)	M	I
(V-S)	M	I
(O-W)	IB	SG

\* INSULATE AND STORE  
 † NETWORK TERMINAL. UNDESIGNATED TERMINALS ARE ON KEY TERMINAL BOARD  
 ‡ 161A ADAPTERS REQUIRED TO CONNECT M16C (MD) OR M16H CORD AT 66-TYPE CONN BLK  
 LS LINE SWITCH

B. IA KTS WIRED FOR BUSY LAMP WITH M16C (MD) OR M16H CORD TERMINATED AT 66-TYPE CONN BLK

Fig. 3—Station Busy Lamp Circuit with 4A Speakerphone (Sheet 2 of 2)



## SERVICE

### 2565HK, 2565HKM, AND 2565HKMS TELEPHONE SETS

### CONNECTIONS

#### 1. GENERAL

1.01 This section contains information for the 2565HK (MD), 2565HKM (MD), and 2565HKMS telephone sets (Fig. 1 and 2).

1.02 Reissued to:

- Show 2565HKM telephone set MD
- Show 3-type speakerphone MD
- Add information on 2565HKMS telephone set
- Add information on 533K diode.

1.03 ♦The 2565HKMS set is similar to the 2565HKM except a new line switch is provided in the 2565HKMS telephone set which breaks both the tip and ring side of the line.♦

#### 2. CONNECTIONS

2.01 These sets are factory-wired for use with 1A1 or 1A2 key telephone systems (KTS), 4A speakerphone, and individual or common line ringer. They can be used with 1A KTS by modifying as shown in Fig. 3 and 4.

2.02 Mounting cord leads are provided for illuminating the hold key position but 51A lamp is not furnished with set and must be ordered separately.

2.03 These sets are factory-equipped with a KS-20419L1 (10 volt ac only) buzzer.

2.04 The H1B ringer leads are factory-wired to terminals RR and RT. When power failure

feature is provided in the KTS, common audible signal must be wired with capacitor in series.

2.05 If 3-type (MD) speakerphone control unit is located near telephone set, the necessary mounting cord conductors can be extended to the control unit using a 149-type adapter or 66E-type connecting block. If control unit is located at key equipment, extend leads through A25B connector cable or inside wiring cable. Speakerphone connections for the 2565-type telephone sets are shown in Division 512.

2.06 When a 2565HK or 2565HKM (manufactured prior to July 20, 1979) telephone set is not used as a speakerphone set and is multiplied with any other set capable of furnishing speakerphone feature, the T1 (V-G) and R1 (G-V) speakerphone leads must be disconnected, insulated and stored at the telephone set. If not disconnected, these speakerphone leads will provide a common path between the circuits of the multiplied telephone sets. Speakerphone, connections are shown in Division 512.

2.07 Exclusion can be added to these sets by installing a D-179935 Kit of Parts which must be ordered separately. Connect as shown in Table A. Exclusion key can also be used to cut off a ringer or buzzer in set.

2.08 All convertible key positions are supplied as pickup keys. To convert from pickup (locking) to signaling (nonlocking), remove the 811218924 (P-12A892) screw detail from key position involved. Make necessary wiring changes as shown in Table B.

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**SECTION 502-543-405**

**2.09** When polarity guard is required in these sets, connect guard assembly as shown in Table C.

**2.10** Additional terminating points can be gained when required for auxiliary services such

as buzzers, lamps, etc. by installing 812559623 (P-25E962) terminal strip assembly.

**2.11** Installation of exclusion switch, polarity guard, and auxiliary terminal strip is covered in Section 502-500-120.



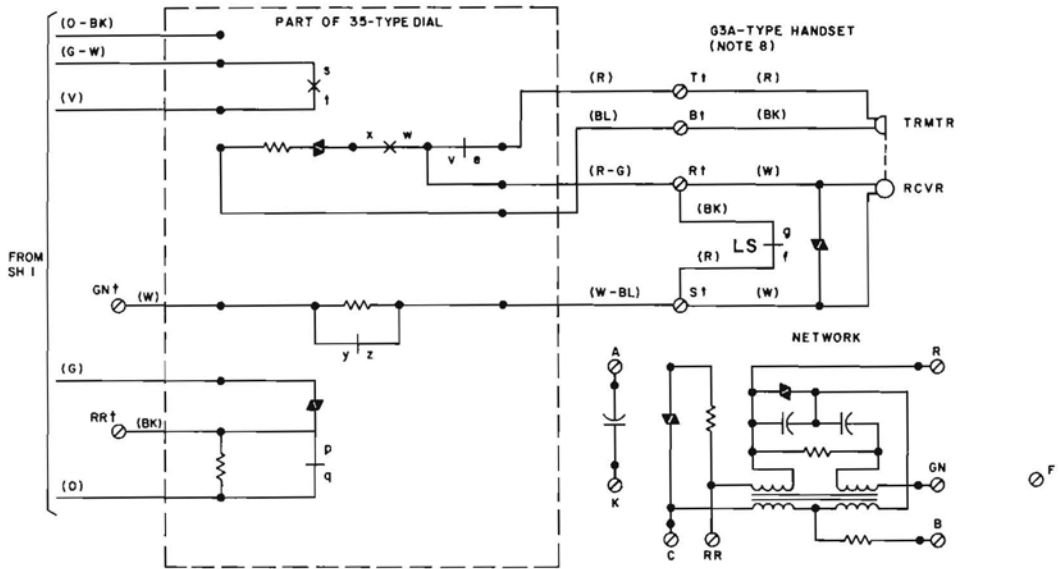
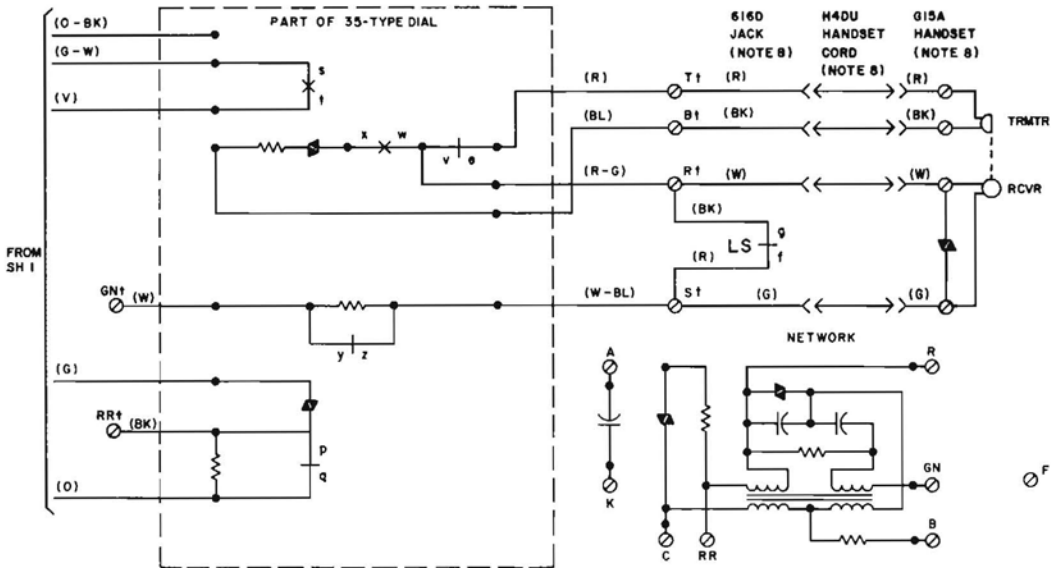


Fig. 1—2565HK (MD) or 2565HKM [(MD) Manufactured Prior to July 20, 1979] Telephone Set, Connections (Sheet 2 of 3)





NOTES:

1. 66E-TYPE CONNECTING BLOCK SHOWN. MOUNTING CORD MAY BE PLUGGED DIRECTLY INTO CONNECTOR CABLE. COLORS AND PIN NUMBERS FOR CONNECTOR CABLE ARE SAME AS MOUNTING CORD.
2. IF EXCLUSION FEATURE IS ADDED, CONNECT SWITCH LEADS PER TABLE A.
3. DISCONNECT, INSULATE AND STORE T1(V-G) AND R1(G-V) MOUNTING CORD LEADS WHEN SET IS NOT USED AS A SPEAKERPHONE SET. THESE LEADS ARE INSULATED AND STORED IN 2565HKM SETS MANUFACTURED AFTER JULY 20, 1979.
4. FOR BRIDGED RINGER ON ANY LINE USING H1A RINGER, CONNECT (R) RINGER LEAD TO RING AND (BK) RINGER LEAD TO TIP OF LINE INVOLVED. FOR BRIDGED RINGER ON ANY LINE USING H1B RINGER, REMOVE (S) STRAP LEAD FROM RR (KEY TERMINAL BOARD) AND CONNECT TO RING AND (BK) RINGER LEAD TO TIP OF LINE INVOLVED.
5. IF CAPACITOR IS NOT REQUIRED IN RINGER CIRCUIT, MOVE (S) RINGER LEAD TO A OF NETWORK FOR H1A RINGER AND (R) RINGER LEAD TO A OF NETWORK FOR H1B RINGER.
6. TO SILENCE RINGER PERMANENTLY REFER TO SECTION 501-254-100.
7. IF HOLD POSITION LAMP IS REQUIRED, USE SPARE PAIR AND TERMINATE ON LH AND LG TERMINALS.
8. 2565HK SETS ARE EQUIPPED WITH G3-TYPE HANDSET AND CORD. 2565HKM SETS ARE EQUIPPED WITH G15A HANDSET, H4DU HANDSET CORD, AND 616D JACK ASSEMBLY.

PU - PICKUP KEY

H - HOLD KEY

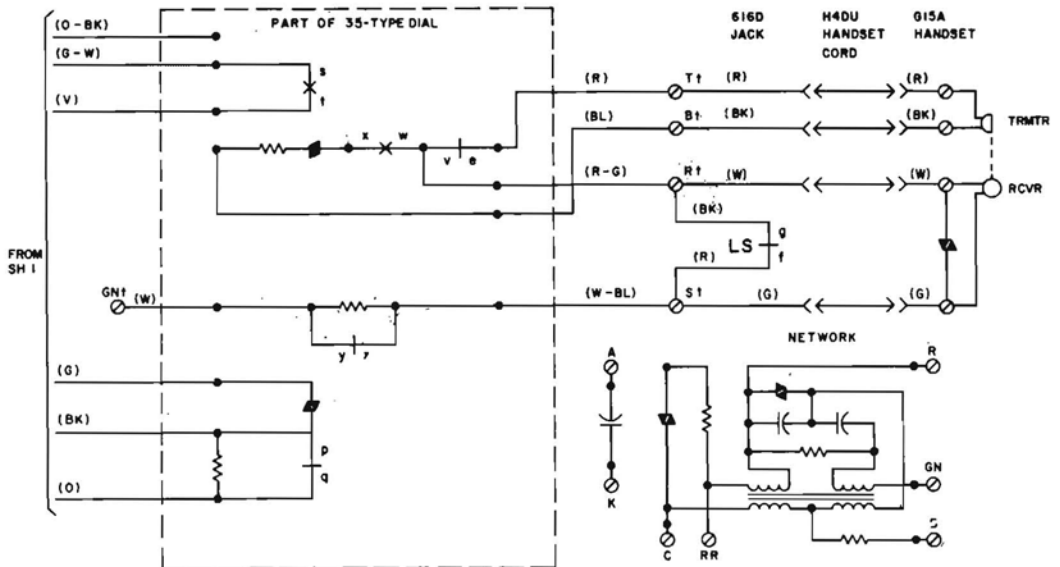
LS - LINE SWITCH

\* - INSULATED AND STORED

† - NETWORK TERMINAL - UNDESIGNATED TERMINALS ARE ON KEY TERMINAL BOARD.

Fig. 1—2565HK (MD) or 2565HKM [(MD) Manufactured Prior to July 20, 1979] Telephone Set, Connections (Sheet 3 of 3)





## NOTES:

1. 66E-TYPE CONNECTING BLOCK SHOWN. MOUNTING CORD MAY BE PLUGGED DIRECTLY INTO CONNECTOR CABLE. COLORS AND PIN NUMBERS FOR CONNECTOR CABLE ARE SAME AS MOUNTING CORD.
2. IF EXCLUSION FEATURE IS ADDED, CONNECT SWITCH LEADS PER TABLE A.
3. WHEN A SPEAKERPHONE IS INSTALLED, CONNECT (G-V) MOUNTING CORD LEAD TO TERMINAL 9 AND (V-G) MOUNTING CORD LEAD TO NETWORK TERMINAL G. ALSO, REMOVE (G) LEAD FROM NETWORK TERMINAL L2 AND CONNECT TO NETWORK TERMINAL F.
4. FOR BRIDGED RINGER ON ANY LINE USING HIB RINGER, REMOVE (S) STRAP LEAD FROM RR (KEY TERMINAL BOARD) AND CONNECT TO RING AND REMOVE (BK) RINGER LEAD FROM RT (KEY TERMINAL BOARD) AND CONNECT TO TIP OF LINE INVOLVED.
5. IF CAPACITOR IS NOT REQUIRED IN RINGER CIRCUIT, MOVE THE (R) RINGER LEAD TO A OF NETWORK.
6. TO SILENCE RINGER PERMANENTLY REFER TO SECTION 501-254-100.
7. IF HOLD POSITION LAMP IS REQUIRED, USE SPARE PAIR AND TERMINATE ON LH AND LG TERMINALS.

PU - PICKUP KEY

H - HOLD KEY

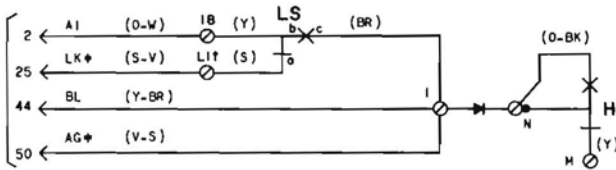
LS - LINE SWITCH

\* - INSULATED AND STORED

† - NETWORK TERMINAL - UNDESIGNATED TERMINALS ARE ON KEY TERMINAL BOARD.

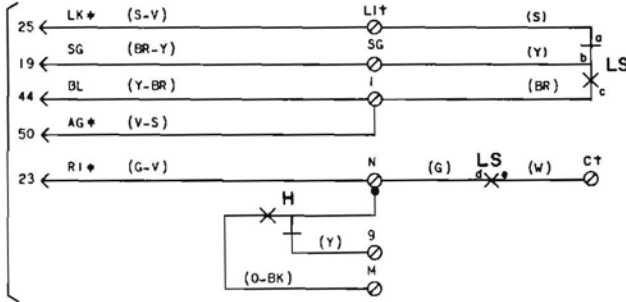
Fig. 2—2565HKMS Telephone Set, Connections (Sheet 2 of 2)†

IA1 OR  
IA2 KTS  
WITH  
BUSY LAMP  
(NOTE 1)



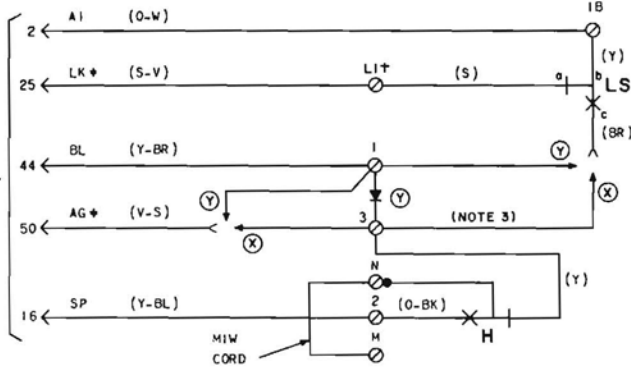
MODIFICATION IA1-IA2 KTS		
LEAD	FROM	TO
(BR)	N	I
(V-S)	N	I
533K DIODE (ORDERED SEPARATELY)		I TO N

IA KTS  
WITH  
BUSY  
LAMP  
(NOTES  
1 AND 2)



MODIFICATION IA KTS		
LEAD	FROM	TO
(Y)	IB	SG
(BR)	N	I
(V-S)	N	I
(Y)	M	9
(O-BK)	N	M
(G)	9	N
(G-V)	9	N

IA1 OR IA2  
KTS WITH  
I HOLD  
WITH/WITHOUT  
BUSY LAMP  
(NOTE 1)



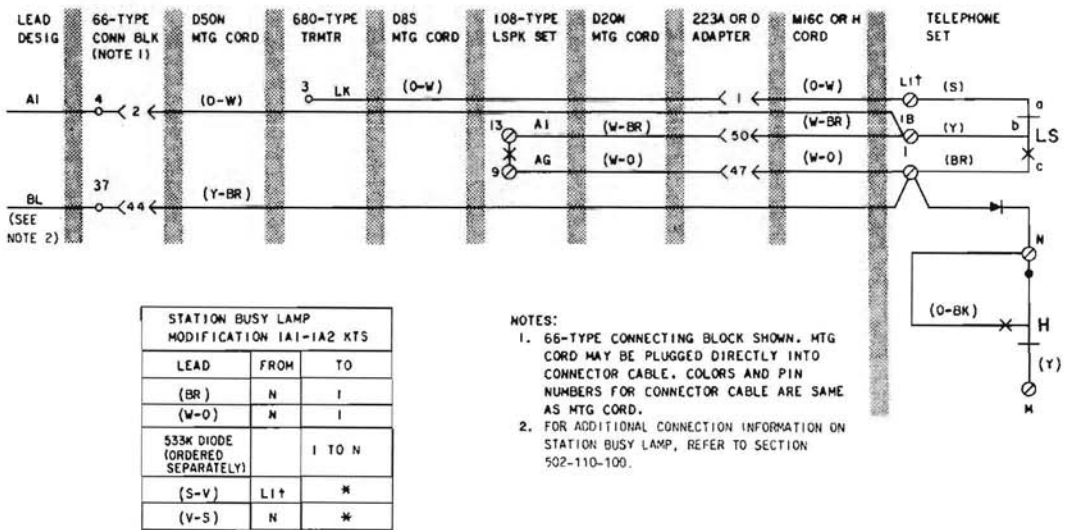
NOTES:

- FOR ADDITIONAL CONNECTION INFORMATION ON STATION BUSY LAMP, REFER TO SECTION 502-110-100.
- FOR IA KTS WITHOUT BUSY LAMP, INSULATE AND STORE (Y-BR) OSON MTG CORD LEAD.
- REMOVE (0-Y) OSON MTG CORD LEAD FROM KEY TERMINAL 3. INSULATE AND STORE.

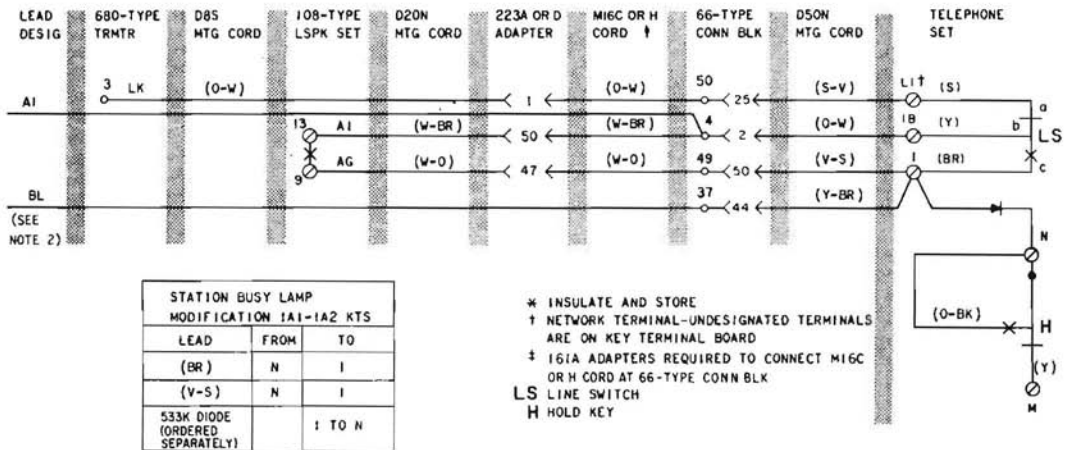
- † NETWORK TERMINALS. UNDESIGNATED TERMINALS ARE ON KEY TERMINAL BOARD
- \* 3-TYPE SPEAKERPHONE LEAD
- LS - LINE SWITCH
- H - HOLD KEY

MODIFICATION I HOLD AND IA1-IA2 KTS			
	LEAD	FROM	TO
WITH BUSY LAMP (Y) OPTION	(BR)	N	I
	(V-S)	N	I
	533K DIODE (ORDERED SEPARATELY)		I TO 3
	(Y)	M	3
	(O-BK)	N	2
	MIW CORD		N TO M
WITHOUT BUSY LAMP (X) OPTION	(BR)	N	3
	(V-S)	N	3
	(Y)	M	3
	(O-BK)	N	2
MIW CORD		N TO M	

Fig. 3—Optional Features with 3-Type (MD) Speakerphone

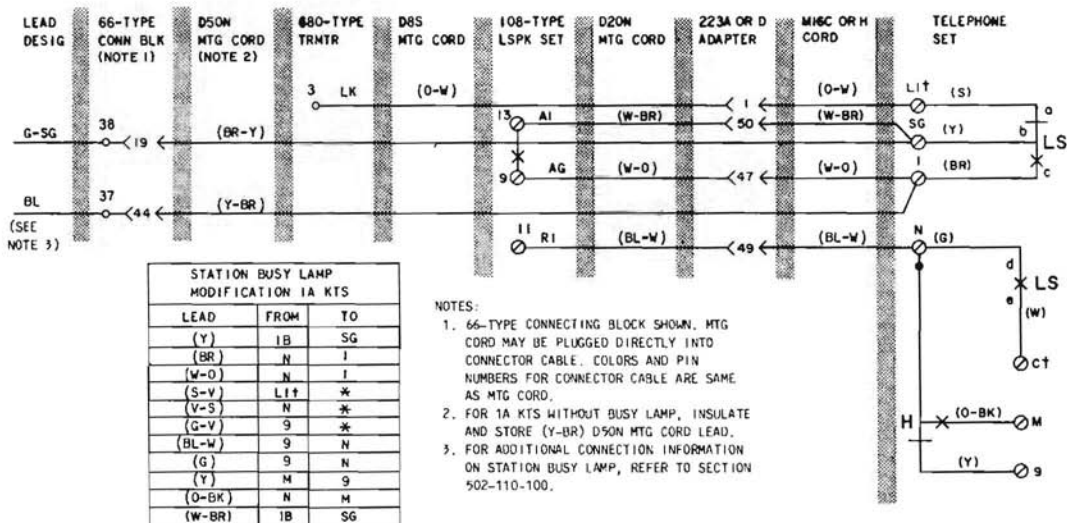


A. IA1-IA2 KTS WIRED FOR BUSY LAMP WITH M16C OR H CORD TERMINATED IN TEL SET

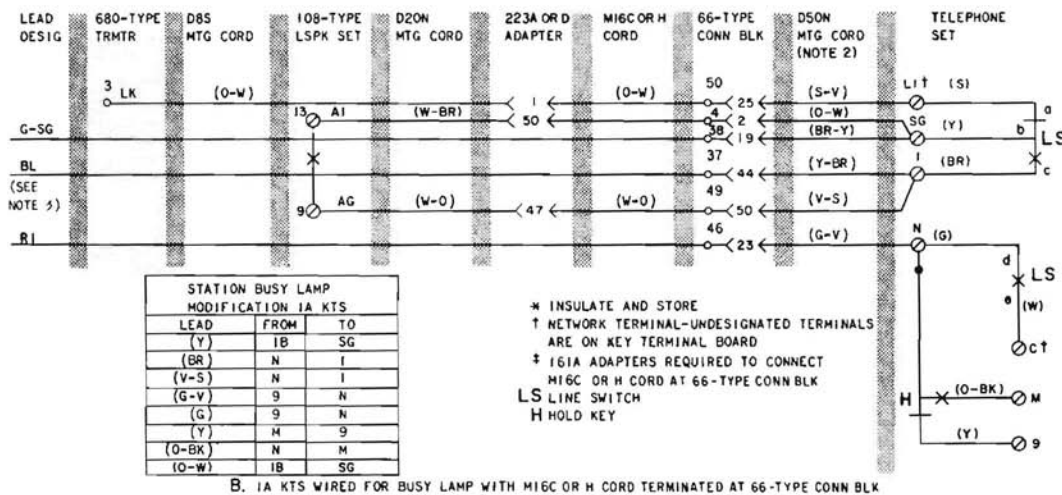


B. IA1-IA2 KTS WIRED FOR BUSY LAMP WITH M16C OR H CORD TERMINATED AT 66-TYPE CONN BLK

Fig. 4—Optional Features with 4A Speakerphone (Sheet 1 of 3)

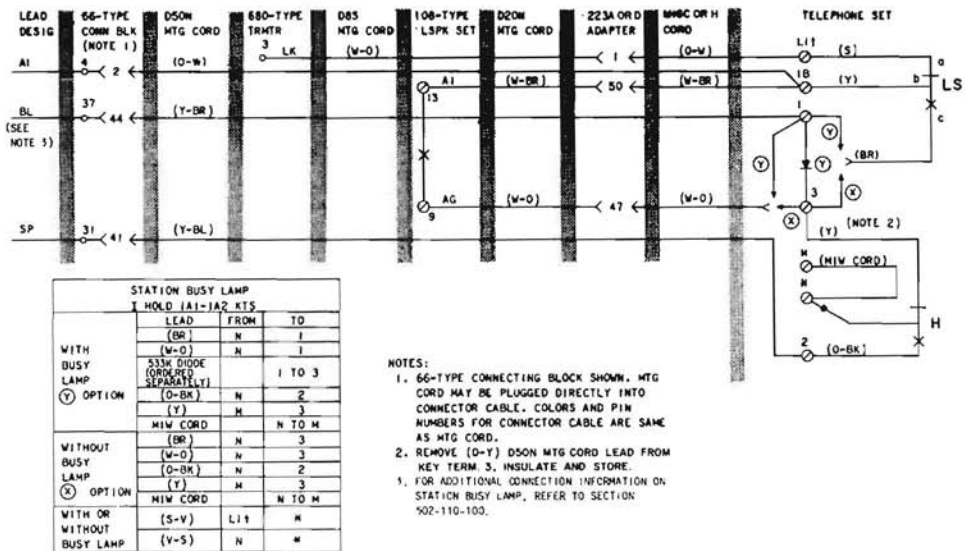


A. IA KTS WIRED FOR BUSY LAMP WITH M16C OR H CORD TERMINATED IN TEL SET

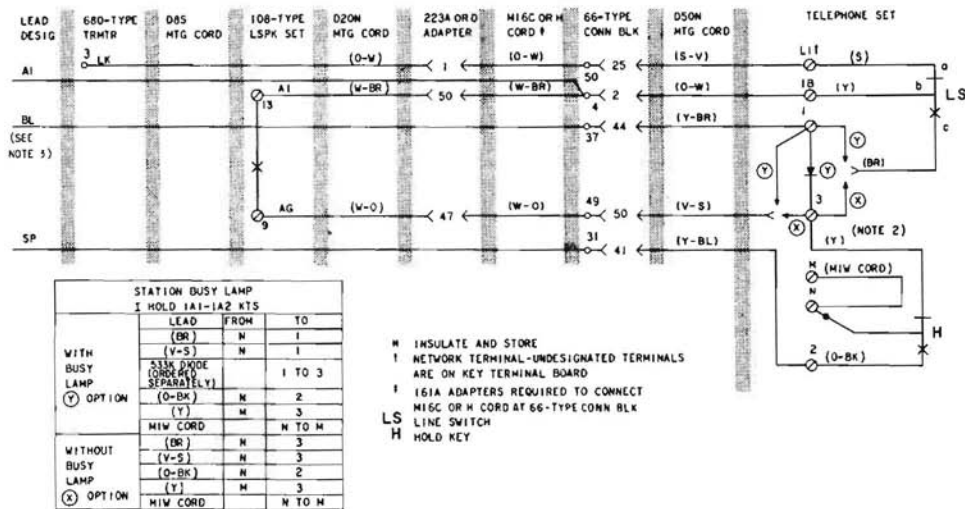


B. IA KTS WIRED FOR BUSY LAMP WITH M16C OR H CORD TERMINATED AT 66-TYPE CONN BLK

Fig. 4—Optional Features with 4A Speakerphone (Sheet 2 of 3)†



A. 1A1-1A2 KTS WIRED FOR BUSY LAMP AND I HOLD WITH M16C OR H CORD TERMINATED IN TEL SET



B. 1A1-1A2 KTS WIRED FOR BUSY LAMP AND I HOLD WITH M16C OR H CORD TERMINATED AT 66-TYPE CONN BLK

Fig. 4—Optional Features with 4A Speakerphone (Sheet 3 of 3)

**TABLE A**  
**EXCLUSION SWITCH CONNECTIONS**

EXCLUSION	KEY TEL SYS	EXCLUSION SWITCH LEADS							
		BL-W	W-BL	O-W	W-O	BL-V	V-BL	O-V	V-O
On any line	1A	R*	T*	1B†	H*	ER	ET	EB	EH
	1A1 or 1A2	R*	T*	EB	H*	ER	ET	EB	EH

\*Terminal of line to be excluded.

† When other than line 1 is excluded on 1A KTS, disconnect, insulate, and store O-W mounting cord conductor from terminal 1B; connect balance lead conductor from line involved to 1B.

**TABLE B**  
**PICKUP-SIGNAL KEY CONVERSION**

KEY TEL SET	CONVERSION OPTIONS	636A KEY LEADS			
		Y-BR	BR	S-R	BR-BK
2565HK, 2565HKM, or 2565HKMS	HPPPPP (Note)	M	M	M	X
	HPPPPS	M	M	M	SG
	HPPSSS	M	M	SG	X
	HPPSSS	M	X	SG	X
	HPPPP*S*	M	M	5H	†
	HPPP*P*S*	M	X	5H	†
HPP*P*P*S*	X	X	5H	†	

\* These arrangements use line switch controlled ground for common signal key used with private or intercommunicating lines. Common signal should be used to operate a common signal relay. Do not wire directly to a buzzer.

† Connect to the same terminals as (BR) line switch lead depending on option and KTS required.

**Note:** To convert from pickup (locking) to signaling (nonlocking) remove the 811218924 or P-12A892 screw detail at the key position being converted.

**TABLE C**  
**POLARITY GUARD CONNECTIONS [819040528 (P-90D052)**  
**GUARD ASSEMBLY]**

LEAD	REMOVE FROM	CONNECT TO	
	NET.	NET.	POLARITY GUARD
Dial	BK	RR	T
	G-W	C	S
Line Switch	W	C	S
Polarity Guard	G		RR
	W		C



## SERVICE

### 2565LK, 2565LKM, AND 2565LKMS TELEPHONE SETS

### CONNECTIONS

#### 1. GENERAL

1.01 This section contains information for the 2565LK (MD), 2565LKM (MD), and 2565LKMS telephone sets (Fig. 1 and 2).

1.02 Reissued to:

- Show 2565LKM telephone set MD
- Show 3-type speakerphone MD
- Add information on 2565LKMS telephone set
- Add information on 533K diode.

1.03 The 2565LKMS telephone set is similar to the 2565LKM except a new line switch assembly is provided in the 2565LKMS set which breaks both the tip and ring side of the line.

#### 2. CONNECTIONS

2.01 These sets are factory-wired for 1A1 or 1A2 KTS, 4A speakerphone, and individual or common line ringer. They are equipped with hold key and cutoff key. Mounting cord conductors are provided for illuminating the hold key lamp, but the lamp is not provided with the set and must be ordered separately.

2.02 When used with 1A KTS and speakerphone, modify sets as shown in Fig. 3 or 4.

2.03 These sets are factory-equipped with a KS-20419L1 (10 volt ac only) buzzer.

2.04 The H1-type ringer leads are wired to terminals RR and RT. When power failure feature is provided in the KTS, the common audible signal must be wired with capacitor in series.

2.05 If 3-type (MD) speakerphone control unit is located near the telephone set, the mounting cord conductors can be extended to the control unit by using a 149-type adapter or 66E-type connecting block. If control unit is located at key equipment, extend leads through an A25B connector cable or inside wiring cable. Speakerphone connections for the 2565-type telephone sets are shown in Division 512.

2.06 When a 2565LK or 2565LKM (manufactured prior to July 20, 1979) telephone set is not used as a speakerphone set and is multiplied with any other set furnishing speakerphone feature, the T1 (V-G) and R1 (G-V) speakerphone leads must be disconnected, insulated, and stored at the telephone set. If not disconnected, these speakerphone leads will provide a common path between the circuits of the multiplied telephone sets. Speakerphone connections are shown in Division 512.

2.07 Exclusion can be provided with these sets by the addition of a D-179935 Kit of Parts which must be ordered separately. Exclusion switch can also be used to cutoff ringer or buzzer in set. Connect as shown in Table A.

2.08 Cutoff of extension stations, ringers, or buzzer can also be made using the cutoff key on the 589AJ key.

2.09 A polarity guard is used only when specified by local instruction for end-to-end signaling installation when battery and ground reversals may be encountered.

2.10 When polarity guard is required with these sets, connect guard assembly as shown in Table B.

2.11 A 811353135 (P-13E313) terminal strip assembly is available when additional terminating

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**SECTION 502-543-406**

points are required for auxiliary services such as buzzers, lamp, etc. Assembly must be ordered separately.

**2.12** The 4th key position is convertible from line pickup (locking) to signaling (nonlocking) by

removal of the 811218924 (P-12A892) screw detail. Arrange as shown in Table C.

**2.13** Installation instructions for the exclusion switch, polarity guard, and auxiliary terminal strip are given in Section 502-500-120.

**TABLE A**  
**EXCLUSION SWITCH CONNECTIONS**

EXCLUSION	KEY TEL SYS	EXCLUSION SWITCH LEADS							
		BL-W	W-BL	O-W	W-O	BL-V	V-BL	O-V	V-O
On any line	1A	R*	T*	1B†	H*	ER	ET	EB	EH
	1A1 or 1A2	R*	T*	EB	H*	ER	ET	EB	EH

\* Terminal of line involved.

† When other than line 1 is excluded on 1A KTS, disconnect, insulate, and store O-W mounting cord conductor from terminal 1B; connect balance lead conductor from line involved to 1B.

**TABLE B**  
**POLARITY GUARD CONNECTIONS**

[819040528 (P-90D052) GUARD ASSEMBLY]

LEAD		REMOVE FROM	CONNECT TO	
		NET.	NET.	POLARITY GUARD
Dial	BK	RR		T
	G-W	C		S
Line Switch	W	C		S
Polarity Guard	G		RR	
	W		C	

**TABLE C**

**PICKUP-SIGNAL KEY CONVERSION**

KEY OPTIONS	BR-BK KEY LEAD
HPPPPC	M
HPPPSC	SG





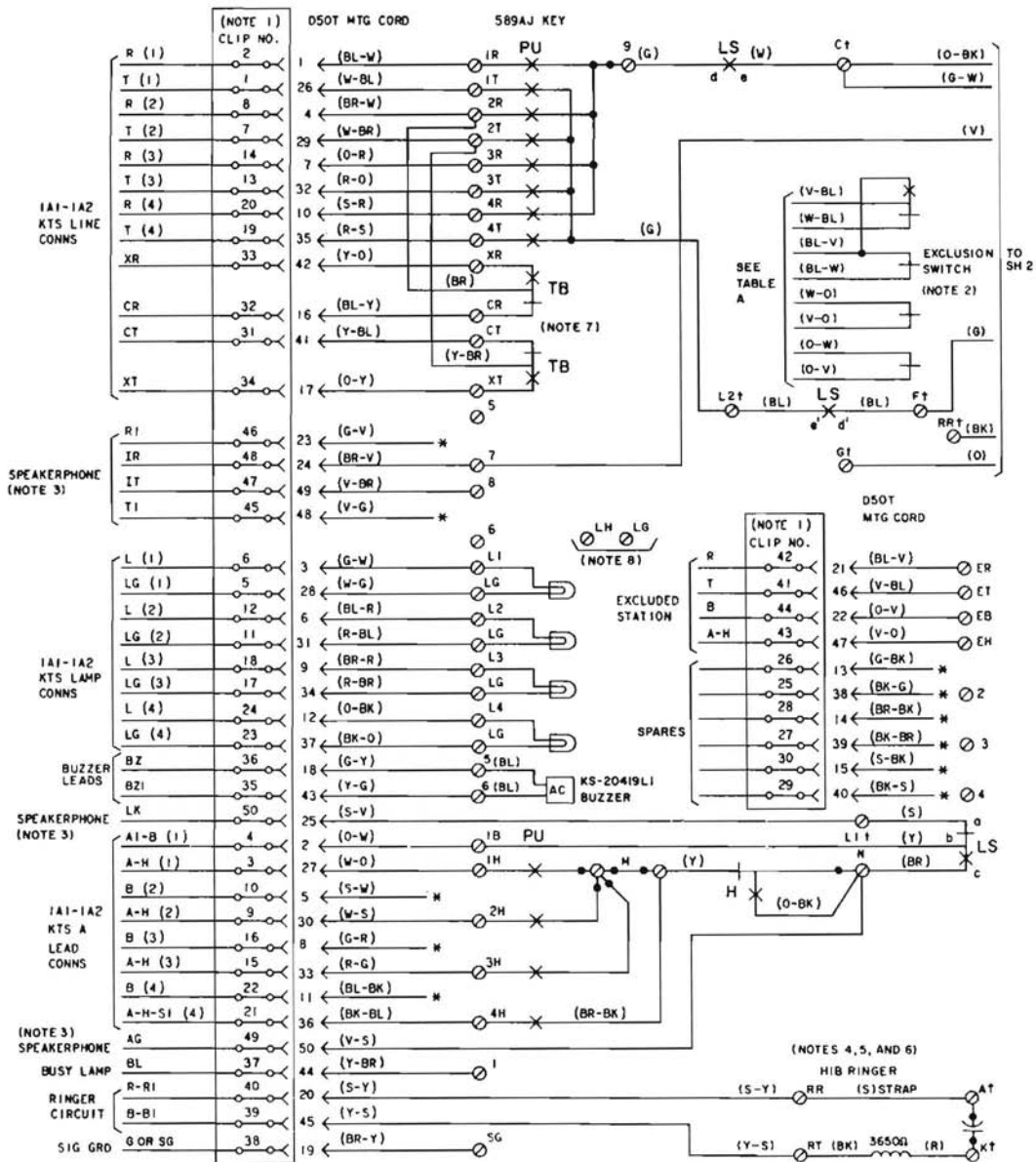
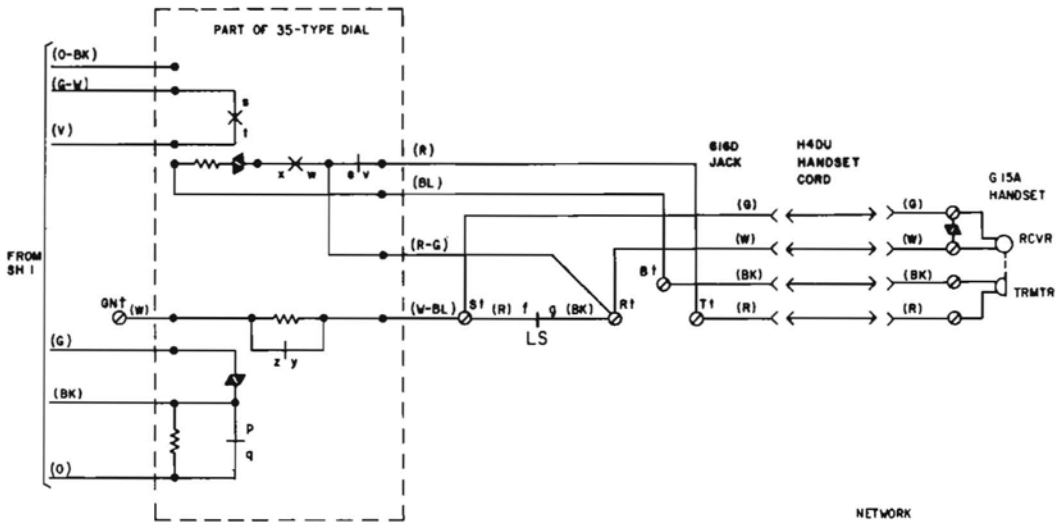
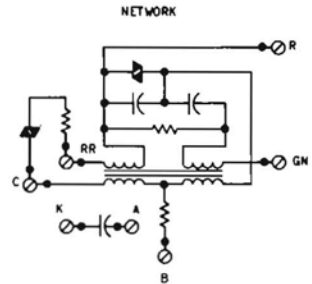


Fig. 2—2565LKMS Telephone Set, Connections (Sheet 1 of 2)



## NOTES:

1. 66E-TYPE CONNECTING BLOCK SHOWN. MOUNTING CORD MAY BE PLUGGED DIRECTLY INTO CONNECTOR CABLE. COLORS AND PIN NUMBERS FOR CONNECTOR ARE SAME AS MOUNTING CORD.
2. IF EXCLUSION FEATURE IS ADDED, CONNECT SWITCH LEADS PER TABLE A.
3. WHEN A SPEAKERPHONE IS INSTALLED, CONNECT (G-V) MOUNTING CORD LEAD TO TERMINAL 9 AND (V-G) MOUNTING CORD LEAD TO NETWORK TERMINAL G. ALSO, REMOVE (G) LEAD FROM NETWORK TERMINAL L2 AND CONNECT TO NETWORK TERMINAL F.
4. FOR BRIDGED RINGER ON ANY LINE, REMOVE (S) STRAP LEAD FROM RR (KEY TERMINAL BOARD) AND CONNECT TO RING AND (BK) RINGER LEAD TO TIP OF LINE INVOLVED.
5. IF CAPACITOR IS NOT REQUIRED IN RINGER CIRCUIT, MOVE (R) RINGER LEAD TO A OF NETWORK.
6. TO SILENCE RINGER PERMANENTLY REFER TO SECTION 501-254-100.
7. TURNBUTTON SHOWN WIRED AS CUTOFF OF LINE 2. CAN BE REWIRED AS CUTOFF OF OTHER LINES, EXT. RINGER, RINGER IN SET, ETC. CONNECT AS REQUIRED.
8. IF HOLD POSITION LAMP IS REQUIRED, USE SPARE PAIR AND TERMINATE ON LH AND LG TERMINALS.



TB-TURNBUTTON (CUTOFF)

PU-PICKUP KEY

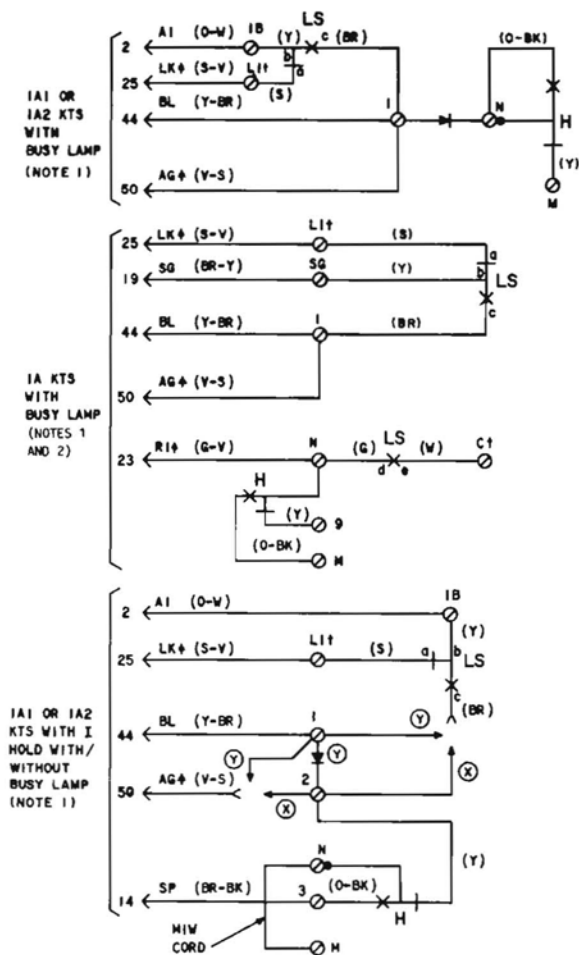
H - HOLD KEY

LS-LINE SWITCH

\* INSULATED AND STORED

† NETWORK TERMINAL-UNDESIGNATED TERMINALS ARE ON KEY TERMINAL BOARD

Fig. 2—#2565LKMS Telephone Set Connections (Sheet 2 of 2)†



## NOTES:

- FOR ADDITIONAL CONNECTION INFORMATION ON STATION BUSY LAMP, REFER TO SECTION 502-110-100.
- FOR IA KTS WITHOUT BUSY LAMP, INSULATE AND STORE (Y-BR) 050T MTG. CORD LEAD.

† - NETWORK TERMINALS - UNDESIGNATED  
TERMINALS ARE ON KEY TERMINAL BOARD  
‡ - 3-TYPE SPEAKERPHONE LEAD

H - HOLD KEY  
LS - LINE SWITCH

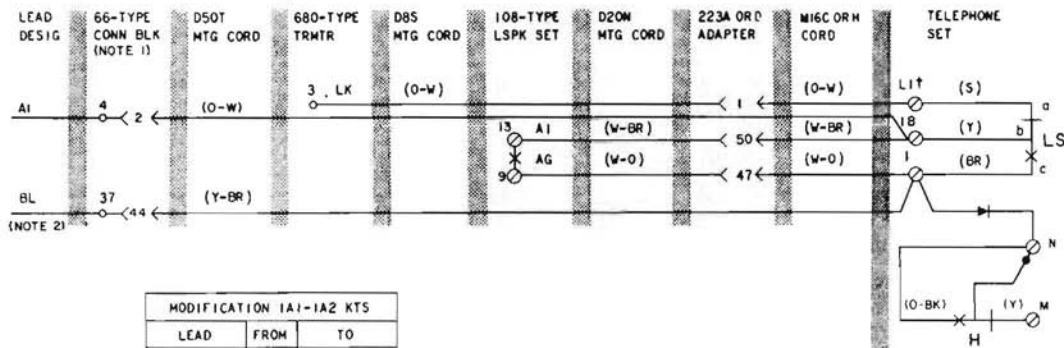
MODIFICATION IA1-IA2 KTS		
LEAD	FROM	TO
(BR)	N	I
(V-S)	N	I
533K DIODE (ORDERED SEPARATELY)		I TO N

MODIFICATION IA KTS		
LEAD	FROM	TO
(Y)	IB	3G
(BR)	N	I
(V-S)	N	I
(Y)	N	9
(O-BK)	N	N
(G)	9	N
(G-V)	9	N

MODIFICATION I HOLD AND IA1-IA2 KTS			
	LEAD	FROM	TO
WITH BUSY LAMP (Y) OPTION	(BR)	N	1
	(V-S)	N	1
	533K DIODE (ORDERED SEPARATELY)		1 TO 2
	(Y)	N	2
	(O-BK)	N	3
WITHOUT BUSY LAMP (X) OPTION	MIW CORD		N TO M
	(BR)	N	2
	(V-S)	N	2
	(Y)	N	2
	(O-BK)	N	3
MIW CORD		N TO M	

Fig. 3—Optional Features with 3-Type (MD) Speakerphone†



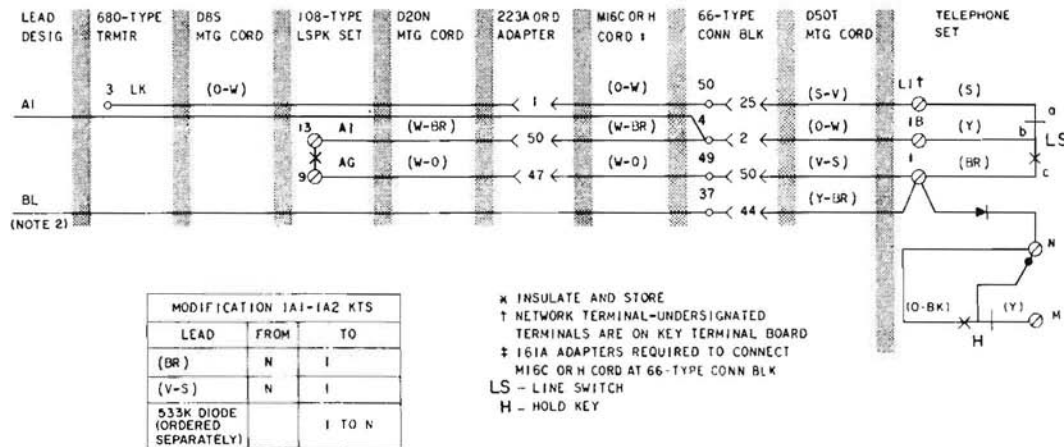


MODIFICATION IA1-IA2 KTS		
LEAD	FROM	TO
(BR)	N	I
(W-0)	N	I
533K DIODE (ORDERED SEPARATELY)		I TO N
(S-V)	LIT	*
(0-W)	IB	M

## NOTES:

- 66-TYPE CONNECTING BLOCK SHOWN. MTG CORD MAY BE PLUGGED DIRECTLY INTO CONNECTOR CABLE. COLORS AND PIN NUMBERS FOR CONNECTOR CABLE ARE SAME AS MTG CORD.
- FOR ADDITIONAL CONNECTION INFORMATION ON STATION BUSY LAMP, REFER TO SECTION 502-110-100.

A. IA1-IA2 KTS WIRED FOR BUSY LAMP WITH M16C OR H CORD TERMINATED IN TEL SET

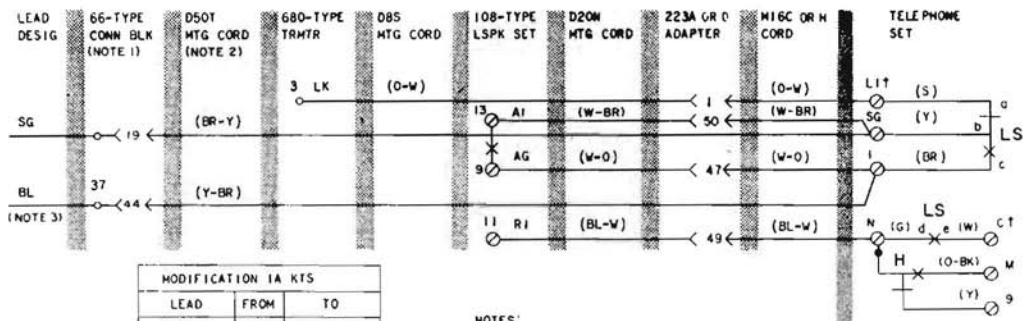


MODIFICATION IA1-IA2 KTS		
LEAD	FROM	TO
(BR)	N	I
(V-S)	N	I
533K DIODE (ORDERED SEPARATELY)		I TO N

- \* INSULATE AND STORE  
 † NETWORK TERMINAL-UNDERSIGNED TERMINALS ARE ON KEY TERMINAL BOARD  
 ‡ 161A ADAPTERS REQUIRED TO CONNECT M16C OR H CORD AT 66-TYPE CONN BLK  
 LS - LINE SWITCH  
 H - HOLD KEY

B. IA1-IA2 KTS WIRED FOR BUSY LAMP WITH M16C OR H CORD TERMINATED AT 66-TYPE CONN BLK

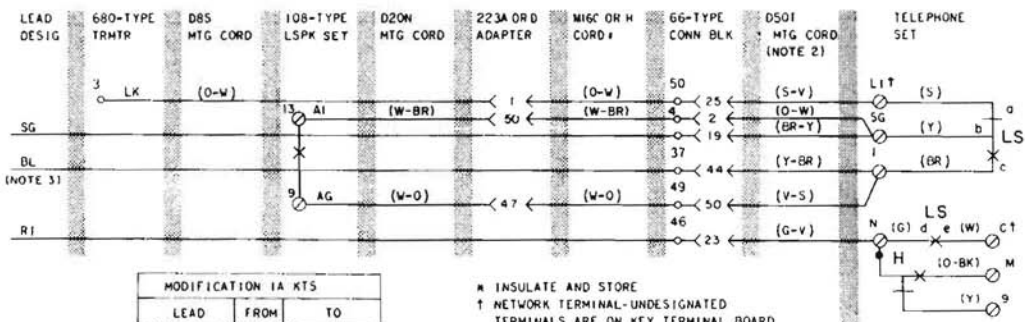
Fig. 4—Optional Features with 4A Speakerphone (Sheet 1 of 3)



MODIFICATION 1A KTS		
LEAD	FROM	TO
(Y)	1B	SG
(BR)	N	I
(W-O)	N	I
(BL-W)	9	N
(G)	9	N
(Y)	M	9
(O-BK)	N	M
(S-V)	L1†	*
(V-S)	N	*
(G-V)	9	*
(W-BR)	1B	SG

- NOTES:
- 66-TYPE CONNECTING BLOCK SHOWN. MTG CORD MAY BE PLUGGED DIRECTLY INTO CONNECTOR CABLE. COLORS AND PIN NUMBERS FOR CONNECTOR CABLE ARE SAME AS MTG CORD.
  - FOR 1A KTS WITHOUT BUSY LAMP, INSULATE AND STORE (Y-BR) D50T MTG CORD LEAD.
  - FOR ADDITIONAL CONNECTION INFORMATION ON STATION BUSY LAMP, REFER TO SECTION 502-110-100.

A. 1A KTS WIRED FOR BUSY LAMP WITH M16C OR H CORD TERMINATED IN TEL SET

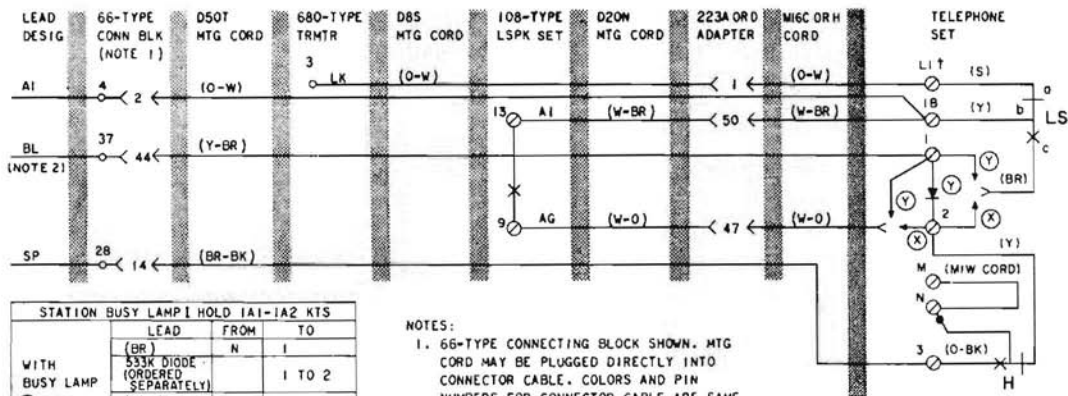


MODIFICATION 1A KTS		
LEAD	FROM	TO
(Y)	1B	SG
(BR)	N	I
(V-S)	N	I
(G-V)	9	N
(G)	9	N
(Y)	M	9
(O-BK)	N	M
(O-W)	1B	SG

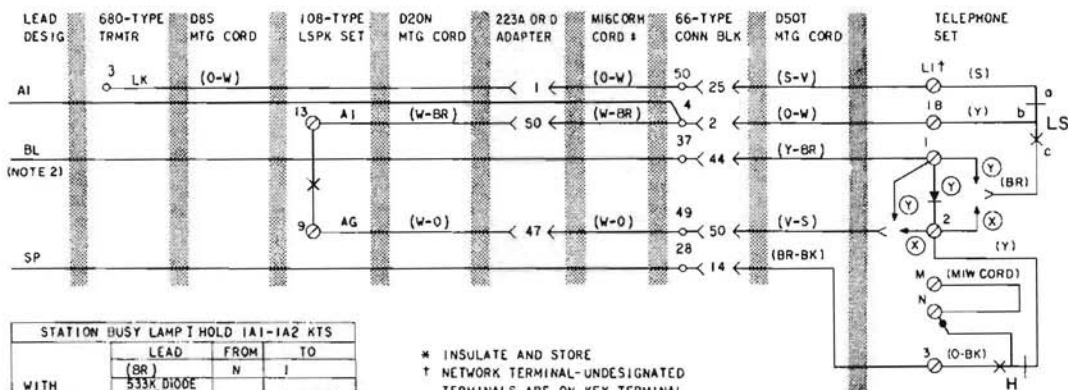
- \* INSULATE AND STORE  
 † NETWORK TERMINAL-UNDESIGNATED  
 ‡ 161A ADAPTERS REQUIRED TO CONNECT  
 M16C OR H CORD AT 66-TYPE CONN BLK  
 LS - LINE SWITCH  
 H - HOLD KEY

B. 1A KTS WIRED FOR BUSY LAMP WITH M16C OR H CORD TERMINATED AT 66-TYPE CONN BLK

Fig. 4—Optional Features with 4A Speakerphone (Sheet 2 of 3)



A. IA1-IA2 KTS WIRED FOR BUSY LAMP AND I HOLD WITH M16C OR H CORD TERMINATED IN TEL SET



B. IA1-IA2 KTS WIRED FOR BUSY LAMP AND I HOLD WITH M16C OR H CORD TERMINATED AT 66-TYPE CONN BLK

Fig. 4—Optional Features with 4A Speakerphone (Sheet 3 of 3)



**SERVICE**  
**500L/M AND 500MM TELEPHONE SETS**

**1. GENERAL**

- Remove 500LM telephone set information (never manufactured)

**1.01 Reissued to:**

- Revise Fig. 1 through 4

- Add Table A

◆ TABLE A ◆

**LINE AND RINGER CONNECTIONS  
FOR COMMON AUDIBLE RING WITH 1A1 OR 1A2 KTS**

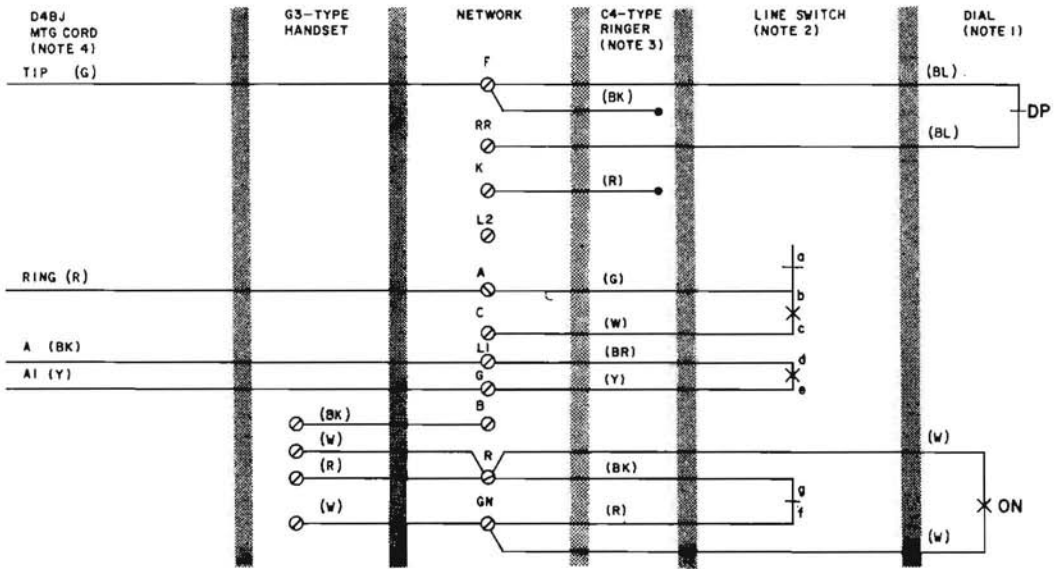
MOUNTING CORD LEAD AT CONNECTING BLOCK						CONNECTIONS IN SET								
						6-CONDUCTOR MOUNTING CORD OR 6-CONDUCTOR JACK LEADS						C4B RINGER LEADS		
(G)	(R)	(BK)	(Y)	(BL)	(W)	(G)	(R)	(BK)	(Y)	(BL)	(W)	(BK)	(R)	
Tip	Ring	A	A1	B1	R1	F	A	L1	G	L2	Note 3	L2	Note 3	
									Note 4					

*Notes:*

1. Sets are furnished wired for 1A1 or 1A2 KTS with bridged ringing.
2. If set is equipped with a 4-conductor mounting cord (Fig. 1, 2, and 3) replace with a 6-conductor mounting cord. If set is equipped with a 4-conductor jack and 4-conductor mounting cord (Fig. 4), replace with a 6-conductor jack and 6-conductor mounting cord.
3. Use D-161488 connector to connect the (R) ringer lead to the (W) mounting cord or jack lead.
4. On Fig. 2 (BK) lead connects to terminal 6 and (Y) lead connects to terminal 5 on terminal strip.

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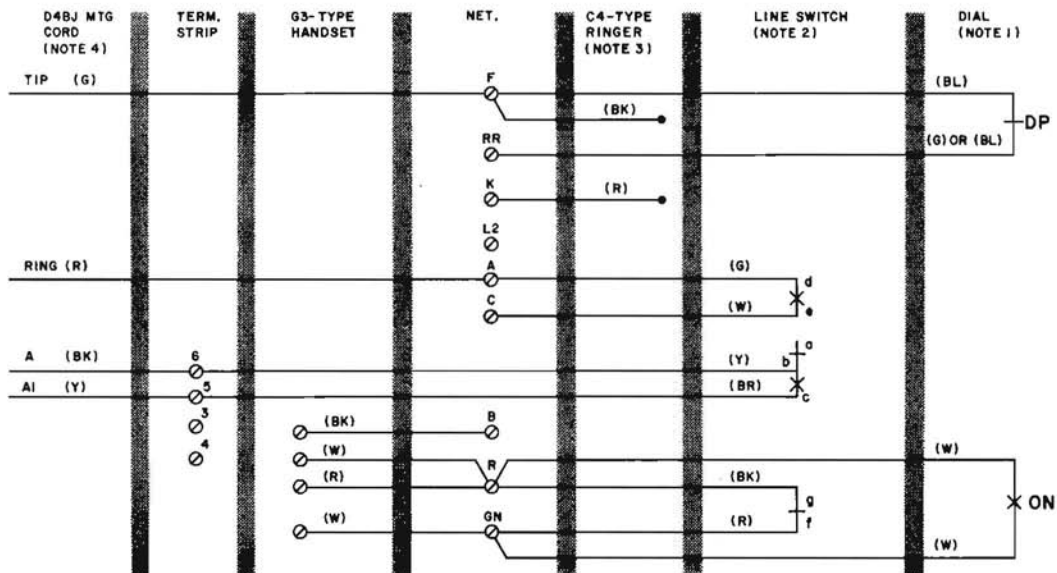


NOTES:

1. FOR MANUAL SERVICE ON 1A1 AND 1A2 KTS, MOVE (G) MOUNTING CORD LEAD AND (BK) RINGER LEAD FROM TERMINAL F TO RR ON NETWORK. REPLACE DIAL WITH APPROPRIATE APPARATUS BLANK.
2. TO PREVENT A FALSE HOLD CONDITION WHEN GOING ON HOOK, THE TIP AND RING CONTACTS OF THE LINE SWITCH MUST BREAK BEFORE A-LEAD CONTACTS BREAK.
3. TO SILENCE RINGER PERMANENTLY, REFER TO APPROPRIATE RINGER SECTION IN DIVISION 501.
4. IF COMMON AUDIBLE RINGING IS REQUIRED, A 6-CONDUCTOR MOUNTING CORD IS REQUIRED. REFER TO TABLE A.

DP - DIAL PULSE CONTACT  
 ON - DIAL OFF-NORMAL CONTACT

Fig. 1—Early 500L/M Telephone Set, Connections With MD Line Switch and Lead Colors

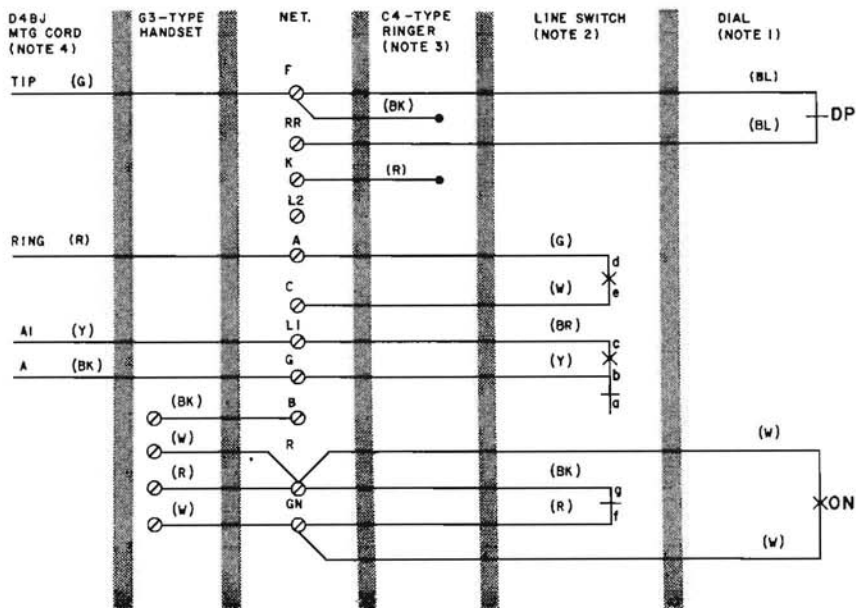


## NOTES:

1. FOR MANUAL SERVICE ON 1A1 AND 1A2 KTS, MOVE (G) MOUNTING CORD LEAD AND (BK) RINGER LEAD FROM TERMINAL F TO RR ON NETWORK. REPLACE DIAL WITH APPROPRIATE APPARATUS BLANK.
2. TO PREVENT A FALSE HOLD CONDITION WHEN GOING ON HOOK, THE TIP AND RING CONTACTS OF THE LINE SWITCH MUST BREAK BEFORE A-LEAD CONTACTS BREAK.
3. TO SILENCE RINGER PERMANENTLY, REFER TO APPROPRIATE RINGER SECTION IN DIVISION 501.
4. IF COMMON AUDIBLE RINGING IS REQUIRED A 6-CONDUCTOR MOUNTING CORD IS REQUIRED. REFER TO TABLE A.

DP - DIAL PULSE CONTACT  
ON - OFF-NORMAL CONTACT

Fig. 2—Later 500L/M Telephone Set, Connections With Current Line Switch Lead Colors, and Terminal Strip



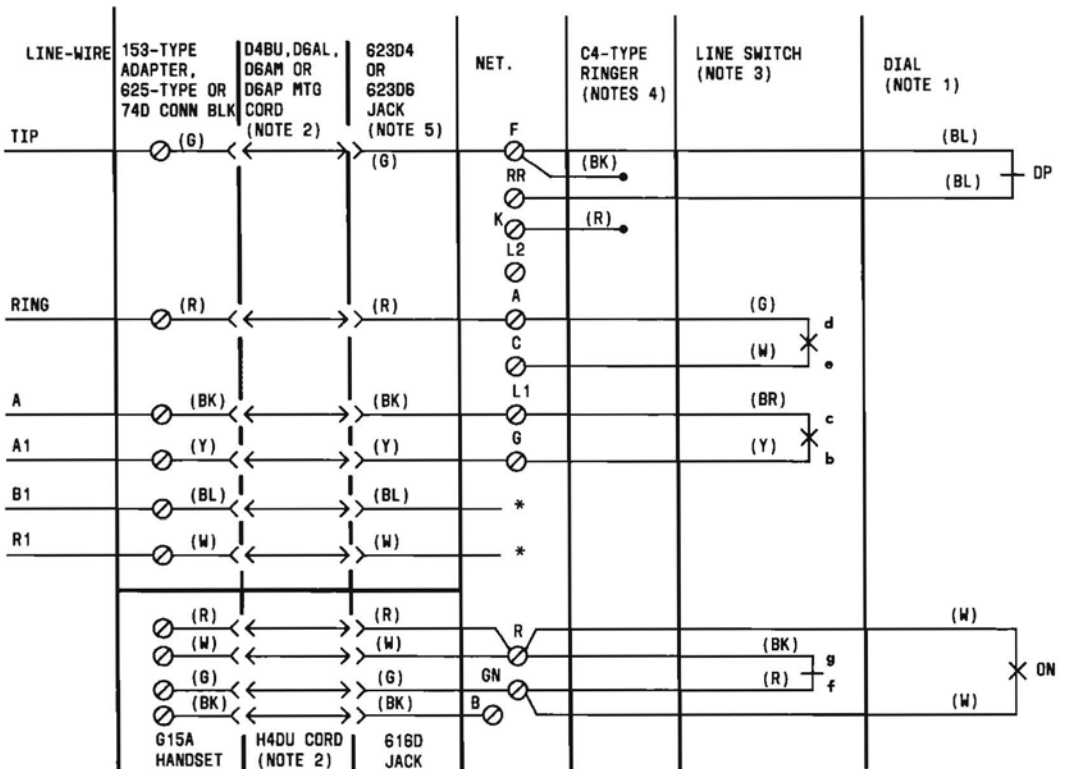
## NOTES:

1. FOR MANUAL SERVICE ON 1A1 AND 1A2 KTS, MOVE (G) MOUNTING CORD LEAD AND (BK) RINGER LEAD FROM TERMINAL F TO RR ON NETWORK. REPLACE DIAL WITH APPROPRIATE APPARATUS BLANK.
2. TO PREVENT A FALSE HOLD CONDITION WHEN GOING ON HOOK THE TIP AND RING CONTACTS OF THE LINE SWITCH MUST BREAK BEFORE A-LEAD CONTACTS BREAK.
3. TO SILENCE RINGER PERMANENTLY, REFER TO APPROPRIATE RINGER SECTION IN DIVISION 501.
4. IF COMMON AUDIBLE RINGING IS REQUIRED, A 6-CONDUCTOR MOUNTING CORD IS REQUIRED. REFER TO TABLE A.

DP - DIAL PULSE CONTACT  
 ON - OFF-NORMAL CONTACT

Fig. 3—Current 500L/M Telephone Set, Current Connections for Sets not Equipped with Terminal Strip





## LEGEND:

DP- DIAL PULSE CONTACT  
 ON- DIAL OFF-NORMAL CONTACT

\* - INSULATE AND STORE

## NOTES:

1. FOR MANUAL SERVICE ON 1A1 AND 1A2 KTS, MOVE (G) JACK LEAD AND (BK) RINGER LEAD FROM TERMINAL F TO RR ON NETWORK. REPLACE DIAL WITH APPROPRIATE BLANK.
2. MUST BE ORDERED SEPARATELY.
3. TO PREVENT A FALSE HOLD CONDITION WHEN GOING ON HOOK, THE TIP AND RING CONTACTS OF THE LINE SWITCH MUST BREAK BEFORE A-LEAD CONTACTS BREAK.
4. TO SILENCE RINGER PERMANENTLY, REFER TO APPROPRIATE RINGER SECTION IN DIVISION 501.
5. IF COMMON AUDIBLE RINGING IS REQUIRED, 623D6 JACK A 6-CONDUCTOR MOUNTING CORD IS REQUIRED. REFER TO TABLE A.

Fig. 4—500MM Telephone Set, Connections



## SERVICE

### 2500M AND 2500MM TELEPHONE SETS

### CONNECTIONS

#### 1. GENERAL

- Show 2500M telephone set MD.

1.01 This section contains information on the 2500M (MD) and 2500MM telephone sets (Fig. 1 and 2).

1.03 An optional common audible ringing feature is available with these sets. When this feature is desired, two additional line conductors are required. Refer to Table A for connection information.

1.02 Reissued to:

- Revise Fig. 1 and 2
- Revise Table A
- Add information on common audible ringing and polarity guard

1.04 When polarity guard is required in these sets connect guard assembly as shown in Table B.

♦ TABLE A ♦

LINE AND RINGER CONNECTIONS  
FOR COMMON AUDIBLE RING WITH 1A1 OR 1A2 KTS

LINE WIRE LEAD DESIGNATION AT CONNECTING BLOCK (NOTE 1)						CONNECTIONS IN SET							
						6-CONDUCTOR MOUNTING CORD OR 6-CONDUCTOR JACK LEADS (NOTE 2)						C48 RINGER LEADS	
(G)	(R)	(BK)	(Y)	(BL)	(W)	(G)	(R)	(BK)	(Y)	(BL)	(W)	(BK)	(R)
Tip	Ring	A	A1	B1	R1	F	A	L1	G	L2	Note 3	L2	Note 3

Note 1: Sets are furnished wired for 1A1 or 1A2 KTS with bridged ringing.

Note 2: If set is equipped with a 4-conductor mounting cord (Fig. 1 and 2) replace with a 6-conductor mounting cord.

Note 3: Use D-161488 connector to connect the (R) ringer lead to the (W) mounting cord or jack lead.

#### NOTICE

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TABLE B

POLARITY GUARD CONNECTIONS  
[819040528 (P-90D052) GUARD ASSEMBLY]

LEAD	COLOR	REMOVE FROM NET.	CONNECT TO	
			POLARITY GUARD	NET
Line Switch	W	C	S	
Dial	BK	RR	T	
Polarity Guard	W			C
	G			RR

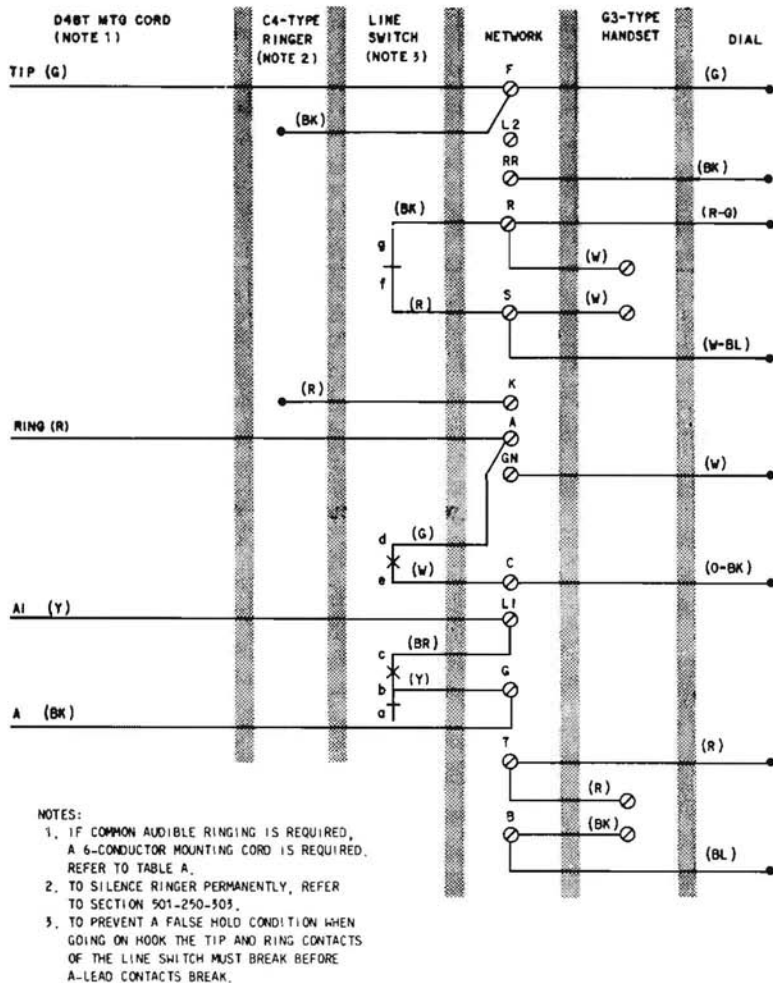


Fig. 1—2500M (MD) Telephone Set, Connections

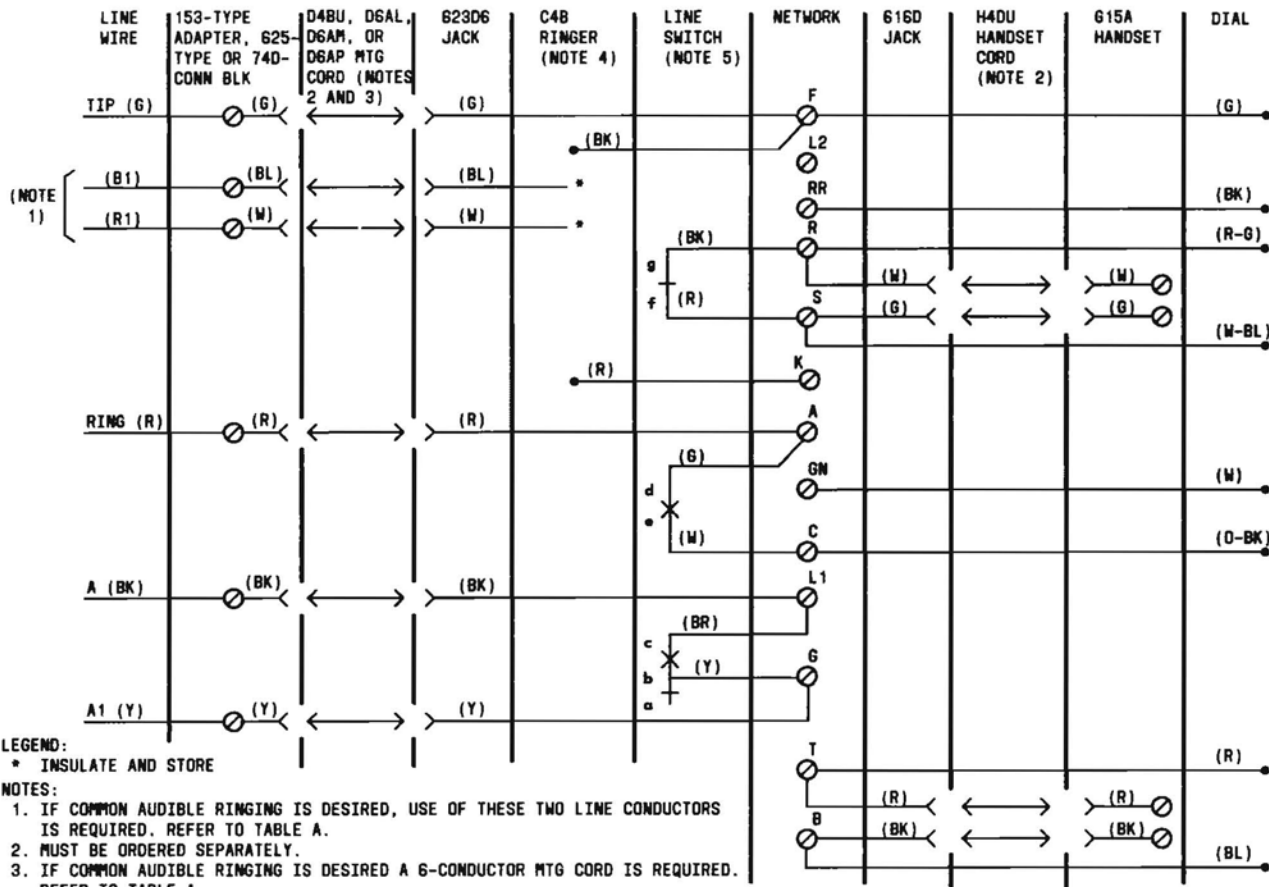


Fig. 2—2500MM Telephone Set, Connections

### 630, 1630, AND 2630 SERIES TELEPHONE SETS

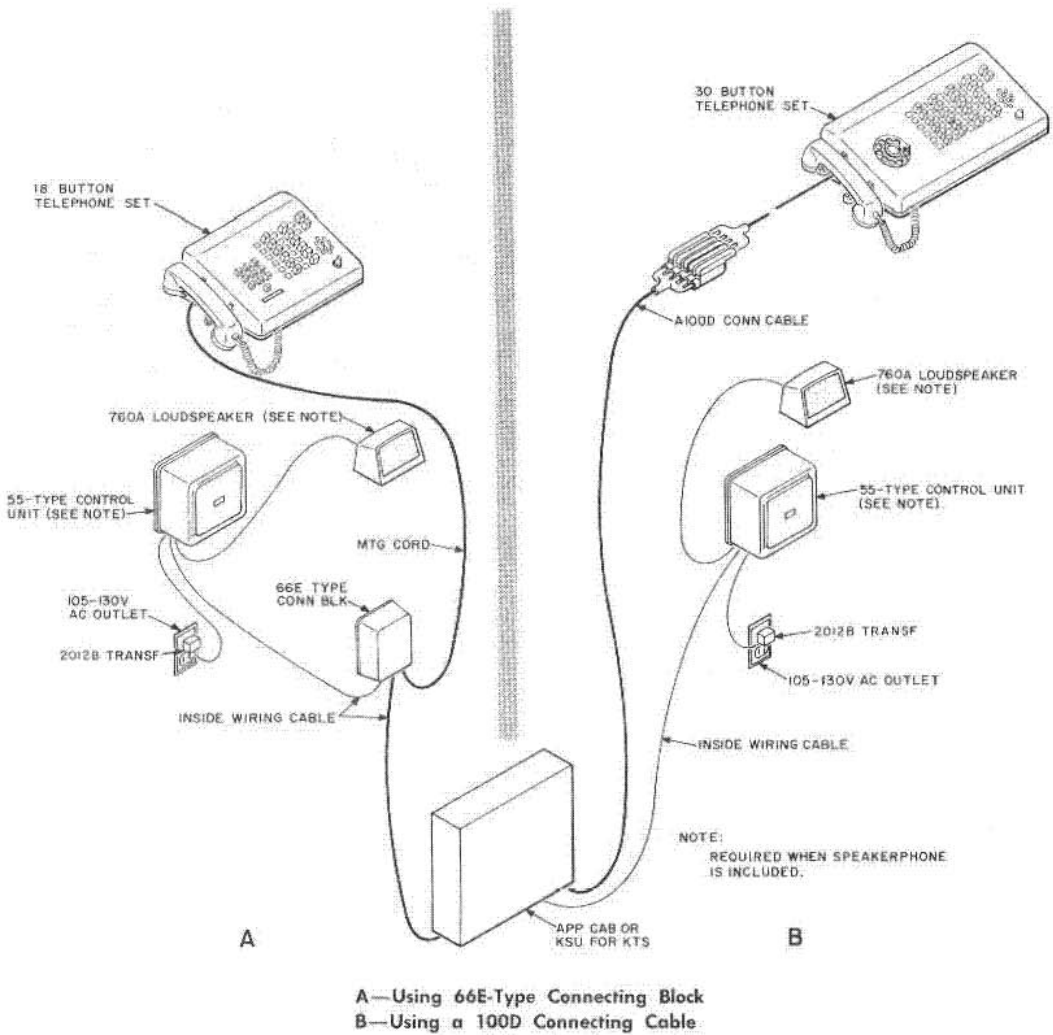


Fig. 1—Two Typical Installation Layouts (Including Speakerphone)

#### NOTICE

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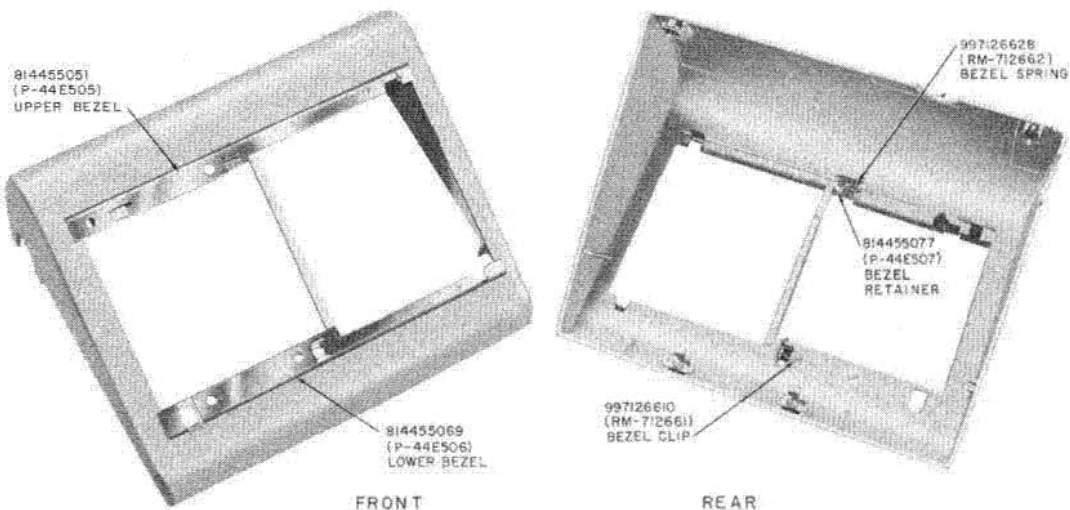


Fig. 3—Housing With Two-Piece Bezel Assembly Installed

- (4) Move key toward rear of set until front end clears mounting frame.
- (5) Raise front end of key—move forward and up to remove.

2.12 Install the keys (590- and 650-series) in the early production telephone sets as follows:



**Before installing additional keys or replacement keys, check for free pivot bar motion and proper return spring action (Fig. 6).**

- (1) Install the desired key and tighten mounting screws. Check for clearance between pivot bar and connector mounting bracket on key.
- (2) Depress the top button (first line pickup) of the key in left-most position until its bar moves to its forward-most operating position and hold in this position. Do not lock down.
- (3) While holding the (reference) key latchbar as in (2), slowly depress the top button of the key and observe the effect of its latchbar on the pivot bar. If the pivot bar moves significantly in the forward direction, the installed

key is positioned too high. To correct, loosen the screws and slightly lower the key until the pivot bar has no perceptible forward motion. Retighten screws.

- (4) Depress the top button of the installed key as in (2) and hold its latchbar in the forward-most position as in (3). Observe the effect of the latchbar of the (reference) key on the pivot bar while slowly depressing its top button. If the pivot bar moves significantly in the forward direction, the installed key is positioned too low. To correct, loosen the screws and very slightly raise the key until the pivot bar has no perceptible forward motion. Retighten screws and recheck (3).

**Note:** If an installed key does not meet the (no perceptible latchbar movement) requirement using this procedure, and there is reason to suspect that the reference key is out of position, reposition all keys as follows:

- (5) Loosen the screws of the (reference) key. With no buttons down and the latchbar held in, shift the reference key until latchbar notch is centered over edge of pivot bar (Fig. 6).



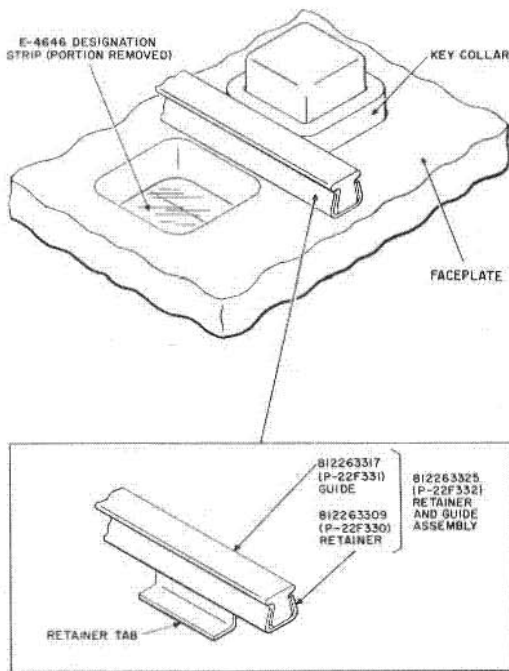


Fig. 4—812263325 (P-22F332) Retainer and Guide Assembly—Enlarged Cutaway End View

Tighten screws while maintaining key and latchbar position.

- (6) Moving from left to right, progressively position and check each key relative to the reference key as in (3) and (4).

**Note:** If the installed key still does not meet the (no perceptible latchbar movement) requirement replace key. It should not be necessary to apply undue force to move and position the 590- and 650-series keys.



**Remove latch-bar return spring and retaining pin on key when adding or replacing keys.**

- (7) Install key designation strip, light shield, housing, mat, and faceplate as required.

2.13 Remove keys (635-type) from current production telephone sets as follows:

- (1) Loosen captive screws at each end of key module.
- (2) Lift key out of key frame disengaging key latch arm from pivot bar.
- (3) Turn key counterclockwise and unplug 508-type and 509A plugs (Fig. 7).
- (4) Remove contact strips from key module.

2.14 Install keys (635-type) in current production telephone sets as follows:

- (1) Install proper contact strips furnished with 635-type keys (Fig. 8).
  - (a) Key modules with six pick-up keys must be equipped with a 840157218 (green lead) and a 840157200 (red lead) contact strip.
  - (b) Key modules with five pick-up keys and a hold key must be equipped with a 840151138 (green lead) and a 840151120 (red lead) contact strip.
  - (c) Key modules with four pick-up keys, a hold key, and a cutoff key must be equipped with a 840151047 (green lead) and a 840151039 (red lead) contact strip.

- (2) Connect 508-type and 509A plugs to proper receptacles (Fig. 7).

**Note:** On initial installation the 508-type and 509A plugs should follow the same color sequence for each key module: Pink (Hold Key), Light Beige (Chaining Switch), Blue (Line 1), Orange (Line 2), Green (Line 3), Brown (Line 4), Slate (Line 5, Cutoff key, or transmitter), and White (Line 6).

- (3) Position key in key frame making certain that latch arm engages in the pivot bar.
- (4) Secure key with captive screws at top and bottom of key.
- (5) Test keys for proper operation (random test from module to module).

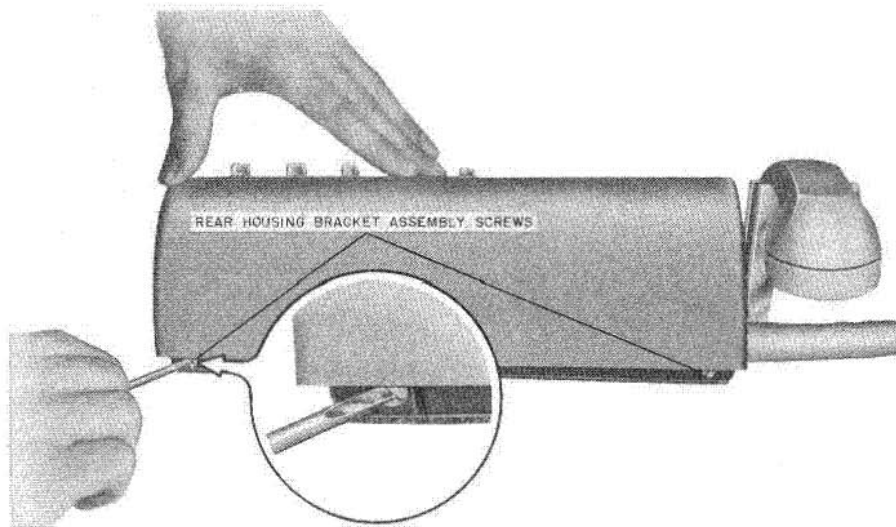


Fig. 5—Housing Retaining Screws

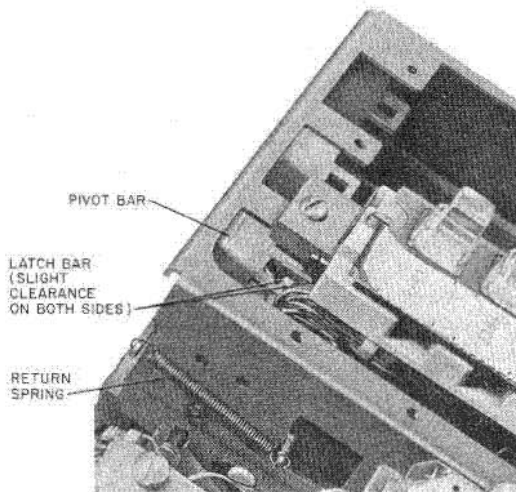


Fig. 6—Positioning 590 and 650 Series Keys

- (6) Remove caps and install key designation numbers.
- (7) Replace caps.

- (8) Install proper collar furnished with 635-type keys. Early production keys have rectangular buttons, and current production keys have square buttons (Fig. 9) making the collars incompatible.

**Note:** Due to the difference in shape of the buttons on early and current production key modules these keys are not compatible appearance wise and should not be intermixed in the same telephone set.

- 2.15 Lines on the current production telephone sets can be transposed from one key position or key module to another by moving the 508-type plugs on the back of the keys. Mounting cord conductors are of sufficient length to allow for complete flexibility of the 508-type plugs.

- 2.16 To convert locking pickup keys to nonlocking for signaling use:

- (1) Remove 811058379 (P-10E837) screw (598-, 599-, 656-, or 657-type keys) or the 812857738 (P-28E773) locking pin from 635-type keys.
- (2) Store screws or locking pin by taping to inside of set base.

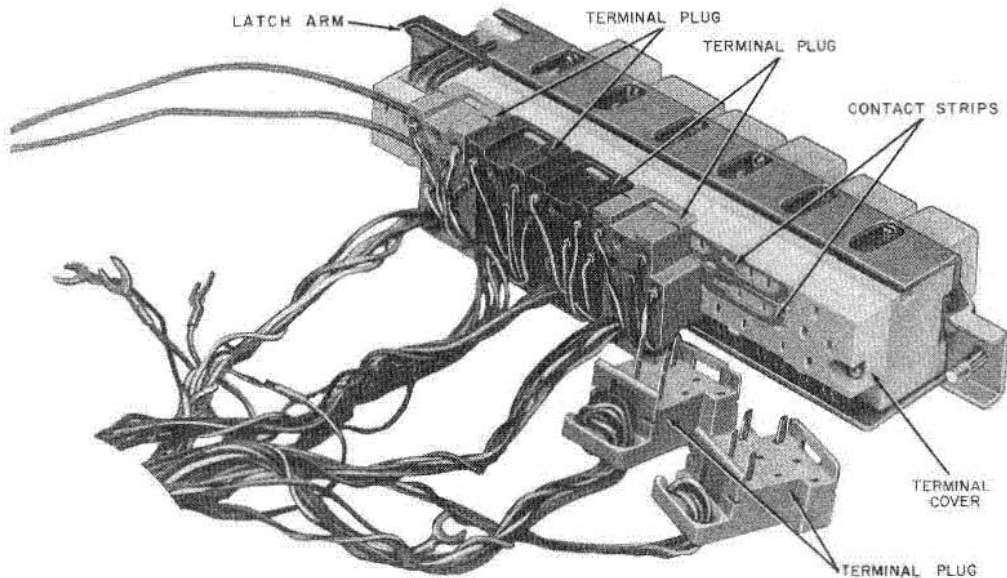


Fig. 7.—Typical Connections to 635-Type Key

**Note:** When converting keys in concentrator type telephone sets from locking to nonlocking, an insulator must be installed over the key contacts associated with the operation of the concentrator units. (Refer to the section on modular keys in Division 512 for details on installing the insulator/insulating detail).

2.17 To provide a second hold button for the priority hold feature on early production telephone sets, install a 599H (MD) or 657L key in the first key position. Current production telephone sets equipped with 635-type keys will require the installation of all or part of a D-180411 Kit of Parts (depending on the type mounting cord) in the second key module. The kit consists of the following:

- 1—635A5C key
- 1—840151161 plug assembly
- 1—840151120 contact strip assembly
- 1—840151138 contact strip assembly

**Note:** Telephone sets equipped with D120K and D200S mounting cords use the complete kit of parts. Telephone sets equipped with D120M and D200AA mounting cords require the 635A5C key and 840151161 plug assembly only.

2.18 The 635AD5C key module is equipped to provide four pickup keys, one cutoff key, and a hold key. The key module is used in the first module of the telephone set and has to be equipped with 2 contact strip assemblies 2.14(1)(c) and a piggy-back adapter 840155501 (Fig. 10) accommodates the slate 508-type mounting cord plug.

2.19 The 811218585, (P-12A858) blocking ring is used to make an individual pickup key inoperative on the 598-, 599-, 656-, and 657-type keys and is installed as follows:

- (1) Remove lamp block assembly from key (Fig. 11).
- (2) Remove button retainer.

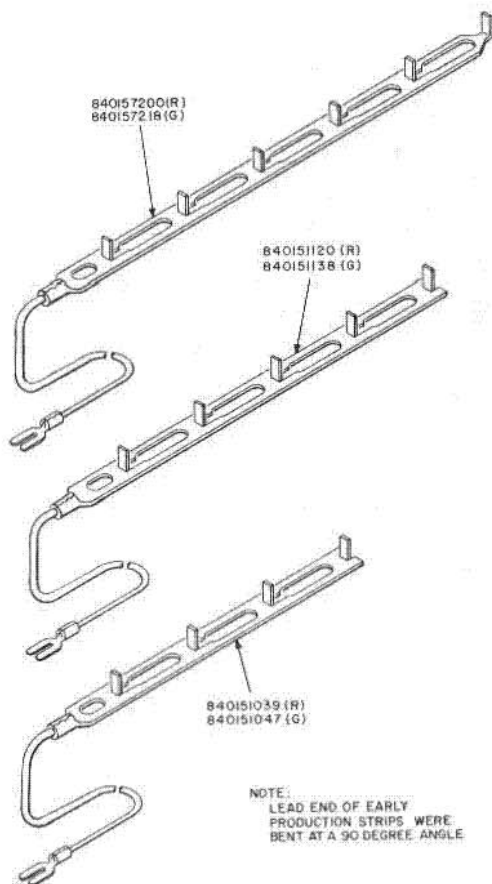


Fig. 8—Contact Strip Used With 635-Type Keys

- (3) Place blocking rings in plungers to be blocked.
- (4) Reassemble button retainer and lamp block assembly.

**2.20** The 812365948 (P-23P594) button stop is used to make an individual pickup key inoperative on the 635-type key and is installed as follows:

- (1) Remove collar.
- (2) Remove button and cap.

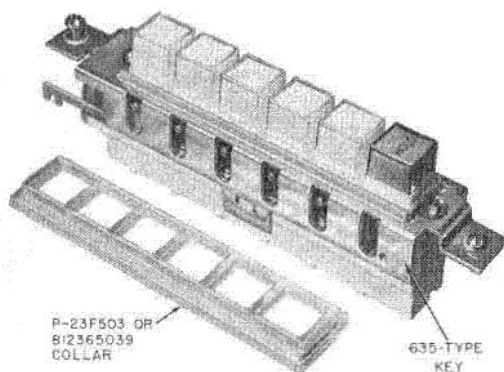


Fig. 9—Current Production 635-Type Key and Collar

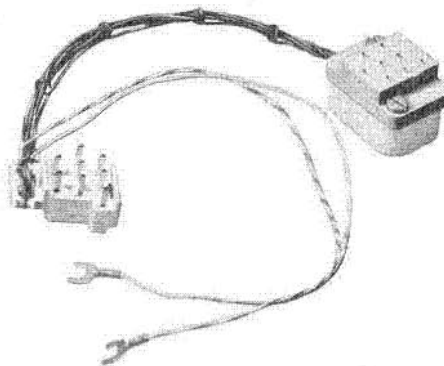


Fig. 10—810155501 Adapter

- (3) Place button stop over lamp (Fig. 12).
- (4) Reinstall button, cap, and collar.

**2.21** Any unused key module should be replaced by a 105B (early production sets) or a 111B (current production sets) apparatus blank.

**2.22** Insulate and store unused 508-type plugs on the 111B apparatus blank as shown in Fig. 13. Individual 508-type plugs can be insulated and stored by taping an 814632659 (P-46C265) cover over the contacts of the plug.

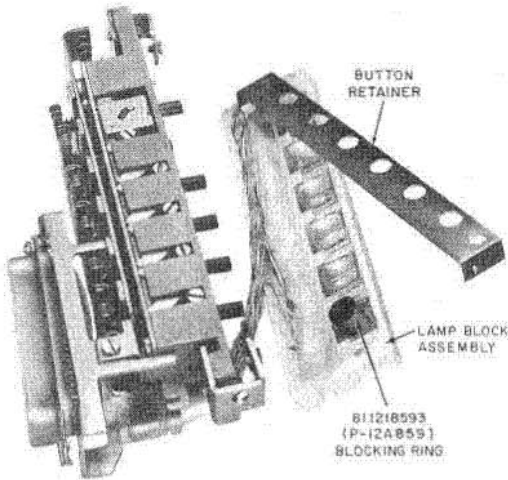


Fig. 11—Blocking Ring Installed in 590 or 650 Series Keys

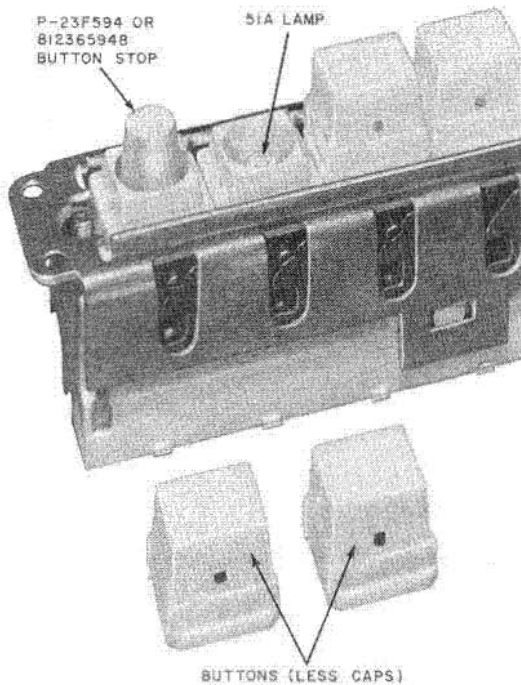


Fig. 12—Button Stop Installed in 635-Type Key

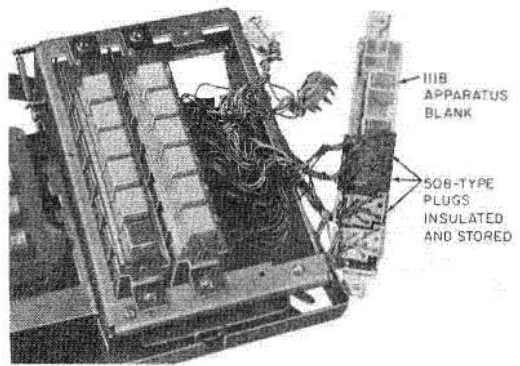


Fig. 13—Insulating and Storing 508-Type Plugs on 111B Apparatus Blank

2.23 To provide multiline conference feature it is necessary to replace the keys. Refer to Section 512-230-104 for specific conversion procedure.

### Dials

2.24 The dial mounting bracket will accommodate either a rotary dial or a TOUCH-TONE® dial. To interchange dials:

- (1) From TOUCH-TONE service to rotary, add 812651974 (P-26E197) and 812651982 (P-26E198) adapter bracket to rotary dial (Fig. 14).
- (2) From rotary to either 10- or 12-button TOUCH-TONE service, dial mounts directly to frame assembly.
- (3) Refer to appropriate Reference section for faceplate and mat ordering information.

### Buzzers

2.25 Current model CALL DIRECTOR sets are furnished from the factory equipped with a KS-20419L1 (10 volt AC only) buzzer (Fig. 15).

2.26 In early model CALL DIRECTOR sets, KS-8100 type buzzers were mounted at location shown in Fig. 15 and 17.

2.27 If a second buzzer is required, a KS-20419L1 can be mounted at any convenient location using a single screw and KS-8109L2 at location shown in Fig. 15 or 17.

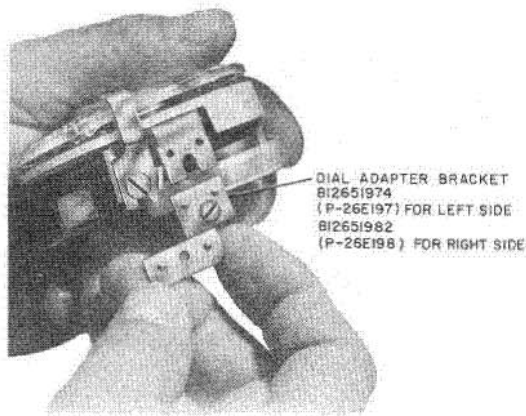


Fig. 14—Placing Dial Adapter Brackets on Rotary Dial When Converting from TOUCH-TONE Dial

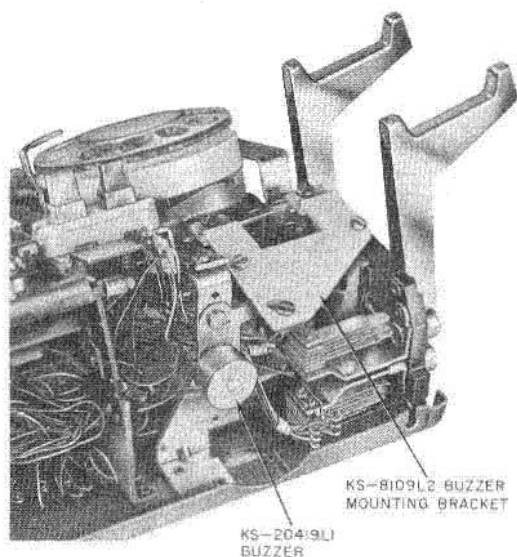


Fig. 15—Mounting Location for First Buzzer

**Note:** Telephone sets manufactured between June 1964 and April 1966 and equipped with a one-piece bezel must have the 814454096 (P-44E409) bracket assembly [includes modified 814454107 (P-44E410) bracket, Fig. 16] installed before the KS-8109L2 buzzer can be mounted.

### Station Busy Lamp

2.28 To provide station busy lamp feature with early production telephone sets equipped for both handset and headset operation and 590- and 650-series keys install a 840362909 Printed Wiring Board Assembly, ordered separately, (Fig. 18). The printed wiring board assembly is provided with adhesive backing to permit mounting on any clean, flat surface.

**Note:** Telephone sets associated with line concentrator units will have the 819040338 (P-90D033) printed wiring board assembly mounted in the 235- or 236-type KTU's.



*Lamps used with these sets to indicate station busy lamp feature should be of the 51A type.*

2.29 To provide station busy lamp feature with current production telephone sets equipped for both handset and headset operation and 635-type keys, a D-180463 Kit of Parts consisting of an 840362909 Printed Wiring Board Assembly and 840361836 plug assembly, ordered separately, must be installed (Fig. 18).

2.30 The printed wiring board assembly is provided with adhesive backing to permit mounting on any clean, flat surface.

2.31 The plug assembly is used to extend the A lead through the chaining switch to the printed wiring board.

**Note:** If all modules are not equipped with keys only the printed wiring board assembly is required. The plug assembly is used to provide the chaining switch function for the last key if all modules are equipped with keys.

### Polarity Guard

2.32 The 819041971 (P-90D197) guard assembly is provided with adhesive backing to permit mounting on any clean, flat surface.

**Note:** Polarity guards should be installed only when specified by local instructions for end-to-end signaling purposes when battery and ground reversals are encountered.

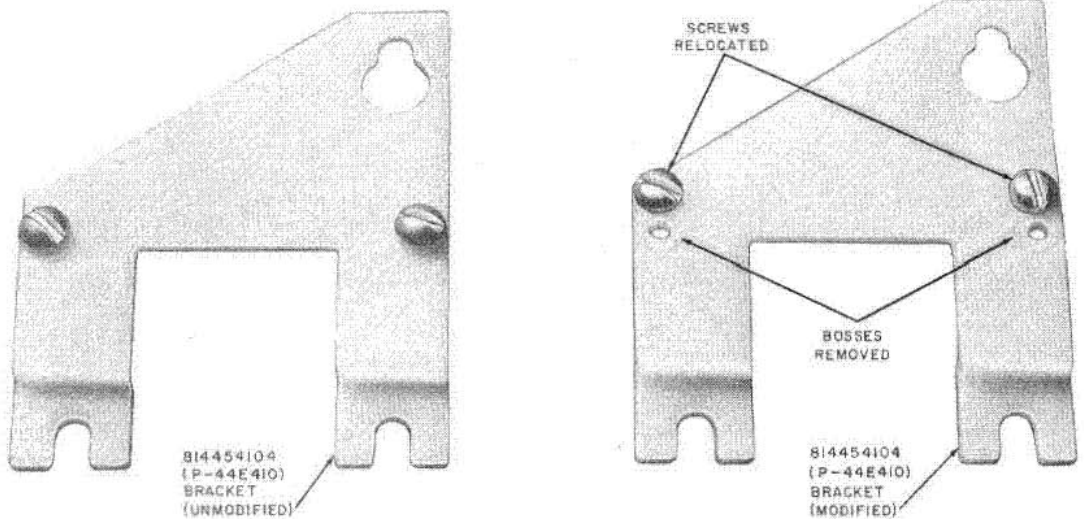


Fig. 16—Buzzer Mounting Bracket Assemblies

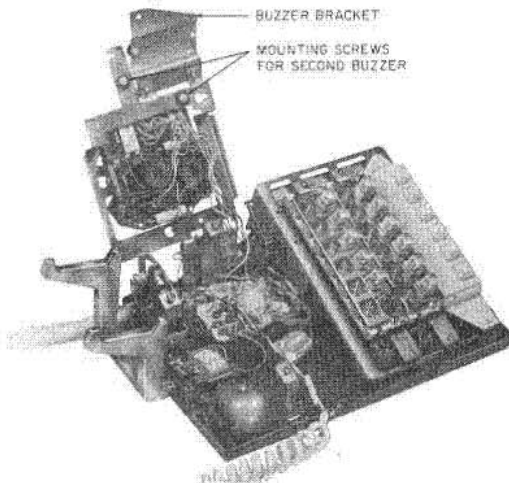


Fig. 17—Mounting Location For Second KS-8109L1 Buzzer

### Speakerphone Transmitter

2.33 Telephone sets that are intended for use with speakerphone can be modified by

installing a 667-type transmitter (Fig. 19) for early production sets or a 679A transmitter (Fig. 20) for current production sets, and replacing the 8R dial with an 8C dial on rotary dial sets.

2.34 The 667-type transmitter is equipped with a connector which uses the plug of the 3rd key module on 18-button sets or the 5th key module on 30-button sets. The 679A transmitter is equipped with a receptacle block which accommodates the slate 508-type plug associated with the last key module.

### Mounting Cord

2.35 After the mounting cord plugs are mated with the connectors on the connector cables the proper covers or service fittings should be used to protect the multiconductor connectors and plugs (see Division 461 for information on adapters, covers, and service fittings).

## 3. MAINTENANCE

3.01 Refer to the proper Reference section for ordering information on replaceable components.

3.02 Refer to appropriate section in Division 501 for maintenance information on handsets,



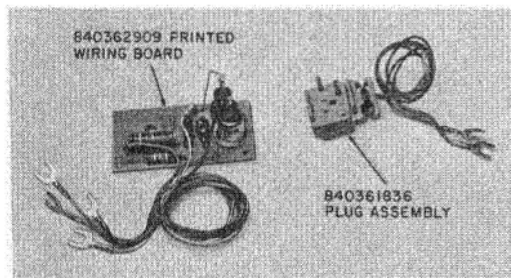


Fig. 18—**PD-180463 Kit of Parts—Station Busy Lamp Feature**

dials, headsets, mounting cords, and ringers. Modular key and transmitter maintenance is covered in Division 512.

**Caution:** Do not carry CALL DIRECTOR telephone sets by the switchhook assembly. Switchhook failure may be caused by applying excessive strain to the switchhook and mounting arrangement.

### 3.03 To replace a mounting cord assembly:

- (1) Remove housing.
- (2) Remove mounting cord clamp.
- (3) Loosen key frame locking screws. [Located on front of key frame on current production telephone sets (Fig. 21) and on the side of key frame on early production sets (Fig. 22)].
- (4) Raise key frame (Fig. 21 and 22).
- (5) Remove dial mounting plate (do not disconnect leads).
- (6) Disconnect mounting cord leads at network, terminal board, and amplifier (when provided).

- (7) Remove mounting cord retaining screws on each side of key frame (early production sets).

- (8) Pull down on mounting cord frame to disengage plugs from key connectors on early production sets or disconnect individual 508- or 509-type plugs on current production sets.

- (9) Install cord assembly in reverse order.

### 3.04 To replace a defective lamp in the current production telephone sets, simply remove cap from key and insert a 553C tool through opening in button to remove lamp. In early production sets it was necessary to remove faceplate, cap, key collar, and button or shield to gain access to lamps.

### 3.05 To remove a defective ringer from early or current production sets:

- (1) Remove housing.
- (2) Loosen dial mounting plate and move to left.
- (3) Disconnect ringer leads.
- (4) Remove N1A or T1A ringer mounting screws from underside of baseplate (Fig. 23) or



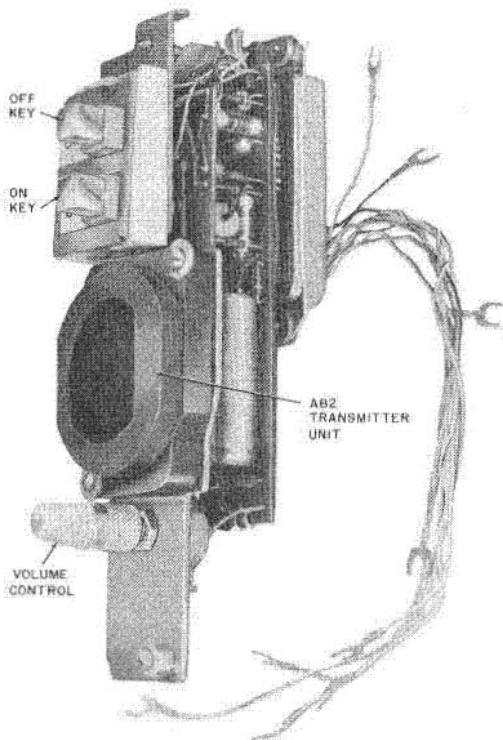


Fig. 19—667-Type Transmitter

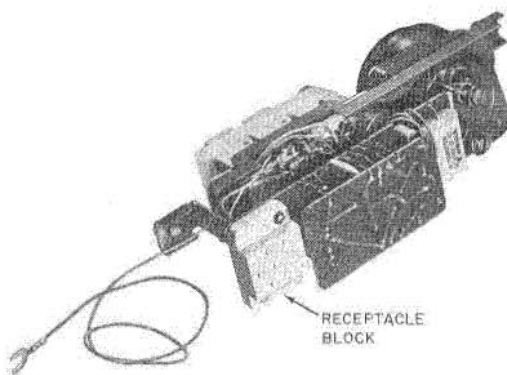


Fig. 20—679A Transmitter

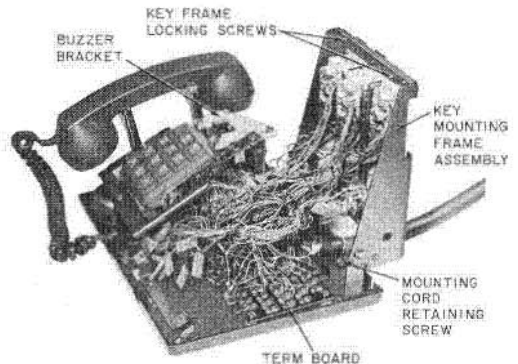


Fig. 21—Key Frame Raised in Current Production Telephone Set

loosen captive screws of D1-type ringers (Fig. 24).

(5) Lift out ringer.

3.06 The use of the head telephone set with jack equipped telephone set requires an amplifier to equalize the level of the N1 transmitter with the T1 transmitter in the handset. If the headset transmission is too loud or inadequate the 241-type amplifier should be replaced.

3.07 In early production sets a 151D amplifier is used. If the headset transmission is too loud replace the 30 ohm resistor on TB2 between terminals 3 and 4 with a 62 ohms KS-13490L1 1/2-watt resistor.

**Note:** If handset transmission is too loud check connections to the amplifier to insure that the handset transmitter output is not being amplified.

3.08 Two KS-14837 capacitors on terminals 1 and 5, and 2 and 6 may be replaced if defective. These capacitors are polarized electrolytics and polarity must be maintained.

3.09 When an operated pickup key does not remain depressed or release any previously operated key on early production sets refer to 2.12 and Fig. 6 for positioning information on these keys.

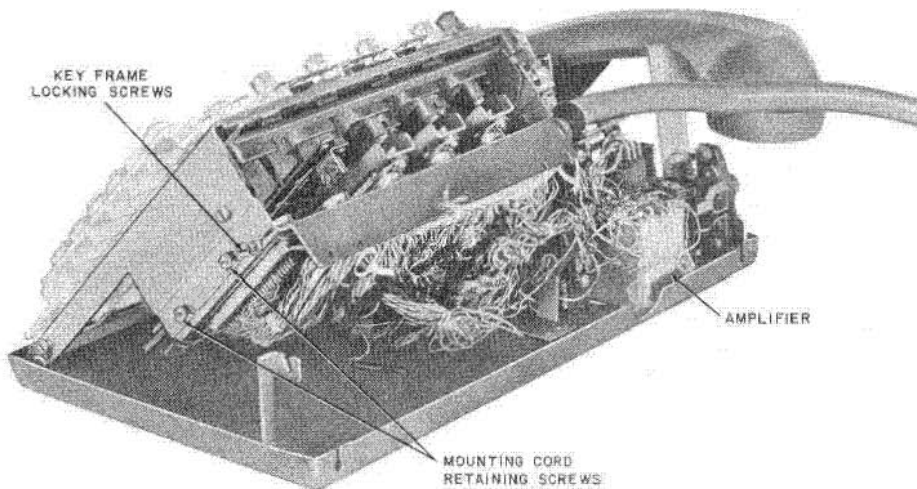


Fig. 22—Key Frame Raised on Early Production Telephone Set

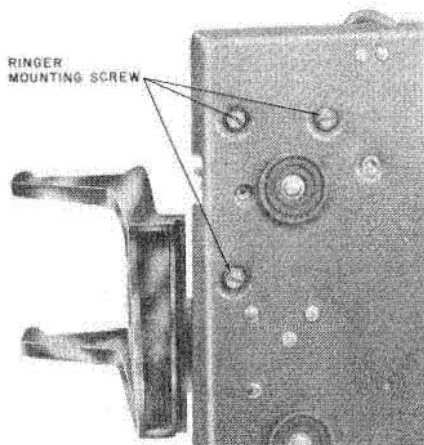


Fig. 23—Location of Mounting Screws for N1A or T1A Ringers

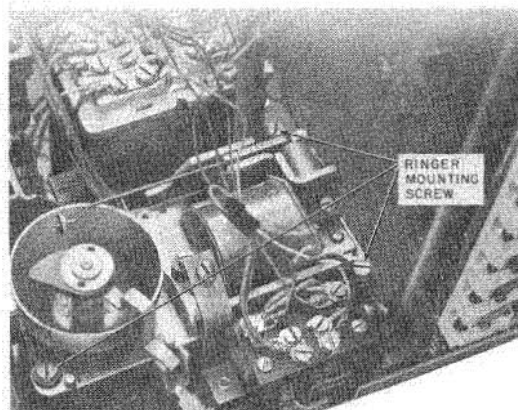


Fig. 24—Location of Mounting Screws for D1-Type Ringers

3.10 When an operated pickup key does not remain depressed or release any previously operated key on later or current production sets:

(1) Check that key latch arm is properly seated in the pivot bar (Fig. 25 and 26).

(2) Adjustment of the key can be made by loosening the mounting screws and shifting the key toward the front of set so that there is no play between the latch arm and pivot bar when a key is operated.

(3) If malfunction is related to one key module test key for proper operation.

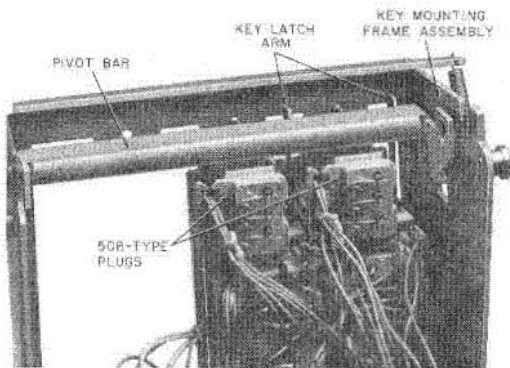


Fig. 25—Rear View of Pivot Bar (Current Production Set Equipped With 635-Type Keys)

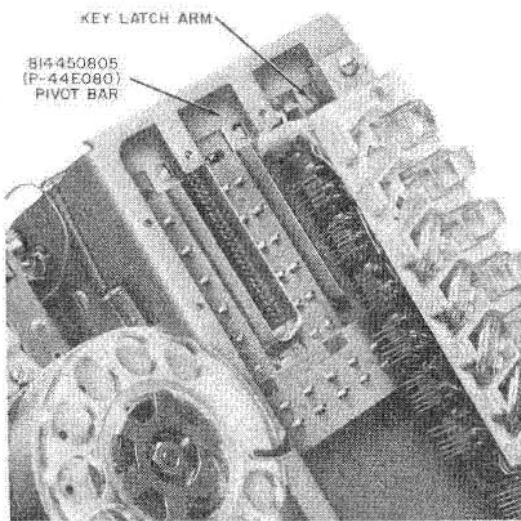


Fig. 26—Top View of One-Piece Bar (Later Production)

3.11 To prevent release button from binding on headset equipped early production telephone sets install a 811256726 (P-12E672) collar as follows:

- (1) Remove faceplate assembly.
- (2) Remove two switch assembly screws (Fig. 27).

- (3) Remove button assembly.
- (4) Place 811256726 (P-12E672) collar around 811159284 (P-11E928) plunger (Fig. 27).
- (5) Reassemble switch assembly.

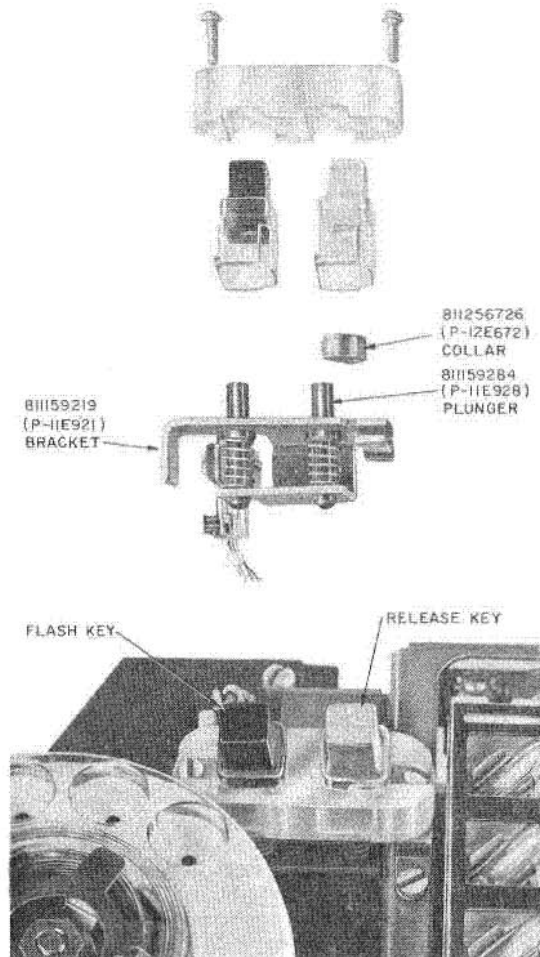


Fig. 27—811159872 (P-11E987) Switch Assembly

3.12 Improper operation of 667-type transmitters may be caused by interference between the printed circuit board and terminal screw of TBVI of the cord assembly. This condition can be

**SECTION 502-600-100**

corrected by replacing 801808015 (P-180801) 5/16-inch machine screw with 801808007 (P-180800) 1/4-inch binder head machine screw.

**Note:** The longer screws were used in D50B, D80B, D120B, and D200B cord assemblies.

**3.13** To eliminate mechanical vibration pickup in the 667-type transmitter install a modified 667B transmitter which includes a 1-inch vinyl sleeve which is to be placed over the pivot bar spring. Order as "Transmitter, 667B modified per D-180196."

## SERVICE

### 630A, B, C, D AND 631A, B, C, D TELEPHONE SETS

#### 1. GENERAL

**1.01** This section contains connection and maintenance information for 18- and 30-button, rotary dial, general purpose CALL DIRECTOR<sup>®</sup> telephone sets.

**1.02** This section is reissued to:

- Add connections for speakerphone with external transmitter (even-count color-coded cords)
- Add reference to Division 512 for speakerphone modification procedures
- Change title of section from 630- and 631-type telephone sets
- Show all codes of these telephone sets are now MD
- Remove common maintenance information which is now covered in Section 502-600-100.

#### 2. CONNECTIONS

**2.01** These sets are factory-wired for use with 1A1, 1A2, or 6A key telephone systems. They may also be used with 1A KTS line circuits by modifying the telephone set as shown in Table A. Line circuits for 1A, 1A1, or 1A2 KTS may be connected to the same set under the following conditions:

- (a) 1A1 or 1A2 KTS lines must be connected to the first key module with 1A lines connected to supplementary key modules.
- (b) 1A, 1A1, or 1A2 KTS lines should not be connected to the same 6 line key module.
- (c) 1A, 1A1, and 1A2 KTS lines appearing behind a manual switchboard should not be intermixed on a CALL DIRECTOR telephone set due to the different time out intervals provided by the associated KTU's.

**2.02** Tip, ring, A, and lamp leads of lines wired for supplementary hold feature must be routed per SD-69530-01 and Division 518 rather than directly to the line circuit. Supplementary hold can be furnished in either of the following arrangements.

- (a) **I Hold:** Transfer **A** lead from ground to -24 volt (Fig. 7); connect stored (BR-V) [S-Y] lead from first module plug to any spare mounting cord lead using spare terminal or D-161488 connector. Mounting cord lead becomes SP lead at key equipment (Fig. 7).
- (b) **Priority Hold:** Substitute the 599- or 657-type key in the first module with a 599H or 657H key which is equipped with a second hold button and wired per Fig. 8 to transfer the **A** lead from ground to -24 volt.

**2.03** To convert a key position from pickup (locking) to signal (nonlocking) remove the screw detail P-10E837 entirely from plunger at the key position to be converted. Make the necessary wiring changes as shown in Table B.

**2.04** At the key telephone system, connector cable lead termination for sets equipped with even-count color-coded cords differ from those for sets equipped with MD color-coded cords (Fig. 3 and 4). If MD sets are replaced by current production sets, it will be necessary to rearrange the connector cable leads at the key telephone system.



*Some spade-tipped conductors or mounting cord leads are insulated with tubing which should be cut off with electrician scissors or diagonal pliers. Other conductors are insulated with stiff plastic pockets. Pinch open the pocket to release the spade tips.*

#### ◆3-Type Speakerphone◆

**2.05** A 661A (MD) or 667-type speakerphone transmitter unit may be used in the third

key position of an 18-button set or fifth key position of a 30-button set when internal speakerphone feature is required.

**2.06** To retain the maximum number of keys in these CALL DIRECTOR telephone sets and still have speakerphone feature, a 666A(MD) or 666B transmitter and 760A loudspeaker may be installed as adjuncts to the telephone set. Spare leads from the first module are used to supply the external speakerphone function (Table D). Refer to Sections 512-620-440 (630-type MD) and 512-620-441 (631-type MD) for complete connections to 3-type speakerphone.

**2.07** Replace the 8R dial with an 8C dial when a telephone set is modified for use with 3-type speakerphone system.

**2.08** Maintenance of handset, dials, ringers, and modular keys is outlined in sections covering these components located in Division 501.

**2.09** Refer to Section 502-600-100 for common installation and maintenance information for these CALL DIRECTOR telephone sets.

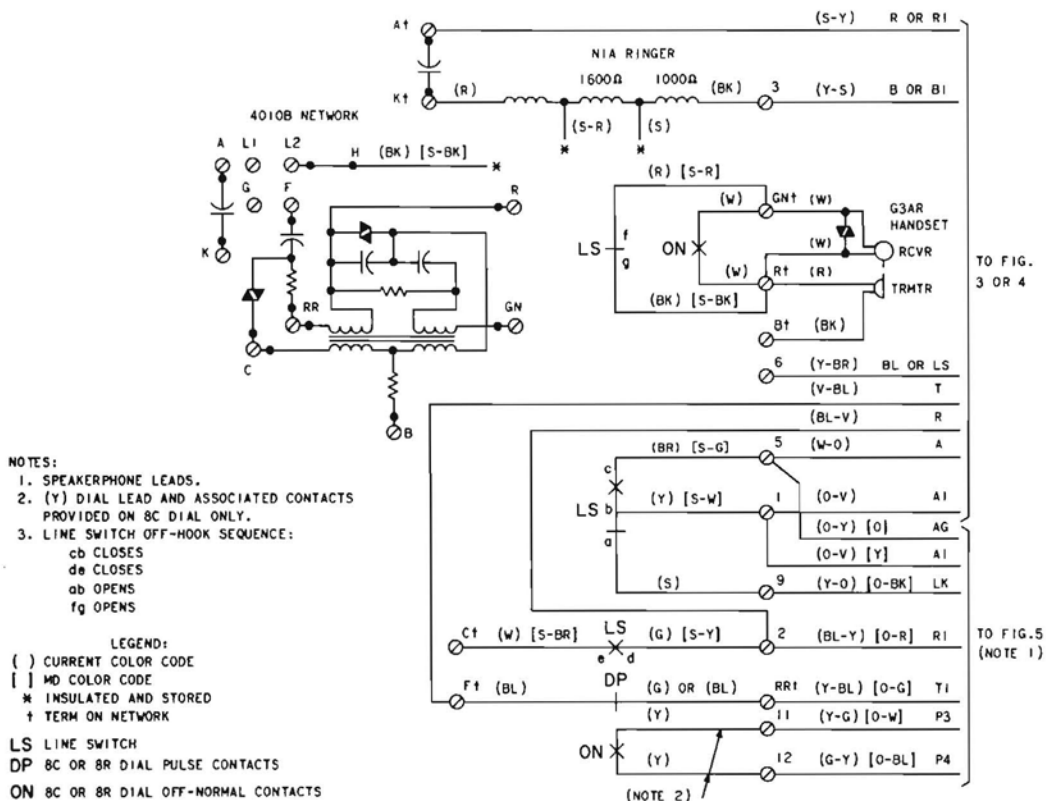


Fig. 1—630- and 631-Type Telephone Set, Connections (Current Production)

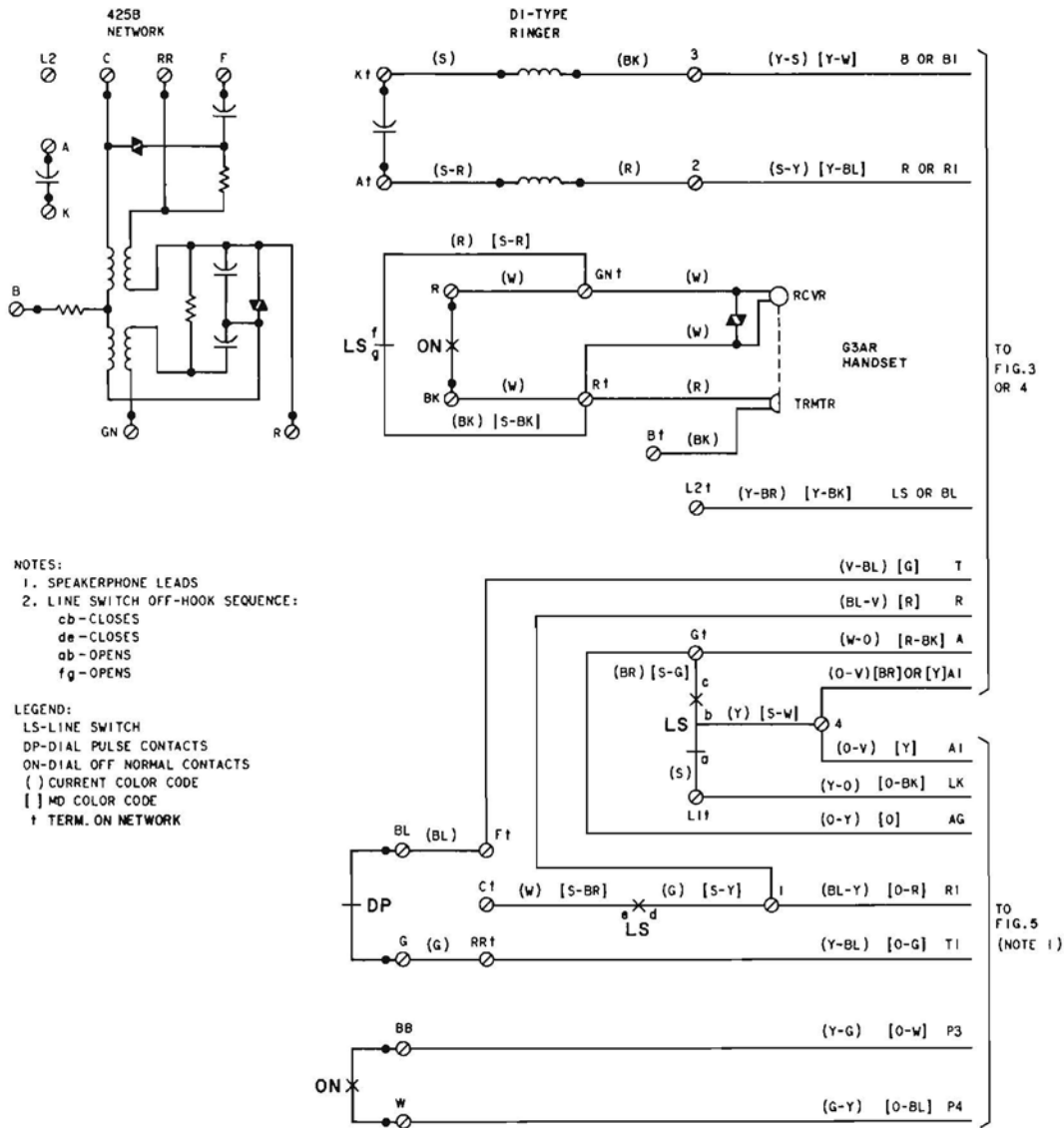


Fig. 2—630- and 631-Type Telephone Set, Connections (Early Production)

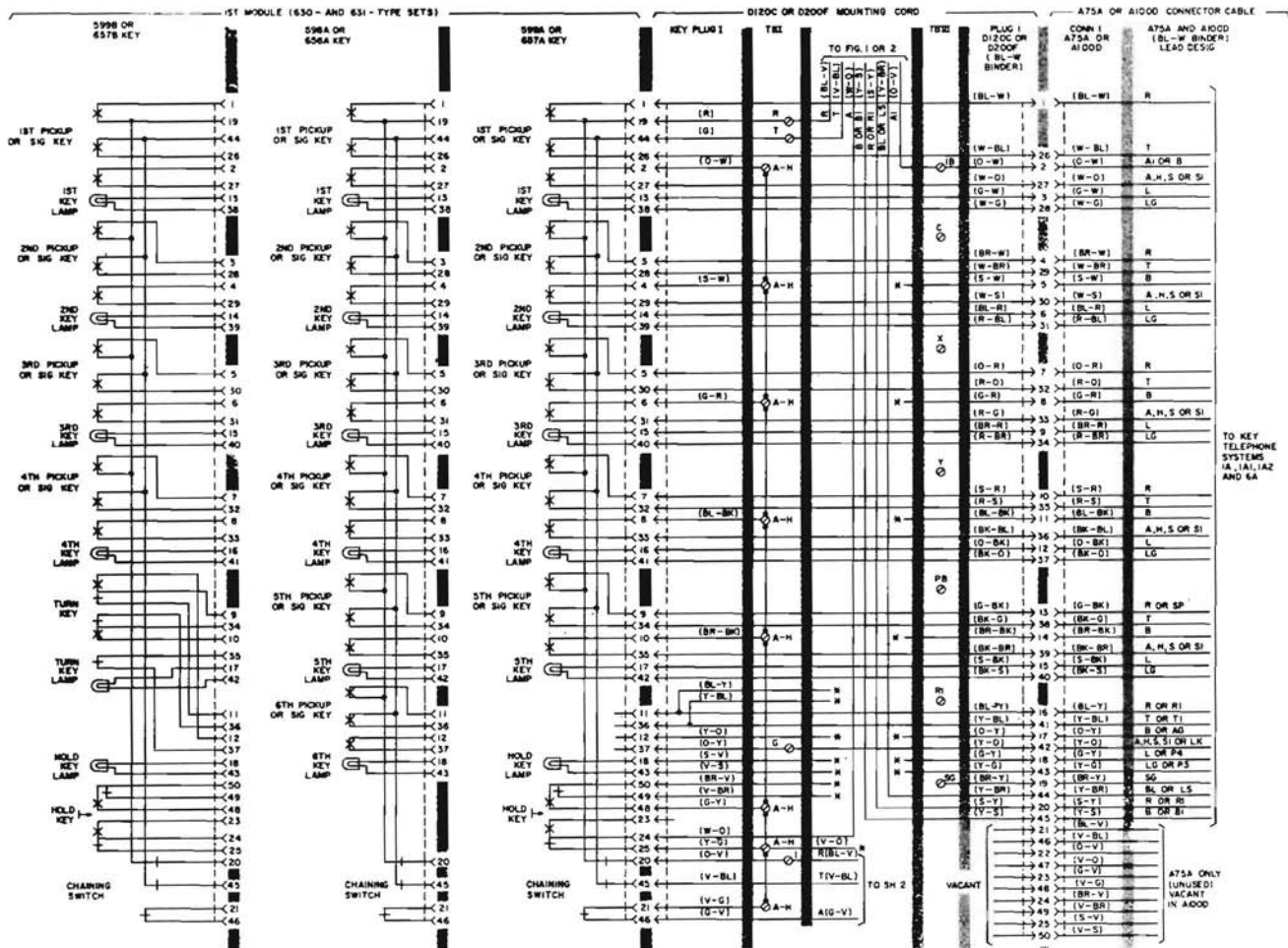


Fig. 3—Module Arrangements and Cord and Cable Connections for Sets Equipped With Even-Count Color-Coded Cords (Sheet 1 of 3)



NOTES:

1. WITH 599A OR 657A KEY IN FIRST MODULE, SPARE TIPPED LEADS FROM KEY PLUG I AND MOUNTING CORD BINDER GROUP (BL-W) ARE INSULATED AND STORED AS SHOWN.

WITH 599B OR 657B KEY IN FIRST MODULE, (BR-BK) LEAD MUST BE REMOVED FROM A-H OF TB1, INSULATED AND STORED.

WITH 599A OR 656A KEY IN FIRST MODULE, CONNECT (V-O) STRAP FROM A-H OF TB1 TO TERMINAL 5 ON TELEPHONE SET TERMINAL BOARD. CONNECT (V-O) AND (BR-BK) LEADS FROM KEY PLUG I TO A-H OF TB1 TO EXTEND LAMP LEADS CONNECT (S-V) AND (V-S) KEY PLUG LEADS TO (G-Y) AND (Y-G) MOUNTING CORDS LEADS RESPECTIVELY USING SPARE TERMINALS OR D-15488 CONNECTORS.

2. FOR USE WITH 1A KEY SYSTEM ONLY, MOVE A1 (O-V) STRAP FROM 1B TO 5G ON TB2L AND MAKE CONVERSION SHOWN IN TABLE A.

3. FOR ADD-ON CONFERENCE CONTROL IN THE 6A KEY TELEPHONE SYSTEM, CONNECT (BR-Y) MOUNTING CORD LEAD (O-W BINDER GROUP) TO TB2L-PB. ALSO REMOVE COMMON LEAD OF ADD-ON CONFERENCE BUTTON (CONVERTED TO SIGNALING) FROM A-H TERMINAL AND CONNECT TO PBL THE 617A KEY MAY ALSO BE USED IN A SIMILAR MANNER ALSO SEE NOTE 4.

4. WHEN THE 617A KEY IS REQUIRED AS A DUAL-PURPOSE KEY, THE BRASS STRAP BETWEEN THE 1B AND 5G TERMINALS OF THE KEY MAY BE REMOVED. USE 15W CORD OR EQUIVALENT TO CONNECT IN TERMINAL OF 617A KEY TO A DISSEMBLAR GROUND OR A NONGROUNDING CIRCUIT.

■ INSULATED AND STORED  
† DEAD ENDED

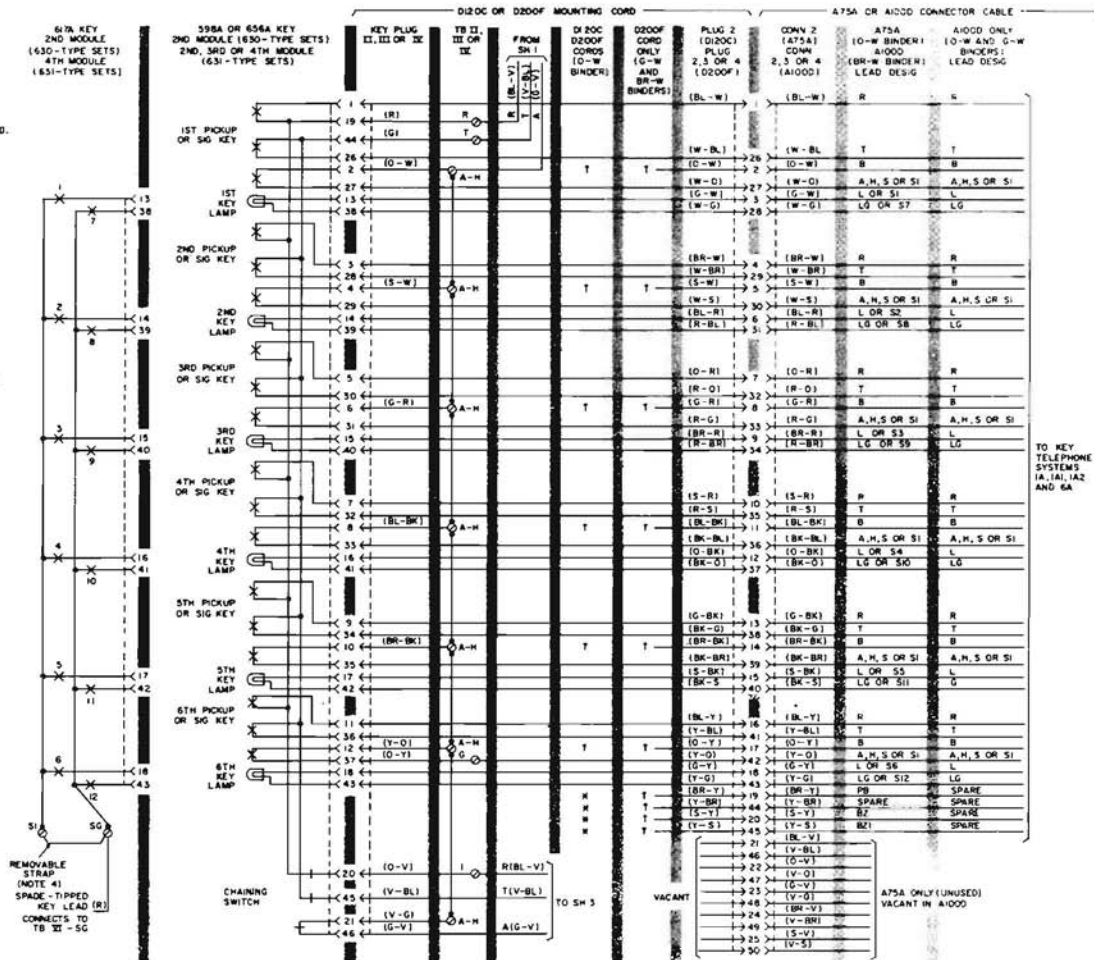
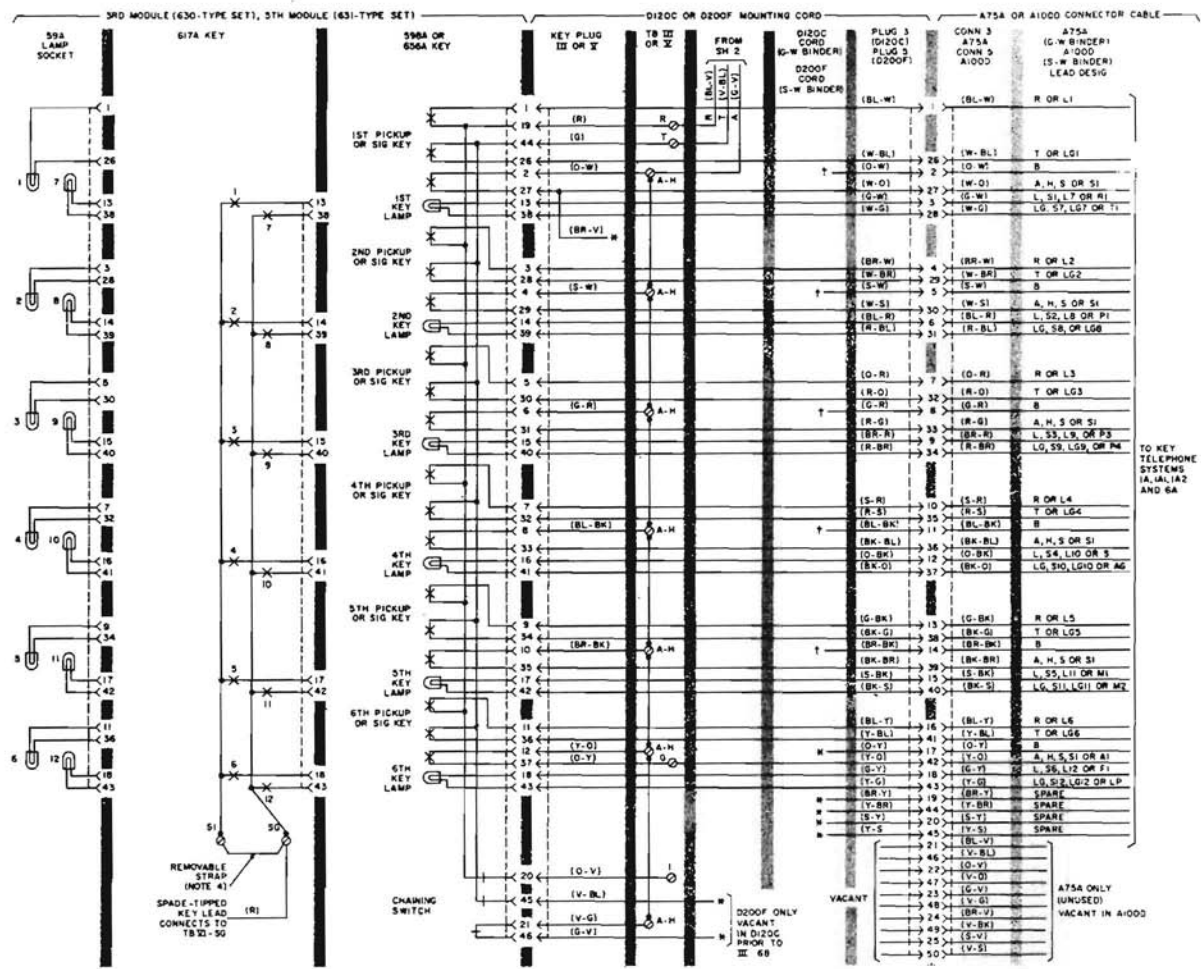


Fig. 3—Module Arrangements and Cord and Cable Connections for Sets Equipped With Even-Count Color-Coded Cords (Sheet 2 of 3)



◆ Fig. 3—Module Arrangements and Cord and Cable Connections for Sets Equipped With Even-Count Color-Coded Cords (Sheet 3 of 3) ◆

TABLE A

**1A AND 1A1 SYSTEM CONVERSIONS  
CONNECTIONS FOR SETS USING D120B(MD), D120C, D200B(MD), OR D200F MOUNTING CORDS**

KEY TELEPHONE SYSTEM CENTRAL OFFICE OR PBX LINE FEATURE	LEADS													
	HOLD KEY					CHAINING SWITCH					STRAP		LINE SWITCH	
						630 AND 631 SETS			631 SETS ONLY					
	(Y-G) [BK-BL]	(G-Y) [BK-W]	(V-O) [S-W]	(BR-V) [S-Y]	(V-BR) [S-BK]	(V-G) [BL-W] 1ST KEY	(V-G) [BL-W] 2ND KEY	(V-G) [BL-W] 3RD KEY	(V-G) [BL-W] 4TH KEY	(V-G) [BL-W] 5TH KEY	(BL-V) [R]	(O-V) [Y]	(BR) [S-G]	
1A1 or 1A2 only (as furnished by shop)	A-H (I)	A-H (I)	*	*	*	A-H (I)	A-H (II)	A-H (III)	A-H (IV)	A-H (V)	R (I)	1B (VI)	†	
First key unit 1A1 or 1A2 remaining key units 1A	A-H (I)	§	*	1‡ (I)	R (II)	§	A-H (II)	A-H (III)	A-H (IV)	A-H (V)	R (I)	1B (VI)	†	
First and second key units 1A1 or 1A2; remaining key units 1A	A-H (I)	§	*	1‡ (II)	R (III)	A-H (I)	§	A-H (III)	A-H (IV)	A-H (V)	R (I)	1B (VI)	†	
First, second, and third key units 1A1 or 1A2; remaining key units 1A	631 sets only	A-H (I)	§	*	1‡ (III)	R (IV)	A-H (I)	A-H (II)	§	A-H (IV)	A-H (V)	R (I)	1B (VI)	†
First through fourth key units 1A1 or 1A2; fifth key unit 1A		A-H (I)	§	*	1‡ (IV)	R (V)	A-H (I)	A-H (II)	A-H (III)	X (VI)	A-H (V)	R (I)	1B (VI)	†
1A only (see connection note 2 in Fig. 3)	§	A-H (I)	*	R1 (VI)	R (I)	A-H (I)	A-H (II)	A-H (III)	A-H (IV)	A-H (V)	R1 (VI)	SG (VI)	6 (VII)	

Note: Roman numerals in parentheses indicate terminal board designations.

\* Lead is spade tipped, insulated, and stored.

† BR lead connects to terminal 5 of telephone set terminal board when station busy lamp circuit is not required or to terminal 6 when station busy lamp is required.

‡ Disconnect, insulate, and store R (BL-V) chaining lead.

§ Connect to terminal X of TBIV on 18-button sets or to terminal X of TBVI on 30-button sets.

( ) Current color code

[ ] MD color code

## Notes for Fig. 4

- WITH 539A OR 657A KEY IN FIRST MODULE, SPADE TIPPED LEADS FROM KEY PLUG I AND MOUNTING CORD BINDER GROUP (W) ARE INSULATED AND STORED AS SHOWN.  
WITH 599B OR 657B KEY IN FIRST MODULE, (G-BL) LEAD MUST BE REMOVED FROM A-H OF TBI, INSULATED AND STORED.  
WITH 596A OR 456A KEY IN FIRST MODULE, CONNECT (S-W) STRAP FROM A-H OF TBI TO TERMINAL G OF NETWORK, CONNECT (S-BR) AND (S-BL) LEADS FROM KEY PLUG I TO A-H OF TBI TO EXTEND LAMP LEADS. CONNECT (BR-F) AND (BR-BK) KEY PLUG LEADS TO (D-BL) AND (D-W) MOUNTING CORD LEADS RESPECTIVELY USING SPADE TERMINALS OR D-16148B CONNECTORS.
- FOR USE WITH 1A KEY SYSTEM ONLY, MOVE A1 (BR) STRAP FROM 1B TO 5G OR TBXX (630) OR 5X (631). MAKE CONVERSION SHOWN IN TABLE A.
- FOR ADD-ON CONFERENCE CONTROL IN THE 6A KEY TELEPHONE SYSTEM, CONNECT (G-W) MOUNTING CORD LEAD ((R) BINDER GROUP) TO TERMINAL PB OR TBIX OR XI, ALSO REMOVE COMMON LEAD OF ADD-ON CONFERENCE BUTTON (CONVERTED TO SIGNALING) FROM A-H TERMINAL AND CONNECT TO PB. THE 617A KEY MAY ALSO BE USED IN A SIMILAR MANNER. ALSO SEE NOTE 5.
- WHEN THE 617A KEY IS REQUIRED AS A DUAL-PURPOSE KEY, THE BRASS STRAP BETWEEN THE S1 AND 5G TERMINALS OF THE KEY MAY BE REMOVED. USE MIN CORD OR EQUIVALENT TO CONNECT S1 TERMINAL OF 617A KEY TO DISSIMILAR GROUND OR A NONGROUNDING CIRCUIT.
- TERMINAL DESIGNATIONS ON TBI THRU TBXX ARE SHOWN FOR D120R AND D200B CORDS. TERMINAL DESIGNATIONS FOR D120A AND D200A DIFFER AS SHOWN BELOW.

TERMINAL BOARD	D200B	D200A
TBI	G	H1
	AH	A1
TBII	G	H2
	AH	A2
TBIII	G	H3
	AH	A3
TBIV	G	H4
	AH	A4
TBV	G	H5
	AH	A5
TBVI	C	C1, C2, C3, C4
	X	---
	PB	---
	---	G1, G2, G3, G4
	---	12, 53, 54, 55

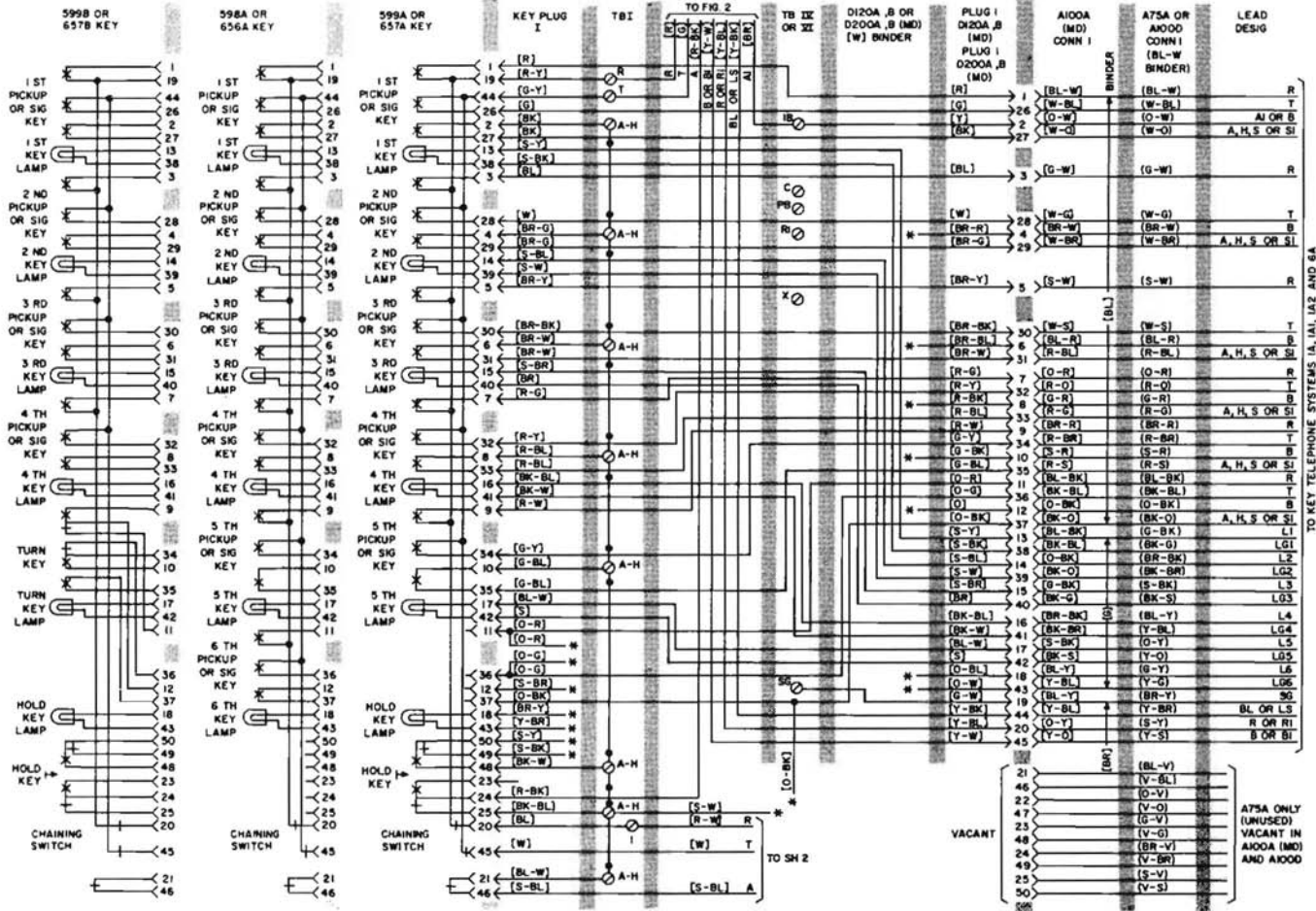
TERMINAL BOARD	D120B	D120A
TBI	G	H1
	AH	A1
TBII	G	H2
	AH	A2
TBIII	G	H3
	AH	A3
TBIV	C	C1, C2
	X	---
	PB	---
	---	G1, G2
	---	52, 53

- W INSULATED AND STORED.  
 T DEAD ENDED.  
 F 1A AND 1A1 SPEAKERPHONE SYSTEM.  
 S 2-TYPE SPEAKERPHONE SYSTEM.  
 I 1 CURRENT COLOR CODE.  
 I 1 NO COLOR CODE.

1 ST MODULE (650- AND 651- TYPE SETS)

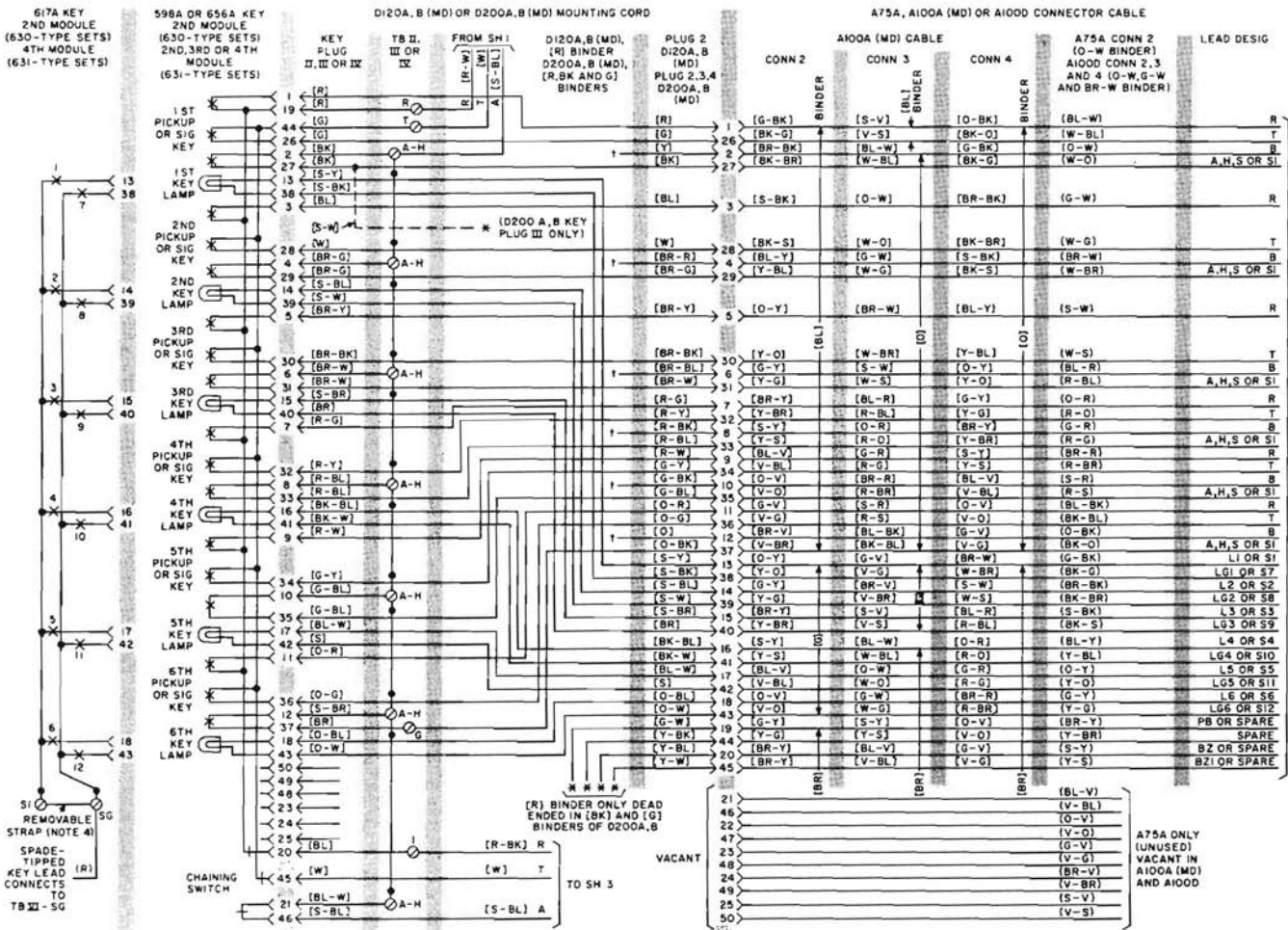
D120A, B (MDI OR D200A, B (MD) MOUNTING CORD

CONNECTOR CABLE



TO KEY TELEPHONE SYSTEMS (A, IA, IA2 AND 6A)

Fig. 4—Module Arrangements and Cord and Cable Connections for Sets Equipped With MD Cords (Sheet 1 of 3)



TO KEY TELEPHONE SYSTEMS 1A, 1A1, 1A2 AND 6A

Fig. 4—Module Arrangements and Cord and Cable Connections for Sets Equipped With MD Cords (Sheet 2 of 3)

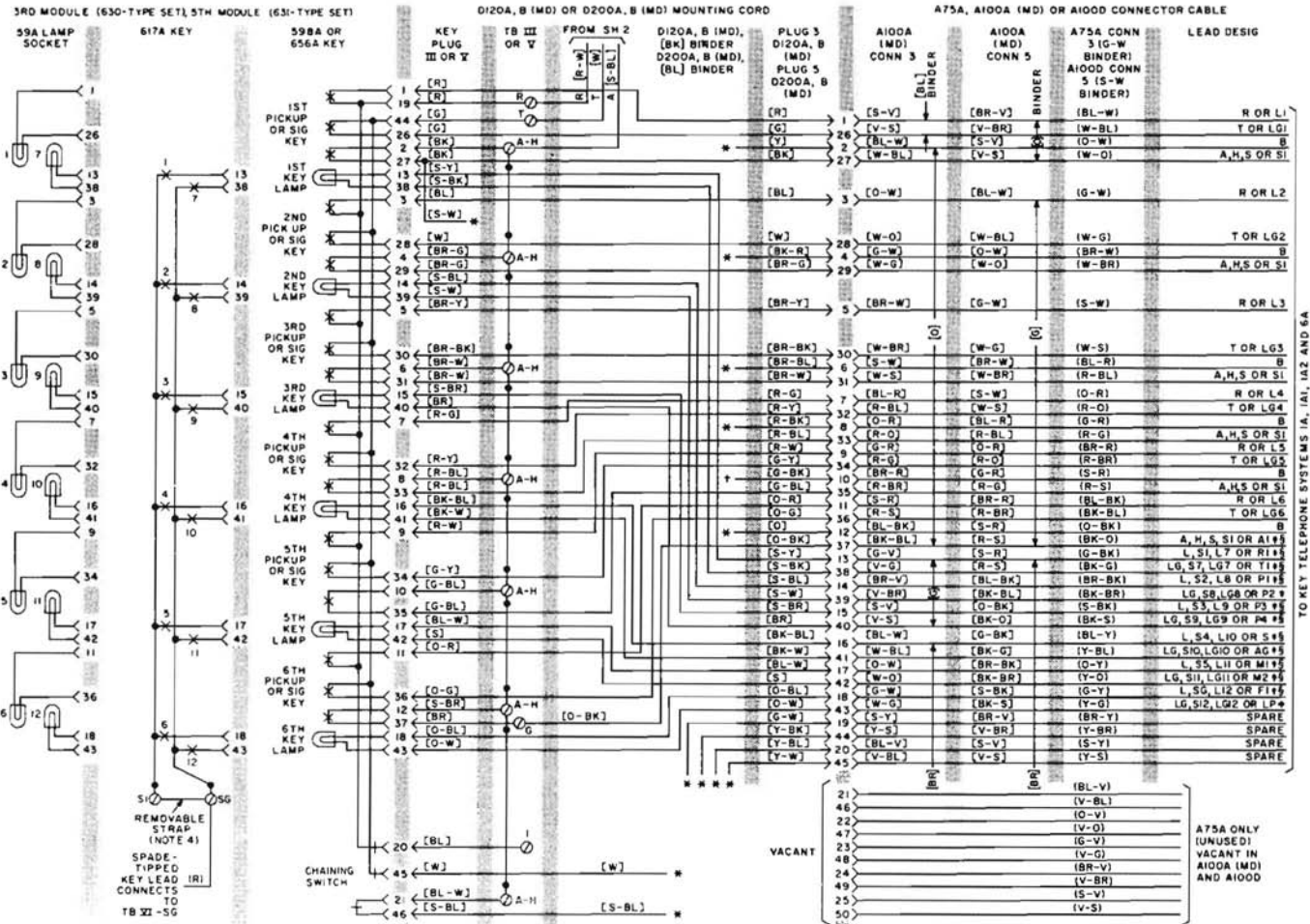


Fig. 4—Module Arrangements and Cord and Cable Connections for Sets Equipped With MD Cords (Sheet 3 of 3)

◆ TABLE B ◆

## PICKUP-SIGNAL KEY CONVERSION (3RD OR 5TH MODULE)

CONVERSION OPTIONS (NOTES)	598A OR 656A KEY						
	(O-W) [BK]	(S-W) [BR-O]	(G-R) [BR-W]	(BL-BK) [R-BL]	(BR-BK) [G-BL]	(Y-O) [S-BR]	(O-Y) [O-BK]
PPPPPP	A-H	A-H	A-H	A-H	A-H	A-H	G
PPPPPS	A-H	A-H	A-H	A-H	A-H	SG	G
PPPPSS	A-H	A-H	A-H	A-H	SG	SG	G
PPSSSS	A-H	A-H	A-H	SG	SG	SG	G
PPSSSS	A-H	A-H	SG	SG	SG	SG	G
PSSSSS	A-H	SG	SG	SG	SG	SG	G
SSSSSS	SG	SG	SG	SG	SG	SG	G
PPPP*P*S	A-H	A-H	A-H	C	C	5	C
PPP*P*P*S	A-H	A-H	C	C	C	5	C
PP*P*P*P*S	A-H	C	C	C	C	5	C
P*P*P*P*P*S	C	C	C	C	C	5	C

**Notes:**

1. Convert buttons on right hand key module first. If more than six (five with common signaling) are required use module preceding right hand position, repeat connection modifications as shown in table.
  2. All key positions are arranged in the shop as pickup positions. To convert to signaling (nonlocking), remove the screw detail P-10E837 from the plunger at the key position to be converted. Make the necessary connection changes as shown in Table B.
- \* These arrangements use line switch controlled ground for common signal key used with private or intercommunicating lines. Common signal should be used to operate a signal relay. Do not wire directly to a buzzer.

( ) Current color code.

[ ] MD color code.



♦ TABLE C ♦  
**CONNECTIONS FOR 599B KEY (TURN KEY)**

FEATURE	FIRST MODULE LEADS									
	5TH PICKUP KEY POSITION				6TH PICKUP KEY POSITION				STORED	
	R	T	A	A-H	R	T	A	A-H		
(MD) Color code	R-W	G-Y	G-BL	G-BL	O-R	O-G	O-BK	S-BR	O-R	O-G
Cord pin numbers	9-9	34-34	35-35	10-AH	11-11	36-36	37-G-37	12-†	11-†	36-†
Even-count color code	G-BK	BK-G	BK-BR	BR-BK	BL-Y	Y-BL	O-Y Y-O	Y-O	BL-Y	Y-BL
Cord pin numbers	9-13	34-38	35-39	10-AH	11-16	36-41	37-G G-42	12-†	11-†	36-†
Cutoff station on 1A1 or 1A2 system	To equip.			Insulate and Store	To ext sta			Insulate and Store		
Cutoff station on 1A system without hold feature	To equip.			Insulate and Store	To ext sta			Insulate and Store		
Cutoff station on 1A system with hold feature (Note 2)	To aux relay to cutoff T, R, B, & H			SG TBVI				SG TBVI	Insulate and store	
Cutoff ext ringer or buzzer	To equip.			Insulate and Store	To ext ringer or buzzer			Insulate and Store		
Cutoff ringer in set	To equip.			Insulate and Store				Insulate and Store	Ringer* TB	
									2 or A†	3
Cutoff buzzer in set	To equip.			Insulate and Store				Insulate and Store	Buzzer*	
									D	C
									A	C
								Cap.	C	
Monitoring	To mon equip.								R TB1	T TB1

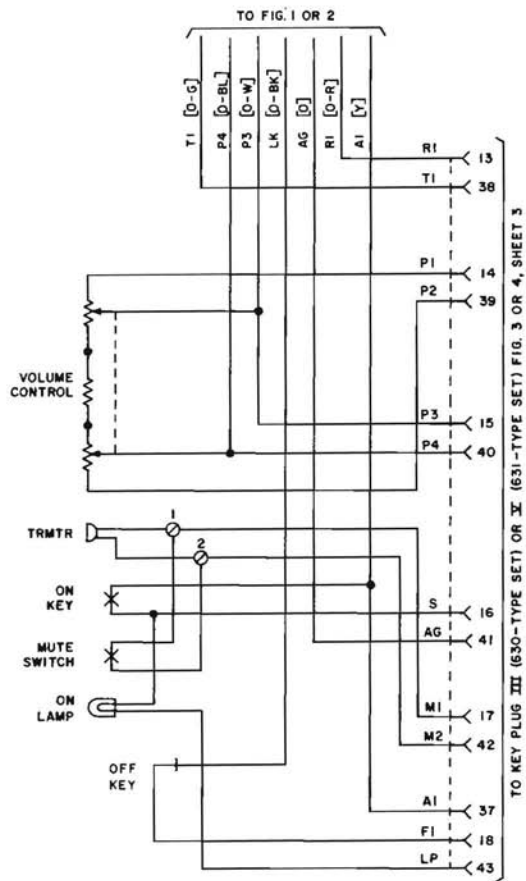
Notes 1: The [O-R] or [BL-Y], and [O-G] or [Y-BL] mounting cord leads should be insulated and stored at the equipment when the bridged spade-tipped leads are used in set.

2: Use auxiliary relay arrangement (such as 5A or 17B key telephone unit) to control circuit leads.

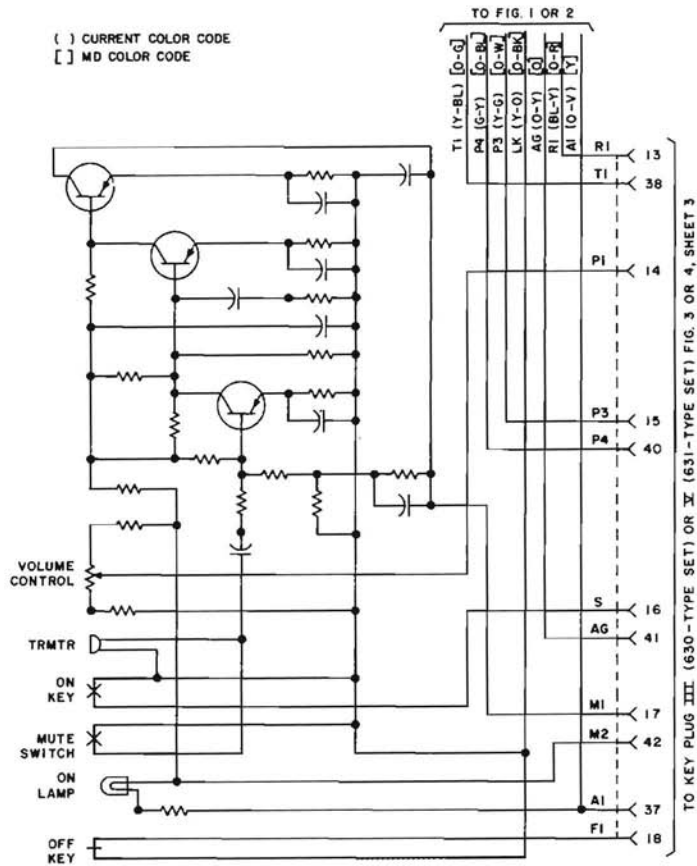
\* Insulate and store BZ and BZ1 leads to buzzer or to ringer terminal board.

† Indicates leads are factory insulated and stored.

‡ Network terminal.



661A TRANSMITTER (MD)



667-TYPE TRANSMITTER

Fig. 5—661A (MD) and 667-Type Transmitter

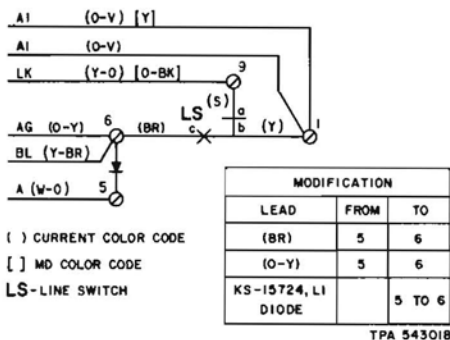


Fig. 6—Station Busy Lamp Circuit With Speakerphone (Current Telephone Sets Without I Hold)

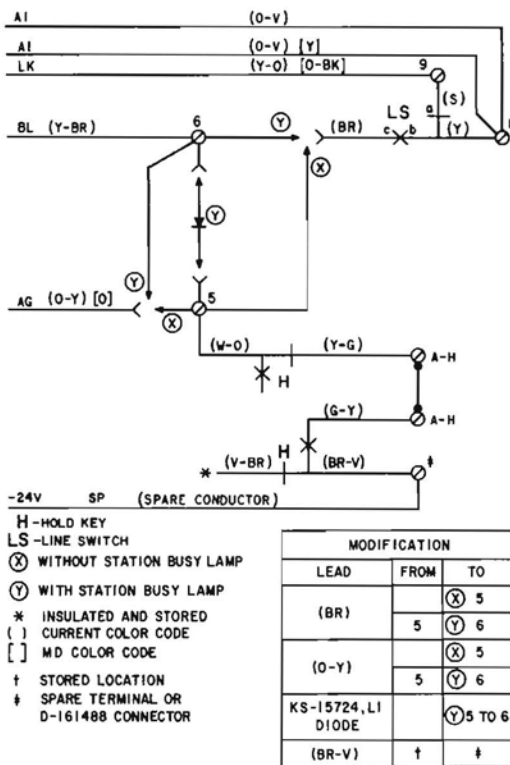


Fig. 7—I Hold Arrangement With Speakerphone (With or Without Station Busy Lamp Feature)

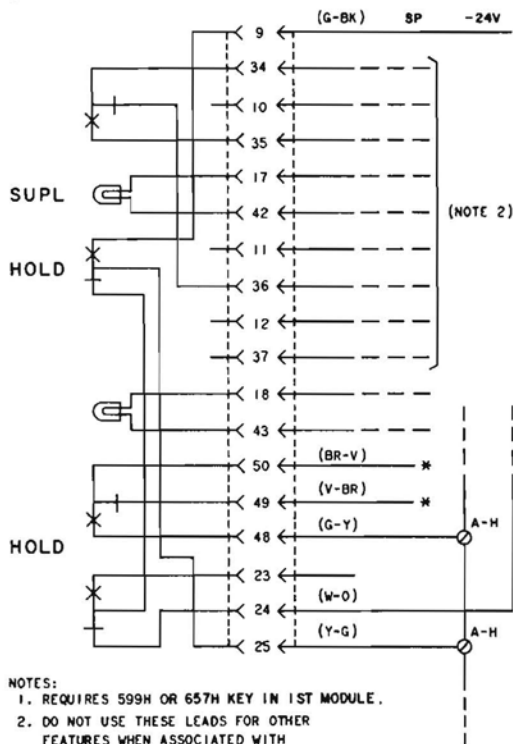
TABLE D

CONNECTIONS FOR EXTERNAL SPEAKERPHONE FOR SETS WITH EVEN-COUNT MOUNTING CORDS

WIRE OR LEAD	COLOR	LEAD DESIG.	REMOVE FROM	CONNECT TO
Mtg. Cord (BL-W Binder)	BL-Y	R1	*	2
	Y-BL	T1	*	RR†
	O-Y	AG	*	5
	Y-O	LK	G	9
	G-Y	P4	*	12
	Y-G	P3	*	11

\* Stored location.

† Network terminal.



NOTES:

- REQUIRES 599H OR 657H KEY IN 1ST MODULE.
- DO NOT USE THESE LEADS FOR OTHER FEATURES WHEN ASSOCIATED WITH 599H OR 657H KEY.

\* INSULATED AND STORED.

Fig. 8—Circuit of 599H or 657H Keys Associated With Priority Hold



**SERVICE**  
**630DA, 630DAM, 630DAMS1, 631DA, 631DAM, AND**  
**631DAMS1 TELEPHONE SETS**  
**CONNECTIONS**

**1. GENERAL**

**1.02** This section contains information on the 630DA (MD), 630DAM (MD), 630DAMS1 (18 button) and 631DA (MD), 631DAM (MD), 631DAMS1 (30 button) telephone sets. These sets may be equipped with different modular key arrangements. The telephone sets will accommodate 635-type keys, 658A keys, 76A lamp sockets, and/or a 679A (MD) transmitter.

**1.02** This section is reissued to add 630DAMS1 and 631DAMS1 telephone sets.

**1.03** The 630DAMS1 and 631DAMS1 telephone sets are similar to the 630DAM and 631DAM except for a new line switch assembly which breaks both tip and ring sides of the line instead of the ring side only.

**2. CONNECTIONS**

**2.01** The 630- and 631-type sets are equipped with a 635A5C (5-line pickup and hold) or can have a 635AD5C (4-line pickup, cutoff, and hold) in the first module position. Contact strip assemblies [required with sets equipped with a D120K (MD) or D200S (MD) mounting cords] differ between the two keys. If ordered for field replacement, the 635AD5C is furnished with a piggy-back adapter in the cut off key position for storing the slate mounting cord plug associated with the fifth line. The necessary contact strip assemblies (840151039 and 840151047) will be shipped with the 635AD5C and will replace the 840151120 and 840151138 assemblies supplied with the 635A5C key.

**Note:** Contact strips are not required with sets equipped with D120M or D200A A mounting

cord or sets equipped with a modified D120K or modified D200S mounting cord.

**2.02** Termination of the mounting cord conductors on a per line basis in individual plugs permits rearrangement of line appearances either in the set or at the key equipment distribution point. Current production sets are equipped with a satin-silver (-87) mounting cord.

**2.03** Contact strips are not extended to the chaining circuit. This requires a second tip and ring conductor to each module (except last). See Fig. 4, sheets 1 through 5.

**2.04** Telephone sets may be equipped for 3-type (MD) speakerphone system by adding associated apparatus to the telephone set as follows.



*If the 630DAMS1 or 631DAMS1 telephone set is to be used with 3-type (MD) speakerphone system, move the two (G) tip leads from G to F of the network.*

- (a) Replace 8R or 8RA dial with an 8CA dial
- (b) A 760A (MD) loudspeaker and 679A (MD) transmitter are used but one key position must be sacrificed. The 679A transmitter is installed in the last key position of the set.
- (c) When maximum key features and speakerphone are required, a 760A loudspeaker and 666A (MD) or 666B (MD) transmitter are connected to the telephone set.

**2.05** Refer to Section 512-620-440 for necessary wiring changes and connections to the 55-type

**NOTICE**

Not for use or disclosure outside the  
Bell System except under written agreement

control unit and connections between the control unit and the telephone set

**2.06** When the 55-type (MD) control unit used with 3-type (MD) speakerphone system is located near the telephone set and an external transmitter is used, an auxiliary mounting cord must be used to connect the speakerphone features to the telephone set.

**2.07** When the 3-type speakerphone system control unit is located near the telephone set and an internal transmitter (679A) is used, an A25B connector cable should be plugged into the last mounting cord plug and terminated on the control unit terminal board.

**2.08** These telephone sets may be equipped for 4A speakerphone system by adding associated apparatus as follows.



*If the 630DAMS1 or 631DAMS1 telephone set is to be used with 4A speakerphone system, move the two (G) tip leads from G to F of the network.*

- (a) Replace 8R or 8RA dial with an 8CA dial.
  - (b) The 680AE transmitter, 108AA loudspeaker set, and 223D adapter are required.
  - (c) Refer to Section 512-730-400 for necessary wiring changes and connections.
- 2.09** All line pickup buttons are convertible from locking to nonlocking when used for signaling or common signaling arrangements. Remove the

812857738 (P-28E773) locking pin from button to be converted and make wiring changes per Table D.

**2.10** The 630- and 631-type telephone sets are factory equipped with a KS-20419L1 (10 volt ac only) buzzer.

**2.11** The Hold key in first module is used as regular hold or if required, **I Hold**. A second hold key is used for **Priority Hold**. When priority hold is to be furnished, a D-180411 Kit of Parts is required and installed as follows.

- (1) Assemble kit of parts by inserting contact strips (if required) into 635A5C key. Plug pin plug into hold position on key.

**Note:** Contact strips are not required with sets equipped with a D120M or D200AA mounting cord or sets equipped with a modified D120K or modified D200S mounting cord.

- (2) Disconnect all mounting cord plugs and the two contact strips leads [sets equipped with D120K (MD) or D200S (MD) mounting cord] from the second module, remove key and replace with 635A5C key.
- (3) Reterminate contact strip leads, if necessary, and connect mounting cord plugs with exception of white plug which is insulated and stored.
- (4) Rearranged wiring per Fig. 6.

**2.12** Station busy lamp circuit with speakerphone is shown in Fig. 7 and 8. For additional information on busy lamp, refer to Section 502-110-100.

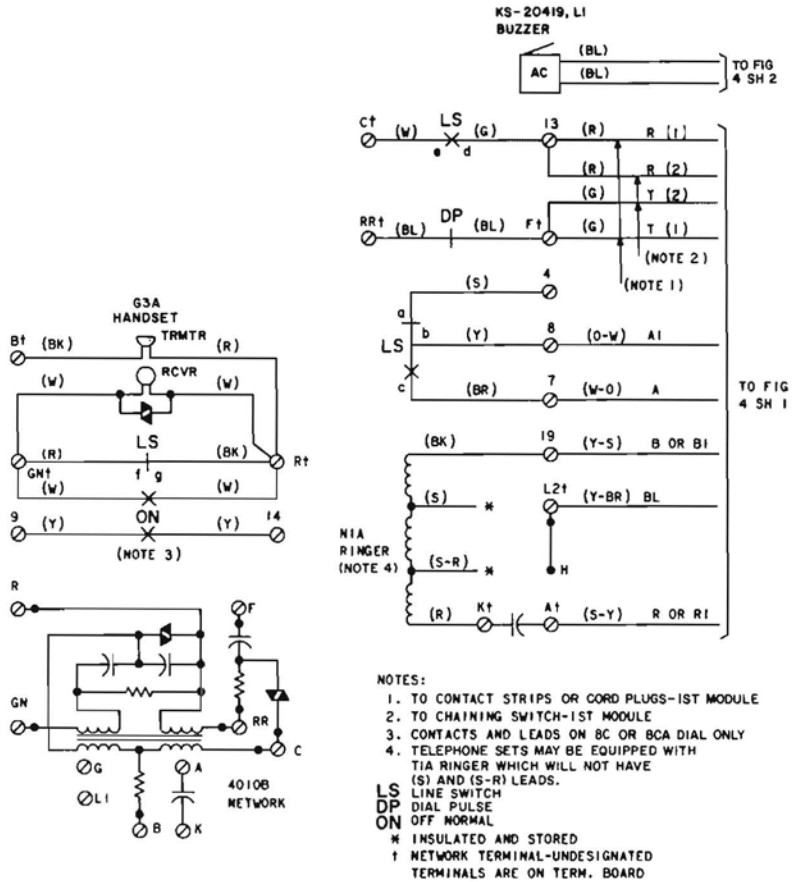


Fig. 1—630DA (MD) or 631DA (MD) Telephone Set Connections

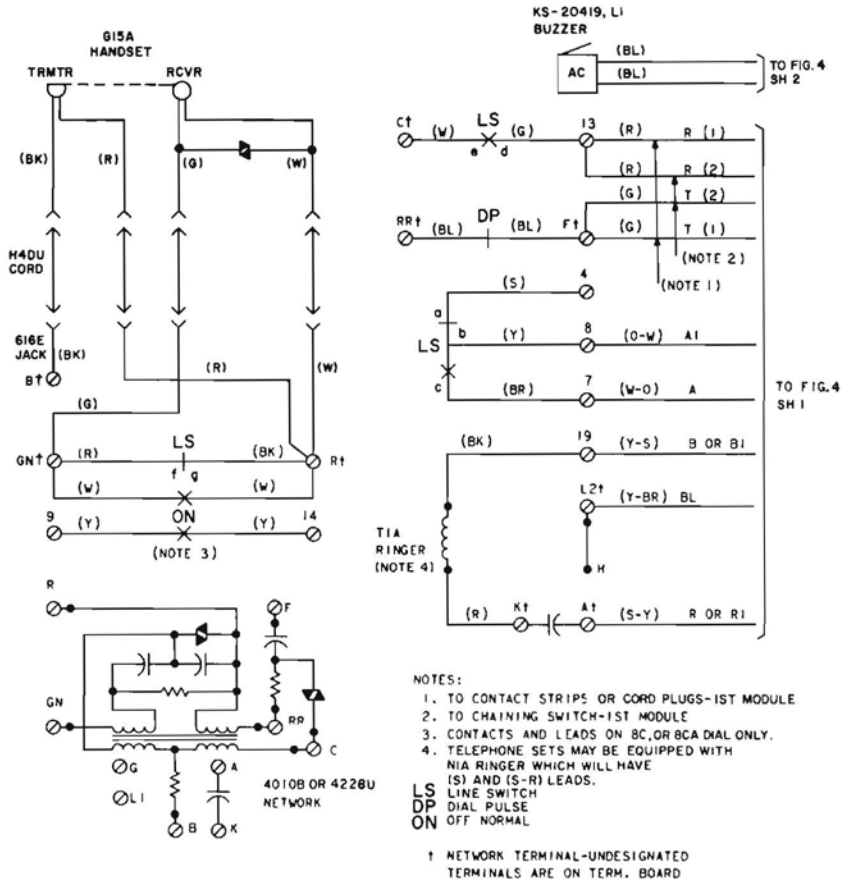


Fig. 2—630DAM (MD) or 631DAM (MD) Telephone Set Connections





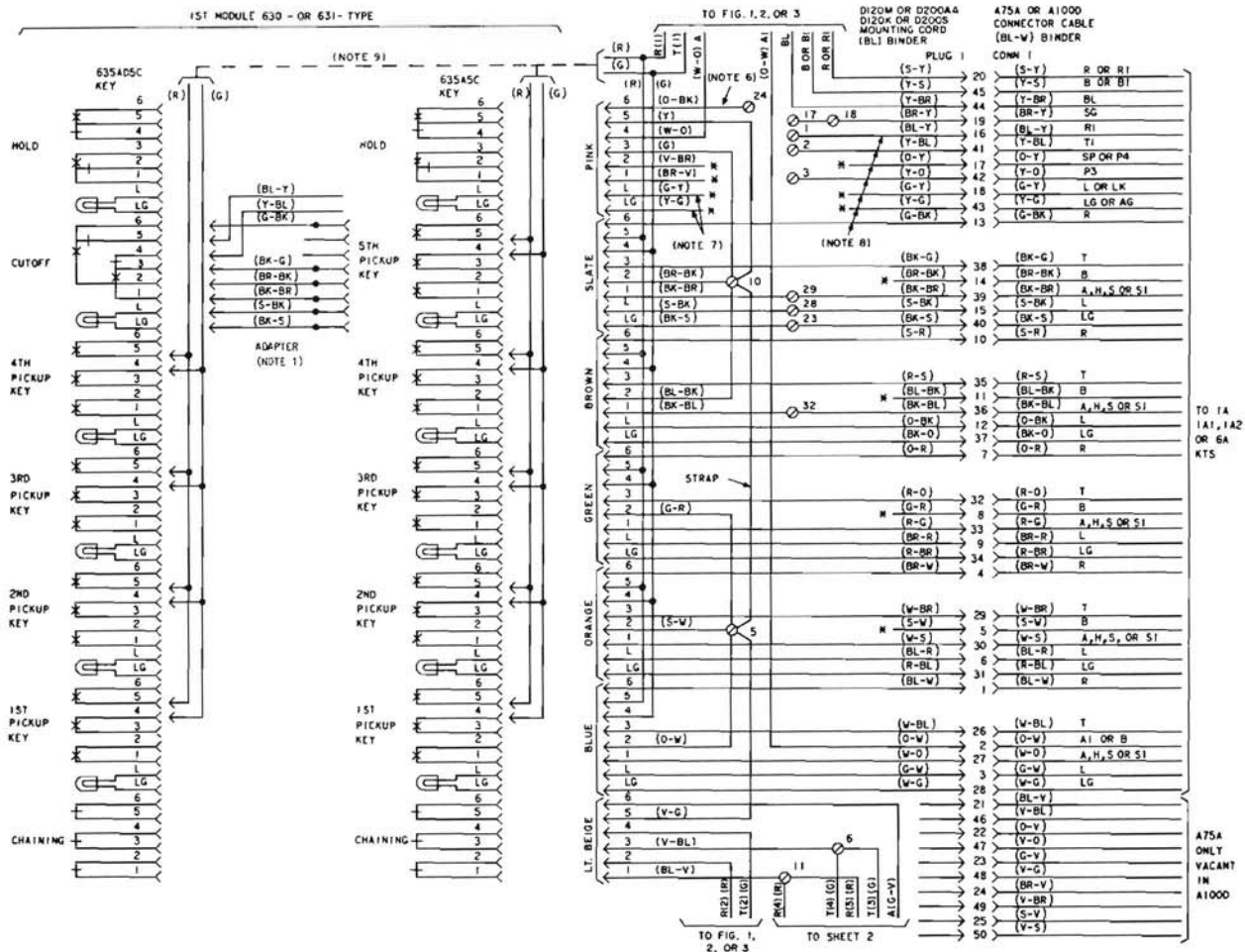


Fig. 4—Module and Connector Cable Arrangements (Sheet 1 of 5)









## NOTES FOR FIG. 4:

1. THE 635AD5C KEY IS SUPPLIED WITH AN ADAPTER IN THE CUTOFF KEY POSITION. THE SLATE MOUNTING CORD PLUG CONNECTS TO THE ADAPTER. BALANCE OF PLUGS CONNECT DIRECTLY TO KEY.
  2. IN SETS EQUIPPED WITH A 658A KEY, THE (G) CONTACT STRIP LEAD IS TERMINATED ON 17 AND (R) ON 18. IF A 658A KEY IS ADDED IN THE FIELD, LEADS MUST BE MOVED FROM PRECEDING MODULE CHAINING CIRCUIT TO TERMINALS 17 AND 18.
  3. PROVISIONS ARE MADE FOR MECHANICALLY STORING THE LIGHT BEIGE CHAINING PLUG ON THE 658A KEY. NO ELECTRICAL CONNECTION IS MADE.
  4. WHEN THE 658A KEY IS REQUIRED AS A DUAL PURPOSE KEY, REMOVE STRAP BETWEEN TERMINALS 17 AND 18. USE M1W CORD OR EQUIVALENT TO CONNECT TERMINAL 17 TO A DISSIMILAR GROUND OR NONGROUNDED CIRCUIT.
  5. MODULE MAY ALSO BE EQUIPPED WITH A 679A TRANSMITTER FOR 3-TYPE SPEAKERPHONE. SEE FIG. 5.
  6. TO SUPPLY "I" HOLD FEATURE, TERMINATE (O-Y) MOUNTING CORD LEAD FROM (BL) BINDER ON TERMINAL 24. LEAD BECOMES SP LEAD AT EQUIPMENT.
  7. IF HOLD POSITION LAMP IS REQUIRED CONNECT (G-Y) AND (Y-G) LAMP LEADS TO SPARE PAIR USING SPARE TERMINALS OR D-161488 CONNECTORS. LAMP MUST BE SEPARATELY ORDERED AND INSTALLED. HOLD POSITION LAMP CANNOT BE ILLUMINATED WHEN EXTERNAL TRANSMITTER IS WIRED FOR 3-TYPE SPEAKERPHONE USING MOUNTING CORD LEADS.
  8. 3-TYPE SPEAKERPHONE LEADS WHEN ASSOCIATED WITH EXTERNAL TRANSMITTER.
  9. THESE CONTACT STRIPS ARE REQUIRED WHEN TELEPHONE SET IS EQUIPPED WITH THE D120K (MD) OR THE D200S (MD) MOUNTING CORD. THESE CONTACT STRIPS SHOULD NOT BE USED WHEN TELEPHONE SET IS EQUIPPED WITH THE D120M OR D200AA MOUNTING CORD OR WHEN TELEPHONE SET IS EQUIPPED WITH A MODIFIED D120K OR D200S MOUNTING CORD.
- \* INSULATED AND STORED.

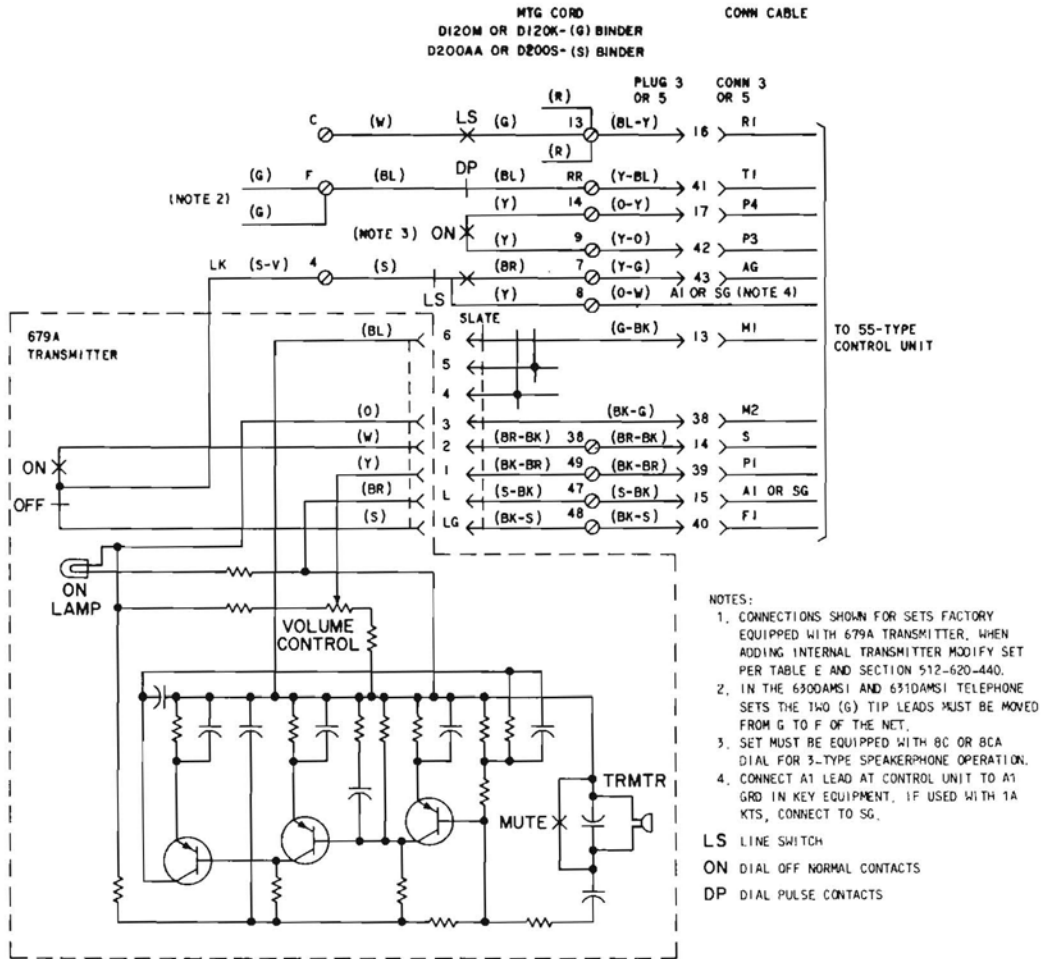
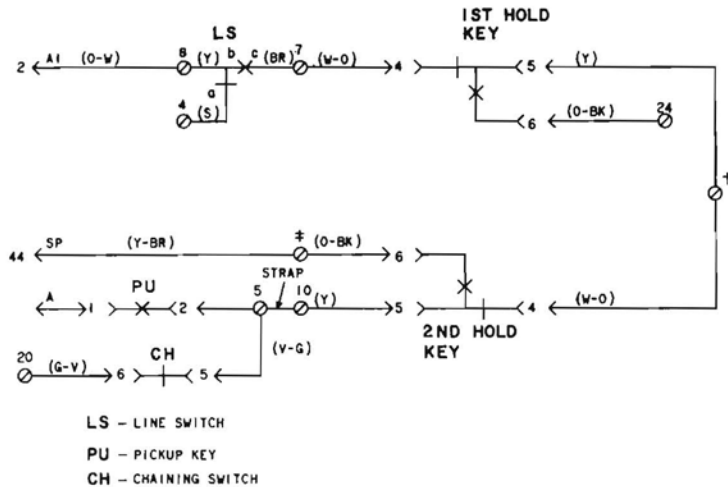


Fig. 5—3-Type (MD) Speakerphone System Connections Using Internal 679A (MD) Transmitter





MODIFICATION		
WIRE OR LEAD	FROM	TO
1ST HOLD KEY (Y)	10	†
2ND HOLD KEY (0-BK)		‡
(Y)		10
(W-O)		†
(Y-BR)	*	‡

\* STORED LOCATION, (0) BINDER GROUP IN MOUNTING CORD

† CONNECT (Y) LEAD FROM 1ST HOLD KEY AND (W-O) LEAD OF 2ND HOLD KEY TO THE SAME SPARE TERMINAL OR D-161488 CONNECTOR.

‡ CONNECT (0-BK) LEAD OF 2ND HOLD KEY AND (Y-BR) MOUNTING CORD LEAD (0) BINDER GROUP TO THE SAME SPARE TERMINAL OR D-161488 CONNECTOR

Fig. 6—Modifications for Priority Hold

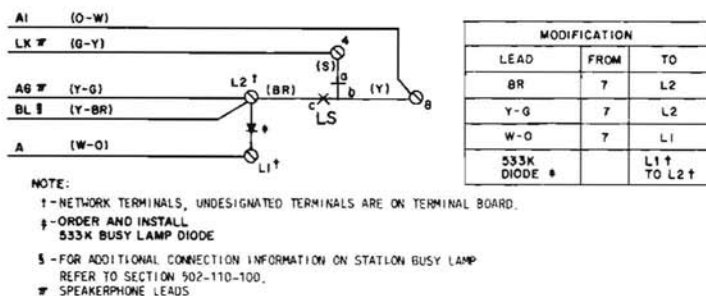


Fig. 7—Station Busy Lamp Circuit With 3-Type (MD) Speakerphone System†

TABLE A

1A, 1A1, AND 1A2 CONVERSION - 630-TYPE TELEPHONE SET

KEY MODULE ARRANGE- MENT	LEAD											
	HOLD KEY				CHAINING PLUG				CONTACT STRIP OR PLUG LEAD			LINE SW.
	Y	G	BR-V	V-BR	V-G 1ST MOD	V-G 2ND MOD	R 1ST MOD	R 2ND MOD	R 1ST MOD	R 2ND MOD	R 3RD MOD	Y
1A1/1A2 Only	10	10	*	*	5	15	13	11	13	11	21	8
1A1/1A2- 1st, 2nd Mod 1A-3rd Mod	10	35	21	40	5	35	13	11	13	11	40	8
1A1/1A2- 1st Mod 1A-2nd, 3rd Mod	10	35	11	40	35	15	13	40	13	40	21	8
1A Only	*	10	13	40	5	15	40	11	40	11	21	18

\* Insulated and stored.



TABLE B  
1A, 1A1, AND 1A2 CONVERSION - 631-TYPE TELEPHONE SET

KEY MODULE ARRANGE- MENT	LEAD																	
	HOLD KEY				CHAINING PLUG								CONTACT STRIP OR PLUG LEAD					LINE SW.
	Y	G	BR-V	V-BR	V-G 1ST MOD	V-G 2ND MOD	V-G 3RD MOD	V-G 4TH MOD	R 1ST MOD	R 2ND MOD	R 3RD MOD	R 4TH MOD	R 1ST MOD	R 2ND MOD	R 3RD MOD	R 4TH MOD	R 5TH MOD	Y
1A1/1A2 Only	10	10	*	*	5	15	35	45	13	11	21	31	13	11	21	31	41	8
1A1/1A2- 1st, 2nd, 3rd, 4th Mod	10	12	41	3†	5	15	35	12	13	11	21	31	13	11	21	31	3	8
1A-5th Mod																		
1A1/1A2- 1st, 2nd, 3rd Mod	10	12	31	3†	5	15	12	45	13	11	21	3	13	11	21	3	41	8
1A-4th, 5th Mod																		
1A1/1A2-1st, 2nd, Mod	10	12	21	3†	5	12	35	45	13	11	3	31	13	11	3	31	41	8
1A-3rd, 4th, 5th Mod																		
1A1/1A2- 1st Mod	10	12	11	3†	12	15	35	45	13	3	21	31	13	3	21	31	41	8
1A-2nd, 3rd 4th, 5th Mod																		
1A Only	*	10	13	37†	5	15	35	45	37	11	21	31	37	11	21	31	41	18

\* Insulated and stored.

† Remove (BR-Y) mounting cord lead. Insulate and store.

‡ Remove (Y-O) mounting cord lead from terminal 3. Insulate and store.

**TABLE C**  
**CUT OFF KEY (635AD5C) CONNECTIONS**

FEATURE	635AD5C KEY ADAPTER		MOUNTING CORD (BL) BINDER		CONNECTOR CABLE (BL-W) BINDER			RINGER	PLACE STRAP
	BL-Y	Y-BL	BL-Y	Y-BL	G-BK	BK-G	BK-BR	BK	
Cutoff Ringer in Set (Note 1)	TB1-1	TB1-2	*	*	Note 2			TB1-1	A (Net.) to TB1-2
Cutoff Ext Ringer or Buzzer (Note 1)	TB1-1	TB1-2	TB1-1	TB1-2	Note 3				
Cutoff Ext Station (Note 4)	*	*	TB1-1	TB1-2		To Aux. Relay	To Relay Grd		

\* Insulate and store.

Notes:

1. Remove (BR-BK) and (BK-BR) slate plug leads from terminals 10 and 29, insulate and store.
2. To individual line or common ringer circuit at equipment.
3. To external ringer or buzzer. Connect ringer or buzzer circuit to (BL-Y) (Y-BL) connector cable leads at equipment.
4. Connect T, R, and A leads from equipment and station to be cut off through contacts of auxiliary relay. Connect battery to relay winding. Use 227B or 421A KTU.

**TABLE D**  
**PICKUP-SIGNAL KEY CONVERSION**  
**3RD (630-TYPE) OR 5TH (631-TYPE) MODULE**

NO. OF SIGNAL KEYS (Note 2)	NO. OF PVT OR INTER-COM LINES (COM. SIG) NOTE 1	KEY PLUG LEADS AND TERMINALS						
		O-W	S-W	G-R	BL-BK	BR-BK	O-Y	Y-O
1		25	25	25	30	30	18	39
2		25	25	25	30	18	18	39
3		25	25	25	18	18	18	39
4		25	25	18	18	18	18	39
5		25	18	18	18	18	18	39
6		18	18	18	18	18	18	39
	2	25	25	25	39	39	30	39
	3	25	25	39	39	39	30	39
	4	25	39	39	39	39	30	39
	5	39	39	39	39	39	30	39

**Notes:**

- 1 When using converted 6th pickup button as common signaling key, remove, insulate and store (Y-O) mounting cord lead from terminal 39.
- 2 If more than six signal keys are required, replace 635G5C key with a 658A key. If more than five private or intercom lines are required, convert keys in 2nd (630-type) or 4th (631-type) module in same order. Connect plug leads to terminal 39 to utilize common signal key. If additional terminals are required, use any spare terminal and strap to 39.

◆ TABLE E ◆

**3-TYPE (MD) SPEAKERPHONE SYSTEM CONNECTIONS  
USING INTERNAL TRANSMITTER (NOTES 1, 2, 4, AND 7)**

WIRE OR LEAD	COLOR	LEAD DESIG	FROM	TO
Mtg Cord (Note 3)	Y-BL	T1	46	RR†
	BL-Y	R1	44	13
	Y-O	P3	39	9
	O-Y	P4	*	14
	Y-G	AG	43	7 (Note 6)
	BR-BK	S	*	38
Slate Key Plug	BR-BK		30	
679A TRMTR	S-V	LK		4

\* Insulated and stored location.

† Terminal on network.

- Note 1**—Connections shown are used when transmitter is part of telephone set and speakerphone leads are connected through the mounting cord.
- Note 2**—When control unit is located near the telephone set an A25B connector cable may be plugged into the 3rd mounting cord plug (630-type) or 5th plug (631-type) and terminate on the control unit.
- Note 3**—Mounting cord conductors from (G) (630-type) or (S) (631-type) binder.
- Note 4**—Connect the slate plug from the 3rd or 5th module to the 679A transmitter (Fig. 5). All other plugs in the module are insulated and stored.
- Note 5**—Set intended for speakerphone use must be equipped with an 8C or 8CA dial for the second set of off-normal contacts (P3 and P4 leads).
- Note 6**—Connect to L2 on network if busy lamp is also furnished (Fig. 7)
- Note 7**—If 630DAMS1 or 631DAMS1 telephone set is used, move the two (G) tip leads from G to F of network.

♦TABLE F♦

EXTERNAL 3-TYPE (MD) SPEAKERPHONE  
SYSTEM CONNECTIONS USING MOUNTING  
CORD LEADS (NOTES 1 AND 2)

COLOR	LEAD DESIG	FROM	TO
Y-BL	T1	2	RR†
BL-Y	R1	1	13
Y-O	P3	3	9
O-Y	P4	*	14
Y-G	AG	*	7 (Note 3)
G-Y	LK	*	4

\* Insulated and stored.

† Network terminal.

*Note 1.* If the 630DAMS1 or 631DAMS1 telephone set is used move the two (G) tip leads from G to F of network.

*Note 2.* Connections shown are used when control unit and apparatus unit are at same location. Leads are in (BL) binder.

*Note 3.* Connect to L2 on network if busy lamp is also furnished (Fig. 7)

♦TABLE G♦

EXTERNAL 3-TYPE (MD) SPEAKERPHONE  
SYSTEM CONNECTIONS USING AUXILIARY  
CORD (NOTE 1 AND 2)

D10R CORD	LEAD DESIG	TO
W-BL	T1	RR†
BL-W	R1	13
W-O	AG	7 (Note 3)
O-W	LK	4
W-G	P3	9
G-W	P4	14
W-BR	A1	8

† Network terminal.

*Note 1.* If the 630DAMS1 or 631DAMS1 telephone set is used move the two (G) leads from G to F of network.

*Note 2.* Connections shown are used when control unit and telephone set are at same location.

*Note 3.* Connect to L2 on network if busy lamp is also furnished.



**SERVICE**  
**634A, B, C, D AND 635A, C, D TELEPHONE SETS**

**1. GENERAL**

**1.001** This addendum supplements Section 502-610-409, Issue 2. Place this pink sheet ahead of Page 1 of this section.

**1.002** This addendum is issued to add new Fig. 6.

**2. CHANGES TO SECTION**

**2.001** On Page 15, Fig. 6 is obsolete. A new Fig. 6 is shown in this addendum.

**NOTICE**

Not for use or disclosure outside the  
Bell System except under written agreement

♦ TABLE A — FEATURE CONVERSION OF TELEPHONE SETS ♦

KEY POSITION		SERVICE FEATURE OPTIONS								LINE PICKUP
		BUZZER SIGNALING		6A ADD-ON		6A PUSHBUTTON		LOCKED-IN LAMP RELEASE		
634 (MD) TEL SET	635 (MD) TEL SET	CONNECT STORED SPADE-TIPPED LEAD INDICATED TO TERM. 5G OF TB VI.	DISCONNECT SPADE-TIPPED LAMP LEAD INDICATED FROM ASSOC TB. INSULATE AND STORE.	CONNECT STORED SPADE-TIPPED LEAD INDICATED TO TERM. PB OF TB VI.	DISCONNECT SPADE-TIPPED LAMP LEAD INDICATED FROM ASSOC TB. INSULATE AND STORE.	CONNECT STORED SPADE-TIPPED LEAD INDICATED TO TERM. A OR 1A OF TB VI.	DISCONNECT SPADE-TIPPED LAMP LEAD INDICATED FROM ASSOC TB. INSULATE AND STORE.	CONNECT STORED SPADE-TIPPED LEAD INDICATED TO TERM. 5G OF TB VI.	MOVE SPADE-TIPPED LAMP LEAD IND FROM ASSOC TB TO AVAIL LAMP GRD.	
1	1	BL	R-BR	BL	R-BR	BL	R-BR	BL	R-BR	Factory equipped and wired
2	2	O	R-S	O	R-S	O	R-S	O	R-S	
3	3	G	BK-BL	G	BK-BL	G	BK-BL	G	BK-BL	
4	4	BR	BK-O	BR	BK-O	BR	BK-O	BR	BK-O	
5	5	S	BK-G	S	BK-G	S	BK-G	S	BK-G	
6	6	NOT CONVERTIBLE								Replace 599A or 657A key with 598A or 656A key. Connect G-R to avail lamp grd. Connect W-0 to term. A or A1 of TBV1.
		635—Connect W to term. SG of TB VI. Connect one of two spares (S-BK or BK-S) from Plug 2 to term. 6 of TBI.	635—Connect W to term. PB of TB VI. Connect one of two spares (S-BK or BK-S) from Plug 2 to term. 6 of TBI.	635—Connect W to term. 1A of TB VI. Connect one of two spares (S-BK or BK-S) from Plug 2 to term. 6 of TBI.	635—Connect W to term. SG of TB VI. Connect one of two spares (S-BK or BK-S) from Plug 2 to term. 6 of TBI. Connect G-R to avail. lamp grd.					
7	7	BL	BK-BR	BL	BK-BR	BL	BK-BR	BL	BK-BR	Factory equipped and wired
8	8	O	BK-S	O	BK-S	O	BK-S	O	BK-S	
9	9	G	Y-BL	G	Y-BL	G	Y-BL	G	Y-BL	
10	10	BR	Y-O	BR	Y-O	BR	Y-O	BR	Y-O	
11	11	S	Y-G	S	Y-G	S	Y-G	S	Y-G	
12	12	W	Y-BR	W	Y-BR	W	Y-BR	W	Y-BR	
	13	BL	W-BL	BL	W-BL	BL	W-BL	BL	W-BL	
	14	O	W-O	O	W-O	O	W-O	O	W-O	
	15	G	W-G	G	W-G	G	W-G	G	W-G	
	16	BR	W-BR	BR	W-BR	BR	W-BR	BR	W-BR	
	17	S	W-S	S	W-S	S	W-S	S	W-S	
	18	W	R-BL	W	R-BL	W	R-BL	W	R-BL	
	19	BL	R-O	BL	R-O	BL	R-O	BL	R-O	
	20	O	R-G	O	R-G	O	R-G	O	R-G	
	21	G	R-BR	G	R-BR	G	R-BR	G	R-BR	
	22	BR	R-S	BR	R-S	BR	R-S	BR	R-S	
	23	S	BK-BL	S	BK-BL	S	BK-BL	S	BK-BL	
	24	W	BK-O	W	BK-O	W	BK-O	W	BK-O	
13	25	BL	Y-S	BL	Y-S	BL	Y-S	BL	Y-S	
14	26	O	V-BL	O	V-BL	O	V-BL	O	V-BL	
15	27	G	V-O	G	V-O	G	V-O	G	V-O	
16	28	BR	V-G	BR	V-G	BR	V-G	BR	V-G	
17	29	S	V-BR	S	V-BR	S	V-BR	S	V-BR	
	30	W	V-S	W	V-S	W	V-S	W	V-S	
18		W	V-S	W	V-S	W	V-S	W	V-S	Connect R-BL to avail. lamp grd.

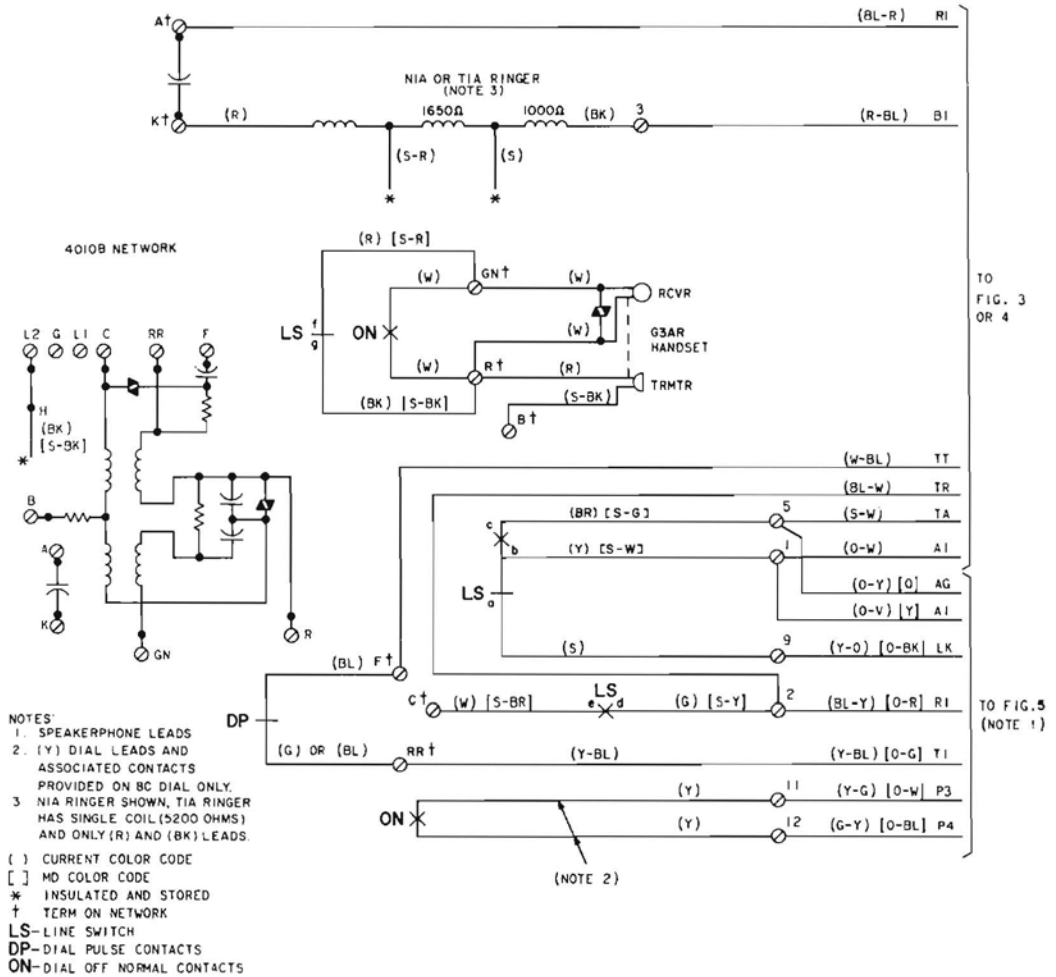


Fig. 1—Current 634- and 635-Type (MD) Telephone Set, Connections

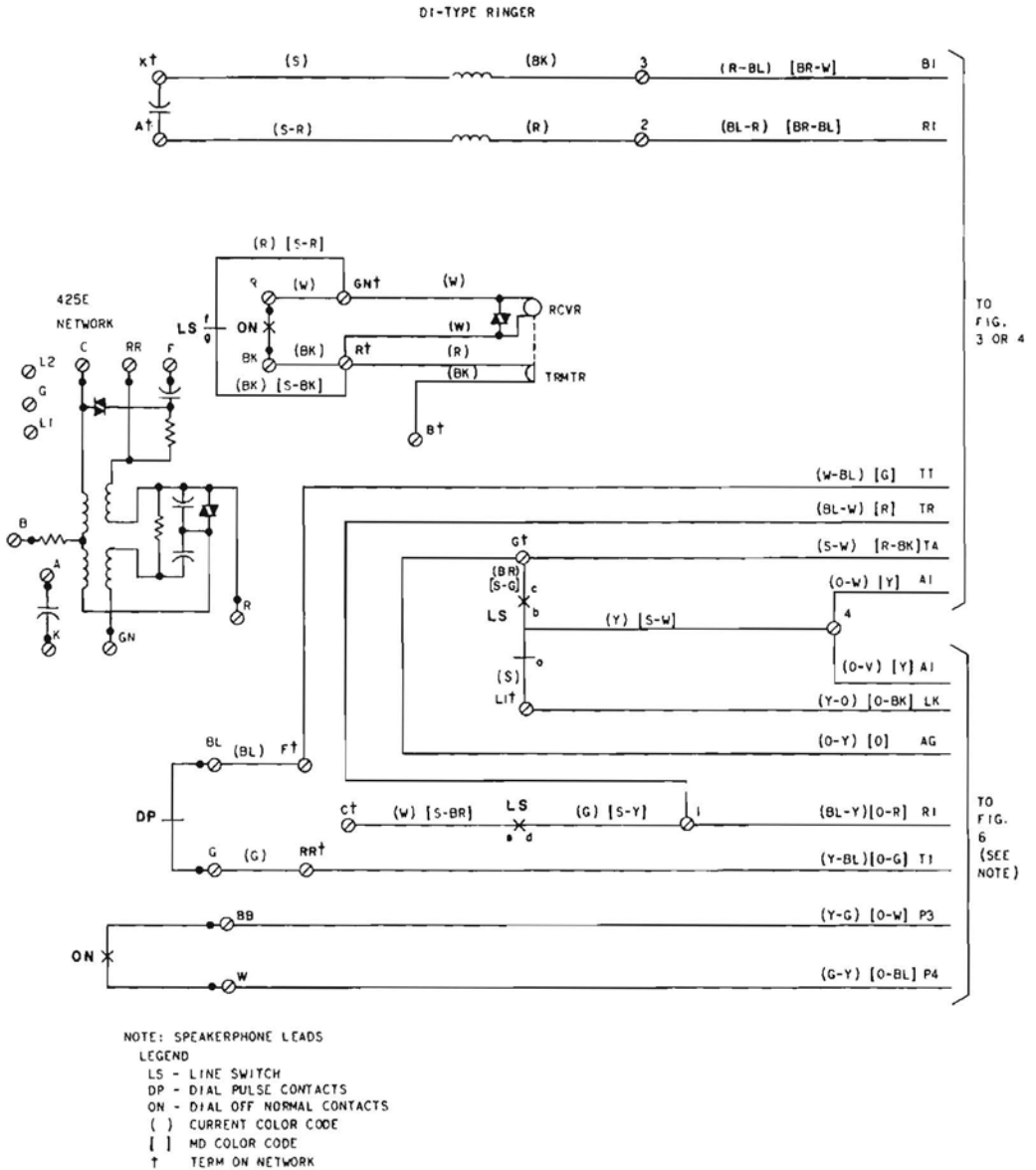


Fig. 2—Early 634- and 635-Type (MD) Telephone Set, Connections

**Notes Associated With Fig. 3 and 4**

1. WHEN 657A, 599A OR 657B, 599B KEYS ARE USED IN FIRST MODULE, HOLD KEY LAMP (6TH LAMP) MAY BE USED FOR A MISCELLANEOUS VISUAL SIGNAL. CONNECT INDICATED LEAD TO AN AVAILABLE LAMP GROUND. WHEN 656A OR 598A KEY IS USED IN FIRST MODULE, INDICATED LEAD IS CONNECTED TO GROUND ON TERMINAL 5 OF TBI.
2. WHEN 656A OR 598A KEY IS USED IN FIRST MODULE, INDICATED LEAD IS CONNECTED TO TERMINAL A (634 SET) AND TERMINAL 1A (635 SET) OF T86.
3. WHEN 656A OR 598A KEY IS USED IN THIRD MODULE OF 634 SET, INDICATED LEAD IS CONNECTED TO TERMINAL 5 OF T83.
4. TO CONVERT A PICKUP KEY FROM LOCKING TO NONLOCKING THE CONVERSIONS SHOWN IN TABLE A MUST BE FOLLOWED. A P-11E977 INSULATING DETAIL MUST BE PLACED OVER THE TWO KEY CONTACTS ADJACENT TO THE KEY PLUNGER. REMOVE THE SCREW DETAIL P-10E837 ENTIRELY FROM THE PLUNGER AT THE KEY POSITION TO BE CONVERTED.
5. CUTOFF OF THE INTERNAL RINGER CAN BE PROVIDED USING THE 657B OR 599B KEY IN FIRST MODULE. TRANSFER BI (R-BL) [BR-W] LEAD FROM TERMINAL 3 OF TERMINAL BOARD (TEL. SET) TO TERMINAL 6 OF TBI. TRANSFER (R) [S-BK] LEAD FROM TERMINAL 5 OF TBI TO TERMINAL 3 VACATED BI LEAD.
6. WHEN 657B OR 599B KEY IS USED IN FIRST MODULE TO PROVIDE CUTOFF, SWITCHING, OR TRANSFER FEATURES, TRANSFER (Y-BR) [Y-BK] LEAD FROM TERMINAL 6 OF TBI TO TERMINAL 5G OF TBVI. THESE SERVICE FEATURES ARE PROVIDED BY AN AUXILIARY RELAY (229B KTU OR EQUIVALENT) SEPARATELY MOUNTED AND CONTROLLED BY THE TURN KEY CONTACTS THROUGH THE LGS, C, S, SI LEAD.
7. CONTACTS OF TURN KEY CONNECTED TO PINS 9 AND 11 MUST BE ISOLATED FROM EACH OTHER WITH INSULATING DETAIL P-13E443 (FURNISHED WITH 657B OR 599B KEY) TO PREVENT INTERFERENCE WITH WORKING CIRCUITS.
8. THE TURN KEY LAMP CAN BE ILLUMINATED IN ACCORDANCE WITH OR INDEPENDENT OF TURN KEY OPERATION.
9. WHEN THE 617A KEY IS REQUIRED AS A DUAL PURPOSE KEY, THE BRASS STRAP BETWEEN THE SI AND SG TERMINALS OF THE KEY MAY BE REMOVED. USE MIW CORD OR EQUIVALENT TO CONNECT SI TERMINAL OF 617A TO A DISSIMILAR GROUND OR A NONGROUNDED CIRCUIT.
10. CORDS MANUFACTURED BEFORE APRIL 1968 HAVE SOME LEADS SOLDERED TO THE TB.
11. WHEN 661- OR 667-TYPE TRANSMITTER IS USED IN THIRD MODULE OF 634 SET, REMOVE INDICATED LEAD AND INSULATE.
12. WHEN SPEAKERPHONE CONTROL UNIT IS LOCATED NEAR TELEPHONE SET, A 148A (MD) OR 148B ADAPTER MAY BE INSERTED BETWEEN CONNECTOR 1 AND PLUG 1 OF THE 634- OR 635-TYPE SET.

\* LEADS ARE SPADE-TIPPED, INSULATED, AND STORED.

† NOT REQUIRED FOR 3-TYPE SPEAKERPHONE SYSTEM.

‡ IF A 148-TYPE ADAPTER IS USED, INSULATE AND STORE THESE LEADS AT TERMINAL.

{ CURRENT COLOR CODE.

[ ] MD COLOR CODE.

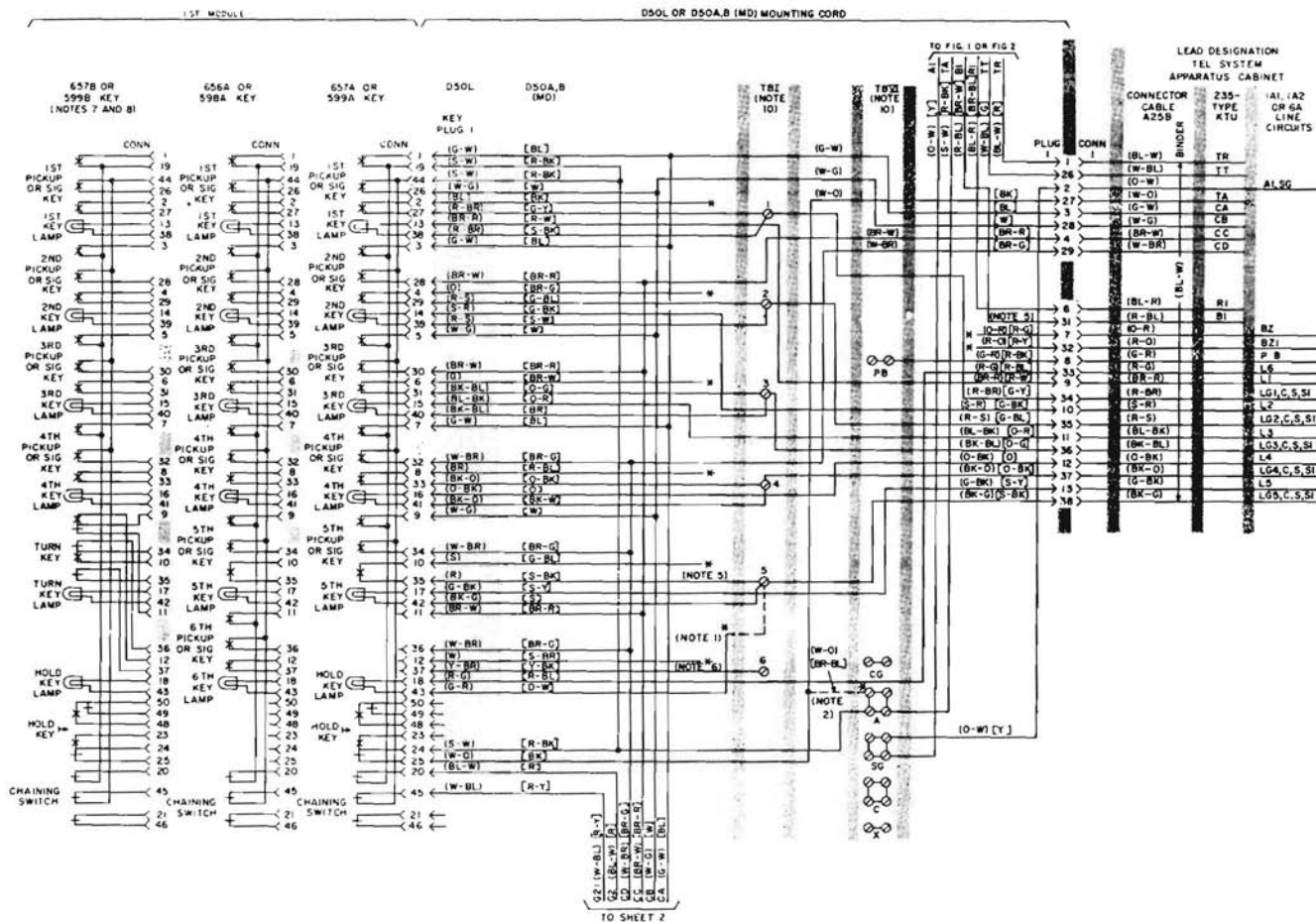


Fig. 3—Module Arrangements and Cord and Cable Connections for 634-Type (MD) Telephone Sets (Sheet 1 of 3)



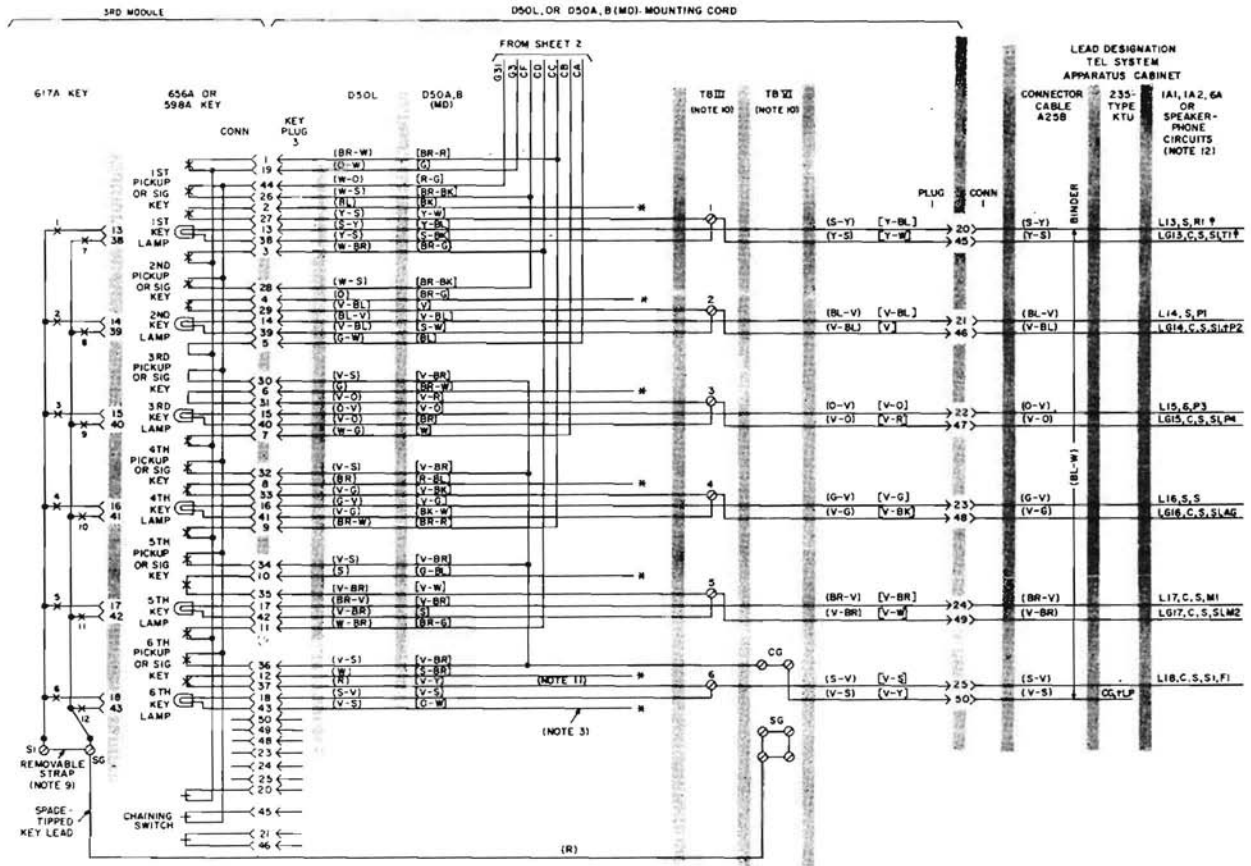


Fig. 3—Module Arrangements and Cord and Cable Connections for 634-Type (MD) Telephone Sets (Sheet 3 of 3)



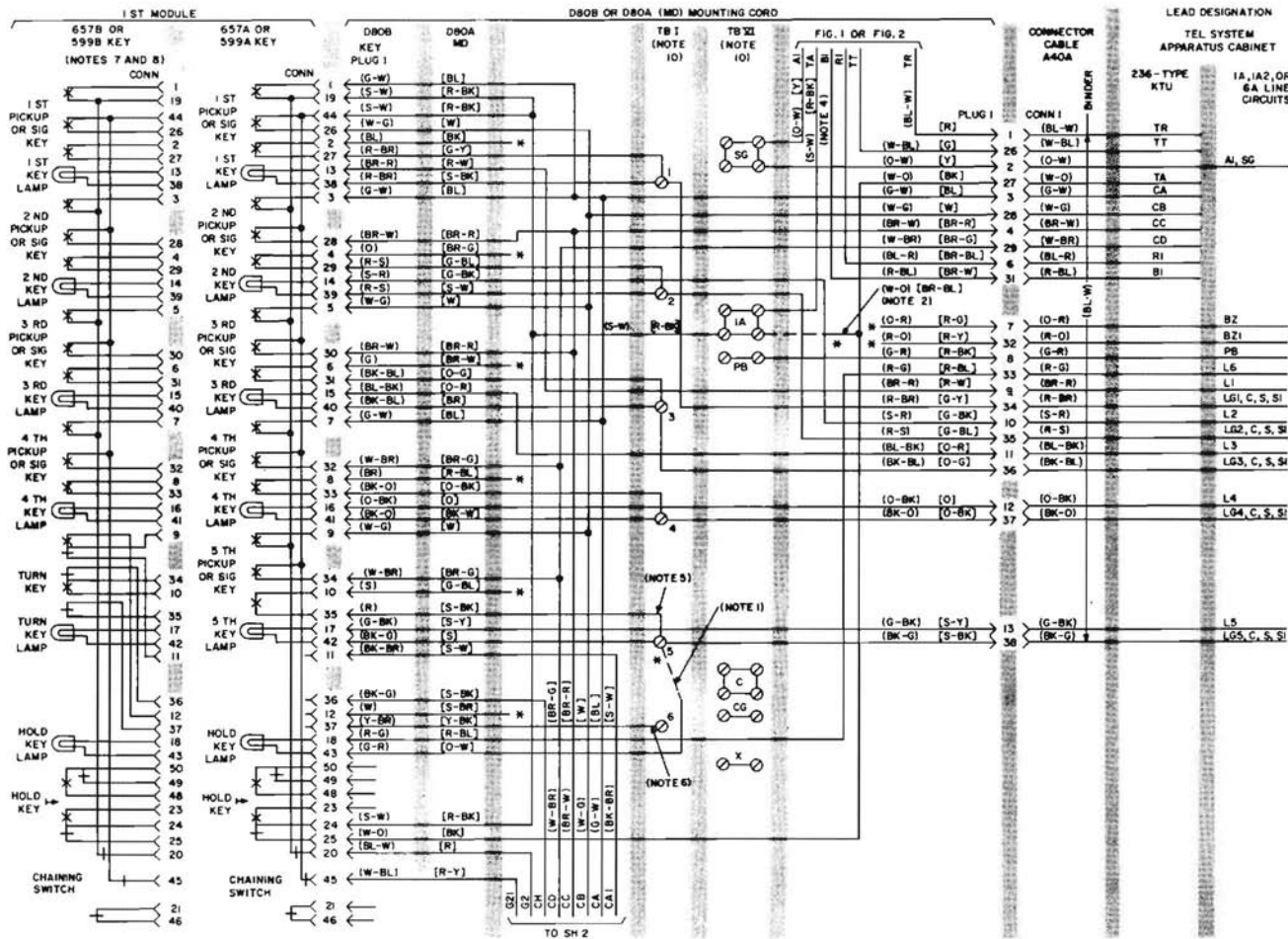


Fig. 4—Module Arrangements and Cord and Cable Connections for 635-Type (MD) Telephone Sets (Sheet 1 of 5)



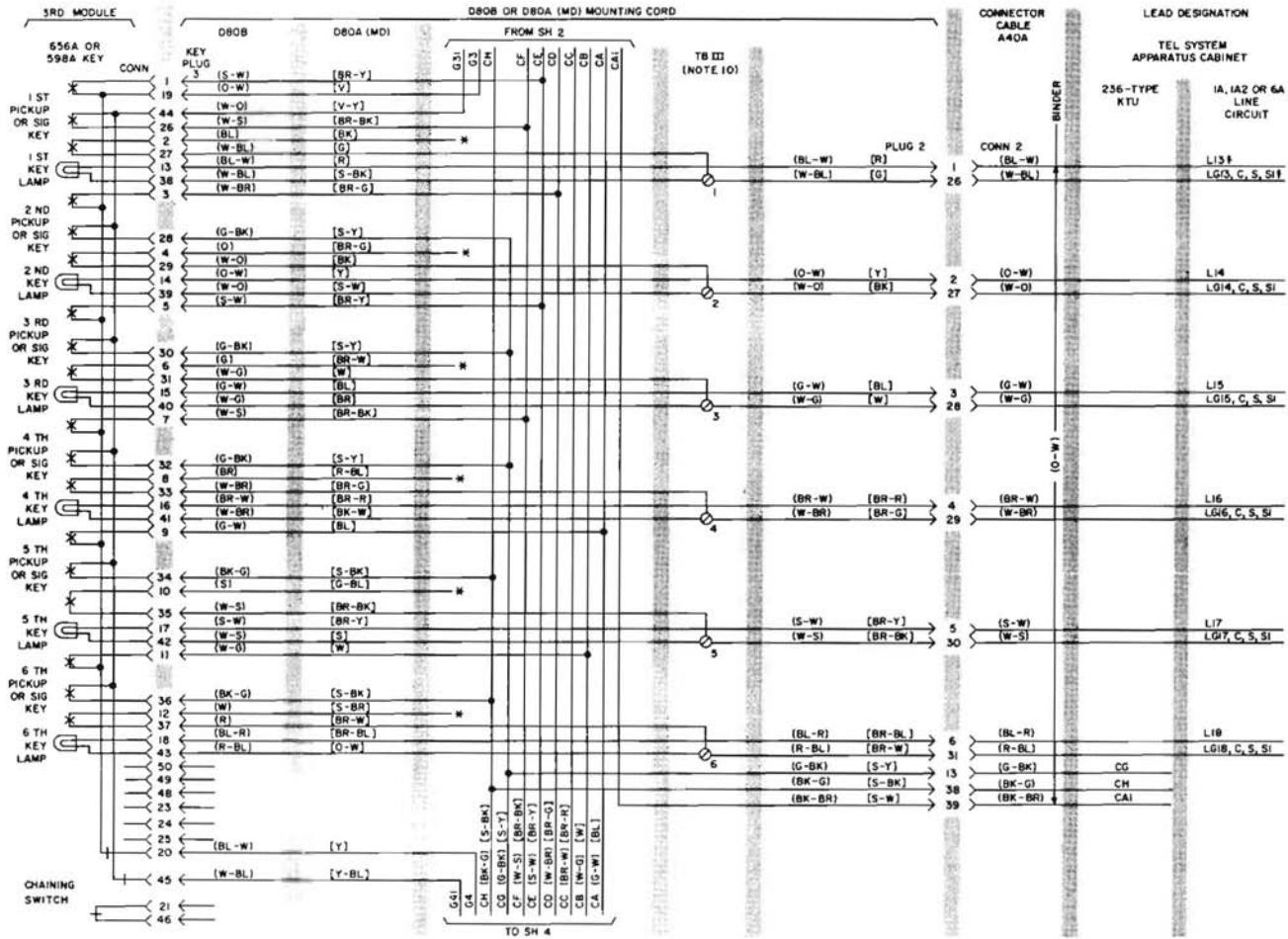


Fig. 4—Module Arrangements and Cord and Cable Connections for 635-Type (MD) Telephone Sets (Sheet 3 of 5)



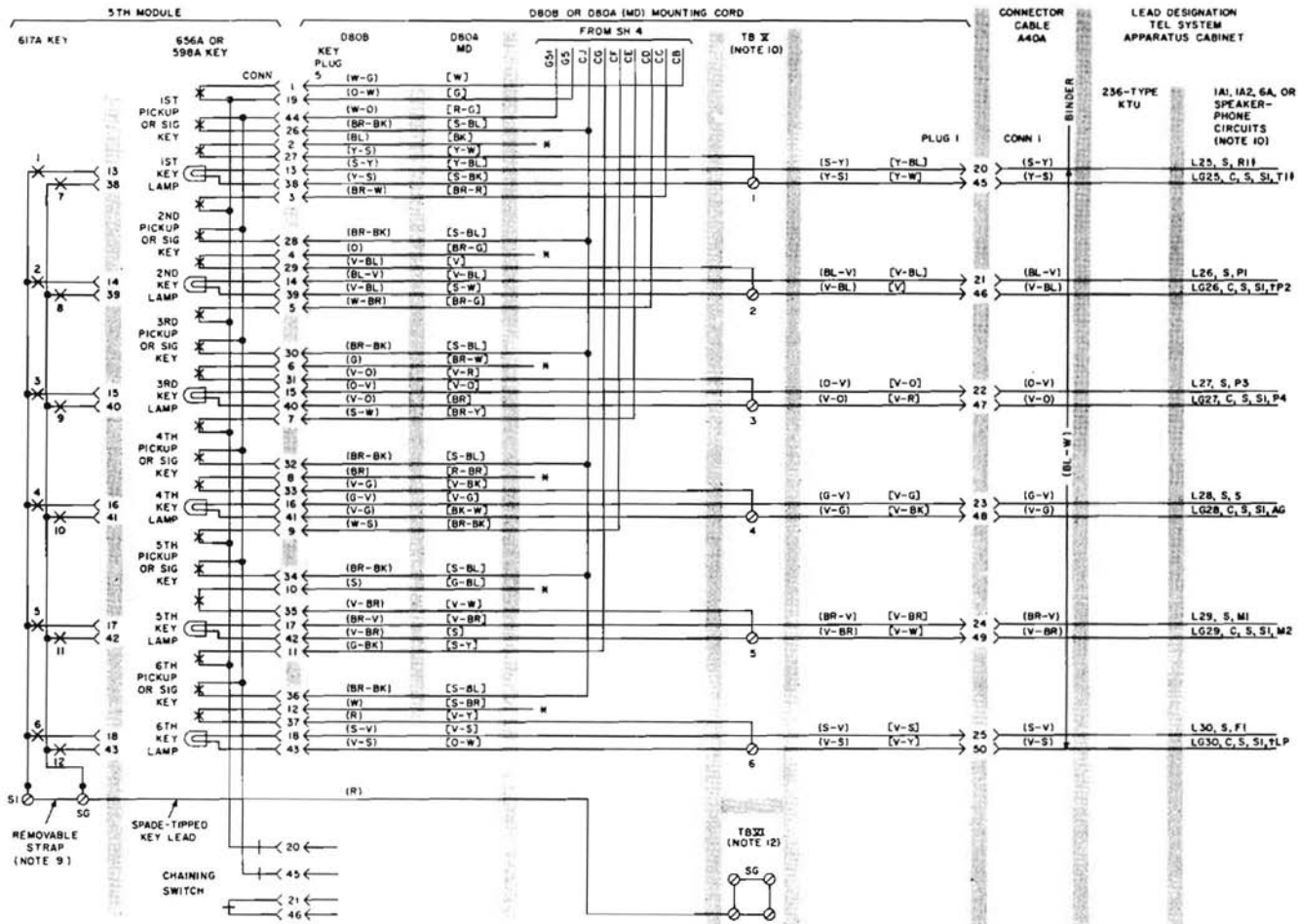


Fig. 4—Module Arrangements and Cord and Cable Connections for 635-Type (MD) Telephone Sets (Sheet 5 of 5)

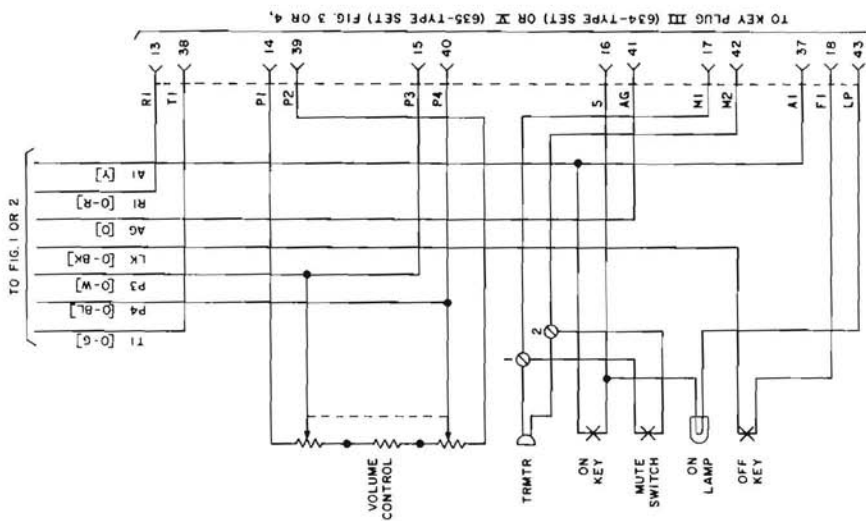
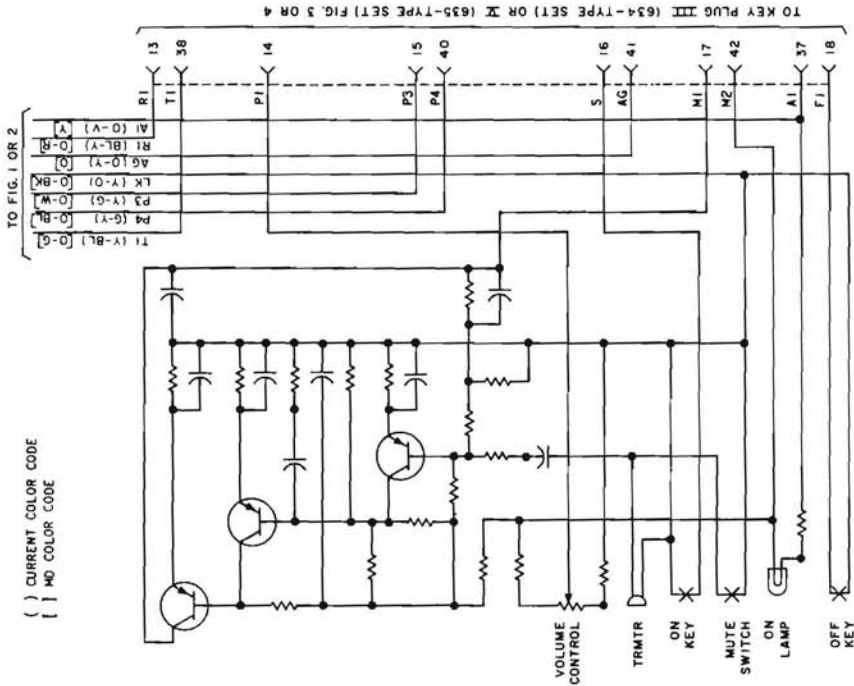


Fig. 5—Speakerphone Transmitters

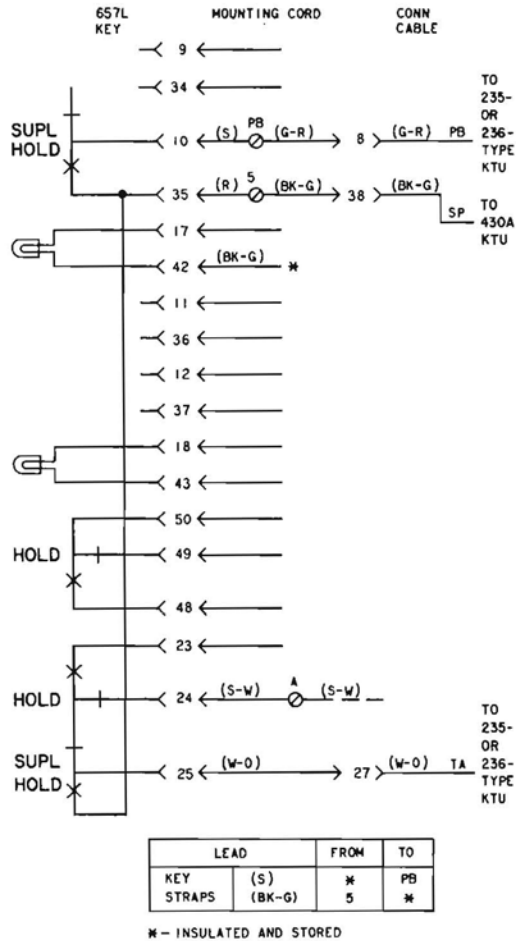


Fig. 6—Priority Hold, Using 657L Key





## SERVICE

### 636A, B, C AND 637A, B, C, D TELEPHONE SETS

#### 1. GENERAL

**1.01** This section contains connection and maintenance information for 18- and 30-button general purpose CALL DIRECTOR® telephone sets equipped with headset jacks.

**1.02** This section is reissued to:

- Change title of section from 636- and 637-type telephone sets
- Show that all codes of these telephone sets are now MD
- Show 599H and 657H keys MD, replaced by 657L key
- Add modification table, Fig. 6
- Add information on T1A ringer, Fig. 1 and change 241A amplifier to 241-type
- Remove common maintenance information which is now covered in Section 502-600-100.

**1.03** These sets are not intended for use with 3-type speakerphone systems.

#### 2. CONNECTIONS

**2.01** These sets are factory-wired for use with 1A1, 1A2, or 6A KTS line circuits. They may also be used with 1A KTS line circuits by modifying the set as shown in Table A. Line circuits for 1A, 1A1, or 1A2 KTS may be connected to the same set under the following conditions:

- (a) 1A1 or 1A2 KTS lines must be connected to the first key units with 1A lines connected to supplementary key modules.
- (b) 1A, 1A1, or 1A2 KTS lines should not be connected to the same 6 line key module.
- (c) 1A, 1A1, or 1A2 KTS lines appearing behind a manual switchboard should not be

intermixed at a CALL DIRECTOR telephone set due to the different time out intervals provided by the associated KTU's.

**2.02** These 636- and 637-type (MD) rotary dial telephone sets are equipped with 517A jacks for the plugs of a G3L handset or a head telephone set. The internal wiring is arranged to electrically connect either the line switch or the headset jacks to the line.

**2.03** Replacement or substitution of the key in the first module may require wiring changes as shown in the notes for Fig. 3 and 4.



*Some spade-tipped conductors or mounting cord leads are insulated with tubing which should be cut off with electrician scissors or diagonal pliers. Other conductors are insulated with stiff plastic pockets. Pinch open the pocket to release the spade tips.*

**2.04** When station busy lamp feature is required with these sets having 1A1 or 1A2 KTS line circuits, a P-90D033 Printed Wiring Board Assembly must be ordered separately and installed in the 636- or 637-type telephone set. With this option, the busy lamp will light whenever a line pickup button is depressed and the handset is off-hook or the headset is plugged into the jack. See Fig. 6 for connections and Section 502-600-100 for installation procedures.

**2.05** Sets equipped with a D120C mounting cord manufactured prior to III-68 must use circuit per Fig. 6 to provide station busy lamp feature.

**2.06** ⚡The tip and ring leads of lines wired for supplementary hold feature must be run directly between the key telephone equipment and key telephone set. The A and lamp leads can be routed per SD-69530-01 and Division 518.⚡

Supplementary hold can be furnished in either of the following arrangements:

◆(a) **Priority Hold:** Replace the 599- or 657-type key in the first module with a 599H (MD) or 657L key which is equipped with a second hold button and wire per Fig. 8 or 9 to transfer the A lead from ground to -24 volts. ◆

(b) **I Hold:** Wire present Hold key to transfer A lead from ground to -24 volt; connect stored (BR-V) [S-Y] Hold lead from first module plug to any spare mounting cord lead using spare terminal or D-161488 connector. Mounting cord lead becomes SP lead at key equipment.

**2.07** To convert a key position from pickup (locking) to signal (nonlocking) remove the

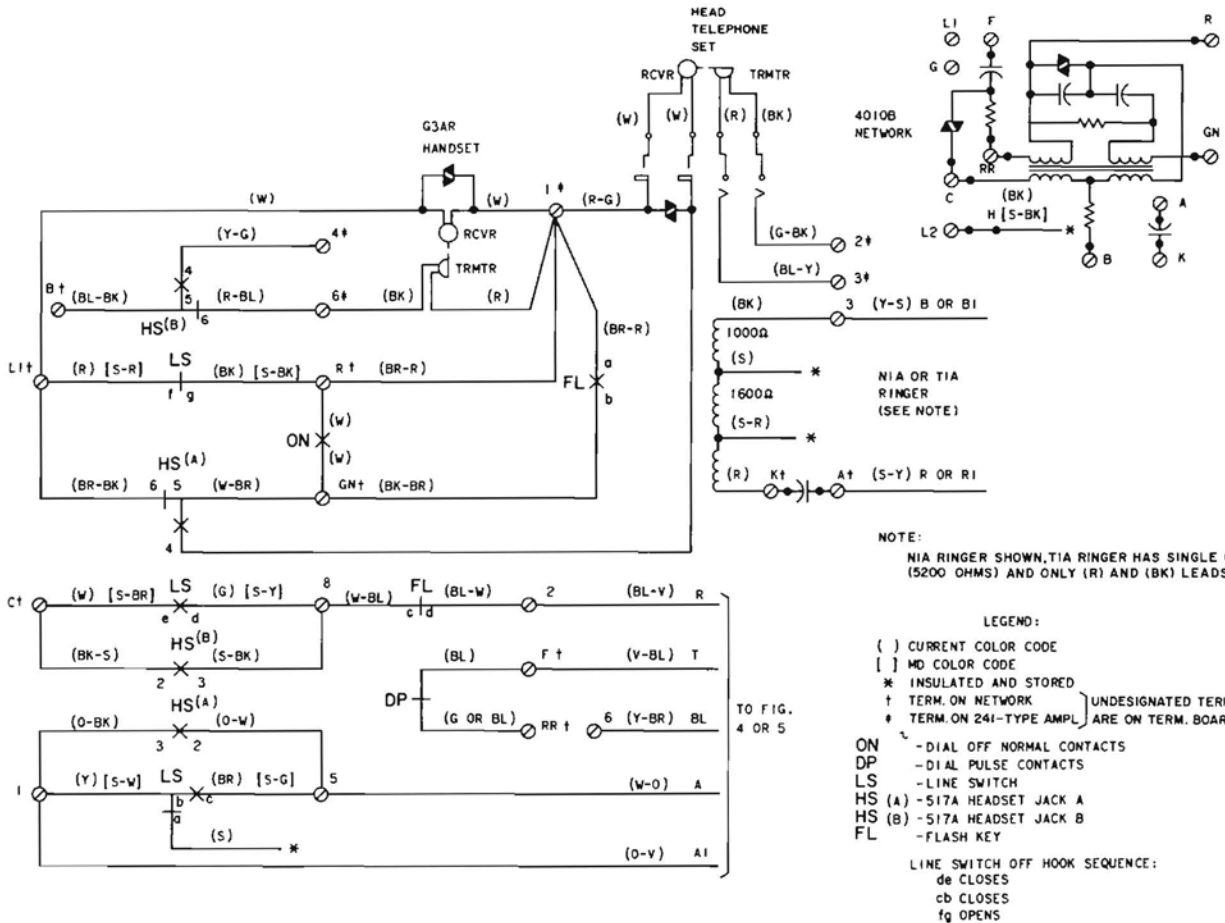
screw detail P-10E837 entirely from plunger at the key position to be converted. Make the necessary wiring changes as shown in Table B.

**2.08** ◆A 657B or 599B key (turnbutton) may be used in the first module for cutoff control of ringer or line. Refer to Note 1 (Fig. 4 and 5) and Table C for necessary wiring changes. ◆

### **3. MAINTENANCE**

**3.01** Maintenance of handset, dials, ringers, and modular keys is outlined in sections covering these components located in Division 501.

**3.02** ◆Refer to Section 502-600-100 for common installation and maintenance information for these CALL DIRECTOR telephone set. ◆



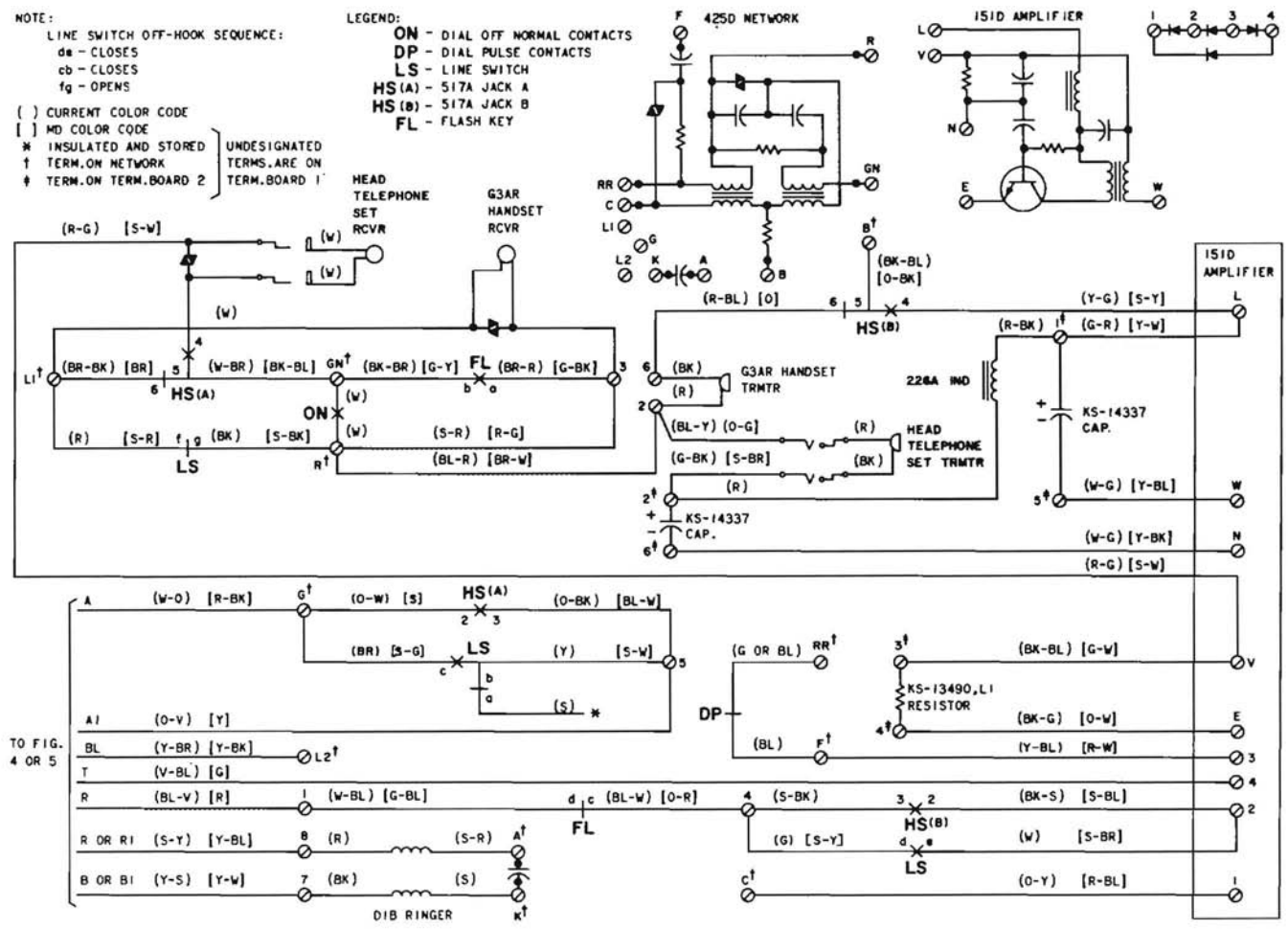
◆ Fig. 1—Current 636- and 637-Type (MD) Telephone Set, Connections ◆

NOTE:  
 LINE SWITCH OFF-HOOK SEQUENCE:  
 dc - CLOSES  
 cb - CLOSES  
 fg - OPENS

( ) CURRENT COLOR CODE  
 [ ] MD COLOR CODE  
 \* INSULATED AND STORED  
 † TERM. ON NETWORK  
 ‡ TERM. ON TERM. BOARD 2

UNDESIGNATED TERMS ARE ON TERM. BOARD 1

LEGEND:  
 ON - DIAL OFF NORMAL CONTACTS  
 DP - DIAL PULSE CONTACTS  
 LS - LINE SWITCH  
 HS(A) - 517A JACK A  
 HS(B) - 517A JACK B  
 FL - FLASH KEY



TO FIG. 4 OR 5

Fig. 2—Early 636- and 637-Type (MD) Telephone Set, Connections

NOTE:

- LINE SWITCH OFF-HOOK SEQUENCE:  
 de CLOSES  
 cb CLOSES  
 fg OPENS
- ( ) CURRENT COLOR CODE  
 [ ] MD COLOR CODE  
 \* INSULATED AND STORED  
 † TERM.ON NETWORK  
 ‡ TERM.ON TERM.BOARD 2
- UNDESIGNATED TERMS ARE ON TERM.BOARD 1

LEGEND:

- ON DIAL OFF NORMAL CONTACTS  
 DP DIAL PULSE CONTACTS  
 LS LINE SWITCH  
 HS (A) 517A JACK A  
 HS (B) 517A JACK B  
 FL FLASH KEY

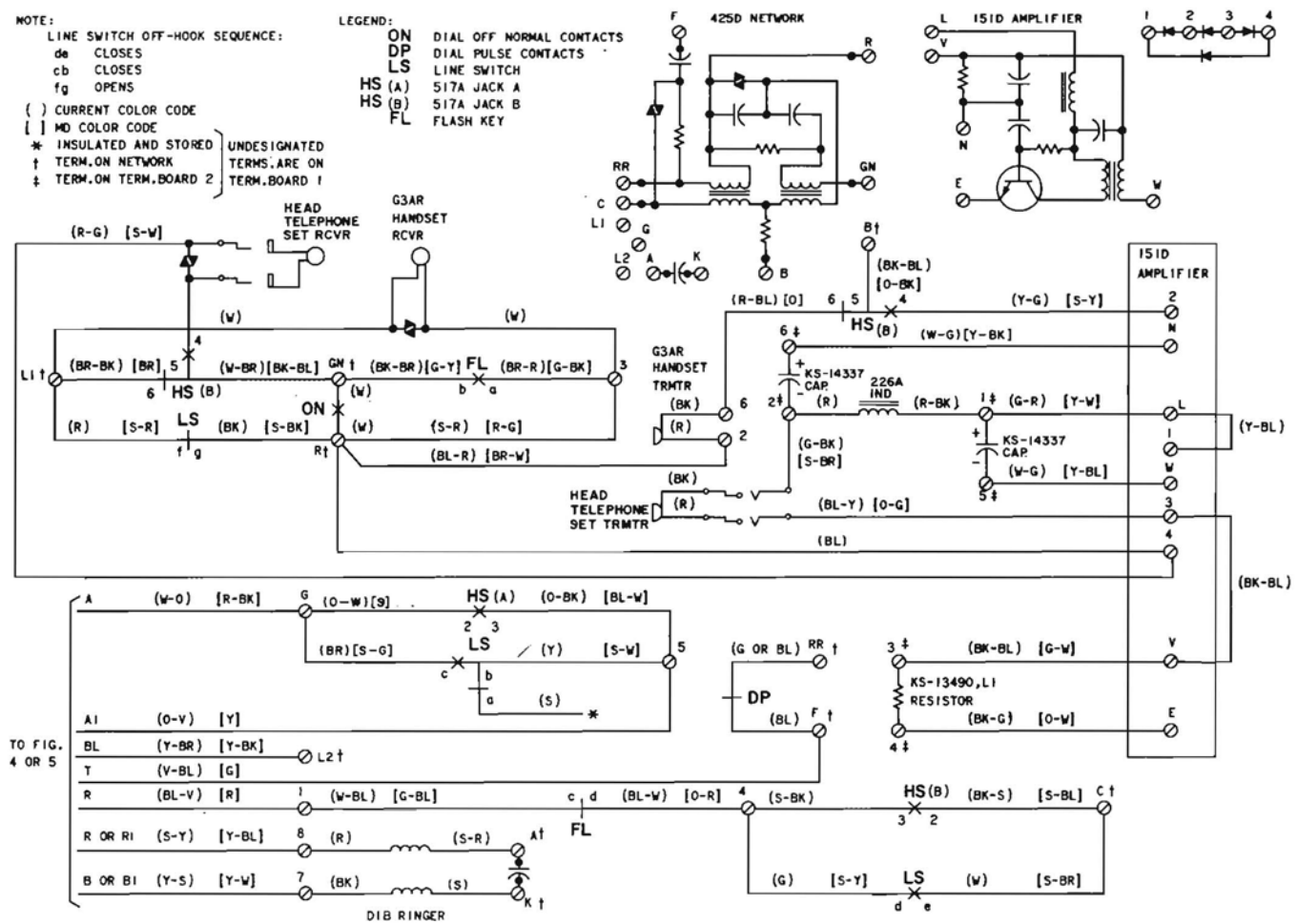


Fig. 3—Early 636- and 637-Type (MD) Telephone Set, Connections (Amplifier Wired for Polarity Guard Diode Protection)









TABLE A — WIRING MODIFICATIONS FOR COMBINING 1A AND 1A1 OR 1A2 KTS LINES

KEY TELEPHONE SYSTEM	MOUNTING CORD LEADS (NOTE 1)												SET LINE SWITCH
	HOLD KEY					CHAINING SWITCH					TEL SET CONTROL (NOTE 2)		
						18- AND 30-BUTTON SETS			30-BUTTON SETS ONLY				
	(Y-G) [BK-BL]	(G-Y) [BK-W]	(V-O) [S-W]	(BR-V) [S-Y]	(V-BR) [S-BK]	(V-G) [BL-W]	(V-G) [BL-W]	(V-G) [BL-W]	(V-G) [BL-W]	(V-G) [BL-W]	(BL-V) [R]	(O-Y) [Y]	
1A1 or 1A2 (shop wiring)	A-H (I)	A-H (I)	*	*	*	A-H (I)	A-H (II)	A-H (III)	A-H (IV)	A-H (V)	R (I)	1B (Note 4)	†
1A1 or 1A2 on first key unit; 1A on remaining key units	A-H (I)	Y (Note 4)	*	1‡ (I)	R (II)	(Y) (Note 4)	A-H (II)	A-H (III)	A-H (IV)	A-H (V)	R (I)	1B (Note 4)	†
1A1 or 1A2 on first and second key units; 1A on remaining key units (30-button sets)	A-H (I)	Y (Note 4)	*	1‡ (II)	R (III)	A-H (I)	Y (Note 4)	A-H (III)	A-H (IV)	A-H (V)	R (I)	1B (Note 4)	†
1A1 or 1A2 on 1st, 2nd, and 3rd key units; 1A on remaining key units (30-button sets)	A-H (I)	Y (Note 4)	*	1‡ (III)	R IV	A-H (I)	A-H (II)	(Y) (Note 4)	A-H (IV)	A-H (V)	R (I)	1B (Note 4)	†
1A1 or 1A2 on 1st through 4th key units; 1A on fifth key unit (30-button sets)	A-H (I)	Y (Note 4)	*	1‡ (IV)	R (V)	A-H (I)	A-H (II)	A-H (III)	Y (Note 4)	A-H (V)	R (I)	1B (Note 4)	†
1A only (See Note 2, Fig. 4 or 5)	Y (Note 4)	A-H (I)	*	R1 (VI)	R (I)	A-H (I)	A-H (II)	A-H (III)	A-H (IV)	A-H (V)	R1 (Note 4)	SG (Note 4)	6 (Note 5)

\* Indicates lead is spade-tipped; insulate and store.

† (BR) [S-G] line switch lead connects to terminal 5 of telephone set terminal board (terminal G of network for MD color code) when station busy circuit is not provided and to terminal 9 of telephone set terminal board when station busy lamp circuit (P-90D033 printed wiring board assembly) is provided (1A1 or 1A2 KTS only).

‡ Disconnect, insulate, and store (BL-V) chaining switch lead at this terminal.

( ) Current color code.

[ ] MD color code.

**Notes:**

1. Mounting cord lead colors in parentheses are in D120C or D200F even count cord; mounting cord lead colors in brackets are in D120B (MD) or D200B (MD) cord.
2. Ring (BL-V) [R] lead connects to (G) [S-Y] line switch lead through flash key contacts and terminals 2 and 8 of telephone set terminal board (even count color code) or terminals 1 and 4 of telephone set terminal board (MD color code). A1 (O-V) [Y] lead connects to (Y) [S-W] line switch lead at terminal 1 (even count color code) or terminal 5 (MD color code) of telephone set terminal board.
3. Roman numerals in parentheses indicate terminal board designations.
4. Terminal on terminal board VI.
5. Terminal on telephone set terminal board (VII).

## NOTES: ASSOCIATED WITH FIG. 5

1. WITH 599A OR 657A KEY IN FIRST MODULE; SPADE TIPPED LEADS FROM KEY PLUG I AND MOUNTING CORD BINDER GROUP [W] ARE INSULATED AND STORED AS SHOWN.  
WITH 599B OR 657B KEY IN FIRST MODULE; [G-BL] LEAD MUST BE REMOVED FROM A-H OF TB1, INSULATED AND STORED.  
WITH 598A OR 656A KEY IN FIRST MODULE; STRAP A-H OF TB1 TO TERMINAL G ON NETWORK.  
CONNECT [S-BR] AND [G-BL] LEADS FROM KEY PLUG I TO A-H OF TB1.  
TO EXTEND HOLD LAMP LEADS CONNECT [BR-Y] AND [BR-BK] KEY PLUGS LEADS TO [O-BL] AND [O-W] MOUNTING CORDS LEADS RESPECTIVELY USING SPARE TERMINALS OR D-161488 CONNECTORS.
2. FOR USE WITH 1A KEY SYSTEM ONLY, MOVE AI [Y] STRAP FROM IB TO SG ON TBVI AND MAKE CONVERSION SHOWN IN TABLE A.
3. FOR ADD-ON CONFERENCE CONTROL IN THE 6A KEY TELEPHONE SYSTEM, CONNECT [G-W] MOUNTING CORD LEAD (RED BINDER GROUP) TO TBVI-PB. ALSO REMOVE COMMON LEAD OF ADD-ON CONFERENCE BUTTON (CONVERTED TO SIGNALING) FROM A-H TERMINAL AND CONNECT TO PB. THE 617A KEY MAY ALSO BE USED IN A SIMILAR MANNER. ALSO SEE NOTE 4.
4. WHEN THE 617A KEY IS REQUIRED AS A DUAL-PURPOSE KEY, THE BRASS STRAP BETWEEN THE SI AND SG TERMINALS OF THE KEY MAY BE REMOVED. USE MIW CORD OR EQUIVALENT TO CONNECT SI TERMINAL OF 617A KEY TO A DISSIMILAR GROUND OR A NONGROUNDED CIRCUIT.
5. WHEN INSTALLING P-900033 PRINTED WIRING BOARD ASSEMBLY TO PROVIDE STATION BUSY LAMP FEATURE IN 1A1 OR 1A2 KTS CONNECT A OR H LEAD [S-BL] FROM LAST KEY MODULE TO TERMINAL X OF TBVI. SEE FIG. 6.

\* INSULATED AND STORED

DEAD ENDED

( ) CURRENT COLOR CODE

[ ] MD COLOR CODE







♦ TABLE B ♦

## PICKUP-SIGNAL KEY CONVERSION (3RD OR 5TH MODULE)

CONVERSION OPTIONS (NOTES)	598A OR 656A KEY						
	(O-W) [BK]	(S-W) [BR-G]	(G-R) [BR-W]	(BL-BK) [R-BL]	(BR-BK) [G-BL]	(Y-O) [S-BR]	(O-Y) [O-BK]
PPPPPP	A-H	A-H	A-H	A-H	A-H	A-H	G
PPPPPS	A-H	A-H	A-H	A-H	A-H	SG	G
PPPPSS	A-H	A-H	A-H	A-H	SG	SG	G
PPSSSS	A-H	A-H	A-H	SG	SG	SG	G
PPSSSS	A-H	A-H	SG	SG	SG	SG	G
PSSSSS	A-H	SG	SG	SG	SG	SG	G
SSSSSS	SG	SG	SG	SG	SG	SG	G
PPPP*P*S	A-H	A-H	A-H	C	C	5†	C
PPP*P*P*S	A-H	A-H	C	C	C	5†	C
PP*P*P*P*S	A-H	C	C	C	C	5†	C
P*P*P*P*P*S	C	C	C	C	C	5†	C

**Notes:**

1. Convert buttons on right hand key module first. If more than six (five with common signaling) are required use module preceding right hand position, repeat connection modifications as shown in table.
2. All key positions are arranged in the shop as pickup positions. To convert to signaling (nonlocking), remove the screw detail P-10E837 from the plunger at the key position to be converted. Make the necessary connection changes as shown in Table B.

\* These arrangements use line switch controlled ground for common signal key used with private or intercommunicating lines. Common signal should be used to operate a signal relay. Do no wire directly to a buzzer.

† Terminal G in early sets.

( ) Current color code.

[ ] MD color code.

TABLE C

## 599B (TURNKEY) KEY CONNECTIONS

FEATURE	FIRST MODULE KEY LEADS						SPADE-TIPPED LEADS OF MOUNTING CORD				
	5TH			6TH							
	R	T	A	R	T	A	(BL-Y) [O-R]	(Y-BL) [O-G]	(O-Y) [O-BK]	(Y-O) [S-BR]	(BR-BK) [G-BL]
	(G-BK) [R-W]	(BK-G) [G-Y]	(BK-BR) [G-BL]	(BL-Y) [O-R]	(Y-BL) [O-G]	(Y-O) [O-BK]					
Cutoff sta on 1A1 or 1A2 sys	To KTS Equip			To Ext Sta			Insulate and store				
Cutoff sta on 1A sys without hold feature	To KTS Equip			To Ext Sta			Insulate and store				
Cutoff station on 1A system with hold feature	To Aux Relay used to cut off T, R, B, and H						Insulate and Store			SG*	SG*
Cutoff external ringer or buzzer	To KTS Equip			To Ext Ringer or Buzzer			Insulate and Store				
Cutoff ringer in set (Note 1)	To KTS Equip						3† (Note 2)	A‡ (Note 2)	Insulate and Store		
Cutoff Buzzer in Set (Note 1 and 2)	AC Buzzer		To BZ and BZ1 at KTS Equip				A	C	Insulate and Store		
	DC Buzzer			D	C						
	Com. Audible			Cap.	C						
Monitoring	To MON Equip						R TBI	T TBI			

\* Terminal on TBVI.

† Terminal on telephone set terminal board.

‡ Terminal on set network.

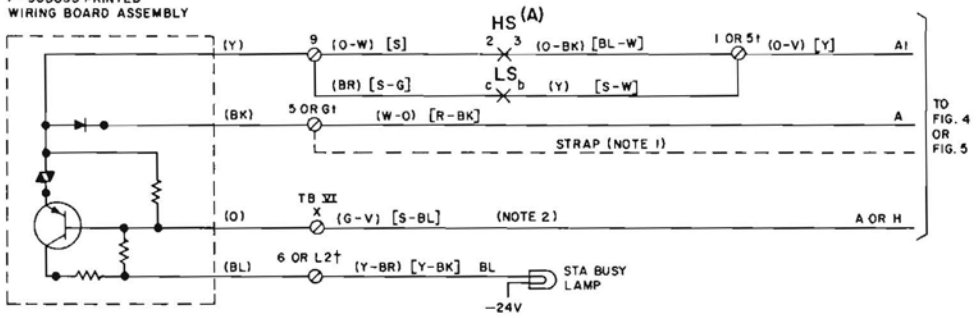
( ) Current color code.

[ ] MD color code.

**Notes:**

1. Insulate and store BZ and BZ1 leads at buzzer or telephone set terminal board.
2. The (BL-Y) [O-R] and (Y-BL) [O-G] mounting cord leads should be insulated and stored at the equipment end when the bridged spade-tipped leads are used in the set.

P-90D033 PRINTED WIRING BOARD ASSEMBLY



NOTES:

1. WITH 598A OR 656A KEY IN FIRST MODULE EXTEND "A" LEAD FROM TBI TERM 5 ON CURRENT SETS OR NETWORK TERM. G ON EARLY SETS.
  2. FROM LAST MODULE.
- { } CURRENT COLOR CODE  
[ ] MD COLOR CODE

\* STORED LOCATION

† NETWORK TERMINAL, EARLY PRODUCTION SETS ONLY.

LEGEND

HS(A) - HEADSET JACK A

LS - LINE SWITCH

MODIFICATION			
WIRE OR LEAD	COLOR	REMOVE FROM	CONNECT TO
P-90D033 PRINTED WIRING BOARD	(Y) (BK) (O) (BL)		TB VII - 9 5 OR G1 TB VII - X 6 OR L21
HEADSET JACK (A)	(O-W) [S]	5 OR G1	TB VII - 9
LINE SWITCH	(BR) [S-G]	5 OR G1	TB VII - 9
CHAINING SWITCH (LAST MODULE)	(G-V) [S-BL]	*	TB VII - X

◆ Fig. 6—Station Busy Lamp Circuit Using Printed Wiring Board Assembly ◆



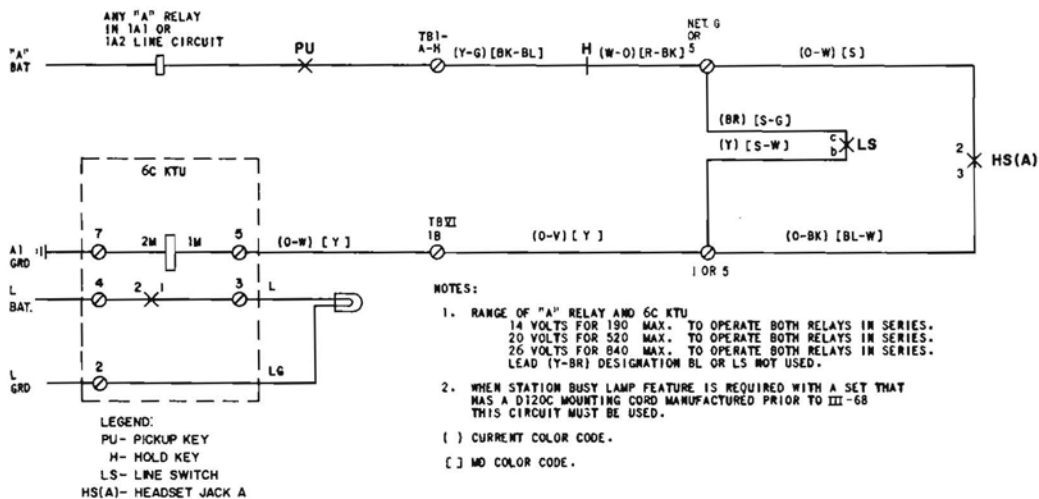
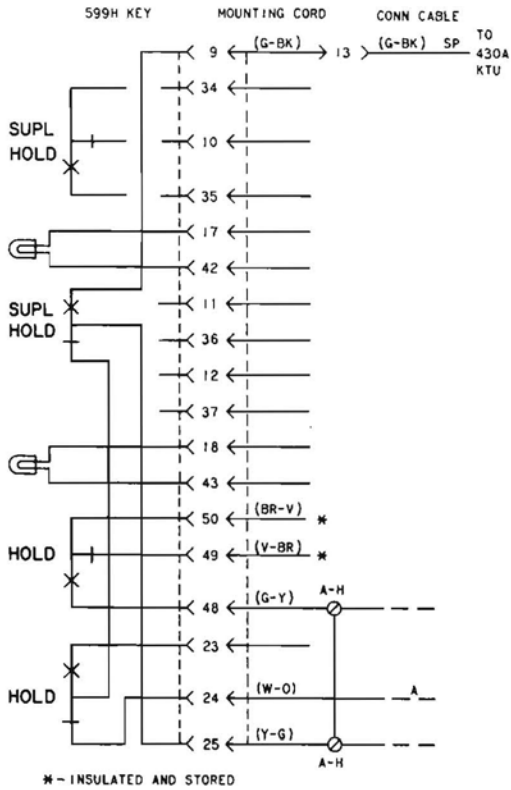
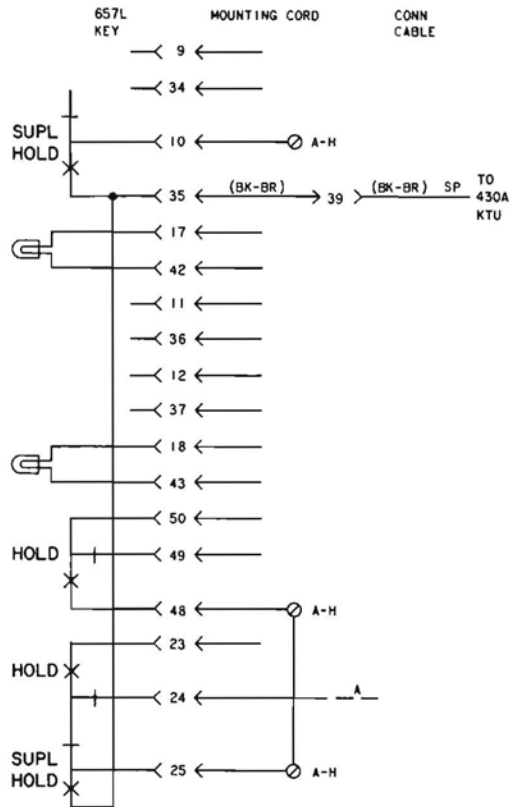


Fig. 7—Busy Lamp Control Circuit with 6C KTU



◆ Fig. 8—Priority Hold, Using 599H Key ◆



◆ Fig. 9—Priority Hold, Using 657L Key ◆

## SERVICE

### 634DA, 634DAM, 635DA, AND 635DAM TELEPHONE SETS

#### 1. GENERAL

1.01 This section contains connection and maintenance information for 634DA (MD), 634DAM (18-button) and 635DA (MD), 635DAM (30-button) CALL DIRECTOR® telephone sets used with station line concentrators.

1.02 This section is reissued to:

- Show D50AH-87 and D80D-87 mounting cords MD
- Add D50BD-87 and D80E-87 mounting cords

#### 2. CONNECTIONS

2.01 These sets are factory-wired for use with 1A1, 1A2, or 6A key telephone systems. Refer to Division 518 for connections to the 235- or 236-type key telephone units.

2.02 A 235-type KTU is associated with each 634-type telephone set and a 236-type KTU with each 635-type telephone set. Because of the single common talking and control lead pattern in these sets, a line concentrator KTU must be associated with each telephone set installed and cannot be shared, even on a bridged station basis.

2.03 ♦The 634- and 635-type sets that are provided with D50AH(MD) or D80D(MD) mounting cords require contact strip assemblies on the 635-type keys. These sets are normally provided with a 635A5C key (5-line pickup and hold) in the first module. If desired, the 635A5C key can be replaced with a 635AD5C key (4-line pickup, cutoff, and hold). In this case the contact strip assemblies for the 635AD5C key (840151039 and 840151047) are furnished with the key.♦

**Note:** ♦Contact strips are not required with sets equipped with D50BD or D80E mounting

cord. A and A1 are common to all pickup buttons through internal mounting cord wiring.♦

2.04 Because of the physical arrangement of the 635-type key, the contact strips do not extend to the chaining switch. This requires additional A1 leads to each module (except the last), to extend A lead control.

2.05 Mounting cords of these CALL DIRECTOR sets terminate in individual plugs connected to the rear of the keys. This permits rearrangement of line appearance either in the set or at the key equipment distribution point. Current production sets are equipped with a satin-silver (-87) mounting cord.

2.06 ♦The D50AH (MD) and D80D (MD) mounting cords are replaced by D50BD and D80E, respectively.♦

2.07 All line key positions are convertible from pickup (locking) to signaling (nonlocking). To convert a key position, remove the 812857738 (P-28E773) screw detail from key position involved and place 840157671 insulating details over the two key contacts adjacent to the plunger (refer to Section 512-230-101). Make the necessary wiring changes as shown in Table A for 634DA, DAM and Table B for 635DA, DAM sets.

**Note:** If more than six signaling keys are required, replace 635G5C key in last module with a 658A key.

2.08 The 634DA, DAM and 635DA, DAM telephone sets are factory-equipped with a KS-20419L1 (10 volt AC only) buzzer. Provisions are made for mounting one KS-8109L2 buzzer when an additional buzzer is desired.

2.09 For 3-type speakerphone operation, a 679A transmitter may be installed in the 3rd (634-type) or 5th (635-type) module. For necessary

#### NOTICE

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Bell System except under written agreement

wiring changes and connections, see Table C.

◆ Replace the 8RA dial with 8CA dial.◆

2.10 For use with a 4A speakerphone, refer to Section 512-730-400.

### 3. MAINTENANCE

3.01 For maintenance information, refer to Division 502 section entitled 630, 1630, and 2630

Series Telephone Sets—Common Installation and Maintenance Information. Individual components such as dials, keys, ringers, etc. are covered in sections located in Division 501.

3.02 **Do not use solvents to clean plastic parts of these sets.** Use a damp cloth only. If discolored, replace part.

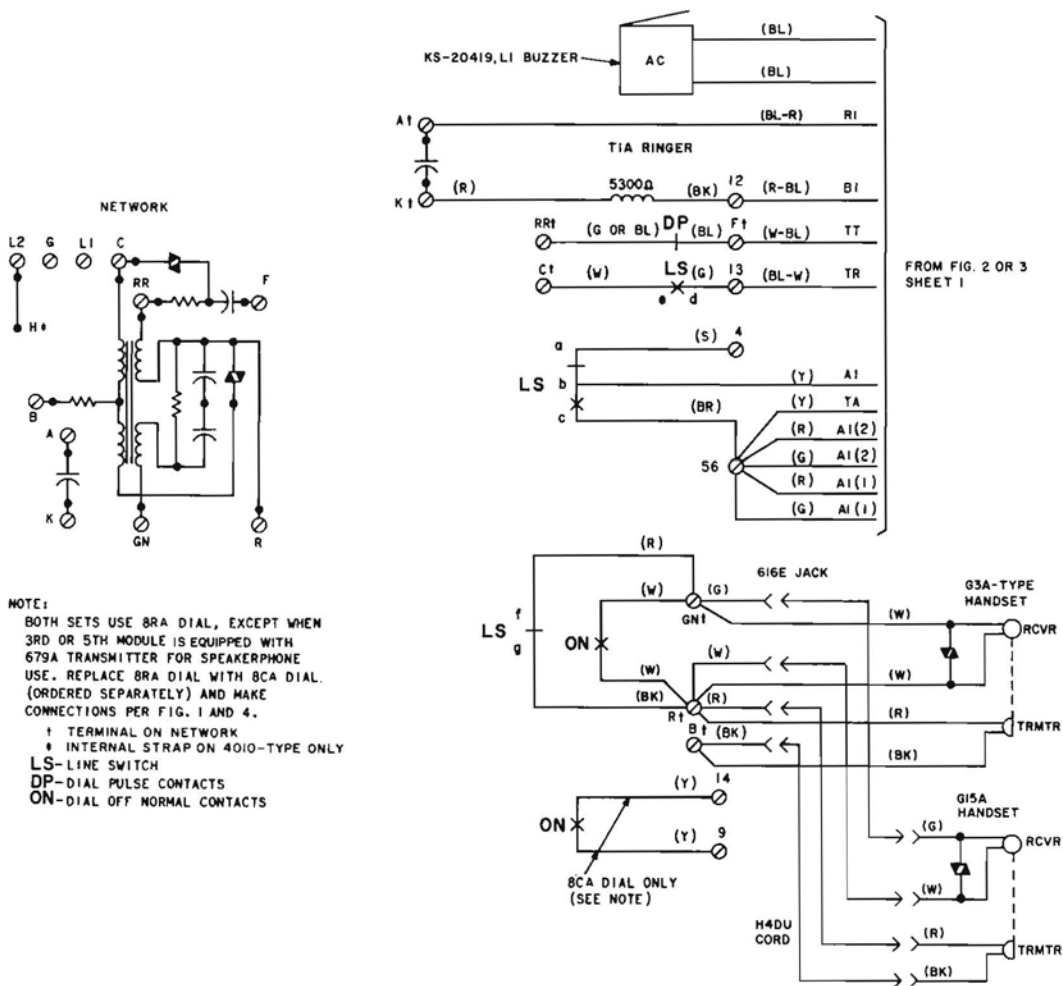


Fig. 1—634DA, DAM and 635DA, DAM Telephone Set Connections

**TABLE A**  
**PICKUP-SIGNAL KEY CONVERSION—634DA, DAM TELEPHONE SET (THIRD MODULE ONLY)**

NO. OF SIGNAL KEYS	KEY PLUG LEADS																							
	1ST PICKUP				2ND PICKUP				3RD PICKUP				4TH PICKUP				5TH PICKUP				6TH PICKUP			
	BL	Y-S	BR-W	W-S	O	V-BL	W-BR	W-S	G	V-O	G-W	V-S R-S†	BR	V-G	W-G	V-S R-S†	S	V-BR	BR-W	V-S R-S†	W	V-S	W-BR	V-S
1	*	50	59	62	*	51	60	62	*	52	58	63	*	53	57	63	*	54	59	63	10	†	*	*
2	*	50	59	62	*	51	60	62	*	52	58	63	*	53	57	63	10	†	*	*	10	†	*	*
3	*	50	59	62	*	51	60	62	*	52	58	63	10	†	*	*	10	†	*	*	10	†	*	*
4	*	50	59	62	*	51	60	62	10	†	*	*	10	†	*	*	10	†	*	*	10	†	*	*
5	*	50	59	62	10	†	*	*	10	†	*	*	10	†	*	*	10	†	*	*	10	†	*	*
6	10	†	*	*	10	†	*	*	10	†	*	*	10	†	*	*	10	†	*	*	10	†	*	*

\* Insulated and stored.

† From LG terminal of plugs — insulate and store.

‡ Lead color in D50BD mounting cord.

**TABLE B**  
**PICKUP-SIGNAL KEY CONVERSION—635DA, DAM TELEPHONE SET (FIFTH MODULE ONLY)**

NO. OF SIGNAL KEYS	KEY PLUG LEADS																							
	1ST PICKUP				2ND PICKUP				3RD PICKUP				4TH PICKUP				5TH PICKUP				6TH PICKUP			
	BL	Y-S	W-G	BR-BK	O	V-BL	BR-W	BR-BK	G	V-O	W-BR	BR-BK	BR	V-G	S-W	BR-BK	S	V-BR	W-S	BR-BK	W	V-S	G-BK	BR-BK
1	*	50	57	65	*	51	59	65	*	52	60	65	*	53	61	65	*	54	62	65	10	†	*	*
2	*	50	57	65	*	51	59	65	*	52	60	65	*	53	61	65	10	†	*	*	10	†	*	*
3	*	50	57	65	*	51	59	65	*	52	60	65	10	†	*	*	10	†	*	*	10	†	*	*
4	*	50	57	65	*	51	59	65	10	†	*	*	10	†	*	*	10	†	*	*	10	†	*	*
5	*	50	57	65	10	†	*	*	10	†	*	*	10	†	*	*	10	†	*	*	10	†	*	*
6	10	†	*	*	10	†	*	*	10	†	*	*	10	†	*	*	10	†	*	*	10	†	*	*

\* Insulated and stored.

† From LG terminal of plugs — insulate and store.

## NOTES FOR FIGURES 2 AND 3:

1. THE 635AD5C KEY IS SUPPLIED WITH AN ADAPTER IN THE CUTOFF KEY POSITION. IN SETS EQUIPPED WITH D50AH OR D80D (MD) MOUNTING CORD, CONTACT STRIP ASSEMBLIES 840151039 AND 840151047 FURNISHED WITH THE 635AD5C KEY REPLACE THE 840151120 AND 840151138 ASSEMBLIES USED WITH THE 635A5C KEY. THE SLATE MOUNTING CORD PLUG CONNECTS TO THE ADAPTER. BALANCE OF PLUGS CONNECT DIRECTLY TO KEY.
2. IF A 635AD5C KEY IS ADDED IN THE FIELD, TERMINATE THE (BL-Y) AND (Y-BL) ADAPTER LEADS AS INDICATED IN NOTE 6 AND REMOVE (R) SLATE PLUG LEAD FROM TERMINAL 22. INSULATE AND STORE.
3. IF THE HOLD POSITION LAMP (6TH) 635A5C OR 635AD5C KEY IN THE FIRST MODULE IS USED FOR A VISUAL SIGNAL, REMOVE (Y-G) LAMP GROUND LEAD FROM STORED LOCATION IN FIRST MODULE AND CONNECT TO TERMINAL 22. CONNECT INSULATED AND STORED (G-Y) LAMP LEAD AND (R-G) MTG CORD LEAD USING SPARE TERMINAL OR D-161488 CONNECTOR.
4. IN SETS EQUIPPED WITH A 658A KEY, THE (G) CONTACT STRIP OR PLUG STRAP LEAD IS TERMINATED ON TERMINAL 10 AND (R) ON 11. IF A 658A KEY IS ADDED IN THE FIELD, LEADS MUST BE MOVED FROM PRECEDING MODULE CHAINING CIRCUIT TO TERMINALS 10 AND 11. PROVISIONS ARE MADE FOR MECHANICALLY STORING THE LIGHT BEIGE PLUG ON THE 658A KEY. NO ELECTRICAL CONNECTION IS MADE.
5. WHEN THE 658A KEY IS REQUIRED AS A DUAL PURPOSE KEY, REMOVE STRAP BETWEEN TERMINALS 10 AND 11. USE MIW CORD OR EQUIVALENT TO CONNECT TERMINAL 11 TO A DISSIMILAR GROUND OR NONGROUNDED CIRCUIT.
6. CUTOFF OF THE INTERNAL RINGER CAN BE PROVIDED USING THE 635AD5C KEY IN FIRST MODULE. TRANSFER BI (R-BL) LEAD FROM TERMINAL 12 AND (BL-Y) ADAPTER LEAD TO SPARE TERMINAL OR D-161488 CONNECTOR. REMOVE (W-G) LEAD (SLATE PLUG) FROM TERMINAL 57 AND CONNECT TO 12.
7. WHEN 635AD5C KEY IS USED IN FIRST MODULE TO PROVIDE CUTOFF, SWITCHING, OR TRANSFER FEATURES, MOVE (W-BR) SLATE PLUG LEAD FROM TERM. 60 TO TERMINAL 11. THESE SERVICE FEATURES ARE PROVIDED BY AN AUXILIARY RELAY (229B KTU OR EQUIVALENT) SEPARATELY MOUNTED AND CONTROLLED BY THE CUTOFF KEY CONTACTS THROUGH LG5, C, S, SI LEAD.
8. CONTROL LEADS CA TO CJ ARE CONNECTED TO TERMINALS 57 TO 65. THESE TERMINALS APPEAR ON MORE THAN ONE OF THE MODULE SHEETS OF FIG. 2 AND 3 BUT ARE THE SAME TERMINAL.
9. THESE CONTACT STRIPS ARE REQUIRED WHEN TELEPHONE SET IS EQUIPPED WITH THE D50AH (MD) OR D80D (MD) MOUNTING CORD. THESE CONTACT STRIPS SHOULD NOT BE USED WHEN TELEPHONE SET IS EQUIPPED WITH THE D50BD OR D80E MOUNTING CORD.

\* INSULATED AND STORED

† DEAD DRESSED

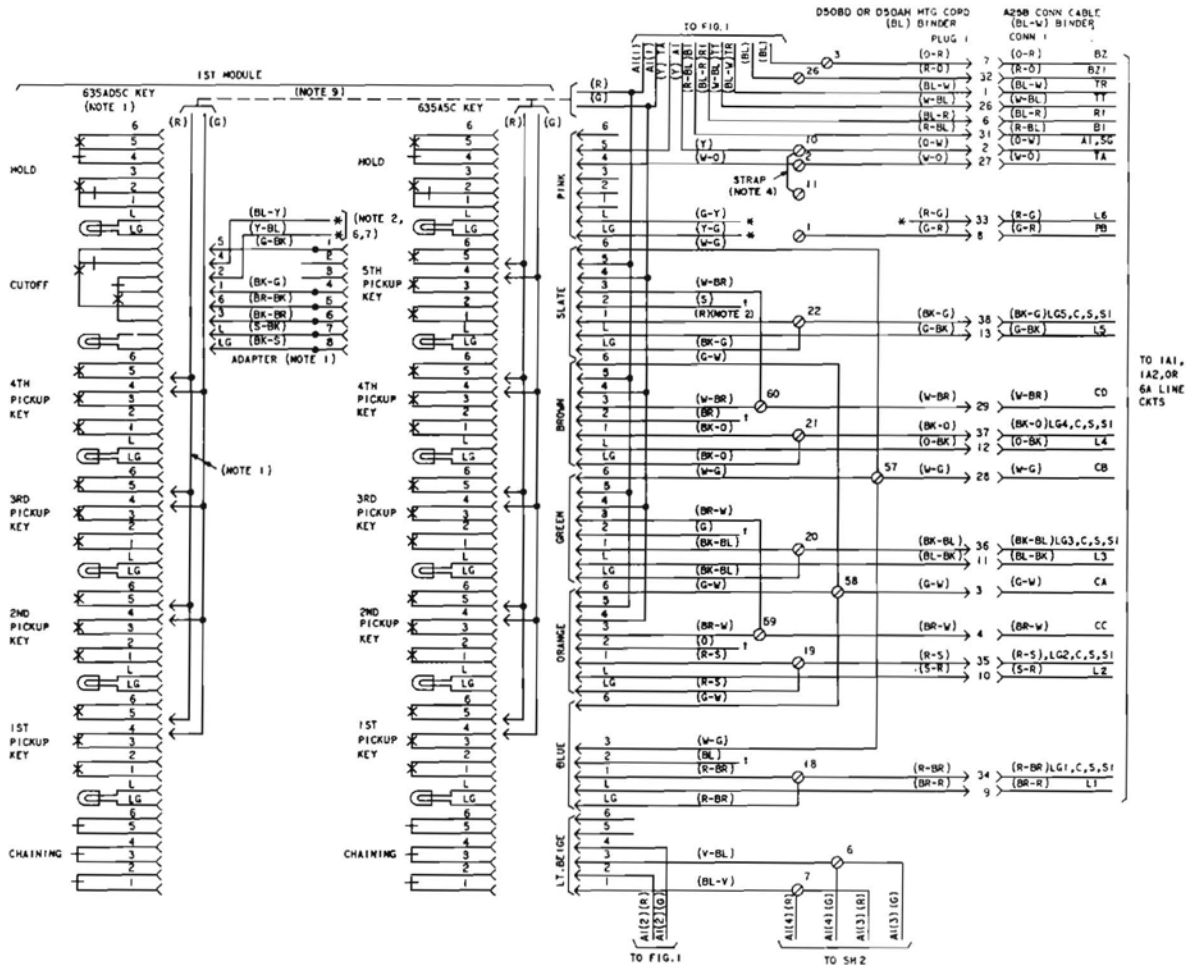


Fig. 2—634DA, DAM Telephone Set Module and Connector Cable Arrangements (Sheet 1 of 3)

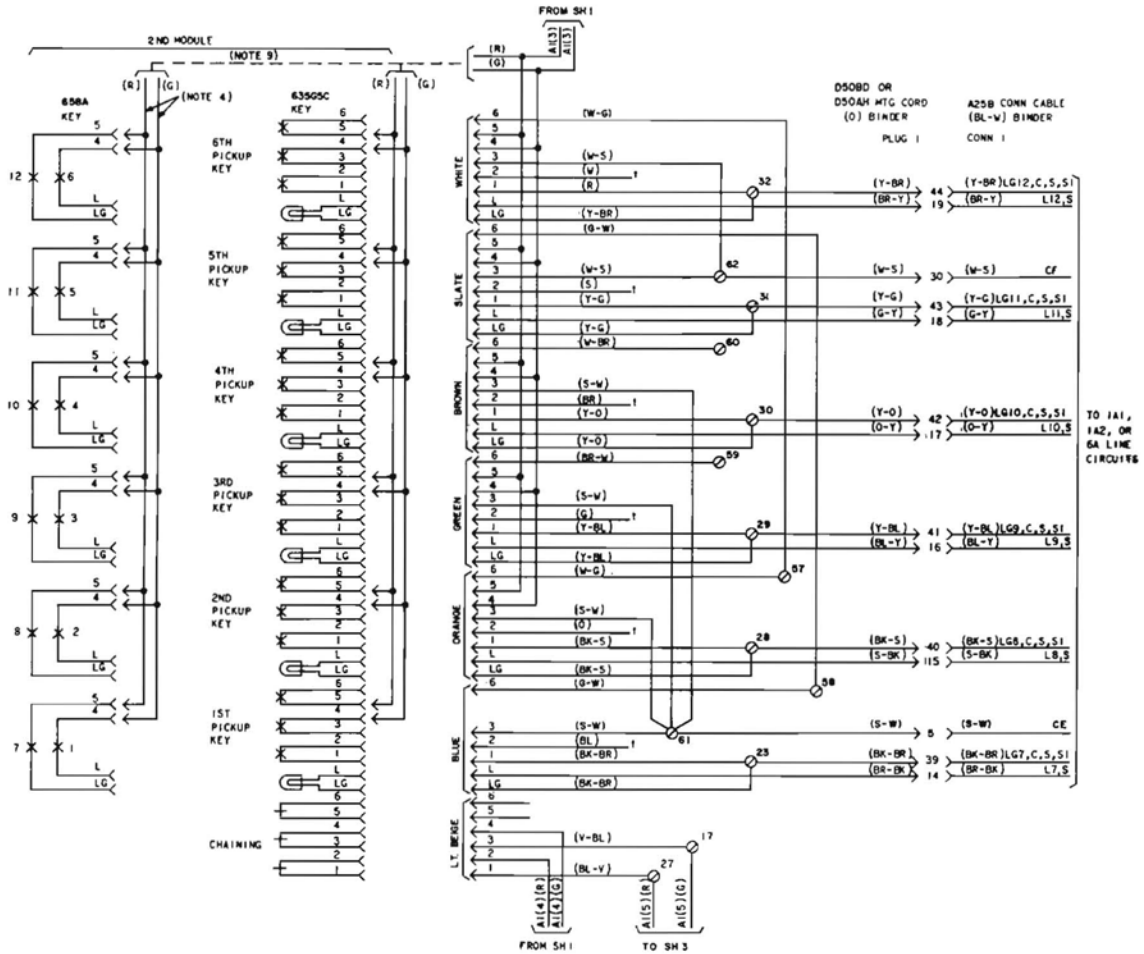


Fig. 2—634DA, DAM Telephone Set Module and Connector Cable Arrangements (Sheet 2 of 3)





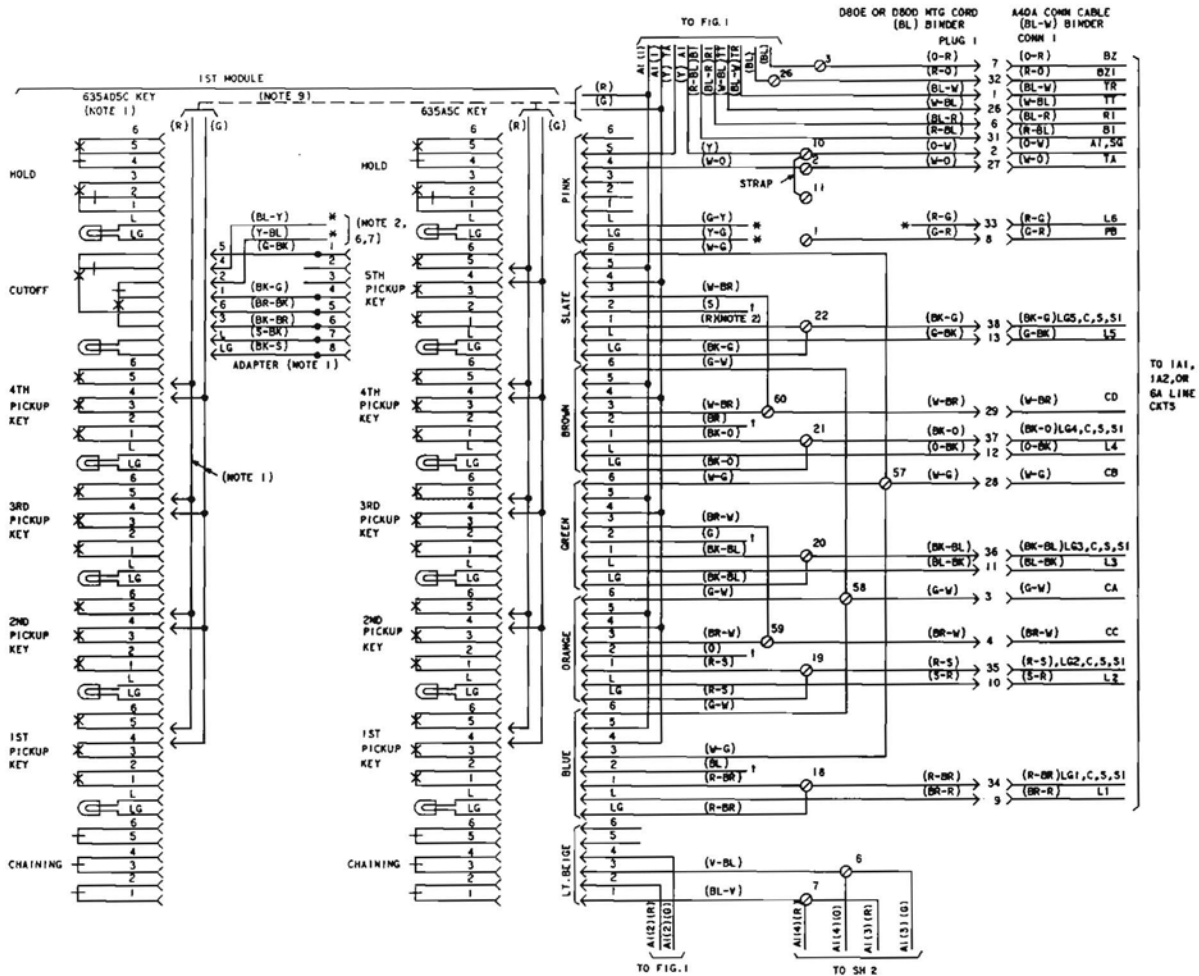


Fig. 3—635DA, DAM Telephone Set Module and Connector Cable Arrangements (Sheet 1 of 5)





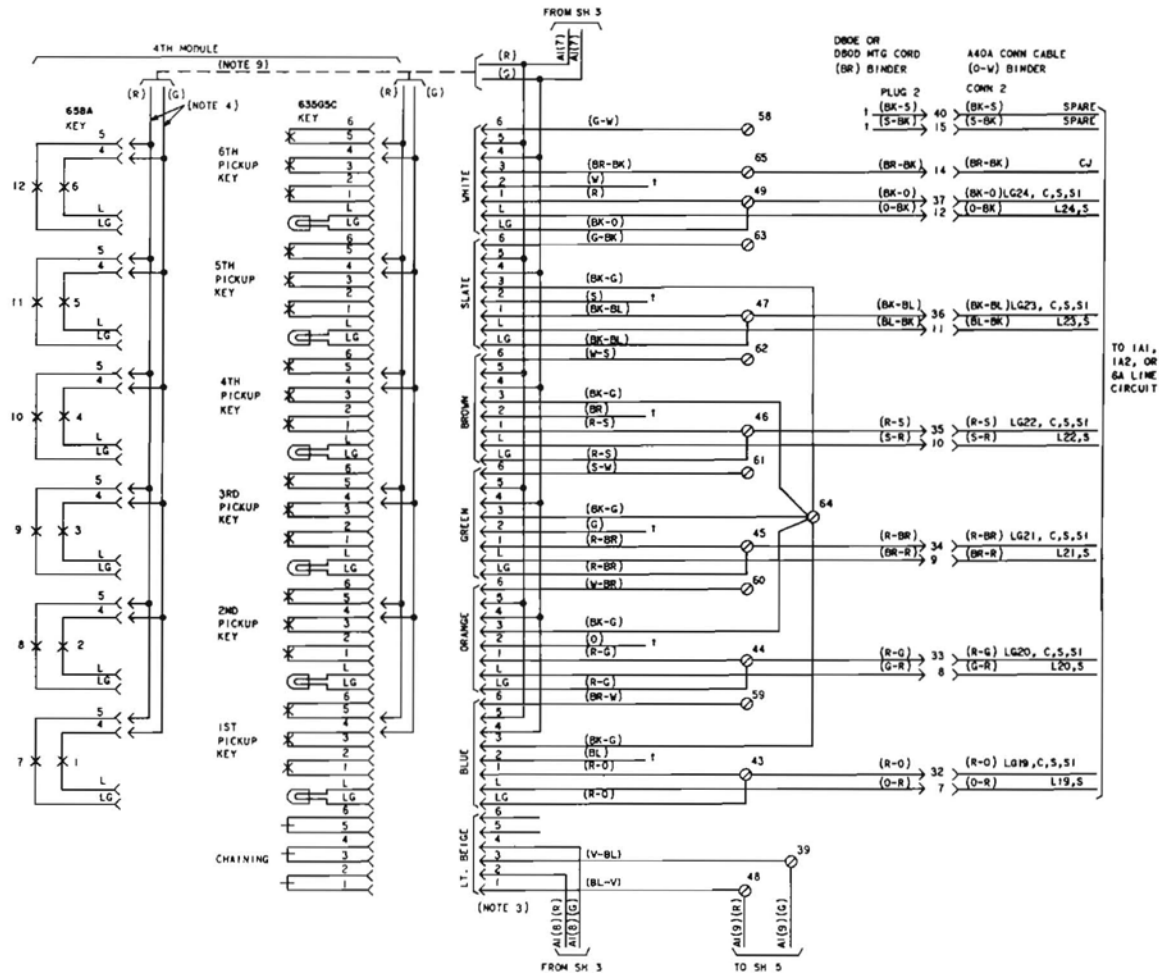


Fig. 3—635DA, DAM Telephone Set Module and Connector Cable Arrangements (Sheet 4 of 5)

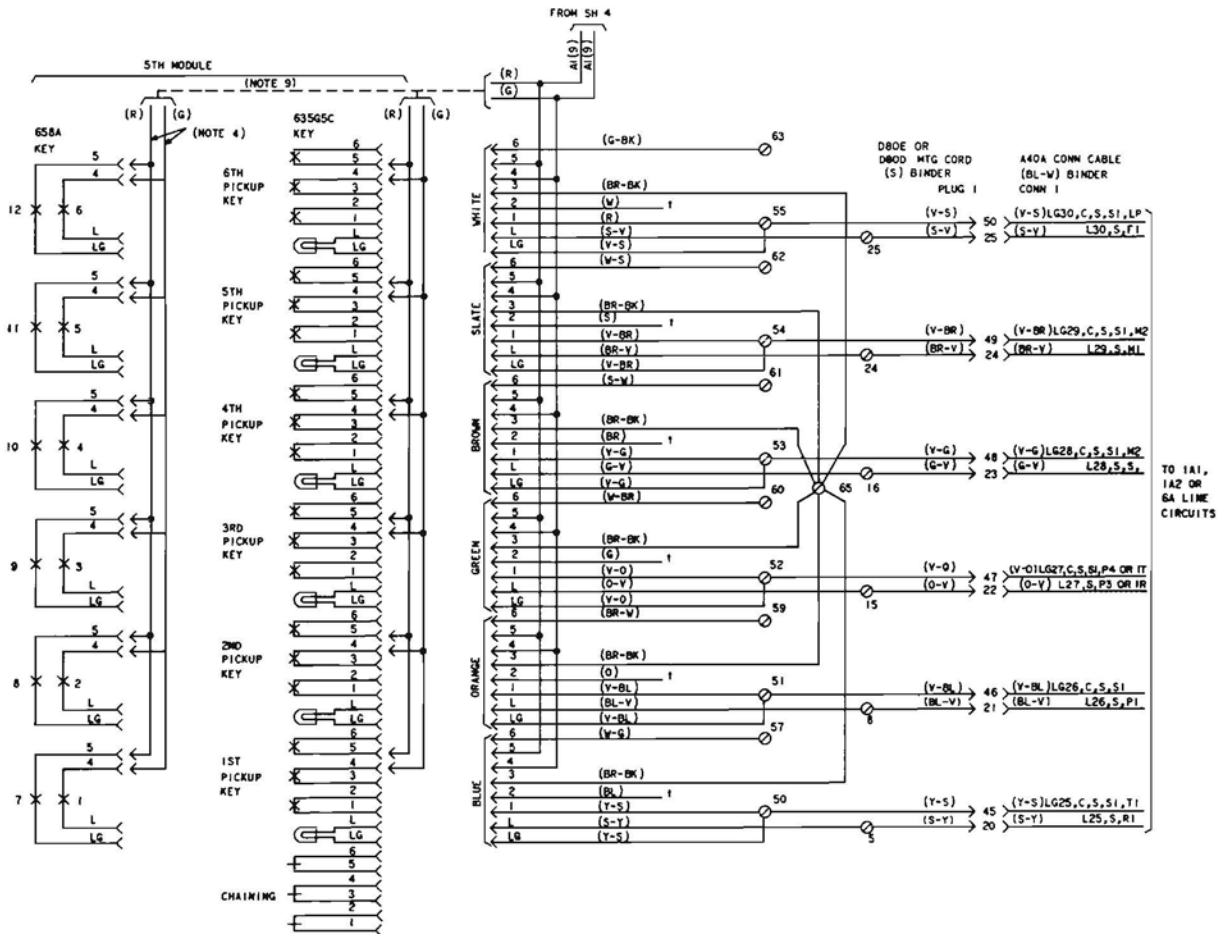


Fig. 3—635DA, DAM Telephone Set Module and Connector Cable Arrangements (Sheet 5 of 5)¶

MTG CORD  
 D50B0, D50AH (634-TYPE)(G)BINDER  
 D80E, D80D (635-TYPE)(S)BINDER

CONN CABLE  
 A25B(634-TYPE)  
 A40A(635-TYPE)

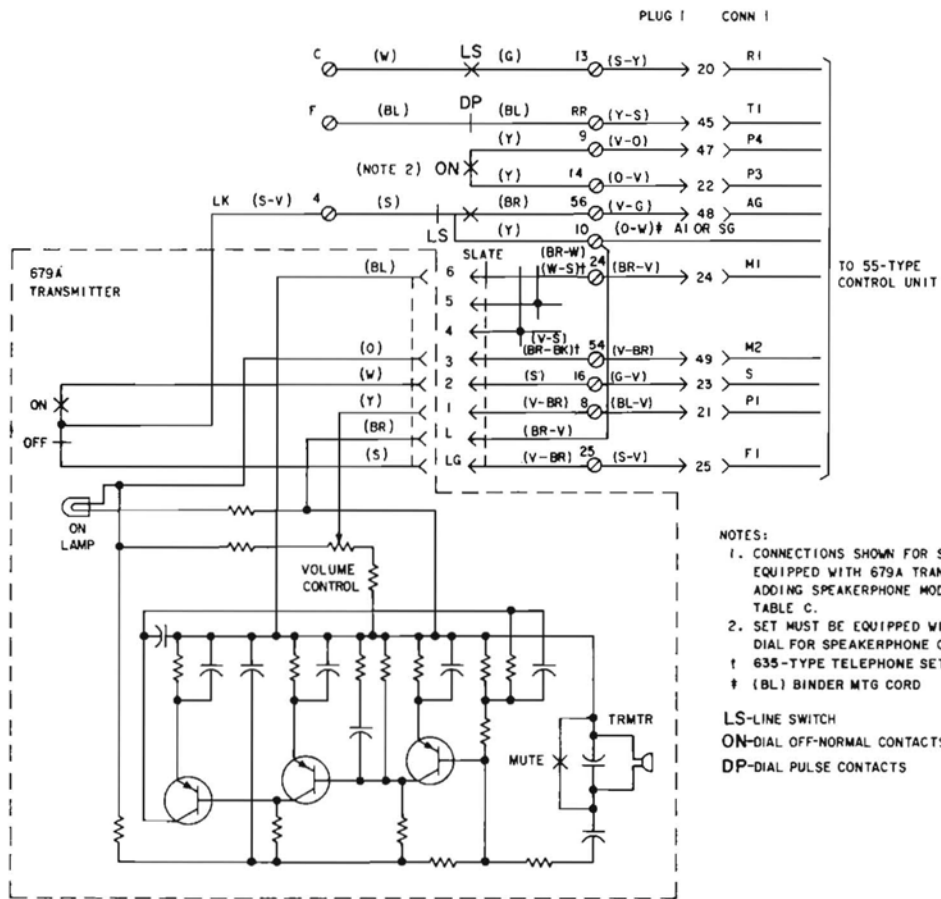


Fig. 4—3-Type Speakerphone Connections

**TABLE C**  
**3-TYPE SPEAKERPHONE MODIFICATION**

WIRE OR LEAD	COLOR	REMOVE FROM	CONNECT TO
Mounting Cord (Note 1)	S-Y	5	13
	Y-S	50	RR*
	V-O	52	9
	O-V	15	14
	V-G	53	56
Slate Plug Straps III Module (634DA, DAM) or V Module (635DA, DAM)	BR-W	59	24
	W-S†	62†	
	V-S**	63	54
	BR-BK†	65†	
	S	‡	16
	V-BR§	54	8
BR-V	24	10	
679A Trmtr	V-BR¶	54	25
	S-V		4

\* Network Terminal.

† 635-type telephone set lead color or terminal.

‡ Stored location.

§ Lead from terminal 1 of slate plug.

¶ Lead from terminal LG of slate plug.

\*\* (R-S) in D50DB mounting cord.

**Notes:**

1. Mounting cord conductors from (G) (634DA, DAM) or (S) (635DA, DAM) binder.
2. Connect the slate plug from the 3rd or 5th module to the 679A transmitter (Fig. 4). All other plugs in the module are insulated and stored.
3. Set intended for speakerphone use must be equipped with an 8C dial for the second set of off-normal contacts (P3 and P4 leads).



## SERVICE

# 636CA, 636CAM, 636CAMS 637DA, 637DAM, AND 637DAMS TELEPHONE SETS CONNECTIONS AND MAINTENANCE

### 1. GENERAL

1.01 This section contains information for the 636CA (MD), 636CAM (MD), 636CAMS (18-button) and 637DA (MD), 637DAM (MD), 637DAMS (30-button) CALL DIRECTOR® telephone sets equipped with rotary dials and headset jacks.

1.02 This section is reissued to:

- Show 636CAM and 637DAM telephone sets MD (Fig. 1)
- Add 636CAMS and 637DAMS code telephone sets.

1.03 ♦All four letter coded sets are now furnished from the factory in only the numerical code (1), and all other numerical code sets are rated MD. Sets may be equipped with different modular key arrangements by ordering the appropriate 635-, 658-type key, or 76A lamp socket. Refer to Section 502-601-101 for recommended layout arrangement of field-installed keys.

1.04 The 636CAMS1 and 637DAMS1 sets (Fig. 2) are furnished equipped with a new line switch which breaks both the tip and ring side of the line instead of the ring side only.♦

### 2. CONNECTIONS

2.01 These sets are factory-wired for use with 1A1, 1A2, 6A, or 6B KTS line circuits. They may also be used with 1A KTS line circuits by modifying the set as shown in Table A and B. Line circuits for 1A, 1A1, or 1A2 KTS may be connected to the same set under the following conditions.

(a) 1A1 or 1A2 KTS lines must be connected to the first key units with 1A lines connected to supplementary key modules.

(b) 1A, 1A1, or 1A2 KTS lines should not be connected to the same 6 line key module.

(c) 1A, 1A1, or 1A2 KTS lines appearing behind a manual switchboard should not be intermixed on a CALL DIRECTOR telephone set due to the different time out intervals provided by the associated KTU's.

2.02 The 636CA, CAM, ♦CAMS♦ and 637DA, DAM, ♦DAMS♦ sets are equipped with a 635A5C (5-line pickup and hold) or 635AD5C (4-line pickup, cutoff, and hold) key in the first module position. Contact strip assemblies [required with sets equipped with a D120K (MD) or D200S (MD) mounting cord] differ between the two keys. If ordered for field replacement, the 635AD5C is furnished with a piggy-back adapter to which the slate mounting cord plug is connected. The necessary contact strip assemblies (840151039 and 840151047) will be shipped with the 635AD5C key, and will replace the 840151120 and 840151138 assemblies supplied with the 635A5C key.

2.03 Because of the physical arrangement of the 635-type key, the contact strips do not extend to the chaining switch. This requires a second tip and ring to each module (except the last). See Fig. 3, sheets 1 through 5.

**Note:** ♦Contact strips are not required on sets equipped with D120M or D200AA mounting cords.♦

2.04 Mounting cords of these CALL DIRECTOR sets terminate in individual plugs connected to the rear of the keys. This permits rearrangement of line appearance either in the set or at the key

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Bell System except under written agreement

equipment distribution point. Current production sets are equipped with a satin-silver (-87) mounting cord.

**2.05** All line key positions are convertible to signaling or common signaling arrangements by removing the 812857738 (P-28E773) screw detail from key positions involved and making the necessary wiring changes per Table C. Refer to Table D for ringer cutoff feature using 635AD5C key in first module.

**2.06** These sets are not intended for use with speakerphone systems.

**2.07** The 636CA, CAM, ♦CAMS♦ and 637DA, DAM, ♦DAMS♦ telephone sets are factory-equipped with a KS-20419L1 (10 volt ac only) buzzer.

**2.08** When station busy lamp feature is required with these sets having 1A1 or 1A2 KTS line circuits, there are two optional circuits available. The busy lamp(s) will light whenever a line pickup button is depressed and the handset is off-hook or the headset is plugged into the jacks. This optional equipment must be ordered separately. For a single busy lamp, install a D-180463 Kit of Parts (ordered separately), consisting of a 819040338 (P-90D033) Printed Wiring Board Assembly and 840361836 plug assembly (light beige). Connect kit of parts as shown in Fig. 4. Install the wiring board and plug assembly as follows:

- (1) Remove set housing.
- (2) Loosen screws on dial mounting plate. Move mounting to left and lift out.
- (3) Remove right-hand dial mounting screw.
- (4) Place dial mounting screw through hole in wiring board and replace screw in dial.
- (5) Connect plug assembly to chaining switch of third module (636-type) or fifth module (637-type) and terminate (G-V) and (V-G) leads

of plug (Fig. 4). Insulate and store unused plug leads.

(6) Replace and secure dial mounting plate.

**Note:** If more than one busy lamp is required, order a 6C KTU and use busy lamp control circuit shown in Fig. 6.

**2.09** A D-180411 Kit of Parts is required when **Priority Hold** is to be furnished. Install as follows.

- (1) Connect contact strips to 635A5C key. Plug pink plug into hold position on key.
- (2) Disconnect all mounting cord plugs and the two contact strips [sets equipped with D120K (MD) or D200S (MD) mounting cords] from the second module, remove key and replace with 635A5C key.
- (3) Rereminate contact strip leads and connect mounting cord plugs with exception of white plug which is insulated and stored.

**Note:** Contact strips are not required on sets equipped with D120M or D200AA mounting cords.

(4) Rearrange wiring per Fig. 5.

Hold key in first module is used as regular hold or if required, **I Hold**. Second key is used for **Priority Hold**.

### 3. MAINTENANCE

**3.01** For maintenance information, refer to Section 502-600-100 entitled 630, 1630, and 2630 Common Installation and Maintenance Information. Individual components such as dials, keys, ringers, etc. are covered in sections pertaining to the particular item.

**3.02** Do not use solvents to clean plastic parts of these sets. Use a damp cloth only. If discolored, replace part.



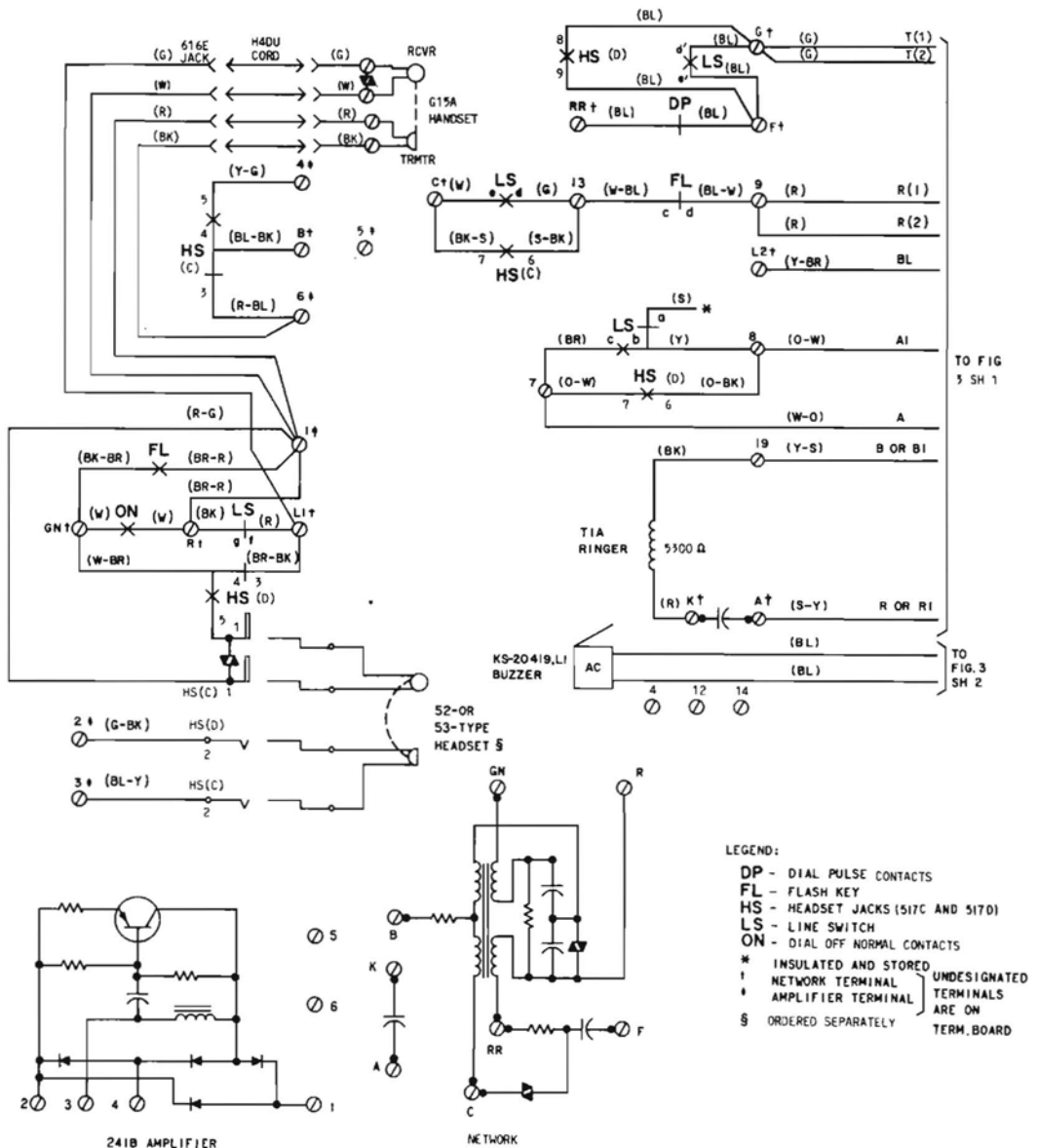


Fig. 2—636CAMS and 637DAMS Telephone Set, Connections

## NOTES FOR FIG. 3:

1. THE 635AD5C KEY IS SUPPLIED WITH AN ADAPTER IN THE CUTOFF KEY POSITION. THE SLATE MOUNTING CORD PLUG CONNECTS TO THE ADAPTER. CONNECT (BL-Y) AND (Y-BL) ADAPTER LEADS TO TERMINALS 1 AND 2, RESPECTIVELY. BALANCE OF PLUGS CONNECT DIRECTLY TO KEY.
2. ON SETS EQUIPPED WITH A 658A KEY, THE (G) CONTACT STRIP LEAD IS TERMINATED ON 17 AND (R) ON 18. IF A 658A KEY IS ADDED IN THE FIELD, LEADS MUST BE MOVED FROM PRECEDING MODULE CHAINING CIRCUIT TO TERMINALS 17 AND 18.
3. PROVISIONS ARE MADE FOR MECHANICALLY STORING THE LIGHT BEIGE PLUG ON THE 658A KEY. NO ELECTRICAL CONNECTION IS MADE.
4. WHEN THE 658A KEY IS REQUIRED AS A DUAL PURPOSE KEY, REMOVE STRAP BETWEEN TERMINALS 17 AND 18. USE M1W CORD OR EQUIVALENT TO CONNECT TERMINAL 17 TO A GROUND OTHER THAN THE SIGNAL GROUND.
5. TO SUPPLY "I" HOLD FEATURE, TERMINATE (O-Y) MOUNTING CORD LEAD FROM FIRST MODULE ON TERMINAL 24. LEAD BECOMES SP LEAD AT EQUIPMENT.
6. IF HOLD POSITION LAMP IS REQUIRED, CONNECT (G-Y) LAMP LEAD AND (Y-G) LAMP GROUND LEAD TO (G-Y) AND (Y-G) MOUNTING CORD (BL BINDER) LEADS, RESPECTIVELY, USING SPARE TERMINAL OR D-161488 CONNECTOR. LAMP MUST BE SEPARATELY ORDERED AND INSTALLED.
7. THESE CONTACT STRIPS ARE REQUIRED WHEN TELEPHONE SET IS EQUIPPED WITH THE D120K (MD) OR THE D200S (MD) MOUNTING CORD.

\* INSULATED AND STORED.

† DEAD DRESSED.



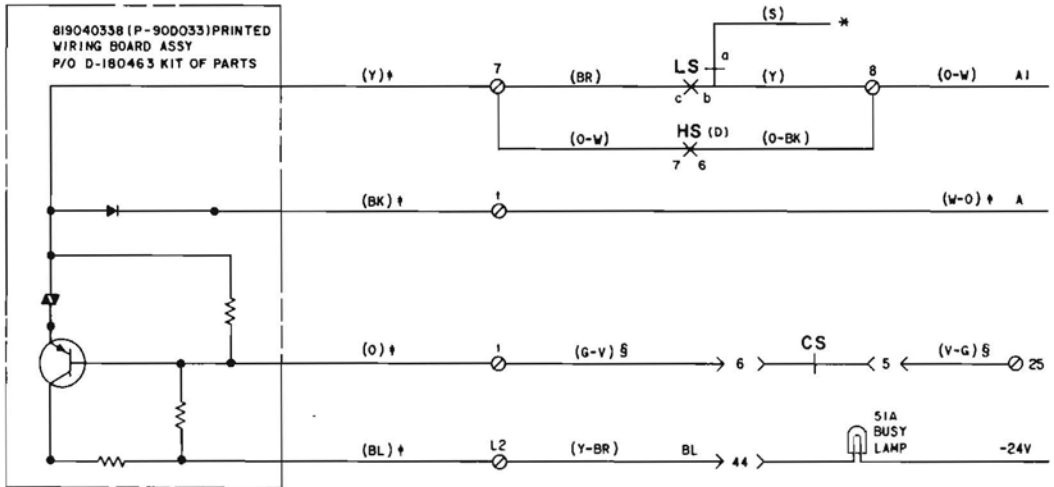












## LEGEND:

LS-LINE SWITCH

HS-HEADSET JACKS

CS-CHAINING SWITCH

\* INSULATED AND STORED

† USE D-161488 CONNECTOR OR SPARE TERMINAL

§ 840361836 PLUG ASSEMBLY LEADS,

P/O D-180463 KIT OF PARTS

## NOTE:

WHEN A SINGLE BUSY LAMP IS REQUIRED, EITHER THIS STATION BUSY LAMP CONTROL CIRCUIT OR THE BUSY LAMP CONTROL CIRCUIT WITH 6C KTU SHOWN IN FIG. 6 MAY BE USED. WHEN MORE THAN ONE BUSY LAMP IS REQUIRED, ONLY THE 6C KTU BUSY LAMP CONTROL CIRCUIT SHOWN IN FIG. 5 MAY BE USED.

Fig. 4—Station Busy Lamp Circuit Using Printed Wiring Board Assembly

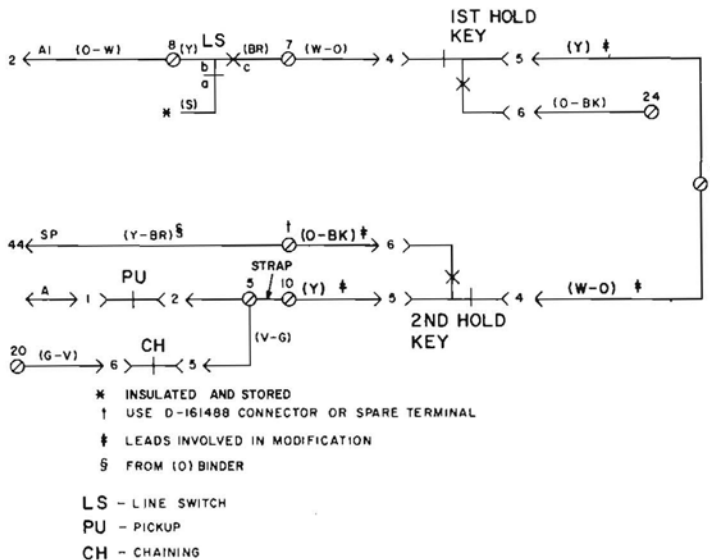
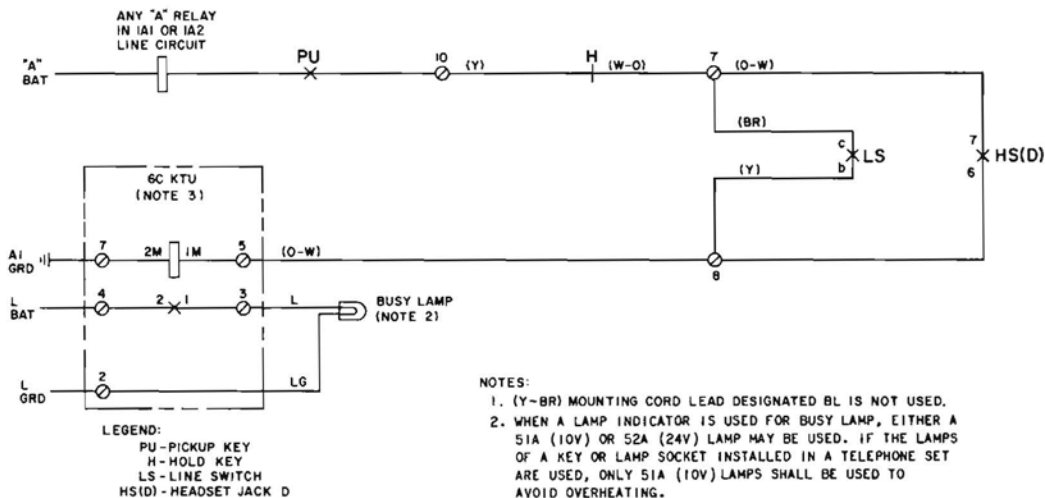


Fig. 5—Modification for Priority Hold



NOTES:

1. (Y-BR) MOUNTING CORD LEAD DESIGNATED BL IS NOT USED.
2. WHEN A LAMP INDICATOR IS USED FOR BUSY LAMP, EITHER A 51A (10V) OR 52A (24V) LAMP MAY BE USED. IF THE LAMPS OF A KEY OR LAMP SOCKET INSTALLED IN A TELEPHONE SET ARE USED, ONLY 51A (10V) LAMPS SHALL BE USED TO AVOID OVERHEATING.
3. WHEN USING 6C KTU, THE STATION CABLE LOOP MUST BE LIMITED TO 25Ω OR 500 FEET OF 24 GA. WIRE.

Fig. 6—Busy Lamp Control Circuit With 6C KTU

TABLE A

## 1A, 1A1, AND 1A2 CONVERSION—636-TYPE TELEPHONE SET

KEY MODULE ARRANGE- MENT	LEAD											
	HOLD KEY				CHAINING PLUG				CONTACT STRIP OR PLUG			LINE SW.
	Y	G	BR-V	V-BR	V-G 1ST MOD	V-G 2ND MOD	R 1ST MOD	R 2ND MOD	R 1ST MOD	R 2ND MOD	R 3RD MOD	Y
1A1/1A2 Only	10	10	*	*	5	15	9	11	9	11	21	8
1A1/1A2- 1st, 2nd Mod 1A-3rd Mod	10	35	21	40	5	35	9	11	9	11	40	8
1A1/1A2- 1st Mod 1A-2nd, 3rd Mod	10	35	11	40	35	15	9	40	9	40	21	8
1A Only	*	10	26	9	5	15	26	11	26	11	21	18

\* Insulated and stored.

TABLE B

## 1A, 1A1, AND 1A2 CONVERSION—637-TYPE TELEPHONE SET

KEY MODULE ARRANGE- MENT	LEAD																	
	HOLD KEY				CHAINING PLUG								CONTACT STRIP OR PLUG					LINE SW.
	Y	G	BR-V	V-BR	V-G 1ST MOD	V-G 2ND MOD	V-G 3RD MOD	V-G 4TH MOD	R 1ST MOD	R 2ND MOD	R 3RD MOD	R 4TH MOD	R 1ST MOD	R 2ND MOD	R 3RD MOD	R 4TH MOD	R 5TH MOD	Y
1A1/1A2 Only	10	10	*	*	5	15	35	45	9	11	21	31	9	11	21	31	41	8
1A1/1A2- 1st, 2nd, 3rd, 4th, Mod 1A-5th Mod	10	12	41	14	5	15	35	12	9	11	21	31	9	11	21	31	14	8
1A1/1A2- 1st, 2nd, 3rd Mod 1A-4th, 5th Mod	10	12	31	14	5	15	12	45	9	11	21	14	9	11	21	14	41	8
1A1/1A2-1st, 2nd, Mod 1A-3rd, 4th, 5th Mod	10	12	21	14	5	12	35	45	9	11	14	31	9	11	14	31	41	8
1A1/1A2- 1st Mod 1A-2nd, 3rd 4th, 5th Mod	10	12	11	14	12	15	35	45	9	14	21	31	9	14	21	31	41	8
1A Only	*	10	37†	13	5	15	35	45	37	11	21	31	37	11	21	31	41	18

\* Insulated and stored.

† Remove (BR-Y) mounting cord lead. Insulate and store.

TABLE C

**PICKUP-SIGNAL KEY CONVERSION**  
**3RD [636CA (MD), CAM (MD), CAMS] OR 5th [637DA (MD), 637DAM (MD), DAMS] MODULE**

NO. OF SIGNAL KEYS	NO. OF PVT OR INTER-COM LINES (COM. SIG) NOTE 1	KEY PLUG LEADS AND TERMINALS						
		O-W	S-W	G-R	BL-BK	BR-BK	O-Y	Y-O
1		25	25	25	30	30	18	39
2		25	25	25	30	18	18	39
3		25	25	25	18	18	18	39
4		25	25	18	18	18	18	39
5		25	18	18	18	18	18	39
6		18	18	18	18	18	18	39
	2	25	25	25	39	39	30	39
	3	25	25	39	39	39	30	39
	4	25	39	39	39	39	30	39
	5	39	39	39	39	39	30	39

Note 1: When using converted 6th pickup button as common signaling key, remove, insulate and store (Y-O) mounting cord lead from terminal 39.

Note 2: If more than six signal keys are required, replace 635G5C key with a 658 key. If more than five private or intercom lines are required, convert keys in 2nd [636CA (MD), CAM (MD), CAMS] or 4th [637DA (MD) DAM (MD), DAMS] module in same order. Connect plug leads to terminal 39 to utilize common signal key. If additional terminals are required, use any spare terminal and strap to 39.

**TABLE D**  
**CUT OFF KEY (635AD5C) CONNECTIONS**

FEATURE	635AD5C KEY ADAPTER		MOUNTING CORD (BL) BINDER		CONNECTOR CABLE (BL-W) BINDER			RINGER	PLACE STRAP
	BL-Y	Y-BL	BL-Y	Y-BL	G-BK	BK-G	BK-BR	BK	
Cutoff Ringer in Set (Note 1)	TB1-1	TB1-2	*	*	Note 2			TB1-1	A (Net.) to TB1-2
Cutoff Ext Ringer or Buzzer (Note 1)	TB1-1	TB1-2	TB1-1	TB1-2	Note 3				
Cutoff Ext Station (Note 4)	*	*	TB1-1	TB1-2		To Aux. Relay	To Relay Grd		

\* Insulate and store.

**Notes:**

1. Remove (BR-BK) and (BK-BR) slate plug leads from terminals 10 and 29, insulate and store.
2. To individual line or common ringer circuit at equipment.
3. To external ringer or buzzer. Connect ringer or buzzer circuit to (BL-Y) (Y-BL) connector cable leads at equipment.
4. Connect T, R, and A leads from equipment and station to be cut off through contacts of auxiliary relay. Connect battery to relay winding. Use 227B or 421A KTU.



## SERVICE

### 2630D AND 2631D TELEPHONE SETS

#### 1. GENERAL

1.01 This section contains connection and maintenance information for 18- and 30-button general purpose CALL DIRECTOR® telephone sets equipped with 12-button TOUCH-TONE® dials.

1.02 This section is reissued to:

- Add information on 657L key (Fig. 7)
- Show 599H key MD
- Remove information on 657H key which was never manufactured
- Include information on new 840157473 key contact insulator.

#### 2. CONNECTIONS

2.01 Optional features, such as polarity guard for TOUCH-TONE dial, buzzer, and 599H (MD) or 657L key for supplementary hold, must be ordered separately and installed as required for customer service.



*Due to differing line circuit time-out functions, 1A2 system lines should not be mixed with 1A1 system line circuits within a CALL DIRECTOR® station. Line circuits of 1A and 1A1 or 1A2 KTS must not be connected to the same 6-button key module.*

2.02 At the key telephone system, connector cable conductor termination for sets equipped with even-count color-coded mounting cords differ from those for sets equipped with MD color-coded cords. If 2630- or 2631-type telephone sets are used to replace MD telephone sets, it will be necessary to rearrange the connector cable leads at the key telephone system.



*Some spade-tipped conductors or mounting cord leads are insulated with tubing which should be cut off with electrician scissors or diagonal pliers. Other conductors are insulated with stiff plastic pockets. Pinch open the pocket to release the spade tips.*

2.03 The tip and ring leads of lines wired for supplementary hold feature can be run directly between the key telephone equipment and key telephone set. The A and lamp leads must be routed per SD-69530-01 and Division 518.

Supplementary hold can be furnished in either of the following arrangements:

(a) **Priority Hold:** Replace the 599- or 657-type key in the first module with a 599H (MD) or 657L key which is equipped with a second hold button and wire per Fig. 6 or 7 to transfer the A lead from ground to the SP lead (-24 volts).

(b) **I Hold:** Wire present Hold key to transfer A lead from ground to the SP lead (-24 volts). Connect stored (BR-V) Hold lead from first module plug to any spare mounting cord lead using spare terminal or D-161488 connector.

2.04 When a polarity guard is required with these sets, install a P-90D197 guard assembly and connect as shown in Table A.

2.05 To convert a key position from pickup (locking) to signal (nonlocking) remove the P-10E837 screw detail from plunger at key position to be converted. Make the necessary wiring changes as shown in Table B. Install key contact insulator (840157473) as required to insulate key contacts. Refer to Section 512-230-100 for installation procedures.

2.06 A KS-8109 or KS-20419L1 buzzer may be installed when a second audible signal is required. Use spare leads located in second, third, or fourth module.

**3-Type Speakerphone**

**2.07** A 667-type speakerphone transmitter unit may be used in the third key position of an 18-button set or fifth key position of a 30-button set when internal speakerphone feature is required.

**2.08** To retain the maximum number of keys in these CALL DIRECTOR telephone sets and still have speakerphone feature, a 666A(MD) or 666B transmitter and 760A loudspeaker may be installed as adjuncts to the telephone set. Spare leads from the first module are used to supply the external speakerphone function (Table E).

Refer to Section 512-622-430 (2630-type) and Section 512-622-431 (2631-type) for complete connections to 3-type speakerphone.

**3. MAINTENANCE**

**3.01** Maintenance of handset, dials, ringers, and modular keys is outlined in sections covering these components located in Division 501 and 512.

**3.02** Refer to Section 502-600-100 for common installation and maintenance information for these CALL DIRECTOR telephone sets.

**TABLE A**  
**P-90D197 GUARD ASSEMBLY CONNECTIONS (Note)**

WIRE OR LEAD	COLOR	REMOVE FROM	CONNECT TO	
		NET.	GUARD ASSY.	NET.
Dial	BK	RR	T	
	G-W	C	S	
Line Switch	W	C	S	
Guard Assembly	G			RR
	W			C*

\* (O-BK) dial lead remains connected to C of network.

**Note:** For use when specified by local instructions for end-to-end signaling installations.

**TABLE B**  
**PICKUP-SIGNAL KEY CONVERSION (3RD OR 5TH MODULE)**

CONVERSION OPTIONS (NOTES 1 AND 2)	598A OR 656A KEY						
	O-W	S-W	G-R	BL-BK	BR-BK	Y-O	O-Y
PPPPPP	A-H	A-H	A-H	A-H	A-H	A-H	G
PPPPPS	A-H	A-H	A-H	A-H	A-H	SG	G
PPPPSS	A-H	A-H	A-H	A-H	SG	SG	G
PPSSSS	A-H	A-H	A-H	SG	SG	SG	G
PPSSSS	A-H	A-H	SG	SG	SG	SG	G
PSSSSS	A-H	SG	SG	SG	SG	SG	G
SSSSSS	SG	SG	SG	SG	SG	SG	G
PPPP*P*S	A-H	A-H	A-H	C	C	5	C
PPP*P*P*S	A-H	A-H	C	C	C	5	C
PP*P*P*P*S	A-H	C	C	C	C	5	C
P*P*P*P*P*S	C	C	C	C	C	5	C

**Notes:**

- Convert buttons on right hand key module first.
  - All key positions are arranged in the shop, as pickup positions. To convert to signaling (nonlocking), remove the screw detail P-10E837 from the plunger at the key position to be converted. Make the necessary connection changes as shown in Table B.
- \* These arrangements use line switch controlled ground for common signal key used with private or intercommunicating lines. Common signal should be used to operate a signal relay. Do not wire directly to a buzzer.

**TABLE C**  
**2630D AND 2631D TELEPHONE SETS — 1A, 1A1, AND 1A2 CONVERSIONS**

KEY TELEPHONE SYSTEM CENTRAL OFFICE OR PBX LINE FEATURE	LEADS													
	HOLD KEY					CHAINING SWITCH					STRAP		LINE SWITCH	
						2630 AND 2631 SETS			2631 SETS ONLY					
	Y-G	G-Y	V-O	BR-V	V-BR	V-G 1ST KEY	V-G 2ND KEY	V-G 3RD KEY	V-G 4TH KEY	V-G 5TH KEY	BL-V	O-V	BR	
1A1 or 1A2 only (as furnished by shop)	A-H (I)	A-H (I)	*	*	*	A-H (I)	A-H (II)	A-H (III)	A-H (IV)	A-H (V)	R (I)	1B (VI)	†	
First key unit 1A1 or 1A2; remaining key units 1A	A-H (I)	§	*	1: (I)	R (II)	§	A-H (II)	A-H (III)	A-H (IV)	A-H (V)	R (I)	1B (VI)	†	
First and second key units 1A1 or 1A2; remaining key units 1A	A-H (I)	§	*	1: (II)	R (III)	A-H (I)	§	A-H (III)	A-H (IV)	A-H (V)	R (I)	1B (VI)	†	
First, second, and third key units 1A1 or 1A2; remaining key units 1A	2631 sets only	A-H (I)	§	*	1: (III)	R (IV)	A-H (I)	A-H (II)	§	A-H (IV)	A-H (V)	R (I)	1B (VI)	†
First through fourth key units 1A1 or 1A2; fifth key unit 1A		A-H (I)	§	*	1: (IV)	R (V)	A-H (I)	A-H (II)	A-H (III)	X (VI)	A-H (V)	R (I)	1B (VI)	†
1A only (see connection note 2, Fig. 2)	§	A-H (I)	*	R1 (VI)	R (I)	A-H (I)	A-H (II)	A-H (III)	A-H (IV)	A-H (V)	R1 (VI)	SG (VI)	6‡	

Note: Roman numerals in parentheses indicate terminal board designations.

\* Lead is spade tipped, insulated, and stored.

† BR lead connects to terminal 5 when station busy lamp circuit is not required or to terminal 6 of telephone set terminal board when station busy lamp is required.

‡ Disconnect, insulate and store R (BL-V) chaining lead.

§ Connect to terminal X of TBIV on 18-button sets or to terminal X of TBVI, on 30-button sets.

¶ Terminal on telephone set terminal board.

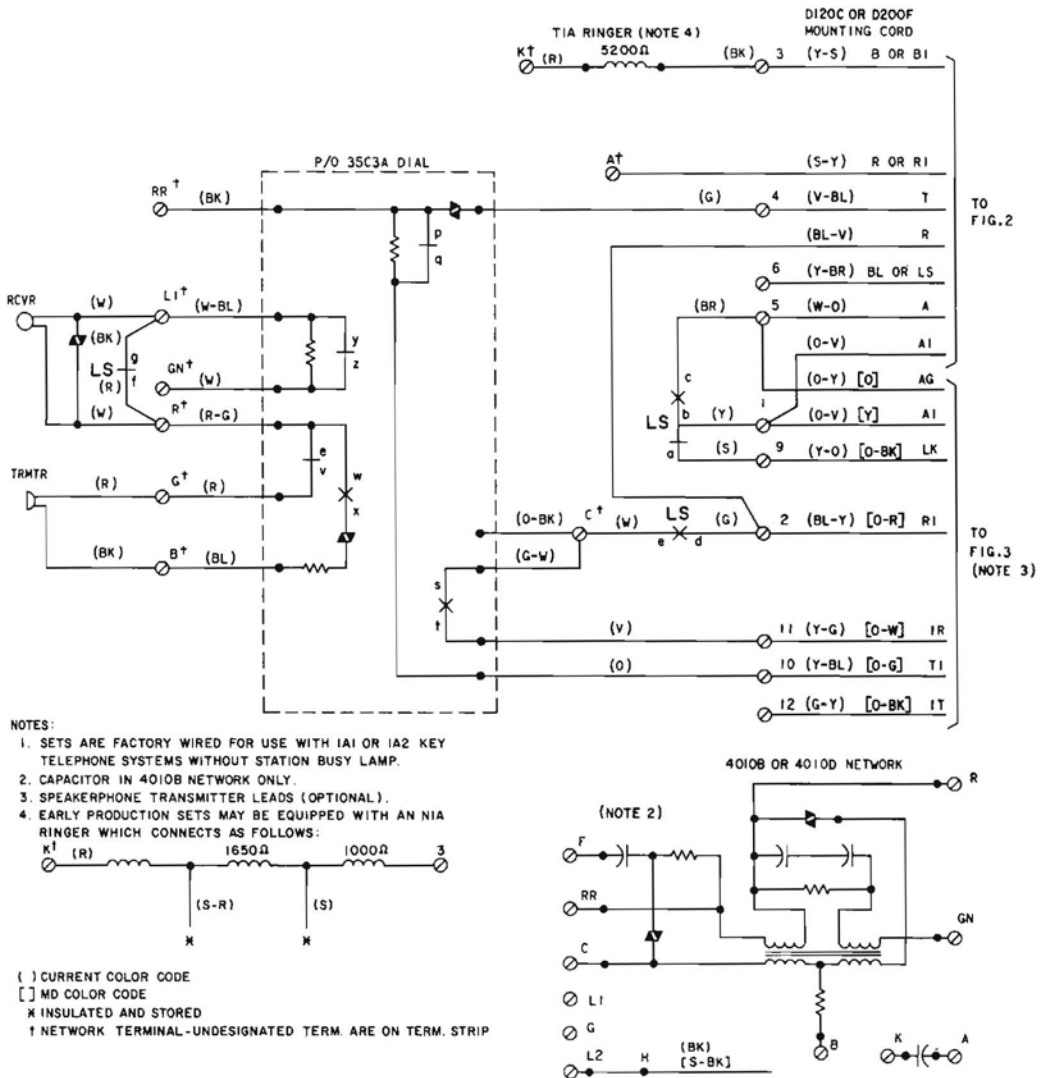


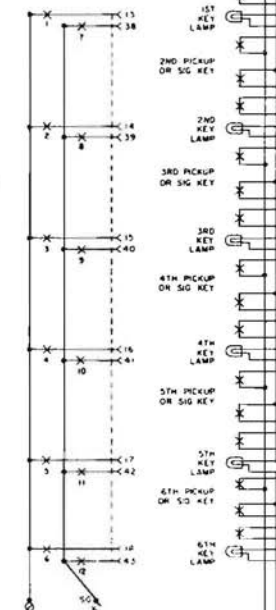
Fig. 1—2630D and 2631D Telephone Set, Connections



NOTES

- WITH 598A OR 607A KEY IN FIRST MODULE: STRAP THREE LEADS FROM KEY PLUG 2 AND MOUNTING CORD BRANCH CIRCUIT (BR-W) AND INSULATED AND STORED AS VACANT.
- WITH 598B OR 607B KEY IN FIRST MODULE: (BR-BK) LEAD MUST BE REMOVED FROM A-H OF 1B1, INSULATED AND STORED.
- WITH 598A OR 606A KEY IN FIRST MODULE: CONNECT 1-V (O) STRAP FROM A-H OF 1B1 TO TERMINAL 5 ON TELEPHONE SET TERMINAL LEADS. CONNECT 1-Y (O) AND 1-BR (R) LEADS FROM KEY PLUG 1 TO A-H OF 1B1 TO EXTEND LAMP LEADS CONNECT 1-S (V) AND 1-V (S) KEY PLUG LEADS TO 10-V (I) AND 1-V (S) MOUNTING CORDS LEADS RESPECTIVELY USING SPARE TERMINALS OR D-4188B CONNECTORS.
- FOR USE WITH 12 KEY SYSTEM ONLY: MOVE A (O-V) STRAP FROM 10 TO 50 ON 1B23 AND MAKE CONVERSION SHOWN IN TABLE C.
- FOR ADD-ON CONFERENCE CONTROL IN THE 6A KEY TELEPHONE SYSTEM: CONNECT 1-BR (V) MOUNTING CORD LEAD (O-W BRACKER GROUP) TO 1B22 - PB ALSO REMOVE COMMON LEAD OF ADD-ON CONFERENCE BUTTON CONVERTED TO SIGNALING FROM A-H TERMINAL AND CONNECT TO PB. THE 67A KEY MAY ALSO BE USED IN A SIMILAR MANNER ALSO SEE NOTE 4.
- WHEN THE 67A KEY IS REQUIRED AS A DUAL-PURPOSE KEY, THE BRASS STRAP BETWEEN THE 5I AND 5G TERMINALS OF THE KEY MAY BE REMOVED. USE MW CORD OR EQUIVALENT TO CONNECT 5I TERMINAL OF 67A KEY TO A DISSIMILAR GROUND ON A NONGROUNDED CIRCUIT.
- INSULATED AND STORED
- DEAD ENDED

67A KEY  
2ND MODULE  
(2630-TYPE SETS)  
4TH MODULE  
(2631-TYPE SETS)



606A OR 598A KEY  
2ND MODULE (2630-TYPE SETS)  
2ND, 3RD OR 4TH MODULE  
(2631-TYPE SETS)

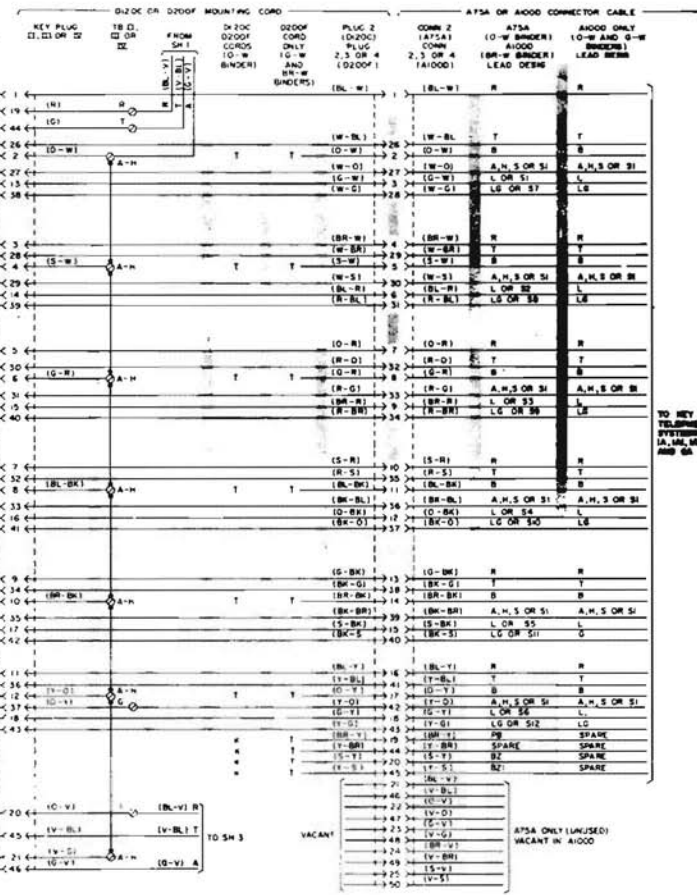


Fig. 2—Module Arrangements and Cord and Cable Connections for Sets Equipped With Even-Count Color-Coded Cords (Sheet 2 of 3)

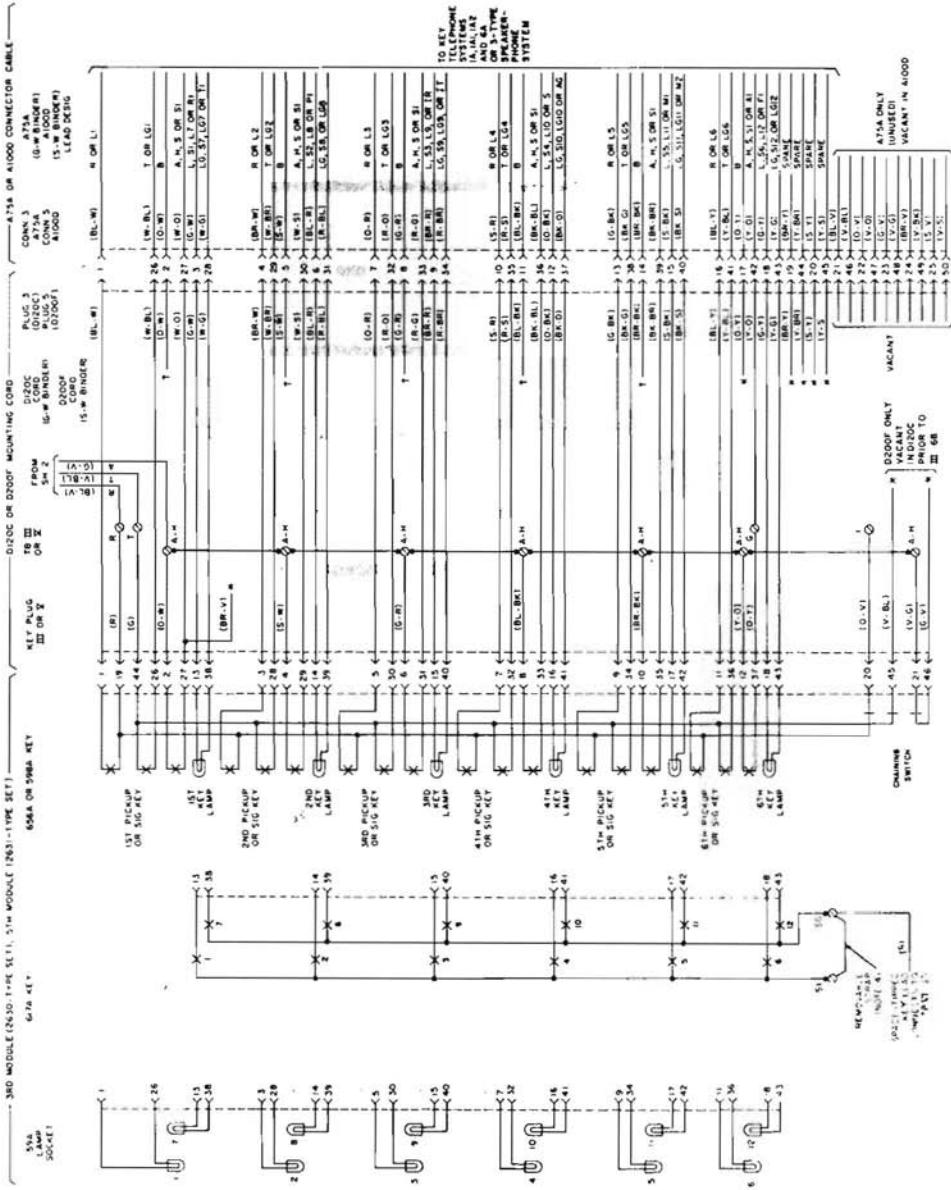


Fig. 2—Module Arrangements and Cord and Cable Connections for Sets Equipped With Even-Count Color-Coded Cords (Sheet 3 of 3)



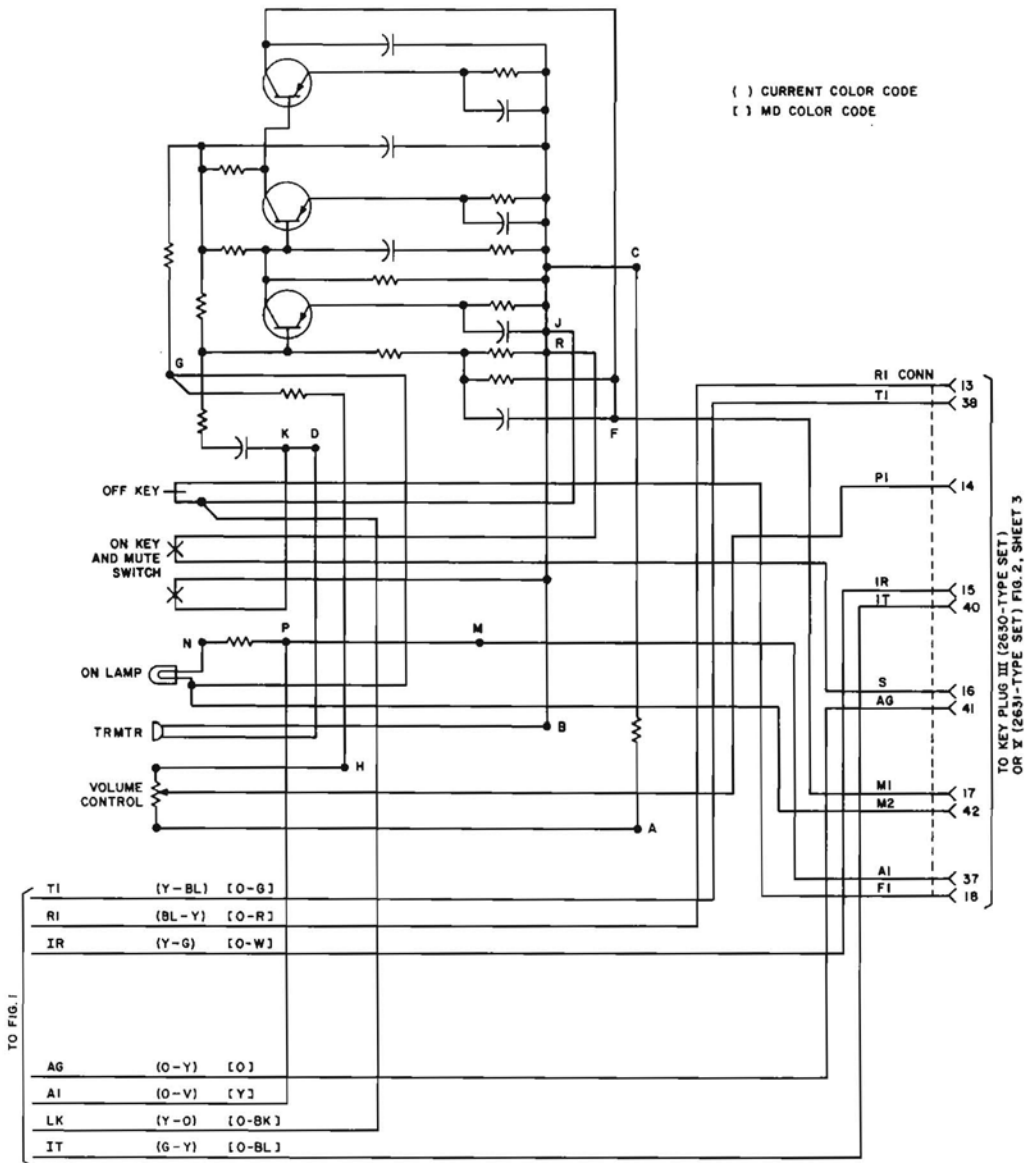


Fig. 3—667-Type Transmitter

**TABLE D**  
**CONNECTIONS FOR 599B OR 657B KEY (TURN KEY)**

FEATURE	FIRST MODULE LEADS									
	5TH PICKUP KEY POSITION				6TH PICKUP KEY POSITION				STORED	
	R	T	A	A-H	R	T	A	A-H		
Even-count color code	G-BK	BK-G	BK-BR	BR-BK	BL-Y	Y-BL	O-Y Y-O	Y-O	BL-Y	Y-BL
Cord pin numbers	9-13	34-38	35-39	10-AH	11-16	36-41	37-G G-42	12-†	11-†	36-†
Cutoff station on 1A1 or 1A2 system	To equip.			Insulate and Store	To ext sta			Insulate and Store		
Cutoff station on 1A system without hold feature	To equip.			Insulate and Store	To ext sta			Insulate and Store		
Cutoff station on 1A system with hold feature	To aux relay to cutoff T, R, B, & H			SG TBVI				SG TB VI	Insulate and Store	
Cutoff ext ringer or buzzer	To equip.			Insulate and Store	To ext ringer or buzzer			Insulate and Store		
Cutoff ringer in set	To equip.			Insulate and Store				Insulate and Store	3† Tel Set Term. Board (Note)	A† Net. Term. (Note)
Cutoff buzzer in set	To equip.			Insulate and Store				Insulate and Store	Buzzer* (Note)	
							D		C	
							A		C	
Monitoring	To mon equip.							R TB1	T TB1	

**Note:** The BL-Y and Y-BL connector cable leads should be insulated and stored at the equipment when the bridged spade tipped leads are used in set.

\* Insulate and store BZ and BZ1 leads to buzzer.

† Indicates leads are factory insulated and stored.

‡ Insulate and store the S-Y lead from terminal A of the network and the Y-S lead from terminal 3 of telephone set terminal board.

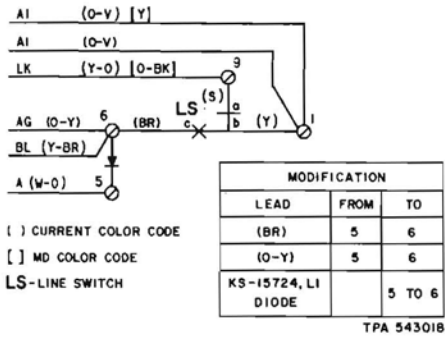


Fig. 4—Station Busy Lamp Circuit With Speakerphone

TABLE E

## CONNECTIONS FOR EXTERNAL SPEAKERPHONE

WIRE OR LEAD	COLOR	LEAD DESIG.	REMOVE FROM	CONN TO TELSET TERM. BD
Mtg. Cord (BL-W Binder)	BL-Y	R1	*	2
	Y-BL	T1	*	10
	O-Y	AG	*	5
	Y-O	LK	G	9
	Y-G	IR	*	11
	G-Y	IT	*	12

\* Stored location.

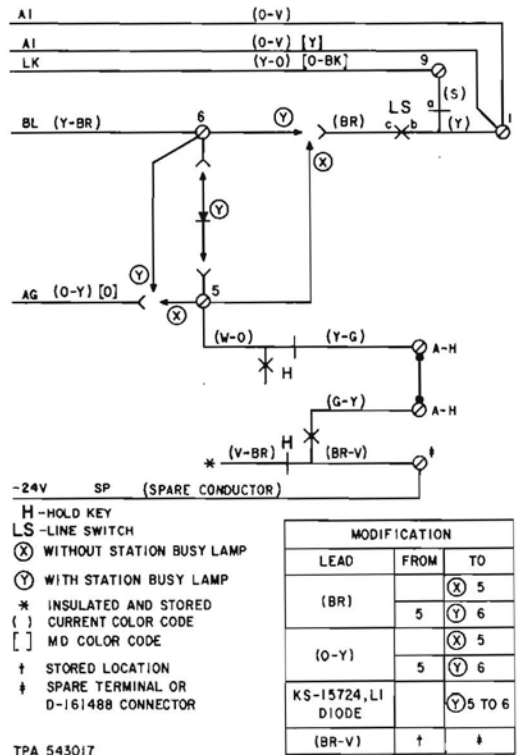


Fig. 5—I Hold Arrangement and Speakerphone (With or Without Station Busy Lamp Feature)

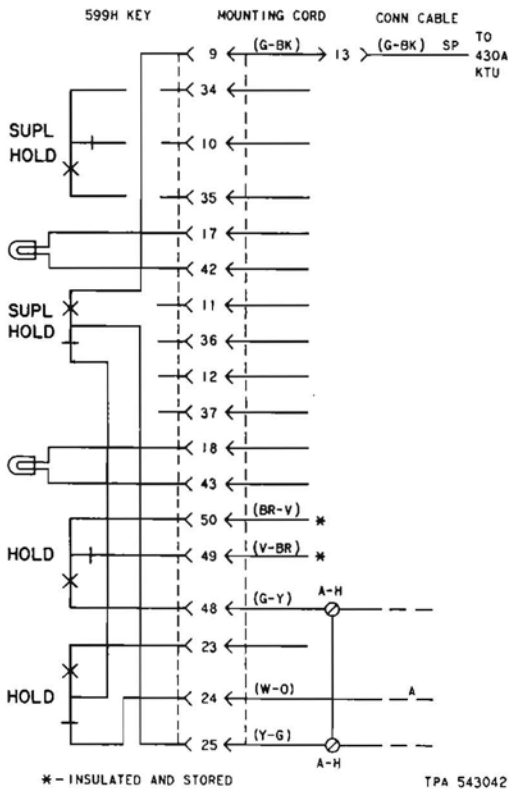


Fig. 6—Priority Hold, Using 599H (MD) Key

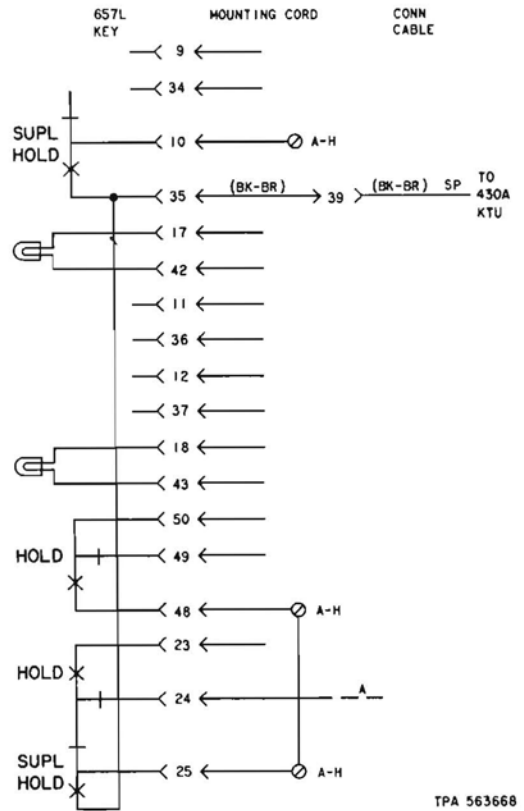


Fig. 7—Priority Hold, Using 657L Key

## SERVICE

### 2630DA, 2630DAM, 2631DA, AND 2631DAM TELEPHONE SETS

### CONNECTIONS AND MAINTENANCE

#### 1. GENERAL

1.01 This section contains information for the 2630DA (MD) or 2630DAM (18-button) and 2631DA (MD) or 2631DAM (30-button) (Fig. 1 and 2) telephone sets. These sets may be equipped with different modular key arrangements. The telephone sets will accommodate 635-type or 658A keys, 76A lamp sockets, and/or a 679A (MD) internal transmitter.

1.02 This section is reissued to:

- Show 2630DA and 2631DA telephone sets MD
- Show 3-type speakerphone components MD
- Show 533K Diode (Station Busy Lamp Diode) Fig. 6 and 7 replacing KS-15724L1 Diode
- Revise Fig. 1, 2, 3, and 4 to update information.

#### 2. CONNECTIONS

2.01 The 2630- and 2631-type sets are equipped with a 635A5C (5-line pickup and hold) or a 635AD5C (4-line pickup, cutoff, and hold) key in the first module position. Contact strip assemblies [required with sets equipped with a D120K (MD) or D200S (MD) mounting cord] differ between the two keys. If ordered for field replacement, the 635AD5C is furnished with a piggy-back adapter in the cut-off key position, for storing the slate mounting cord plug associated with the fifth line. The necessary contact strip assemblies (840151039 and 840151047) will be shipped with the 635AD5C and will replace the 840151120 and 840151138 assemblies supplied with the 635A5C key.

*Note:* Contact strips are not required with sets equipped with a D120M or D200AA mounting cord or sets equipped with a modified D120K or D200S mounting cord.

2.02 The 2630DAM and 2631DAM modular telephone sets are similar to the 2630DA or 2631DA, respectively, except the modular G15A handset with its associated H4DU cord and 616E jack assembly are used in place of the hard wired G3A-type handset.

2.03 Because of the physical arrangement of the 635-type key, the contact strips do not extend to the chaining switch. This requires a second tip and ring conductor to each module (except the last). See Fig. 3, Sheets 1 through 5.

2.04 The line conductors of the mounting cords for these sets terminate in individual plugs on a per line basis and are connected to the rear of the keys. This permits rearrangement of line appearances either in the set or at the key equipment distribution point.

2.05 These sets can be used with 1A, 1A1, 1A2, or 6A KTS. Refer to Table A or B for key modular arrangements.

2.06 Refer to Table C for connections when 635AD5C cut off key is used in first module.

2.07 All line pickup key positions are convertible to signaling or common signaling arrangements by removing the 812857738 (P-28E773) detail from key positions involved and making the necessary wiring changes per Table D.

2.08 A KS-20419L1 (10 volt ac only) buzzer is factory-installed for use as a second audible signal, when required. This arrangement uses (S-Y)

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and (Y-S) mounting cord conductors from (O) binder in the second module (Fig. 3).

**2.09** These sets may be used with either the 3-type (MD) or 4A speakerphone systems.

**2.10** Sets may be equipped for 3-type (MD) speakerphone by the addition of a 679A (MD) transmitter in the 3rd (2630-type) or 5th (2631-type) module (Fig. 4). Refer to Section 512-620-440 for necessary wiring changes and connections. Wiring of sets with speakerphone and necessary field modifications are shown in Fig. 4 and Table D.

**2.11** When the 3-type speakerphone control unit is located near the telephone set and an internal transmitter (679A) is used, an A25B connector cable should be plugged into the last mounting cord plug and terminated on the control unit terminal board.

**2.12** To retain the maximum number of keys in the CALL DIRECTOR telephone sets and still have 3-type speakerphone feature, a 666A (MD) or 666B(MD) transmitter and 760A(MD) loudspeaker may be installed as adjuncts to the telephone set. Spare leads and hold key lamp leads from the first module are used to supply the external speakerphone function. When control unit and telephone set are at same location, an auxiliary mounting cord (D1OR) may be used. Refer to Section 512-620-440 for complete connections to 3-type speakerphone.

**2.13** Refer to Section 512-730-400 for connections to the 4A speakerphone system.

**2.14** The hold key in the first module is used as regular hold and if required ***I Hold***. A second hold key is used for ***Priority Hold***. When Priority Hold is to be furnished, a D-180411 Kit of Parts is required. Install as follows:

- (1) Assemble kit of parts by inserting contact strips into new 635A5C key. Install pink plug furnished with kit in hold position on key.

**Note:** Contact strips are not required with sets equipped with a D120M or D200AA mounting cord or sets equipped with a modified D120K or D200S mounting cord.

- (2) Disconnect all mounting cord plugs and the two contact strip leads [sets equipped with D120K (MD) or D200S (MD) mounting cord] from the key in the second module. Remove key and replace with 635A5C key from kit.

- (3) Rereminate contact strip leads and connect mounting cord plugs with exception of white plug which is insulated and stored.

- (4) Rearrange wiring per Fig. 5.

**2.15** When required, these sets may be equipped with a polarity guard. Polarity guards should be installed only when specified by local instructions for end-to-end signaling purposes when battery and ground reversals are encountered. An 819041971 (P-90D197) guard assembly must be ordered separately and connected as shown in Table E.

**2.16** For station busy lamp feature with 3-type (MD) or 4A speakerphone system, refer to Fig. 6 and 7, respectively.

### 3. MAINTENANCE

**3.01** Maintenance of these sets should be limited to replacement of items available through regular supply channels. Refer to the reference Section 502-603-100 for 2630DA (MD), 2630DAM, 2631DA (MD), and 2631DAM telephone sets.

**3.02** Maintenance of components of these sets such as dials, ringers, etc. is covered in sections pertaining to the particular component. Maintenance information common to CALL DIRECTOR sets can be found in Section 502-600-100.

**3.03** ***Do not use solvents to clean plastic parts of these sets.*** Use a damp cloth only. If discolored, replace part.

**TABLE A**  
**1A, 1A1, AND 1A2 CONVERSION—2630DA (MD) OR 2630DAM TELEPHONE SET**

KEY MODULE ARRANGEMENT	LEAD											
	HOLD KEY				CHAINING PLUG				CONTACT STRIP OR PLUG LEAD			LINE SW.
	Y	G	BR-V	V-BR	V-G 1ST MOD	V-G 2ND MOD	R 1ST MOD	R 2ND MOD	R 1ST MOD	R 2ND MOD	R 3RD MOD	Y
1A1/1A2 Only	10	10	*	*	5	15	13	11	13	11	21	8
1A1/1A2 — 1st, 2nd Mod 1A — 3rd Mod	10	35	21	40	5	35	13	11	13	11	40	8
1A1/1A2 — 1st Mod 1A — 2nd, 3rd Mod	10	35	11	40	35	15	13	40	13	40	21	8
1A Only	*	10	13	26	5	15	26	11	26	11	21	18

\* Insulated and stored.

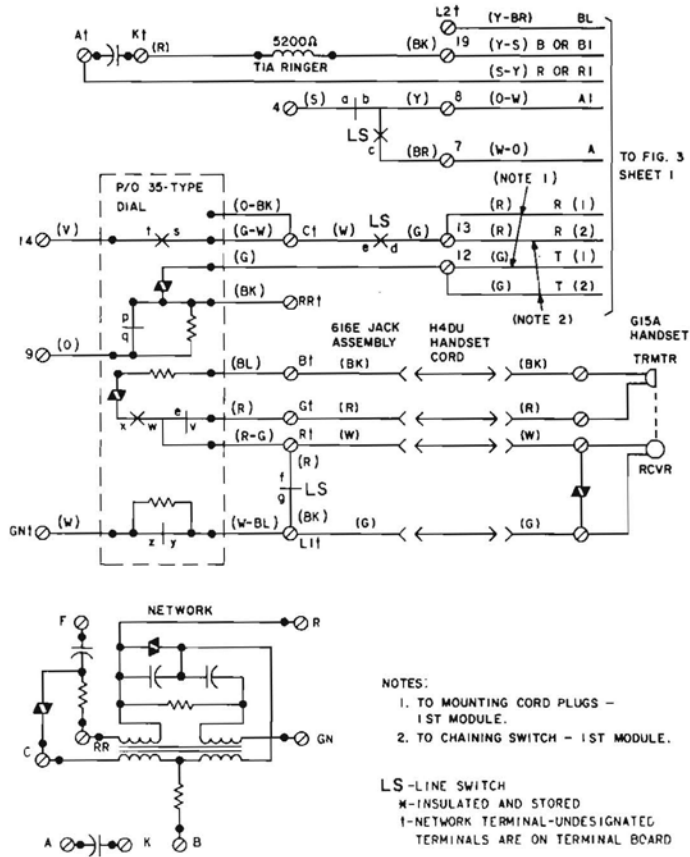


Fig. 1—2630DAM and 2631DAM Telephone Set, Connections



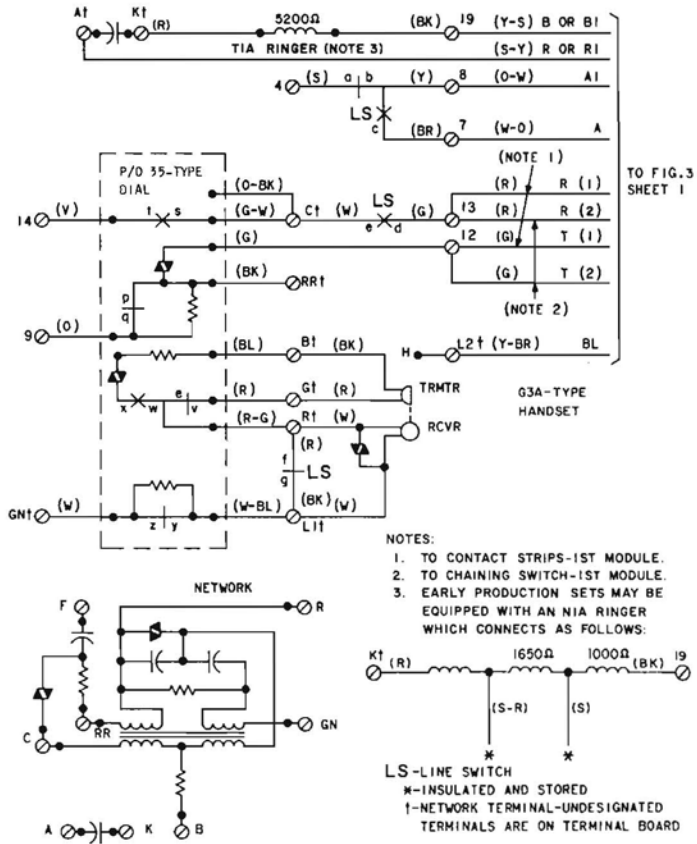


Fig. 2—2630DA (MD) and 2631DA (MD) Telephone Set, Connections

NOTES FOR FIG. 3:

1. THE 635AD5C KEY IS SUPPLIED WITH AN ADAPTER IN THE CUTOFF KEY POSITION. THE SLATE MOUNTING CORD PLUG CONNECTS TO THE ADAPTER. REFER TO TABLE C FOR SPADE-TIPPED LEAD CONNECTIONS. BALANCE OF PLUGS CONNECT DIRECTLY TO KEY.
2. IN SETS EQUIPPED WITH A 658A KEY THE (G) CONTACT STRIP LEAD IS TERMINATED ON 17 AND (R) ON 18. IF A 658A KEY IS ADDED IN THE FIELD, LEADS MUST BE MOVED FROM PRECEDING MODULE CHAINING CIRCUIT TO TERMINALS 17 AND 18.
3. PROVISIONS ARE MADE FOR MECHANICALLY STORING THE LIGHT BEIGE PLUG ON THE 658A KEY. NO ELECTRICAL CONNECTION IS MADE.
4. WHEN THE 658A KEY IS REQUIRED AS A DUAL PURPOSE KEY, REMOVE STRAP BETWEEN TERMINALS 17 AND 18. USE M1W CORD OR EQUIVALENT TO CONNECT TERMINAL 17 TO A DISSIMILAR GROUND OR NONGROUNDED CIRCUIT.
5. MODULE MAY ALSO BE EQUIPPED WITH A 679A INTERNAL TRANSMITTER FOR SPEAKERPHONE. SEE FIG. 4 AND SECTION 512-620-440 FOR WIRING CHANGES.
6. TO SUPPLY "I" HOLD FEATURE TERMINATE (Y-BR) MOUNTING CORD LEAD FROM (O) BINDER GROUP TO TERMINAL 24. LEAD BECOMES SP LEAD AT EQUIPMENT.
7. IF HOLD POSITION LAMP IS REQUIRED CONNECT (G-Y) AND (Y-G) LAMP LEADS TO SPARE PAIR USING SPARE TERMINAL OR D-161488 CONNECTORS. LAMP MUST BE SEPARATELY ORDERED AND INSTALLED. HOLD POSITION LAMP CANNOT BE ILLUMINATED WHEN EXTERNAL TRANSMITTER IS WIRED FOR 3-TYPE (MD) SPEAKERPHONE USING MOUNTING CORD LEADS.
8. 3-TYPE (MD) SPEAKERPHONE LEADS WHEN ASSOCIATED WITH EXTERNAL TRANSMITTER.
9. THESE CONTACT STRIPS ARE REQUIRED WHEN TELEPHONE SET IS EQUIPPED WITH THE D120K (MD) OR THE D200S (MD) MOUNTING CORD. THESE CONTACT STRIPS SHOULD NOT BE USED WHEN TELEPHONE SET IS EQUIPPED WITH THE D120M OR D200AA MOUNTING CORD OR WHEN TELEPHONE SET IS EQUIPPED WITH A MODIFIED D120K OR D200S MOUNTING CORD.

\* INSULATED AND STORED.

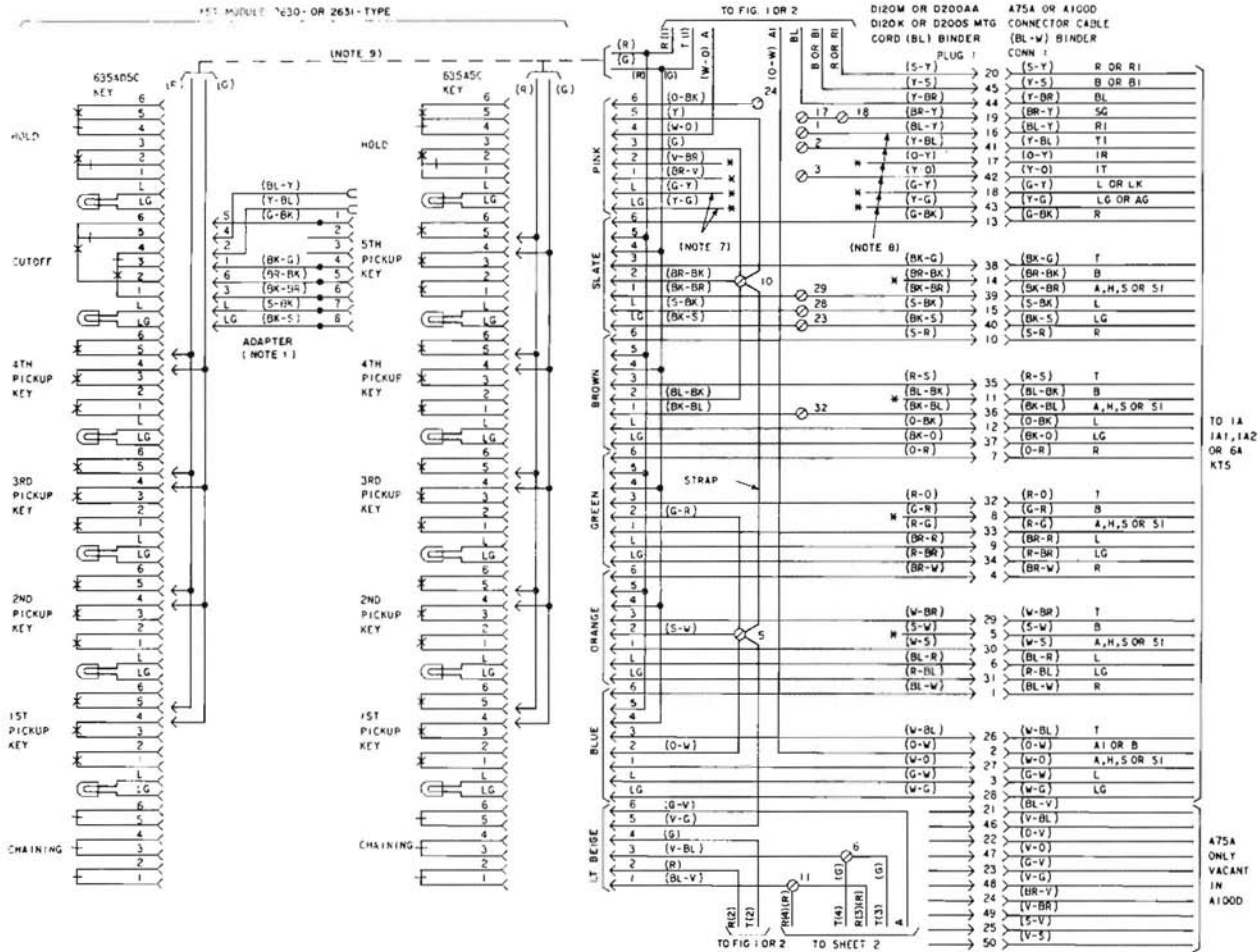


Fig. 3—Module and Connector Cable Arrangements (Sheet 1 of 5)



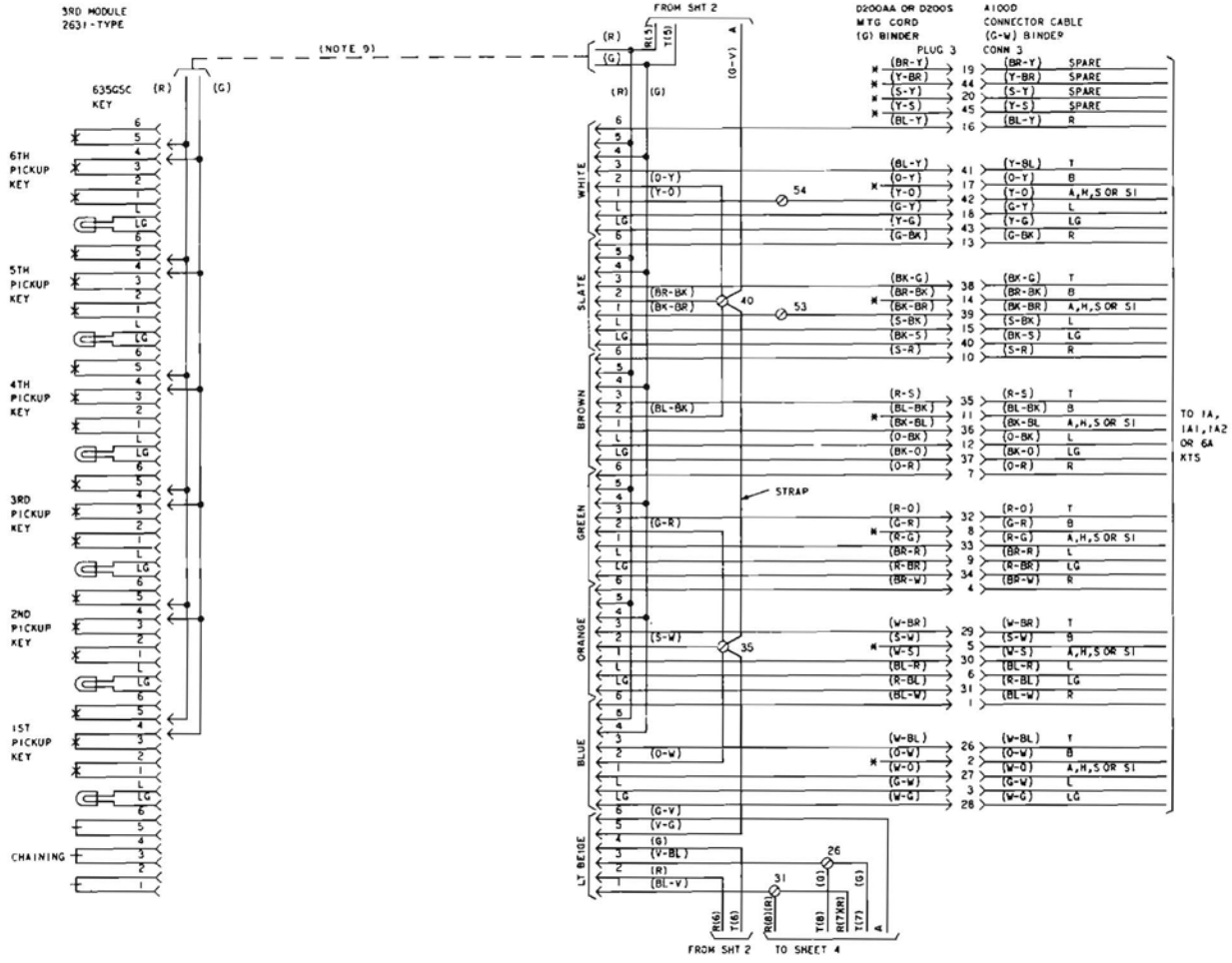


Fig. 3—Module and Connector Cable Arrangements (Sheet 3 of 5)

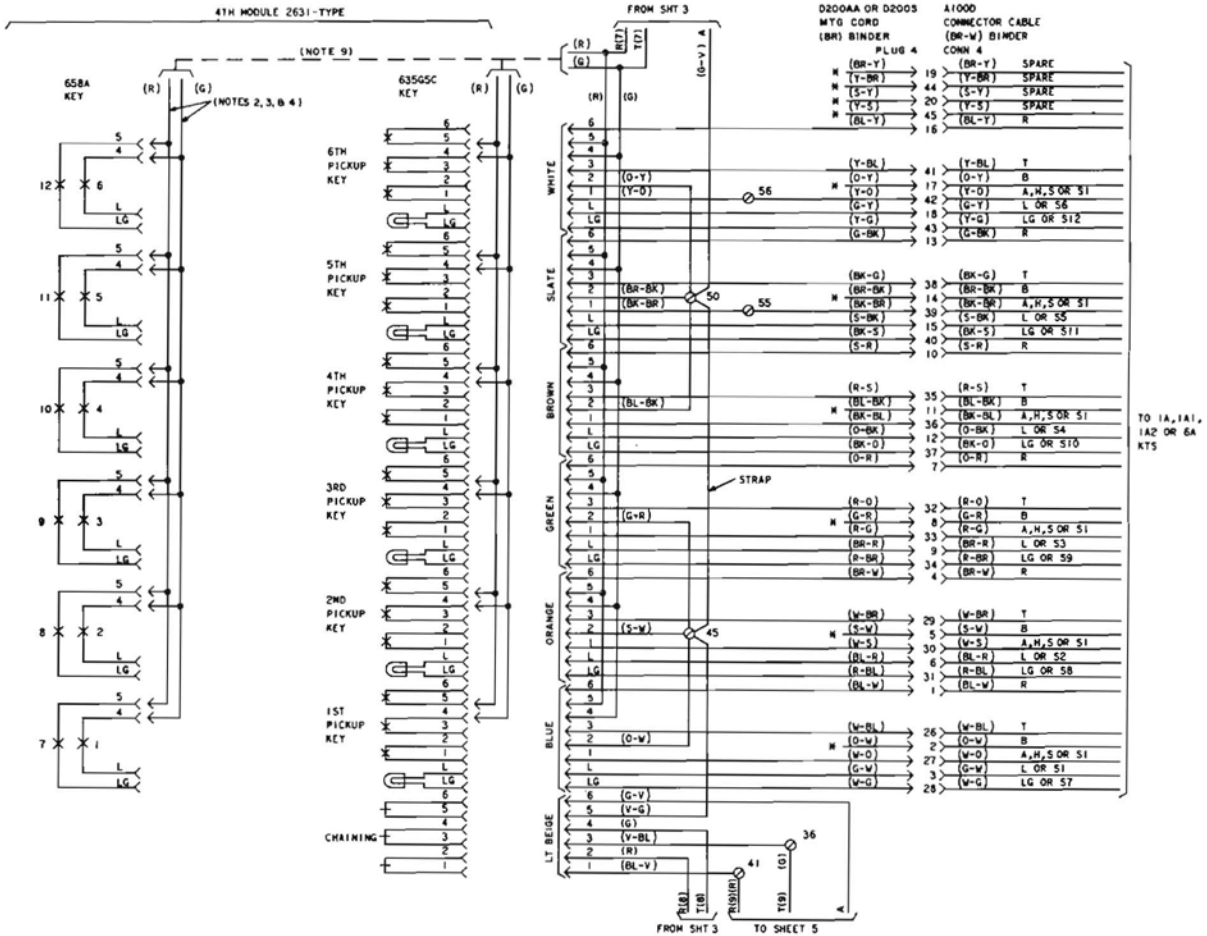


Fig. 3—Module and Connector Cable Arrangements (Sheet 4 of 5)



**TABLE B**  
**1A, 1A1, AND 1A2 CONVERSION—2631DA (MD) OR 2631DAM TELEPHONE SET**

KEY MODULE ARRANGEMENT	LEAD																	
	HOLD KEY				CHAINING PLUG								CONTACT STRIP OR PLUG LEAD					LINE SW.
	Y	G	BR-V	V-BR	V-G 1ST MOD	V-G 2ND MOD	V-G 3RD MOD	V-G 4TH MOD	R 1ST MOD	R 2ND MOD	R 3RD MOD	R 4TH MOD	R 1ST MOD	R 2ND MOD	R 3RD MOD	R 4TH MOD	R 5TH MOD	Y
1A1/1A2 Only	10	10	*	*	5	15	35	45	13	11	21	31	13	11	21	31	41	8
1A1/1A2— 1st, 2nd, 3rd, 4th Mod. 1A—5th Mod.	10	22‡	41	3†	5	15	35	22	13	11	21	31	13	11	21	31	3	8
1A1 1A2— 1st, 2nd, 3rd Mod. 1A—4th, 5th Mod.	10	22‡	31	3†	5	15	22	45	13	11	21	3	13	11	21	3	41	8
1A1 1A2— 1st, 2nd Mod. 1A—3rd, 4th, 5th Mod.	10	22‡	21	3†	5	22	35	45	13	11	3	31	13	11	3	31	41	8
1A1 1A2— 1st Mod. 1A—2nd, 3rd, 4th, 5th Mod.	10	22‡	11	3†	22	15	35	45	13	3	21	31	13	3	21	31	41	8
1A Only	*	10	13	3†	5	15	35	45	3	11	21	31	3	11	21	31	41	18

\* Insulated and stored.

† Remove (Y-O) mounting cord lead. Insulate and store.

‡ Remove (Y-G) mounting cord and key plug leads from terminal 22, insulate and store. If hold lamp position is being used, these leads must be terminated on a D-161488 connector.





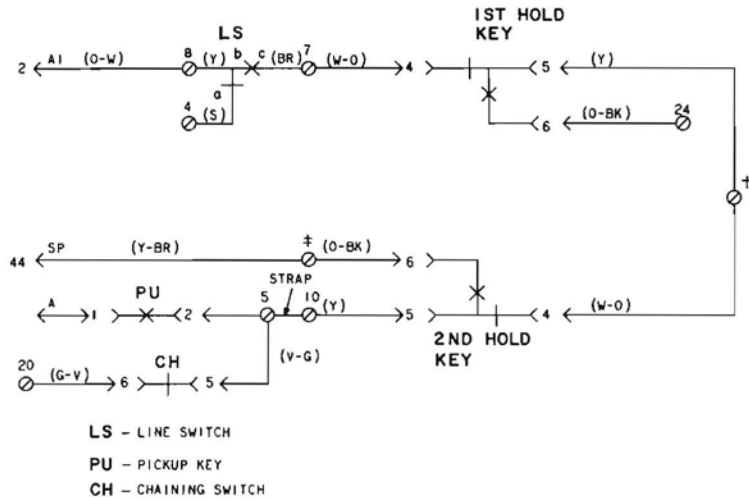
**TABLE C**  
**CUT OFF KEY (635AD5C) CONNECTIONS**

FEATURE	635AD5C KEY ADAPTER		MOUNTING CORD (BL) BINDER		CONNECTOR CABLE (BL-W) BINDER			RINGER	PLACE STRAP
	BL-Y	Y-BL	BL-Y	Y-BL	G-BK	BK-G	BK-BR	BK	
Cutoff Ringer in Set (Note 1)	TB1-1	TB1-2	*	*	(Note 2)			TB1-1	A (Net.) to TB1-2
Cutoff Ext Ringer or Buzzer (Note 1)	TB1-1	TB1-2	TB1-1	TB1-2	(Note 3)				
Cutoff Ext Station (Note 4)	*	*	TB1-1	TB1-2		To Aux. Relay	To Relay Grd		

\* Insulate and store.

Notes:

1. Remove (BR-BK) and (BK-BR) slate plug leads from terminals 10 and 29, insulate and store.
2. To individual line or common ringer circuit at equipment.
3. To external ringer or buzzer. Connect ringer or buzzer circuit to (BL-Y) (Y-BL) connector cable leads at equipment.
4. Connect T, R, and A leads from equipment and station to be cut off through contacts of auxiliary relay. Connect battery to relay winding. Use 227B or 421A KTU.



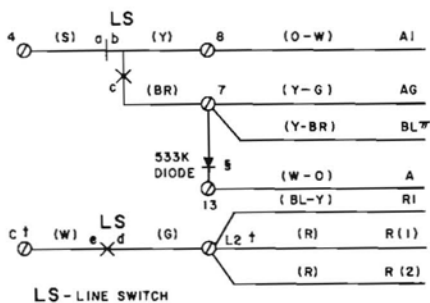
MODIFICATION		
WIRE OR LEAD	FROM	TO
1ST HOLD KEY (Y)	10	†
2ND HOLD KEY (O-BK)		‡
(Y)		10
(W-O)		†
(Y-BR)	*	‡

\* STORED LOCATION (O) BINDER GROUP

† CONNECT (Y) LEAD FROM 1ST HOLD KEY AND (W-O) LEAD OF 2ND HOLD KEY TO THE SAME SPARE TERMINAL OR D-161488 CONNECTOR.

‡ CONNECT (O-BK) LEAD OF 2ND HOLD KEY AND (Y-BR) MOUNTING CORD LEAD (O) BINDER GROUP TO THE SAME SPARE TERMINAL OR D-161488 CONNECTOR.

Fig. 5—Modifications for Priority Hold



MODIFICATION		
LEAD	FROM	TO
Y-BR	L2 †	7
W-O	7	13
533K DIODE		7 TO 13
G	13	L2 †
R ‡	13	L2 †
BL-Y	1	L2 †

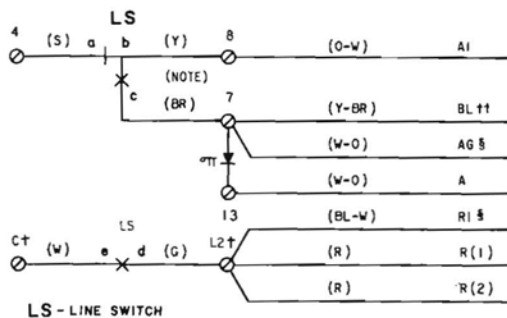
† NETWORK TERMINAL - UNDESIGNATED TERMINALS ARE ON TERMINAL BOARD

‡ MOVE BOTH (R) LEADS FROM TERMINAL 13 TO L2 OF NETWORK

§ ORDER AND INSTALL 533K BUSY LAMP DIODE

¶ USE "B" BATTERY SUPPLY FROM KTS IF AVAILABLE. DO NOT USE 10V AC LAMP BATTERY.

Fig. 6—Station Busy Lamp Circuit with 3-Type (MD) Speakerphone System



MODIFICATION		
LEAD	FROM	TO
Y-BR	L2 †	7
W-O	7	13
533K DIODE		7 TO 13
G	13	L2 †
R ‡	13	L2 †
BL-W §	13	L2 †

NOTE:

FOR BUSY LAMP CONTROLLED BY SPEAKERPHONE ONLY, MOVE (BR) LINE SWITCH LEAD FROM TERMINAL 7 TO 13.

† - NETWORK TERMINAL, UNDESIGNATED TERMINALS ARE ON TERMINAL BOARD

‡ - MOVE BOTH (R) LEADS FROM TERMINAL 13 TO L2

§ - LEAD IN M16C (MD) OR M16H CORD

¶ - ORDER AND INSTALL 533K BUSY LAMP DIODE

†† - USE "B" BATTERY SUPPLY FROM KTS IF AVAILABLE. DO NOT USE 10V AC LAMP BATTERY

Fig. 7—Station Busy Lamp Circuit with 4A Speakerphone System

**TABLE D**  
**PICKUP-SIGNAL KEY CONVERSION**  
**3RD (2630-TYPE) OR 5TH (2631-TYPE) MODULE**

NO. OF SIGNAL KEYS	NO. OF PVT OR INTER-COM LINES (COM. SIG) NOTE 1	KEY PLUG LEADS AND TERMINALS						
		O-W	S-W	G-R	BL-BK	BR-BK	O-Y	Y-O
1		25	25	25	30	30	18	39
2		25	25	25	30	18	18	39
3		25	25	25	18	18	18	39
4		25	25	18	18	18	18	39
5		25	18	18	18	18	18	39
6		18	18	18	18	18	18	39
	2	25	25	25	39	39	30	39
	3	25	25	39	39	39	30	39
	4	25	39	39	39	39	30	39
	5	39	39	39	39	39	30	39

**Notes:**

1. When using converted 6th pickup button as common signaling key, remove, insulate and store (Y-O) mounting cord lead from terminal 39.
2. If more than six signal keys are required, replace 635G5C key with a 658A key. If more than five private or intercom lines are required, convert keys in 2nd (2630-type) or 4th (2631-type) module in same order. Connect plug leads to terminal 39 to utilize common signal key. If additional terminals are required, use any spare terminal and strap to 39.

TABLE E

## 819041971 OR P-90D197 GUARD ASSEMBLY CONNECTIONS (Note)

WIRE OR LEAD	COLOR	REMOVE FROM	CONNECT TO	
		NET.	GUARD ASSY.	NET.
Dial	BK	RR	T	
	G-W	C	S	
Line Switch	W	C	S	
Guard Assembly	G			RR
	W			C*

\*(O-BK) dial lead remains connected to C of network.

*Note:* For use when specified by local instructions for end-to-end signaling installations.

## SERVICE

### 2634D AND 2635D TELEPHONE SETS

#### 1. GENERAL

**1.01** This section contains connection and maintenance information for 18- and 30-button telephone sets equipped with 12-button TOUCH-TONE® dials and used with station line concentrators.

**1.02** This section is reissued to:

- Change title from 2634- and 2635-type
- Show the 2634D and 2635D telephone sets rated MD
- Add priority hold using 657L key
- Add new insulating detail for 656- and 657-type keys
- Remove common maintenance information which is now covered in Section 502-600-100

#### 2. CONNECTIONS

**2.01** See SD-69498-01 (key telephone systems, 6A, 1A1, and 1A2, station line concentrator) and appropriate sections in Division 518 for connections to station line concentrator using 235B or 236B key telephone units.

**2.02** A 235B KTU is associated with each 2634D telephone set and a 236B KTU with each 2635D telephone set. Because of the single common talking and control lead pattern in these sets, a line concentrator KTU must be associated with each telephone set installed and cannot be shared, even on a bridged station basis.

**2.03** A 599B or 657B key may be used in the first key position to provide ringer or line cutoff (Notes 5 and 6, Fig. 2 or 3). When other uses are required, they must be provided for by means of an auxiliary relay separately mounted and controlled by the turn key contacts since there are insufficient mounting cord conductors to permit full switching at the key.

**2.04** ♦Priority hold can be supplied in these sets by installing a 657L key in the first module and modifying set as shown in Fig. 5. Refer to Section 518-310-405 for connections to the 235- or 236-type KTU and to Section 518-215-125 and SD-69530-01 for connections to the 429A and 430A KTUs.♦

**2.05** To convert a key position from pickup (locking) to signaling (nonlocking) remove the screw detail P-10E837 entirely from the plunger at the key position to be converted. ♦Make the necessary wiring changes as shown in Table B and use 840157473 insulating detail to isolate the ring and tip contacts. Refer to Division 512, section entitled Modular Keys, Lamp Sockets, and Transmitters (KS-Type connector Equipped) for more information on keys and insulators.♦

#### 3. MAINTENANCE

**3.01** Maintenance of handsets, dials, and ringers is covered in Division 501 and modular keys in Division 512.

**3.02** Refer to the appropriate Reference section in Division 502 for replaceable components.

**3.03** ♦For maintenance information covering these sets refer to Section 502-600-100.♦

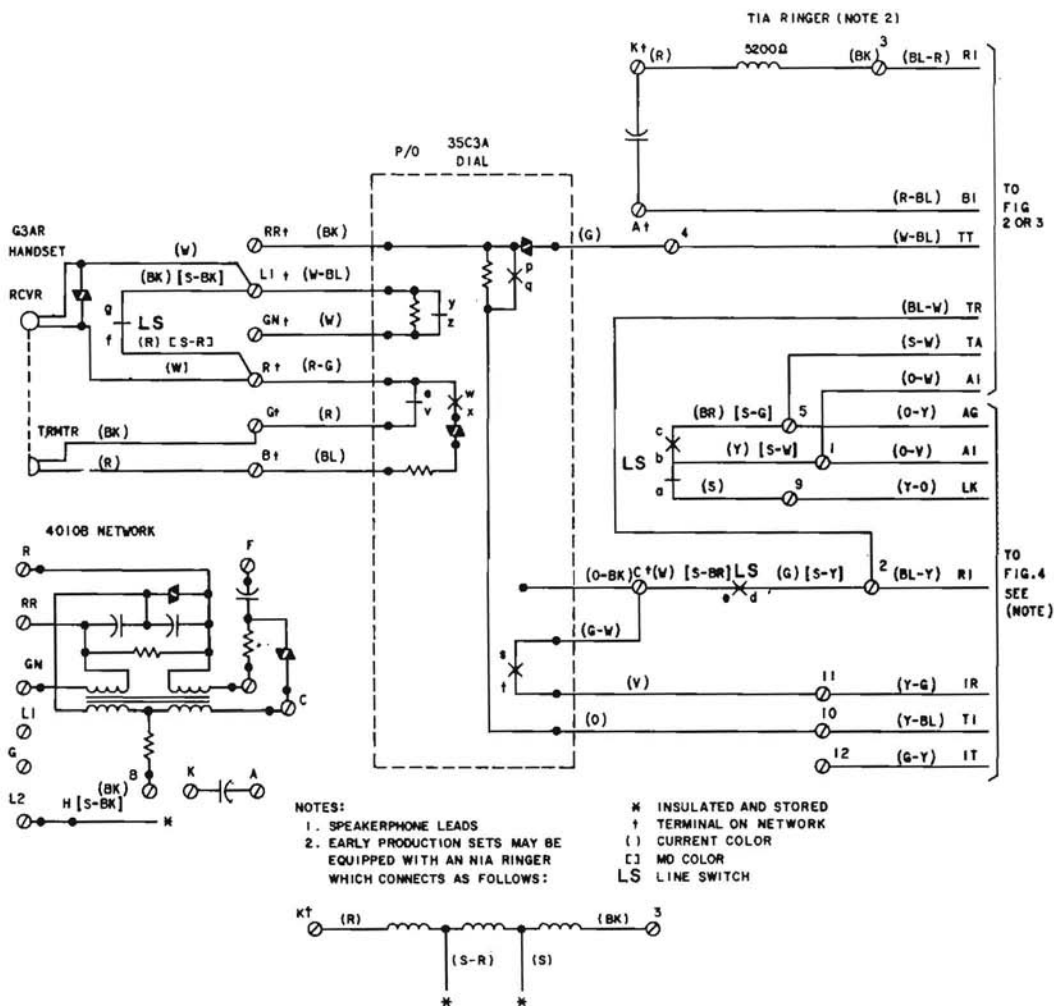


Fig. 1—2634D (MD) and 2635D (MD) Telephone Set, Connections



TABLE A — FEATURE CONVERSION OF TELEPHONE SETS

KEY POSITION		SERVICE FEATURE OPTIONS								LINE PICKUP
		BUZZER SIGNALING		6A ADD-ON		6A PUSHBUTTON		LOCKED-IN LAMP RELEASE		
		CONNECT STORED SPADE-TIPPED LEAD INDICATED TO TERM. SG OF TB VI.	DISCONNECT SPADE-TIPPED LAMP LEAD INDICATED FROM ASSOC. TB, INSULATE AND STORE.	CONNECT STORED SPADE-TIPPED LEAD INDICATED TO TERM. PB OF TB VI.	DISCONNECT SPADE-TIPPED LAMP LEAD INDICATED FROM ASSOC. TB, INSULATE AND STORE.	CONNECT STORED SPADE-TIPPED LEAD INDICATED TO TERM. A OR 1A OF TB VI.	DISCONNECT SPADE-TIPPED LAMP LEAD INDICATED FROM ASSOC. TB, INSULATE AND STORE.	CONNECT STORED SPADE-TIPPED LEAD INDICATED TO TERM. SG OF TB VI.	MOVE SPADE-TIPPED LAMP LEAD INDICATED FROM ASSOC. TB TO AVAIL. LAMP GRD.	
2634 TEL SET	2635 TEL SET									
1	1	BL	R-BR	BL	R-BR	BL	R-BR	BL	R-BR	Factory equipped and wired
2	2	O	R-S	O	R-S	O	R-S	O	R-S	
3	3	G	BK-BL	G	BK-BL	G	BK-BL	G	BK-BL	
4	4	BR	BK-O	BR	BK-O	BR	BK-O	BR	BK-O	
5	5	S	BK-G	S	BK-G	S	BK-G	S	BK-G	
6		NOT CONVERTIBLE								
	6	2635—Connect W to term. SG of TB VI. Connect one of two spares (S-BK or BK-S) from Plug 2 to term. 6 of TBI.		2635—Connect W to term. PB of TB VI. Connect one of two spares (S-BK or BK-S) from Plug 2 to term. 6 of TBI.		2635—Connect W to term. 1A of TB VI. Connect one of two spares (S-BK or BK-S) from Plug 2 to term. 6 of TBI.		2635—Connect W to term. SG of TB VI. Connect one of two spares (S-BK or BK-S) from Plug 2 to term. 6 of TBI. Connect G-R to avail. lamp grd.		Replace 599A or 657A key with 598A or 656A key. Connect G-R to avail. lamp grd. Connect W-O to term. A or 1A of TB VI.
7	7	BL	BK-BR	BL	BK-BR	BL	BK-BR	BL	BK-BR	Factory equipped and wired
8	8	O	BK-S	O	BK-S	O	BK-S	O	BK-S	
9	9	G	Y-BL	G	Y-BL	G	Y-BL	G	Y-BL	
10	10	BR	Y-O	BR	Y-O	BR	Y-O	BR	Y-O	
11	11	S	Y-G	S	Y-G	S	Y-G	S	Y-G	
12	12	W	Y-BR	W	Y-BR	W	Y-BR	W	Y-BR	
	13	BL	W-BL	BL	W-BL	BL	W-BL	BL	W-BL	
	14	O	W-O	O	W-O	O	W-O	O	W-O	
	15	G	W-G	G	W-G	G	W-G	G	W-G	
	16	BR	W-BR	BR	W-BR	BR	W-BR	BR	W-BR	
	17	S	W-S	S	W-S	S	W-S	S	W-S	
	18	W	R-BL	W	R-BL	W	R-BL	W	R-BL	
	19	BL	R-O	BL	R-O	BL	R-O	BL	R-O	
	20	O	R-G	O	R-G	O	R-G	O	R-G	
	21	G	R-BR	G	R-BR	G	R-BR	G	R-BR	
	22	BR	R-S	BR	R-S	BR	R-S	BR	R-S	
	23	S	BK-BL	S	BK-BL	S	BK-BL	S	BK-BL	
	24	W	BK-O	W	BK-O	W	BK-O	W	BK-O	
13	25	BL	Y-S	BL	Y-S	BL	Y-S	BL	Y-S	
14	26	O	V-BL	O	V-BL	O	V-BL	O	V-BL	
15	27	G	V-O	G	V-O	G	V-O	G	V-O	
16	28	BR	V-G	BR	V-G	BR	V-G	BR	V-G	
17	29	S	V-BR	S	V-BR	S	V-BR	S	V-BR	
	30	W	V-S	W	V-S	W	V-S	W	V-S	
18		W	V-S	W	V-S	W	V-S	W	V-S	Connect R-BL to avail lamp grd.

## NOTES FOR FIG. 2 AND 3:

1. WHEN 657A, 599A OR 657B, 599B KEYS ARE USED IN FIRST MODULE, HOLD KEY LAMP (6TH LAMP) MAY BE USED FOR A MISCELLANEOUS VISUAL SIGNAL. CONNECT INDICATED LEAD TO AN AVAILABLE LAMP GROUND. WHEN 656A OR 598A KEY IS USED IN FIRST MODULE, INDICATED LEAD IS CONNECTED TO GROUND ON TERMINAL 5 OF TBI.
  2. WHEN 656A OR 598A KEY IS USED IN FIRST MODULE, INDICATED LEAD IS CONNECTED TO TERMINAL A (2634D) AND TERMINAL 1A (2635D) OF TBI.
  3. WHEN 656A OR 598A KEY IS USED IN THIRD MODULE OF 2634D OR 2635D SET (V-S) LEAD IS CONNECTED TO TERMINAL 5 OF TBIII ON 2634D SET AND (R-BL) IS CONNECTED TO TERMINAL 6 OF TBIII ON 2635D SET.
  4. TO CONVERT A PICKUP KEY FROM LOCKING TO NONLOCKING THE CONVERSIONS SHOWN IN TABLE B MUST BE FOLLOWED. REMOVE THE SCREW DETAIL P-10E837 ENTIRELY FROM THE PLUNGER AT THE KEY POSITION TO BE CONVERTED, AND USE 840157473 INSULATING DETAIL TO ISOLATE THE TIP AND RING CONTACTS.
  5. CUTOFF OF THE INTERNAL RINGER CAN BE PROVIDED USING THE 657B OR 599B KEY IN FIRST MODULE. TRANSFER RI (BL-R) LEAD FROM TERMINAL 3 OF TERMINAL BOARD (TEL SET) TO TERMINAL 6 OF TBI. TRANSFER (R) LEAD FROM TERMINAL 5 OF TBI TO TERMINAL 3 VACATED BY RI LEAD.
  6. WHEN 657B OR 599B KEY IS USED IN FIRST MODULE TO PROVIDE CUTOFF, SWITCHING, OR TRANSFER FEATURES, TRANSFER (Y-BR) LEAD FROM TERMINAL 6 OF TBI TO TERMINAL 5G OF TBI. THESE SERVICE FEATURES ARE PROVIDED BY AN AUXILIARY RELAY (229B KTU OR EQUIVALENT) SEPARATELY MOUNTED AND CONTROLLED BY THE TURN KEY CONTACTS THROUGH THE L65, C, S, S1 LEADS.
  7. CONTACTS OF TURN KEY CONNECTED TO PINS 9 AND 11 MUST BE ISOLATED FROM EACH OTHER WITH INSULATING DETAIL P-13E443 (FURNISHED WITH 657B OR 599B KEY) TO PREVENT INTERFERENCE WITH WORKING CIRCUITS.
  8. THE TURN KEY LAMP CAN BE ILLUMINATED IN ACCORDANCE WITH OR INDEPENDENT OF TURN KEY OPERATION.
  9. WHEN THE 617A KEY IS REQUIRED AS A DUAL PURPOSE KEY, THE BRASS STRAP BETWEEN THE S1 AND 5G TERMINALS OF THE KEY MAY BE REMOVED. USE MIW CORD OR EQUIVALENT TO CONNECT S1 TERMINAL OF 617A TO A DISSIMILAR GROUND OR A NONGROUND CIRCUIT.
  10. CORDS MANUFACTURED BEFORE APRIL 1968 HAVE SOME LEADS SOLDERED TO THE TB.
  11. WHEN 661- OR 667-TYPE TRANSMITTER IS USED IN THIRD MODULE OF 2634D SET, REMOVE INDICATED LEAD AND INSULATE.
  12. WHEN SPEAKERPHONE CONTROL UNIT IS LOCATED NEAR TELEPHONE SET, A 148A (MD) OR 148B ADAPTER MAY BE INSERTED BETWEEN CONNECTOR I AND PLUG J OF THE 2634D OR 2635D TELEPHONE SET.
- \* LEADS ARE SPADE-TIPPED, INSULATED, AND STORED.  
 † NOT REQUIRED FOR 3-TYPE SPEAKERPHONE SYSTEM.  
 ‡ IF 148-TYPE ADAPTER IS USED, INSULATE AND STORE THESE LEADS AT TERMINAL.



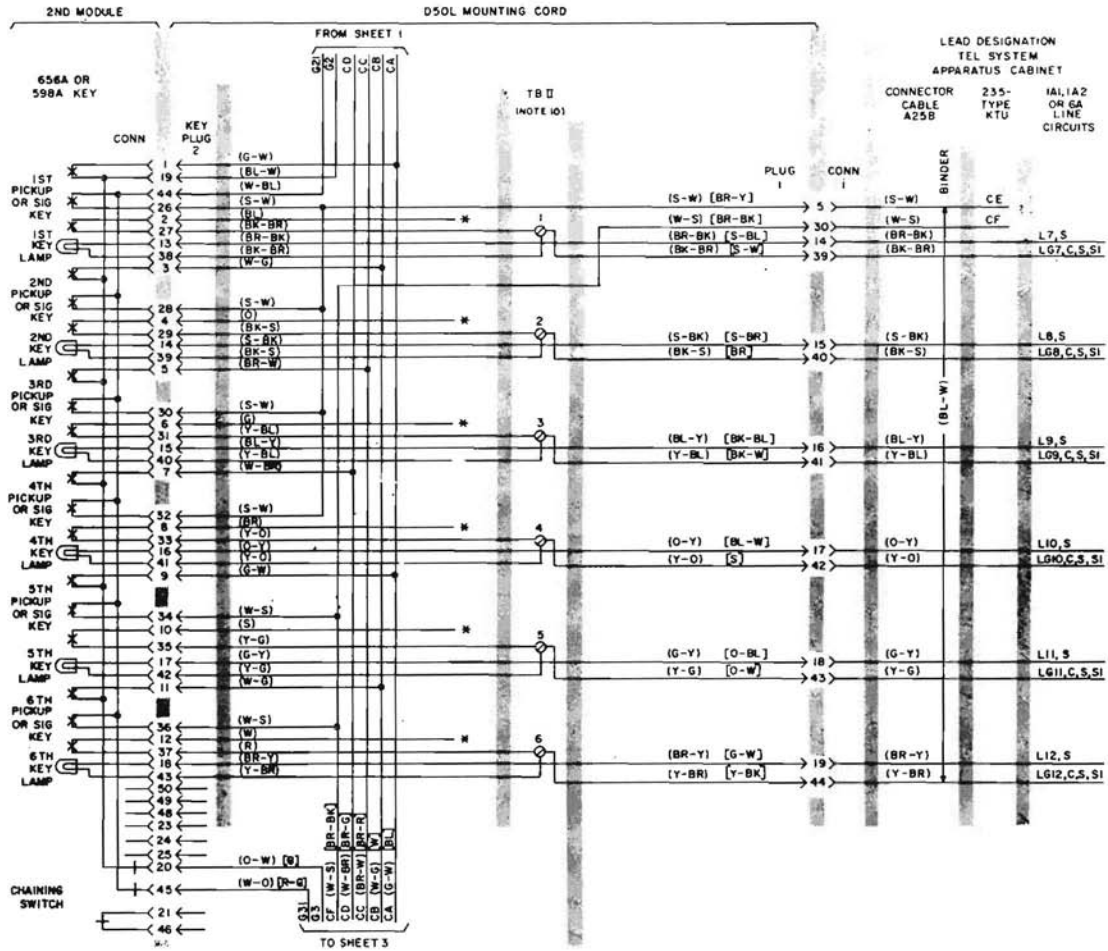


Fig. 2—Module Arrangements and Cord and Cable Connections for 2634D (MD) Telephone Sets (Sheet 2 of 3)



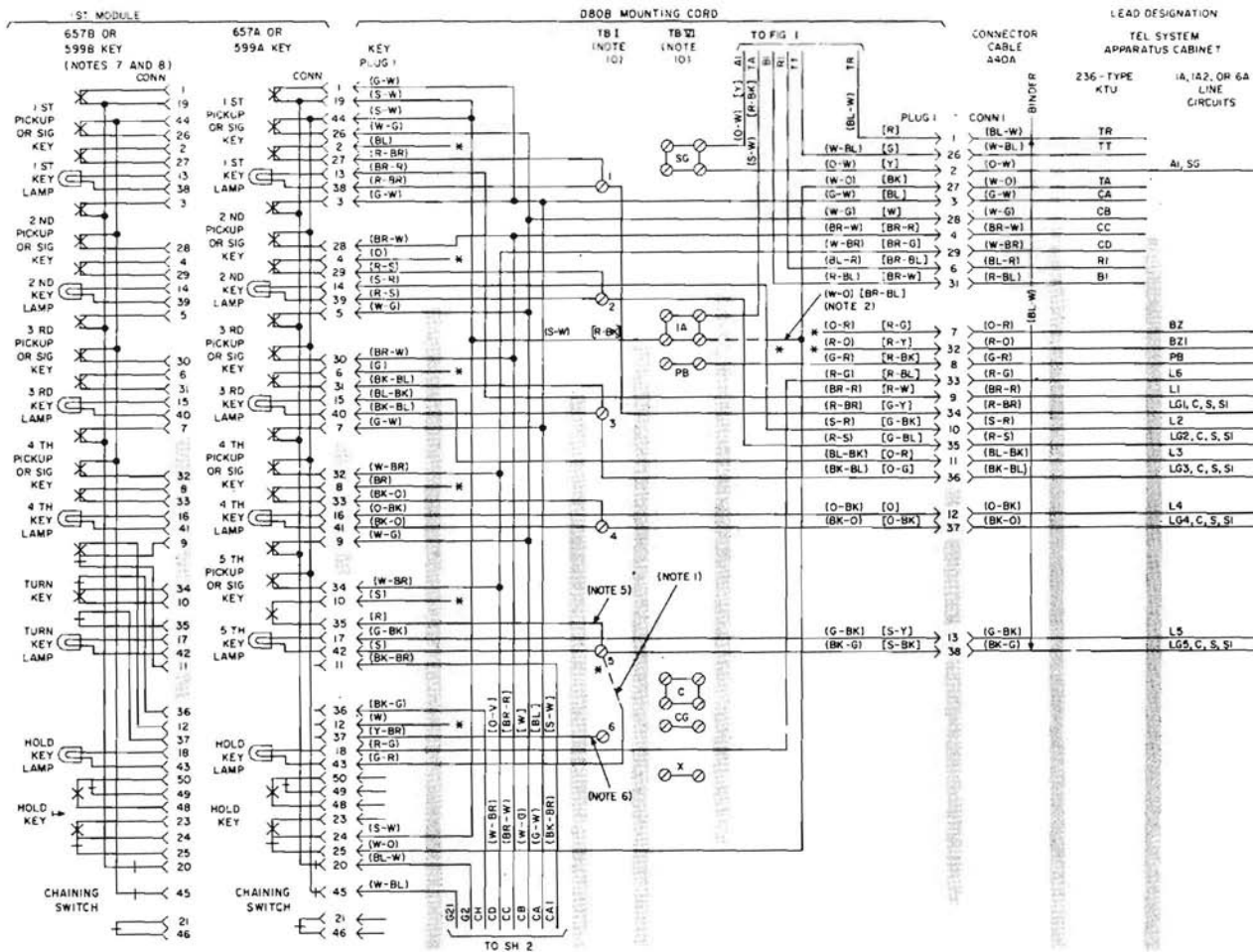


Fig. 3—Module Arrangements and Cord and Cable Connections for 2635D (MD) Telephone Sets (Sheet 1 of 5)



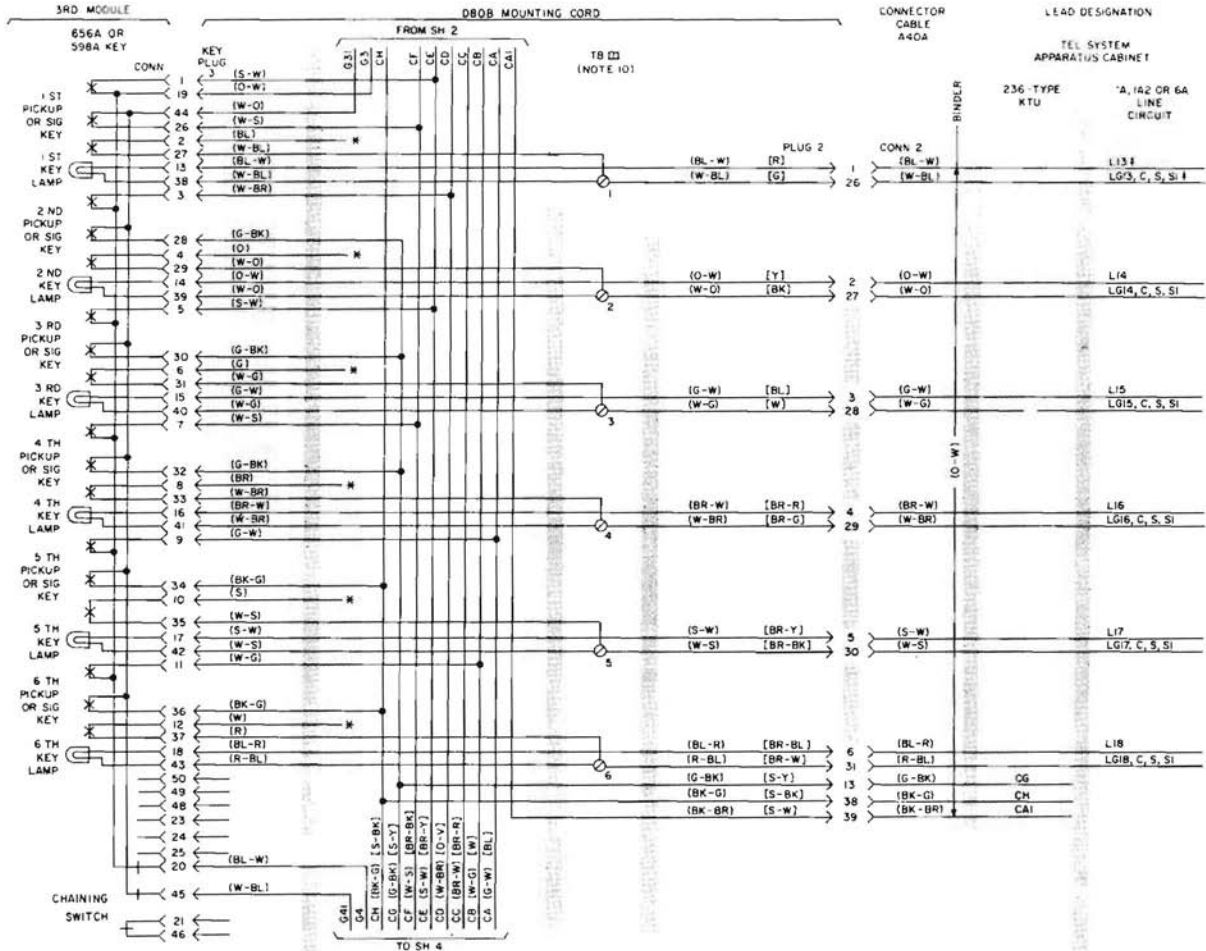


Fig. 3—Module Arrangements and Cord and Cable Connections for 2635D (MD) Telephone Sets (Sheet 3 of 5)





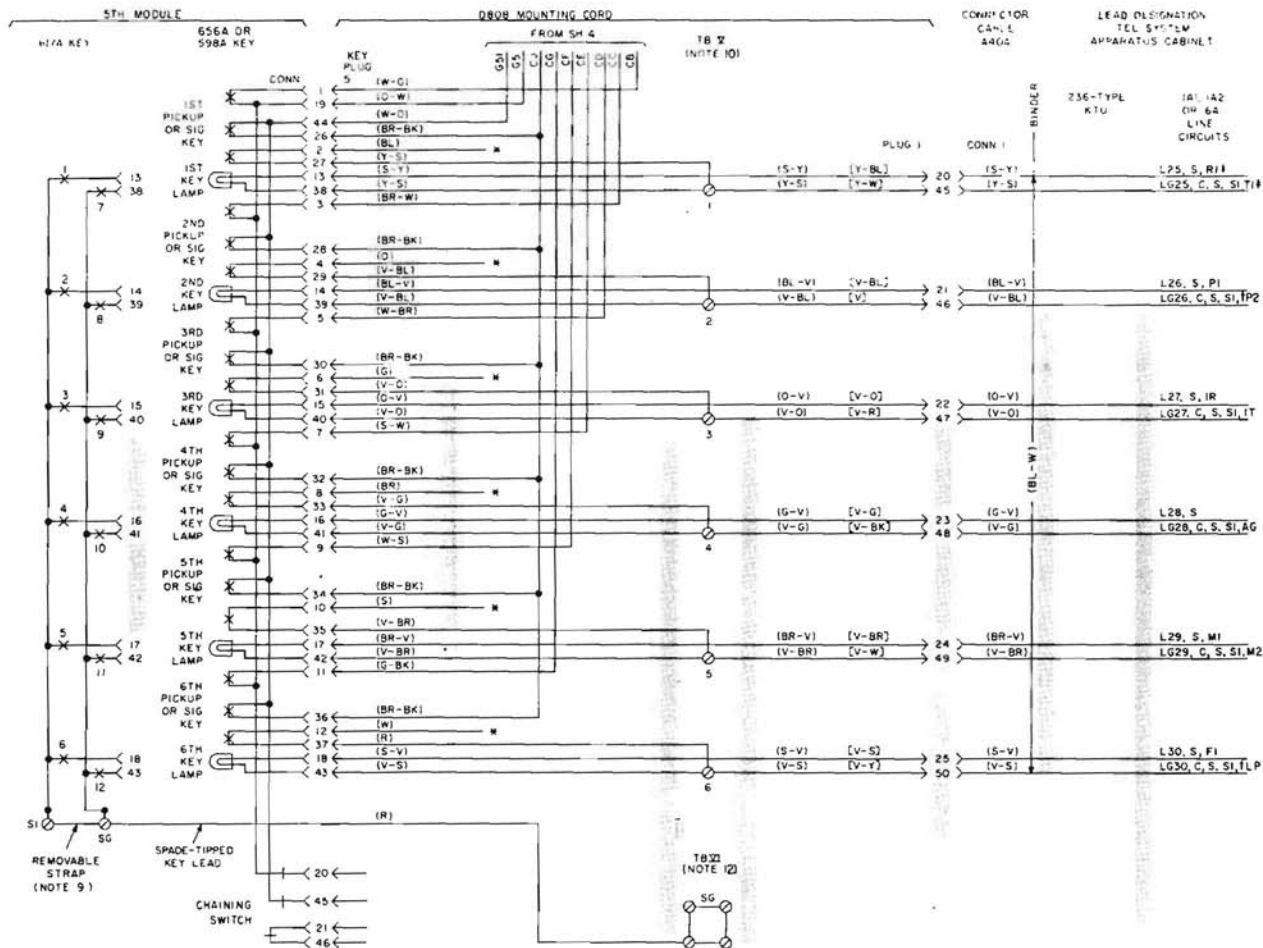
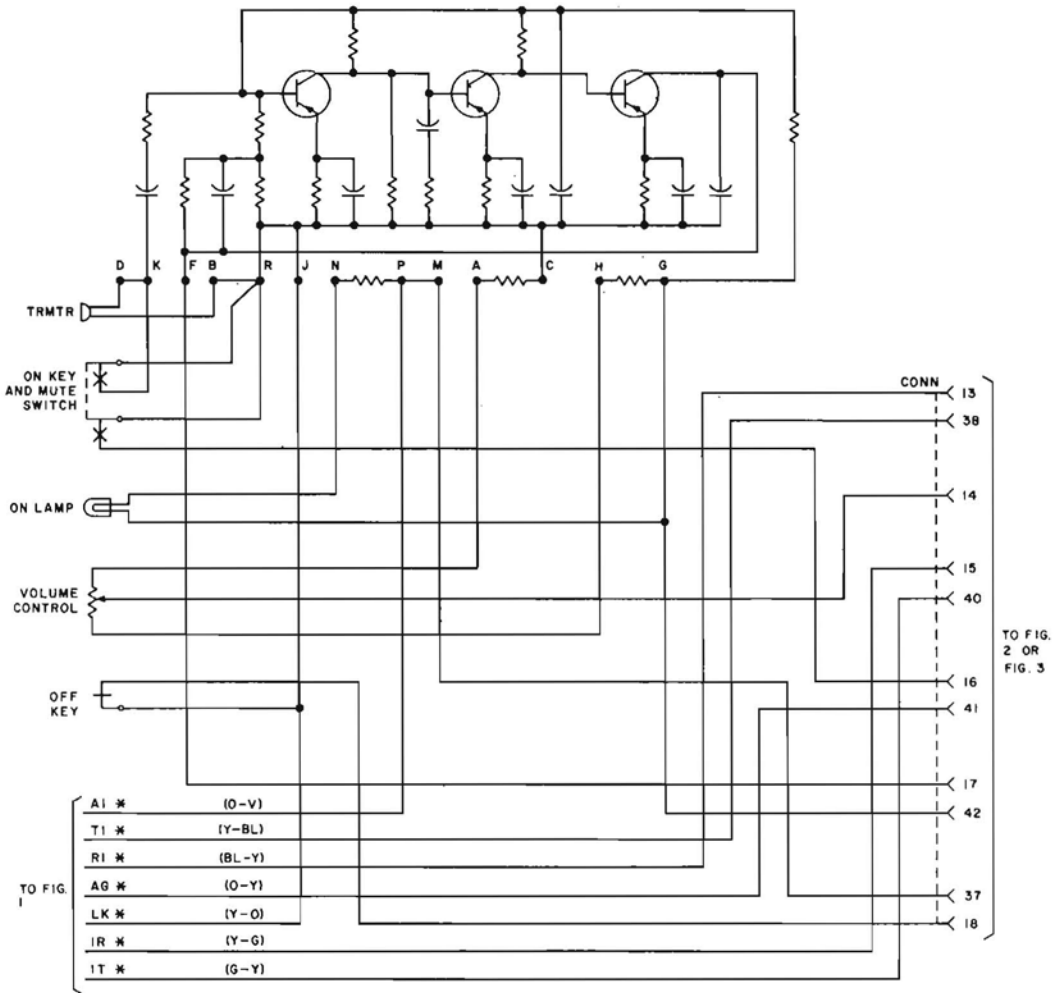


Fig. 3—Module Arrangements and Cord and Cable Connections for 2635D (MD) Telephone Sets (Sheet 5 of 5)



\* LEADS ARE SPADE TIPPED AND OF SUFFICIENT LENGTH TO REACH NETWORK OR DIAL TERMINAL WHEN SPEAKERPHONE MODULE IS IN THE FIFTH KEY POSITION.

Fig. 4-667B Transmitter

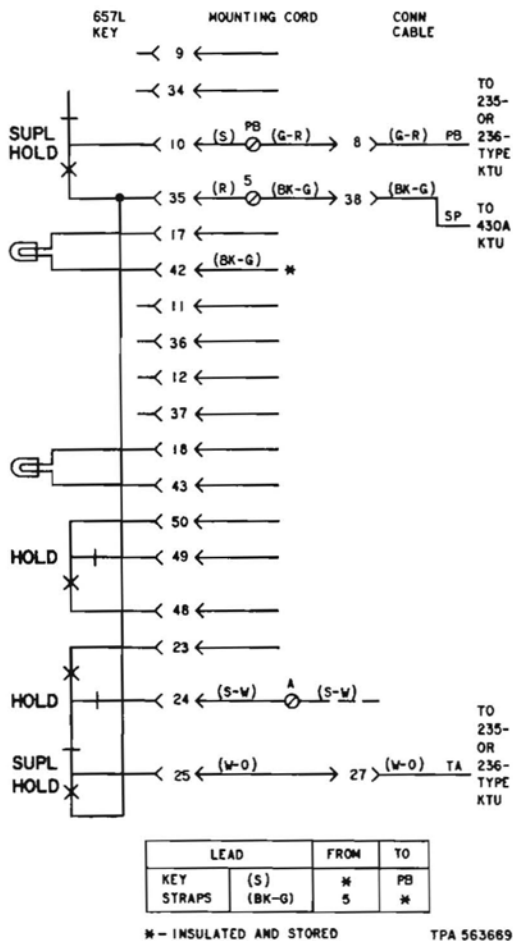


Fig. 5—Priority Hold, Using 657L Key

TABLE B

P-90D197 POLARITY GUARD CONNECTIONS

LEAD		REMOVE FROM	CONNECT TO
Line Switch	(W)	C*	S†
Dial	(G-W)		RR*
	(BK)		
Polarity Guard	(W)		C*
	(G)		RR*

\*Network terminal.

†Polarity guard terminal.

**Note:** Polarity guards shall be installed only when specified by local instructions for end-to-end signaling.

## SERVICE

### 2636- AND 2637-TYPE TELEPHONE SETS

#### 1. GENERAL

**1.01** This section contains connection and maintenance information for the 2636- and 2637-type telephone sets. Connection information for these sets was formerly contained in Section 502-636-421 which is hereby canceled.

#### 2. CONNECTIONS

**2.01** These sets are factory-wired for use with 1A1 or 1A2 KTS line circuits. They may also be used with 1A or 6A KTS by modifying the set as shown in Tables A and B. 1A and 1A1 or 1A2 KTS line circuits may be connected to the same set under the following conditions:

- 1A1 or 1A2 KTS lines must be connected to the first key units, with 1A lines connected to supplementary key units (Table A).
- 1A, 1A1, or 1A2 KTS lines should not be connected to the same 6-line key unit.



*Some mounting cord conductors are dead dressed with insulators (tubing). When these conductors are required, do not use long-nose pliers to remove tubing, as this may break the conductor or pull off the spade tip. Remove tubing with electrician's scissors or diagonal pliers.*

- 2.02** These sets are not intended for use with 3-type speakerphone systems.
- 2.03** Replacement or substitution of the key in the first module may require wiring changes as shown in the notes for Fig. 2.
- 2.04** When station busy lamp feature is required with these sets having 1A1 or 1A2 KTS line

circuits, a P-90D033 Printed Wiring Board Assembly must be ordered separately and installed in the 2636- or 2637-type telephone set. Install as follows:

- (1) Remove set housing.
- (2) Loosen screws on dial mounting plate, move mounting to left and lift out.
- (3) Remove right-hand dial mounting screw.
- (4) Place dial mounting screw through hole in wiring board and replace screw in dial. Components on board should be positioned so as not to interfere with other set components when dial mounting plate is replaced.
- (5) Replace and secure dial mounting plate.
- (6) Connect wiring board leads and make wiring changes as shown in Fig. 2 and 3.

**2.05** Supplementary hold feature can be provided in two configurations (Fig. 4). **Priority Hold** requires a 599H key in the first module. **I Hold** requires a wiring modification of the existing hold key in first module. Refer to Division 518 and SD-69530-01 for detailed information on supplementary hold.

**2.06** When a polarity guard is required with these sets, install a P-90D197 Guard Assembly and connect as shown in Table D. Polarity guards should be installed only when authorized by local instructions to prevent battery and ground reversals encountered in end-to-end signaling.

#### 3. MAINTENANCE

- 3.01** Replaceable components are listed in the Reference section for these sets.
- 3.02** Maintenance of components such as dials, keys, ringers, etc is covered in the sections pertaining to those components.

**TABLE A**  
**WIRING MODIFICATIONS FOR COMBINING 1A AND 1A1 OR 1A2 KTS LINES**

KEY TELEPHONE SYSTEM	MOUNTING CORD LEADS												SET LINE SWITCH (BR)
	HOLD KEY					CHAINING SWITCH					TEL SET CONTROL		
						18- AND 30-BUTTON SETS			30-BUTTON SETS ONLY				
	1ST KEY	2ND KEY	3RD KEY	4TH KEY	5TH KEY	RING	A1						
(Y-G)	(G-Y)	(V-O)	(BR-V)	(V-BR)	(V-G)	(V-G)	(V-G)	(V-G)	(V-G)	(BL-V)	(O-V)		
1A1 or 1A2 (shop wiring)	A-H I	A-H I	*	*	*	A-H I	A-H II	A-H III	A-H IV	A-H V	R I	1B VI	5 Note 1
1A1 or 1A2 on 1st key unit; 1A on remaining units.	A-H I	Y VI	*	1† I	R II	Y VI	A-H II	A-H III	A-H IV	A-H V	R I	1B VI	5 Note 1
1A1 or 1A2 on 1st and 2nd key units; 1A on remaining key units	A-H I	Y VI	*	1† II	R III	A-H I	Y VI	A-H III	A-H IV	A-H V	R I	1B VI	5 Note 1
1A1 or 1A2 on 1st, 2nd, and 3rd key units; 1A on remaining key units (30-button sets)	A-H I	Y VI	*	1† III	R IV	A-H I	A-H II	Y VI	A-H IV	A-H V	R I	1B VI	5 Note 1
1A1 or 1A2 on 1st through 4th key units; 1A on fifth key unit (30-button sets)	A-H I	Y VI	*	1† IV	R V	A-H I	A-H II	A-H III	Y VI	A-H V	R I	1B VI	5 Note 1
1A only	Y VI	A-H I	*	R1 VI	R I	A-H I	A-H II	A-H III	A-H IV	A-H V	R1 VI	SG VI	6

\*Insulate and store.

†Disconnect, insulate, and store (BL-Y) chaining switch lead at this terminal.

**Notes:**

1. See station busy lamp connections, Fig. 3. Terminals referred to are on telephone set terminal block.
2. Roman numerals refer to terminal board number.

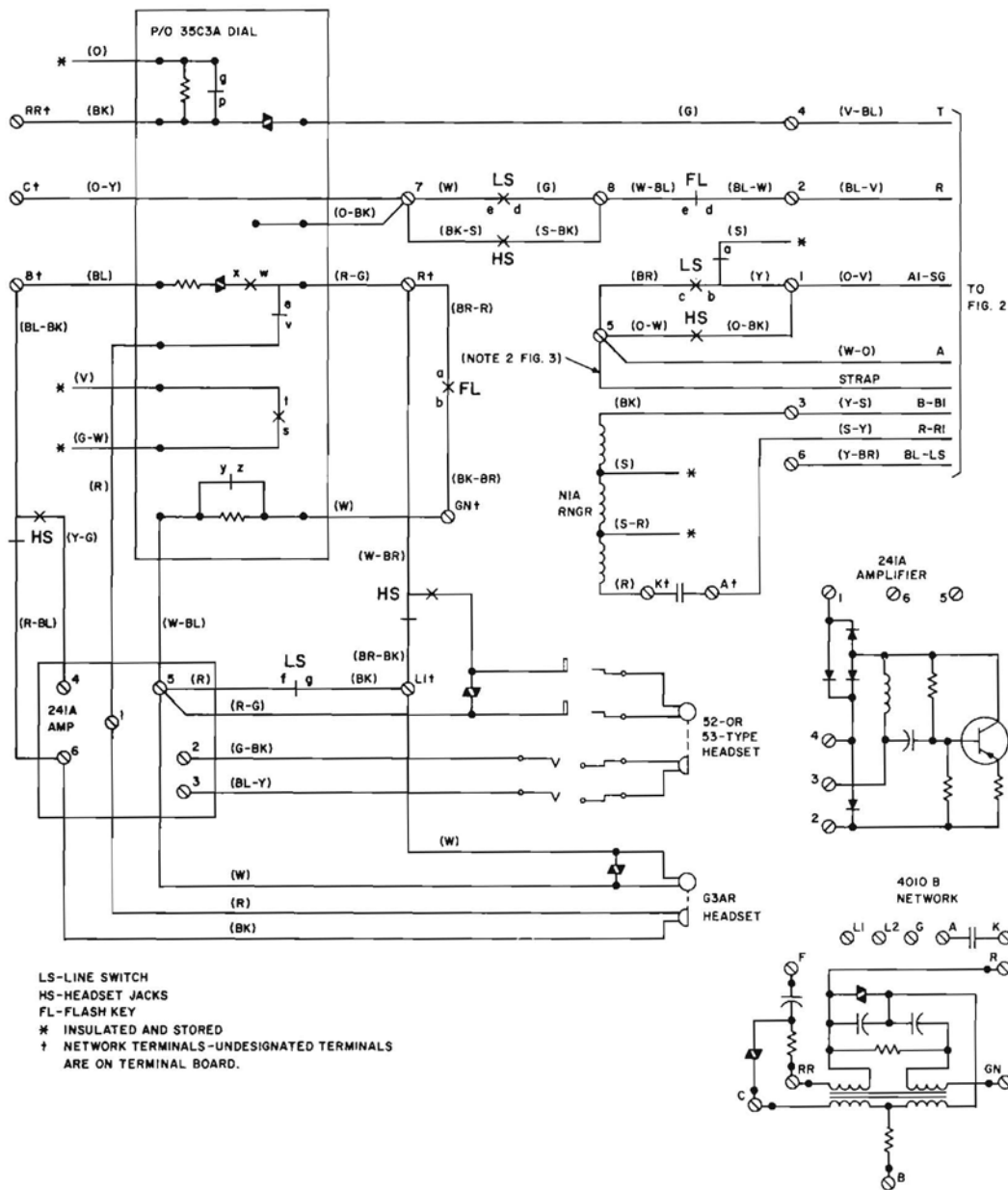


Fig. 1—2636- and 2637-Type Telephone Sets, Connections

Notes for Fig. 2:

1. When necessary to install a 599A or 599B key in the 1st module, the following leads must be insulated and stored:

- Mounting cord leads — (G-Y), (Y-G)
- Module plug leads — (Y-O)
- Plug straps — (Y-BL), (BL-Y)

In addition, for a 599B key, insulate and store the (BR-BK) module plug lead.

2. When installing 598A key in 1st module:

- Place strap from terminal 5 of telephone set terminal block to A-H of TBI or use stored (V-O) strap.
- Connect (G-Y) (Y-G) to (S-V) (V-S) respectively, using spare terminals or D-161488 connectors.
- Connect (Y-O) and (BR-BK) to A-H of TBI.

3. When providing station busy lamp with 1A1 or 1A2 KTS, connect A or H lead (G-V) from last module to terminal X of TBVI. Insulate and store (BL-V) and (V-BL) leads from last module. For 1A KTS with busy lamp, move (O-V) from 1B to SG on TBVI.

4. T, R, A, and L leads of lines wired for supplementary hold feature must be routed per SD-69530-01 rather than directly to line circuits.

5. To transfer A lead from ground to -24V for *I hold* feature, connect stored (BR-V) lead from 1st module plug to any spare mounting cord lead using spare terminal or D-161488 connector. Mounting cord lead becomes SP lead at key equipment.

6. The PB lead (BR-Y) is used for add-on conference control of the 6A KTS.

7. These leads are insulated and stored in the second and last modules and dead-ended in the third and fourth modules.

8. When 617A key is required as a dual-purpose key, remove brass strap. Connect S1 of key to a dissimilar or ungrounded circuit.

\* Insulated and stored.

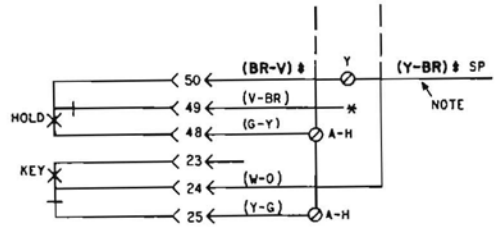
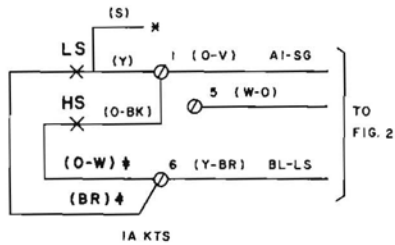
† Dead-ended.





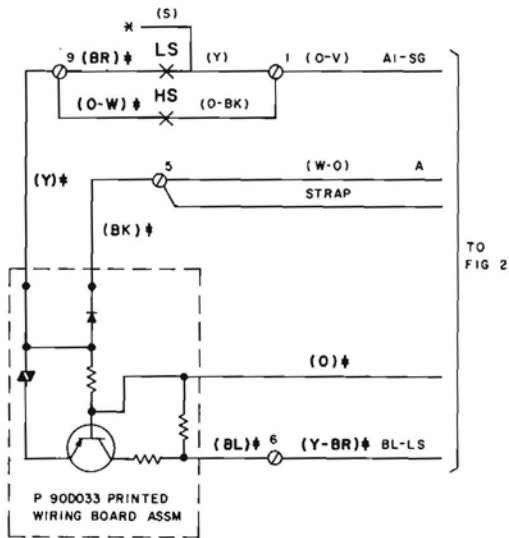






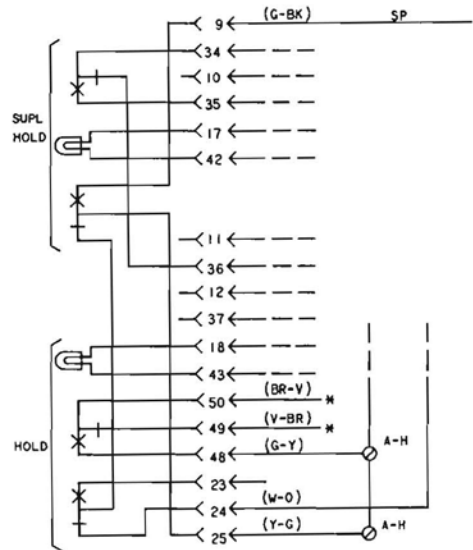
NOTE: USE STORED (Y-BR) MTG CO CONDUCTOR FROM O-W BINDER OR ANY OTHER SPARE CONDUCTOR.  
 † LEAD INVOLVED IN MODIFICATION

A. I HOLD



† LEADS INVOLVED IN MODIFICATION

Fig. 3—Station Busy Lamp Modification



NOTE: REQUIRES 599H OR 657H KEY IN 1ST MODULE

B. PRIORITY HOLD

Fig. 4—Supplementary Hold Arrangement

**TABLE B**  
**PICKUP-SIGNAL KEY CONVERSION**

NO. OF PICKUP KEYS	NO. OF SIG. KEYS	NO. OF PRIVATE AND INTERCOM LINES WITH COM SIG KEY	KEY LEADS AND TERMINALS OF KEY UNITS INVOLVED							
			(O-W)	(S-W)	(G-R)	(BL-BK)	(BR-BK)	(Y-O)	(O-Y)	
6			A-H	A-H	A-H	A-H	A-H	A-H	A-H	G
5	1		A-H	A-H	A-H	A-H	A-H	A-H	SG*	G
4	2		A-H	A-H	A-H	A-H	A-H	SG*	SG*	G
3	3		A-H	A-H	A-H	SG*	SG*	SG*	SG*	G
2	4		A-H	A-H	SG*	SG*	SG*	SG*	SG*	G
1	5		A-H	SG*	SG*	SG*	SG*	SG*	SG*	G
	6		SG*	SG*	SG*	SG*	SG*	SG*	SG*	G
3	1	2	A-H	A-H	A-H	C*	C*	A-H	A-H	C
2	1	3	A-H	A-H	C*	C*	C*	A-H	A-H	C
1	1	4	A-H	C*	C*	C*	C*	A-H	A-H	C
	1	5	C*	C*	C*	C*	C*	A-H	A-H	C

\*Located on TBVI.

- Notes: 1. Table B shows conversion for one 6-button ky unit. Convert buttons on right-hand unit first (module 3 or 5). When more than six buttons are used for common signaling, move spade-tipped leads of the additional buttons from terminal A-H of unit involved to terminal C. If additional terminals are required, use X or Y if idle and strap to C.
2. Convert keys to signaling by removing P-10E837 screw detail from positions involved.

**TABLE C**  
**599B (TURNKEY) KEY CONNECTIONS**

FEATURE	FIRST MODULE KEY LEADS						SPADE-TIPPED LEADS OF MOUNTING CORD					
	3TH			6TH								
	R	T	A	R	T	A						
	(G-BK)	(BK-G)	(BK-BR)	(BL-Y)	(Y-BL)	(Y-O)	(BL-Y)	(Y-BL)	(O-Y)	(Y-O)	(BR-BK)	
Cutoff sta on 1A1 or 1A2 sys	To KTS Equip			To Ext Sta			Insulate and store					
Cutoff sta on 1A sys without hold feature	To KTS Equip			To Ext Sta			Insulate and store					
Cutoff station on 1A system with hold feature	To Aux Relay used to cut off T, R, B, and H						Insulate and Store		SG*	SG*		
Cutoff external ringer or buzzer	To KTS Equip			To Ext Ringer or Buzzer			Insulate and store					
Cutoff ringer in set (Note 1)	To KTS Equip						3† (Note 2)	A‡ (Note 2)	Insulate and Store			
Cutoff Buzzer in Set (Note 1 and 2)	AC Buzzer	To BZ and BZ1 at KTS Equip						A	C	Insulate and Store		
	DC Buzzer							D	C			
	Com. Audible							Cap.	C			
Monitoring	To MON Equip						R TBI	T TBI				

\*Terminal on TBVI.

†Telephone set terminal strip.

‡Network terminal.

**Notes:**

1. Insulate and store BZ and BZ1 leads at buzzer or ringer terminal board.
2. The (BL-Y) and (Y-BL) mounting cord leads should be insulated and stored at the equipment end when the bridged spade-tipped leads are used in the set.

**TABLE D**  
**POLARITY GUARD CONNECTIONS**  
**(P-90D197 GUARD ASSEMBLY)**

LEAD		REMOVE FROM		CONNECT TO		
		NET	TERM. BLOCK	NET	TERM. BLOCK	POLARITY GUARD
Dial	BK	RR				T
Line Switch	W		7			S
Jacks	BK-S		7			S
Polarity Guard	W G			RR	7	

*Note:* For use when specified by local instructions for end-to-end signaling.





## SERVICE

### 2634DA, 2634DAM, 2635DA, AND 2635DAM TELEPHONE SETS

#### 1. GENERAL

**1.01** This section contains connection and maintenance information for 2634DA (MD), 2634DAM (18-button) and 2635DA (MD), 2635DAM (30-button) CALL DIRECTOR® telephone sets.

**1.02** This section is reissued to:

- Show 2634DA and 2635DA telephone set MD
- Show D50AH and D80D mounting cords MD
- Add D50BD and D80E mounting cords.

**1.03** Nonmodular 2634DA and 2635DA telephone sets are furnished from the factory equipped with a G3-type handset and cord. Modular 2634DAM and 2635DAM telephone sets are equipped with a G15A handset, H4DU handset cord, and 616E jack assembly (Fig. 1).

#### 2. CONNECTIONS

**2.01** These sets are factory-wired for use with 1A1, 1A2, or 6A KTS station line concentrators. Refer to Division 518 for connections using 235- or 236-type key telephone units.

**2.02** A 235-type KTU is associated with each 2634-type telephone set and a 236-type KTU with each 2635-type telephone set. Because of the single common talking and control lead pattern in these sets, a line concentrator KTU must be associated with each telephone set installed and cannot be shared, even on a bridged station basis.

**2.03** The 2634- and 2635-type sets that are provided with D50AH (MD) or D80D (MD) mounting cords require contact strip assemblies on the 635-type keys. These sets are normally provided with a 635A5C key (5-line pickup and hold) in the first module. If desired, the 635A5C key can be replaced with a 635AD5C key (4-line pickup, cutoff,

and hold). In this case the contact strip assemblies for the 635AD5C key (840151039 and 840151047) are furnished with the key.

**Note:** Contact strips are not required with sets equipped with D50BD or D80E mounting cord. A and A1 are common to all pickup buttons through internal mounting cord wiring.

**2.04** Because of the physical arrangement of the 635-type key, the contact strips do not extend to the chaining switch. This requires additional A1 leads to each module (except the last), to extend A lead control.

**2.05** Mounting cords of these CALL DIRECTOR sets terminate in individual plugs connected to the rear of the keys. This permits rearrangement of line appearances either in the set or at the key equipment distribution point. Current production sets are equipped with a satin-silver (-87) mounting cord.

**2.06** The D50AH (MD) and D80D (MD) mounting cords are replaced by D50BD and D80E, respectively.

**2.07** All line key positions are convertible from pickup (locking) to signaling (nonlocking). To convert a key position to signaling, remove the 812857738 (P-28E773) screw detail from the key position involved and place 840157671 insulating details over the two key contacts adjacent to the plunger (refer to Section 512-230-101). Make necessary wiring changes as shown in Table A for 2634DA or DAM and Table B for 2635DA or DAM.

**Note:** If more than six signaling keys are required, replace 635G5C key in last module with a 658A key.

**2.08** The 2634DA or DAM and 2635DA or DAM telephone sets are factory equipped with a KS-20419L1 (10 volt AC only) buzzer. Provisions

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are made for mounting one KS-8109L2 buzzer when an additional buzzer is desired.

**2.09** For 3-type speakerphone operation, a 679A transmitter may be installed in 3rd (2634-type) or 5th (2635-type) module. For necessary wiring changes and connections, see Table C and Fig. 4.

**2.10** For use with a 4A speakerphone, refer to Section 512-730-400.

**2.11** When required, these sets may be equipped with a polarity guard. Polarity guards should be installed only when specified by local instructions for end-to-end signaling purposes when battery and ground reversals are encountered. An

819041971 (P-90D197) guard assembly must be separately ordered and connected as shown in Table D.

### **3. MAINTENANCE**

**3.01** For maintenance information, refer to Division 502, section entitled 630, 1630, and 2630 Series Telephone Sets—Common Installation and Maintenance Information. Individual components such as dials, keys, ringer, etc., are covered in sections located in Division 501.

**3.02** *Do not use solvents to clean plastic parts of these sets.* Use a damp cloth only. If discolored, replace part.



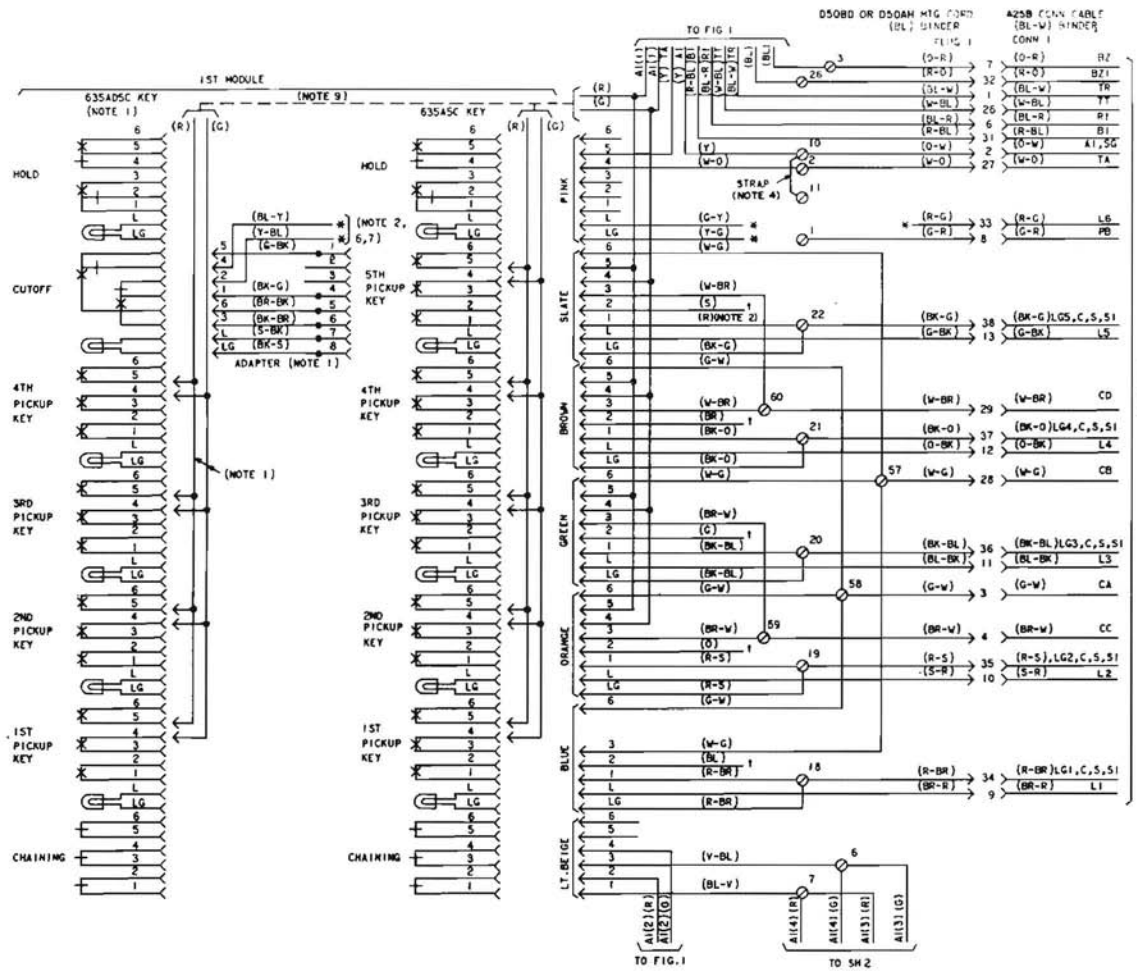


Fig. 2—#2634DA or DAM Telephone Set Module and Connector Cable Arrangements (Sheet 1 of 3)Ⓢ

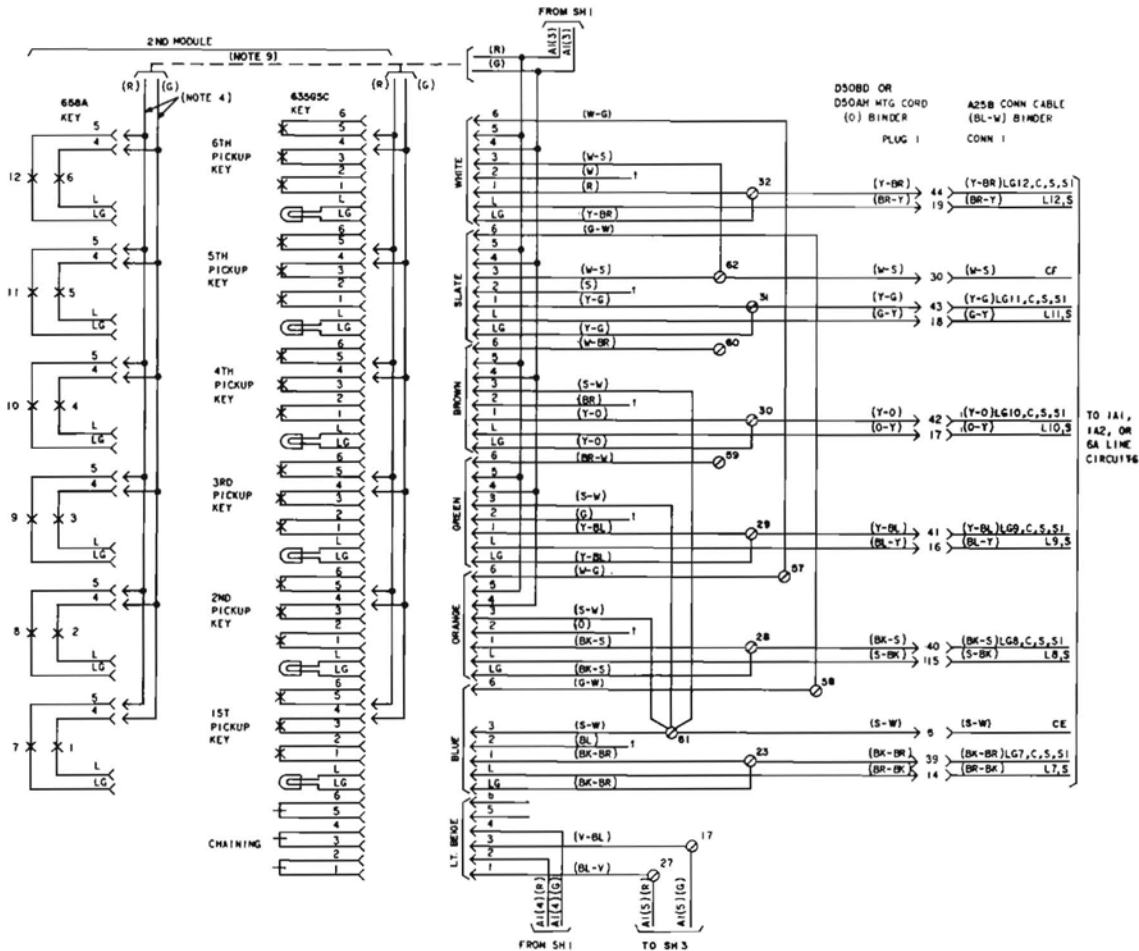


Fig. 2—#2634DA or DAM Telephone Set Module and Connector Cable Arrangements (Sheet 2 of 3)

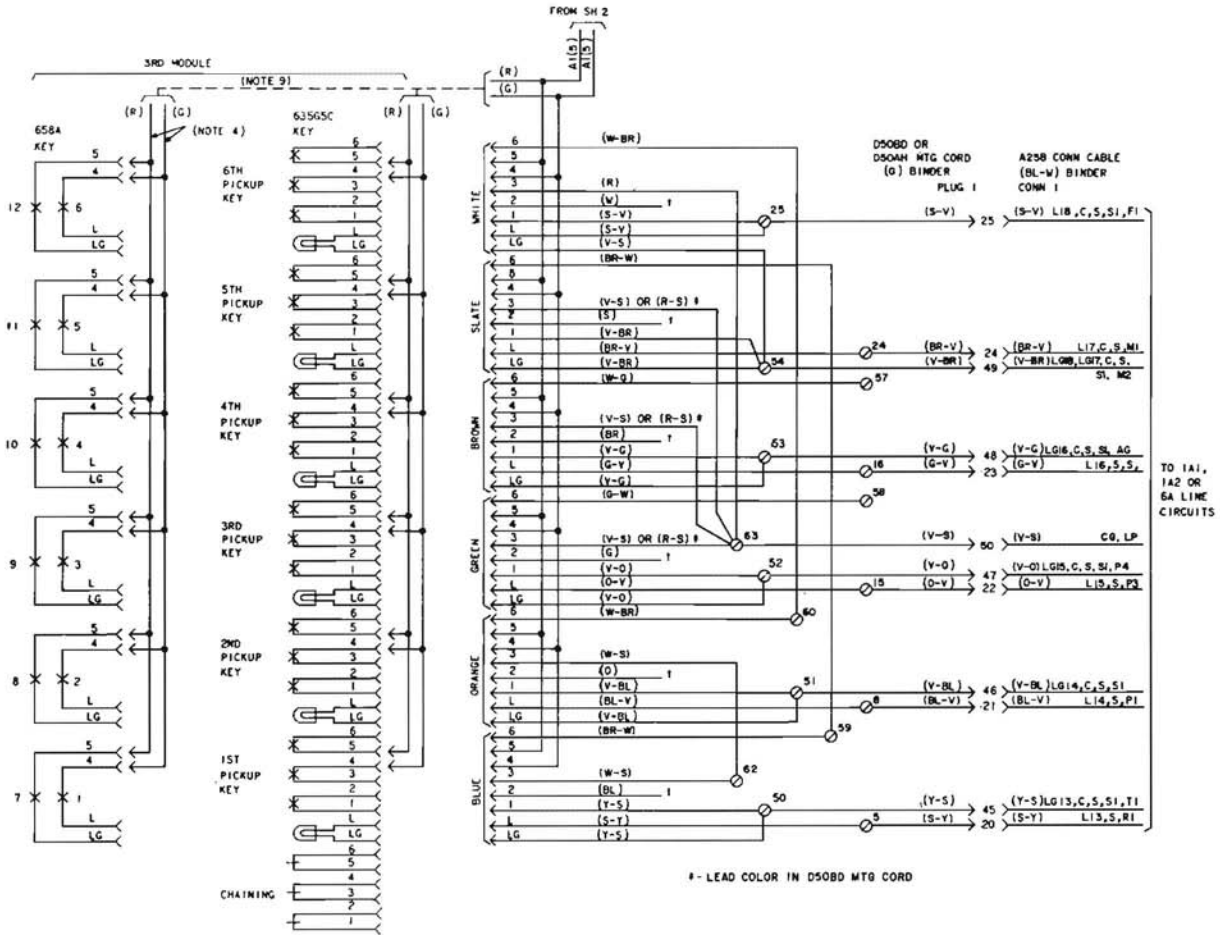


Fig. 2—Φ2634DA or DAM Telephone Set Module and Connector Cable Arrangements (Sheet 3 of 3)¶

## NOTES FOR FIGURES 2 AND 3:

1. THE 635AD5C KEY IS SUPPLIED WITH AN ADAPTER IN THE CUTOFF KEY POSITION. IN SETS EQUIPPED WITH D50AH OR D80D (MD) MOUNTING CORD, CONTACT STRIP ASSEMBLIES 840151039 AND 840151047 FURNISHED WITH THE 635AD5C KEY REPLACE THE 840151120 AND 840151138 ASSEMBLIES USED WITH THE 635A5C KEY. THE SLATE MOUNTING CORD PLUG CONNECTS TO THE ADAPTER. BALANCE OF PLUGS CONNECT DIRECTLY TO KEY.
2. IF A 635AD5C KEY IS ADDED IN THE FIELD, TERMINATE THE (BL-Y) AND (Y-BL) ADAPTER LEADS AS INDICATED IN NOTE 6 AND REMOVE (R) SLATE PLUG LEAD FROM TERMINAL 22, INSULATE AND STORE.
3. IF THE HOLD POSITION LAMP (6TH) 635A5C OR 635AD5C KEY IN THE FIRST MODULE IS USED FOR A VISUAL SIGNAL, REMOVE (Y-G) LAMP GROUND LEAD FROM STORED LOCATION IN FIRST MODULE AND CONNECT TO TERMINAL 22. CONNECT INSULATED AND STORED (G-Y) LAMP LEAD AND (R-G) MTG CORD LEAD USING SPARE TERMINAL OR D-161488 CONNECTOR.
4. IN SETS EQUIPPED WITH A 658A KEY, THE (G) CONTACT STRIP OR PLUG STRAP LEAD IS TERMINATED ON TERMINAL 10 AND (R) ON 11. IF A 658A KEY IS ADDED IN THE FIELD, LEADS MUST BE MOVED FROM PRECEDING MODULE CHAINING CIRCUIT TO TERMINALS 10 AND 11. PROVISIONS ARE MADE FOR MECHANICALLY STORING THE LIGHT BEIGE PLUG ON THE 658A KEY. NO ELECTRICAL CONNECTION IS MADE.
5. WHEN THE 658A KEY IS REQUIRED AS A DUAL PURPOSE KEY, REMOVE STRAP BETWEEN TERMINALS 10 AND 11. USE MIW CORD OR EQUIVALENT TO CONNECT TERMINAL 11 TO A DISSIMILAR GROUND OR NONGROUNDED CIRCUIT.
6. CUTOFF OF THE INTERNAL RINGER CAN BE PROVIDED USING THE 635AD5C KEY IN FIRST MODULE. TRANSFER BI (R-BL) LEAD FROM TERMINAL 12 AND (BL-Y) ADAPTER LEAD TO SPARE TERMINAL OR D-161488 CONNECTOR. REMOVE (W-G) LEAD (SLATE PLUG) FROM TERMINAL 57 AND CONNECT TO 12.
7. WHEN 635AD5C KEY IS USED IN FIRST MODULE TO PROVIDE CUTOFF, SWITCHING, OR TRANSFER FEATURES, MOVE (W-BR) SLATE PLUG LEAD FROM TERM. 60 TO TERMINAL 11. THESE SERVICE FEATURES ARE PROVIDED BY AN AUXILIARY RELAY (229B KTU OR EQUIVALENT) SEPARATELY MOUNTED AND CONTROLLED BY THE CUTOFF KEY CONTACTS THROUGH LG5, C, S, S1 LEAD.
8. CONTROL LEADS CA TO CJ ARE CONNECTED TO TERMINALS 57 TO 65. THESE TERMINALS APPEAR ON MORE THAN ONE OF THE MODULE SHEETS OF FIG. 2 AND 3 BUT ARE THE SAME TERMINAL.
9. THESE CONTACT STRIPS ARE REQUIRED WHEN TELEPHONE SET IS EQUIPPED WITH THE D50AH (MD) OR D80D (MD) MOUNTING CORD. THESE CONTACT STRIPS SHOULD NOT BE USED WHEN TELEPHONE SET IS EQUIPPED WITH THE D50BD OR D80E MOUNTING CORD.

\* INSULATED AND STORED

† DEAD DRESSED





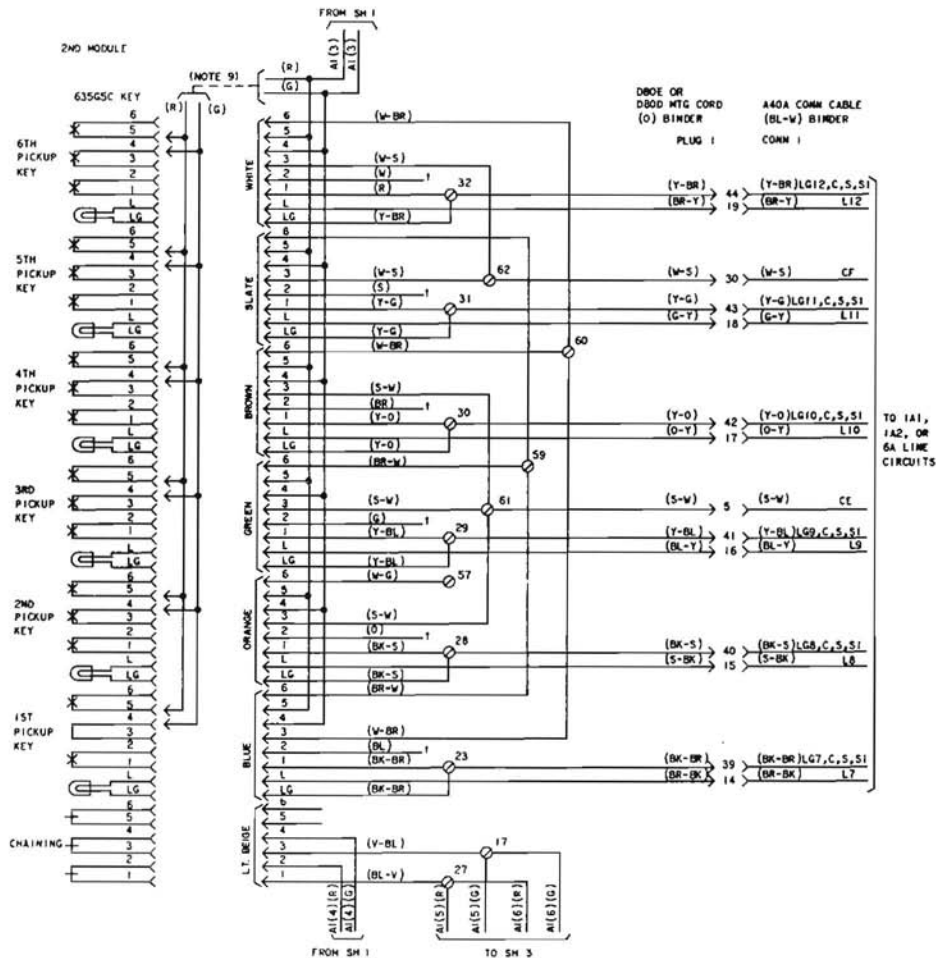


Fig. 3—2635DA or DAM Telephone Set Module and Connector Cable Arrangements (Sheet 2 of 5)

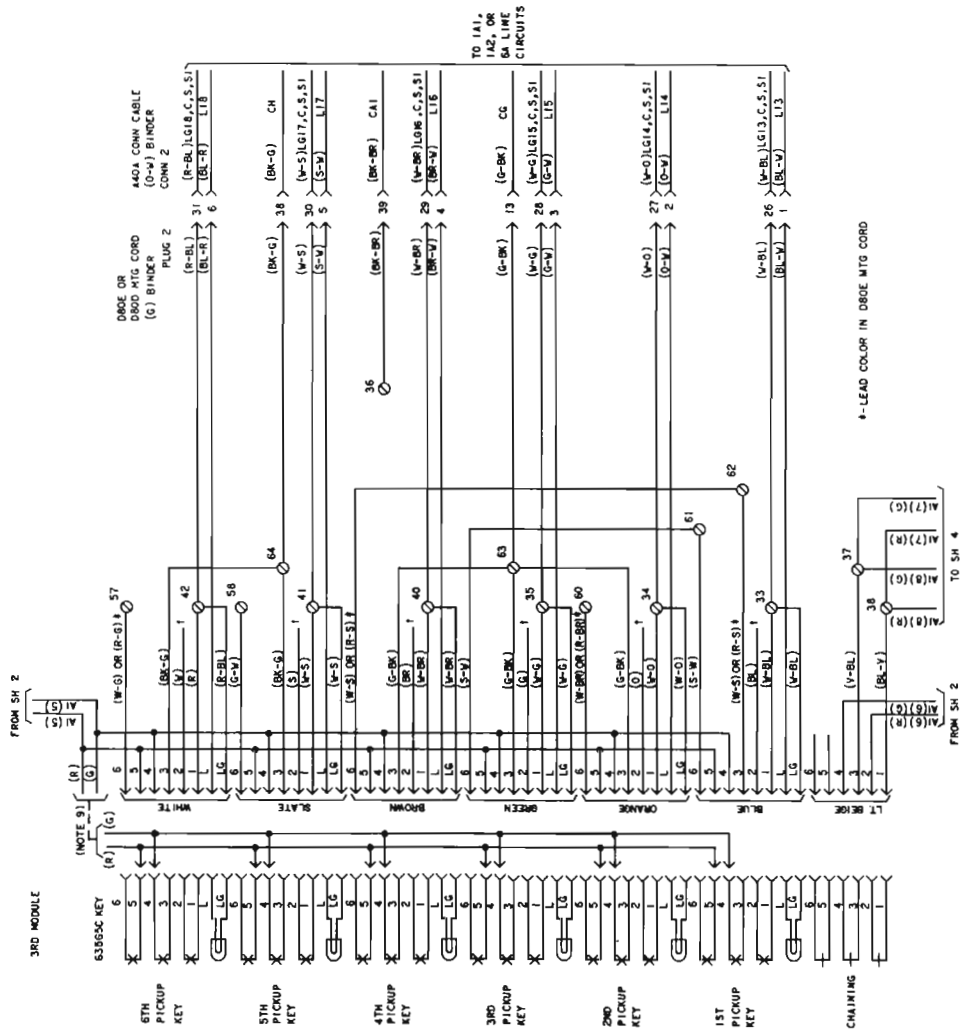


Fig. 3—2635DA or DAM Telephone Set Module and Connector Cable Arrangements (Sheet 3 of 5)

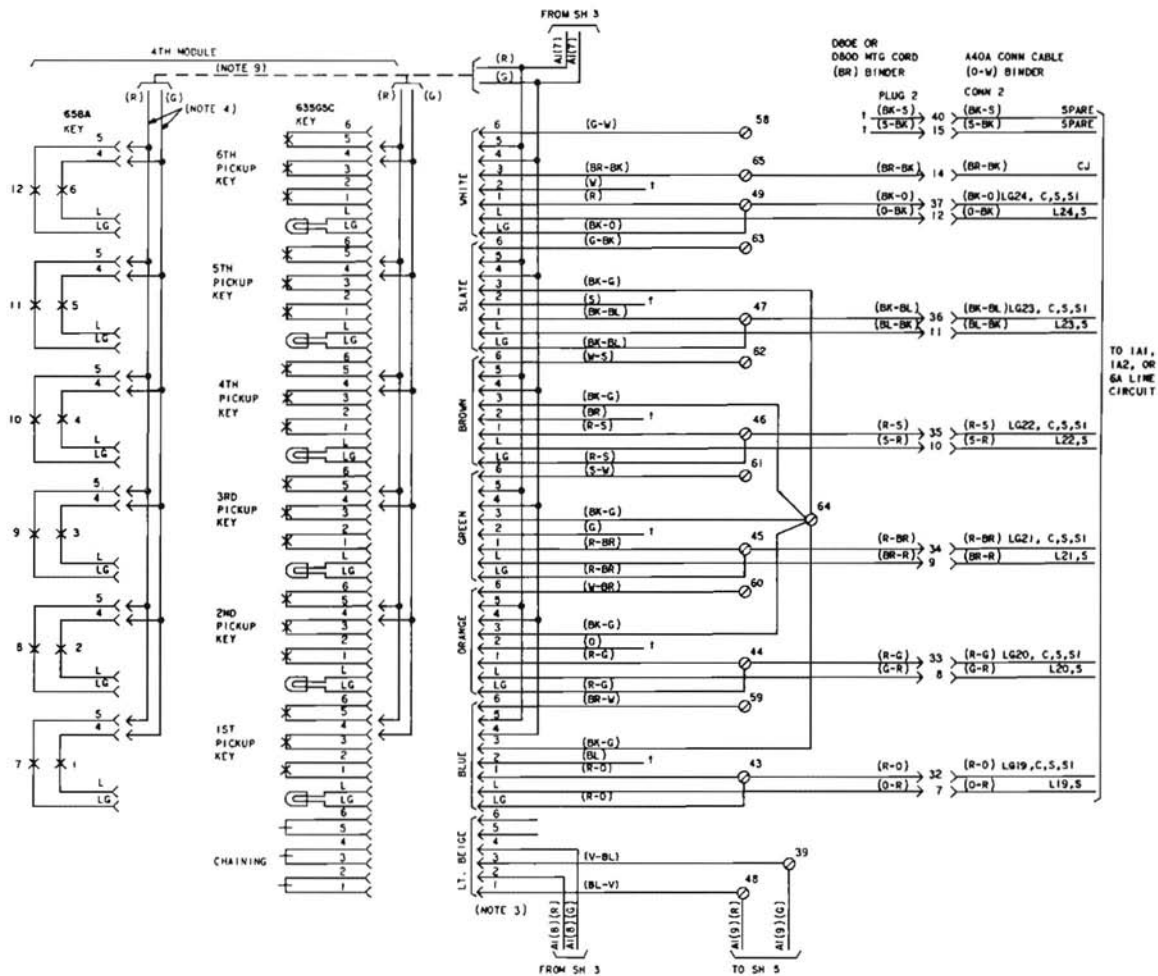


Fig. 3—#2635DA or DAM Telephone Set Module and Connector Cable Arrangements (Sheet 4 of 5)†

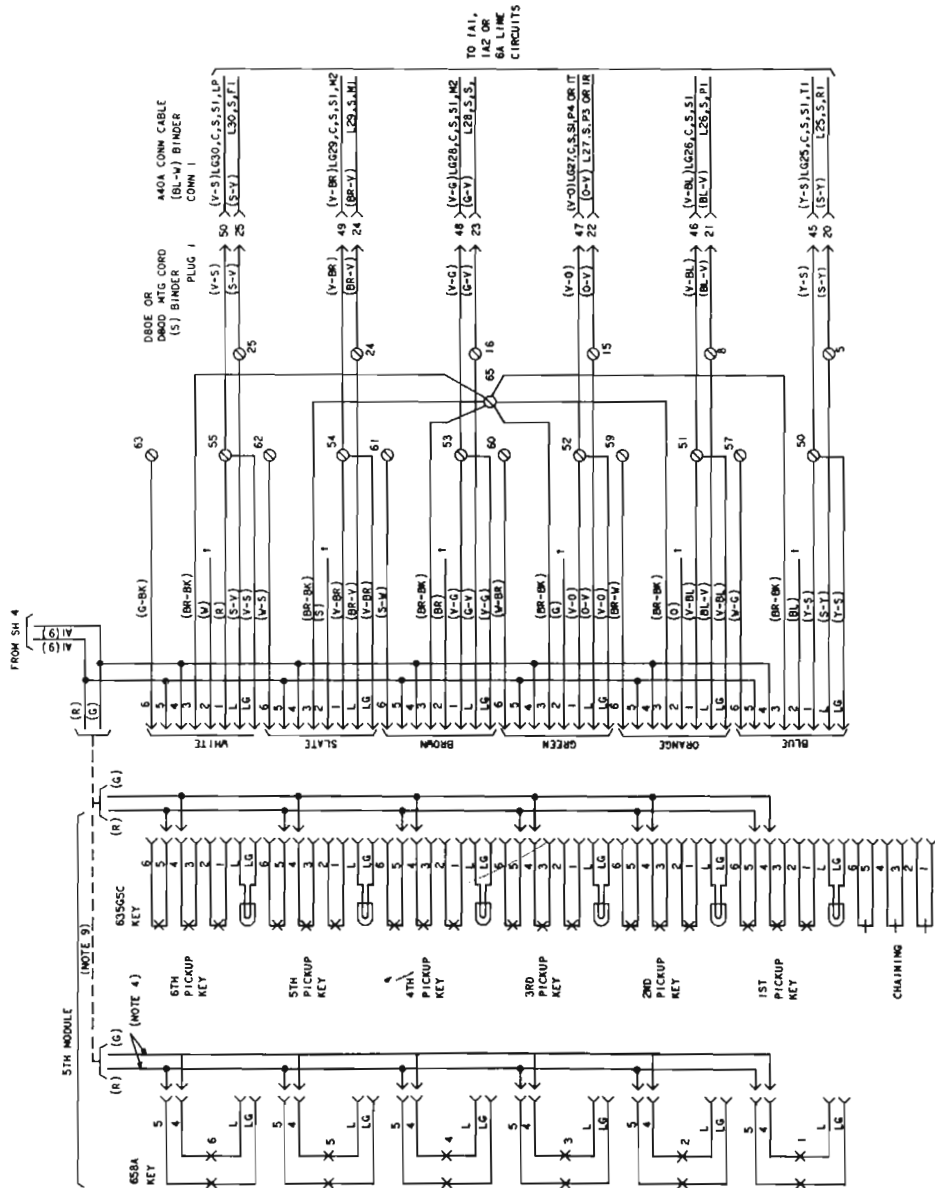


Fig. 3—2635DA or DAM Telephone Set Module and Connector Cable Arrangements (Sheet 5 of 5) 4

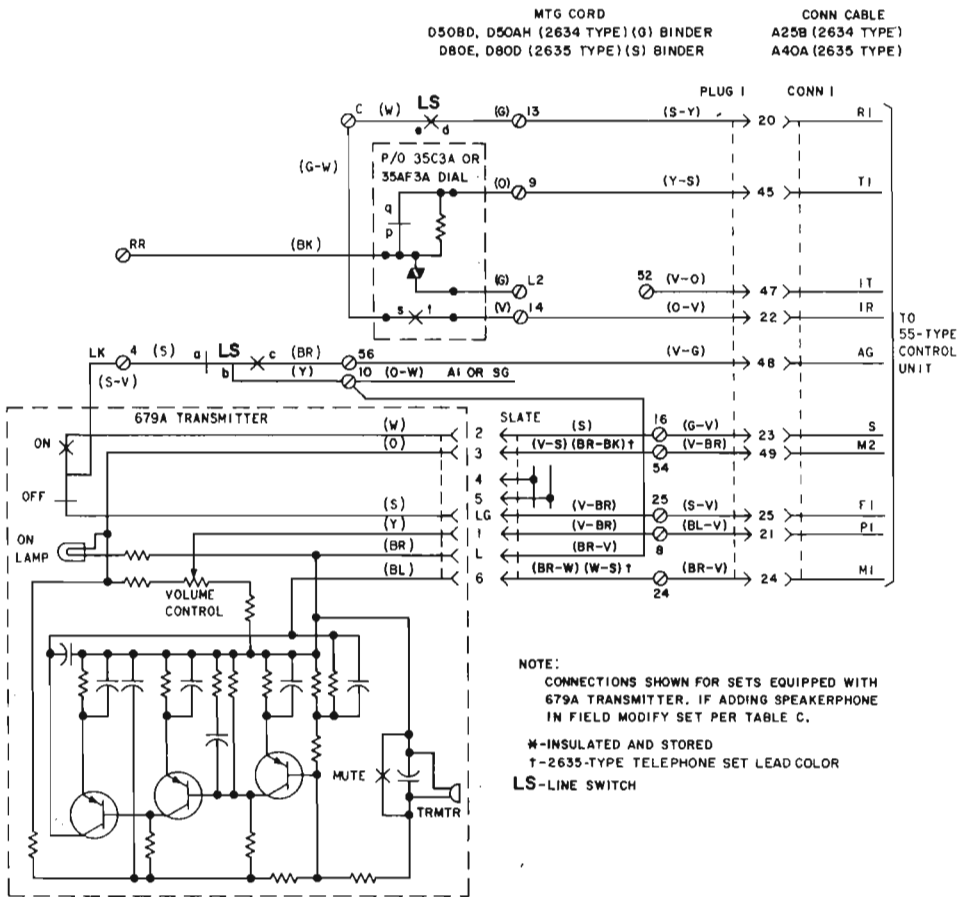


Fig. 4—3-Type Speakerphone Connections

TABLE A

## PICKUP-SIGNAL KEY CONVERSION—2634DA OR 2634DAM TELEPHONE SET (THIRD MODULE ONLY)

NO. OF SIGNAL KEYS	KEY PLUG LEADS																							
	1ST PICKUP				2ND PICKUP				3RD PICKUP				4TH PICKUP				5TH PICKUP				6TH PICKUP			
	BL	Y-S	BR-W	W-S	O	V-BL	W-BR	W-S	G	V-O	G-W	V-S R-S‡	BR	V-G	W-G	V-S R-S‡	S	V-BR	BR-W	V-S R-S‡	W	V-S	W-BR	V-S
1	*	50	59	62	*	51	60	62	*	52	58	63	*	53	57	63	*	54	59	63	10	†	*	*
2	*	50	59	62	*	51	60	62	*	52	58	63	*	53	57	63	10	†	*	*	10	†	*	*
3	*	50	59	62	*	51	60	62	*	52	58	63	10	†	*	*	10	†	*	*	10	†	*	*
4	*	50	59	62	*	51	60	62	10	†	*	*	10	†	*	*	10	†	*	*	10	†	*	*
5	*	50	59	62	10	†	*	*	10	†	*	*	10	†	*	*	10	†	*	*	10	†	*	*
6	10	†	*	*	10	†	*	*	10	†	*	*	10	†	*	*	10	†	*	*	10	†	*	*

\* Insulated and stored.

† From LG terminal of plugs — insulate and store.

‡ Lead color in D50BD mounting cord.

TABLE B

## PICKUP-SIGNAL KEY CONVERSION—2635DA OR 2635DAM TELEPHONE SET (FIFTH MODULE ONLY)

NO. OF SIGNAL KEYS	KEY PLUG LEADS																							
	1ST PICKUP				2ND PICKUP				3RD PICKUP				4TH PICKUP				5TH PICKUP				6TH PICKUP			
	BL	Y-S	W-G	BR-BK	O	V-BL	BR-W	BR-BK	G	V-O	W-BR	BR-BK	BR	V-G	S-W	BR-BK	S	V-BR	W-S	BR-BK	W	V-S	G-BK	BR-BK
1	*	50	57	65	*	51	59	65	*	52	60	65	*	53	61	65	*	54	62	65	10	†	*	*
2	*	50	57	65	*	51	59	65	*	52	60	65	*	53	61	65	10	†	*	*	10	†	*	*
3	*	50	57	65	*	51	59	65	*	52	60	65	10	†	*	*	10	†	*	*	10	†	*	*
4	*	50	57	65	*	51	59	65	10	†	*	*	10	†	*	*	10	†	*	*	10	†	*	*
5	*	50	57	65	10	†	*	*	10	†	*	*	10	†	*	*	10	†	*	*	10	†	*	*
6	10	†	*	*	10	†	*	*	10	†	*	*	10	†	*	*	10	†	*	*	10	†	*	*

\* Insulated and stored.

† From LG terminal of plugs — insulate and store.

**TABLE C**  
**MODIFICATION FOR 3-TYPE SPEAKERPHONE**

WIRE OR LEAD	COLOR	REMOVE FROM	CONNECT TO
Mounting Cord (Note 1)	S-Y	5	13
	Y-S	50	9
	O-V	15	14
	V-G	53	56
Slate Plug Straps III Module (2634-Type) or V Module (2635-Type)	BR-W	59	24
	W-S*	62*	
	V-S¶	63	54
	BR-BK*	65*	
	S	†	16
	V-BR‡	54	8
BR-V	24	10	
V-BR§	54	25	
679A Trmtr	S-V		4

\*2635-type telephone set lead color or terminal.

† Stored location.

‡ Lead from terminal 1 of slate plug.

§ Lead from terminal LG of slate plug.

¶(R-S) in D50BD mounting cord.

**Notes:**

1. Mounting cord conductors from (G) 2634-type or (S) 2635-type binder.
2. Connect the slate plug from the 3rd or 5th module to the 679A transmitter (Fig. 4). All other plugs in the module are insulated and stored.

**TABLE D**  
**POLARITY GUARD CONNECTIONS**  
**(P-90D197 OR 819041971 GUARD ASSEMBLY)**

LEAD	COLOR	REMOVE FROM	CONNECT TO
Line Switch	W	C*	S†
Dial	G-W		
		BK	RR*
Polarity Guard	W		C*
	G		RR*

\* Network terminal.

† Polarity guard terminal.

**Note:** For use when specified by local instructions for end-to-end signaling installations.





## SERVICE

### 2636CA, 2636CAM, 2637DA, AND 2637DAM TELEPHONE SETS

#### 1. GENERAL

**1.01** This section contains connection and maintenance information for 2636CA (MD), CAM (18-button) and 2637DA (MD), DAM (30-button) CALL DIRECTOR® telephone sets equipped with headset jacks.

**1.02** This section is reissued to:

- Add information on 2636CAM and 2637DAM (modular) telephone sets
- Show the 2636CA and 2637DA telephone sets MD.

#### 2. CONNECTIONS

**2.01** These sets are factory-wired for use with 1A1, 1A2, or 6A KTS line circuits. They may also be used with 1A KTS line circuits by modifying the set as shown in Tables A and B. Line circuits for 1A, 1A1, or 1A2 KTS may be connected to the same set under the following conditions:

- 1A1 or 1A2 KTS lines must be connected to the first key units with 1A lines connected to supplementary key modules.
- 1A, 1A1, or 1A2 KTS lines should not be connected to the same 6 line key module.
- 1A, 1A1, or 1A2 KTS lines appearing behind a manual switchboard should not be intermixed on a CALL DIRECTOR telephone set due to the different time out intervals provided by the associated KTU's.

**2.02** These sets are equipped with a 635A5C (5-line pickup and hold) or a 635AD5C (4-line pickup, cutoff, and hold) key in the first module position. Contact strip assemblies [required with sets equipped with a D120K (MD) or D200S (MD) mounting cord]

differ between the two keys. If ordered for field replacement, the 635AD5C key is furnished with a piggy-back adapter to which the slate mounting cord plug is connected. The necessary contact strip assemblies (840151039 and 840151047 ) will be shipped with the 635AD5C key, and will replace the 840151120 and 840151138 assemblies supplied with the 635A5C key.

**2.03** Because of the physical arrangement of the 635-type key, the contact strips do not extend to the chaining switch. This requires a second tip and ring conductor to each module (except the last). See Fig. 2, sheets 1 through 5.

**2.04** The line conductors of the mounting cords for these sets terminate in individual plugs on a per line basis and are connected to the rear of the keys. This permits rearrangement of line appearances either in the set or at the key equipment distribution point. Current production sets are equipped with a satin-silver (-87) mounting cord.

**2.05** All line pickup key positions are convertible to signaling or common signaling arrangements by removing the 812857738 (P-28E773) screw detail from key positions involved and making the necessary wiring changes per Table C.

**2.06** These sets are not intended for use with speakerphone systems.

**2.07** The 2636CA, CAM and 2637DA, DAM telephone sets are factory equipped with a KS-20419L1 (10 volt AC only) buzzer.

**2.08** When station busy lamp feature is required with these sets having 1A1 or 1A2 KTS line circuits, there are two optional circuits available. The busy lamp(s) will light whenever a line pickup button is depressed and the handset is off-hook or the headset is plugged into the jacks. This optional equipment must be ordered separately. If more than one busy lamp is required, a 6C KTU must

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be connected as shown in Fig. 5. For a single busy lamp, install a D-180463 Kit of Parts (ordered separately), consisting of 819040338 (P-90D033) Printed Wiring Board Assembly and 840361836 plug assembly (light beige). Connect kit of parts as shown in Fig. 3. Install the wiring board and plug assembly as follows:

- (1) Remove set housing.
- (2) Loosen screws on dial mounting plate, move mounting to left and lift out.
- (3) Remove right-hand dial mounting screw.
- (4) Place dial mounting screw through hole in wiring board and replace screw in dial.
- (5) Connect plug assembly to chaining switch of third module (2636-type) or fifth module (2637-type) and terminate (G-V) and (V-G) leads of plug (Fig. 3). Insulate and store unused plug leads.
- (6) Replace and secure dial mounting plate.

**Note:** If more than one busy lamp is required, order a 6C KTU and use busy lamp control circuit as shown in Fig. 5.

**2.09** A D-180411 Kit of Parts is required when **Priority Hold** is to be furnished. Install as follows:

- (1) Assemble kit of parts by connecting contact strips to 635A5C key. Install pink plug in hold position on key.
- (2) Disconnect all mounting cord plugs and the two contact strips [sets equipped with D120K

(MD) or D200S (MD) mounting cord] from the key in the second module. Remove key and replace with 635A5C key from kit of parts.

- (3) Rerminate contact strip leads and connect mounting cord plugs, with the exception of the white plug which is insulated and stored.

**Note:** Contact strips are not required with sets equipped with D120M or D200AA mounting cords.

- (4) Rearrange wiring per Fig. 4.

Hold key in first module is used as regular hold and if required **I Hold**. Second hold key is used for **Priority Hold**.

**2.10** When required, these sets may be equipped with a polarity guard. Polarity guards should be installed only when specified by local instructions for end-to-end signaling purposes when battery and ground reversals are encountered. A 819051970 (P-90D197) guard assembly must be separately ordered and connected as shown in Table E.

### 3. MAINTENANCE

**3.01** For maintenance information, refer to Division 502, section entitled 630, 1630, and 2630 Series Telephone Sets — Common Installation and Maintenance Information. Individual components such as dials, keys, ringers, etc. are covered in sections pertaining to the particular item.

**3.02** Do not use solvents to clean plastic parts of these sets. Use a damp cloth only. If discolored, replace part.

**TABLE A**  
**1A, 1A1, AND 1A2 CONVERSION—2636CA, CAM TELEPHONE SET**

KEY MODULE ARRANGE- MENT	LEAD											
	HOLD KEY				CHAINING PLUG				CONTACT STRIP OR PLUG			LINE SW.
	Y	G	BR-V	V-BR	V-G 1ST MOD	V-G 2ND MOD	R 1ST MOD	R 2ND MOD	R 1ST MOD	R 2ND MOD	R 3RD MOD	Y
1A1/1A2 Only	10	10	*	*	5	15	9	11	9	11	21	8
1A1/1A2- 1st, 2nd Mod 1A-3rd Mod	10	35	21	40	5	35	9	11	9	11	40	8
1A1/1A2- 1st Mod 1A-2nd, 3rd Mod	10	35	11	40	35	15	9	40	9	40	21	8
1A Only	*	10	26	9	5	15	26	11	26	11	21	18

\* Insulated and stored.



**Notes for Fig. 2:**

1. THE 635AD5C KEY IS SUPPLIED WITH AN ADAPTER IN THE CUTOFF KEY POSITION. THE SLATE MOUNTING CORD PLUG CONNECTS TO THE ADAPTER. CONNECT (BL-Y) AND (Y-BL) ADAPTER LEADS TO TERMINALS 1 AND 2, RESPECTIVELY. BALANCE OF PLUGS CONNECT DIRECTLY TO KEY.
2. IN SETS EQUIPPED WITH A 658C KEY, THE (G) CONTACT STRIP LEAD IS TERMINATED ON 17 AND (R) ON 18. IF A 658C KEY IS ADDED IN THE FIELD, LEADS MUST BE MOVED FROM PRECEDING MODULE CHAINING CIRCUIT TO TERMINALS 17 AND 18.
3. PROVISIONS ARE MADE FOR MECHANICALLY STORING THE LIGHT BEIGE PLUG ON THE 658A KEY. NO ELECTRICAL CONNECTION IS MADE.
4. WHEN THE 658A KEY IS REQUIRED AS A DUAL PURPOSE KEY, REMOVE STRAP BETWEEN TERMINALS 17 AND 18. USE MIW CORD OR EQUIVALENT TO CONNECT TERMINAL 17 TO A DISSIMILAR GROUND OR NONGROUNDED CIRCUIT.
5. TO SUPPLY "I" HOLD FEATURE, TERMINATE (O-Y) MOUNTING CORD LEAD FROM FIRST MODULE ON TERMINAL 24. LEAD BECOMES SP LEAD AT EQUIPMENT.
6. IF HOLD POSITION LAMP IS REQUIRED, CONNECT (G-Y) LAMP GROUND LEAD AND (Y-G) LAMP LEAD TO (G-Y) AND (Y-G) MOUNTING CORD (BL BINDER) LEADS, RESPECTIVELY, USING SPARE TERMINAL OR D-161488 CONNECTOR. LAMP MUST BE SEPARATELY ORDERED AND INSTALLED.
7. THESE CONTACT STRIPS ARE REQUIRED WHEN TELEPHONE SET IS EQUIPPED WITH THE D120K (MD) OR THE D200S (MD) MOUNTING CORD.

\* INSULATED AND STORED.

† DEAD DRESSED.

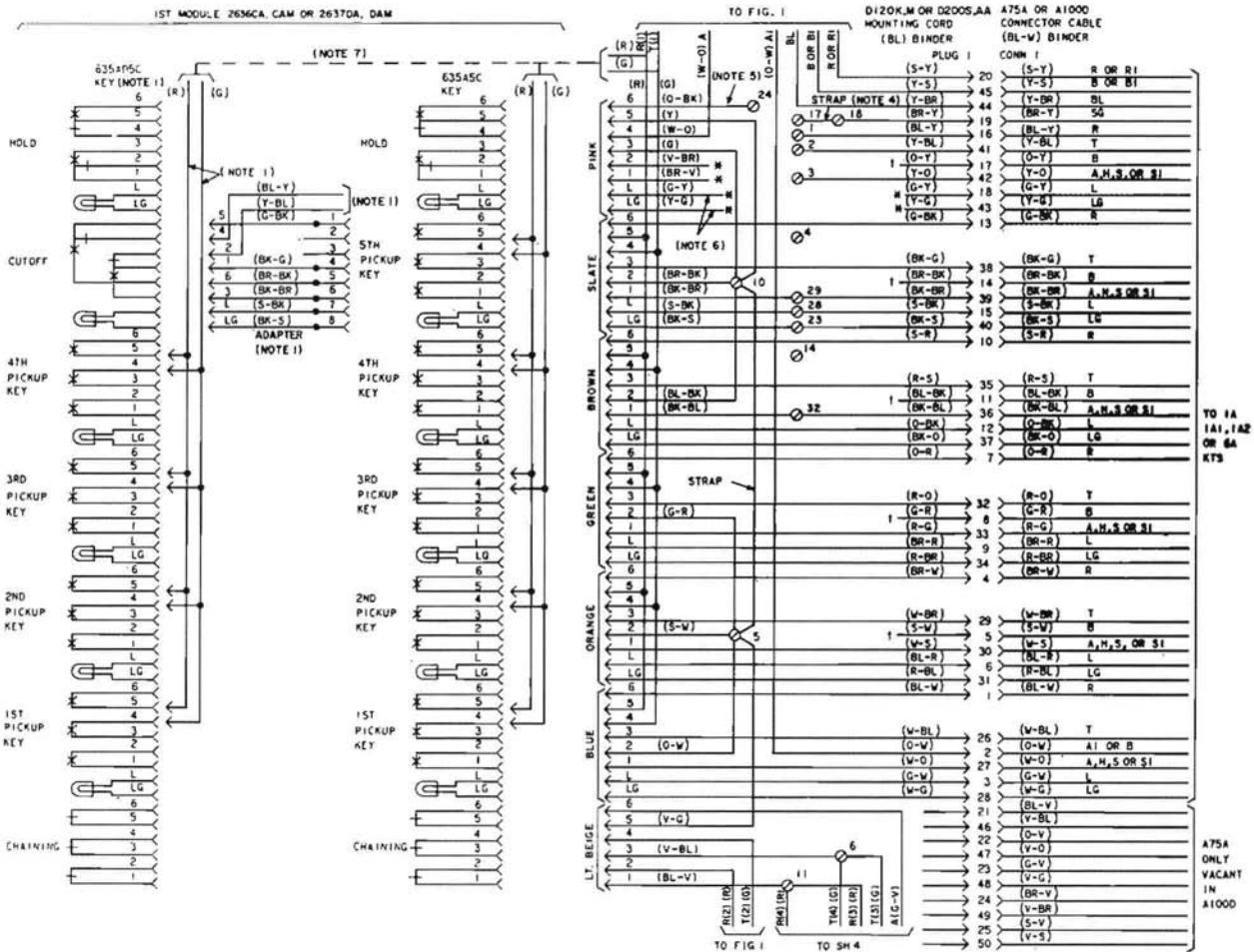


Fig. 2—Module and Connector Cable Arrangements (Sheet 1 of 5)

2ND MODULE  
2636CA, CAM OR 2637DA, DAM

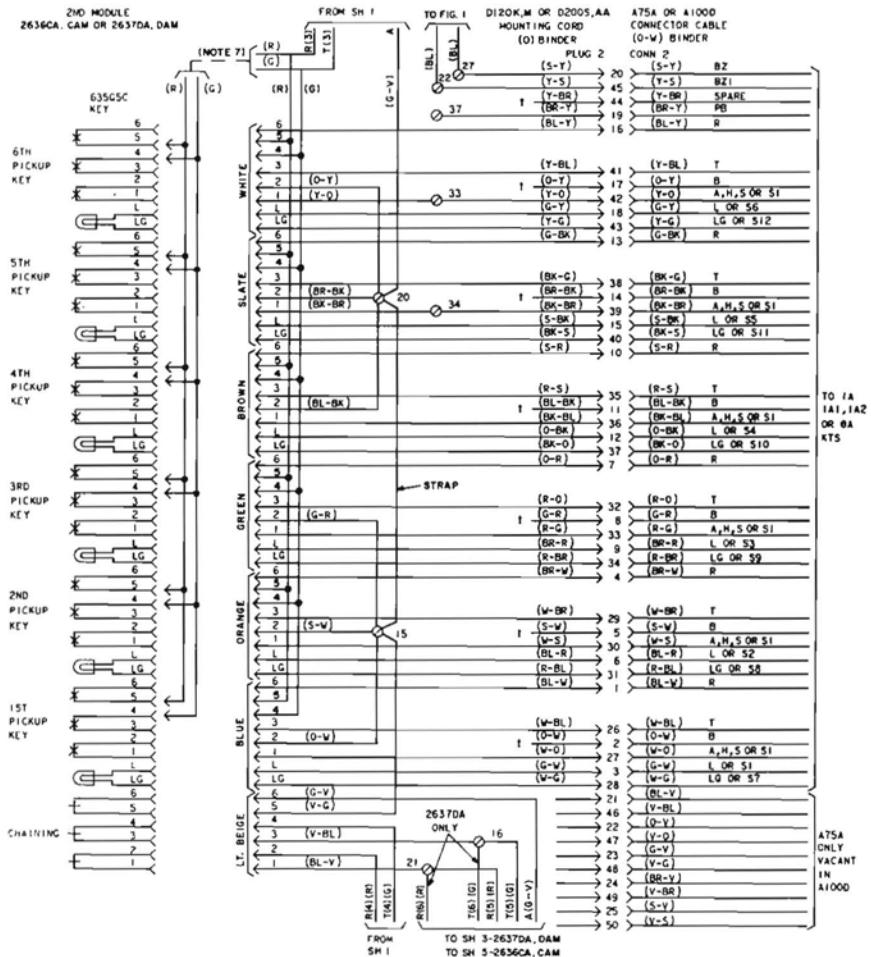


Fig. 2—Module and Connector Cable Arrangements (Sheet 2 of 5)





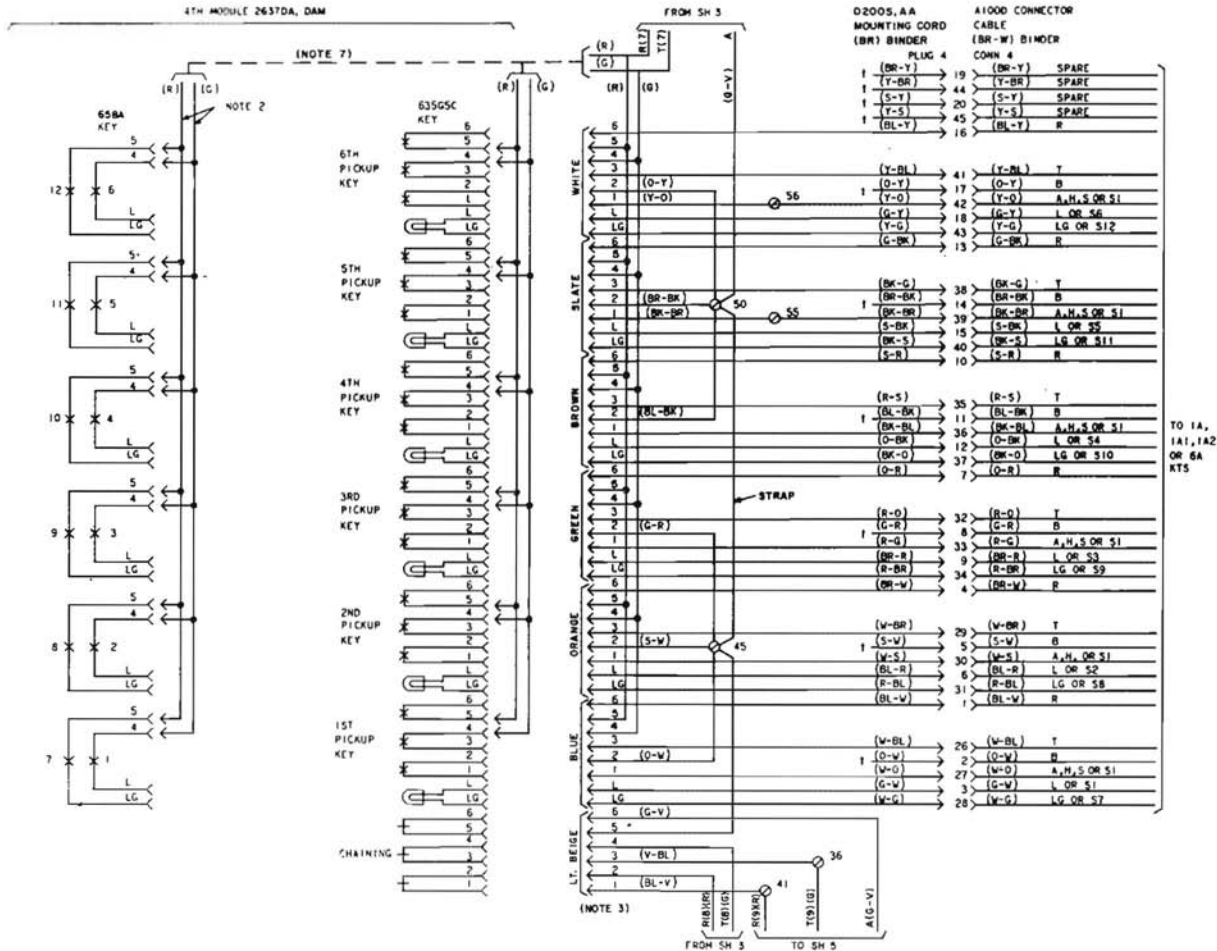


Fig. 2—Module and Connector Cable Arrangements (Sheet 4 of 5)

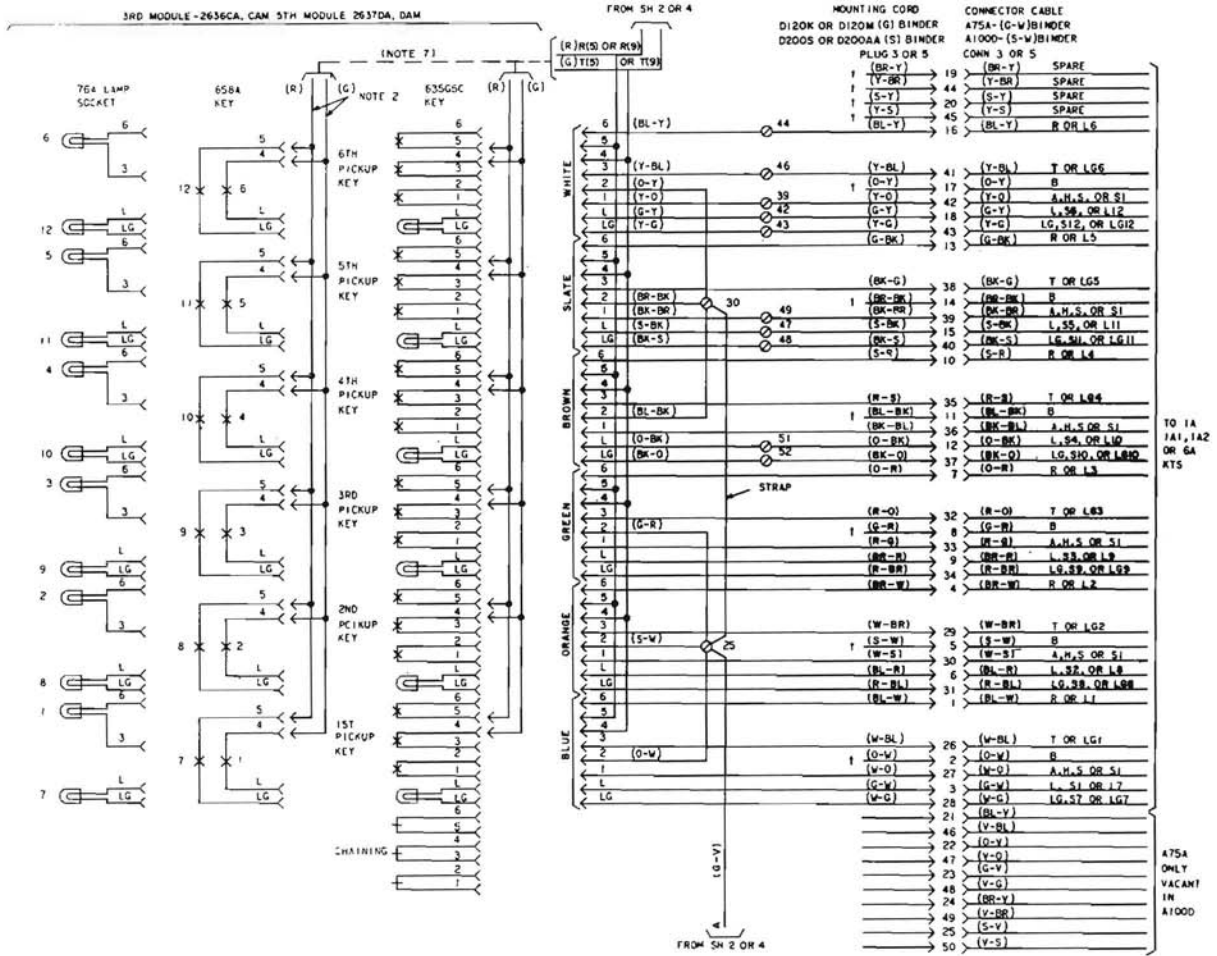
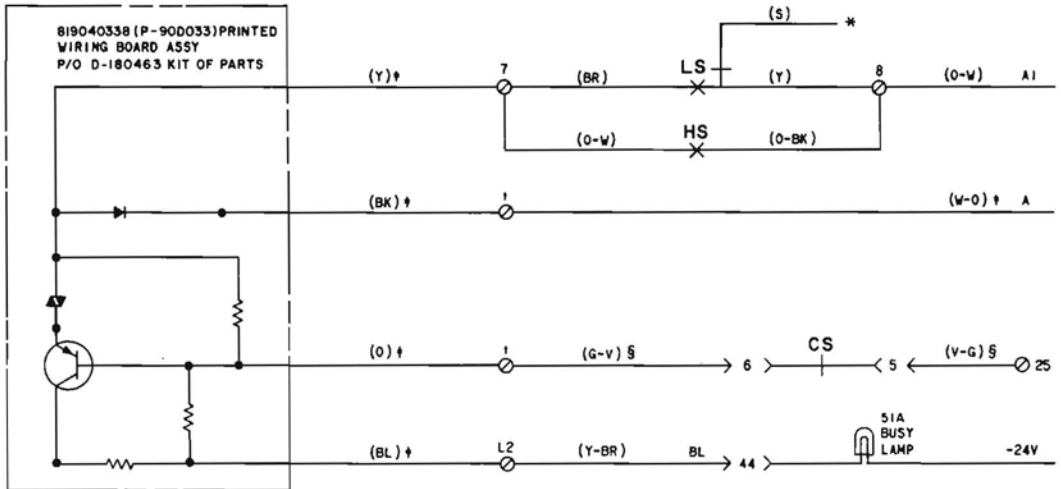


Fig. 2—Module and Connector Cable Arrangements (Sheet 5 of 5)



## LEGEND:

- LS- LINE SWITCH  
 HS- HEADSET JACKS  
 CS- CHAINING SWITCH  
 \* INSULATED AND STORED  
 † USE D-161488 CONNECTOR OR SPARE TERMINAL  
 † LEADS INVOLVED IN MODIFICATION  
 § 840361836 PLUG ASSEMBLY LEADS,  
 P/O D-180463 KIT OF PARTS

## NOTE:

WHEN A SINGLE BUSY LAMP IS REQUIRED,  
 EITHER THIS STATION BUSY LAMP CONTROL  
 CIRCUIT OR THE BUSY LAMP CONTROL CIRCUIT  
 WITH 6C KTU SHOWN IN FIG.5 MAY BE USED.  
 WHEN MORE THAN ONE BUSY LAMP IS  
 REQUIRED, ONLY THE 6C KTU BUSY LAMP  
 CONTROL CIRCUIT SHOWN IN FIG.5 MAY BE  
 USED.

Fig. 3—Station Busy Lamp Circuit using Printed Wiring Board Assembly

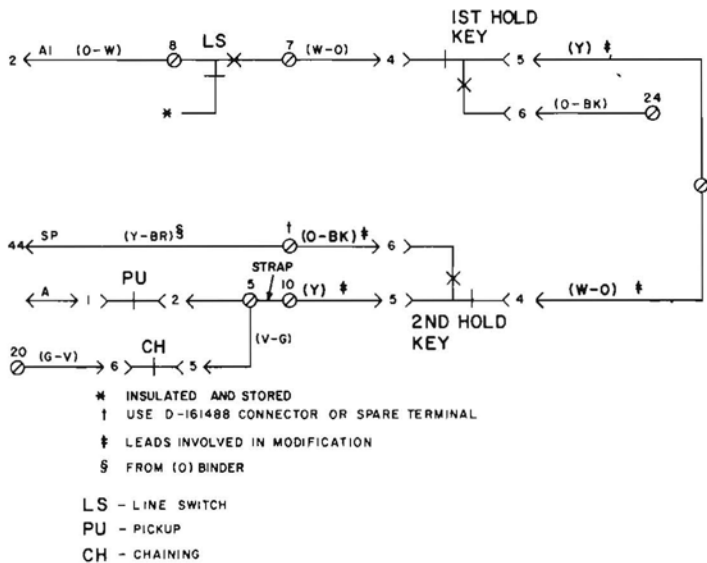


Fig. 4—Modification for Priority Hold

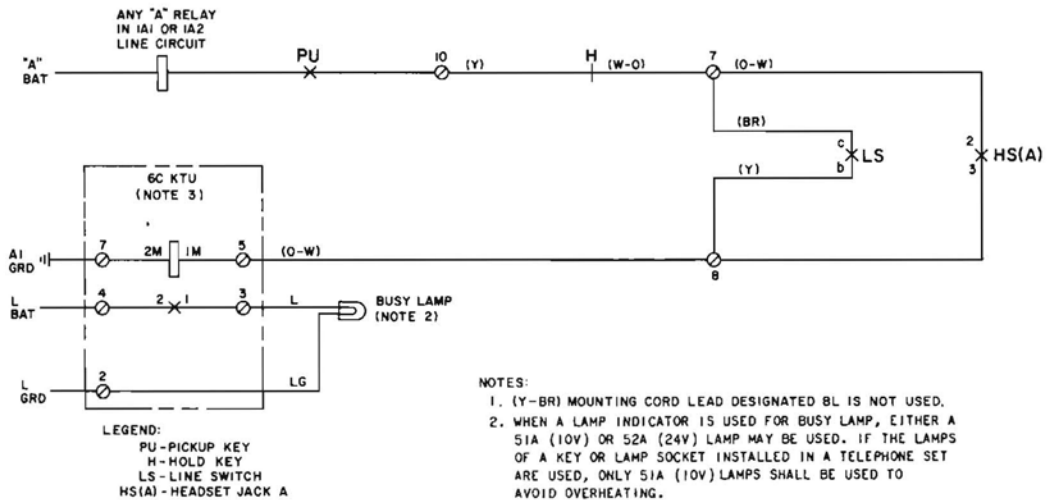


Fig. 5—Busy Lamp Control Circuit Using 6C KTU

**TABLE B**  
**1A, 1A1, AND 1A2 CONVERSION—2637DA, DAM TELEPHONE SET**

KEY MODULE ARRANGE- MENT	LEAD																		
	HOLD KEY				CHAINING PLUG								CONTACT STRIP OR PLUG					LINE SW.	
	Y	G	BR-V	V-BR	V-G 1ST MOD	V-G 2ND MOD	V-G 3RD MOD	V-G 4TH MOD	R 1ST MOD	R 2ND MOD	R 3RD MOD	R 4TH MOD	R 1ST MOD	R 2ND MOD	R 3RD MOD	R 4TH MOD	R 5TH MOD	Y	
1A1/1A2 Only	10	10	*	*	5	15	35	45	9	11	21	31	9	11	21	31	41	8	
1A1/1A2- 1st, 2nd, 3rd, 4th, Mod 1A-5th Mod	10	12	41	14	5	15	35	12	9	11	21	31	9	11	21	31	14	8	
1A1/1A2- 1st, 2nd, 3rd Mod 1A-4th, 5th Mod	10	12	31	14	5	15	12	45	9	11	21	14	9	11	21	14	41	8	
1A1/1A2-1st, 2nd, Mod 1A-3rd, 4th, 5th Mod	10	12	21	14	5	12	35	45	9	11	14	31	9	11	14	31	41	8	
1A1/1A2- 1st Mod 1A-2nd, 3rd 4th, 5th Mod	10	12	11	14	12	15	35	45	9	14	21	31	9	14	21	31	41	8	
1A Only	*	10	37†	13	5	15	35	45	37	11	21	31	37	11	21	31	41	18	

\* Insulated and stored.

† Remove (BR-Y) mounting cord lead. Insulate and store.

**TABLE C**  
**PICIUP-SIGNAL KEY CONVERSION**  
**3RD (2636CA, CAM) OR 5TH (2637DA, DAM) MODULE**

NO. OF SIGNAL KEYS	NO. OF PVT OR INTER-COM LINES (COM. SIG) NOTE 1	KEY PLUG LEADS AND TERMINALS						
		O-W	S-W	G-R	BL-BK	BR-BK	O-Y	Y-O
1		25	25	25	30	30	18	39
2		25	25	25	30	18	18	39
3		25	25	25	18	18	18	39
4		25	25	18	18	18	18	39
5		25	18	18	18	18	18	39
6		18	18	18	18	18	18	39
	2	25	25	25	39	39	30	39
	3	25	25	39	39	39	30	39
	4	25	39	39	39	39	30	39
	5	39	39	39	39	39	30	39

**Notes:**

1. When using converted 6th pickup button as common signaling key, remove, insulate and store (Y-O) mounting cord lead from terminal 39.
2. If more than six signal keys are required, replace 635G5C key with a 658A key. If more than five private or intercom lines are required, convert keys in 2nd (2636CA, CAM) or 4th (2637DA, DAM) module in same order. Connect plug leads to terminal 39 to utilize common signal key. If additional terminals are required, use any spare terminal and strap to 39.

**TABLE D**  
CUT OFF KEY (635AD5C) CONNECTIONS

FEATURE	635AD5C KEY ADAPTER		MOUNTING CORD (BL) BINDER		CONNECTOR CABLE (BL-W) BINDER			RINGER	PLACE STRAP
	BL-Y	Y-BL	BL-Y	Y-BL	G-BK	BK-G	BK-BR	BK	
Cutoff Ringer in Set (Note 1)	TB1-1	TB1-2	*	*	Note 2			TB1-1	A (Net.) to TB1-2
Cutoff Ext Ringer or Buzzer (Note 1)	TB1-1	TB1-2	TB1-1	TB1-2	Note 3				
Cutoff Ext Station (Note 4)	*	*	TB1-1	TB1-2		To Aux. Relay	To Relay Grd		

\* Insulate and store.

**Notes:**

1. Remove (BR-BK) and (BK-BR) slate plug leads from terminals 10 and 29, insulate and store.
2. To individual line or common ringer circuit at equipment.
3. To external ringer or buzzer. Connect ringer or buzzer circuit to (BL-Y) (Y-BL) connector cable leads at equipment.
4. Connect T, R, and A leads from equipment and station to be cut off through contacts of auxiliary relay. Connect battery to relay winding. Use 227B or 421A KTU.

**TABLE E**  
819051970 (P-90D197) GUARD ASSEMBLY CONNECTIONS  
(NOTE)

WIRE OR LEAD	COLOR	REMOVE FROM	CONNECT TO	
		NET.	GUARD ASSY.	NET.
Dial	BK	RR	T	
Headset Jack	BK-S	C	S	
Line Switch	W	C	S	
Guard Assembly	G			RR
	W			C*

\* (O-BK) dial lead remains connected to C of network.

*Note:* For use when specified by local instructions for end-to-end signaling installations.





## 851- AND 2851-TYPE TELEPHONE SETS

### IDENTIFICATION, INSTALLATION, CONNECTIONS, AND MAINTENANCE

#### 1. GENERAL

1.01 This section contains information on the 851- and 2851-type telephone sets.

1.02 This section is reissued to:

- Add additional ordering information
- Update dial wiring diagram information, Fig. 27 and 29
- Add cable routing in current 851CM and 2851CM telephone sets, Fig. 30 and 31.

#### 2. IDENTIFICATION

2.01 The 851BM (MD) or 851CM (rotary dial) and 2851BM (MD) or 2851CM (TOUCH-TONE® dial) are modular telephone sets with a G15A handset and H4DU handset cord.

2.02 The 851CM (rotary dial) and 2851CM (TOUCH-TONE dial) codes are available as a completely assembled telephone set or a basic modular telephone set base.

2.03 **Purpose:** Provides features of a 6-button key station (5-line pickup and hold) at wall installations.

2.04 **Application:** Used with central office or PBX line circuits in 1A, 1A1, 1A2, or 6A key telephone systems. Both the 851- and 2851-type sets are wired for 1A1, 1A2, and 6A systems. For 1A KTS, internal wiring changes must be made.

#### 2.05 Ordering Guide:

##### (a) Telephone Sets (Complete):

- Set, Telephone, 851CM-\* (Fig. 1)
- Set, Telephone, 2851CM-\* (Fig. 2)



Fig. 1—851-Type Telephone Set

##### (b) Telephone Set Bases:

- Base, Telephone Set, 851CM
- Base, Telephone Set, 2851CM

##### (c) Modular Items:

- Faceplate, 852A-\*
- Faceplate, 2852A-\*

#### NOTICE

Not for use or disclosure outside the  
Bell System except under written agreement.



Fig. 2—2851-Type Telephone Set

- Housing, 851A-\*
- Handset, G15A-\*
- Cord, Handset, H4DU-\*

\*Add color suffix from Table A.

(d) **Options:**

- Exclusion
- Buzzer
- Station Busy
- Polarity Guard
- 4A Speakerphone
- Amplifier type handsets

- Multiline Conferencing.

(e) **Replaceable Components:**

- Dial, 8RA (rotary service)
- Dial, 35AF3A (TOUCH-TONE service)
- Ringer, P1B
- Key, 635A5
- Buzzer, KS-20419L1
- 812365039 (P-23F503) Key Collar
- Lamp, 51A (10V) for all key positions
- All items listed as modular.

TABLE A  
COLOR ORDERING GUIDE

HOUSING, CORDS AND HANDSET		COORDINATED FACEPLATE	
COLOR	SUFFIX	COLOR	SUFFIX
Black	-03	Charcoal	-70
Ivory	-50	Muted Ivory	-80
Green	-51	Light Green	-71
Red	-53	Muted Red	-69
Yellow	-56	Light Yellow	-72
White	-58	Light Gray	-73
Light Beige	-60	Muted Beige	-75
Aqua Blue	-62	Muted Blue	-76

2.06 **Design Features:**

- Sets are surface mounted on wall or vertical surface using holes for standard outlet box or keyhole slots.
- Handset is cradled on top, permitting on-hook dialing when speakerphone is provided.
- All key buttons including hold can be illuminated (lamps are furnished except in Hold position).
- All pickup buttons convertible to signaling.

- An access hole is provided in the P1-type ringer for ringer bias spring adjustment. Refer to Section 501-259-101.

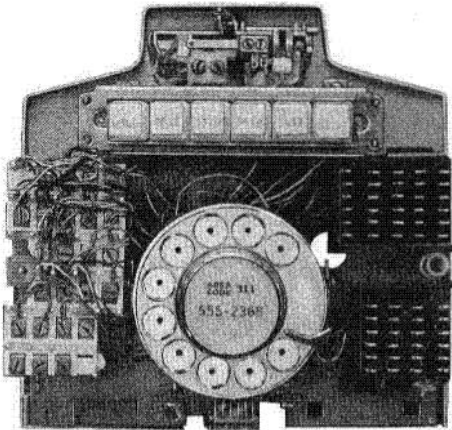


Fig. 3—Early Version 851-Type Telephone Set Base  
(Housing Removed)

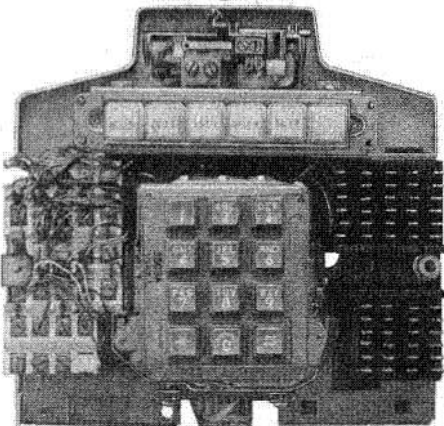


Fig. 4—Early Version 2851-Type Telephone Set Base  
(Housing Removed)

### 3. INSTALLATION

**3.01** When mounting the 851- or 2851-type telephone set, select a location which provides at least 6 inches of clearance on all sides to permit removal of the handset, and for maintenance.

**3.02** The telephone set should be mounted before installing the modular items. To expose the mounting holes, the hinged chassis assembly must be lowered by loosening the captive screws (Fig. 10) holding the top of the chassis. For ease of installation the chassis assembly can be removed from the base pan by springing the hinged brackets sufficiently to clear the pins. The base pan can then be mounted directly to the wall using the keyhole slots, or holes provided for mounting over an electrical outlet box.

**Caution:** Avoid damage to wall or telephone set whenever chassis is in lowered position.

**3.03** All sets except the CM codes can be wired using either inside wiring cable or connector cable. When mounted over an outlet box, bring wiring through opening in base pan before mounting. When exposed, bring wiring up from bottom (right side of handset cord jack). Allow 20-22 inches of cable inside set for routing and terminating.

**3.04** With wiring brought into set and base pan mounted, replace chassis assembly if previously removed, but leave in lowered position.

**3.05** Where IW cable is used, prepare and route as follows.

- (1) Remove sheath to surface of outlet box or bottom of hole in base pan, depending on method of wiring.
- (2) Remove cable clamps. Pinch legs of clamp from front of chassis (Fig. 13).
- (3) Slip one of the clamps provided with set around conductors approximately 9 inches from end of sheath. Add second clamp 2 inches above first.
- (4) Form slack loop as shown in Fig. 7 or 8 and install first clamp in hole to left of cord jack.

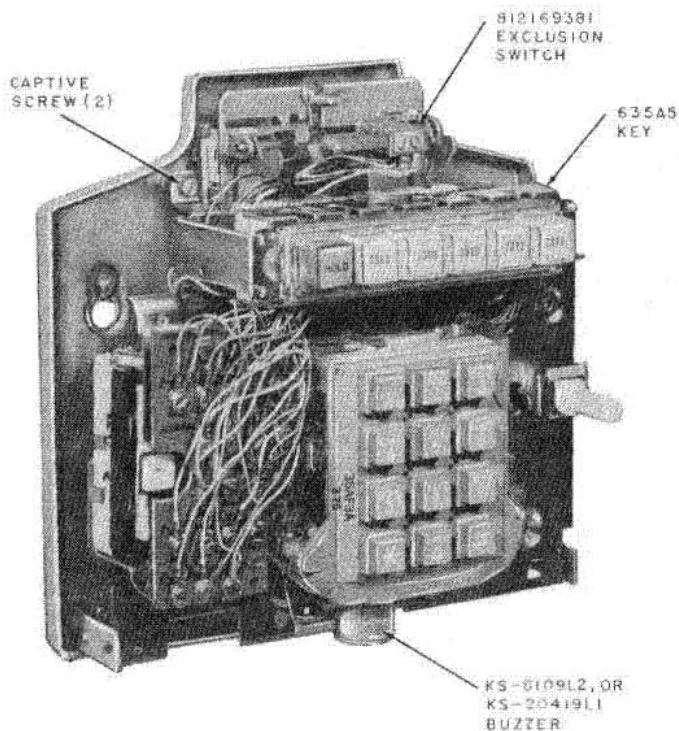


Fig. 5—2851CM Telephone Set With Exclusion (Housing Removed)

- (5) Route cable below jack and install second clamp in hole to left of ringer.
- (6) Twist ends of conductors together and feed through opening between dial, ringer, and connecting blocks.

**3.06** On all sets except CM codes, if the set is served by the connector equipped end of an A25B connector cable, a D-180375 Kit of Parts must be used to obtain raw-ended conductors for termination. The mated connector and plug should be located as shown in Fig. 9. Check that connector and plug do not interfere with operation of line switch. Cable is routed and fastened in same manner as IW cable (Fig. 7 and 8).

**3.07** Check before terminating that sufficient slack is provided to permit hinging action of chassis assembly.



*Cable slack must be in area behind dial and not touching ringer. Chassis cannot be secured if slack lies between base pan and network or base pan and cord jack.*

**3.08** Since individual terminals are not designated on the quick-connect blocks, terminal identification is provided on the inside of the housing as a wiring guide (Fig. 16). Terminals 1-30 are on the upper block and 31-54 are on the lower block. Terminals 51-54 are spare. Use a 714B tool to terminate conductors.

**3.09** The 851CM and 2851CM telephone sets are equipped with a KS-16671L1 connector (Fig. 6). An A25B connector cable is required to connect set to key equipment (Fig. 30 and 31).

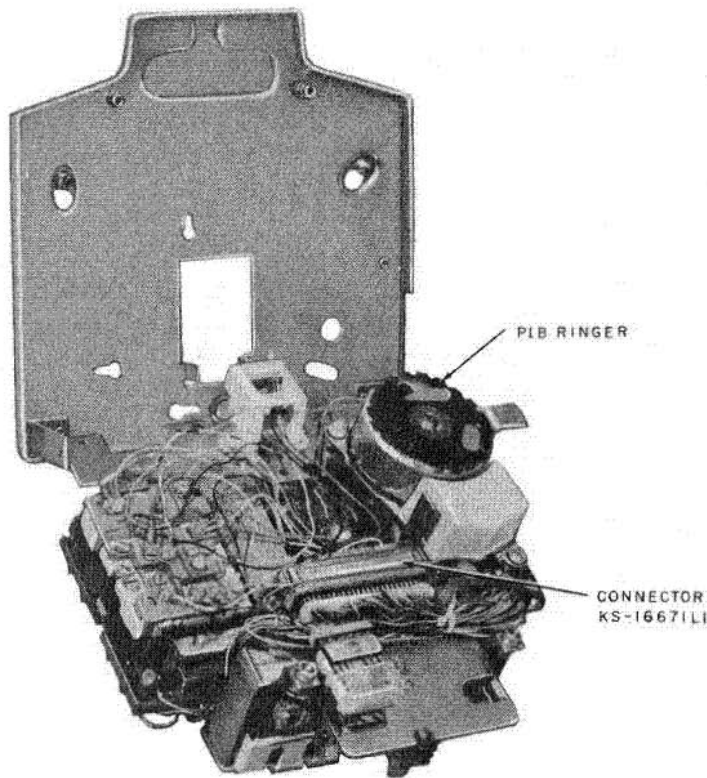


Fig. 6—851CM or 2851CM Telephone Set Showing KS-16671L1 Mounting Cord Connector

**Note:** Care must be exercised in securing the connector cable to eliminate the possibility of undue strain on the conductors and to prevent damage to the insulation of the conductors which could cause shorts. Plastic tie-wraps should be used to bundle the conductors in order to protect the leads from being damaged when closing the hinged chassis.

**3.10 Exclusion Switch:** To provide exclusion, install the exclusion switch assembly as follows.

- (1) With chassis in lowered position, fasten switch assembly to line switch bracket using screw provided in kit. Screw must be inserted in hole from rear of bracket.

- (2) Position switch assembly horizontally (Fig. 5 or 10) and fasten securely.

**3.11 Polarity Guard:** When required with the 2851-type telephone set, install the adhesive backed 819041971 (P-90D197) guard assembly to the left-hand bracket in the position shown in Fig. 11.

**3.12 3-Type (MD) Speakerphone:** These sets are factory-wired for 3-type speakerphone except that the 851-type telephone set requires the replacement of the 8RA dial with an 8CA dial to provide a second set of off-normal contacts (P3 and P4 leads). When replacing the dial, the adapter brackets must be removed from the 8RA dial and added to the 8CA dial (Fig. 12). With both the

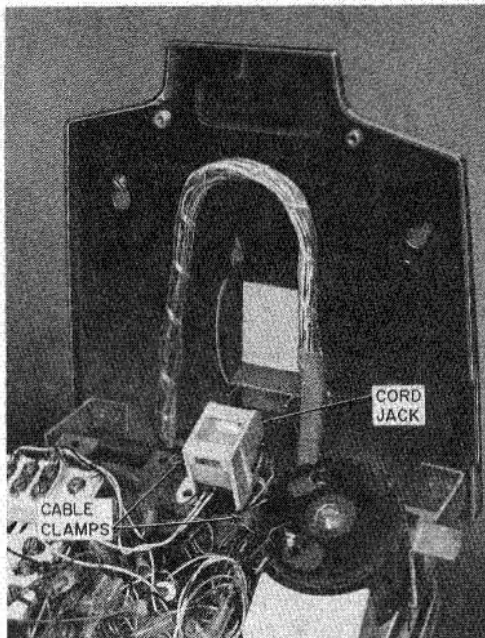


Fig. 7—Inside Wiring Cable, Exposed Wiring (Early Version)

rotary and TOUCH-TONE sets, a loudspeaker and transmitter must be installed external to the set and wired to the 55-type control unit. The control unit can be located near the telephone set (Fig. 21) or at the KTS equipment.

**3.13 4A Speakerphone:** If 4A speakerphone is provided, the 223D adapter is recommended, however, the 82-type adapter also may be used to interconnect the 4A speakerphone components [680-type transmitter, 108-type loudspeaker set, and the 85B1 power unit, (Fig. 22 and 23)].

**3.14** For connections to the 3-type (MD) or 4A speakerphone system, refer to the appropriate section in Division 512.

**3.15** When an 851- or 2851-type set is multipled with sets furnishing speakerphone features, certain leads must be disconnected, insulated, and stored to avoid interference with working circuits. The designation of leads to be removed are as

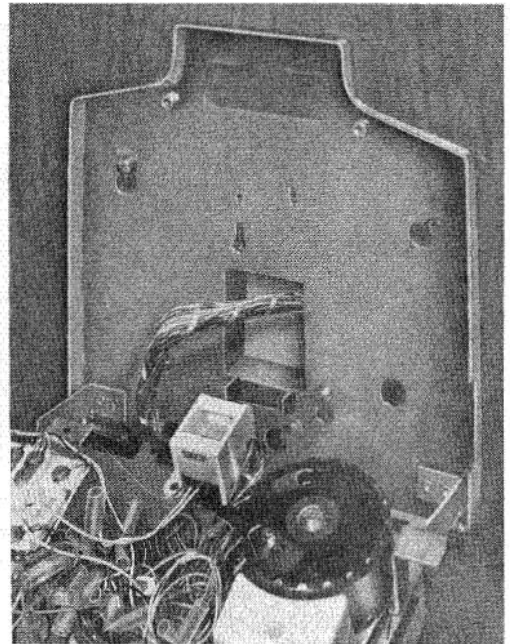


Fig. 8—Inside Wiring Cable, from Outlet Box (Early Version)

follows: T1 (V-G), R1 (G-V), P3 or IT (V-BR), P4 or IR (BR-V), AG (V-S), and LK (S-V).

**3.16 Buzzer:** The KS-20419L1 buzzer is mounted on an insulated bracket below the dial (Fig. 13). If required, an additional KS-20419L1 may be added or the existing KS-20419L1 may be replaced by the KS-8109L2 buzzer (14-30 volt ac or dc) which would be mounted using both screws.

**3.17 Station Busy Lamp:** A 533K diode is used to provide a station busy lamp feature for multibutton wall telephone sets used in 1A1 and 1A2 key telephone systems.

For connection information, refer to Table B.

**3.18 Key Features.**

- All pickup positions of the 635A5 key are convertible to signaling by the removal of the 812857738 (P-28E773) locking pins from



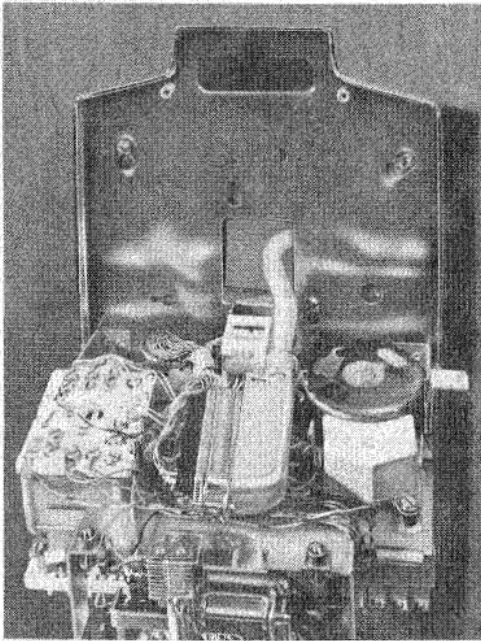


Fig. 9—Connector Cable and D-180375 Kit of Parts (Early Version)

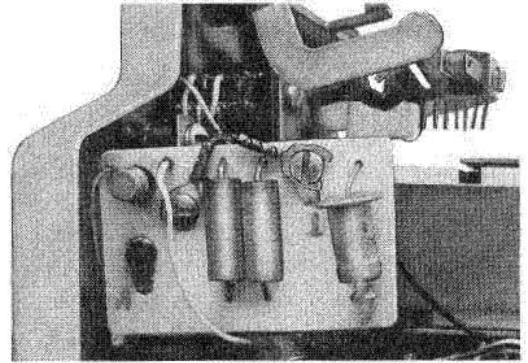


Fig. 11—Polarity Guard Position

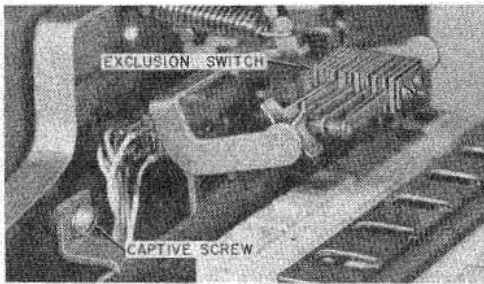


Fig. 10—Exclusion Switch Installed and Hinged Chassis Mounting Screws (Early Version)

the positions involved and making the necessary wiring change (Table C).

- Lamp and set wiring are provided for illuminating all key positions, except in the

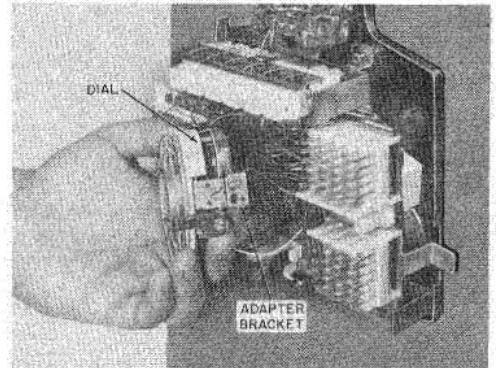


Fig. 12—Dial Adapter Bracket

hold position (lamp must be furnished separately) where the associated lamp leads are insulated and stored.

- Line appearances on the key can be rearranged by switching the color coded plugs on the rear of the key or rearrangement of the cross connections at the key equipment.
- If multiline conferencing option is provided the 635A5 key must be replaced with 635CF5 key, and a 2A1 matrix block shall be added to the equipment (Table E), in place of polarity guard described in paragraph 3.11. This unit provides eight polarity guard

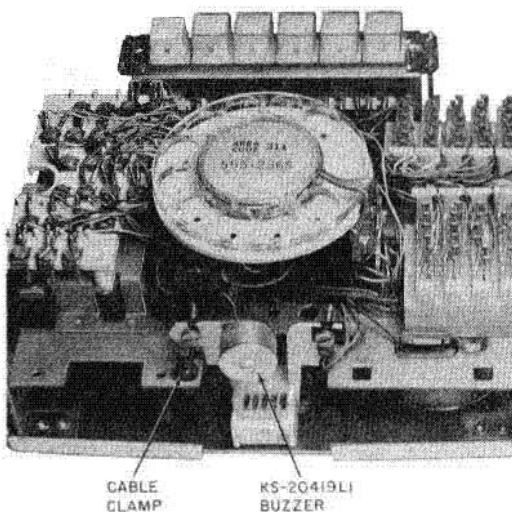


Fig. 13—KS-20419LI Buzzer Mounted on 851-Type Telephone Set

circuits. One polarity guard circuit is required for each line which is conferenceable by multibutton depression. The polarity guard is located between the station side of the line circuit and the station cut-down field.

3.19 Install H4DB handset cord in later production models of 851- and 2851-type telephone sets by inserting the end of the cord having the tapered plug into the handset and the square end into jack on bottom of set. Spring locking tab should face away from wall at bottom of set (Fig. 19).

**Warning:** Cord must be removed from jack in bottom of set anytime chassis assembly must be put in lowered position.

3.20 When installing H4DU handset cord in 851BM, 851CM, 2851BM, or 2851CM telephone sets, either end of cord will fit in telephone set base or handset. The cord should be inserted in the jack until cord retaining clip locks in place.

3.21 Where conditions warrant, the G3A6, G12A, or G15A handset supplied with these sets can be replaced with other types as follows:

- For impaired hearing—G6-type
- For weak speech—G7-type
- For noisy location—G8-type or D-180413.

**Note:** Refer to Section 501-211-102 for connections of these handsets. An H4CJ or equivalent handset cord must be used on nonmodular type handsets.

### 3.22 *Installation of Spade-Tipped Handset Cords in Early Production Sets Equipped with G12A Handset (Fig. 14):*

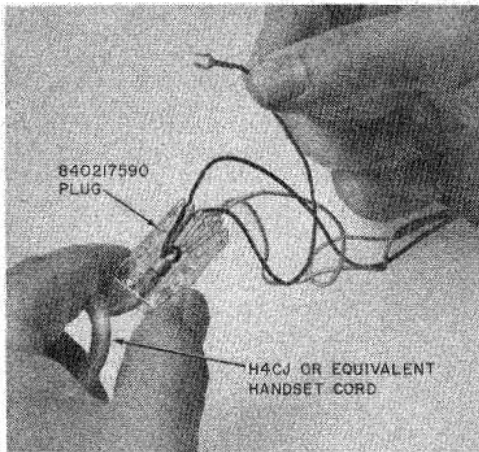
To install spade-tipped handset cord (H4CJ or equivalent) remove J hook stayband from the cord. Cut back and remove cord sheath to stayband marks. Thread spade-tipped conductors through plug, ordered separately, (spade tips must be bent to clear cord entrance). Pull cord until about 1/4-inch of cord sheath is in the central cavity of the plug. Separate the conductors into two groups and tie an overhand knot, pulling the knot to the cord sheath. Pull cord from plug until strain relief position is attained by knot entering sheath and resting against plug. Feed spade-tipped conductors straight through jack and connect to proper terminals. Insert plug in jack.

3.23 *Installation of Spade-Tipped Handset Cords in 851BM, 851CM, 2851BM, and 2851CM Telephone Sets:* To install spade-tipped handset cord (H4CJ or equivalent) insert J hook stayband of cord in slot provided in base of telephone set and terminate on appropriate network terminals (Fig. 26, 27, 28, or 29).

### 3.24 *To install housing.*

- (1) Refer to paragraph 5.05.
- (2) If chassis assembly is in lowered position, raise and fasten in place with two captive screws.
- (3) Install collar on key.
- (4) Withdraw the two mounting screws until they are held in the housing by their threads.





**Fig. 14—Installing Spade-Tipped Handset Cords in Early Production 851- and 2851-Type Telephone Sets with G12A Handset**

With both line switch plungers fully lifted, move the housing directly into position around the telephone set (if an exclusion switch is installed, the left plunger will touch the exclusion switch when the housing is about 3/8-inch from the base). Depress both plungers to their on-hook position. Continue working the housing into position against the base. Release plungers.

- (5) Fasten housing in place with two captive screws.
- (6) Check complete operation of line switch and exclusion feature.

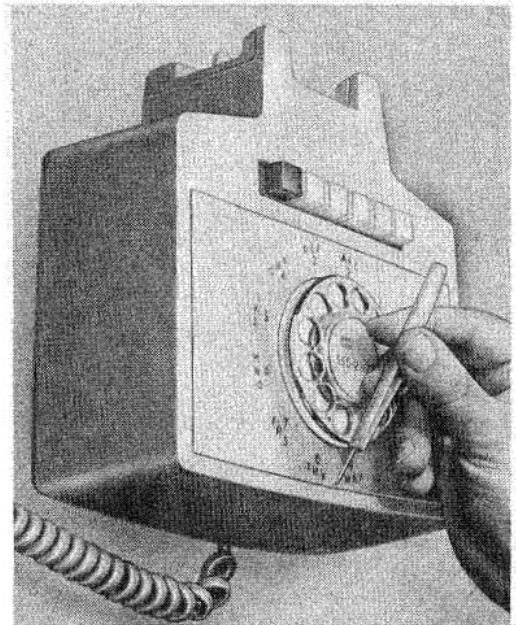
**3.25** Use Form E-5002-A or E-5002-B as a station number card for a TOUCH-TONE station and Form E-4203-G for rotary sets.

### **3.26 To Install Faceplate.**

- (1) Insert tabs on faceplate into slots of housing. Use a KS-21107 type releaser or equivalent to depress the tab of the faceplate retainer clip while seating the faceplate. To insure proper positioning of the retainer clip, raise the handle

of the releaser well above horizontal, as shown in Fig. 15 before withdrawing the tool.

- (2) If installing 2851A faceplate (2851-type telephone set) place station number card in front of faceplate in standard manner.
- (3) If installing 2852A faceplate, an 840693253 adapter (furnished) is used to retain the station number card. Install adapter in faceplate with the two retaining tabs toward the top of the faceplate. Check for proper seating of adapter.
- (4) If the latching characteristics of the 802695247 (P-269524) retainer clip is inadequate, replace



**Fig. 15—Installing 851A(MD) or 852A Faceplate**

- 3.27** The 635A5 key uses an E-5837 form (key button designation tabs). To install, squeeze sides of cap to remove from key button and insert designation tab. When replacing cap or key button

make sure assembly snaps into place. If cap does not snap in place properly, rotate 90 degrees.

#### 4. CONNECTIONS

**4.01** For sets equipped with a 66S1-type connecting block, terminate IW cable as shown in Fig. 26 and 27 using the terminal identification information inside the housing as a guide in locating terminal numbers (Fig. 16).

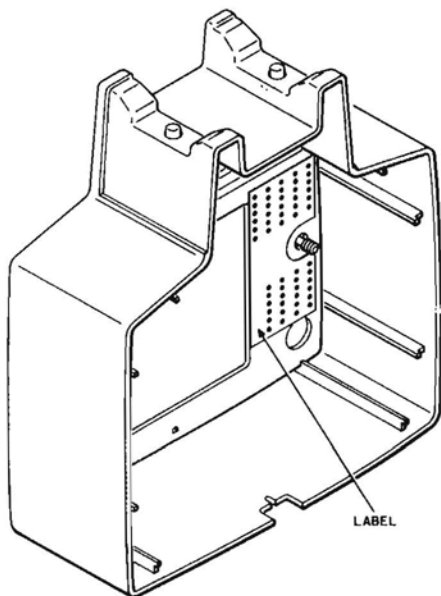


Fig. 16—Connecting Block Terminal Information

**4.02** All leads or straps involved in service or option changes are equipped with spade tips. If not factory terminated, leads are insulated and stored.

**4.03** For sets equipped with the KS-16671L1 connector, (Fig. 6) an A25B connector cable is required.

#### 4.04 Connection Index:

Table B—Connections for KTS and/or Station Busy Lamp

Table C—Pickup-Signal Key Conversions

Table D—Polarity Guard Connections for 2851-Type Telephone Set [819041971 (P-90D197) Guard Assembly]

Table E—2A1 Matrix Block Connections

Fig. 24—Exclusion Switch Connections

Fig. 25—Hold Lamp Connections

Fig. 26—851BT, 851B, or 851BM Telephone Set, Connections

Fig. 27—2851BT, 2851B, or 2851BM Telephone Set, Connections

Fig. 28—851CM Telephone Set, Connections

Fig. 29—2851CM Telephone Set, Connections

#### 5. MAINTENANCE

**5.01** Maintenance replacement should be limited to the following:

- Complete telephone sets
- Modular items
- Optional items
- Replaceable components.

**5.02** When dial replacement is necessary in the 851-type telephone set, use an 8RA dial for nonspeakerphone sets and an 8CA dial for sets with speakerphone. Remove dial by loosening adapter mounting screws and springing dial brackets sufficiently to release dial from locating pins. Transfer adapter brackets from dial being replaced to new dial (Fig. 12).

**5.03** Maintenance of the 35-type TOUCH-TONE dial is not recommended and the dial should be replaced. Adapter brackets are not involved when replacing the TOUCH-TONE dial.

**5.04** When necessary to remove housing, the faceplate must first be removed by using a KS-21107 type releaser or equivalent in catch in bottom of faceplate. Housing can then be removed

by loosening two captive screws under faceplate area.

**5.05** For field replacement of 851A housing—early version of housing (Fig. 17) can be used with sets equipped with either the early, later, or current baseplate (Fig. 18, 19, and 20). The current housing (Fig. 18 and 19) can not be used with the early version baseplate.

**5.06** Access to the ringer is obtained by lowering the hinged chassis assembly. The ringer

can be removed by loosening the two shouldered mounting screws.

**5.07** The current production 635-type keys have been modified for easy lamp replacement by merely removing the lamp cap and inserting a 553-type tool through the hole in the top of the button. In early production keys it was necessary to remove faceplate, housing, key collar, and button for lamp replacement.

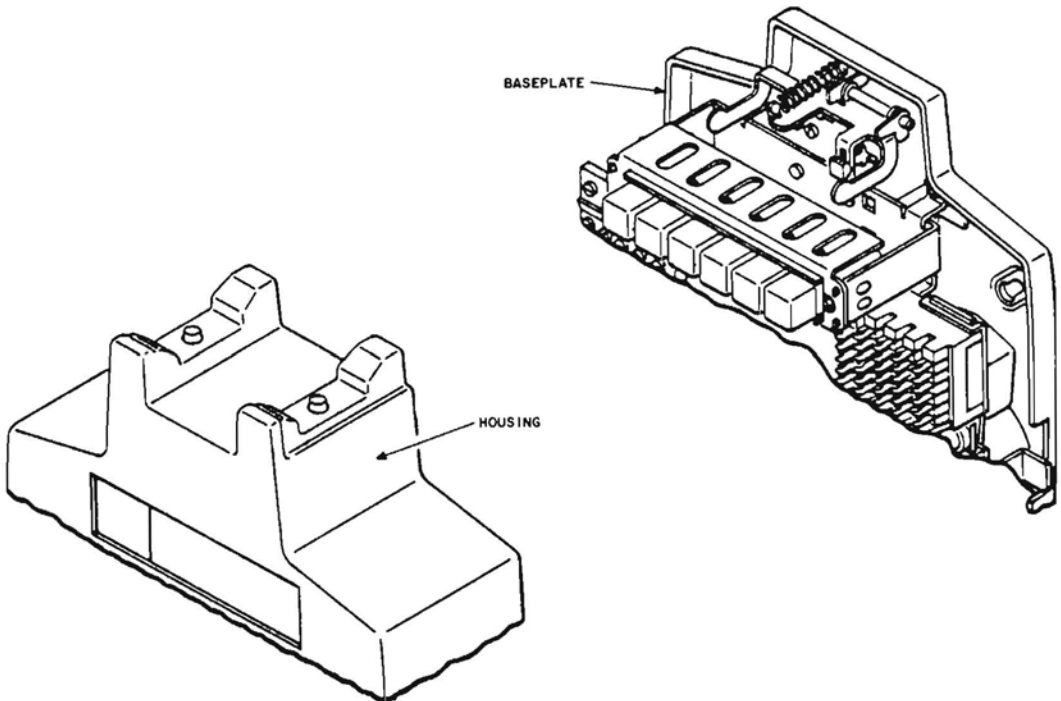


Fig. 17—Early Version Baseplate and Housing

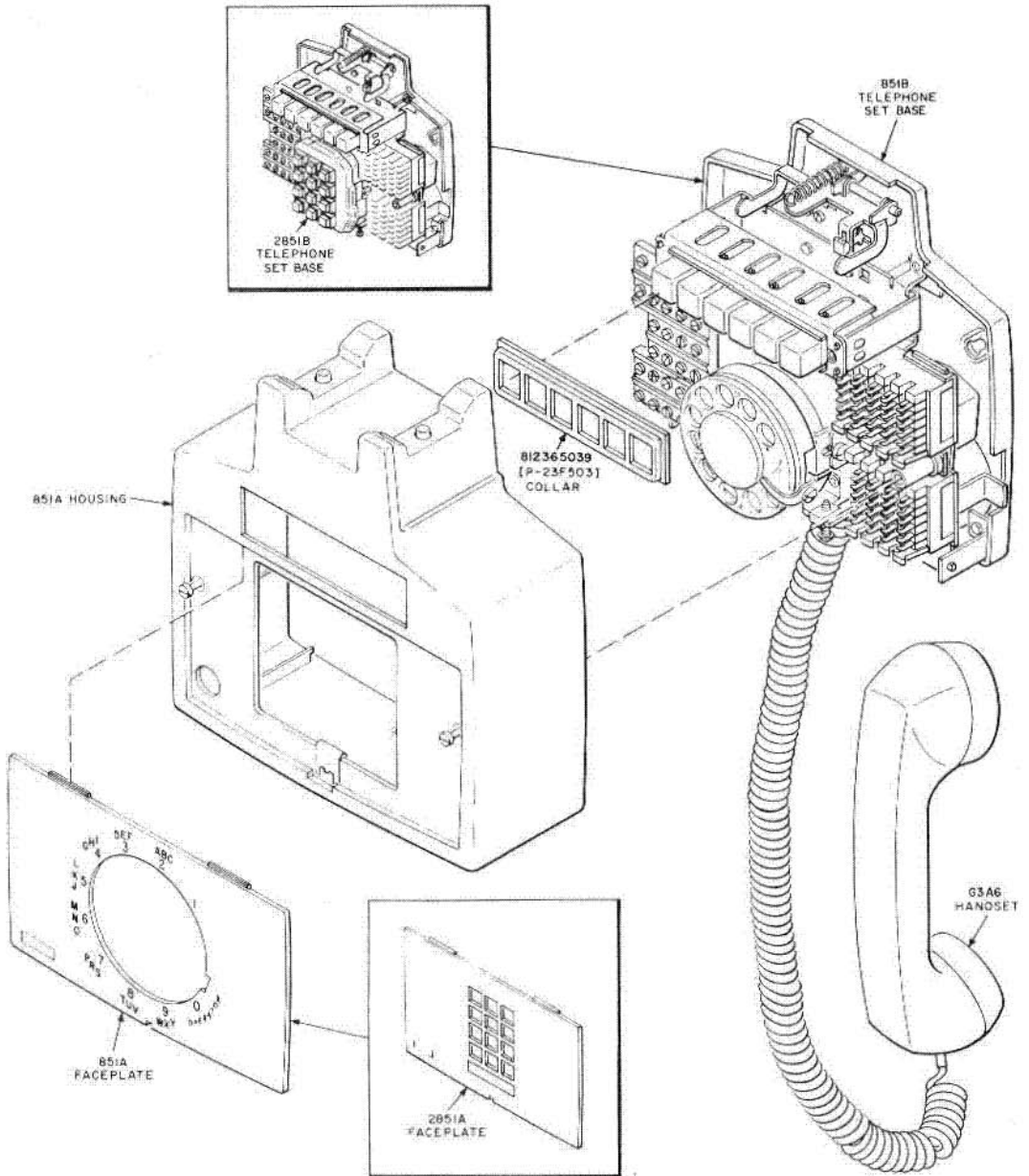


Fig. 18—851B and 2851B Telephone Set, Early Version, Showing 851A Housing and Base Plate

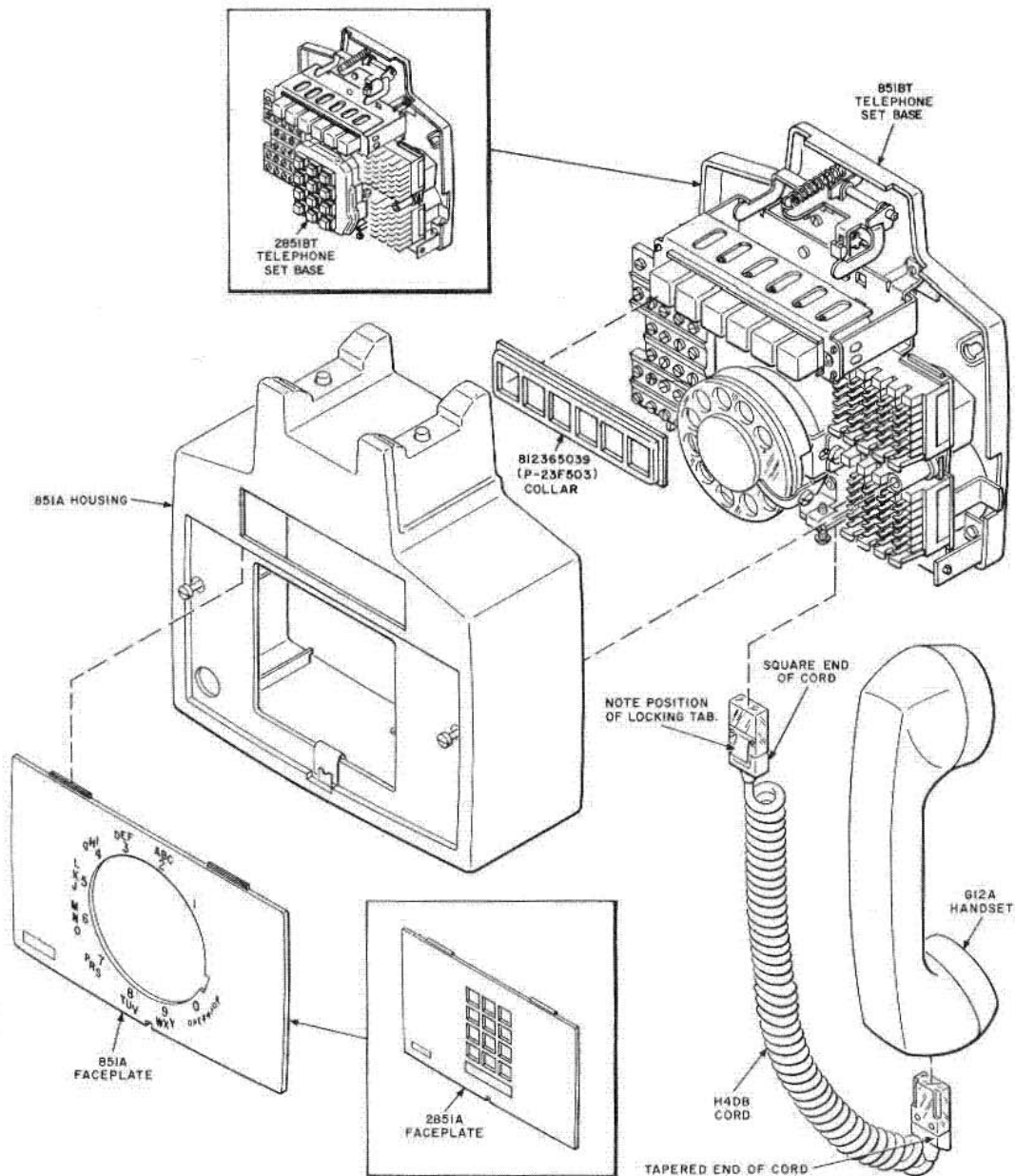


Fig. 19—Station Modular Arrangement, 851BT and 2851BT Telephone Set Showing Later 851A Housing and Base Plate

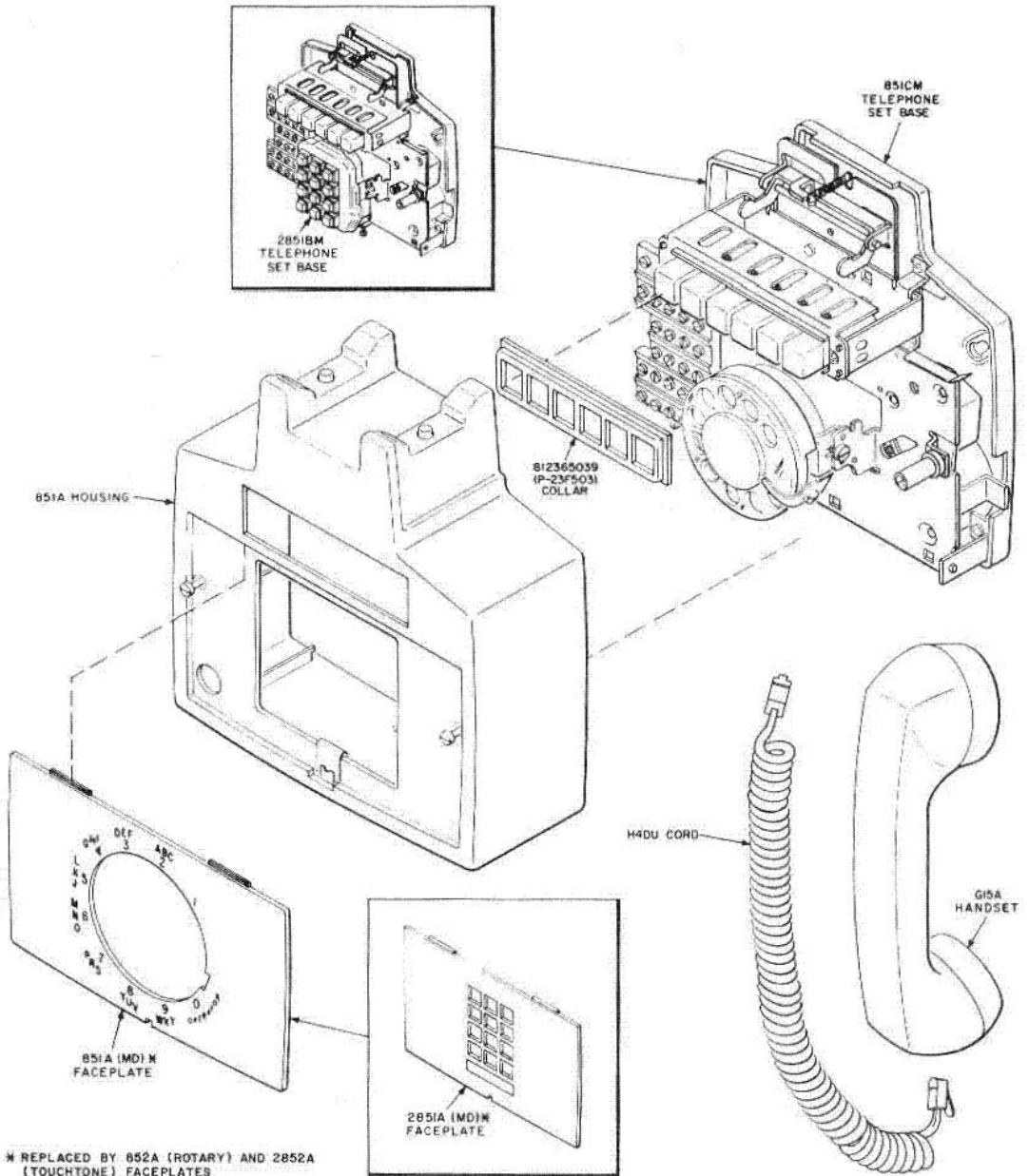


Fig. 20—Station Modular Arrangement 851CM and 2851CM Current Telephone Set

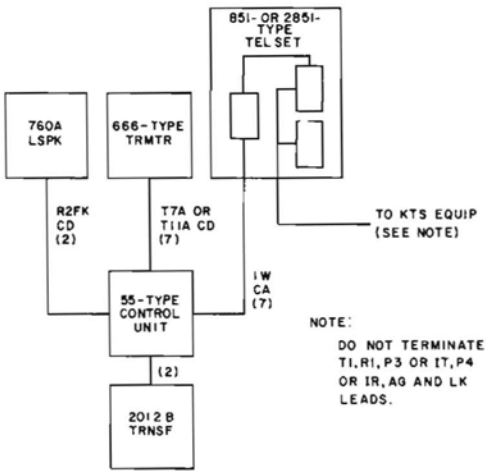


Fig. 21—Block Diagram of 3-Type (MD) Speakerphone Control Unit Located Near Station

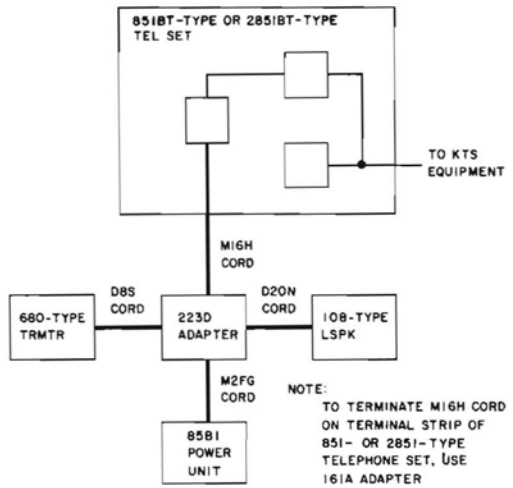


Fig. 23—Block Diagram of 4A Speakerphone Located at Station Using 223D Adapter

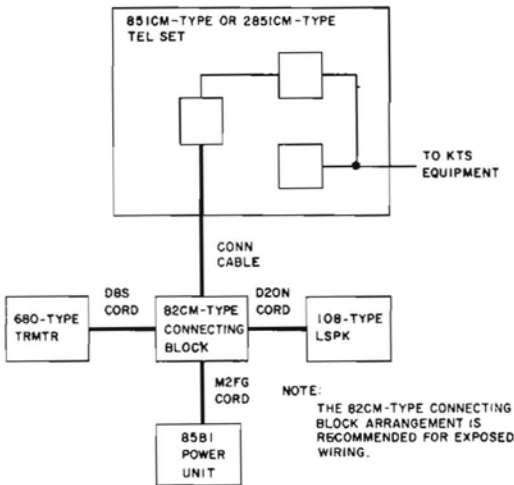
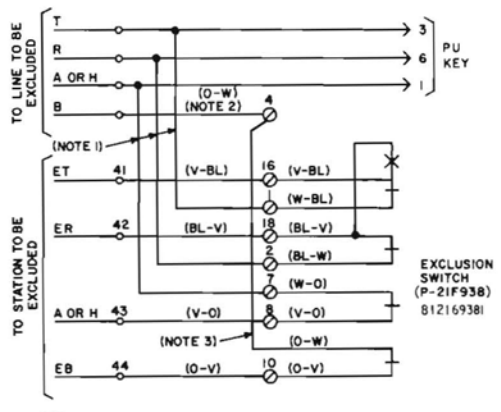


Fig. 22—Block Diagram of 4A Speakerphone Located at Station Using 82-Type Adapter



NOTES:

1. STORED SPADE-TIPPED LEADS OF LINE TO BE EXCLUDED.
2. WHEN OTHER THAN LINE 1 IS EXCLUDED ON IA KTS, DISCONNECT, INSULATE AND STORE (O-W) LEAD FROM TERMINAL 4. CONNECT BALANCE LEAD OF LINE INVOLVED TO TERMINAL 4.
3. FOR 1A1 OR 1A2 KTS, CONNECT (O-W) EXCLUSION LEAD TO TERMINAL 10. A1 GROUND MUST BE SUPPLIED DIRECTLY TO EXCLUDED STATION.

Fig. 24—Exclusion Switch Connections

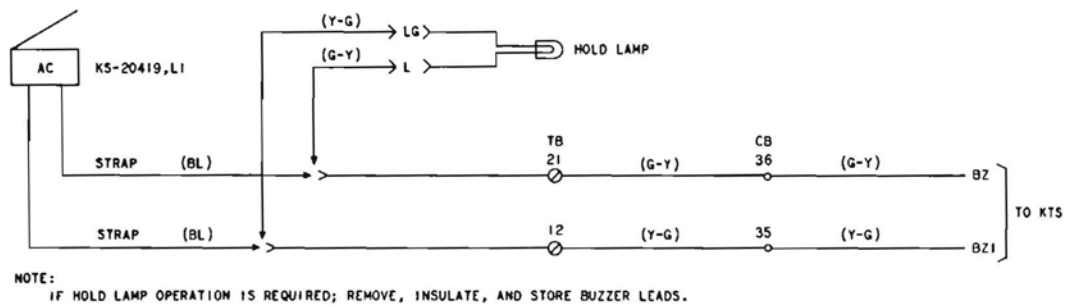


Fig. 25—Hold Lamp Connections



TABLE B

CONNECTIONS FOR KTS AND/OR STATION BUSY LAMP (See Note)

STATION BUSY LAMP		WIRE OR LEAD								533K BUSY LAMP DIODE
		LINE SWITCH			HOLD KEY		STRAP OR MTG CD CONDR			
		Y	BR	G	O-BK	BK-BL	V-S	G-V	Y-BR	
With- out	1A	11	*	3	9	13	*	3	L2†	
	1A1-1A2	4	3	13	3	9	3	13	L2†	
With	1A	11	L2†	3	9	13	L2†	3	L2†	L2† → 3
	1A1-1A2	4	L2†	13	3	9	L2†	13	L2†	

Note: Use B battery supply from KTS if available. Do not use 10 volt ac lamp battery.

\* Insulate and store.

† Network terminal, undesiguated terminals are on terminal board.

TABLE C

PICKUP-SIGNAL KEY CONVERSIONS

TEL SET	KEY OPTION	KEY LEAD				
		O-W	S-W	G-R	BL-BK	BR-BK
851-or 2851-Type	HPPPPP	9	9	9	9	9
	HPPPPS	9	9	9	9	11
	HPPSSS	9	9	9	11	11
	HPPSSS	9	9	11	11	11
	HPSSSS	9	11	11	11	11
	HPPP*P*S*	9	9	6	6	3
	HPP*P*P*S*	9	6	6	6	3

\* For common signaling with intercommunicating or private lines with signaling under line switch control. For 1A KTS, move (Y) line switch lead from terminal 4 to 11.

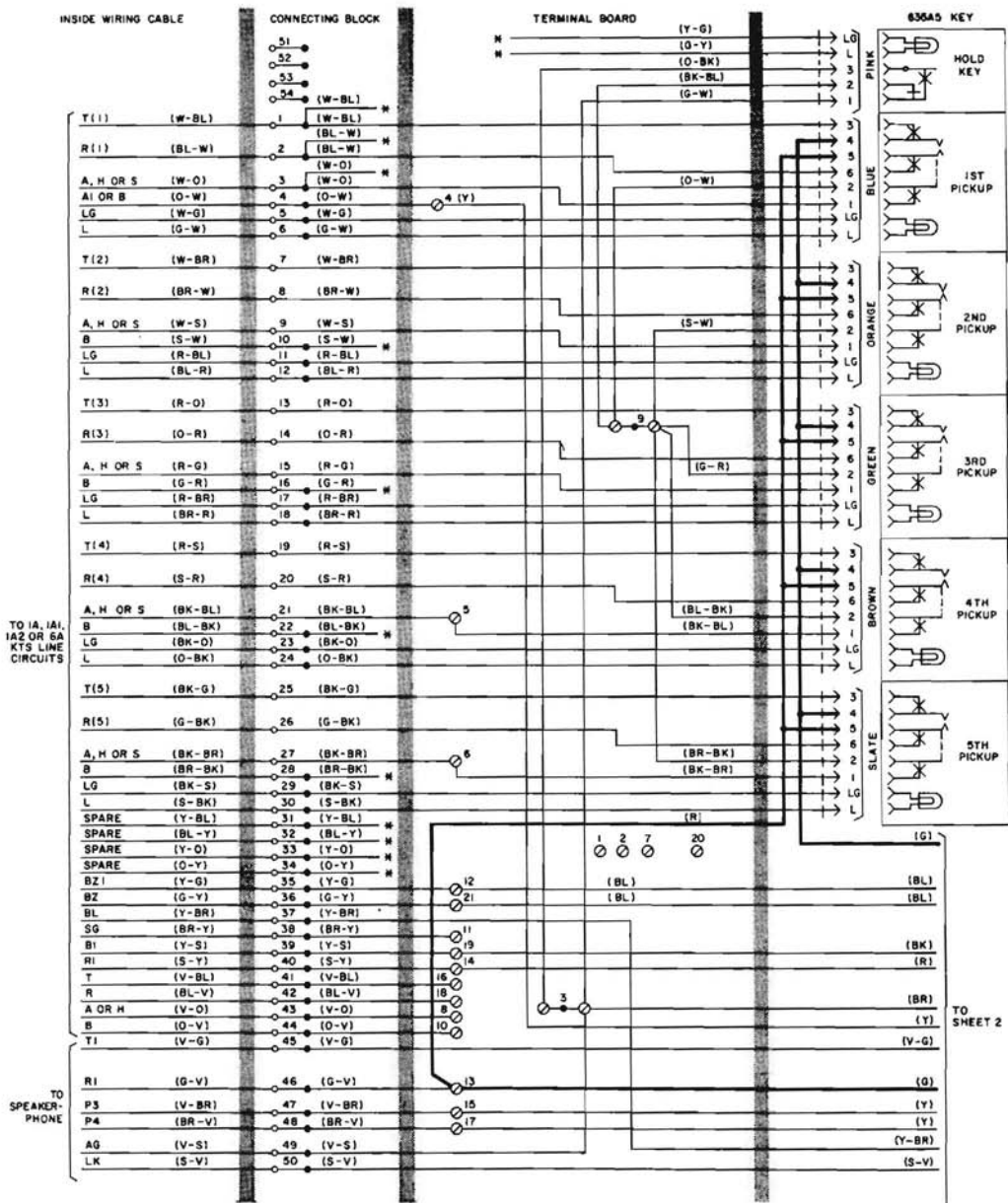
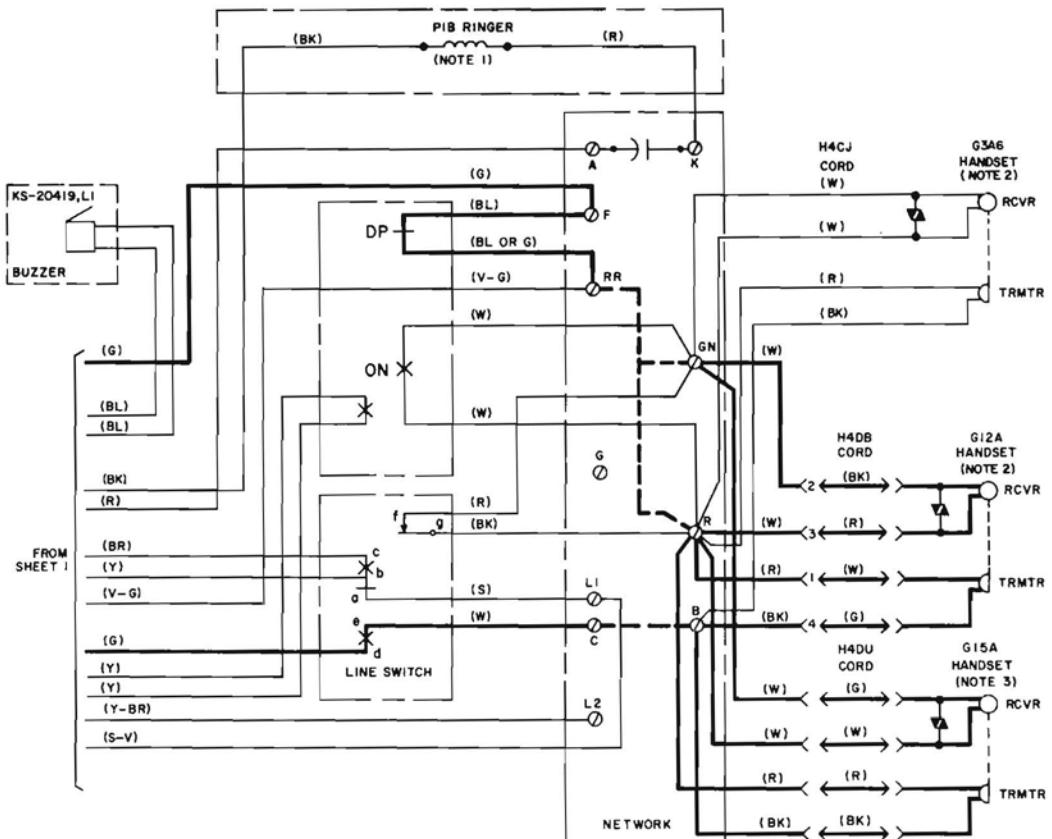


Fig. 26—851BT, 851B, and 851BM Telephone Set Connections (Sheet 1 of 2)



## NOTES:

1. CONNECTIONS FOR PIB RINGER SHOWN. RINGER CONNECTIONS FOR SETS EQUIPPED WITH PIA RINGER SAME AS PIB EXCEPT (S) AND (S-R) LEADS ARE INSULATED AND STORED. (BL) LEAD REMOVED FROM CURRENT MODEL PIA RINGERS.
2. LATER 851B(MD) TELEPHONE SETS ARE EQUIPPED WITH G3A6 HANDSET WHICH IS WIRED DIRECTLY TO THE TELEPHONE SET. EARLY PRODUCTION 851-TYPE TELEPHONE SETS WERE EQUIPPED WITH A G12A HANDSET USING A PLUG-ENDED CORD.
3. 851 BM TELEPHONE SETS ARE SHIPPED WITH G15A HANDSET AND THE H4DU HANDSET CORD.
4. FOR MANUAL SERVICE MOVE (G) FROM F TO RR TERMINAL AND MOVE (W) FROM R TO GN TERMINAL. DIAL REMAINS ON SET.

DP- DIAL PULSE  
ON- OFF NORMAL

\* INSULATED AND STORED

Fig. 26—851BT, 851B, and 851BM Telephone Set Connections (Sheet 2 of 2)

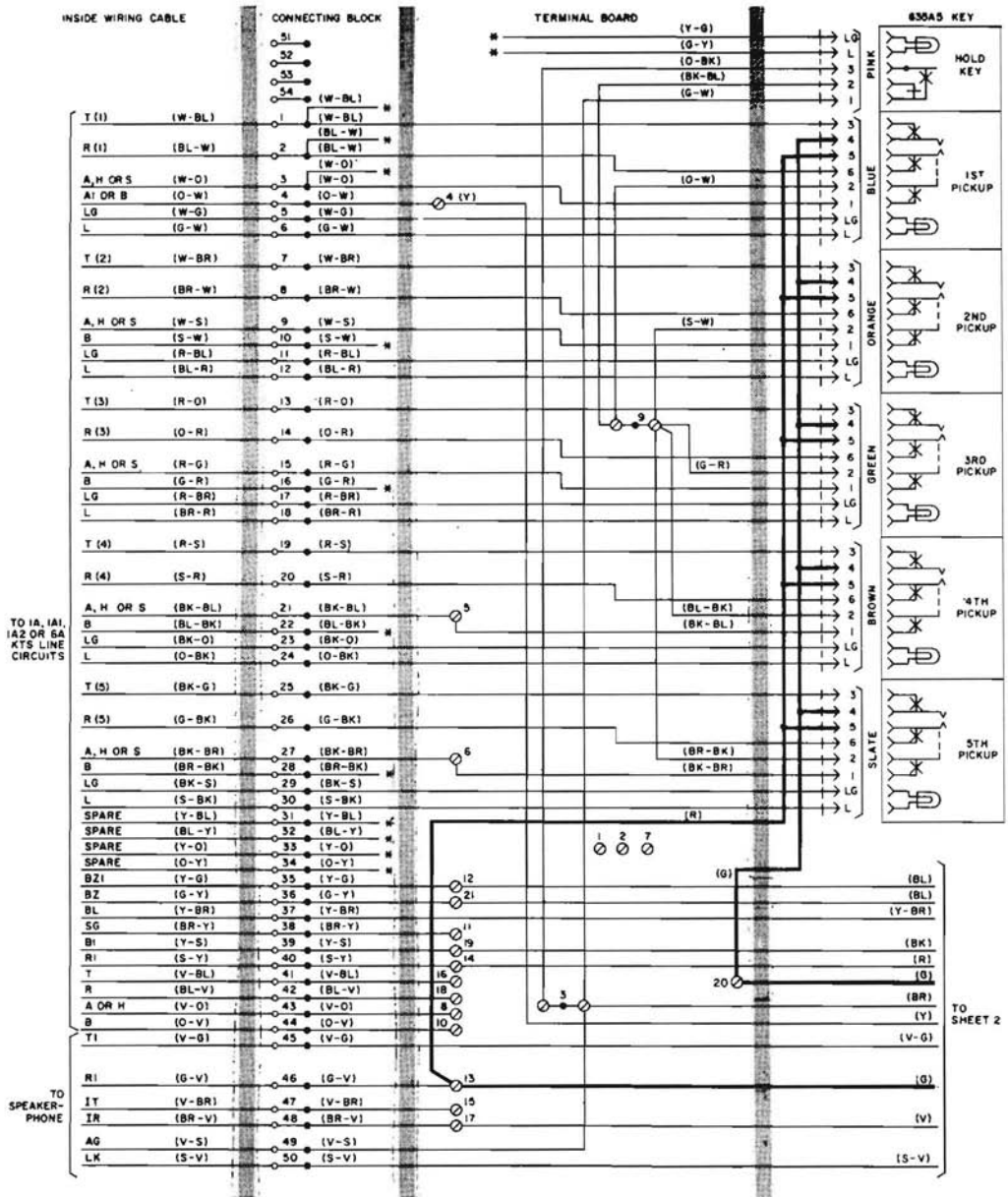
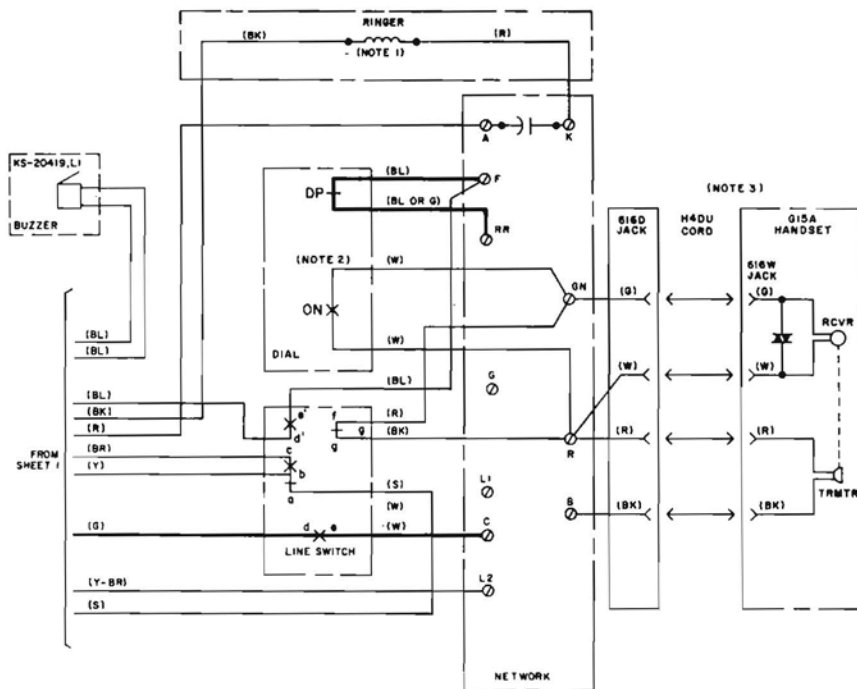


Fig. 27—2851BT, 2851B, and 2851BM Telephone Set, Connections (Sheet 1 of 2)





## NOTES:

1. CONNECTIONS FOR P1B RINGER SHOWN. RINGER CONNECTIONS FOR SETS EQUIPPED WITH P1A RINGER SAME AS P1B EXCEPT (S) AND (S-R) LEADS ARE INSULATED AND STORED. (BL) LEAD REMOVED FROM CURRENT MODEL P1A RINGERS.
2. WHEN USING SPEAKERPHONE, REMOVE (G) LEAD FROM TERM 2 AND CONNECT TO TERM F. REPLACE BRA DIAL WITH BGA DIAL AND CONNECT (Y) LEADS TO TERMS 15 AND 17. SPEAKERPHONE LEADS R1(G-V) AND T1(V-G) ARE INSULATED AND STORED IN SETS MANUFACTURED AFTER JULY 20, 1979. WHEN INSTALLING SPEAKERPHONE, CONNECT THE R1(G-V) TO TERMINAL 15 AND THE T1(V-G) LEAD TO NETWORK TERMINAL RR.
3. 851CM TELEPHONE SETS ARE SHIPPED WITH 615A HANDSET AND THE 616W HANDSET CORD.
4. FOR MANUAL SERVICE MOVE (BL) FROM F TO RR TERMINAL AND MOVE (W) FROM R TO GN TERMINAL. DIAL REMAINS ON SET.

• INSULATED AND STORED  
 DP - DIAL PULSE  
 ON - OFF NORMAL

Fig. 28—851CM Telephone Set, Connections (Sheet 2 of 2)

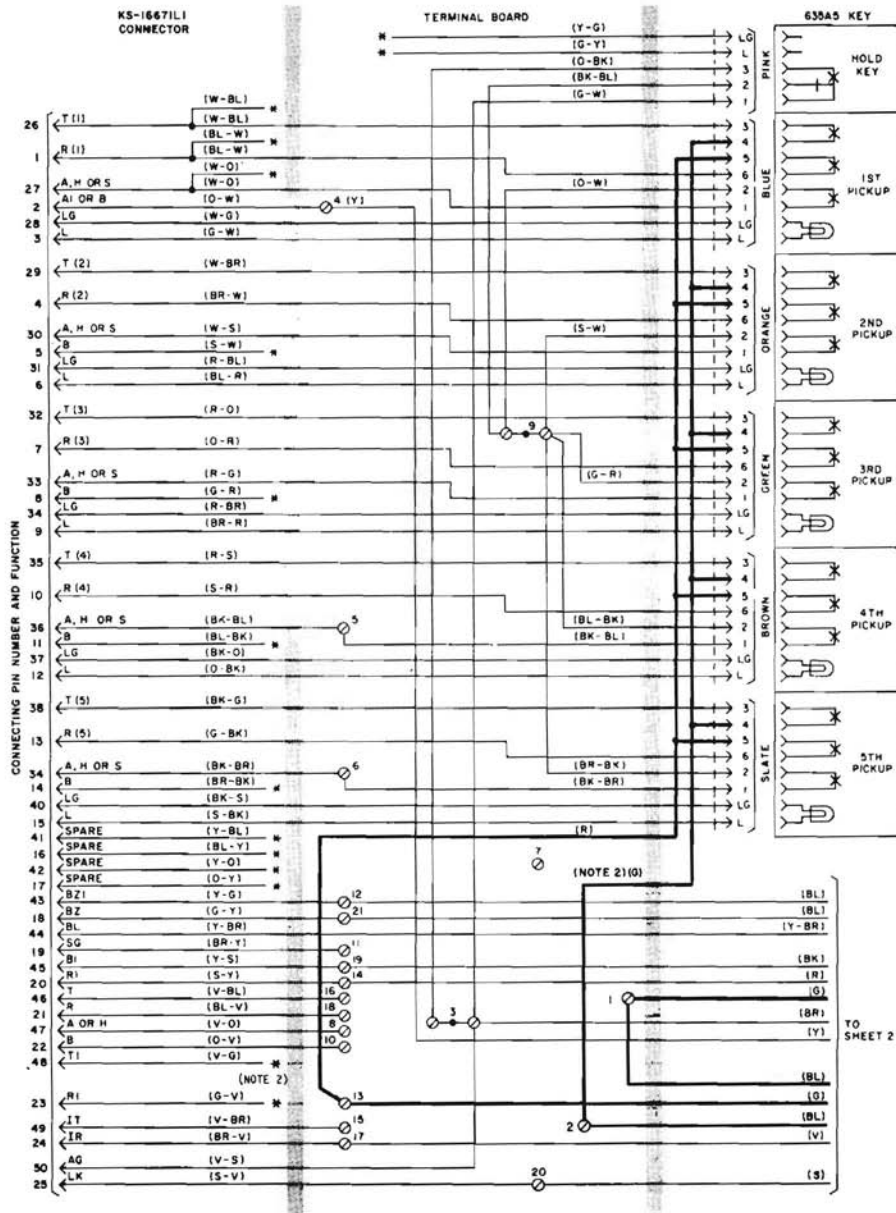


Fig. 29—2851CM Telephone Set, Connections (Sheet 1 of 2)

## NOTES:

1. CONNECTIONS FOR PIB RINGER SHOWN. RINGER CONNECTIONS FOR SETS EQUIPPED WITH PIA RINGER SAME AS PIB EXCEPT (BL), (S), AND (S-R) LEADS ARE INSULATED AND STORED. (CURRENT MODEL PIA RINGERS DO NOT HAVE (BL) LEAD).
  2. WHEN USING SPEAKERPHONE, REMOVE (G) LEAD FROM TERM 2 AND CONNECT TO TERM 1. REMOVE (BL) LEADS FROM TERMS 1 AND 2. INSULATE AND STORE. SPEAKERPHONE LEADS R1(G-V) AND T1(V-G) ARE INSULATED AND STORED IN SETS MANUFACTURED AFTER JULY 20, 1979. WHEN INSTALLING SPEAKERPHONE CONNECT THE R1(G-V) LEAD TO TERMINAL 13 AND THE T1(V-G) LEAD TO NETWORK TERMINAL G.
  3. 2851 CM TELEPHONE SETS ARE SHIPPED WITH GISA HANDSETS AND HADU HANDSET CORD.
  4. ON SETS MANUFACTURED PRIOR TO 4-1-78, THE GREEN AND WHITE HANDSET CORD JACK LEADS IN TELEPHONE SET WERE CONNECTED TO NETWORK TERMINALS R AND S, RESPECTIVELY.
- \* INSULATED AND STORED

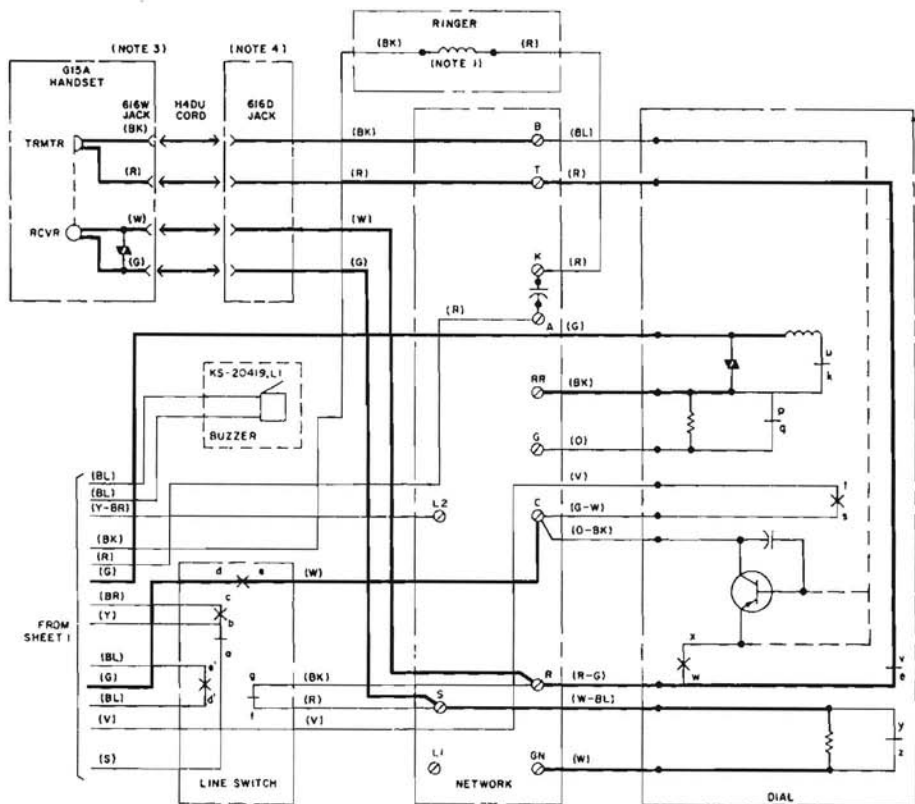


Fig. 29—2851CM Telephone Set, Connections (Sheet 2 of 2)



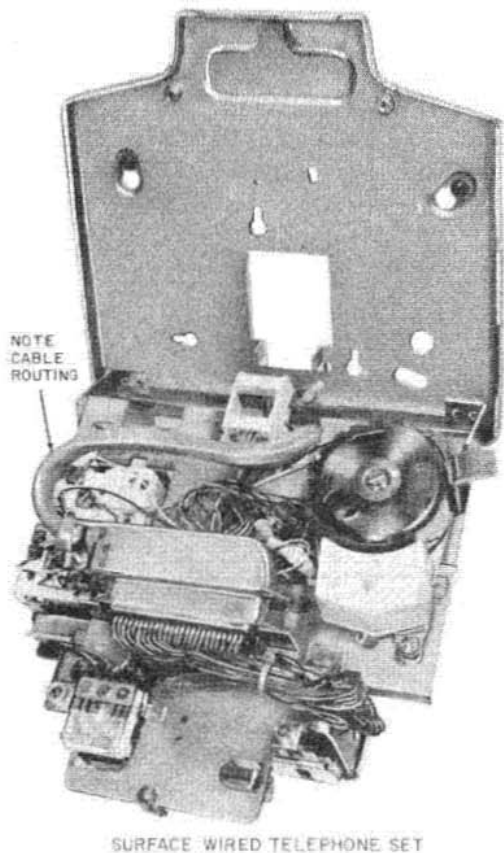


Fig. 30—Cable Routing on Current 851CM and 2851CM Telephone Sets at Exposed Wire Location

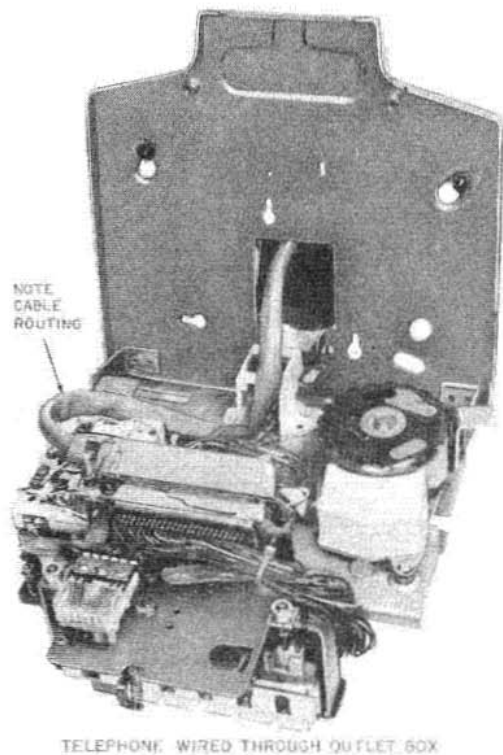


Fig. 31—Cable Routing in Current 851CM and 2851CM Telephone Sets at Prewired Location

TABLE D

POLARITY GUARD CONNECTIONS FOR 2851-TYPE  
TELEPHONE SET [819041971 (P-90D197) GUARD  
ASSEMBLY]

WIRE OR LEAD	COLOR	REMOVE FROM	CONNECT TO	
		NET.	GUARD ASSY	NET.
Dial	BK	RR	T	
	G-W	C	S	
Line Switch	W	C	S	
Guard Assembly	G			RR
	W			C

Note: For use when specified by local instructions for end-to-end signaling installations.

TABLE E

## 2A1 MATRIX BLOCK

LINE		LINE TERM. (LEFT)	STATION TERM. (RIGHT)
1	T	1	1
	R	5	5
2	T	7	7
	R	11	11
3	T	13	13
	R	17	17
4	T	19	19
	R	23	23
5	T	25	25
	R	29	29
6	T	31	31
	R	35	35
7	T	37	37
	R	41	41
8*	T	43	43
	R	47	47

\* If more than 8 lines are provided, additional 2A1 matrix blocks are required.

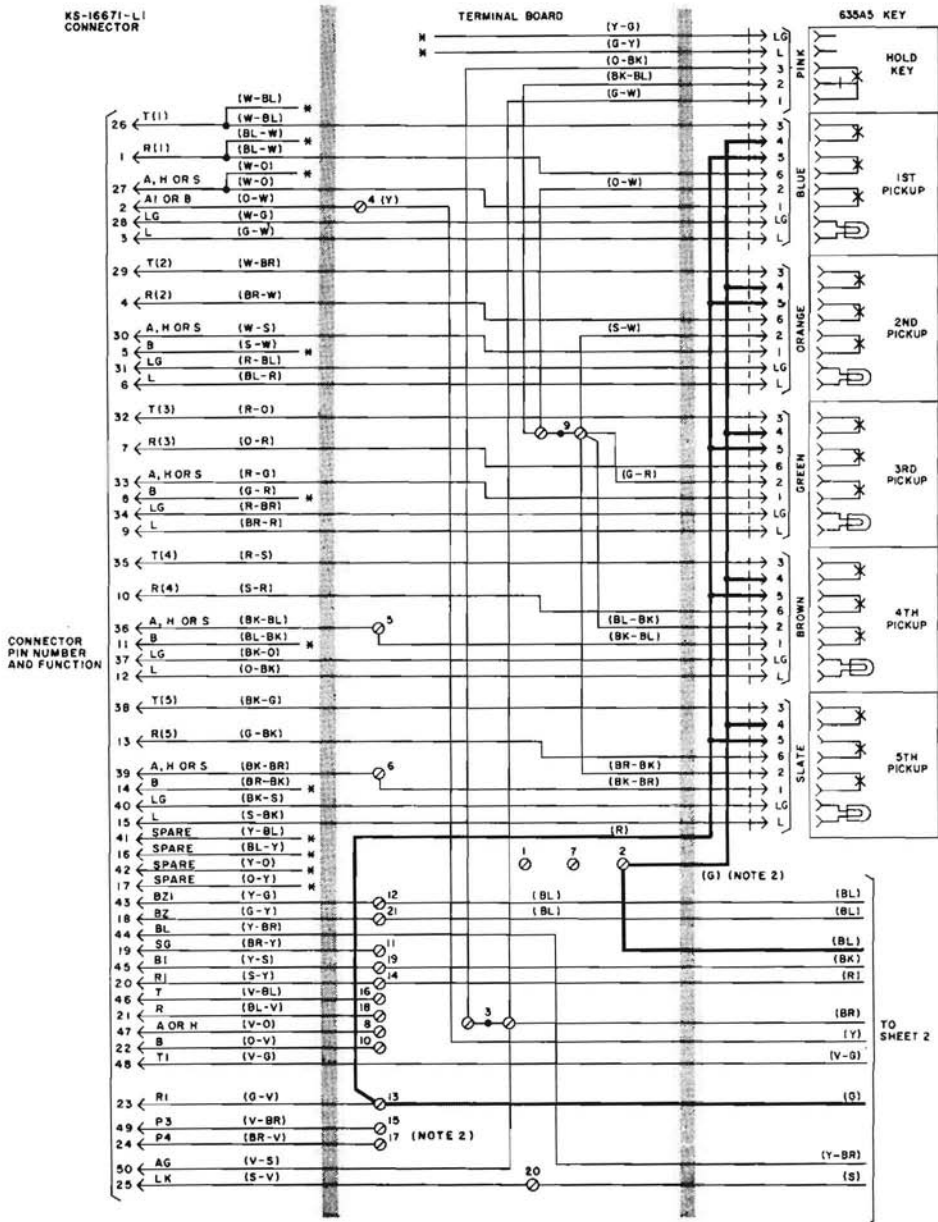


Fig. 28—851CM Telephone Set, Connections (Sheet 1 of 2)



**2872A1M OR 2872A2M TELEPHONE SET  
(TOUCH-A-MATIC® AUTOMATIC DIALER)**

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Optional Features . . . . .	3	Line Key Removal . . . . .	17
Ordering Guide . . . . .	4	Faceplate Removal . . . . .	17
Operating Features . . . . .	6	Handset Cradle Removal . . . . .	17
3. INSTALLATION . . . . .	6	Housing Removal . . . . .	17
STANDARD INSTALLATION . . . . .	6	4. CONNECTIONS . . . . .	18
Installation Check Procedure . . . . .	7	5. OPERATION . . . . .	18
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**NOTICE**

Not for use or disclosure outside the  
Bell System except under written agreement

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**1. GENERAL**

1.01 This section contains identification, installation, connections, operation, and maintenance information on the 2872A1M (MD) or 2872A2M telephone set (TOUCH-A-MATIC service) (Fig. 1).

1.02 This section is reissued to:

- Show 2872A1M telephone set (MD)

- Revise Fig. 1 through 5, 7 through 12, and 14
- Revise Tables A through G, J, and N
- Add Fig. 13
- Show 2872A1 faceplate MD
- Add Tables K, L, and M
- Eliminate connection information for 82A connecting block
- Add D-180818 Kit of Parts (Record Disable and Dial Intermix Features)
- Add reference for use of station head telephone adapters.

Since this reissue covers a general revision, arrows ordinarily used to indicate changes have been omitted.

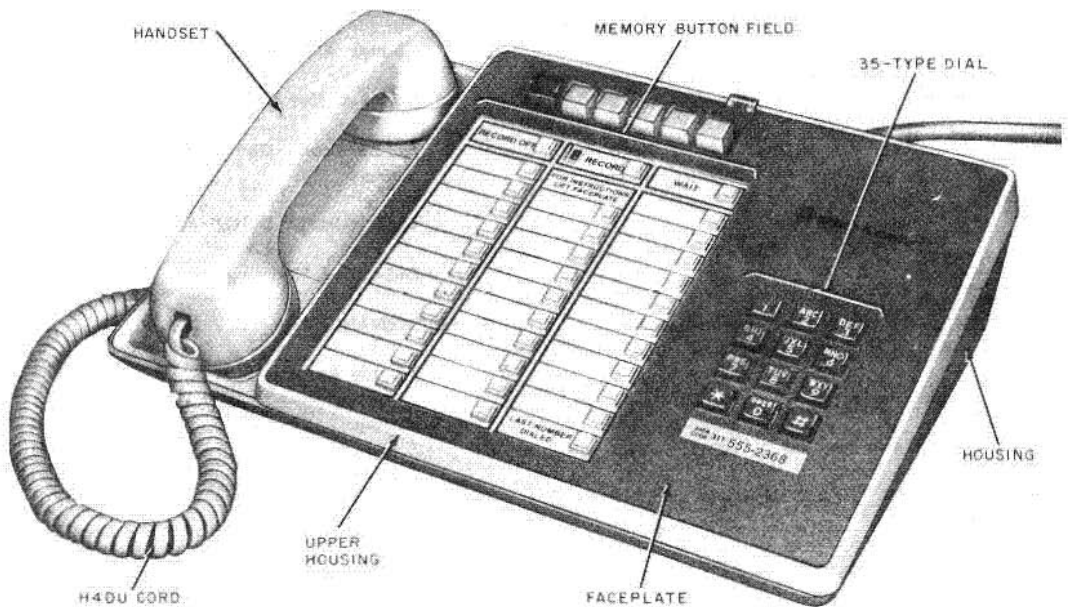


Fig. 1—2872A1M (MD) or 2872A2M Telephone Set

**1.03** The 2872A1M or 2872A2M telephone set is factory-wired for use with 1A1, 1A2, or 6A key telephone systems (KTS). They may be converted (Table J) for use with 1A KTS.

**1.04** The telephone sets are available in the following colors:

- Black (-03)
- Green (-51)
- White (-58)
- Lt. Beige (-60).

**1.05** The 2872A1 (MD) faceplate is available in only the satin-silver (-87) color.

**1.06** The 2872B1 decorative faceplates are available in the following colors:

- Teak Woodgrain (-108)
- Walnut Woodgrain (-109)
- Matte Aluminum (-122).

## 2. IDENTIFICATION

**2.01** The 2872A1M or 2872A2M telephone set provides all standard features of a 6-button key telephone set plus (manual) TOUCH-TONE® dialing, automatic dialing of 31 frequently called numbers, and a LAST NUMBER DIALED *scratch pad* memory.

**2.02** The 2872A2M telephone set differs from the 2872A1M set only in the battery circuit. The 2872A2M set has a battery interlock circuit that prevents the set from dialing automatically if the battery is not plugged in. Also, the 2872A2M telephone set utilizes a newly coded battery (KS-203901A) which can not be used in the 2872A1M set.

### 2.03 Design Features:

- Modular key telephone set
- Integrated circuit RC TOUCH-TONE oscillator
- Integrated circuit memory

- Surge protector
- Polarity guard (removable for dry circuit application)
- Common audible ringing
- Buzzer
- Busy lamp diode
- Line pickup buttons convertible to nonlocking signal buttons
- Memory buttons from which to select preprogrammed telephone numbers for automatic dialing
- Capability to record and automatically dial 31 telephone numbers of up to 15 digits each
- Last number manually dialed memory
- Plug-in battery
- Capability to pause for subsequent dial tones during automatic dialing (WAIT input)
- End-to-end signaling for data application.

### 2.04 Optional Features (Refer to Table A):

- Speakerphone—either 3B or 4A speakerphone systems may be added to stations
- Dial Tone Detector—automatically starts dialer when precise TOUCH-TONE dial tone (350 Hz and 440 Hz) is present.
- One-Touch Calling, (requires both dial tone detector and speakerphone)—depressing one memory button will automatically turn on speakerphone, detect dial tone, and dial complete number.

**Note:** All dial tones encountered in the process of placing a call must be precise TOUCH-TONE dial tone if the call is to be completed automatically.

- Record Disable—turns off the recording feature to prevent accidental erasures of previously stored numbers

Booklet, Instruction, Subscriber, SIB-2455B

(d) **Optional Apparatus (order as required):**

- Kit of Parts, D-180492 (must be used for speakerphone service)
- Kit of Parts, D-180493 (Dial Tone Detector and One-Touch Calling switch)
- Kit of Parts, D-180494 (for conversion to 4-wire service)
- Kit of Parts, D-180818 (Record Disable and Dial Intermix)

**Note:** This kit of parts may be used only with sets equipped with a 2870B memory

- Faceplate, 2872B1-\*

**Note:** If set is equipped with 2872A1-87 faceplate, then an upper housing (870A1U-\*) of the appropriate color must also be ordered.

- Set, Head Telephone [using Plantronics Jackset Model JS180-1 (2 foot cord) or JS180-02 (7 foot cord)].

\*Add appropriate color suffix (1.04 or 1.06).

**2.07 Operating Features (Fig. 2).**

- Dial (TOUCH-TONE dial).
- Line key (635BT5), 6-button key. Hold with five line pickup buttons which are convertible to nonlocking. An additional momentary contact (logic reset switch) is attached to the Hold side of the key to reset the logic circuit anytime a key button is depressed.
- 32-button array of low force, low travel nonlocking memory buttons arranged in three columns. Left and right columns have eleven buttons, center column has ten buttons.
- LAST NUMBER DIALED button located in lower right corner of memory array, when momentarily depressed, automatically redials the last number manually dialed.
- RECORD button (nonlocking), when momentarily depressed, lights the RECORD lamp and

enables the memory circuits to store telephone numbers.

- RECORD OFF button (nonlocking), when momentarily depressed extinguishes the RECORD lamp, indicating that the dialer is switched out of the record mode.
- WAIT button (nonlocking), when momentarily depressed during recording operation, enters a code into memory to initiate a halt in the automatic dialing sequence [used where access digit(s) required].

**3. INSTALLATION**

**STANDARD INSTALLATION**

**3.01** Make all wiring changes and telephone set modifications (Table A) before external connections are made to the set (4.01).

**Caution:** Do not plug in either battery or power unit until all connections and modifications have been completed. Take extreme care not to damage the exposed components, circuit, etc. when the set is opened.

**3.02** The set is shipped from the factory with the battery disconnected. After all wiring changes and modifications have been completed, connect the battery (Fig. 6) by tilting the set up, and inserting the battery plug into the mating jack.

**Note:** Write date of installation on label provided on battery.

**3.03** Install the 95B-type power unit within 150 feet (24 gauge conductors) of the telephone set and plug into an ac outlet not controlled by a switch (continuous ac power is required). A retaining clamp (841050818) will be shipped with the 95B-type power unit and should be mounted to the ac receptacle to hold power unit securely and prevent accidental loss of power. The power unit may be located at the equipment end of the cable or run directly into the telephone set by conductors separate from the mounting cord and connected to PSB terminals 30 and 31. Refer to applicable tables and Fig. 7 for particular type of installation. When separate power conductors are used, disconnect, insulate, and store the (BL-V) and (V-BL) mounting cord leads from PSB terminals 30 and 31.



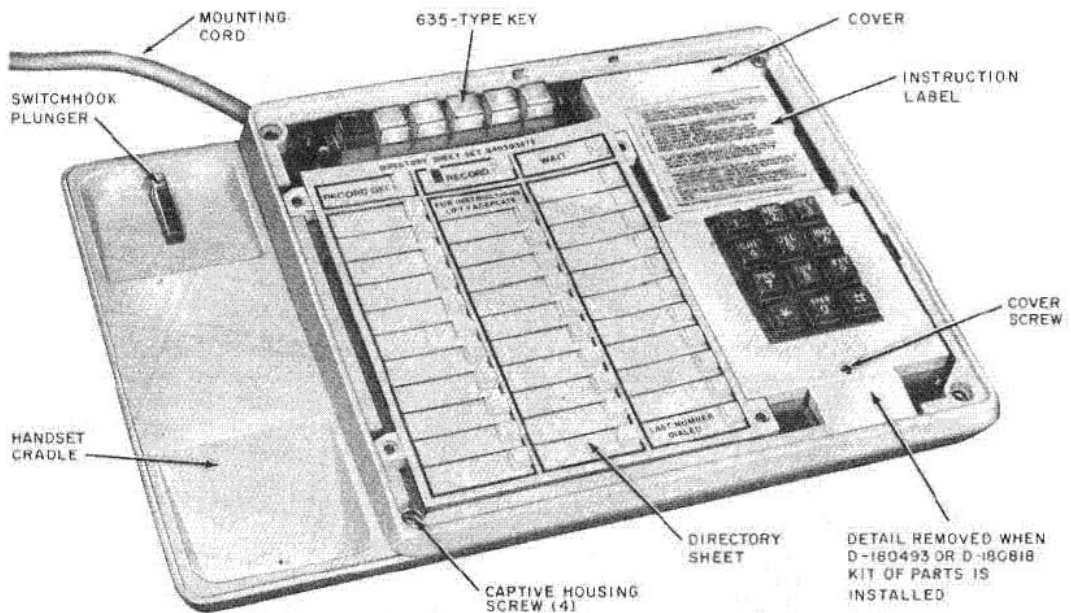


Fig. 2—2872A2M Telephone Set—Faceplate and Handset Removed

**Danger:** Securely attach retaining clamp to ac outlet using outlet cover screw **BEFORE** attempting to install 95B-type power unit. When removing power unit, always unplug it completely from the outlet **BEFORE** attempting to remove the retaining clamp. This will prevent the possibility of a loosened retainer clamp or metallic outlet cover making contact with the ac prongs of the power unit when partially withdrawn from outlet. Do not use 841050818 or similar retaining clamps on outlets where the cover mounting screw holds the duplex outlet in the box.

**Note:** The 95B-type power unit must be located no closer than 1-1/2 feet from the telephone set in order to prevent a noise problem.

**3.04** The station number card retainer 812558039 (P-25E803) snaps into the faceplate below the dial.

**3.05** The directory sheets (Fig. 2) fit over the buttons of the memory and are held in place by the faceplate. Additional sheets are available in the directory sheet set, 840393672.

**3.06** To designate the buttons of the 635-type 6-button key.

- (1) Use Form 5837 tabs.
- (2) Squeeze the sides of the key button caps gently and remove.
- (3) Insert the tabs.
- (4) Replace the caps so that small bumps on side of caps fit into small holes on sides of buttons.

#### Installation Check Procedure

**3.07** Check telephone set installation per the following tests (refer to Part 5 for operation). In case of failure, refer to Trouble Analysis, Table N.

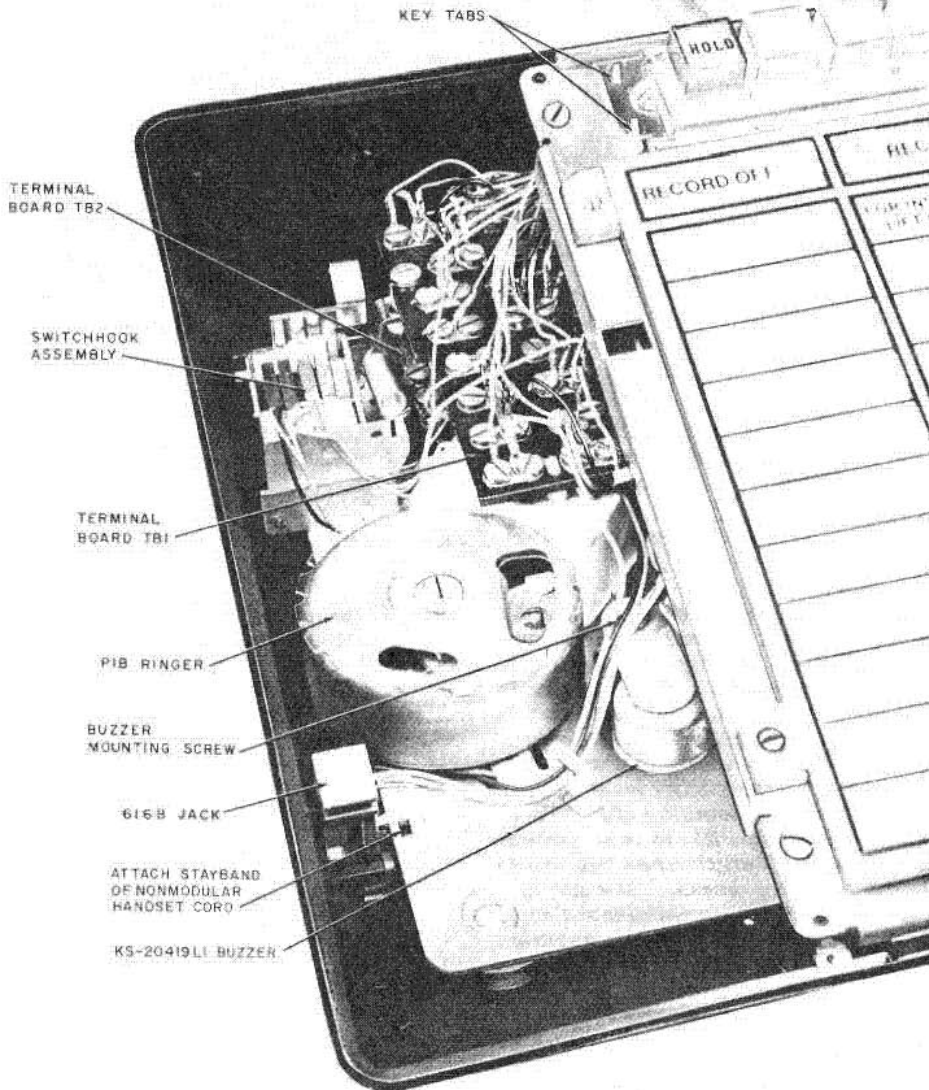


Fig. 3—2872A2M Telephone Set With Faceplate, Handset, and Handset Cradle Removed

(1) Disconnect the power unit and manually dial a known telephone number to check that the telephone operates correctly in the absence of commercial power.

(2) Reconnect the power unit to ac outlet.

(3) With handset on-hook, record digits 1 through 0 into consecutive memory locations, storing one digit per memory. Fill all memory locations except LAST NUMBER DIALED and location immediately above it [5.01 (4) through (7)].

(4) Manually dial CO dial test and ringer circuit and simultaneously record into memory location immediately above LAST NUMBER DIALED button [5.01 (4) through (7)]. After depressing RECORD OFF button, and when dial test circuit is ready, test dial frequencies by manually dialing digits 1 through 0 into the test circuit.

(5) Momentarily hang up handset and automatically dial the test circuit number recorded in Step (4) by depressing button immediately above LAST NUMBER DIALED button and proceed as follows.

(a) Depress LAST NUMBER DIALED button. Digits 1 through 0 will be automatically dialed into test circuit. Verify that correct signal is returned from test circuit.

(b) Momentarily depress the memory buttons used in Step (3) in the same sequence in which the digits were recorded. Verify that correct signal is returned from test circuit after each series of numbers.



***The battery and the power unit must be connected a minimum of five minutes before doing Step (c).***

(c) Momentarily disconnect the power unit (for 5 to 10 seconds). After reconnecting power unit, depress a memory button of a memory location used in Step (3), to verify retention of memory.

(6) Dial the appropriate code for ring-back to test the ringer.

(7) Check operation of the logic reset switch by pressing the RECORD button (RECORD lamp will come on) and subsequently pressing an unoperated line button. The RECORD lamp must go out.

(8) If equipped with one-touch calling option (D-180493 Kit of Parts and speakerphone), and with set in on-hook condition, depress the memory button used in Step (4). The speakerphone should turn on, dial tone should be detected, and the stored number should be automatically dialed.

#### OPTIONAL APPARATUS INSTALLATION

##### D-180492 Kit of Parts (With Speakerphone)

3.08 To install.

- (1) Proceed as described in 3.16.
- (2) Make connections per the appropriate Tables, B through E.
- (3) Mount the kit assembly to the chassis with the screws provided (Fig. 4). Beveled corner of printed wiring board (PWB) should be located at lower right corner.

##### D-180493 Kit of Parts (Dial Tone Detector and One-Touch Calling Switch)

3.09 To install.

- (1) Remove the housing (3.21), and access PSB terminal board (3.17).
- (2) Insert the board assembly from the back of the set and locate as shown in Fig. 4, such that the two tabs on the board assembly fit into the slots in the bottom of the chassis.
- (3) Lock the board into position by inserting the self-threading screw through the right side of the chassis.
- (4) Mount the one-touch calling switch below the dial with the two screws provided.

**Note:** If switch for D-180818 Kit of Parts is already present, the one-touch calling switch can not be installed. The PSB terminal where the switch leads should be connected (Table

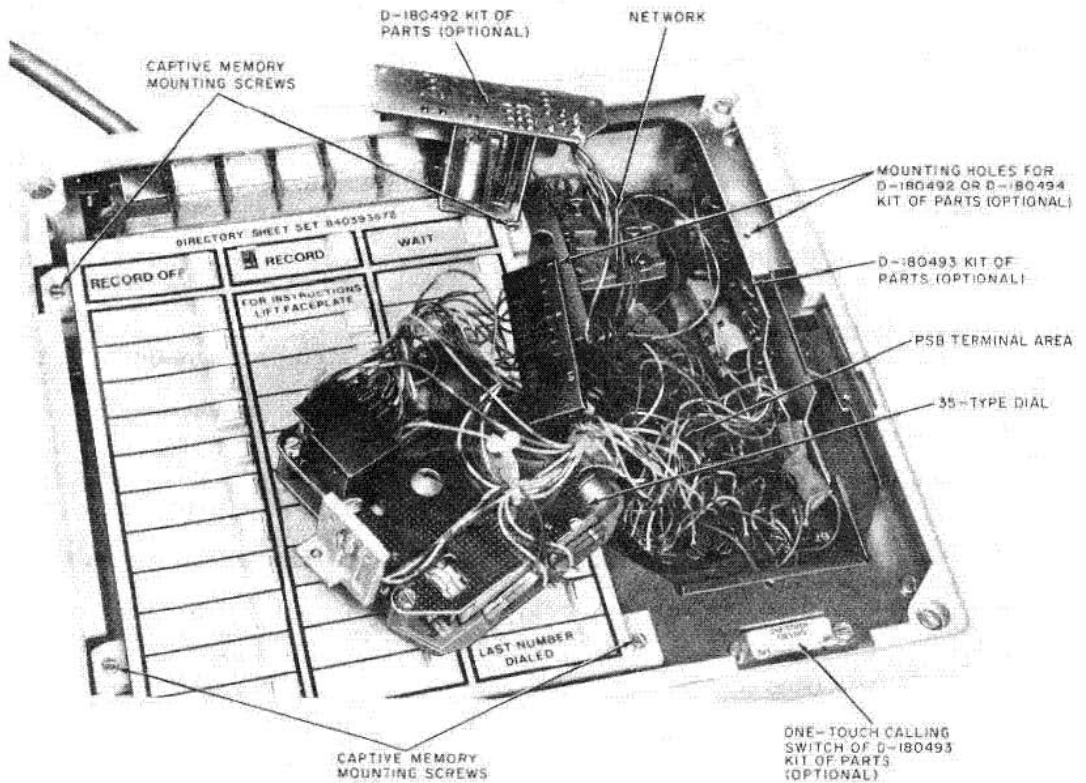


Fig. 4—2872A2M Telephone Set—Dial Removed To Show Terminal Area

C or E) shall be strapped together. (The one-touch calling option cannot be turned off by the subscriber.)

- (5) Make connections per Table C, E, or F.
- (6) Break off the detail at the bottom of the cover (Fig. 2) and trim edge as required.
- (7) Verify correct operation of the option.
- (8) Reassemble set.

#### D-180494 Kit of Parts (2/4-Wire Service)

##### 3.10 To install.

- (1) Proceed as described in 3.17.

- (2) Make connections per Table G.

- (3) Mount the kit assembly to the chassis with the screws provided (Fig. 4).

#### D-180818 Kit of Parts (Record Disable and Dial Intermix Features)

##### 3.11 To install.

- (1) Remove faceplate (3.19).
- (2) Loosen the captive screw at the bottom of the cover around the dial and remove the cover.
- (3) Disengage the four captive memory mounting screws (Fig. 4).

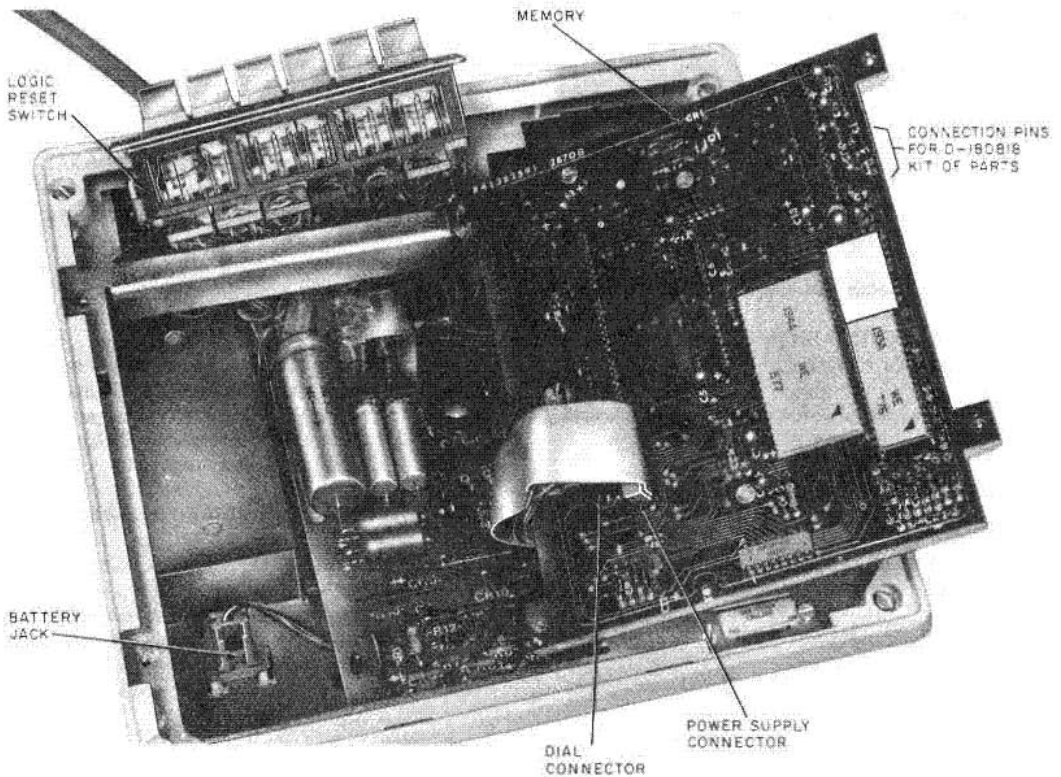


Fig. 5—2872A2M Telephone Set, Internal View, Overall

- (4) Disengage the two captive dial mounting screws and move dial aside.
- (5) Rotate left edge of the memory upward as shown by Fig. 5.

**Note:** If set is equipped with a 2870A Memory, replace it with 2870B Memory and carefully pack and return the old memory according to local procedures.

- (6) Mount switch below dial using the two screws provided.

**Note:** If the one-touch calling switch (D-180493 Kit of Parts) has been provided, it must be removed. The PSB terminals where the switch leads were connected (Table C or E) must be

strapped together. (The one-touch calling option can no longer be turned off by the subscriber.)

- (7) Connect switch lead connectors to post terminals on memory board per Table K.
- (8) With feature switch in OFF position, verify that set operates in normal manner:
  - Numbers can be recorded into memory
  - Numbers can be changed
  - Numbers can be deleted from memory.
- (9) Set feature switch to ON position and verify feature provided.

- Record disable feature, only.
    - (a) RECORD lamp will not light when RECORD button is depressed.
    - (b) No telephone numbers can be recorded, changed, or deleted in memory.
    - (c) LAST NUMBER DIALED feature is operative.
  - Record disable and dial intermix features.
    - (a) RECORD lamp will not light when record button is depressed.
    - (b) No telephone numbers can be recorded, changed, or deleted in memory.
    - (c) LAST NUMBER DIALED feature is disabled.
    - (d) Manually and automatically dialed digits may be intermixed (5.07).
- (10) Reassemble set.

#### Single-line Service

**3.12** The 2870A2M TOUCH-A-MATIC telephone set is available from the factory as a single line set. However, with the addition of a 2870B1 faceplate, the 2872A1M and 2872A2M telephone sets may be converted to single line service as follows.

- (1) Remove the faceplate, key collar, and all buttons of the 635-type key.
- (2) Gain access to terminal area (3.17).
- (3) Remove the cradle (3.20).
- (4) Make correction per Table L.
- (5) Reassemble set and install a 2870B1 faceplate of the appropriate color.

**Note:** If set was originally equipped with a 2872A1-87 faceplate, refer to 6.11.

#### Head Telephone Set

**3.13** To install.

- (1) Remove housing (3.21).
- (2) Access PSB terminal area (3.17).
- (3) Remove cradle (3.20).
- (4) Thread jack set cord through hole in rear of housing and make connections per appropriate table provided for Plantronics Jackset.
- (5) Reassemble telephone set.
- (6) Insert head telephone set plug into jackset.



*Other optional components may be used such as SPOKESMAN® loudspeaker sets, etc. Refer to the appropriate section for connection information for these components.*

#### COMPONENT LOCATION AND ACCESS INFORMATION

##### Location of Components

**3.14** The components are located in three areas as follows.

- (a) Under the handset cradle (Fig. 3):
  - Buzzer
  - Ringer
  - Switchhook assembly
  - Handset jack
  - Terminal boards (TB1 and TB2).
- (b) Under the faceplate, inside the set (Fig. 4 and 5):
  - Battery jack (Fig. 5)
  - Power supply (PSB) terminal area (Fig. 4)
  - Network (Fig. 4)
  - Options (Fig. 4):
    - D-180492 (relay kit for speakerphone)
    - D-180493 (dial tone detector and one-touch calling switch kit)

D-180494 (2/4-wire relay kit)

D-180818 (record disable and dial intermix feature switch)

(c) Bottom of telephone set (Fig. 6).

- Battery.

#### Mounting Cord

3.15 The D50BB-87 mounting cord is amphenol ended at the equipment end and equipped

with 508-type plugs for terminating on the back of the 635-type key module at the telephone set end. The conductors terminated in the 508-type plugs provide the major line service requirements. Spade-tipped conductors are provided for auxiliary control functions or options and are terminated directly on associated equipment, terminal boards, or stored.

**Note:** Sets manufactured prior to fourth quarter 1976 were equipped with D50AM-87 mounting cords. The major difference in the cords is that TIP and RING contact strips

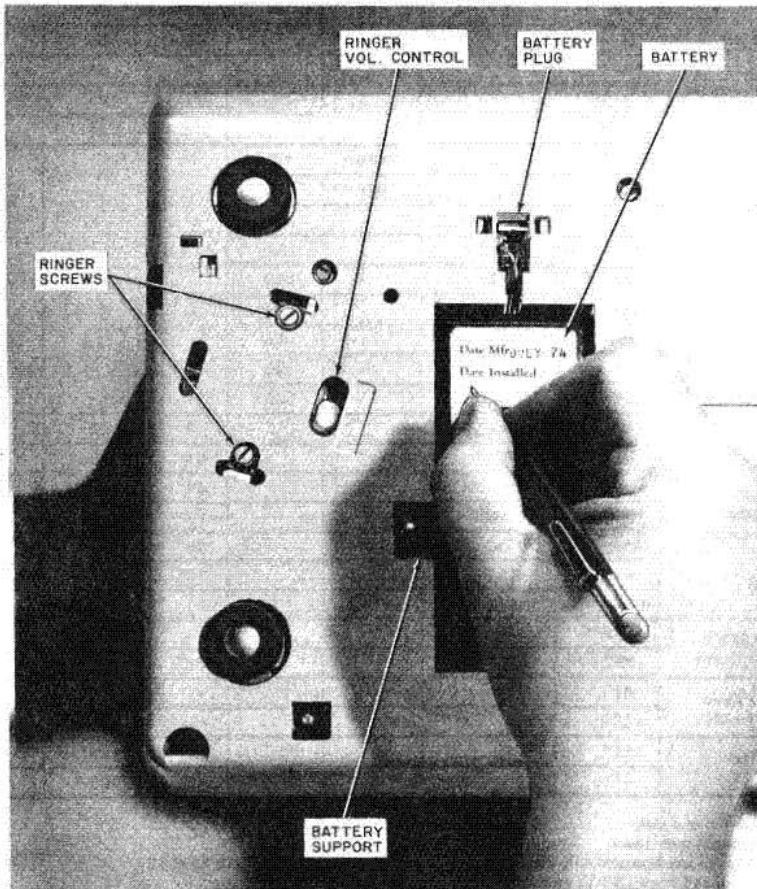


Fig. 6—2872A1M or 2872A2M Telephone Set, Bottom View



**TABLE B**  
**CONNECTIONS – 2872A1M OR 2872A2M TELEPHONE SET WITH 3B SPEAKERPHONE**

APPARATUS	LEAD		TEL. SET (NOTE 1)		CONNECT		
	DESIG	COLOR			FROM		TO
			CONT UNIT (NOTE 3)		1498 ADPT (D10R CORD)		
			FROM	TO PSB TERM.	55A	55B	TERM.
Tel Set	T1	V-G	*	2	19	1	8A
	R1	G-V	*	11	28	10	7A
	A1				12	2	A1
	AG	V-S	*	F†	5	11	12A
	LK	S-V	*	17	11	35	11A
	R or R1				18	34	1B
	R or R1				9	25	1A
	B or B1				17	33	2B
	B or B1				8	24	2A
	Strap	BK	PSB10	*			
Strap	BK	PSB20	*				
D-180492 Kit of Parts	CE	BL-BK		10			
	B+	BK-BL		15			
	SHa	R-BL		16			
	LK	BL-R		17			
	SHi	G-W		18			
	PFR	BL-V		20			
	VDD	W-G		21			
666B TRMTR (T7A Cord)	M1	S-BK			4	7	
	P1	BL-R			13	8	
	-15V	BK-S			14	16	
	S	O-BK			3	18	
	A1	Y-O			29	19	
	F1	G-Y			2	17	
	LK	BK-O			11	35	
760A LSPK (R2FK Cord)	SP1	G			34	20	
	SP2	R			33‡	29‡	
95B-Type Pwr-Unit	AC1						3B §
	AC2						4B §
2012B Trnsf (Note 2)	AC1				27	27	
	AC2				36	36	

\* Insulated and stored.

† Terminal on network.

‡ To reduce loudspeaker volume, move SP2 lead to terminal 24 (55A) or 30 (55B)

§ Insulate and store (BL-V) and (V-BL) leads in connector cable.

**Notes:**

1. Plug telephone set mounting cord into 149B adapter.
2. Both power unit and 2012B transformer must be connected for speakerphone operation.
3. When 55A control unit is used, it must be in the type modified for TOUCH-TONE, and strap terminals 20 and 21 (55A) or 4 and 5 (55B).



TABLE C

CONNECTIONS – 2872A1M OR 2872A2M TELEPHONE SET WITH  
ONE-TOUCH CALLING USING 3B SPEAKERPHONE

APPARATUS	LEAD		TEL SET (NOTE 1)		CONNECT		
	DESIG	COLOR			FROM		TO
			CONT UNIT (NOTE 5)		149B ADPT (D10R CORD)		
			FROM	TO PSB TERM.	55A	55B	TERM.
Tel Set	T1	V-G	*	2	19	1	8A
	R1	G-V	*	11	28	10	7A
	A1				12	2	A1
	AG	V-S	*	F†	5	11	12A
	LK	S-V	*	17	11	35	11A
	SPO	O-V	*	34	3	18	5B
	R or R1				18	34	1B
	R or R1				9	25	1A
	B or B1				17	33	2B
	B or B1				8	24	2A
D-180493 Kit of Parts (Note 4)	Input	G-R		2			
	PB	O-BK		9			
	Input	G-R		11			
	LK	Y-G		17			
	DT	O-Y		19			
	VDD	R-O		21			
	DR	Y-O		24			
	PL	O-R		25			
	DTT	BL-Y		26			
	SPR	Y-BL		27			
	COM	BK-O		29			
	SPO	G-Y		34			
	Switch	S			28		
S				29			
D-180492 Kit of Parts (Note 2)	CE	BL-BK		10			
	B+	BK-BL		15			
	SHa	R-BL		16			
	LK	BL-R		17			
	SHi	G-W		18			
	PFR	BL-V		20			
VDD	W-G		21				

TABLE C (Cont)

**CONNECTIONS – 2872A1M OR 2872A2M TELEPHONE SET WITH  
ONE-TOUCH CALLING USING 3B SPEAKERPHONE**

APPARATUS	LEAD		TEL SET (NOTE 1)		CONNECT		
	DESIG	COLOR	FROM	TO PSB TERM.	FROM		TO
					CONT UNIT (NOTE 5)		149B ADPT (D10R CORD)
					55A	55B	TERM.
666B TRMTR (T7A Cord)	M1	S-BK			4	7	
	P1	BL-R			13	8	
	-15V	BK-S			11	16	
	S	O-BK			3	18	
	A1	Y-O			29	19	
	F1	G-Y			2	17	
	LK	BK-O			11	35	
760A Lspk (R2FK Cord)	SP1	G			34	20	
	SP2	R			33†	29‡	
95B-Type Pwr Unit	AC1						3B §
	AC2						4B §
2012B Trnsf (Note 3)	AC1				27	27	
	AC2				36	36	

\* Insulated and stored

† Terminal on network

‡ To reduce loudspeaker volume, move SP2 lead to terminal 24 (55A) or 30 (55B)

§ Insulate and store (BL-V) and (V-BL) leads in connector cable.

**Notes:**

1. Plug telephone set mounting cord into 149B adapter.
2. When installing the D-180492 Kit of Parts, disconnect (BK) strap from PSB terminal 10, insulate and store; disconnect (BK) lead from PSB terminal 20; insulate and store.
3. Both power unit and 2012B transformer must be connected for speakerphone operation.
4. When installing the D-180493 Kit of Parts, remove (BK) strap leads from PSB terminals 19, 26, and 29, insulate and store.
5. When 55A control unit is used, it must be the type modified for TOUCH-TONE, and strap terminals 20 and 21 (55A) or 4 and 5 (55B).

were required with the D50AM-87, whereas individual conductors of the D50BB-87 connect to the TIP and RING contacts of the 635-type key.

**Network Terminals**

**3.16** For access to the network terminals.

- (1) Remove the faceplate (3.19).
- (2) Loosen the captive cover screw at the bottom of the white cover around the dial (Fig. 2).

(3) Remove the cover.

(4) To replace the cover, the three tabs of the cover (one at the top center and one at each side just above the dial) must be aligned with holes in the chassis before the screw is refastened. Failure to do this will result in improper seating of the faceplate.

**Power Supply (PSB), Terminals**

**3.17** To access the terminal field on the power supply board, proceed as follows.

- (1) Remove the faceplate (3.19).
- (2) Loosen the captive cover screw at the bottom of the white cover around the dial (Fig. 2).
- (3) Remove the cover.
- (4) Loosen the two captive screws that hold the dial in place.

**Note:** On sets with metal dial brackets, the screws will have to be removed.

- (5) Gently raise the dial and disconnect 12 position plug from terminal board.
- (6) Rotate dial over onto the memory.
- (7) To reassemble; reverse procedure.
- (8) To replace the cover, the three tabs of the cover (one at the top center and one at each side just above the dial) must be aligned with holes in the chassis before the screw is refastened. Failure to do this will result in improper seating of the faceplate.

#### Line Key Removal

**3.18** To remove, use the following procedure.

- (1) Remove faceplate (3.19).
- (2) Push the key toward the rear of the set to unlock it from the tabs.
- (3) Raise the metal plate of the key just above the tabs and move the key toward the left, then raise the right end of the key until it clears the chassis of the set.

**Caution:** Do not damage contact strips which protrude from bottom right side of key or logic reset switch attached on HOLD side of key. (These contact strips will only be found on sets equipped with D50AM-87 mounting cords.)

- (4) Lift the key completely out of the set.
- (5) Replace key by reverse procedure.

#### Faceplate Removal

**3.19** Removal will differ depending on faceplate provided.

- (a) The 2872B1 faceplate is held in place by a spring clip attached to the 870A1U upper housing. To disengage the faceplate, lift up the tab which protrudes from the center of the back edge of the faceplate.

**Note:** The 2872B1 faceplate is not a direct replacement for the 2872A1-87 faceplate. An 870A1U upper housing is also required with the 2872B1 faceplate (see 6.11).

- (b) The 2872A1-87 faceplate is held in place by two snaps bonded to the faceplate and aligned to fit holes in the chassis. To remove the faceplate, grasp it by any convenient edges and lift.

#### Handset Cradle Removal

**3.20** To remove the handset cradle from the housing, proceed as follows.

- (1) Remove the faceplate (3.19), and place the handset aside.
- (2) Remove upper housing, if provided, [3.21(b)].
- (3) Disengage the captive cradle screws located in the two tabs on the cradle (Fig. 2).
- (4) Lift the cradle, by pulling up on the plunger, and remove.
- (5) Replace the handset cradle by sliding it sideways to engage the clips with the mating tabs in the side of the housing.

**Caution:** The plunger must be held from the top side of the cradle as it is slid into position to prevent damage to the switchhook arm.

- (6) Refasten the captive cradle screws.

#### Housing Removal

**3.21** To remove, proceed as follows.

- (a) **Lower housing.**

- (1) Unplug the handset cord, at the telephone set end and remove handset.
- (2) Remove the faceplate (3.19).
- (3) Remove the handset cradle (3.20).

**Caution:** Attempting to remove the housing without removing the handset cradle may damage the switchhook arm.

- (4) Disengage the four captive housing screws (Fig. 2) located in each corner of the upper housing.
- (5) Separate the housing from the telephone set base.
- (6) Feed mounting cord through hole in bottom of housing as housing is removed.
- (7) Before replacing the housing, lift the set to check that the shoulders of the battery jack are against the two tabs on the chassis. Misalignment may cause the bottom of the housing to bow.
- (8) When replacing the housing, keep the handset jack from being trapped between the housing and the chassis.

(b) **Upper housing.**

- (1) Remove the faceplate (3.19).
- (2) Disengage the captive housing screws located in each corner of the upper housing (Fig. 2). This will release the lower housing.
- (3) Pull the upper housing away from the chassis as each housing screw is backed out. This will separate the upper housing from the chassis.
- (4) If necessary, thread screws out of housing.
- (5) To reassemble, reverse procedure.

#### 4. CONNECTIONS

- 4.01 Telephone set connections are shown in Fig. 8 and Table I.

**Caution:** Some conductor assignments are not standard (Table I).

- 4.02 Refer to Table A for connection reference for all options.
- 4.03 A partial functional schematic is shown on Fig. 14.

#### 5. OPERATION

##### Record A Number Into Memory

##### 5.01 To record.

- (1) Remove the faceplate (3.19).
- (2) Write or type the desired name and telephone number for a selected memory button on the associated position of the directory sheet.
- (3) Replace the directory sheet and faceplate.
- (4) Depress the RECORD button. The RECORD lamp adjacent to the RECORD button will light. (A number can be called and recorded simultaneously by lifting handset before depressing the RECORD button.)

**Note:** If set is equipped with the D-180818 Kit of Parts, switch must be placed in the OFF position.

- (5) Depress the specific memory button adjacent to the desired telephone number listed on the directory sheet.
- (6) Manually dial the desired telephone number. If an access code and pause for second dial tone is required.
  - (a) Dial the access digit(s) for the outside line.
  - (b) Push the WAIT button when the RECORD lamp relights. (The WAIT entry counts as one digit.)
  - (c) Dial the telephone number.

**Note:** A number up to 15 digits in length may be recorded. The RECORD lamp will go out momentarily as each digit is dialed. If exactly 15 digits are recorded, the RECORD

lamp will go out and stay out, indicating that the dialer has been reset. If a memory button has not been depressed, the RECORD lamp will go out when the first digit is dialed and recording operation will be voided.

- (7) Depress the RECORD OFF button if less than 15 digits are recorded. The RECORD lamp will go out. The dialer will be reset. The number is now stored in the selected memory. The dialer will also be reset by a switchhook, line key, or speakerphone operation.

#### Change A Number In Memory

**Note:** If set is equipped with a D-180818 Kit of Parts, switch must be in OFF position.

- 5.02 Whenever a new number is recorded in a previously used memory position, it will automatically replace the previously stored number.

#### Delete A Number From Memory

**Note:** If set is equipped with a D-180818 Kit of Parts, switch must be in OFF position.

- 5.03 Complete the following operations in succession.

- (1) Depress the RECORD button.
- (2) Depress the memory button corresponding to the name and number to be deleted.
- (3) Depress the RECORD OFF button.

#### Automatically Dial A Number From Memory

- 5.04 To automatically dial a number.

- (a) For factory-wired sets go off-hook, listen for dial tone, and depress the desired memory button. If WAIT input has been recorded, automatic dialing will stop. When second dial tone is heard, depress memory button again to complete automatic dialing.
- (b) For sets equipped with the dial tone detector only, go off-hook, listen for dial tone, and depress the desired memory button.
- (c) For sets equipped with the one-touch calling option (with speakerphone and dial tone detector), simply depress the memory button.

#### LAST NUMBER DIALED Feature

**Note:** If set is equipped with a D-180818 Kit of Parts, and dial intermix feature is provided, switch must be in OFF position.

- 5.05 The TOUCH-A-MATIC telephone set automatically records into the LAST NUMBER DIALED position (Fig. 1) any number dialed using the standard telephone dial. Each number in the LAST NUMBER DIALED position is automatically replaced by the next number manually dialed. Although the unit is recording, the RECORD lamp does not light at any time during this operation.

- 5.06 Operation of LAST NUMBER DIALED feature.

- (a) With no access digit(s) required.

- (1) Go off-hook.
- (2) Listen for dial tone.
- (3) Manually dial telephone number.
- (4) To redial same number automatically.

(a) For factory-wired sets, go off-hook, listen for dial tone and depress LAST NUMBER DIALED button.

(b) For sets equipped with the dial tone detector only, go off-hook, listen for dial tone, and depress the LAST NUMBER DIALED button.

(c) For sets equipped with the one-touch calling option (with speakerphone and dial tone detector), simply depress the LAST NUMBER DIALED button.

- (b) When an access code and pause for second dial tone is required.

- (1) Go off-hook.
- (2) Listen for dial tone.
- (3) Dial access digit(s).
- (4) Depress WAIT button, after second dial tone is heard.

- (5) Manually dial telephone number.
- (6) To redial same number automatically.
  - (a) For factory-wired sets, go off-hook, listen for dial tone and depress LAST NUMBER DIALED button. Automatic dialing will stop at the recorded WAIT input. When second dial tone is heard, depress LAST NUMBER DIALED button again to complete automatic dialing.
  - (b) For sets equipped with the dial tone detector only, go off-hook, listen for dial tone, and depress LAST NUMBER DIALED button.
  - (c) For sets equipped with the one-touch calling option (with speakerphone and dial tone detector), simply depress the LAST NUMBER DIALED button.

#### End-to-End Signaling

**5.07** For end-to-end signaling (such as data transmission) this set has the capability to intermix manual and automatic dialing. This can be accomplished if the following procedures are observed.

**Note:** If the telephone set is to be used for end-to-end signaling, V option (with polarity guard) shall be used, (Fig. 8B).

- (1) If the telephone set is equipped with the one-touch calling option the initial number must be dialed automatically (even if the one-touch calling switch is in the OFF position). This allows the dial tone detector to complete its function and then additional numbers may be dialed automatically or manually.
  - (a) **Standard Operation:** If, at any time, information is keyed in manually, the RECORD OFF button must be depressed before another number can be dialed from memory. (The RECORD lamp will not light at any time but depressing the RECORD OFF button will remove the set from the "last number dialed" mode and allow additional automatic dialing.)
  - (b) **Dial Intermix (D-180818 Kit of Parts):** With the switch in the ON

position, manually and automatically dialed digits may be intermixed as desired. Operation of the RECORD OFF button is not required.

**Note:** In this mode, the RECORD button and the LAST NUMBER DIALED feature are inoperative.

#### 6. MAINTENANCE

**6.01** In case of power failure, the automatic dialing feature cannot be used. The battery retains the number associated with each of the memory buttons for at least 24 hours. If power loss exceeds 24 hours, the numbers may have to be rerecorded.

#### Trouble Analysis

- 6.02** When trouble is encountered, the subsequent procedure should be followed.
- (1) Confirm improper operation either as a basic telephone set or as an automatic dialer (Part 5).
  - (2) Check for improper connections.
  - (3) Refer to Table N, and the following paragraphs.
  - (4) If removal of set is required, proceed as follows.
    - (a) Disconnect telephone set.
    - (b) Unplug battery.
    - (c) Place battery plug sideways into housing slot below battery jack and tape into place.

**Caution:** Failure to restrain plug can result in plug damage necessitating battery replacement.

#### Battery

**6.03** The KS-20390L2 and L4 batteries are not completely interchangeable. The List 2 battery may be used in both sets but the List 4 battery should only be used in the 2872A2M telephone set. Either battery has an expected life of about 4 years. It can be replaced without loss of memory provided that commercial ac power to

the set is continuously maintained. To replace the battery, proceed as follows (Fig. 6).

- (1) Tilt the front of the set up.
- (2) Unplug the battery.
- (3) Loosen captive screw on the battery support.
- (4) Remove battery support.
- (5) Remove battery.
- (6) Install new battery.
- (7) When battery has been connected at least five minutes, check memory retention by momentarily disconnecting ac power and then automatically dialing a known telephone number.

#### Memory

**6.04** The memory may be replaced in the following manner.

**Note:** Removal of the memory results in loss of stored telephone numbers.

- (1) Remove the faceplate (3.19).
- (2) Loosen the four captive memory mounting screws (Fig. 4).
- (3) Rotate the left edge of the memory upward as shown in Fig. 5.
- (4) Disengage the two connectors by pulling on them perpendicular to the printed wiring board.
- (5) Replace the memory by engaging the dial connector first. The dial connectors are keyed, one position is filled and should fit over the vacant position in the row of pins. The flat power supply cable should not be twisted. It should form a loop as shown in Fig. 5 when connected to the board.
- (6) Reassemble set.
- (7) Test per 3.07.

#### Dial

**6.05** To replace.

- (1) Proceed per 3.17.
- (2) Loosen the four captive mounting screws of the memory (Fig. 4).
- (3) Gently raise the left side of the memory and rotate to position shown in Fig. 5. This will expose 10-position dial connector.

**Caution:** Do not remove the power supply connector in the process of changing the dial, since this will result in complete loss of stored telephone numbers.

- (4) Carefully disengage the dial connector by pulling on it perpendicular to the printed wiring board.
- (5) Lift the dial out.
- (6) To replace a new dial, reverse the previous steps. The connectors are keyed to orient them relative to the pins. Observe the correct orientation and do not force the connection.

#### 6-Button Line Key

**6.06** To replace.

- (1) Remove key per 3.18.
- (2) Access PSB terminal area per 3.17.
- (3) Disconnect logic reset leads from PSB terminals 14 and 29.
- (4) Remove the 508-type plugs and (if provided) the two contact strips from the back of the key.
- (5) Install new key.
- (6) Reassemble the set.
- (7) Test for operation of the logic reset switch [3.07(7)].

**Ringer****6.07** To replace.

- (1) Remove the faceplate (3.19) and place handset aside.
- (2) Remove upper housing, if provided, [3.21(b)].
- (3) Remove the cradle (3.20).
- (4) Disconnect the ringer leads (Fig. 8I).
- (5) Tilt the front of the set up.
- (6) Unfasten ringer mounting screws (Fig. 6).
- (7) Remove ringer.
- (8) Replace new ringer and assemble in reverse order. The leads should be routed as shown in Fig. 3 to prevent contact with the gong and subsequent damping of the ringer output. Dial ringback code to test ringer.
- (9) Reassemble set.

**Buzzer****6.08** To replace the buzzer.

- (1) Remove the faceplate (3.19), and place handset aside.
- (2) Remove upper housing, if provided, [3.21(b)].
- (3) Remove the cradle (3.20).
- (4) Remove the buzzer mounting screw.
- (5) Remove the mounting screw and spacer for TB1 (Fig. 3).
- (6) Move board TB1 to gain access to the appropriate terminals on TB2.
- (7) Remove appropriate leads (Fig. 8H).
- (8) Reassemble. When replacing TB1, locate its tabs in the slots of the chassis before refastening the TB1 mounting screw.

**Handset Jack****6.09** To replace the 616B handset jack.

- (1) Remove the faceplate (3.19), and place handset aside.
- (2) Remove upper housing, if provided, [3.21(b)].
- (3) Remove the cradle (3.20).
- (4) Remove the mounting screw and spacer for TB1 (Fig. 3).
- (5) Move board TB1 to gain access to the appropriate terminals on TB2.
- (6) Disconnect the appropriate leads (Fig. 8H), and remove jack.
- (7) Reassemble. When replacing TB2, locate its tabs in the slots of the chassis before refastening the TB1 mounting screw.

**Handset**

**6.10** A defective G15A handset may be replaced or changed to a modular amplifying handset (G6BM, G7BM, or G8BM) by unplugging the H4DU cord and inserting it into the new handset. To replace the G15A handset with a nonmodular amplifying handset (G6B, G7B, or G8B) proceed as follows.

- (1) Unplug H4DU handset cord at telephone set end.
- (2) Remove faceplate (3.19), and place handset aside.
- (3) Remove upper housing, if provided, [3.21(b)].
- (4) Remove handset cradle (3.20).
- (5) Disconnect 616B handset jack (6.09). (Jack may be removed or stored just to right of ringer.)
- (6) Insert spade-tipped end of handset cord through hole in the side of the housing.
- (7) Attach stayboard hook to bottom of chassis (Fig. 3).



- (8) Route leads as shown in Fig. 3.
- (9) Make connections (Fig. 8H).
- (10) Reassemble set.

#### Faceplate

**6.11** To replace a 2872A1-87 faceplate with a 2872B1 faceplate.

- (1) Remove the 2872A1-87 faceplate by lifting up at any of its edges.
- (2) Remove the four captive housing screws (Fig. 2) from the chassis.
- (3) Use the four housing screws to mount the 870A1U upper housing to the chassis and

870A1 housing. The three parts should be held tightly together as the screws are driven.

- (4) Place the two tabs located along the lower edge of the 2872B1 faceplate in the notches in the lower side of the 870A1U-type upper housing.

- (5) Lower the faceplate to rest on the memory. The spring clip located at the top center of the upper housing should retain the faceplate.

#### Speakerphone

**6.12** For maintenance information on the 3B or 4A speakerphone systems, refer to Section 512-620-100 or 512-700-100, respectively.

**6.13** For speakerphone connections use appropriate Tables, B through E.

TABLE D

CONNECTIONS — 2872A1M OR 2872A2M TELEPHONE SET WITH  
4A SPEAKERPHONE, USING 82B CONNECTING BLOCK

APPARATUS	LEAD		TEL SET		82B CONN BLK (NOTE 1)	CONN CABLE AT KEY EQUIP	
	DESIG	COLOR	FROM	TO PSB TERM.		COLOR	TO
Tel Set	T1	V-G	*	2	(Note 2)		
	R1	G-V	*	11			
	A1						
	AG	V-S	*	F† *			
	LK	S-V	*	17			
	Strap	BK	PSB-10	*			
	Strap	BK	PSB-20	*			
D-180492 Kit of Parts	CE	BL-BK		10			
	B+	BK-BL		15			
	SHa	R-BL		16			
	LK	BL-R		17			
	SHi	G-W		18			
	PFR	BL-V		20			
	VDD	W-G		21			
85B1 Power Unit (Note 3)	AC1	BK			AC1	BR-V *	
	AC2	Y			AC2	V-BR *	
95B-Type Power Unit (Note 3)						BL-V *	
	AC1	R			21	V-BL *	
	AC2	G			46		

\* RBL  
A1 to L2  
Remove from  
L-2 on network  
& place on F  
of network

When transformer  
at WPT  
24 to AC  
49 AC

\* Insulated and stored.  
† Terminal on network.

## Notes:

1. Plug mounting cords of telephone set, 108A loudspeaker, and 660A transmitter into 82B connecting block. Install option plug in ringer cutoff mode.
2. For 1A1 or 1A2 KTS, connect link between 2 and A1. For 1A KTS, connect link between 19 and A1.
3. Both power units must be connected for speakerphone operation.

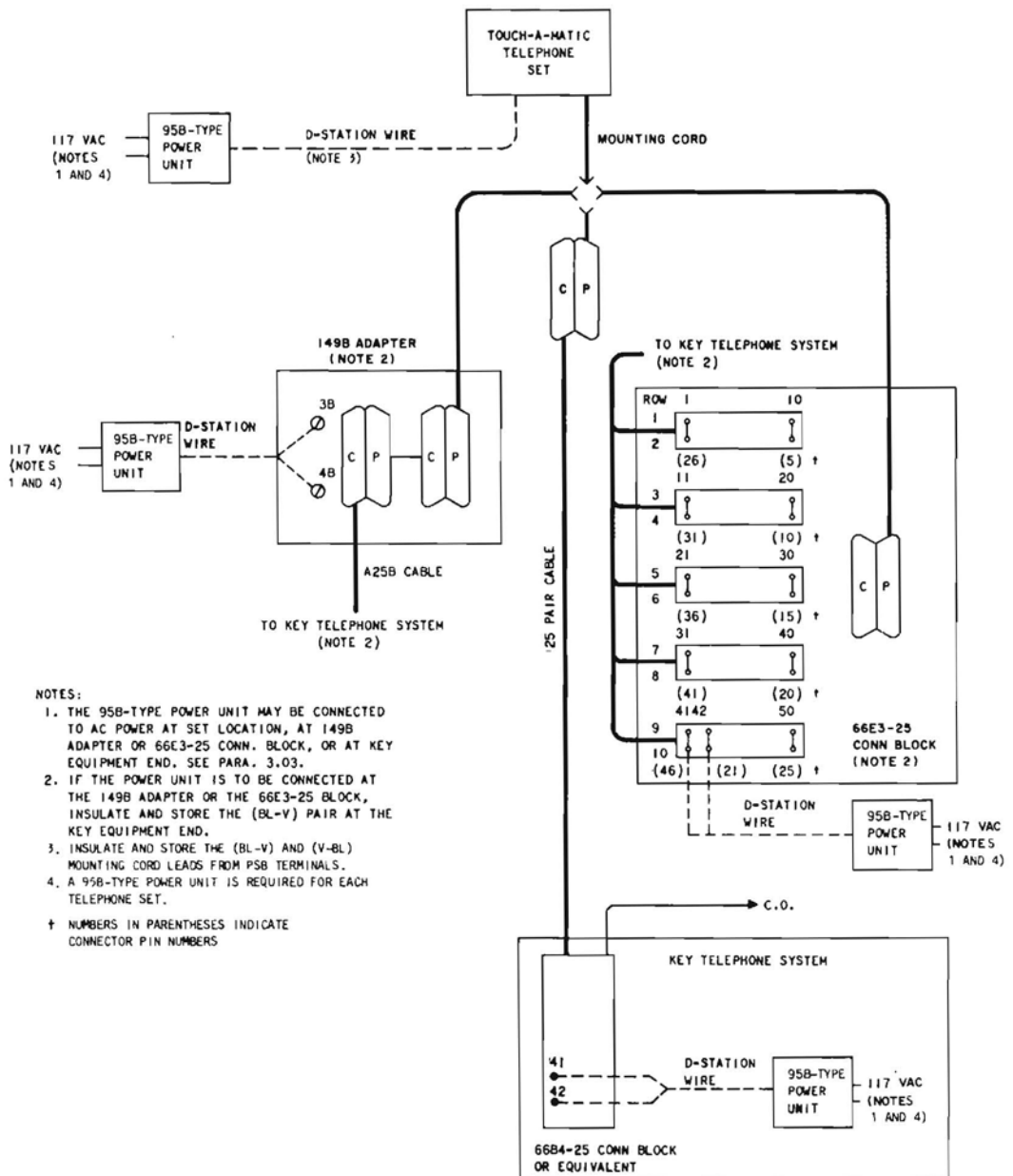


Fig. 7—2872A1M or 2872A2M Telephone Set, Alternate Power Connection Methods

TABLE E

CONNECTIONS — 2872A1M OR 2872A2M TELEPHONE SET WITH  
ONE-TOUCH CALLING USING 4A SPEAKERPHONE

APPARATUS	LEAD		TEL SET		82B CONN. BLK (NOTE 1)	CONN CABLE AT KEY EQUIP.	
	DESIG	COLOR	FROM	TO PSB TERM.		COLOR	TO
Tel Set	T1	V-G	*	2	(Note 2)		
	R1	G-V	*	11			
	A1						
	AG	V-S	*	F†			
	LK	S-V	*	17			
	SPO	O-V	*	34	Strap 10 to 35	O-V	*
D-180493 Kit of Parts (Note 4)	Input	G-R		2			
	PB	O-BK		9			
	Input	G-R		11			
	LK	Y-G		17			
	DT	O-Y		19			
	VDD	R-O		21			
	DR	Y-O		24			
	PL	O-R		25			
	DTT	BL-Y		26			
	SPR	Y-BL		27			
	COM	BK-O		29			
	SPO	G-Y		34			
	SWITCH	S		28			
		S		29			
D-180492 Kit of Parts (Note 3)	CE	BL-BK		10			
	B+	BK-BL		15			
	SHa	R-BL		16			
	LK	BL-R		17			
	SHi	G-W		18			
	PFR	BL-V		20			
	VDD	W-G		21			
85B1 Power Unit (Note 5)	AC1					BR-V	*
		BK			AC1		
	AC2	Y			AC2	V-BR	*

TABLE E (Cont)

**CONNECTIONS – 2872A1M OR 2872A2M TELEPHONE SET WITH  
ONE-TOUCH CALLING USING 4A SPEAKERPHONE**

APPARATUS	LEAD		TEL SET		82B CONN. BLK (NOTE 1)	CONN CABLE AT KEY EQUIP.	
	DESIG	COLOR	FROM	TO PSB TERM.		COLOR	TO
95B-Type Power Unit (Note 5)	AC1					BL-V	*
		R			21		
	AC2					V-BL	*
		G				46	

\* Insulated and stored.

† Terminal on network.

*Notes:*

1. Plug mounting cords of telephone set, 108A loudspeaker, and 680A transmitter into 82B connecting block. Install option plug in ringer cutoff mode.
2. For 1A1 or 1A2 KTS, connect link between 2 and A1. For 1A KTS, connect link between 19 and A1.
3. When installing D-180492 Kit of Parts, disconnect (BK) strap from PSB-10, insulate and store; disconnect (BK) lead from PSB-20, insulate and store.
4. Remove (BK) lead from PSB terminals 19, 26, and 29; insulate and store.
5. Both power units must be connected for speakerphone operation.

**TABLE F**  
**CONNECTIONS – 2872A1M OR 2872A2M**  
**TELEPHONE SET WITH DIAL TONE**  
**DETECTOR (NOTE)**

APPARATUS	LEAD		TEL SET	
	DESIG	COLOR	FROM	TO PSB TERM
Tel Set	Strap	BK	19	*
	Strap	BK	26	*
D-180493 Kit of Parts	Input	G-R		2
	PB	O-BK		9
	Input	G-R		11
	LK	Y-G		*
	DT	O-Y		19
	VDD	R-O		21
	DR	Y-O		24
	PL	O-R		25
	DTT	BL-Y		26
	SPR	Y-BL		*
	COM	BK-O		29
	SPO	G-Y		*
	Switch †	S		*
	S		*	

\* Insulated and stored.

† Switch is not required when speakerphone is not provided.

*Note:* May be used for applications where first dial tone is not precise (350 Hz and 440 Hz) but all subsequent dial tones must be precise if number is to be dialed automatically.



FIG. C  
RELAY PRINTED  
WIRING BOARD  
(D-180492)

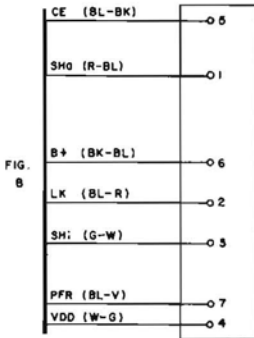


FIG. E  
ONE-TOUCH  
CALLING SWITCH  
(D-180493)

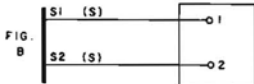


FIG. D  
DIAL TONE DETECTOR  
(D-180493)

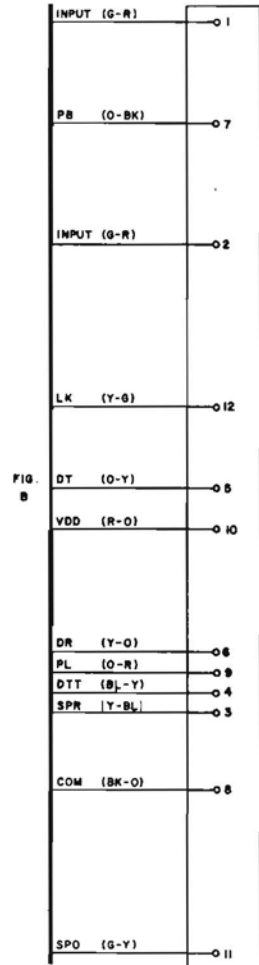


Fig. 8—2872A1M or 2872A2M Telephone Set, Connections (Sheet 2 of 5)



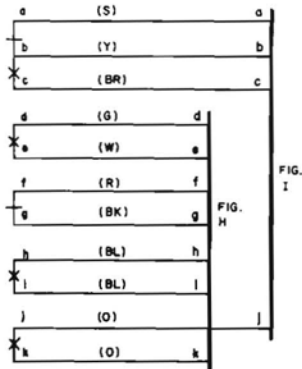
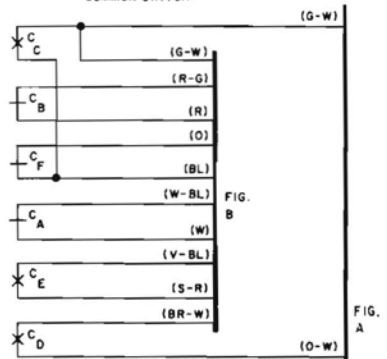
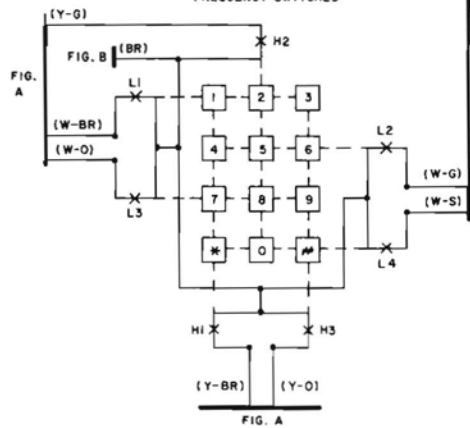
FIG. F  
SWITCHHOOKFIG. G  
DIAL  
COMMON SWITCHDIAL  
FREQUENCY SWITCHES

Fig. 8—2872A1M or 2872A2M Telephone Set, Connections (Sheet 3 of 5)

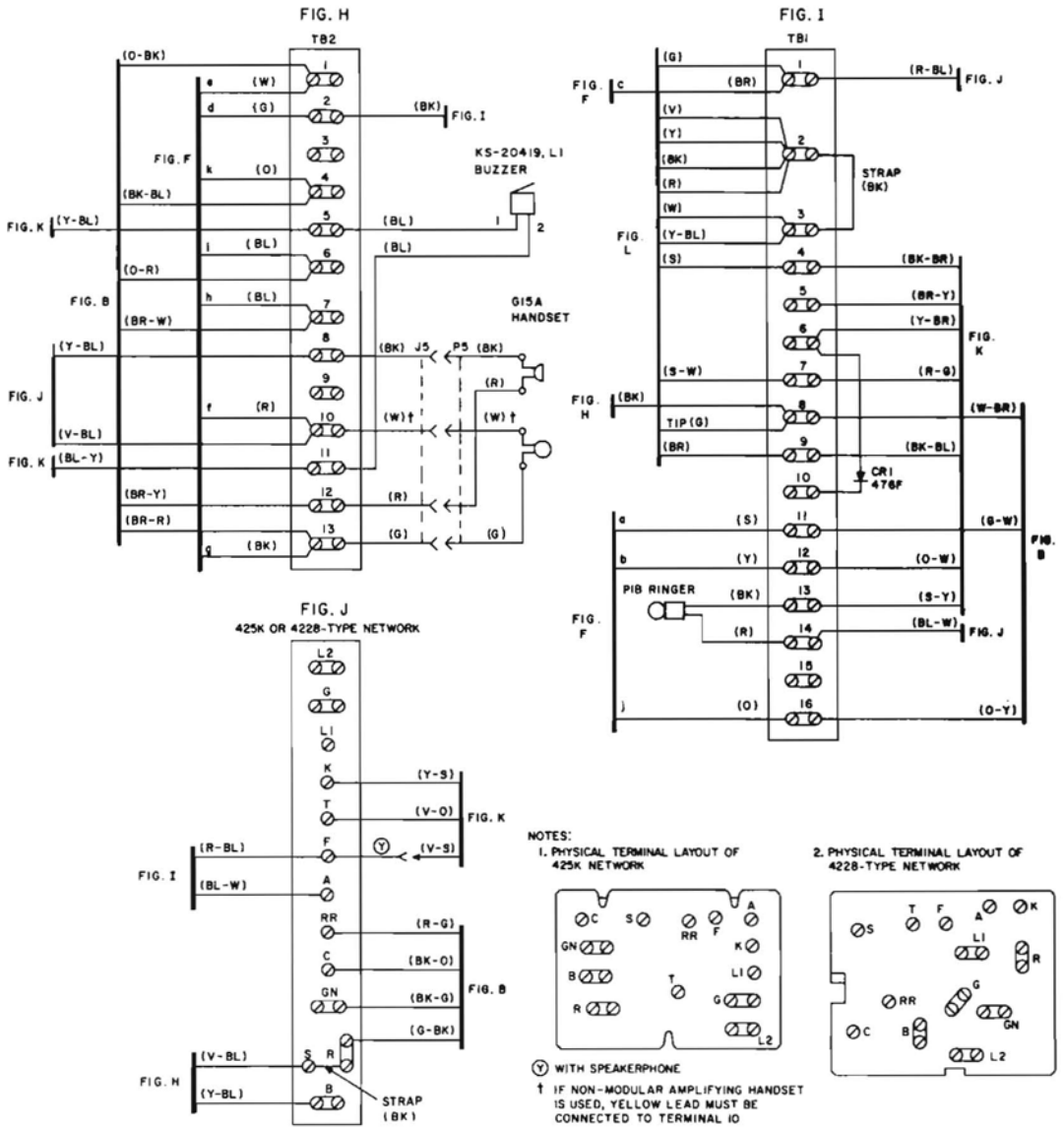


Fig. 8—2872A1M or 2872A2M Telephone Set, Connections (Sheet 4 of 5)



**TABLE G**  
**CONNECTIONS FOR 2/4-WIRE SERVICE**

APPARATUS	LEAD COLOR	REMOVE FROM	CONNECT TO
Tel Set	BK-G	Net. GN	Net. L1
	BK	Net. R	*
	BR-V	*	PSB-17
	V-BR	*	PSB-34
D-180494 Kit of Parts	V		Net. T
	S		Net. F
	BR		PSB-3
	Y-BR		Net. L1
	BL-R		Net. GN
	G-BK		PSB-17
	R-BR		Net. R
	R-O		Net. S
	BL-Y		PSB-34

\* Insulated and Stored.

**TABLE H**  
**CONVERSION OF KEYS FOR SIGNALING**

SELECTIVE SIGNALING							
508 PLUG	COLOR:	BLUE	ORANGE	GREEN	BROWN	SLATE	
	PIN NO:	2	2	2	2	2	1
	LEAD COLOR:	W	R	BK	Y	V	S
Key Functions †	HPPPPP	TB1-3	TB1-2	TB1-2	TB1-2	TB1-2	TB1-4
	HPPPPS	TB1-3	TB1-2	TB1-2	TB1-2	TB1-5	TB1-4
	HPPSSS	TB1-3	TB1-2	TB1-2	TB1-5	TB1-5	TB1-4
	HPPSSS	TB1-3	TB1-2	TB1-5	TB1-5	TB1-5	TB1-4
COMMON SIGNALING (SEE NOTE)							
508 PLUG	COLOR:	BLUE	ORANGE	GREEN	BROWN	SLATE	
	PIN NO:	2	2	2	2	2	1
	LEAD COLOR:	W	R	BK	Y	V	S
Key Functions †	HPPP*P*S	TB1-3	TB1-3	TB1-2	TB1-2	TB1-2	TB1-3
	HPP*P*P*S	TB1-3	TB1-2	TB1-2	TB1-2	TB1-2	TB1-3

Note: Remove (BK) strap between TB1-2 and TB1-3.

\* These arrangements use line switch controlled ground for common signal key, used with private or intercommunicating lines. Common signal should be used to operate a common signal relay. Do not wire directly to a buzzer.

† Remove pins to make key nonlocking when used for signaling.

**TABLE I**  
**MOUNTING CORD AND 508 PLUG CONNECTIONS**

AMPHENOL PLUG			INSIDE TELEPHONE SET						
DESIG	PIN NO.	COLOR	MTG CD TERMINATIONS			SPADE TIP CONDUCTORS FROM 508 PLUGS.			
			SPADE TIP COND. IN MTG. CD	508 PLUGS		PLUG COLOR	PLUG PIN NO.	COLOR	TERM.
				COLOR	PIN NO.				
R(1)	1	BL-W		BL	6	BL	6	BL-W	*
T(1)	26	W-BL		BL	3	BL	3	W-BL	*
A1	2	O-W	TB1-12			BL	2	W	TB1-3
A(1)	27	W-O		BL	1	BL	1	W-O	*
L(1)	3	G-W		BL	L				
LG(1)	28	W-G		BL	LG				
R(2)	4	BR-W		O	6				
T(2)	29	W-BR		O	3				
B(2)	5	S-W	*			O	2	R	TB1-2
A(2)	30	W-S		O	1				
L(2)	6	BL-R		O	L				
LG(2)	31	R-BL		O	LG				
R(3)	7	O-R		G	6				
T(3)	32	R-O		G	3				
B(3)	8	G-R	*			G	2	BK	TB1-2
A(3)	33	R-G	TB1-7			G	1	S-W	TB1-7
L(3)	9	BR-R		G	L				
LG(3)	34	R-BR		G	LG				
R(4)	10	S-R		BR	6				
T(4)	35	R-S		BR	3				
B(4)	11	BL-BK	*			BR	2	Y	TB1-2
A(4)	36	BK-BL	TB1-9			BR	1	BR	TB1-9
L(4)	12	O-BK		BR	L				
LG(4)	37	BK-O		BR	LG				
R(5)	13	G-BK		S	6				
T(5)	38	BK-G		S	3				
B(5)	14	BR-BK	*			S	2	V	TB1-2
A(5)	39	BK-BR	TB1-4			S	1	S	TB1-4
L(5)	15	S-BK		S	L				
LG(5)	40	BK-S		S	LG				
BZ1	16§	BL-Y	TB2-11						
BZ	41§	Y-BL	TB2-5						

**TABLE I (CONT)  
MOUNTING CORD AND 508 PLUG CONNECTIONS**

AMPHENOL PLUG			INSIDE TELEPHONE SET						
DESIG	PIN NO.	COLOR	MTG CD TERMINATIONS			SPADE TIP CONDUCTORS FROM 508 PLUGS.			
			SPADE TIP COND. IN MTG. CD	508 PLUGS		PLUG COLOR	PLUG PIN NO.	COLOR	TERM.
				COLOR	PIN NO.				
Spare	17	O-Y	*						
Spare	42	Y-O	*						
HL	18	G-Y	PSB-32						
HLG	43	Y-G	PSB-33						
SG	19	BR-Y	TB1-5						
BL	44	Y-BR	TB1-6						
R or R1	20	S-Y	TB1-13						
B or B1	45	Y-S	Net. K						
AC1†	21§	BL-V	PSB-30						
AC2†	46§	V-BL	PSB-31						
SPO‡	22§	O-V	*						
Spare	47	V-O	Net. T						
R1‡	23	G-V	*						
T1‡	48	V-G	*						
IR‡	24	BR-V	*						
IT‡	49	V-BR	*						
LK‡	25	S-V	*						
AG‡	50	V-S	*						
Tip						S	4	G	TB1-8
Ring						S	5	R	PSB-12
						Pink	HL	BR-W	PSB-32
						Pink	HLG	W-BR	PSB-33
						Pink	3	BL	*
						Pink	2	G	TB1-1
						Pink	1	Y-BL	TB1-3

\* Insulate and store.

† 95B1 Power Unit (Touch-A-Matic Power Supply)

‡ Designations for speakerphone options. Refer to Tables B through E.

§ Nonstandard pin numbers.

**TABLE J**  
**TO CONVERT THE 2872A1M OR 2872A2M**  
**TELEPHONE SET FROM 1A1, 1A2, TO**  
**1A OPERATION (SEE NOTE)**

LEAD DESIG	COLOR	FROM (1A1, 1A2)	TO (1A)
SHb	Y	TB1-12	TB1-5
HOLD	Y-BL	TB1-3	TB1-16
HOLD	BL	* (Pink 508 Plug)	TB1-3
HQLD	G	TB1-1	Net. L2
RING	R	PSB-12	Net. L2
SHc †	BR	TB1-1	TB1-6
Net. F ‡	R-BL	TB1-1	TB1-6

\* Insulated and stored.

† Only required when busy-lamp option is provided.

‡ Only required when both busy-lamp and speakerphone options are provided.

**Note:** Tables B through G provide speakerphone connections for 1A1 and 1A2 KTS. The same tables apply for 1A KTS

**TABLE K**

**CONNECTIONS FOR D-180818**  
**KIT OF PARTS**

D-KIT SWITCH LEADS		TERMINAL POSTS FOR SWITCH LEAD CONNECTORS	
DESIG.	COLOR (NOTE 1)	RECORD DISABLE ONLY	RECORD DISABLE AND DIAL INTERMIX FEATURE (NOTE 2)
WDC	BK †	*	1
VDD	R	2	2
RCRD	BK	3	3

\* Insulate and store.

† Single pin connector.

**Notes:**

- These are connectors attached to the switch leads. A single pin connector with a (BK) lead and a double pin connector with a (R) and (BK) lead.
- When this option is provided the LAST NUMBER DIALED (LND) feature is disabled and the 32nd memory may be used just as any other memory.

**TABLE L**

**CONNECTIONS FOR CONVERSION**  
**TO SINGLE LINE SERVICE WITH**  
**BRIDGED RINGING**

LEAD		CONNECT	
DESIG.	COLOR	FROM	TO
Tip	W-BL	(1PU-3)*	TB1-8
Ring	BL-W	(1PU-6)*	TB1-16
B1	Y-S	Net. K	*
Strap	BK	Net. K	PSB-35
R1	S-Y	TB1-13	*
Strap	BK	TB1-13	TB1-16
A-Lead	W-O	(1PU-1)*	TB1-1
Hold	Y-BL	TB1-3	*
LRS-2	BR	PSB-14	*

\* Insulated and stored.

**TABLE M**

**CONVERSION TO BRIDGED**  
**RINGING ON FIRST LINE WITH**  
**6-BUTTON KEY SERVICE**

LEAD		CONNECT	
DESIG.	COLOR	FROM	TO
Tip	W-BL	(1PU-3)*	TB1-15
Ring	BL-W	(1PU-6)*	TB1-13
B1	Y-S	Net. K	*
Strap	BK	Net. K	TB1-15
R1	W-Y	TB1-13	*

\* Insulated and stored.

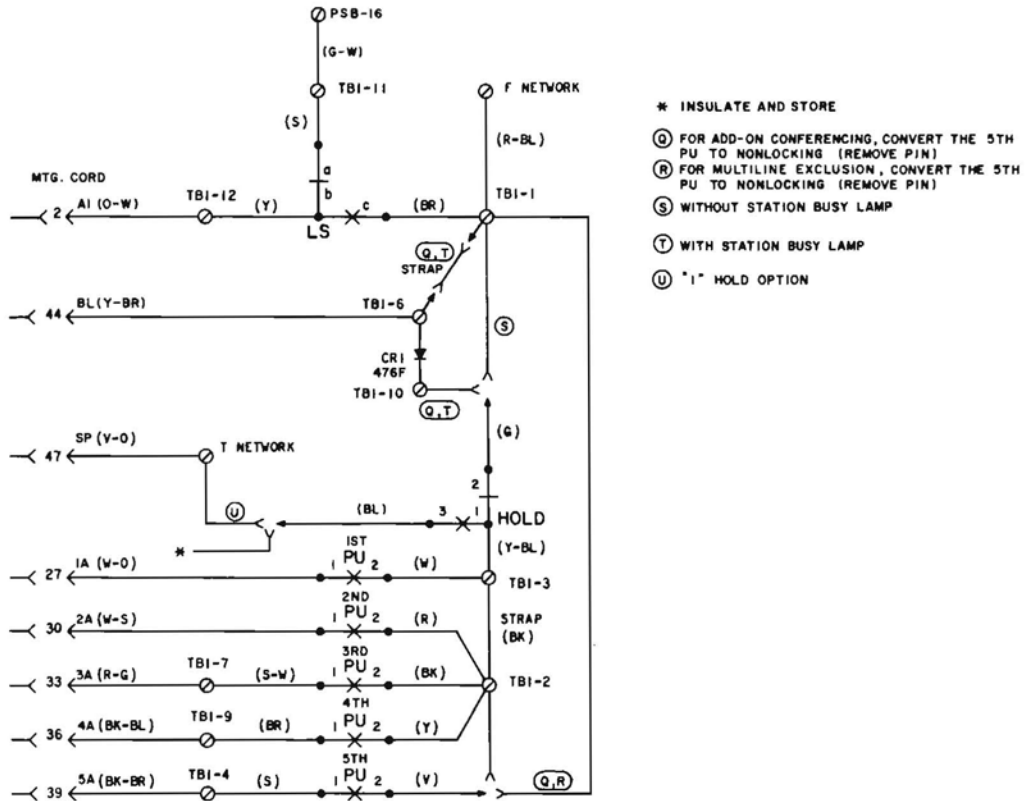


Fig. 9—"I" Hold, Exclusion, Station Busy Lamp, and Add-On Conferencing—1A1 and 1A2 KTS (Showing 5th Key Modified)



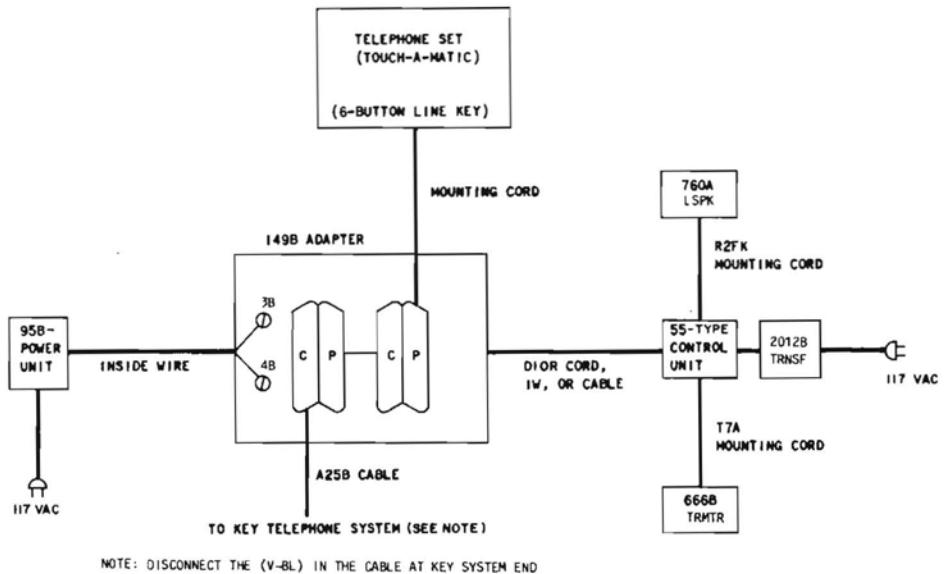
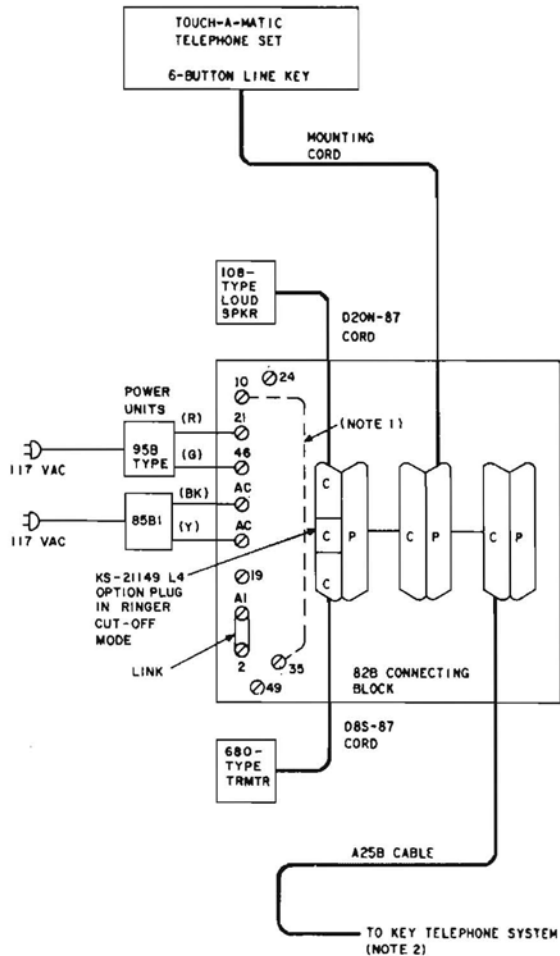


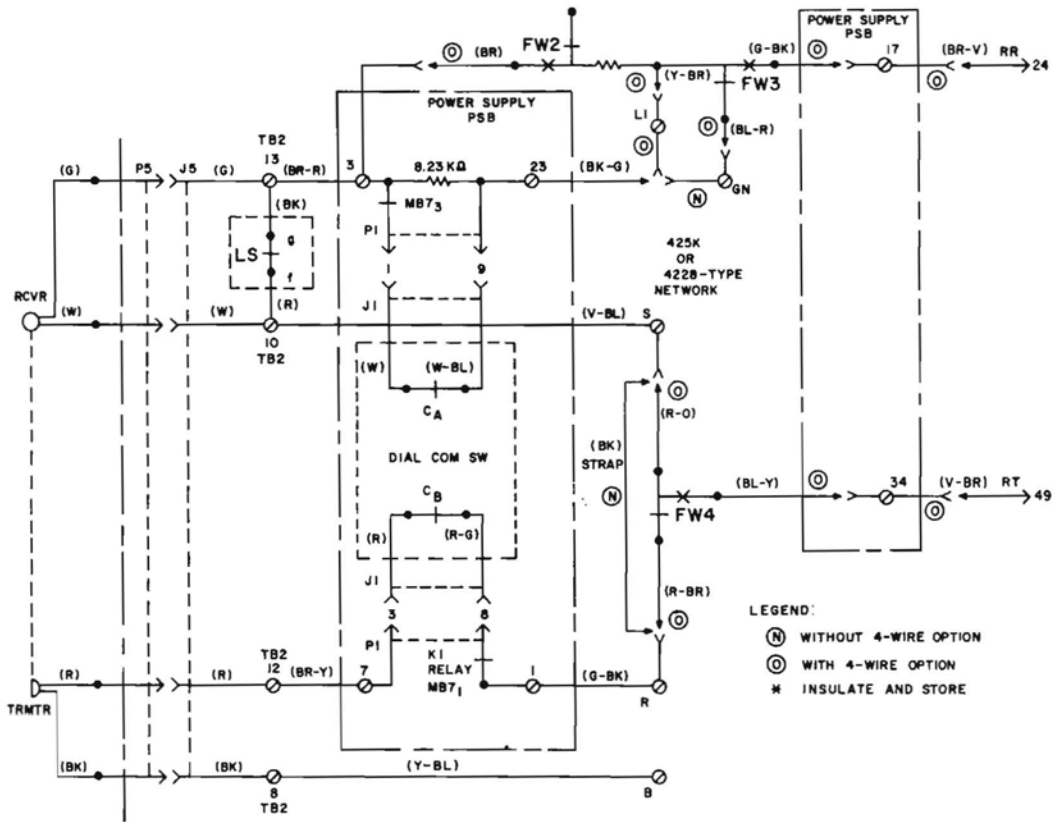
Fig. 10—Block Diagram—2872A1M or 2872A2M Telephone Set Using 3B Speakerphone



## NOTES:

1. STRAP NECESSARY ONLY IF SET IS ALSO EQUIPPED WITH DIAL TONE DETECTOR TO PROVIDE ONE-TOUCH CALLING OPTION.
2. IF POWER IS PROVIDED THROUGH KEY CABLE, USE (BR-V) PAIR FOR 85-TYPE POWER UNIT AND STRAP 24 TO AC1 AND 49 TO AC2 ON 82B CONNECTING BLOCK.

Fig. 11—Block Diagram—2872A1M or 2872A2M Telephone Set Using 4A Speakerphone



4-WIRE CONTROL

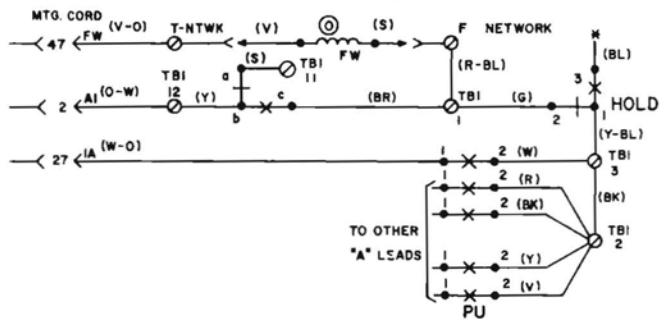
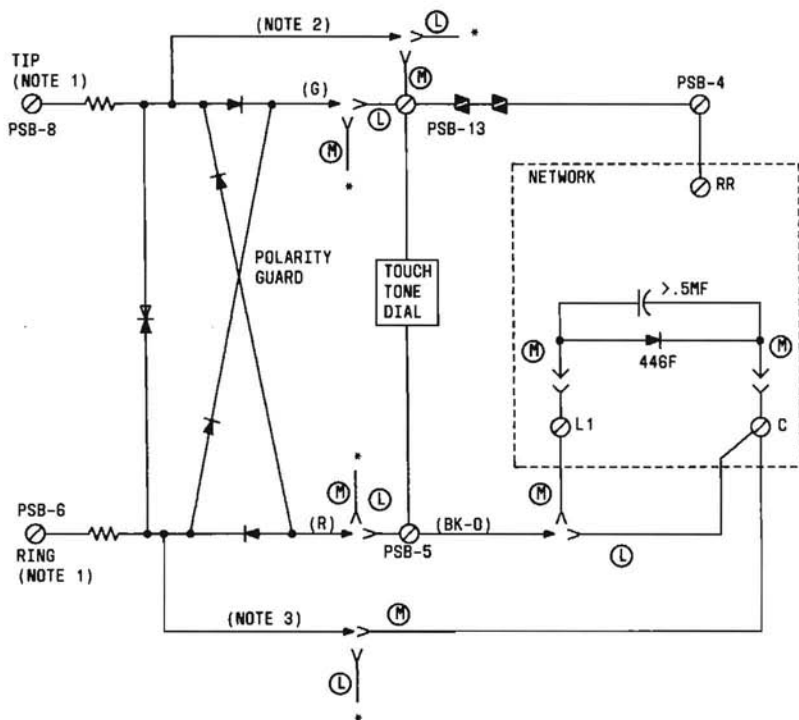


Fig. 12—2872A1M or 2871A2M Telephone Set—2/4-Wire Connections



\* INSULATED AND STORED

(L) WITHOUT RESTRICTED DIALING (FACTORY WIRED)

(M) WITH RESTRICTED DIALING

NOTES:

1. REVERSE POLARITY ON TIP AND RING LEADS ON ALL LINES WITH RESTRICTED DIALING
2. FOR 2872A1M SET - (Y)  
FOR 2872A2M SET - (BL)
3. FOR 2872A1M SET - (BL)  
FOR 2872A2M SET - (Y)

Fig. 13—2872A1M or 2872A2M Telephone Set, Connections for Restricted Dialing Option



**TABLE N**  
**TROUBLE ANALYSIS – 2872A1M OR 2872A2M**

TROUBLE NUMBER	FAILURE	ADDITIONAL SYMPTOM	POSSIBLE CAUSE	REMEDIAL ACTION
1	Dead set on all lines	Line lamp does not come on when handset is taken off-hook	Mounting cord improperly inserted at equipment end	Check cord insertion and connections
		Line lamp comes on when handset is taken off-hook	Bad connection between handset and telephone set	1. Check handset cord connections 2. Check handset jack connections
			Defective receiver	Check handset
			Unknown	Replace telephone set*
		Dial tone is not present when speakerphone is on	Open tip or ring lead at line key	Check leads and connections from contact strips
Dial tone is present when speakerphone is on	Defective switchhook d-e or j-k contacts	Replace telephone set*		
2	Cannot transmit or receive when off-hook using handset	Line lamp comes on	Handset cord improperly inserted into handset or jack in telephone set	Check handset cord and/or handset
		Dial tone present, but sidetone absent. No audible TOUCH-TONE® signal	12-pin connector or dial not properly inserted on pins on power supply board	1. Check connector insertion 2. Replace dial
			Defective 616B jack	Replace 616B jack
			Defective network	Replace telephone set*
3	Cannot manually dial when off-hook	Clicking sounds or damped TOUCH-TONE signals heard when dial buttons are depressed Cannot hang up set.	Bridged set off-hook	Place bridged set on-hook
			No audible TOUCH-TONE signal present	20-pin power supply connector not properly inserted on pins on memory PWB
		Dial connectors not properly inserted		1. Check connector insertion 2. Replace dial
		Defective memory PWB		Replace memory
		Unknown	Replace telephone set*	
Some TOUCH-TONE dial frequencies incorrect	Static discharge damage	1. Consult Telco engineer for proper grounding procedure 2. Replace memory		
4	Cannot manually dial some digits when off-hook		Open or loose leads to dial contacts	Check for proper insertion of leads into 10-position dial connector
			Defective frequency contacts on dial	Replace dial

\*Refer to 6.02 (4).

TABLE N (Cont)  
TROUBLE ANALYSIS – 2872A1M OR 2872A2M

TROUBLE NUMBER	FAILURE	ADDITIONAL SYMPTOM	POSSIBLE CAUSE	REMEDIAL ACTION
4 (cont'd)			Defective memory PWB	Replace memory.
			Unknown	Replace telephone set*
5	Cannot manually dial off-hook for ac power failure condition	Can manually dial off-hook with ac power	Open strap lead between screw terminals 10 and 15 on PSB	Repair or replace strap lead
			Open path on PSB	Replace telephone set*
6	RECORD lamp does not function properly	RECORD lamp does not turn on when RECORD button is depressed or RECORD lamp is on and cannot be turned off	Battery not plugged in, or defective	Plug in or replace battery
		RECORD lamp does not turn on when RECORD button is depressed	AC power not present	Check for commercial power
			Switch of D-180818 Kit of Parts in ON position	Change switch position to OFF
			AC power unit not plugged in or defective	Check or replace power unit (should read 13.4 to 18 VAC across screw terminals 30 and 31 on PSB)
			Open in IW	Check IW and connection
			Memory, RECORD OFF, or WAIT button stuck down	Clear stuck button
			Defective lamp or lamp driver circuit	Replace memory
			Defective logic reset switch on line key	Replace line key
			Static discharge damage	1. Consult your Telco engineer for proper grounding procedures 2. Replace memory
		Unknown	Replace telephone set*	
Lamp turns off when any memory button is depressed or Lamp does not momentarily turn off when a dial button is depressed	Defective logic	Replace memory		
	Unknown	Replace telephone set*		
7	Cannot record into memory	RECORD lamp momentarily flashes when RECORD button is depressed	Stuck RECORD OFF button	Check RECORD OFF button
			Wait contacts closed even when WAIT button is not depressed	1. Check WAIT button 2. Replace memory

\*Refer to 6.02 (4).

TABLE N (Cont)

## TROUBLE ANALYSIS – 2872A1M OR 2872A2M

TROUBLE NUMBER	FAILURE	ADDITIONAL SYMPTOM	POSSIBLE CAUSE	REMEDIAL ACTION	
8	Cannot record properly into the 31 memory positions or into the LAST NUMBER DIALED position	Warble tones heard when automatically dialing. Get "cannot complete" intercept for automatic or manual dialing	WAIT contacts closed even when WAIT button is not depressed	Replace memory	
			Switch of D-180818 Kit of Parts in ON position	Change switch position to OFF	
		Party is reached when number is recorded as it is manually dialed. However, when number is subsequently dialed from memory, party is not reached — wrong number is dialed from memory	Incorrect dial contact sequence	Replace dial	
			Defective logic	Replace memory	
		Open circuit on PSB	Replace telephone set*		
9	Cannot dial properly from memory		Did not record properly	1. Record per 5.01 2. See No. 7	
		MB7 relay does not operate (no clicking sound heard) when memory button is depressed. No audible TOUCH-TONE signal present	Battery not plugged in (2872A2M tel set)	Plug battery in	
			Memory not securely mounted	Tighten memory mounting screws	
			Open circuit in power path	Check for proper strap lead connections on PSB. See Fig. 8 [B]	
			Defective logic	Replace memory	
			Defective switch-hook h-i contacts	Replace telephone set*	
		MB7 relay operates (clicking sound heard) but holds for less than 0.1 second for a 15 digit number	Incorrect dial sequence	Replace dial	
					No audible TOUCH-TONE signal present
					Audible gap in train of digits being dialed
		Digits dialed too rapidly (fast dialer)	Noise on ac power line (2872A1M)	1. Minimize wire length between 95B1 power unit and telephone set. 2. Insert 145A filter between 95B1 power unit and commercial power outlet	
Defective power supply PWB assembly (2872A2M)	Replace telephone set*				

\*Refer to 6.02 (4).



TABLE N (Cont)  
TROUBLE ANALYSIS – 2872A1M OR 2872A2M

TROUBLE NUMBER	FAILURE	ADDITIONAL SYMPTOM	POSSIBLE CAUSE	REMEDIAL ACTION
9 (cont'd)		No digits or random digits in memory	AC power outage for 24 hours or longer	Reestablish ac power and rerecord numbers into memory
			Disconnected or defective battery	<ol style="list-style-type: none"> <li>1. Plug in the battery</li> <li>2. Allow the battery to be charged for a minimum of 5 minutes. Then momentarily remove the 95B1 power unit from the ac power outlet and reinsert</li> <li>3. If previously stored numbers are not dialed from memory, replace the battery</li> <li>4. Repeat procedure</li> </ol>
			Defective power supply circuit	Replace telephone set*
		No digits or all the same digits in random memory locations	Defective memory	Replace memory
		Two or more memory locations have some digits which are usually different from originally recorded digits	Static discharge damage	<ol style="list-style-type: none"> <li>1. Consult your Telco engineer for proper grounding procedures</li> <li>2. Replace memory</li> </ol>
Automatically dials through a "wait" after pausing momentarily at the "wait" space on a train of recorded digits	Defective WAIT contacts or defective circuit components	<ol style="list-style-type: none"> <li>1. Replace memory</li> <li>2. Replace dial tone detector PWB assembly of D-180493 Kit of Parts (if option is provided).</li> </ol>		
10	Cannot manually dial off-hook for ac power failure condition  (Wired for speakerphone option)	With a strap lead between screw terminals 10 and 15 on PSB, can manually dial off-hook for ac power failure condition	Defective circuit or connections on D-180492 Kit of Parts	<ol style="list-style-type: none"> <li>1. Check connections per Table B, C, D, or E</li> <li>2. Replace D-180492 Kit of Parts</li> </ol>
11	Cannot turn speakerphone on when ON button is depressed (Wired for speakerphone option)	Speakerphone indicator lamp does not turn on, but line lamp is lit.	Handset off-hook	Place handset on-hook
		No dial tone heard, but indicator lamp turns on	Line button not depressed	Depress line button
		Speakerphone indicator lamp does not turn on and neither does line lamp	Improper connections or defective 85B1 power unit	<ol style="list-style-type: none"> <li>1. Check connections per Table B, C, D, or E</li> <li>2. Check for commercial power</li> <li>3. Check that 85B1 power unit is plugged into commercial ac power outlet</li> <li>4. Check or replace 85B1 power unit (should read 18 to 25 VAC across secondary screw terminals)</li> </ol>

\*Refer to 6.02 (4).

TABLE N (Cont)

## TROUBLE ANALYSIS – 2872A1M OR 2872A2M

TROUBLE NUMBER	FAILURE	ADDITIONAL SYMPTOM	POSSIBLE CAUSE	REMEDIAL ACTION
11 (cont'd)		Speakerphone indicator lamp does not turn on but line lamp lights	Improper connections or defective 95B-Type power unit	1. Check connections 2. Check or replace power unit (should read 13.4 to 18 VAC across screw terminals 30 and 31 on PSB)
		With temporary strap lead added between power supply screw terminals 16 and 17, speakerphone turns on when ON button is depressed	Defective 327A relay, MA3 relay or connecting leads on D-180492 Kit of Parts	Replace D-180492 Kit of Parts
		When temporary strap lead added between screw terminals 11 and 12 on TB1, speakerphone turns on when ON button is depressed	Defective switchhook a-b contacts or connecting lead to PSB	1. Check (G-W) harness lead between screw terminal 11 on TB1 and terminal 16 on PSB 2. Replace telephone set*
			Defective speakerphone	See appropriate speakerphone BSP
12	Cannot turn speakerphone off when handset is lifted off-hook (Wired for speakerphone option)	Speakerphone turns off when OFF button is depressed but turns back on when OFF button is released	Short circuit between screw terminals 11 and 12 on TB1	Clear short
			Defective switchhook a-b contacts	Replace telephone set*
13	RECORD lamp does not turn off when speakerphone ON button is depressed (Wired for speakerphone option)	Speakerphone indicator lamp does not turn on. Line lamp is lit	Handset off-hook	Place handset on-hook
		With temporary strap lead added between screw terminals 16 and 17 on power supply, speakerphone turns on when ON button is depressed and RECORD lamp goes off	LK relay circuit defective on D-180492 Kit of Parts	Replace D-180492 Kit of Parts
		Operation of RECORD OFF button or line key buttons turns RECORD lamp off	Defective switchhook h-i contacts	Replace telephone set*
14	Cannot break dial tone when dialing with speakerphone on (Wired for speakerphone option)	Cannot manually dial when off-hook	Refer to trouble number 3	Refer to trouble number 3
		When dial button is depressed, audible level of TOUCH-TONE signal is high on speakerphone	Defective muting circuit on PSB	Replace telephone set*
15	Cannot hear tones when dialing with speakerphone on (Wired for speakerphone option)	With the speakerphone ON button depressed, the audible tone level is normal	Physical spacing between speakerphone loudspeaker and transmitter units is too close	See appropriate speakerphone BSP for proper placement of units
		Normal conversational level on speakerphone	Defective muting circuit on PSB	Replace telephone set*

\*Refer to 6.02 (4).

TABLE N (Cont)  
TROUBLE ANALYSIS – 2872A1M OR 2872A2M

TROUBLE NUMBER	FAILURE	ADDITIONAL SYMPTOM	POSSIBLE CAUSE	REMEDIAL ACTION
16	Cannot turn speakerphone off (Wired for one-touch option)	Speakerphone turns off when OFF button is depressed but turns on when OFF button is released	Black strap lead to PSB-27 was not insulated and stored	Remove the strap lead
		Speakerphone turns off and stays off when (Y-BL) lead is disconnected from terminal 27 on PSB and OFF button is depressed	Defective output logic level from memory PWB	Replace memory
		Speakerphone turns off when handset is taken off-hook but turns on when handset is placed on-hook	Defective circuit on D-180493 Kit of Parts	Replace dial tone detector board assembly of D-180493 Kit of Parts
17	Speakerphone does not turn on when a memory button is momentarily depressed in the automatic dialing mode (Wired for one-touch option)	MB7 relay does not operate (no click heard) when memory button is depressed	Battery not plugged in (2872A2M set)	Plug battery in
			3B speakerphone: V-BR lead connected to PSB-34	Insulate and store V-BR lead, and connect O-V lead to PSB-34
			4A speakerphone installed using 82A connecting block	Change to 82B connecting block
			4A speakerphone with 82B block: strap not placed on 82B block	Add strap from terminal 10 to 35 in 82B block
		With temporary strap between screw terminals 28 and 29 on PSB, speakerphone turns on when a memory button is depressed	One-touch calling switch turned off or defective	1. Turn one-touch calling switch on 2. Replace one-touch calling switch assembly of D-180493 Kit of Parts
			Defective dial tone detector D-180493 Kit of Parts	Replace dial tone detector PWB assembly of D-180493 Kit of Parts
		With temporary strap between screw terminals 17 and 34 on PSB, speakerphone turns on when a memory button is depressed.	Defective connections between dial tone detector and PSB	Check (Y-G) and (G-Y) leads to PSB terminals 17 and 34, respectively
Defective dial tone detector D-180493 Kit of Parts	Replace dial tone detector PWB assembly of D-180493 Kit of Parts			
18	Delay time between depression of a memory button and initiation of automatic dialing exceeds 3 seconds (Wired for one-touch option)		Defective timing circuit	1. Replace memory 2. Replace dial tone detector PWB assembly of D-180493 Kit of Parts

\*Refer to 6.02 (4).

TABLE N (Cont)

## TROUBLE ANALYSIS – 2872A1M OR 2872A2M

TROUBLE NUMBER	FAILURE	ADDITIONAL SYMPTOM	POSSIBLE CAUSE	REMEDIAL ACTION
19	Speakerphone turns on but set does not automatically dial when memory button is depressed		Black strap leads were not lifted from PSB terminals 19 and 26 when option was wired	Insulate and store strap leads.
	(Wired for one-touch option)	Set dials when screw terminals 26 and 29 on PSB are temporarily shorted	Precise dial tone not present	1. Check CO line for presence of precise dial tone (350 Hz and 440 Hz) 2. If correct dial tone is present, replace dial tone detector PWB assembly of D-180493 Kit of Parts
		Set does not dial from memory when screw terminals 26 and 29 on PSB are temporarily shorted	Defective logic	Replace memory
20	Automatic dialing commences for no apparent reason (wired for one-touch option)		Static discharge damage	1. Consult your Telco engineer for proper grounding procedures 2. Replace memory
21	Calls not completed if handset is quickly taken off-hook while automatically dialing on a speakerphone	Automatic dialing is terminated before all digits are dialed	Marginal switchhook sequence between a-b and h-i contacts	Remove handset more slowly from handset cradle
22	Set dials automatically but does not wait for dial tone (Wired for one-touch calling)		Noise on line	1. Add .05 $\mu$ f capacitor between PSB-21 and PSB-26 2. Remove above capacitor and add resistor (10K $\Omega$ -50K $\Omega$ ) in series with (G-R) dial tone detector input lead.
23	Cannot dial properly from memory when on handset  (Wired with dial tone detector option)	MB7 relay does not operate (no click heard) when memory button is depressed.	Battery not plugged in (2872A2M tel set)	Plug battery in
			Precise TOUCH-TONE <sup>®</sup> dial tone may not be present	Make sure precise (350 Hz and 440 Hz) dial tone is present
			Memory not securely mounted	Tighten memory mounting screws
			Improper installation of dial tone detector, D-180493	Check connections for D-180493 installation
		Same as above — Addition of strap lead between PSB terminals 26 and 29 does not correct problem	Improper connection to or defective memory	1. Check connector cable 2. Replace memory
		Addition of strap lead between PSB terminals 26 and 29 corrects problem	Defective memory	Replace memory
	Defective dial tone detector	Replace D-180493 dial tone detector		
	Unknown	Replace telephone set*		

\*Refer to 6.02 (4).

## 872A1M TELEPHONE SET (TOUCH-A-MATIC® SET)

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### NOTICE

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Bell System except under written agreement

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## 1. GENERAL

**1.01** This section contains identification, installation, connections, operation, and maintenance information on the 872A1M TOUCH-A-MATIC® telephone set (Fig. 1).

**1.02** This section is reissued to:

- Add D-180818 Kit of Parts (Record Disable and Dial Intermix Feature)
- Show 872A1-87 faceplate MD
- Add 872B1 faceplate and 870A1U upper housing
- Revise Fig. 1 through 6, 8 through 12, and 14
- Add Fig. 7 and 13
- Revise Tables A through F, J, K, M, and N
- Add Tables G, H, I, and L.

Since this reissue covers a general revision, arrows ordinarily used to indicate changes have been omitted.

**1.03** The 872A1M telephone set is factory-wired for use with 1A1, 1A2, or 6A key telephone systems (KTS). It may be converted (Table K) for use with 1A KTS.

**1.04** The telephone set is available in the following colors:

- Black (-03)
- Green (-51)
- White (-58)
- Lt. Beige (-60)

**1.05** The 872A1 (MD) faceplate is available in only the satin-silver (-87) color.

**1.06** The 872B1 decorative faceplates are available in the following colors:

- Teak Woodgrain (-108)
- Walnut Woodgrain (-109)
- Matte Aluminum (-122)

## 2. IDENTIFICATION

**2.01** The 872A1M telephone set provides all standard features of a 6-button key telephone set plus automatic dialing of 31 frequently called numbers, and a LAST NUMBER DIALED *scratch pad* memory.

### 2.02 *Design Features:*

- Modular key telephone set
- Integrated circuit memory
- Common audible ringing
- Buzzer
- Busy lamp diode
- Line pickup buttons convertible to nonlocking signal buttons
- Memory buttons from which to select preprogrammed telephone numbers for automatic dialing
- Capability to record and automatically dial 31 telephone numbers of up to 15 digits each

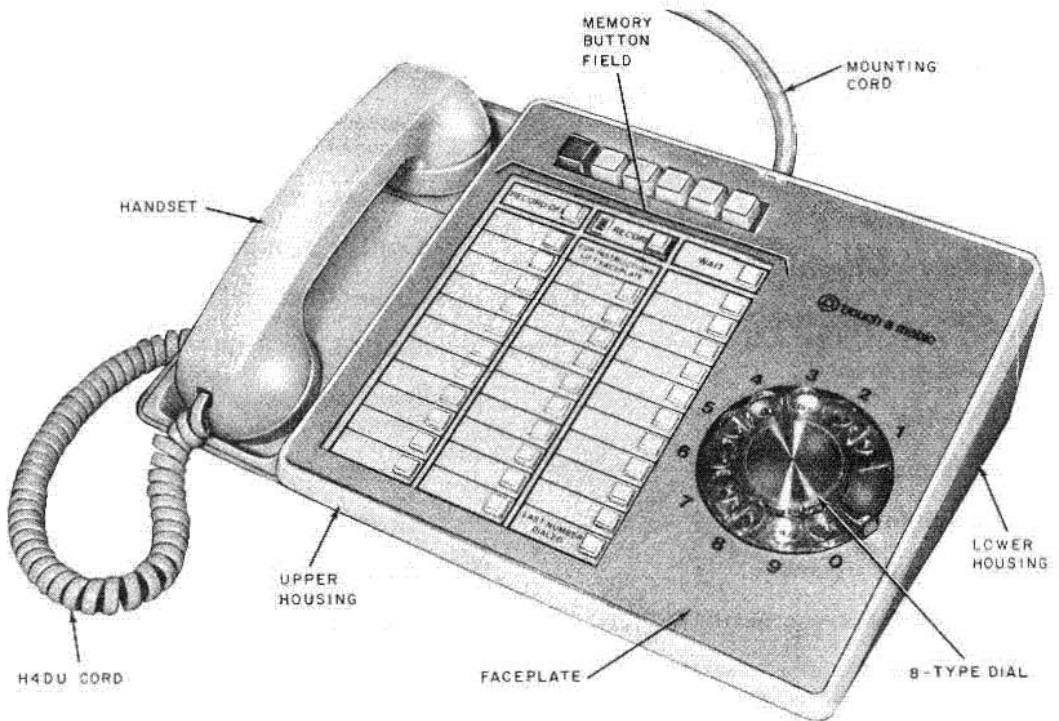


Fig. 1—872A1M Telephone Set

- Last number manually dialed memory
- Plug-in battery
- Capability to pause for subsequent dial tones during automatic dialing (WAIT input).

### 2.03 Optional Features (Refer to Table A):

- Decorative Faceplate
- Speakerphone—either 3B or 4A speakerphone systems may be added to stations
- Dial Tone Detector—automatically starts dialer when precise TOUCH-TONE® dial tone (350 Hz and 440 Hz) is present.

- One-Touch Calling, (requires both dial tone detector and speakerphone)—depressing one memory button will automatically turn on speakerphone, detect dial tone, and dial complete number.

**Note:** All dial tones encountered in the process of placing a call must be precise TOUCH-TONE dial tone, if the call is to be completed automatically.

- Record Disable—turns off the recording feature to prevent accidental erasures of previously stored numbers.
- Dial Intermix—same as record disable feature plus.
  - (a) Allows digits dialed from manual dial and from memory to be intermixed

without having to depress the RECORD OFF button.

(b) Disables the LAST NUMBER DIALED feature, and allows that memory position to be used as any other one.

- Station Busy Lamp
- 2/4-Wire Service
- Add-On-Conference
- Exclusion (multiline)
- Bridged Ringing
- "I" Hold
- Signaling
- Restricted Dialing
- Amplifying Handset
- Head telephone set operation
- End-to-end signaling using 1035C3A (MD) or 1035AF3A Dial Adjunct (Section 501-164-130).

**2.04 All options are implemented by:**

- Wiring changes in the telephone set
- Installation of appropriate additional items.

**2.05 Ordering Guide:**

(a) The 872A1M telephone set is a modular type telephone set and may be ordered complete and ready to install as.

- Set, Telephone, 872A1M-\*

(b) **Ordered Separately:**

- Unit, Power, 95B1 or 95B2 (required for operation of the automatic dialing feature.

**Note:** A 95B-type power unit is required for each telephone set.

(c) The 872A1M set is comprised of the following component parts:

- Housing, 870A1-\*
- Housing, Upper, 870A1U-\* (used with 872B1 faceplate)
- Faceplate, 872A1-87 (MD)
- Faceplate, 872B1-122 (matte aluminum)
- Handset, G15A-\*
- Cord, Handset, H4DU-\*
- Base, Telephone Set, 872AM (includes the following):

Dial, 8EA-119

Key, 635BT5

812365039 (P-23F503) Collar

Ringer, P1B

Network, 425K or 4228-type

Buzzer, KS-20419L1

Cord, Mounting, D50BB-87

Battery, KS-20390L4 or KS-20390L2

Jack, Handset, 616B

Memory, 870B (includes button field)

841382617 Power Supply Printed Wiring Board (PSB) Assembly

840393672 Directory Sheet Set

Booklet, Instruction, Subscriber, SIB-2455B

(d) **Optional Apparatus (order as required):**

- Kit of Parts, D-180568 (must be used for speakerphone service)
- Kit of Parts, D-180493 (Dial Tone Detector and One-Touch Calling switch)



**TABLE A**  
**OPTIONS**

OPTION		ADDITIONAL ITEMS REQUIRED	CONNECTION PER	
			FIGURE	TABLE
Speakerphone*	4A	108-Type Loudspeaker	11	D,E
		680-Type Transmitter	11	D,E
		82B Connecting Block	11	D,E
		85B1 Power Unit	11	D,E
		D-180568 Kit of Parts	8(C)	D,E
	3B	760A Loudspeaker	10	B,C
		666B Transmitter	10	B,C
		55-Type Control Unit	10	B,C
		2012B Transformer	10	B,C
		149B Adapter		B,C
		D-180568 Kit of Parts	8(C)	B,C
	One-Touch Calling	D-180493 Kit of Parts	8(D,E)	C or E
		Speakerphone	8(B)	
	Dial Tone Detector	D-180493 Kit of Parts	8(D)	C,E, or F
Station Busy Lamp		9		
"I" Hold		9		
Signaling			M	
Exclusion (Multiline)		9		
Add-On-Conference		9		
Bridged Ringing			H,I	
2/4 Wire Service*	D-180494 Kit of Parts	12	G	
1A Key Service			K	
Amplifying Handset	G6-, G7-, or G8-Type Handset	8(H)		
Restricted Dialing	446F Diode	13		
Record Disable	D-180818 Kit of Parts (See Note)		L	
Dial Intermix				
Decorative Faceplate	872B1-108 (Teak)†			
	872B1-109 (Walnut)†			
Head Telephone Set Operation	Plantronics Jack Set Model JS180-1 or JS180-2		Tables provided for Plantronics Jack Set	
	Desired Head Telephone Set			

\* D-Kits for 2/4 wire service and speakerphone are designed to mount in the same place in the set. If both services are to be provided simultaneously, consult your Telco engineer.

† An 870A1U upper housing may be required (6.11).

Note: If set is equipped with an 870A memory, an 870B memory will also be required.

- Kit of Parts, D-180494 (for conversion to 4-wire service)
- Kit of Parts, D-180818 (Record Disable and Dial Intermix)

**Note:** This kit of parts may be used only with sets equipped with an 870B Memory.

- Faceplate, 872B1-\*

**Note:** If set is equipped with an 872A1-87 faceplate, then an upper housing (870A1U-\*) of the appropriate color must also be ordered.

- Set, Head Telephone [using Plantronics Jackset Model JS180-1 (2 foot cord) or JS180-2 (7 foot cord)]

\* Add appropriate color suffix (1.04 or 1.06)

### 2.06 Operating Features (Fig. 2).

- Line key (635BT5), 6-button key. Hold with five line pickup buttons which are convertible to nonlocking. An additional momentary contact (logic reset switch) is attached to the hold side of the key to reset the logic circuit anytime a key button is depressed.
- 32-button array of low force, low travel, nonlocking memory buttons arranged in three columns. Left and right columns have eleven buttons, center column has ten buttons.
- LAST NUMBER DIALED button, located in lower right corner of memory array, when momentarily depressed, automatically redials the last number manually dialed.
- RECORD button (nonlocking), when momentarily depressed, lights the RECORD lamp and enables the memory circuits to store telephone numbers.
- RECORD OFF button (nonlocking), when momentarily depressed extinguishes the RECORD lamp, indicating that the dialer is switched out of the record mode.
- WAIT button (nonlocking), when momentarily depressed during recording operation, enters a code into memory to initiate a halt in

the automatic dialing sequence [used where access digit(s) required].

## 3. INSTALLATION

### STANDARD INSTALLATION

**3.01** Make all wiring changes and telephone set modifications (Table A) before external connections are made to the set (4.01).

**Caution:** Do not plug in either battery or power unit until all connections and modifications are complete. Take extreme care not to damage the exposed components, circuit, etc. when the set is opened.

**3.02** The set is shipped from the factory with the battery disconnected. After all wiring changes and modifications have been completed, connect the battery (Fig. 6), by tilting the set up, and inserting the battery into the mating jack.

**Note:** Wire date of installation on label provided on battery.

**3.03** Install the 95B-type power unit within 150 feet (24 gauge conductors) of the telephone set and plug into an ac outlet not controlled by a switch (continuous ac power is required). A retaining clamp (841050818) will be shipped with the 95B-type power unit and should be mounted to the ac receptacle to hold power unit securely and prevent accidental loss of power. The power unit may be located at the equipment end of the cable or run directly into the telephone set by conductors separate from the mounting cord and connected to PSB terminals 24 and 25. When separate power conductors are used, disconnect, insulate, and store the (BL-V) and (V-BL) mounting cord leads from PSB terminals 24 and 25.

**Danger:** Securely attach retaining clamp to ac outlet using outlet cover screw BEFORE attempting to install 95B-type power unit. When removing power unit, always unplug it completely from the outlet BEFORE attempting to remove the retaining clamp. This will prevent the possibility of a loosened retainer clamp or metallic outlet cover making contact with the ac prongs of the power unit when partially

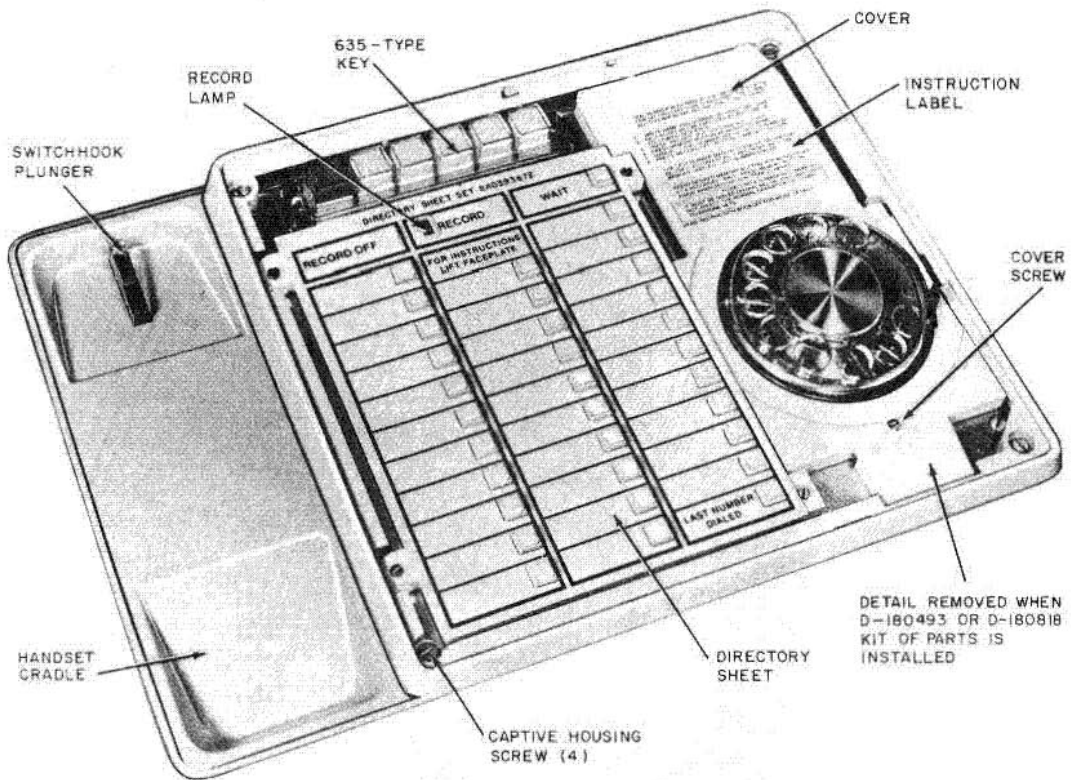


Fig. 2—872A1M Telephone Set—Faceplate and Handset Removed

*withdrawn from outlet. Do not use 841050818 or similar retaining clamps on outlets where the cover mounting screw holds the duplex outlet in the box.*

**Note:** The 95B-type power unit must be located no closer than 1-1/2 feet from the telephone set in order to prevent a noise problem.

**3.04** The station number card shall be placed in the plastic fingerwheel of the dial. The silver disc provided with the dial shall be retained under the number card.

**3.05** The directory sheets (Fig. 2) fit over the buttons of the memory and are held in place by the faceplate. Additional sheets are available in directory sheet set, 840393672.

**3.06** To designate the 635-type 6-button key.

- (1) Use Form 5837 tabs.
- (2) Squeeze the key button caps gently and remove.
- (3) Insert the tabs.
- (4) Replace the caps so that small bumps on side of caps are on sides of buttons.

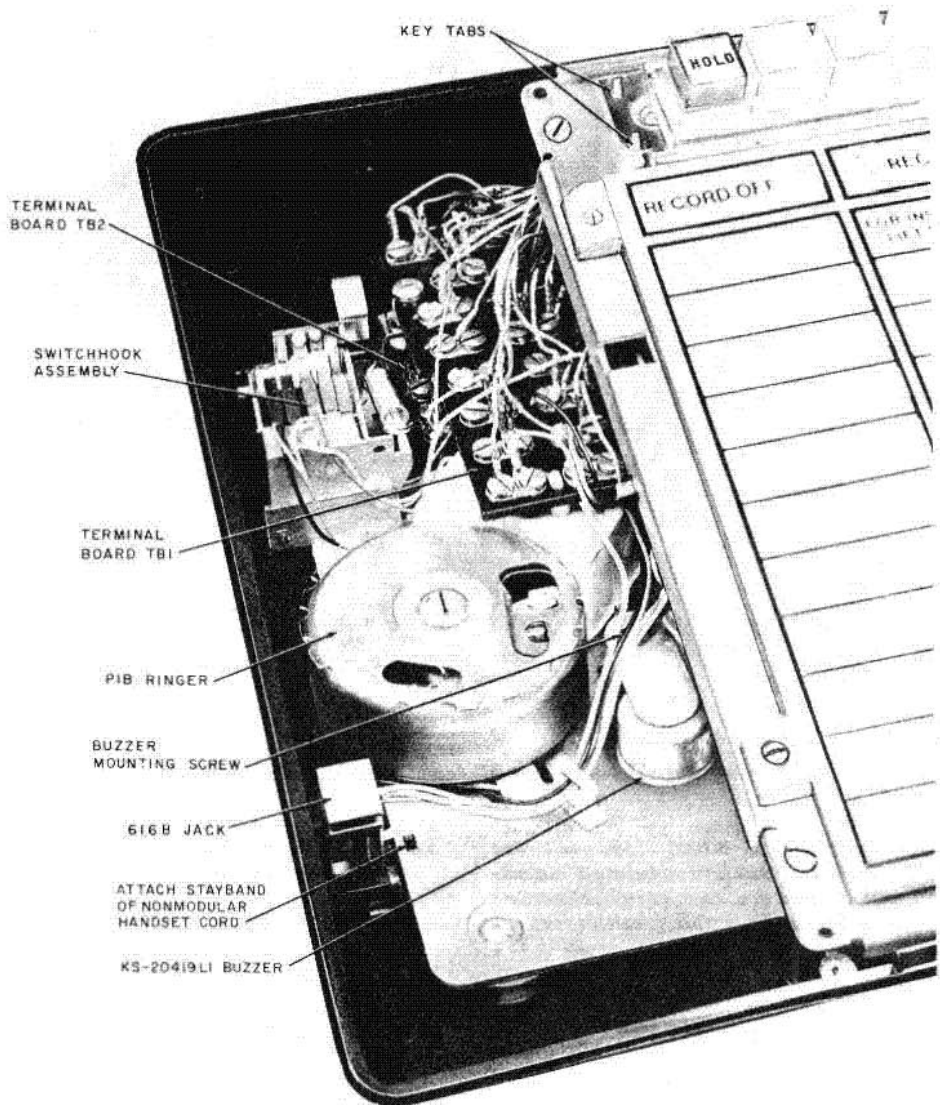


Fig. 3—872A1M Telephone Set With Faceplate, Upper Housing, Handset, and Handset Cradle Removed

**Installation Check Procedure**

**3.07** Check telephone set installation per the following tests (refer to Part 5 for operation). In case of failure, refer to Table N, Trouble Analysis.

- (1) Disconnect the power unit and manually dial a known telephone number to check that the telephone operates correctly in the absence of commercial power.
- (2) Reconnect the power unit to ac outlet.
- (3) With the handset on-hook, record known telephone numbers, storing consecutive digits of the numbers in sequential memory locations. Fill all memory locations except LAST NUMBER DIALED and location immediately above it [5.01(4) through (7)].
- (4) Automatically dial the telephone numbers stored in Step (3) by momentarily depressing the memory buttons in the same sequence in which the digits were recorded. Verify that the digits thus dialed produce the expected telephone numbers.
- (5) Go off-hook and simultaneously manually dial and record a known telephone number into memory location immediately above LAST NUMBER DIALED button [5.01 (4) through (7)].
- (6) Momentarily hang up handset and then automatically dial the number recorded in Step (5).
- (7) Go off-hook and manually dial a known telephone number with a WAIT input inserted in the telephone number.
- (8) Momentarily hang up the handset and then automatically dial the number by depressing the LAST NUMBER DIALED button. The set should stop dialing when it reaches the stored WAIT input. Depress the LAST NUMBER DIALED button again and the remaining digits should be dialed.



**The battery and power unit must be connected a minimum of five minutes before doing Step (9).**

- (9) Momentarily disconnect the power unit (for 5 to 10 seconds). After reconnecting power unit, momentarily depress memory buttons in same sequence in which digits were recorded in Step (3). Verify that the correct telephone numbers are dialed.
- (10) Dial the appropriate code for ring-back to test the ringer.
- (11) Check operation of the logic reset switch by pressing the RECORD button (RECORD lamp will come on) and subsequently pressing an unoperated line button. (RECORD lamp must go out.)
- (12) If equipped with one-touch calling option, (D-180493 Kit of Parts and speakerphone), and with set in on-hook condition, depress the memory button used in Step (5). The speakerphone should turn on, dial tone should be detected, and the stored number should be automatically dialed.

**OPTIONAL APPARATUS INSTALLATION****D-180568 Kit of Parts (Speakerphone)**

**3.08** To install.

- (1) Proceed as described in 3.17.
- (2) Make connections per one of the appropriate Tables, B through E.
- (3) Mount the kit assembly to the chassis with the screws provided (Fig. 4). Beveled corner of printed wiring board (PWB) should be at lower right corner.

**D-180493 Kit of Parts (Dial Tone Detector and One-Touch Calling Switch)**

**3.09** To install.

- (1) Remove the housing (3.21), and access PSB terminal board (3.17).
- (2) Insert the board assembly from the back of the set and locate as shown in Fig. 4, such that the two tabs on the board assembly fit into the slots in the bottom of the chassis.

TABLE B

## CONNECTIONS - 872A1M TELEPHONE SET WITH 3B SPEAKERPHONE

APPARATUS	LEAD		872A1M TEL. SET (NOTE 1)		CONNECT		
	DESIG	COLOR			FROM		TO
			FROM	TO PSB TERM.	CONT UNIT		149B ADPT (DIOR CORD)
	55A	55B			TERM.		
8 7 2 A 1 M  T e l  S e t	T1	V-G	*	2	19	1	8A
	R1	G-V	*	9	28	10	7A
	A1				12	2	A1
	AG	V-S	*	F†	5	11	12A
	LK	S-V	*	13	11	35	11A
	P3	V-BR	*	3	21	4	10A
	P4	BR-V	*	6	30	13	9A
	R or R1				18	34	1B
	R or R1				9	25	1A
	B or B1				17	33	2B
	B or B1				8	24	2A
D-180568 Kit of Parts	LK	BL-R		13			
	SHi	G-W		14			
	SHa	R-BL		16			
	VDD	W-G		17			
666B TRMTR (T7A Cord)	M1	S-BK			4	7	
	P1	BL-R			13	8	
	-15V	BK-S			14	16	
	S	O-BK			3	18	
	A1	Y-O			29	19	
	F1	G-Y			2	17	
	LK	BK-O			11	35	
760A Lspk (R2FK Cord)	SP1	G			34	20	
	SP2	R			33‡	29‡	
95B1 Pwr Unit	AC1						3B§
	AC2						4B§
2012B Trnsf	AC1				27	27	
	AC2				36	36	

\*Insulated and stored.

†Terminal on network.

‡To reduce loudspeaker volume, move SP2 lead to terminal 24(55A) or 30(55B).

§Insulate and store (BL-V) and (V-BL) leads in connector cable.

Note: Plug telephone set mounting cord into 149B adapter.

TABLE C

## CONNECTIONS - 872A1M TELEPHONE SET WITH ONE-TOUCH CALLING USING 3B SPEAKERPHONE

APPARATUS	LEAD		872A1M TEL SET (NOTE 1)		CONNECT			CONN CABLE AT KEY EQUIP.	
					FROM		TO		
	DESIG	COLOR			FROM		CONT UNIT		
			55A	55B			TERM.		
8 7 2 A 1 M  T e l S e t	T1	V-G	*	2	19	1	8A		
	R1	G-V	*	9	28	10	7A		
	A1				12	2	A1		
	AG	V-S	*	F†	5	11	12A		
	LK	S-V	*	13	11	35	11A		
	SPO	O-V	*	21	3	18	5B	O-V	*
	P3	V-BR	*	3	21	4	10A		
	P4	BR-V	*	6	30	13	9A		
	R or R1				18	34	1B		
	R or R1				9	25	1A		
	B or B1				17	33	2B		
	B or B1				8	24	2A		
	STRAP	BK	PSB-11	*					
	STRAP	BK	PSB-18	*					
STRAP	BK	PSB-23	*						
D-180493 Kit of Parts (Note 2)	INPUT	G-R		2					
	PB	O-BK		7					
	INPUT	G-R		9					
	DT	O-Y		11					
	LK	Y-G		13					
	VDD	R-O		17					
	SPR	Y-BL		18					
	DR	Y-O		19					
	COM	BK-O		20					
	SPO	G-Y		21					
	PL	O-R		22					
	DTT	BL-Y		23					
Switch	S			15					
	S			20					
D-180568 Kit of Parts	LK	BL-R		13					
	SHi	G-W		14					
	SHa	R-BL		16					
	VDD	W-G		17					

TABLE C (Cont)

## CONNECTIONS — 872A1M TELEPHONE SET WITH ONE-TOUCH CALLING USING 3B SPEAKERPHONE

APPARATUS	LEAD		872A1M TEL SET (NOTE 1)		CONNECT			CONN CABLE AT KEY EQUIP.	
	DESIG	COLOR			FROM		TO		
			FROM	TO PSB TERM.	CONT UNIT		149B ADPT (DIOR CORD)		
	55A	55B			TERM.	COLOR	TO		
666B Trans (T7A Cord)	M1	S-BK			4	7			
	P1	BL-R			13	8			
	-15V	BK-S			14	16			
	S	O-BK			3	18			
	A1	Y-O			29	19			
	F1	G-Y			2	17			
	LK	BK-O			11	35			
760A Lspk (R2FK Cord)	SP1	G			34	20			
	SP2	R			33†	29‡			
95B1 Pwr Unit	AC1						3B	BL-V	*
	AC2						4B	V-BL	*
2012B Trnaf	AC1				27	27			
	AC2				36	36			

\*Insulated and stored.

†Terminal on network.

‡To reduce loudspeaker volume, move SP2 lead to terminal 24 (55A) or 30 (55B).

**Notes:**

1. Plug telephone set mounting cord into 149B adapter.
2. All dial tones encountered in the process of placing a call must be precise TOUCH-TONE dial tone.

(3) Lock the board into position by inserting the self-threading screw through the right side of the chassis.

(4) Mount the one-touch calling switch below the dial with the two screws provided.

**Note:** If switch for D-180818 Kit of Parts is already present, the one-touch calling switch can not be installed. The PSB terminals to which the switch leads are normally connected (Table C or E), shall be strapped together. (The one-touch calling option can not be turned off by the subscriber.)

(5) Make connections per Table C, E, or F.

(6) Break off the detail at the bottom of the cover (Fig. 2) and trim edge as required.

(7) Verify correct operation of option.

(8) Reassemble set.

**D-180494 Kit of Parts (2/4-Wire Service)****3.10 To install.**

- (1) Proceed as described in 3.17.
- (2) Make connections per Table G.
- (3) Mount the kit assembly to the chassis with the screws provided (Fig. 4).

**D-180818 Kit of Parts (Record Disable and Dial Intermix Features)****3.11 To install.**



TABLE D  
 CONNECTIONS – 872A1M TELEPHONE SET WITH 4A SPEAKERPHONE

APPARATUS	LEAD		872A1M TEL SET		82B CONN BLK (NOTE 1)	CONN CABLE AT KEY EQUIP	
	DESIG.	COLOR	FROM	TO PSB TERM.		COLOR	TO
872A1M Tel Set	T1	V-G	*	2	(Note 2)		
	R1	G-V	*	9			
	A1						
	AG	V-S	*	F†			
	LK	S-V	*	13			
	P3	V-BR	*	3			
	P4	BR-V	*	6			
D-180568 Kit of Parts	LK	BL-R		13			
	SHi	G-W		14			
	SHa	R-BL		16			
	VDD	W-G		17			
†	85B1 POWER UNIT	AC1	BK		AC1		
		AC2	Y		AC2		
	95B-TYPE POWER UNIT	AC1	R		21	BL-V	*
		AC2	G		46	V-BL	*
§	85B1 POWER UNIT	AC1			Strap AC1 to 24	BR-V	AC1
		AC2			Strap AC2 to 49	V-BR	AC2
	95B-TYPE POWER UNIT	AC1				BL-V	AC1
		AC2				V-BL	AC2

\*Insulated and stored.

†Terminal on network.

‡Preferred power connections.

§Alternate power connections.

Notes:

1. Plug mounting cords of telephone set, 108-type loudspeaker, and 680-type transmitter into 82B connecting block. Install option plug in ringer cutoff mode.
2. For 1A1 or 1A2 KTS, connect link between 2 and A1. For 1A KTS, connect link between 19 and A1.

- (1) Remove faceplate (3.19).
  - (2) Loosen the captive screw at the bottom of the cover around the dial and remove the cover.
  - (3) Disengage the four captive memory mounting screws (Fig. 4).
  - (4) Remove the two dial mounting screws and move dial aside.
  - (5) Rotate left edge of memory upward as shown by Fig. 5.
- Note:** If set is equipped with an 870A memory, replace it with 870B memory, and carefully pack and return the old memory according to local procedures.

TABLE E

CONNECTIONS – 872A1M TELEPHONE SET WITH ONE-TOUCH CALLING  
USING 4A SPEAKERPHONE

APPARATUS	LEAD		872A1M TEL SET		82B CONN BLK (NOTE 1)	CONN CABLE AT KEY EQUIP.	
	DESIG	COLOR	FROM	TO PSB TERM		COLOR	TO
872A1M Tel Set	T1	V-G	*	2			
	R1	G-V	*	9			
	A1						
	AG	V-S	*	F†	Strap 10 to 35	O-V	*
	LK	S-V	*	13			
	SPO	O-V	*	21			
	P3	V-BR	*	3			
	P4	BR-V	*	6			
D-180493 Kit of Parts (Note 3) (Note 4)	Input	G-R		2			
	PB	O-BK		7			
	Input	G-R		9			
	DT	O-Y		11			
	LK	Y-G		13			
	VDD	R-O		17			
	SPR	Y-BL		18			
	DR	Y-O		19			
	COM	BK-O		20			
	SPO	G-Y		21			
	PL	O-R		22			
				23			
	Switch	S		15			
		S		20			
D-180568 Kit of Parts	LK	BL-R		13			
	SHi	G-W		14			
	SHa	R-BL		16			
	VDD	W-G		17			
†	85B1 PWR UNIT	AC1	BK		AC1		
		AC2	Y		AC2		
	95B-TYPE PWR UNIT	AC1	R		21	BL-V	*
		AC2	G		46	V-BL	*

TABLE E (Contd)

**CONNECTIONS – 872A1M TELEPHONE SET WITH ONE-TOUCH CALLING  
USING 4A SPEAKERPHONE**

APPARATUS		LEAD		872A1M TEL SET		82B CONN. BLK (NOTE 1)	CONN CABLE AT KEY EQUIP.	
		DESIG	COLOR	FROM	TO PSB TERM		COLOR	TO
§	85B1 PWR UNIT	AC1				Strap 24-AC1	BR-V	AC1
		AC2				Strap 49-AC2	V-BR	AC2
	95B-TYPE PWR UNIT	AC1					BL-V	AC1
		AC2					V-BL	AC2

\* Insulated and stored.

† Terminal on network

‡ Preferred power connections.

§ Alternate power connections.

**Notes:**

1. Plug mounting cords of telephone set, 108-type loudspeaker, and 680-type transmitter into 82B connecting block. Install option plug in ringer cutoff mode.
2. For 1A1 or 1A2 KTS, connect link between 2 and A1. For 1A KTS, connect link between 19 and A1.
3. Remove (BK) strap leads between PSB terminals 11 and 17; 17 and 23; and 18 and 20.
4. All dial tones encountered in placing a call must be precise TOUCH-TONE dial tone.

- (6) Mount switch below dial using the two screws provided.

**Note:** If the one-touch calling switch (D-180493 Kit of Parts) is already present, it must be removed. The PSB terminals to which the switch leads were connected (Table C or E), must be strapped together. (The one-touch calling option can no longer be turned off by the subscriber.)

- (7) Connect switch lead connectors to post terminals on memory board per Table L.

- (8) With feature switch in OFF position, verify that set operates in normal manner.

- Numbers can be recorded into memory
- Numbers can be changed
- Numbers can be deleted from memory.

- (9) Set feature switch to ON position and verify feature provided.

- Record disable feature, only.

**TABLE F**  
**CONNECTIONS – 872A1M TELEPHONE SET**  
**WITH DIAL TONE DETECTOR ONLY (SEE NOTE)**

APPARATUS	LEAD		872A1M TEL SET	
	DESIG	COLOR	FROM PSB TERM.	TO PSB TERM.
872A1M Tel Set	Strap	BK	11	*
	Strap	BK	23	*
D-180493 Kit of Parts	Input	G-R		2
	PB	O-BK		7
	Input	G-R		9
	DT	O-Y		11
	LK	Y-G		*
	VDD	R-O		17
	SPR	Y-BL		*
	DR	Y-O		19
	COM	BK-O		20
	SPO	G-Y		*
	PL	O-R		22
	DTT	BL-Y		23
	Switch †	S		
S				*

\*Insulate and store.

†Switch not required when speakerphone is not provided.

Note: May be used for applications where first dial tone is not precise (350 Hz and 440 Hz) but all subsequent dial tones must be precise if number is to be dialed automatically.

- (a) RECORD lamp will not light when RECORD button is depressed.
- (b) No telephone numbers can be recorded, changed, or deleted in memory.
- (c) LAST NUMBER DIALED feature is operative.
- Record disable and dial intermix features.
  - (a) RECORD lamp will not light when RECORD button is depressed.
  - (b) No telephone numbers can be recorded, changed, or deleted in memory.
  - (c) LAST NUMBER DIALED feature is disabled.
- (d) Manually and automatically dialed digits may be intermixed.
- (10) Reassemble set

#### Single-Line Service

**3.12** The 872A1M-type TOUCH-A-MATIC telephone set is available from the factory as a single line set. However, with the addition of an 870B1 faceplate, the 872A1M telephone set may be converted to single line service as follows.

- (1) Remove the faceplate, key collar, and all buttons of the 635-type key.
- (2) Gain access to terminal area (3.17).
- (3) Remove the cradle (3.20).

**TABLE G**  
**CONNECTIONS FOR 2/4-WIRE SERVICE**

APPARATUS	COLOR	REMOVE FROM	CONNECT TO
872A1M Tel Set	BK-G	GN	L1
	BK	R	*
	BR-V	*	PSB-13
	V-BR	*	PSB-21
D-180494 Kit of Parts	V		T
	S		F
	BR		*
	Y-BR		L1
	BL-R		GN
	G-BK		PSB-13
	R-BR		R
	R-O		S
BL-Y		PSB-21	

\*Insulate and store.

**TABLE H**  
**CONNECTIONS FOR CONVERSION TO SINGLE  
LINE SERVICE WITH BRIDGED RINGING**

DESIG	LEAD		REMOVE FROM	CONNECT TO
	COLOR			
Tip	W-BL		* (1 PU-3)	Net. K
Ring	BL-W		* (1 PU-6)	TB1-13
B1	Y-S		Net. K	*
R1	S-Y		TB1-13	*
A-Lead	W-O		* (1 PU-1)	TB1-1
Hold	Y-BL		TB1-3	*
LRS-1	W		PSB-20	*

\*Insulate and store.

**TABLE I**  
**CONVERSION TO BRIDGED RINGING ON FIRST  
LINE WITH 6-BUTTON KEY SERVICE**

DESIG	LEAD		REMOVE FROM	CONNECT TO
	COLOR			
Tip	W-BL		(1 PU-3)*	Net. K
Ring	BL-W		(1 PU-6)*	TB1-13
B1	Y-S		Net. K	*
R1	S-Y		TB1-13	*

\*Insulate and store.

- (4) Make connections per Table H.
- (5) Reassemble set and install an 870B1 faceplate of the appropriate color.

**Note:** If set was originally equipped with an 872A1-87 faceplate, refer to 6.11.

#### Head Telephone Set

#### 3.13 To install.

- (1) Remove housing (3.21).
- (2) Access PSB terminal area (3.17).
- (3) Remove cradle (3.20).
- (4) Thread jack set cord through hole in rear of housing and make connections per appropriate table provided for Plantronics Jackset.
- (5) Reassemble telephone set.
- (6) Insert head telephone set plug into jack set.



*Other optional components may be used such as SPOKESMAN<sup>®</sup>, loudspeaker sets, etc. Refer to the appropriate section for connection information for these components.*

#### COMPONENT LOCATION AND ACCESS INFORMATION

##### Location of Components

- 3.14 The components are located in three areas as follows.
- (a) Under the handset cradle (Fig. 3):
    - Buzzer
    - Ringer
    - Switchhook assembly
  - Handset jack
  - Terminal boards (TB1 and TB2).

- (b) Under the faceplate, inside the set (Fig. 4 and 5):

- Battery jack (Fig. 5)
- Power supply board (PSB) terminal area (Fig. 4)
- Network (Fig. 4)
- Options (Fig. 4):

D-180568 (relay kit for speakerphone)

D-180493 (dial tone detector and one-touch calling switch kit)

D-180494 (2/4-wire relay kit)

D-180818 (record disable and dial intermix switch).

- (c) Under the telephone set (Fig. 6):

- Battery.

#### Mounting Cord

**3.15** The D50BB-87 mounting cord is amphenol ended at the equipment end and equipped with 508-type plugs for terminating on the back of the 635-type module at the telephone set end. The conductors terminated in the 508-type plugs provide the major line service requirements. Spade-tipped conductors are provided for auxiliary control functions or options and are terminated directly on associated equipment, terminal boards, or stored.

**Note:** Sets manufactured prior to fourth quarter 1976 were equipped with D50AM-87 mounting cords. The major difference in the cords is that TIP and RING contact strips were required with the D50AM-87, whereas individual conductors of the D50BB-87 connect to the TIP and RING contacts of the 635-type key.

#### Network Terminals

**3.16** For access to the network terminals.

- (1) Remove the faceplate (3.19).

- (2) Loosen the captive cover screw at the bottom of the white cover around the dial (Fig. 2).

- (3) Remove the cover.

- (4) To replace the cover, the three tabs of the cover (one at the top center and one at each side just above the dial) must be aligned with holes in the chassis before the screw is refastened. Failure to do this will result in improper seating of the faceplate.

#### Power Supply Board (PSB) Terminals

**3.17** To access the terminal field on the power supply board, proceed as follows.

- (1) Remove the faceplate (3.19).
- (2) Loosen the captive cover screw at the bottom of the white cover around the dial (Fig. 2).
- (3) Remove the cover.
- (4) Remove the two screws that hold the dial in place.
- (5) Gently raise the dial and move aside.
- (6) To reassemble; reverse procedure.
- (7) To replace the cover, the three tabs of the cover (one at the top center and one at each side just above the dial) must be aligned with holes in the chassis before the screw is refastened. Failure to do this will result in improper seating of the faceplate.

#### Line Key Removal

**3.18** To remove, use the following procedure.

- (1) Remove faceplate (3.19).
- (2) Push the key toward the rear of the set to unlock it from the tabs.
- (3) Raise the metal plate of the key just above the tabs and move the key toward the left, then raise the right end of the key until it clears the chassis of the set.

**Caution:** Do not damage contact strips which protrude from the right side

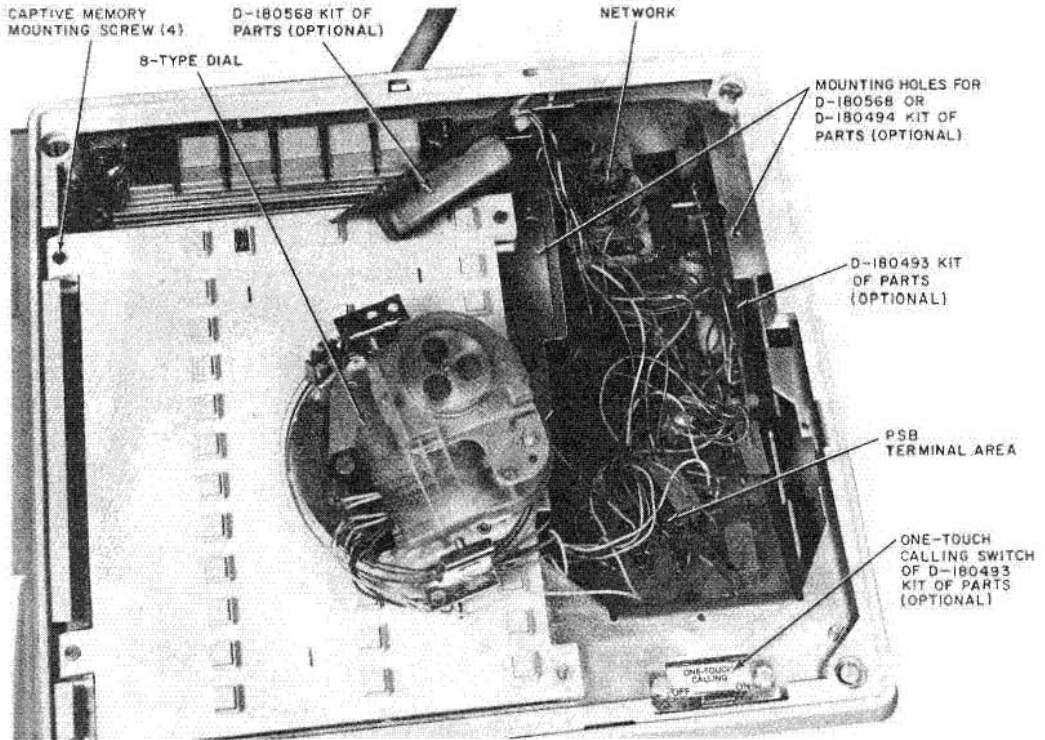


Fig. 4—872A1M Telephone Set—Dial Removed To Show Terminal Area

*of the key or logic reset switch attached on HOLD side of key. (These contact strips will only be found on sets equipped with D50AM-87 mounting cords.)*

- (4) Lift the key completely out of the set.
- (5) Replace key by reverse procedure.

#### Faceplate Removal

3.19 Removal will differ depending on faceplate provided.

- (a) The 872B1-type faceplate is held in place by a spring clip attached to the 870A1U upper housing. To disengage the faceplate, lift up on the tab which protrudes from the center of the back edge of the faceplate.

**Note:** The 872B1 faceplate is not a direct replacement for the 872A1-87 faceplate. An 870A1U upper housing is also required with the 872B1 faceplate (6.11).

- (b) The 872A1-87 faceplate is held in place by two snaps bonded to the faceplate and aligned to fit holes in the chassis. To remove the faceplate, grasp it by any convenient edges and lift.

#### Handset Cradle Removal

3.20 To remove the handset cradle from the housing, proceed as follows.

- (1) Remove the faceplate (3.19), and place the handset aside.
- (2) Remove upper housing, if provided, [3.21(b)].

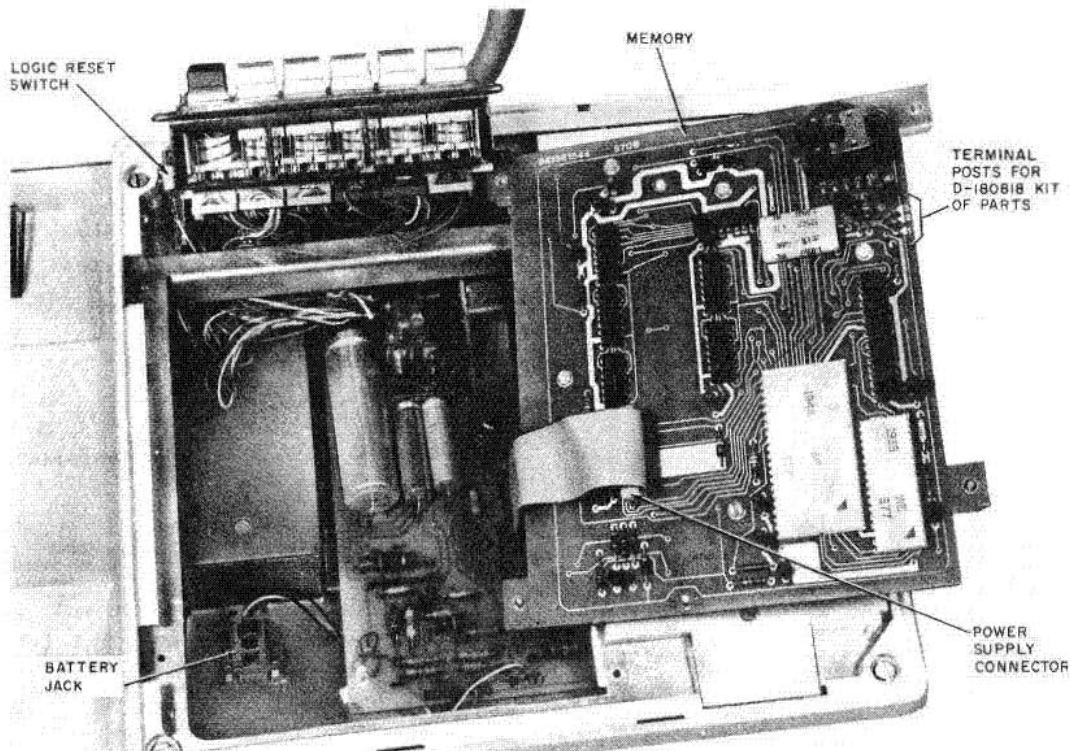


Fig. 5—872A1M Telephone Set, Overall Internal View

- (3) Disengage the captive cradle screws located in the two tabs on the cradle (Fig. 2).
- (4) Lift the cradle by pulling up on the plunger, and remove.
- (5) Replace the handset cradle by sliding it sideways to engage the clips with the mating tabs in the side of the housing.

**Caution:** *The plunger must be held from the top side of the cradle as it is slid into position to prevent damage to the switchhook arm.*

- (6) Refasten the captive cradle screws.

#### Housing Removal

3.21 To remove, proceed as follows.

#### (a) Lower housing.

- (1) Unplug the handset cord, at the telephone set end, and remove handset.
- (2) Remove the faceplate (3.19).
- (3) Remove the handset cradle (3.20).

**Caution:** *Attempting to remove the housing without removing the handset cradle may damage the switchhook arm.*

- (4) Disengage the four captive housing screws, (Fig. 2), one located in each corner of the upper housing.
- (5) Separate the housing from the telephone set base.



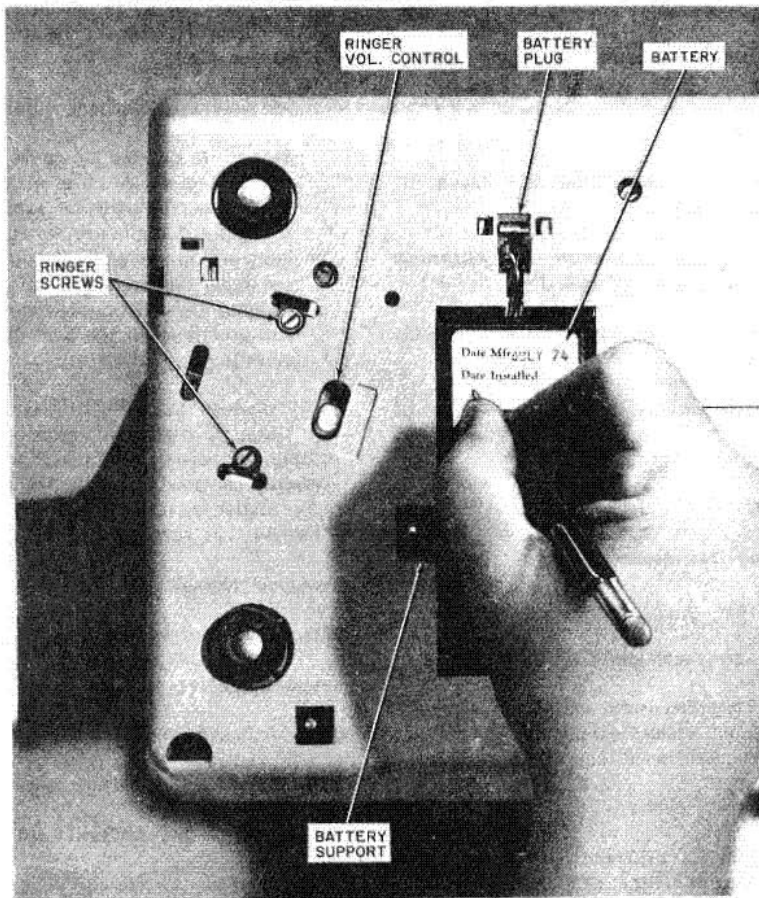


Fig. 6—872A1M Telephone Set, Bottom View

- (6) Feed mounting cord through hole in bottom of housing as housing is removed.
- (7) Before replacing the housing, lift the set to check that the shoulders of the battery jack are against the two tabs of the chassis. Misalignment may cause the bottom of the housing to bow.
- (8) When replacing the housing, keep the handset jack from being trapped between the housing and chassis

(b) *Upper housing.*

- (1) Remove the faceplate (3.19).
- (2) Disengage the captive housing screws located in each corner of the upper housing, (Fig. 2). This will release the lower housing.
- (3) Pull the upper housing away from the chassis as each housing screw is backed out. This will separate the upper housing from the chassis.

- (4) If necessary, thread screws out of housing.
- (5) To reassemble, reverse procedure.

#### 4. CONNECTIONS

4.01 Telephone set connections are shown in Fig. 8 and Table J.

**Caution:** *Some conductor assignments are not standard (Table J).*

4.02 Refer to Table A for connection information for all options.

4.03 A partial functional schematic is shown in Fig. 14.

#### 5. OPERATION

##### Record A Number Into Memory

5.01 To record.

- (1) Remove the faceplate (3.19).
- (2) Write or type the desired name and telephone number for a selected memory button on the associated position of the directory sheet.
- (3) Replace the faceplate.
- (4) Depress the RECORD button. The RECORD lamp adjacent to the RECORD button will light. (A number can be called and recorded simultaneously by lifting handset before depressing the RECORD button.)

**Note:** If set is equipped with the D-180818 Kit of Parts, feature switch must be placed in the OFF position.

- (5) Depress the specific memory button adjacent to the desired telephone number listed on the directory sheet.
- (6) Manually dial the desired telephone number. If an access code and a pause for second dial tone is required.
  - (a) Dial the access digit(s) for the outside line.

- (b) Push the WAIT button when the RECORD lamp relights. (The WAIT entry counts as one digit.)

- (c) Dial the telephone number.

**Note:** A number up to 15 digits in length may be recorded. The RECORD lamp will go out momentarily as each digit is dialed. If exactly 15 digits are recorded, the RECORD lamp will go out and stay out, indicating that the dialer has been reset. If a memory button has not been depressed, the RECORD lamp will go out when the first digit is dialed and recording operation will be voided.

- (7) Depress the RECORD OFF button if less than 15 digits are recorded. The RECORD lamp will go out. The dialer will be reset. The number is now stored in the selected memory. The dialer can also be reset by a switchhook, line key, or speakerphone operation.

##### Change A Number In Memory

5.02 Whenever a new number is recorded in a previously used memory position, it will automatically replace the previously stored number.

##### Delete A Number From Memory

5.03 Complete the following operations in succession.

- (1) Depress the RECORD button.
- (2) Depress the memory button corresponding to the name and number to be deleted.
- (3) Depress the RECORD OFF button.

##### Automatically Dial A Number From Memory

5.04 To automatically dial a number.

- (a) For factory-wired sets go off-hook, listen for dial tone, and depress the desired memory button. If a WAIT input has been recorded, automatic dialing will stop. When second dial tone is heard, depress memory button again to complete automatic dialing.
- (b) For sets equipped with dial tone detector only, go off-hook, listen for dial tone and depress the memory button.

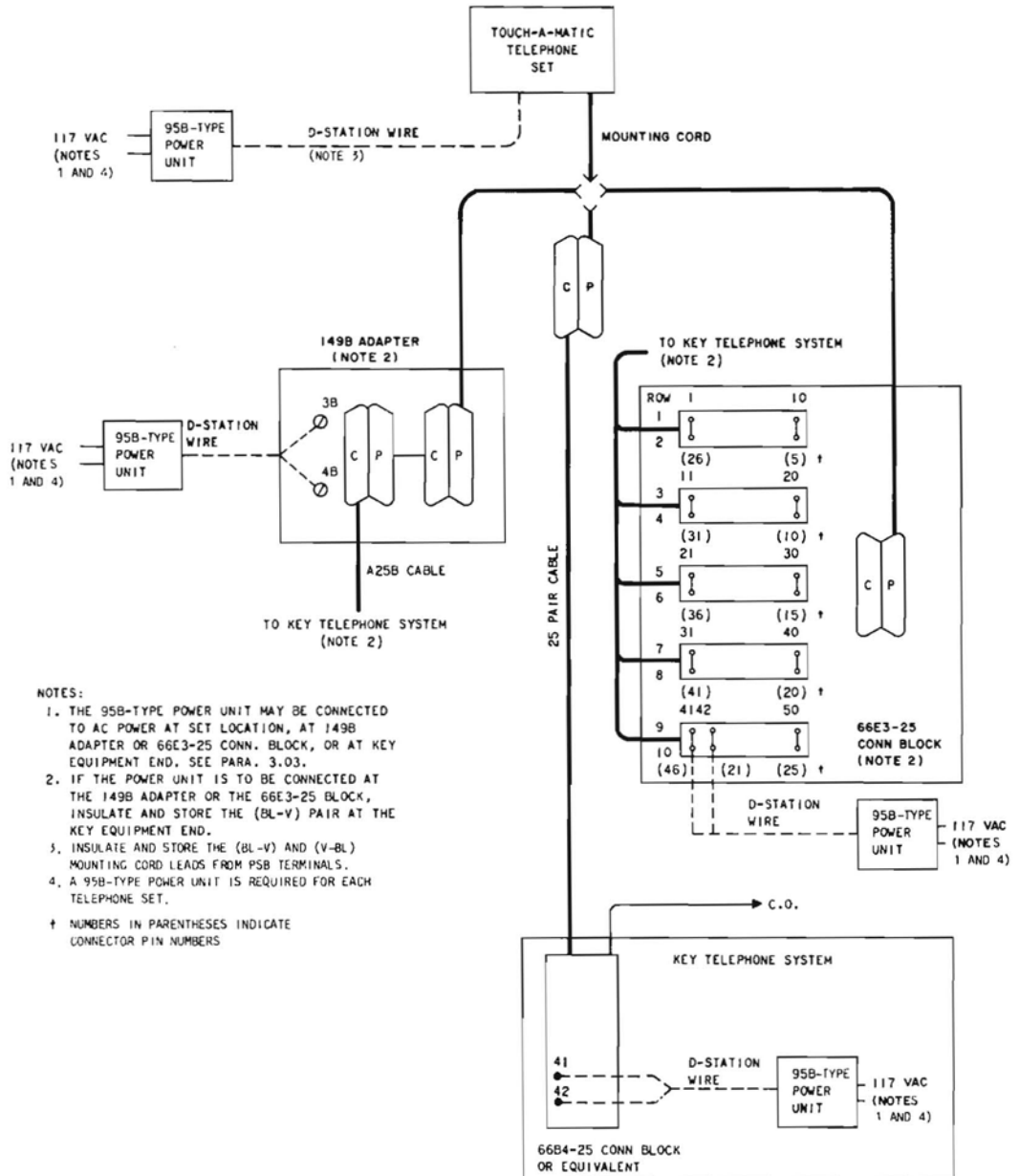


Fig. 7—872A1M Telephone Set, Alternate Power Connection Method

- (c) For sets equipped with the one-touch calling option (with speakerphone and dial tone detector), simply depress the memory button.

**LAST NUMBER DIALED Feature**

**5.05** The TOUCH-A-MATIC telephone set automatically records into the LAST NUMBER DIALED position (Fig. 1) any number dialed using the standard telephone dial. Each number in the LAST NUMBER DIALED position is automatically replaced by the next number manually dialed. Although the unit is recording, the RECORD lamp does not light at any time during this operation.

**5.06** Operation of LAST NUMBER DIALED feature.

- (a) With no access digit(s) required.
  - (1) Go off-hook.
  - (2) Listen for dial tone.
  - (3) Manually dial telephone number.
  - (4) To redial same number automatically.
    - (a) For factory-wired sets, go off-hook, listen for dial tone and depress LAST NUMBER DIALED button.
    - (b) For sets equipped with the dial tone detector only, go off-hook, listen for dial tone, and depress the LAST NUMBER DIALED button.
    - (c) For sets equipped with the one-touch calling option (with speakerphone and dial tone detector), simply depress the LAST NUMBER DIALED button.
- (b) When an access code and pause for second dial tone is required.
  - (1) Go off-hook.
  - (2) Listen for dial tone.
  - (3) Dial access digit(s).
  - (4) Depress WAIT button, after second dial tone is heard.

- (5) Manually dial telephone number.
- (6) To redial same number automatically.

- (a) For factory-wired sets, go off-hook, listen for dial tone and depress LAST NUMBER DIALED button. Automatic dialing will stop at the recorded WAIT input. When second dial tone is heard, depress LAST NUMBER DIALED button again to complete automatic dialing.

- (b) For sets equipped with the dial tone detector only, go off-hook, listen for dial tone, and depress LAST NUMBER DIALED button.

- (c) For sets equipped with the one-touch calling option (with speakerphone and dial tone detector), simply depress the LAST NUMBER DIALED button.

**6. MAINTENANCE**

**6.01** In case of power failure, the automatic dialing feature cannot be used. The battery retains the number associated with each of the memory buttons for at least 24 hours. If power loss exceeds 24 hours, the numbers may have to be rerecorded.

**Trouble Analysis**

**6.02** When trouble is encountered, the subsequent procedure should be followed.

- (1) Confirm improper operation either as a basic telephone set or as an automatic dialer (Part 5).
- (2) Check for improper connections.
- (3) Refer to Table N, and the following paragraphs.
- (4) If removal of set is required, proceed as follows:
  - (a) Disconnect telephone set.
  - (b) Unplug battery.
  - (c) Place battery plug sideways into housing slot below battery jack and tape into place.

**Caution:** Failure to restrain plug can result in plug damage necessitating battery replacement.

#### Battery

**6.03** The KS-20390L4 or L2 battery has an expected life of about 4 years. It can be replaced without loss of memory provided commercial ac power to the set is continuously maintained. To replace the battery, proceed as follows (Fig. 6).

- (1) Tilt the front of the set up.
- (2) Unplug the battery.
- (3) Loosen the captive screw on the battery support.
- (4) Remove battery support.
- (5) Remove battery.
- (6) Install new battery.
- (7) When battery has been connected at least five minutes, check memory retention by momentarily disconnecting ac power and then automatically dialing a known telephone number.

#### Memory

**6.04** The memory may be replaced in the following manner.

**Note:** Removal of the memory results in loss of stored telephone numbers.

- (1) Remove the faceplate (3.19).
- (2) Loosen the four captive memory mounting screws (Fig. 4).
- (3) Rotate the left edge of the memory upward as shown in Fig. 5.
- (4) Disengage the connector by pulling it perpendicular to the printed wiring board.
- (5) Replace the memory. Do not twist the gray power supply cable. It should form a loop as shown in Fig. 5 when connected to the board.
- (6) Reassemble set.

(7) Test per 3.07

#### Dial

**6.05** To replace.

- (1) Access PSB terminal area per 3.17.
- (2) Disconnect dial leads and remove dial.
- (3) Install new dial by reverseing procedure.

#### 6-Button Line Key

**6.06** To replace.

- (1) Remove key per 3.18.
- (2) Access PSB terminal area per 3.17.
- (3) Disconnect logic reset leads from PSB terminals 10 and 20.
- (4) Remove the 50S-type plugs and (if provided) the two contact strips from the back of the key.
- (5) Install new key.
- (6) Reassemble the set.
- (7) Test for operation of the logic reset switch [3.07(11)].

#### Ringer

**6.07** To replace.

- (1) Remove the faceplate (3.19) and place the handset aside.
- (2) Remove upper housing, if provided, [3.21(b)].
- (3) Remove the cradle (3.20).
- (4) Disconnect the ringer leads (Fig. 81).
- (5) Tilt the front of the set up.
- (6) Unfasten ringer mounting screws (Fig. 6).
- (7) Remove ringer.

(8) Replace new ringer and assemble in reverse order. The leads should be routed as shown in Fig. 3 to prevent contact with the gong and subsequent damping of the ringer output.

#### Buzzer

**6.08** To replace.

- (1) Remove the faceplate (3.19) and place handset aside.
- (2) Remove upper housing, if provided, [3.21(b)].
- (3) Remove the cradle (3.20).
- (4) Remove the buzzer mounting screw.
- (5) Remove the mounting screw and spacer for TB1 (Fig. 3).
- (6) Move terminal board TB1 to gain access to the appropriate terminals on TB2.
- (7) Remove appropriate leads (Fig. 8H).
- (8) Reassemble. When replacing TB1, locate its tabs in the slots of the chassis before refastening the TB1 mounting screw.

#### Handset Jack

**6.09** To replace.

- (1) Remove the faceplate (3.19) and place handset aside.
- (2) Remove upper housing, if provided, [3.21(b)].
- (3) Remove the cradle (3.20).
- (4) Remove the mounting screw and spacer for TB1 (Fig. 3).
- (5) Move terminal board TB1 to gain access to the appropriate terminals on TB2.
- (6) Disconnect the appropriate leads (Fig. 8H) and remove jack.
- (7) Reassemble. When replacing TB1, locate its tabs in the slots of the chassis before refastening the TB1 mounting screw.

#### Handset

**6.10** A defective G15A handset may be replaced or changed to a modular amplifying handset (G6BM, G7BM, or G8BM) by unplugging the H4DU cord and inserting it into the new handset. To replace the G15A handset with a nonmodular amplifying handset (G6B, G7B, or G8B) proceed as follows.

- (1) Unplug H4DU handset cord at telephone set end.
- (2) Remove faceplate (3.19) and place handset aside.
- (3) Remove upper housing, if provided [3.21(b)].
- (4) Remove handset cradle (3.20).
- (5) Disconnect 616B handset jack (6.09). (Jack may be removed or stored just to right of ringer.)
- (6) Insert spade-tipped end of handset cord through hole in the side of the housing.
- (7) Attach stayband hook to chassis.
- (8) Route leads through wire guide as shown in Fig. 3.
- (9) Make connections (Fig. 8H).
- (10) Reassemble set.

#### Faceplate

**6.11** To replace an 872A1-87 faceplate with an 872B1 faceplate.

- (1) Remove the 872A1-87 faceplate by lifting up at any of its edges.
- (2) Remove the four captive housing screws (Fig. 2) from the chassis.
- (3) Use the four housing screws to mount the 870A1U-type upper housing to the chassis and 870A1-type housing. The three parts should be held together tightly as the screws are driven.
- (4) Place the two tabs located along the lower edge of the 872B1 faceplate in the notches

in the lower side of the 870A1U-type upper housing.

- (5) Lower the faceplate to rest on the memory. The spring clip located at the top center of the upper housing should retain the faceplate.

### **Speakerphone**

**6.12** For maintenance information on the 3B or 4A speakerphone systems, refer to Section 512-620-100 or 512-700-100, respectively. For speakerphone connections, use applicable Tables B through E.

**TABLE J**  
**MOUNTING CORD AND 508 PLUG CONNECTIONS**

AMPHENOL PLUG			INSIDE TELEPHONE SET						
DESIG	PIN NO.	COLOR	MTG CD TERMINATIONS			SPADE TIP CONDUCTORS FROM 508 PLUGS.			
			SPADE TIP COND. IN MTG. CD	508 PLUGS		PLUG COLOR	PLUG PIN NO.	COLOR	TERM.
				COLOR	PIN NO.				
R(1)	1	BL-W		BL	6	BL	6	BL-W	*
T(1)	26	W-BL		BL	3	BL	3	W-BL	*
A1	2	O-W	TB1-12			BL	2	W	TB1-3
A(1)	27	W-O		BL	1	BL	1	W-O	*
L(1)	3	G-W		BL	L				
LG(1)	28	W-G		BL	LG				
R(2)	4	BR-W		O	6				
T(2)	29	W-BR		O	3				
B(2)	5	S-W	*			O	2	R	TB1-2
A(2)	30	W-S		O	1				
L(2)	6	BL-R		O	L				
LG(2)	31	R-BL		O	LG				
R(3)	7	O-R		G	6				
T(3)	32	R-O		G	3				
B(3)	8	G-R	*			G	2	BK	TB1-2
A(3)	33	R-G	TB1-7			G	1	S-W	TB1-7
L(3)	9	BR-R		G	L				
LG(3)	34	R-BR		G	LG				
R(4)	10	S-R		BR	6				
T(4)	35	R-S		BR	3				
B(4)	11	BL-BK	*			BR	2	Y	TB1-2
A(4)	36	BK-BL	TB1-9			BR	1	BR	TB1-9
L(4)	12	O-BK		BR	L				
LG(4)	37	BK-O		BR	LG				
R(5)	13	G-BK		S	6				
T(5)	38	BK-G		S	3				
B(5)	14	BR-BK	*			S	2	V	TB1-2
A(5)	39	BK-BR	TB1-4			S	1	S	TB1-4
L(5)	15	S-BK		S	L				
LG(5)	40	BK-S		S	LG				
BZ1	16§	BL-Y	TB2-11						
BZ	41§	Y-BL	TB2-5						

\*Insulate and store.



**TABLE J (CONT)**  
**MOUNTING CORD AND 508 PLUG CONNECTIONS**

AMPHENOL PLUG			INSIDE TELEPHONE SET						
DESIG	PIN NO.	COLOR	MTG CD TERMINATIONS			SPADE TIP CONDUCTORS FROM 508 PLUGS.			
			SPADE TIP COND IN. MTG. CD	508 PLUGS		PLUG COLOR	PLUG PIN NO.	COLOR	TERM.
				COLOR	PIN NO.				
Spare	17	O-Y	*						
Spare	42	Y-O	*						
HL	18	G-Y	PSB-26						
HLG	43	Y-G	PSB-27						
SG	19	BR-Y	TB1-5						
BL	44	Y-BR	TB1-6						
R or R1	20	S-Y	TB1-13						
B or B1	46	Y-S	Net. K						
AC1†	21§	BL-V	PSB-24						
AC2†	46§	V-BL	PSB-25						
SPO‡	22§	O-V	*						
Spare	47	V-O	Net. T						
R1‡	23	G-V	*						
T1‡	48	V-G	*						
P4-1R‡	24	BR-V	*						
P3-1T‡	49	V-BR	*						
LK‡	25	S-V	*						
AG‡	50	V-S	*						
Tip						S	4	G	TB1-8
Ring						S	5	R	PSB-9
						Pink	HL	BR-W	PSB-26
						Pink	HLG	W-BR	PSB-27
						Pink	3	BL	*
						Pink	2	G	TB1-1
						Pink	1	Y-BL	TB1-3

\*Insulate and store.

†95B1 Power Unit

‡Designations for speakerphone options. Refer to Tables B through E.

§ Non-standard pin numbers.

TABLE K

TO CONVERT THE 872A1M TELEPHONE SET  
FROM 1A1, 1A2, TO 1A OPERATION (See Note)

LEAD DESIG	COLOR	FROM (1A1, 1A2)	TO (1A)
SHb	Y	TB1-12	TB1-5
HOLD	Y-BL	TB1-3	TB1-16
HOLD	BL	* (Pink 508 Plug)	TB1-3
HOLD	G	TB1-1	Net. L2
RING	R	PSB-9	Net. L2
SHc†	BR	TB1-1	TB1-6
Net. F‡	R-BL	TB1-1	TB1-6

\*Insulated and stored.

†Only required when busy-lamp option is provided.

‡Only required when both busy-lamp and speakerphone options are provided.

Note: Tables B through E provides speakerphone connections for 1A1 and 1A2 KTS. The same tables apply for 1A KTS

TABLE L

CONNECTIONS FOR D-180818 KIT OF PARTS

D-KIT SWITCH LEADS		TERMINAL POSTS FOR SWITCH LEAD CONNECTORS	
DESIG.	COLOR (NOTE 1)	RECORD DISABLE ONLY	RECORD DISABLE AND DIAL INTERMIX (NOTE 2)
WDC	BK †	*	1
VDD	R	2	2
RCRD	BK	3	3

\*Insulate and store.

†Single pin connector.

Notes:

- These are connectors attached to the switch leads. A single pin connector with a (BK) lead and a double pin connector with a (R) and a (BK) lead.
- When this option is provided, the LAST NUMBER DIALED (LND) feature is disabled and the 32nd memory may be used just as any other memory.

TABLE M

CONVERSION OF KEYS FOR SIGNALING

SELECTIVE SIGNALING							
508 PLUG	COLOR:	BLUE	ORANGE	GREEN	BROWN	SLATE	
	PIN NO:	2	2	2	2	2	1
	LEAD COLOR:	W	R	BK	Y	V	S
Key Functions†	HPPPPP	TB1-3	TB1-2	TB1-2	TB1-2	TB1-2	TB1-4
	HPPPPS	TB1-3	TB1-2	TB1-2	TB1-2	TB1-5	TB1-4
	HPPSSS	TB1-3	TB1-2	TB1-2	TB1-5	TB1-5	TB1-4
	HPPSSS	TB1-3	TB1-2	TB1-5	TB1-5	TB1-5	TB1-4
COMMON SIGNALING (SEE NOTE)							
508 PLUG	COLOR:	BLUE	ORANGE	GREEN	BROWN	SLATE	
	PIN NO:	2	2	2	2	2	1
	LEAD COLOR:	W	R	BK	Y	V	S
Key Functions†	HPPP*P*S	TB1-3	TB1-3	TB1-2	TB1-2	TB1-2	TB1-3
	HPP*P*P*S	TB1-3	TB1-2	TB1-2	TB1-2	TB1-2	TB1-3

Note: Remove (BK) strap between TB1-2 and TB1-3.

\*These arrangements use line switch controlled ground for common signal key, used with private or intercommunicating lines. Common signals should be used to operate a common signal relay. Do not wire directly to a buzzer.

†Remove pins to make key nonlocking when used for signaling.

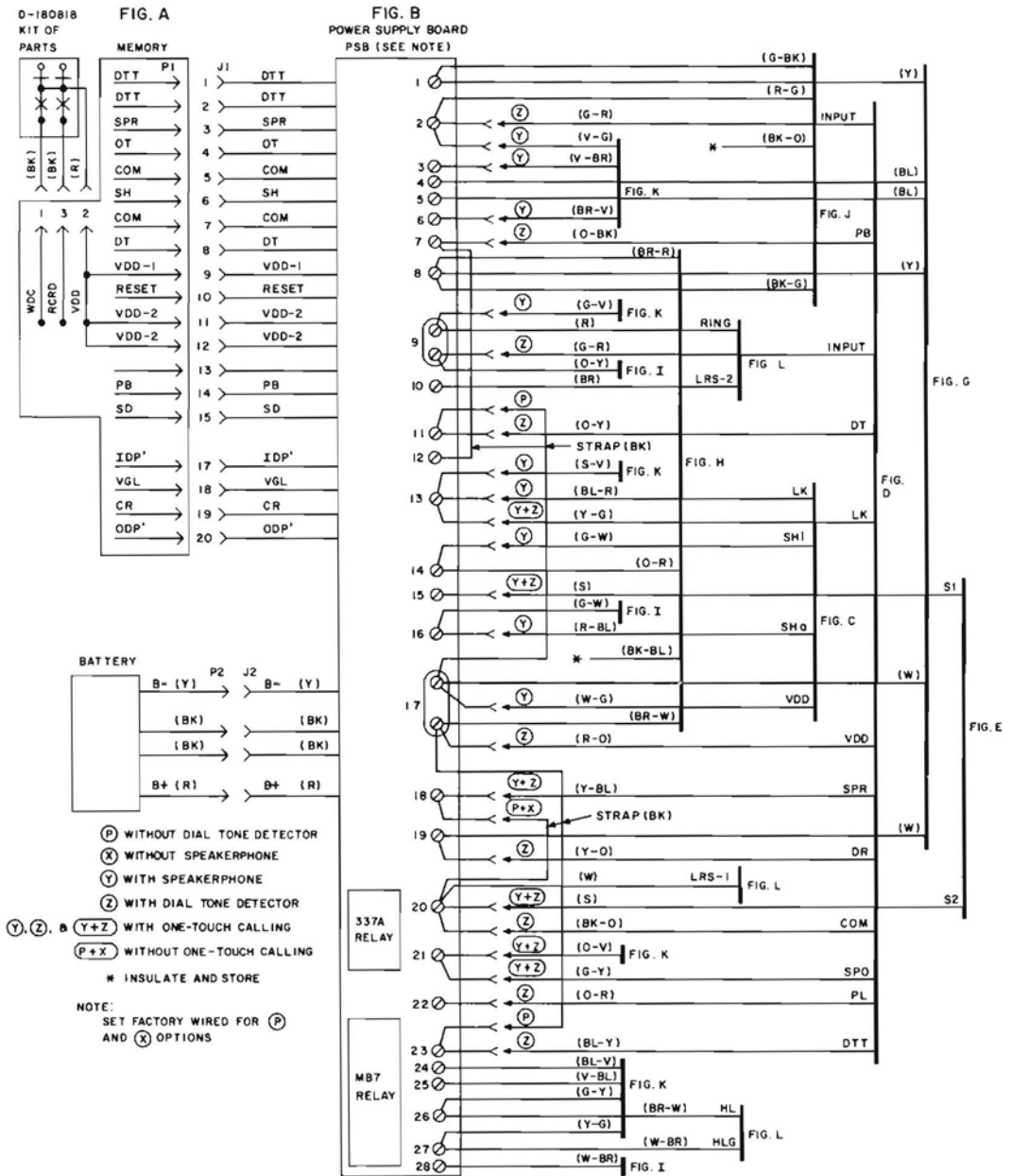


Fig. 8—872A1M Telephone Set, Connections (Sheet 1 of 4)

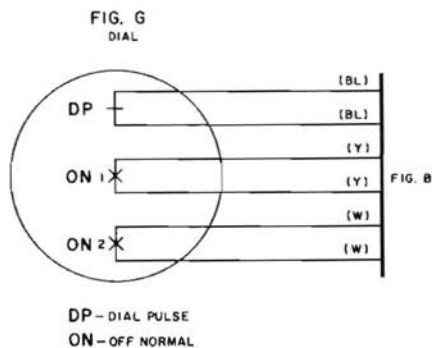
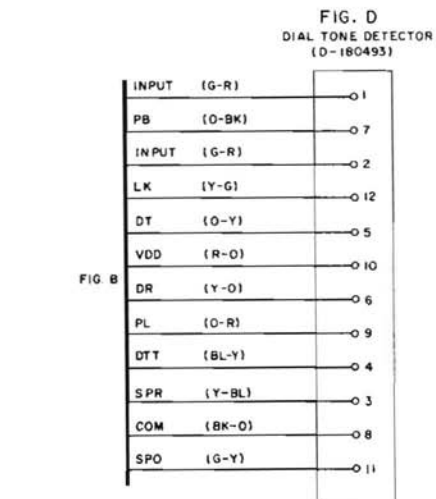
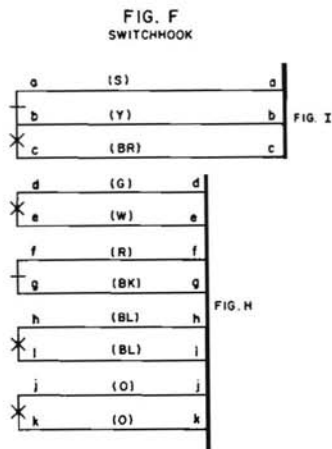
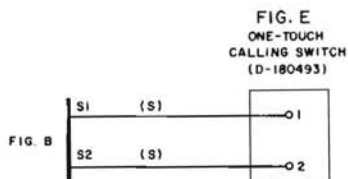
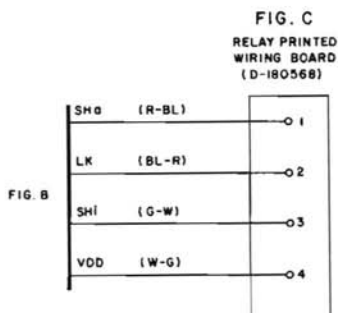


Fig. 8—872A1M Telephone Set, Connections (Sheet 2 of 4)

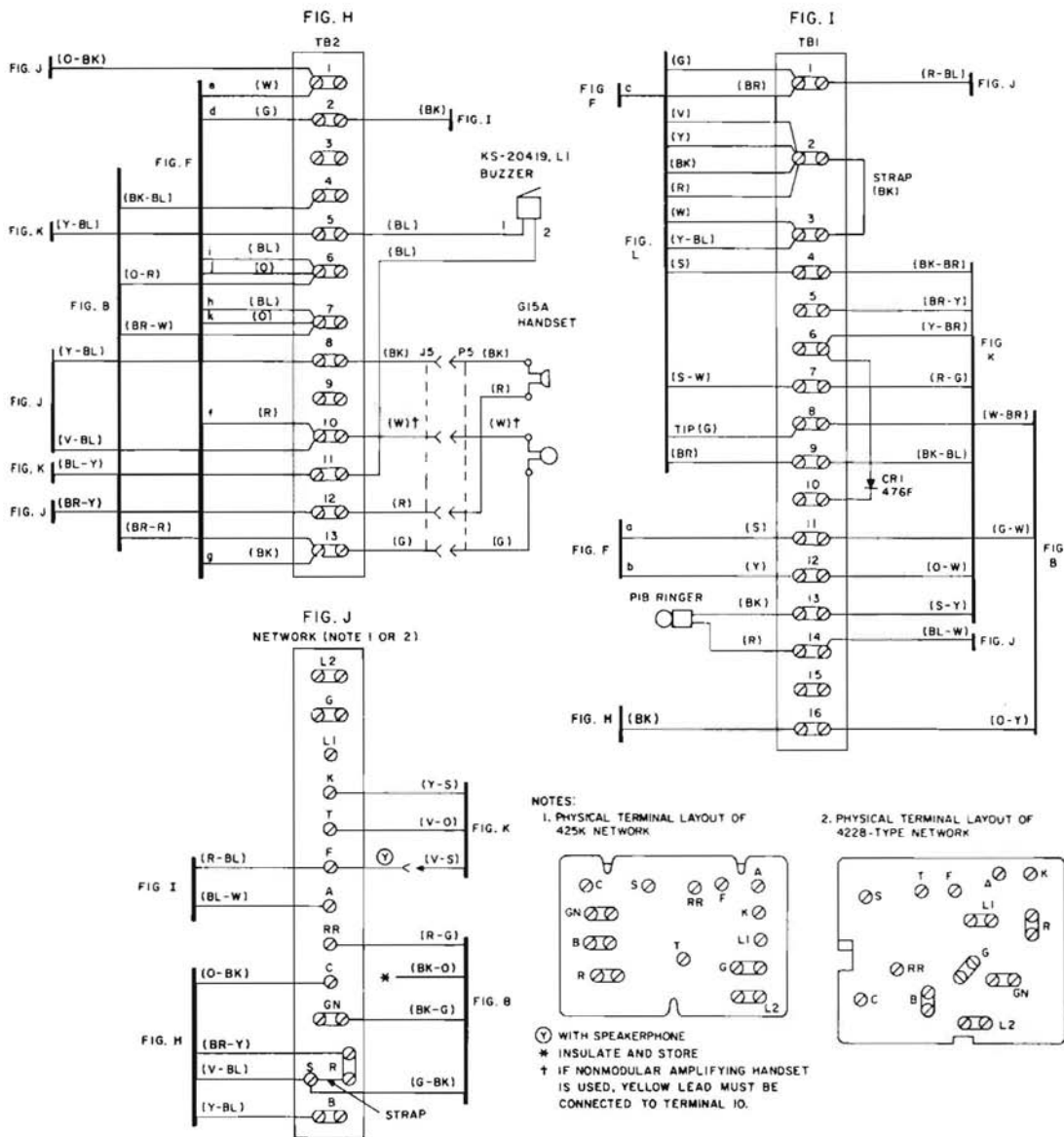


Fig. 8—872A1M Telephone Set, Connections (Sheet 3 of 4)

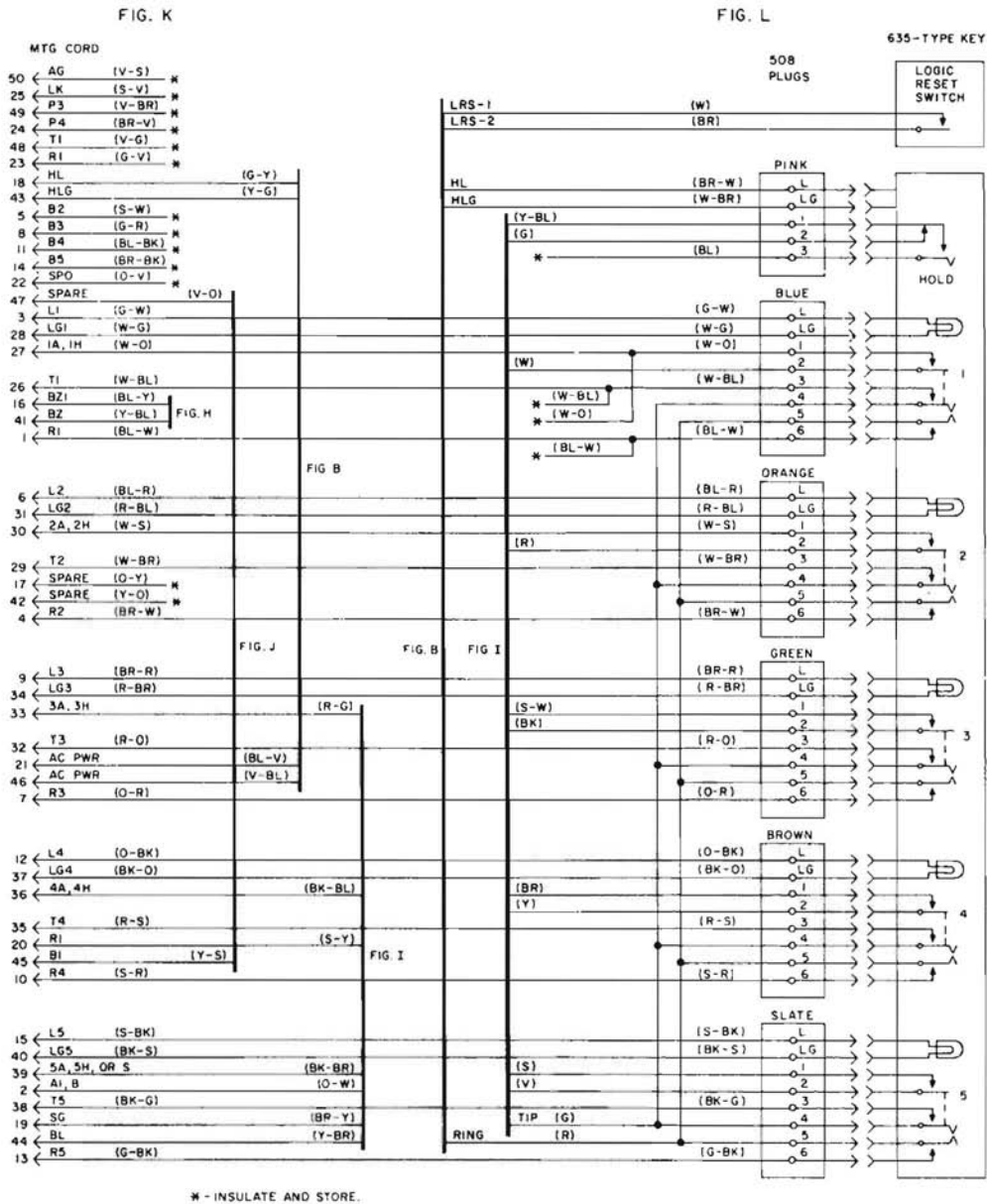


Fig. 8—872A1M Telephone Set, Connections (Sheet 4 of 4)

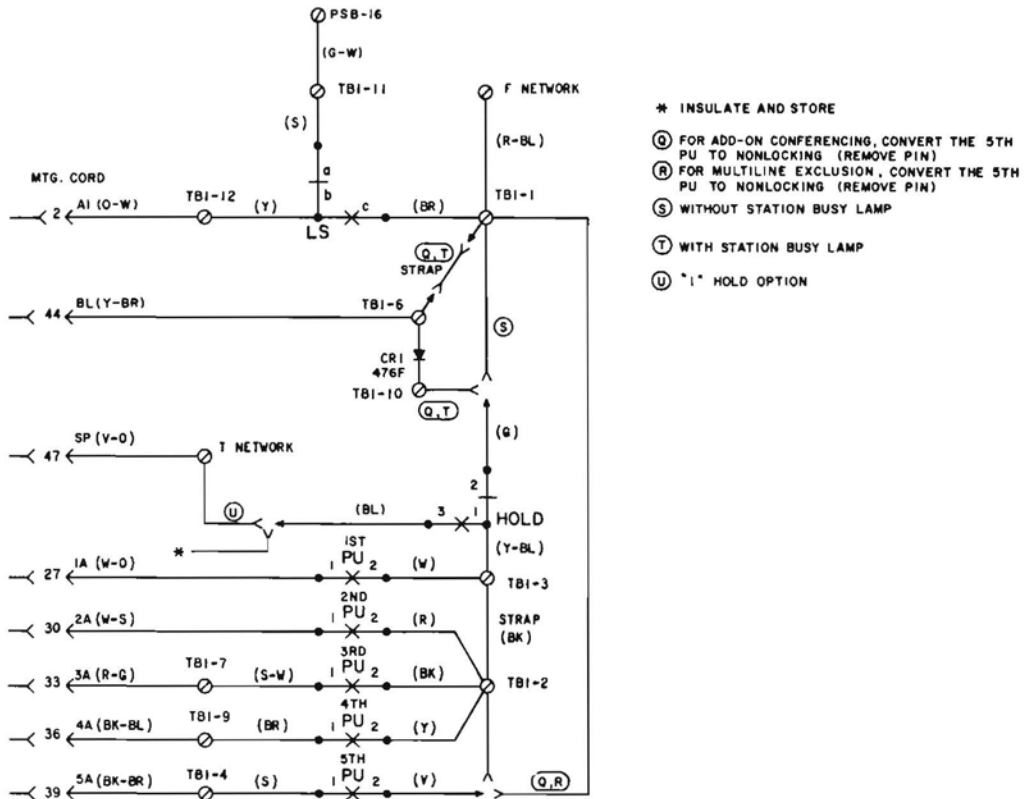


Fig. 9—"Y" Hold, Exclusion, Station Busy Lamp, and Add-On Conference—1A1 and 1A2 KTS (Showing 5th Key Modified)

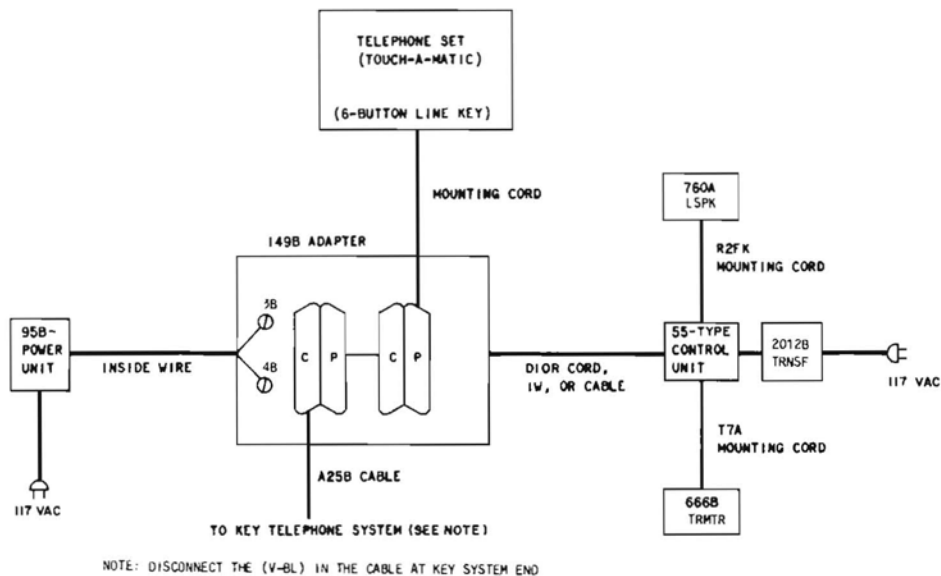
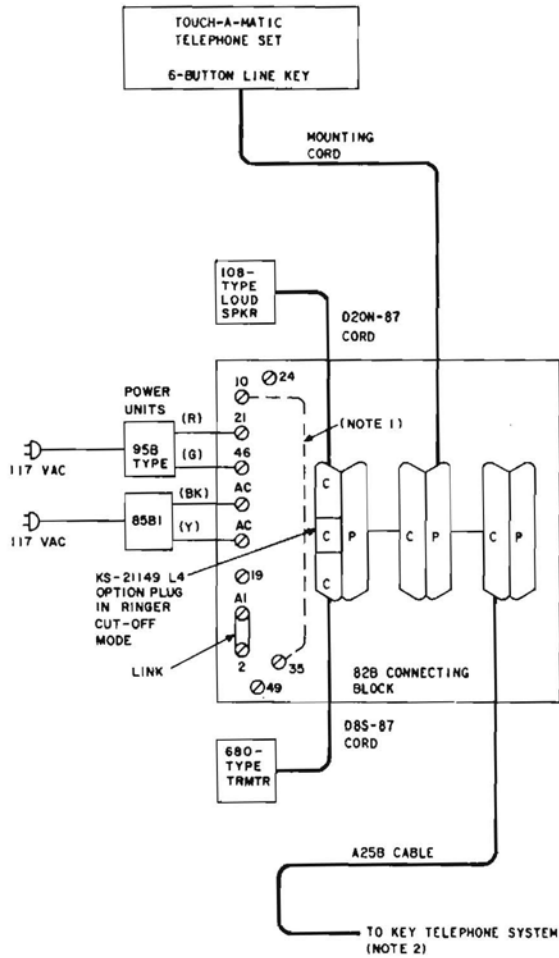


Fig. 10—Block Diagram—872A1M Telephone Set Using 3B Speakerphone





## NOTES:

1. STRAP NECESSARY ONLY IF SET IS ALSO EQUIPPED WITH DIAL TONE DETECTOR TO PROVIDE ONE-TOUCH CALLING OPTION.
2. IF POWER IS PROVIDED THROUGH KEY CABLE, USE (BR-V) PAIR FOR 85-TYPE POWER UNIT AND STRAP 24 TO AC1 AND 49 TO AC2 ON 82B CONNECTING BLOCK.

Fig. 11—Block Diagram—72A1M Telephone Set Using 4A Speakerphone

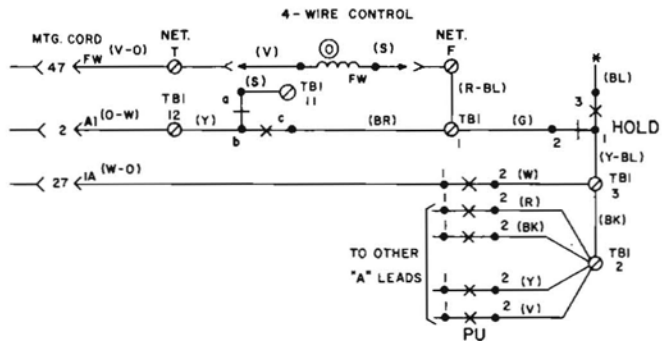
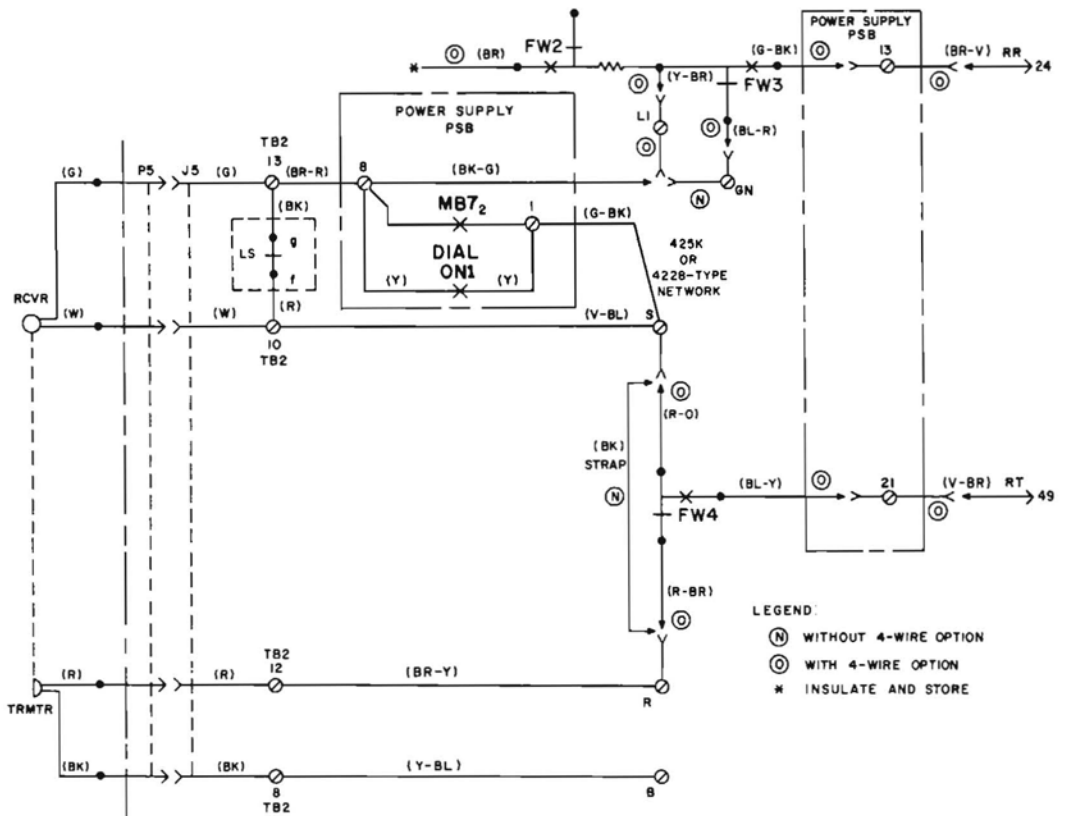
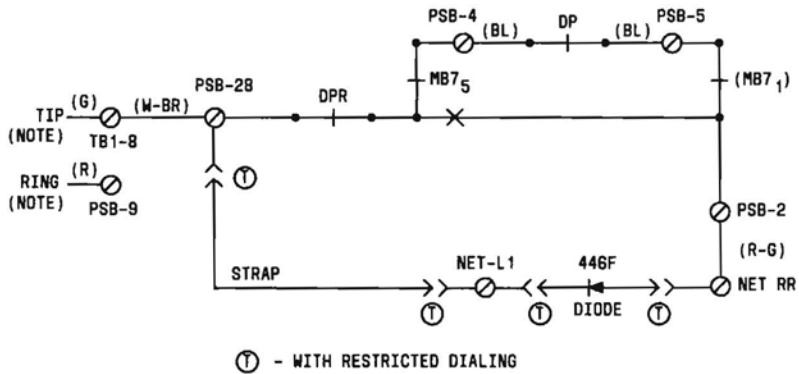


Fig. 12—872A1M Telephone Set—2/4 Wire Connections



NOTE: REVERSE POLARITY ON TIP AND RING LEADS ON ALL LINES WITH RESTRICTED DIALING.

Fig. 13—Connections for Restricted Dialing Option

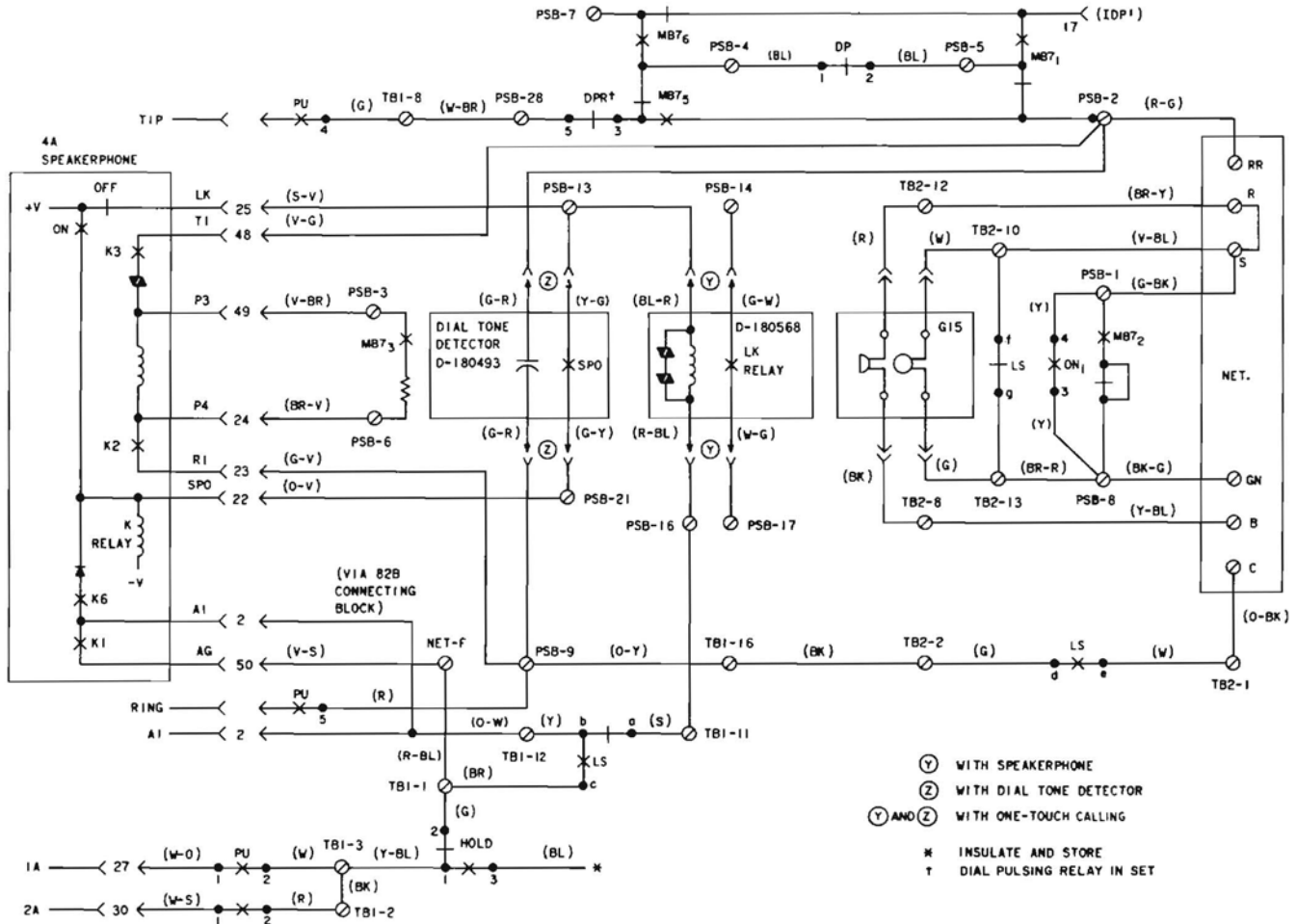


Fig. 14—872A1M Telephone Set, Partial Functional Schematic

**TABLE N**  
**TROUBLE ANALYSIS – 872A1M**

TROUBLE NUMBER	FAILURE	ADDITIONAL SYMPTOM	POSSIBLE CAUSE	REMEDIAL ACTION
1	Dead set on all lines when off-hook on handset	Line lamp does not come on when handset is taken off-hook.	Mounting cord improperly inserted at equipment end	Check cord insertion and connections
		Line lamp comes on when handset is taken off-hook. Set remains dead when 95B power unit is disconnected.	Bad connection between handset and telephone set	1. Check handset cord connections 2. Check handset jack connections
			Defective receiver	Check handset
		Dial tone is not present when speakerphone is on.	Open tip or ring lead at 635-type line key	Check leads and connections from contact strips
			Unknown	Replace telephone set*
		Line lamp comes on when handset is taken off-hook. Set becomes active when 95B power unit is disconnected.	Improperly installed or defective memory	1. Check connector cable insertion 2. Replace memory
			Defective PSB	Replace telephone set*
2	Dead set on all lines only when speakerphone is on	Set is active when off-hook on handset.	Improperly connected or defective speakerphone	1. Check connections 2. See appropriate speakerphone BSP for trouble analysis
3	Cannot transmit when off-hook on handset.	Line lamp comes on. Dial tone present, but sidetone absent.	Handset cord improperly inserted into either handset or jack in telephone set	Check handset cord and/or handset
			Defective transmitter	Replace transmitter or handset
			Defective 616B jack	Replace 616B jack
			Defective network	Replace telephone set*

\*Refer to 6.02 (4)

TABLE N  
TROUBLE ANALYSIS – 872A1M (Contd)

TROUBLE NUMBER	FAILURE	ADDITIONAL SYMPTOM	POSSIBLE CAUSE	REMEDIAL ACTION
4	Cannot manually dial when off-hook on handset (dial tone is present).	Dialing clicks heard (in handset) when dial is returning.	Bridged set off-hook	Place bridged set on-hook
			Speakerphone improperly installed or defective	Check appropriate speakerphone BSP for analysis
		No dialing clicks heard when dial is returning. Condition remains unchanged when 95B power unit is disconnected.	Improperly installed or defective rotary dial	1. Check connections 2. Replace rotary dial
			Unknown	Replace telephone set*
		No dialing clicks heard when dial is returning. With 95B power unit disconnected, set can manually dial.	Improperly installed or defective memory	1. Check connector cable 2. Replace memory
			Defective PSB	Replace telephone set*
5	Cannot manually dial when speakerphone is on. (Dial tone is present.)	Set does manually dial when off-hook on handset	Improperly installed on defective speakerphone	1. Check connections 2. See appropriate speakerphone BSP for trouble analysis
			Defective switchhook	Replace telephone set*
6	RECORD lamp does not function properly	RECORD lamp does not turn on when RECORD button is depressed.	AC power not present	Check for commercial power
			Battery not connected	Connect battery
			95B power unit not plugged in or defective	Check or replace 95B power unit (should read 13.4 to 18 Vac across screw terminals 24 and 25 on PSB)
			Open in IW	Check IW and connections
			Memory, RECORD OFF or WAIT button stuck down	Clear stuck button
			Defective logic reset switch	Replace line key
			Switch of D-180818 Kit of Parts in ON position	Change switch position to OFF

\*Refer to 6.02 (4)

**TABLE N**  
**TROUBLE ANALYSIS – 872A1M (Contd)**

TROUBLE NUMBER	FAILURE	ADDITIONAL SYMPTOM	POSSIBLE CAUSE	REMEDIAL ACTION
6 (cont'd)			Improperly installed or defective memory	1. Check connector cable 2. Replace memory
			Unknown	Replace telephone set*
		Lamps turns off when any memory button is depressed.	Improperly installed or defective memory	1. Check connector cable 2. Replace memory
			Unknown	Replace telephone set*
		Lamp does not turn off as dial is returning. No relay click heard at beginning of dial wind-up or at end of dial return.	Improperly connected or defective rotary dial (off-normal contact)	1. Check rotary dial connections 2. Replace telephone set*
			Unknown	Replace telephone set *
		Lamp does not turn off as dial is returning, but relay click is heard at beginning of dial wind-up and at end of dial return. Can manually dial off-hook.	Improperly connected or defective memory	1. Check cable 2. Replace memory
			Unknown	Replace telephone set*
		Lamp turns off as dial is returning and stays off. Can manually dial off-hook.	Memory button was not depressed prior to the operation of the dial	Record per 5.01 (4) through (7)
			Defective memory	Replace memory
Unknown	Replace telephone set*			
7	Cannot record properly into the 31 memory positions or into LAST NUMBER DIALED position.	Record lamp functions properly and set dials manually	Defective memory	Replace memory
			Unknown	Replace telephone set*

\*Refer to 6.02 (4)

TABLE N  
TROUBLE ANALYSIS – 872A1M (Contd)

TROUBLE NUMBER	FAILURE	ADDITIONAL SYMPTOM	POSSIBLE CAUSE	REMEDIAL ACTION
7 (cont'd)		Party is reached when number is recorded as it is manually dialed; however, when number is subsequently dialed from memory, party is not reached – wrong number is dialed from memory	Check recording procedure	Record per 5.01 (4) through (7)
			Defective memory	Replace memory
			Unknown	Replace telephone set*
8	Cannot dial properly from memory on handset.	MB7 relay does not operate (no click heard) when memory button is depressed	Battery not connected	Connect battery
			Memory not securely mounted	Tighten memory mounting screws
			Improper and/or defective strap from PSB terminal 18 to PSB terminal 20	Check and/or replace strap lead. See Fig. 8B
			Improper connection to or defective memory	1. Check connector cable 2. Replace memory
		Unknown	Replace telephone set*	
		MB7 relay operates (click heard) when memory button is depressed but no dialing clicks are heard. In addition, transmit and receive levels are very low.	WAIT button is stuck down or defective	Free stuck WAIT button or replace memory
			Unknown	Replace telephone set*
No digits, random digits or all the same digits in memory location(s). Note: memory may or may not have functioned properly at some previous time.	AC power outage for 24 hours or longer	Reestablish ac power and record numbers into memory		

\*Refer to 6.02 (4)



TABLE N

## TROUBLE ANALYSIS – 872A1M (Contd)

TROUBLE NUMBER	FAILURE	ADDITIONAL SYMPTOM	POSSIBLE CAUSE	REMEDIAL ACTION
8 (cont'd)			Defective battery	1. Allow the battery to be charged for a minimum of 5 minutes. Then momentarily remove the 95B power unit from the ac power outlet and reinsert 2. If previously stored numbers are not dialed from memory, replace the battery 3. Repeat procedure
			Defective memory	Replace memory
			Unknown	Replace telephone set*
		Two or more memory locations have same digits which are usually different from originally recorded digits	Static discharge damage	1. Consult Telco Engineer for proper grounding procedure 2. Replace memory
		Automatically dials through a "wait"	Memory not securely mounted	Tighten memory mounting screws
			Improper connection to PSB terminal 23	Check connection to and/or replace strap to PSB terminal 23
			Defective memory	Replace memory
			Unknown	Replace telephone set*
9	Cannot dial properly from memory when on the handset (wired for dial tone detector option)	MB7 relay does not operate (no click heard) when memory button is depressed.	Battery not connected	Connect battery
			Precise TOUCH-TONE dial tone may not be present	Make sure precise (350 Hz and 440 Hz) dial tone is present
			Memory not securely mounted	Tighten memory mounting screws
			Improper installation of dial tone detector D-180493	Check connections for D-180493 installation

\*Refer to 6.02 (4)

**TABLE N**  
**TROUBLE ANALYSIS – 872A1M (Contd)**

TROUBLE NUMBER	FAILURE	ADDITIONAL SYMPTOM	POSSIBLE CAUSE	REMEDIAL ACTION
9 (cont'd)		Same as above — Addition of strap lead between PSB terminals 20 and 23 does not correct problem	Improper connection to or defective memory	1. Check connector cable 2. Replace memory
		Addition of strap lead between PSB terminals 20 and 23 corrects problem.	Defective memory	Replace memory
			Defective dial tone detector	Replace D-180594 dial tone detector
			Unknown	Replace telephone set*
		Automatically dials through a "wait."	Memory not securely mounted	Tighten memory mounting screws
		Improper connection to PSB terminals 23 and 11	Check installation of D-180493 Kit of Parts	
10	Cannot turn speakerphone on when ON button is depressed (wired for speakerphone option).	Speakerphone indicator lamp does not turn on , but line lamp is on.	Handset off-hook	Place handset on-hook
		No dial tone heard, but indicator lamp turns on.	Line button not depressed	Depress line button
		With temporary strap lead added between PSB screw terminals 16 and 13, speakerphone turns on when ON button is depressed.	Improper connections or defective D-180568 Kit of Parts	Check connections to and/or replace D-180568 Kit of Parts
		With temporary strap lead added between screw terminals 11 and 12 on TB1, speakerphone turns on when ON button is depressed.	Defective switchhook a-b contacts or connecting lead to power supply PSB	1. Check (G-W) harness lead between screw terminal 11 on TB1 and PSB terminal 16 2. Replace telephone set*
		Speakerphone indicator lamp does not turn on and neither does line lamp	Improper connections or defective 85B1 power unit	1. Check for commercial power 2. Check connections per Tables B, C, D, and E

\*Refer to 6.02 (4)

**TABLE N**  
**TROUBLE ANALYSIS – 872A1M (Contd)**

TROUBLE NUMBER	FAILURE	ADDITIONAL SYMPTOM	POSSIBLE CAUSE	REMEDIAL ACTION
10 (contd)				3. Check that 85B1 power unit is plugged into commercial ac power outlet 4. Check or replace 85B1 power unit (should read 18 to 25 Vac across "open circuited" secondary screw terminals)
			Defective speakerphone	See appropriate speakerphone BSP for trouble analysis
11	RECORD lamp does not turn off when speakerphone ON button is depressed (wired for speakerphone option).	With temporary strap lead added between PSB screw terminals 14 and 17, speakerphone turns on when ON button is depressed and RECORD lamp goes off	LK relay circuit defective on D-180568 Kit of Parts	Replace D-180568 Kit of Parts
		Operation of RECORD OFF button or line key buttons turns RECORD lamp off.	Defective switchhook h-i or j-k contacts	Replace telephone set*
12	Cannot turn speakerphone off when handset is lifted off-hook (wired for speakerphone option).	Speakerphone turns off when OFF button is depressed but turns back on when OFF button is released	Short circuit between screw terminals 11 and 12 on TB1	Clear short
			Defective switchhook a-b contacts	Replace telephone set*
13	Cannot hear dial clicks when dialing with speakerphone on (wired for speakerphone option).	With the speakerphone ON button depressed, dialing clicks can be heard.	Physical spacing between speakerphone, loudspeaker and transmitter units is too close	See appropriate speakerphone BSP for proper placement of units
14	Speakerphone does not turn on when a memory button is momentarily depressed in the automatic dialing mode (wired for one-touch option).	MB7 relay does not operate (no click heard) when memory button is depressed	Battery not connected	Connect battery
			With 4A speakerphone, strap not added on 82B block	Add strap from terminal 10 to 35 in 82B block
		With temporary strap between PSB screw terminals 16 and 20 speakerphone turns on when a memory button is depressed	One-touch calling switch turned off or defective	1. Turn one-touch calling switch on 2. Replace one-touch calling switch assembly of D-180493 Kit of Parts

\*Refer to 6.02 (4)

**TABLE N**  
**TROUBLE ANALYSIS – 872A1M (Contd)**

TROUBLE NUMBER	FAILURE	ADDITIONAL SYMPTOM	POSSIBLE CAUSE	REMEDIAL ACTION
14 (cont'd)			Defective dial tone detector D-180493 Kit of Parts	Replace dial tone detector PWB assembly of D-180493 Kit of Parts
		With temporary strap between PSB screw terminals 13 and 21, speakerphone turns on.	Defective connections between dial tone detector and PSB.	Check (Y-G) and (G-Y) leads to PSB terminals 13 and 21, respectively
			Defective dial tone detector D-180493 Kit of Parts	Replace dial tone detector PWB assembly of D-180493 Kit of Parts
15	Speakerphone turns on but set does not automatically dial when memory button is depressed (Wired for one-touch option).		(BK) strap leads to screw terminals 11 and 23 on PSB were not insulated and stored when option was wired	Insulate and store strap leads.
		Set automatically dials when screw terminals 20 and 23 on PSB are temporarily shorted.	Precise TOUCH-TONE dial tone not present or a defective dial tone detector	<ol style="list-style-type: none"> <li>1. Check CO line for presence of precise TOUCH-TONE dial tone (350 Hz and 440 Hz)</li> <li>2. If correct dial tone is present, replace dial tone detector PWB assembly of D-180493 Kit of Parts</li> </ol>
16	Delay time between depression of a memory button and initiation of automatic dialing exceeds 3 seconds (wired for one-touch option).		Defective timing circuit	<ol style="list-style-type: none"> <li>1. Replace memory</li> <li>2. Replace dial tone detector PWB assembly of D-180493 Kit of Parts</li> </ol>
17	Cannot turn speakerphone off (wired for one-touch option).	Normal conversational level on speakerphone.	Defective muting circuit	Replace telephone set*

\*Refer to 6.02 (4)

**TABLE N**  
**TROUBLE ANALYSIS – 872A1M (Contd)**

TROUBLE NUMBER	FAILURE	ADDITIONAL SYMPTOM	POSSIBLE CAUSE	REMEDIAL ACTION
17 (contd)		Speakerphone turns off when OFF button is depressed but turns on when OFF button is released.	(BK) strap to screw terminal 18 on PSB was not insulated and stored when option was wired	Insulate and store strap lead
		Speakerphone turns off and stays off when (Y-BL) lead is disconnected from terminal 27 on PSB and OFF button is depressed.	Defective output logic level	Replace memory
		Speakerphone turns off when handset is taken off-hook but turns on when handset is placed on-hook.	Defective circuit of D-180493 Kit of Parts	Replace dial tone detector PWB assembly of D-180493 Kit of Parts
18	Set dials automatically but does not wait for dial tone (wired for one-touch calling)		Noise on line	<ol style="list-style-type: none"> <li>1. Add .05 mf capacitor between PSB-17 and PSB-23</li> <li>2. Remove above capacitor and add resistor (10 K<math>\Omega</math> to 50 K<math>\Omega</math>) in series with (G-R) dial tone detector input lead.</li> </ol>
19	Automatic dialing commences for no apparent reason (wired for one-touch calling)		Static discharge damage	<ol style="list-style-type: none"> <li>1. Consult Telco Engineer for proper grounding procedure</li> <li>2. Replace memory</li> </ol>



## 830- AND 2830-TYPE TELEPHONE SETS

### IDENTIFICATION, INSTALLATION, MAINTENANCE, AND CONNECTIONS

#### 1. GENERAL

1.01 This section contains information for the 830- and 2830-type telephone sets.

1.02 This section is reissued to:

- Show 830DM and 2830DM telephone sets MD
- Show G12A handset (A&M only)
- Show 3-type speakerphone MD
- Show 533K diode for use with Station Busy Lamp and Dial Restriction
- Add information on 830FM and 2830FM telephone sets
- Add Table A, ordering guide and replaceable components, Fig. 3
- Remove information on P-90D170 polarity guard
- Remove information on D-180656 Kit of Parts (wall mounting arrangement).

Since this reissue covers a general revision, arrows ordinarily used to indicate changes have been omitted.

#### 2. IDENTIFICATION

##### A. Purpose

2.01 The 830-(Rotary dial) and 2830-(TOUCH-TONE® dial) type telephone sets are obtainable as modular or complete desk-type, 10- or 11-button, key telephone sets (Fig. 1, 2, or 3) equipped to provide standard key system features.

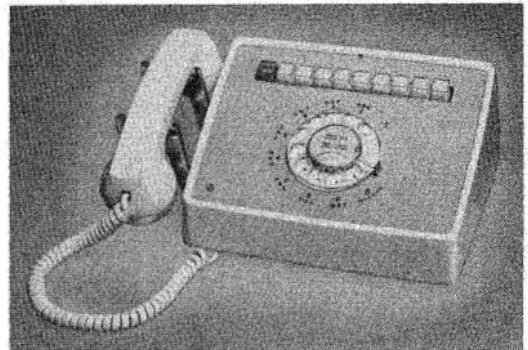


Fig. 1—830CM Telephone Set



Fig. 2—830DM (MD) or 830FM Telephone Set

##### B. Application

2.02 Used with central office, PBX or intercommunication line circuits in IA1, IA2, or 6A key telephone systems (KTS). These sets are not equipped for use with IA KTS.

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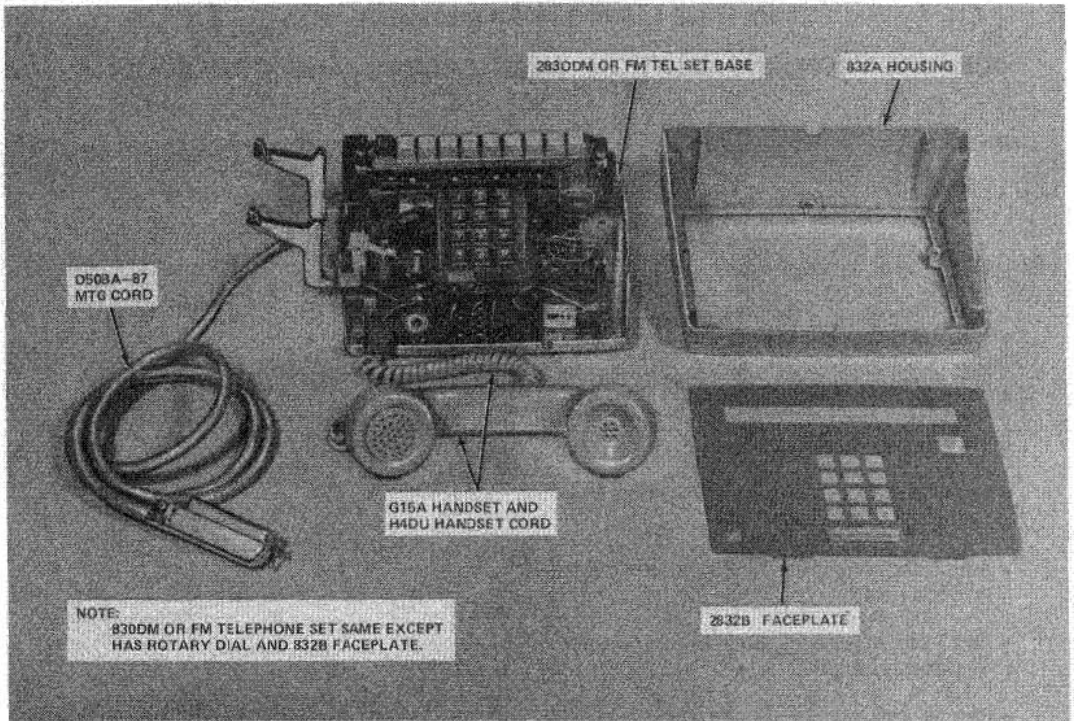


Fig. 3—Station Modular Arrangement 2830DM (MD) or 2830FM Telephone Set

**2.03** All 830- and 2830-type telephone sets may be used with the 3-type (MD) or 4A speakerphone system. When used with 3-type speakerphone, a D10R auxiliary mounting cord may be required due to the limited number of mounting cord conductors.

#### C. Optional Components

**2.04** Optional Components (order separately):

- Diode, 533K (for use with station busy lamp)
- Diode, 533K for dial restriction (830-type sets only)
- Buzzer, KS-8109L2
- Buzzer, KS-20419L1 (one provided with set)

- Dial, 8CA-58 (for 830-type set used with speakerphone)
- 819041971 (P-90D197) Polarity Guard (adhesive backed)
- Lamp, 51A (Hold button for message waiting).

#### D. Ordering Guide

**2.05** For telephone set, faceplate, and replaceable component ordering information, refer to Tables A and B.

#### E. Design Features

- 2.06** Design features for the 830- and 2830-type sets are as follows:
- Modular set.



TABLE A

## TELEPHONE SETS ORDERING GUIDE AND REPLACEABLE COMPONENTS

TEL SET	BASE	HOUSING	DIAL	KEY	FACE-PLATE	HANDSET	HANDSET CORD	LAMP
830CM	830CM	832A.*	8RA-58	647A5	830B.*	G15A.*	H4DU.*	51A
830FM	830FM	832A.*	8RA-58	647AJ5, 651K	832B.*	G15A.*	H4DU.*	51A
2830CM	2830CM	832A.*	35AF3A	647A5	2830B.*	G15A.*	H4DU.*	51A
2830FM	2830FM	832A.*	35AF3A	647AJ5, 651K	2832B.*	G15A.*	H4DU.*	51A

\* See Table B for color suffix.

TABLE B

## COLOR ORDERING GUIDE

HOUSING, HANDSET, AND HANDSET CORD		FACEPLATE	
COLOR	SUFFIX	COORDINATED COLOR	SUFFIX
Black	-03	Charcoal	-70
Ivory	-50	Muted Ivory	-80
Green	-51	Light Green	-71
Red	-53	Muted Red	-69
Yellow	-56	Light Yellow	-72
White	-58	Light Gray	-73
Light Beige	-60	Muted Beige	-75
Aqua Blue	-62	Muted Blue	-76

- 10-button [9-line pickup and hold on all sets except the 830DM (MD), 830FM, 2830DM (MD), and 2830FM]
- 11-button [7-line pickup, hold, recall, and 2 intercom on 830DM (MD), 830FM, 2830DM (MD) and 2830FM only, see Fig. 2]
- All pickup and intercom buttons are convertible to signaling
- Automatic Button Restoration (ABR) with preselect, 830DM (MD), 830FM, 2830DM (MD), and 2830FM telephone sets only

- Multiline Conferencing (MLC) 830DM (MD), 830FM, 2830DM (MD), and 2830FM telephone sets only, on pickup lines only (no conferencing on intercom lines or pickup-to-intercom lines)
- Hold button can be illuminated (lamp ordered separately)
- KS-20419L1 buzzer provided and connected to dedicated mounting cord leads
- Provision for mounting KS-8109L2 buzzer or additional KS-20419L1 buzzers on base pan
- Plug-in handset [G12A (A&M only) or G15A]
- Provision for polarity guard assembly (optional) all 2830-type telephone sets except 2830DM or 2830FM sets
- Limited number of mounting cord conductors restricts number of optional features which may be simultaneously provided. If additional conductors are required, use an auxiliary D10R cord
- An access hole is provided in the P1-type ringer for biasing spring adjustment, refer to Section 501-259-101
- 3-type (MD) or 4A speakerphone (paragraph 2.03)
- Tip and ring are common to all pickup buttons through internal mounting cord

wiring (current sets) and contact strips (early sets).

#### F. Operating Features

**2.07** The operating features for the 830- and 2830-type telephone sets are the same as all standard key type telephone sets with the following exception. The 830DM (MD), 830FM, 2830DM (MD), and 2830FM telephone sets provide the following additional features.

- (a) **Multiline Conferencing:** Any combination of pickup buttons may be simultaneously depressed, for this feature, however, it is not possible to conference CO/PBX lines with the dedicated intercom lines, or intercom lines with each other.



*When lines are conferenced, distant stations may have difficulty hearing each other and transmission quality is not guaranteed.*

- (b) **Automatic Button Restoration (ABR):**

The ABR feature releases locked-down buttons when the handset is restored. The buttons may be preset without removing the handset from the cradle.

- (c) **Line Recall:** An amber-capped recall button provides switchhook flash without releasing the buttons.

- (d) **Intercom:** Two buttons are dedicated to the intercom feature. These buttons are located on the right end of the 10-button key. These buttons may be converted in the standard manner to provide signaling or may be used for CO/PBX lines. However, CO/PBX lines when terminated at these positions will not be conferenceable.

### 3. INSTALLATION

**3.01** Install the completely assembled telephone set or assemble the required components to the telephone set base (Fig. 3).

**Note:** On current production keys the cap must be properly oriented to lock the cap on the button.

**3.02** Individual signaling may be provided by converting a locking key button to nonlocking. Remove the 812857738 (P-28E773) locking pin from the button to be converted and modify per Table C.

**3.03** If an additional buzzer is required, plastic screw grommets and mounting screws are provided for installation. The KS-8109L2 or additional KS-204191L buzzer must be ordered separately.

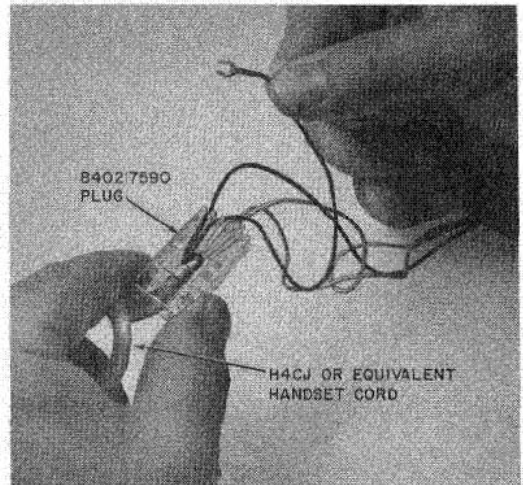


Fig. 4—Installation of Spade-Tipped Handset Cord Leads

#### 3.04 Dial Restriction:

- (1) 830-Type Telephone Set:

(a) Install a 533K diode between terminals RR and F of the network as shown in Fig. 5.

(b) Wire telephone set as shown in Table D.

- (2) 2830-Type Telephone Set:

(a) Wire telephone set as shown in Table D.

- (3) Installations as described above will restrict dialing on all lines of the respective telephone

**TABLE C**  
**PICKUP SIGNAL KEY CONVERSION**

CONVERSION OPTION (NOTE)	647A5 OR 647AJ5 KEY LEADS								
	O-W	S-W	G-R	BL-BK	BR-BK	BK-BR	BK-BL	R-G	W-S
HPPPPPPPPP	7	7	7	11	11	11	15	15	15
HPPPPPPPPS	7	7	7	11	11	11	15	15	26
HPPPPPPPSS	7	7	7	11	11	11	15	26	26
HPPPPPPSSS	7	7	7	11	11	11	26	26	26
HPPPPSSSSS	7	7	7	11	11	26	26	26	26
HPPPPSSSSS	7	7	7	11	26	26	26	26	26

**Note:** Move (O-Y) mounting cord lead from terminal ⑥ 12 to terminal 26. Beyond five signal conversions strap terminal 26 to a spare terminal and move the signal leads consecutively to that terminal. Example: (BL-BK) lead from terminal 11 to spare terminal, then (G-R) from 7 to spare terminal, etc.

○ 830A1M (MD) or 2830A1M (MD) (early version).

□ All other telephone sets.

set. To permit dialing on selected lines reverse tip and ring leads of the line involved at the distribution terminal or 66-type connecting block. When a 2A1 matrix block is used, the reversing of tip and ring conductors must be done on the telephone set side of the matrix block.

(4) For additional information on dial restriction, refer to Section 500-155-100.

**3.05** Polarity guard (all 2830-type telephone sets except the 2830DM and 2830FM) (see paragraph 3.06) should be used only when specified by local instructions for end-to-end signaling installations where battery and ground reversals may be encountered. An 819041971 (P-90D197) polarity guard assembly (adhesive backed) is installed wherever space permits. Connect per Table E.

**3.06** The 830DM, 830FM, 2830DM, and 2830FM telephone set employs the 2A1 matrix block in place of polarity guard described in paragraph 3.05. This unit provides eight polarity guard circuits. One polarity guard circuit is required for each line which is conferenceable by multibutton depression. The polarity guard is located between

the station side of the line circuit and the station cut-down field.

**3.07** Where conditions warrant, G3A6, G12A, or G15A handset can be replaced with other types as follows:

- For impaired hearing — G6-type
- For weak speech — G7-type
- For noisy location—G8-type

Refer to Division 501 for connections of these handsets. When either of these handsets are used, an H4DU or H4CJ or equivalent handset cord must be provided (see paragraph 3.08).

**3.08** *Installing Spade-Tipped Handset Cords in Early Production Sets Equipped with G12A Handset:* To install spade-tipped handset cord (H4CJ or equivalent) remove J Hook Stayband from the cord. Cut back and remove cord sheath to stayband marks. Thread spade-tipped conductors through plug (Fig. 4) (spade tips must be bent to clear cord entrance). Pull cord until about 1/4-inch of cord sheath is in the central

TABLE D

## DIAL RESTRICTION MODIFICATION (NOTE 1)

TEL SET	LEAD		REMOVE FROM		CONNECT TO	
	FUNCTION	COLOR	NET.	SET	NET.	SET
830FM and 2830FM	Line Tip	G		8		3
	Line Ring	R		3		8
830CM and 2830CM E/W New Line Switch MFR after 1-77 (Note 3)	Line Tip	G		8		6
	Line Ring	R		6		8
830CM and 2830CM E/W New Line Switch and MFR Before 2-77 (Notes 2 and 3)	Line Tip	G		16		6
	Line Ring	R		6		16
830A1M, 830B1M 830C, 830CT, or 830CM E/W Old Line Switch	Line Tip	G	F			6
	Line Ring	R		6	F	
2830A1M, 2830B1M, 2830C, 2830CT, or 2830CM E/W Old Line Switch (Note 3)	Line Tip	G		8		6
	Line Ring	R		6		8

*Note 1:* Rotary dial telephone sets must have a 533K diode (ordered separately), installed between RR and F of the network see Fig. 5.

*Note 2:* The new line switch can be identified by two additional leads which are (BL).

*Note 3:* On TOUCH-TONE sets dial restriction and polarity guard cannot be provided simultaneously.

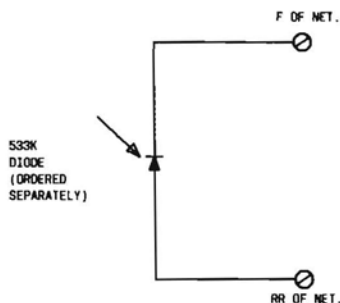


Fig. 5—Installing Diode for Dial Restriction

cavity of the plug. Separate the conductors into two groups and tie an overhand knot, pulling the knot to the cord sheath. Pull the cord from plug until strain relief position is attained by knot entering sheath and resting against plug. Feed spade-tipped conductor straight through jack 812266203 (P-22F620) and connect to proper terminals. Insert plug in jack.

*Note:* On later version of the telephone set base, a plug (Fig. 4) is not required and a notch is provided on front lip of base pan for J Hook Stayband of nonmodular type cords.

**3.09** When adding speakerphone to 830-type telephone sets; the 8RA dial must be replaced by an 8CA dial (order separately) to provide the additional off-normal contacts required for speakerphone connections.

**3.10** When using speakerphone with telephone sets equipped with the new line switch assembly, make wiring changes shown in Table I. The new line switch can be identified by two additional leads which are blue (BL).

**3.11** The 830FM and 2830FM telephone sets may be used in all cases to directly replace the 830DM (MD) and 2830DM (MD) telephone sets, respectively. However, due to wiring changes, the DM codes can not always be used to replace the FM codes.

#### 4. MAINTENANCE

**4.01** Maintenance of the 830- and 2830-type telephone set should be limited to checking for loose or broken connections and replacement of items per local instructions.

**4.02** Early manufactured cords in neutral light pearl-gray (-82) and dark gray-brown (-83) have been MD. All new mounting cords will be satin-silver (-87).

**4.03** Current sets are equipped with a P1B ringer which does not have the (S-R), (S), and (BL) leads. For maintenance purposes, either the P1B or P1A ringer may be used. (If P1A ringer is used, insulate and store the unused leads.)

**4.04** For maintenance of keys, buzzers, dials, speakerphone components, and polarity guard, refer to appropriate sections pertaining to these items.

**4.05** The current production 647-type keys have been modified for easy lamp replacement by merely removing the button cap and inserting a 553-type tool through the hole in the top of the button. In early production models it is necessary to remove faceplate, key collar, and button for lamp replacement.



*Telephone sets should NOT be carried by the handset cradle. Line switch failure may be caused by applying excessive strain to the handset cradle and the line switch mounting arrangement.*

#### 5. CONNECTIONS



*Due to the limited number of mounting cord conductors the 830- and 2830-type*

*telephone sets do not follow standard wiring arrangements (Fig. 6 through 12).*

**5.01** To provide mounting cord leads for illuminating the HOLD button, the ringer or buzzer leads must be used, meaning only two of the three options (ringer, buzzer, or hold lamp) may be provided at the same time.

**5.02** To provide station busy lamp modify the telephone set wiring and connect the 533K diode (ordered separately) per Table F.

**5.03** To provide priority hold (I HOLD) modify the telephone set per Table G.

**5.04** To provide 3-type (MD) speakerphone leads in the mounting cord, the buzzer leads along with the lamp and lamp ground leads from the 8th and 9th key buttons must be used. An auxiliary D10R cord may be used if these leads are not available. For connections for all sets, refer to Section 512-620-485 and Table I.

**5.05** To provide 4A speakerphone connections, refer to Section 512-740-470 and Table I.

**5.06** To provide polarity guard for all 2830-type telephone sets except the 2830DM and 2830FM, refer to Table E. The 2A1 matrix block is used for a polarity guard for the 2830DM and 2830FM telephone sets (see paragraph 5.07).

**5.07** The 2A1 matrix block (ordered separately) provides the polarity guard function to telephone set with multiline conferencing via multibutton depression. The matrix block consists of a 66-type molded plastic connecting block, containing quick-connect terminals wired and equipped with eight diode bridges for eight lines. The matrix block is connected between the line circuit and the station cut-down field. For connections to the 2A1 matrix block, refer to Table H.



*If a station requires line ringing on a particular line, connect the ringing leads from the key telephone set to the appropriate terminals on the LINE SIDE of the matrix block, not to the station side.*

**5.08** For schematic, refer to Fig. 6 through 12.

TABLE E


## POLARITY GUARD CONNECTIONS (GUARD ASSEMBLY)

WIRE OR LEAD	COLOR	REMOVE FROM	CONNECT TO	
		NET.	GUARD ASSY.	NET.
Dial	BK	RR	T	
	G-W	C	S	
Line Switch	W	C	S	
Guard Assembly	G			RR
	W			C

**Note:** For use when specified by local instructions for end-to-end signaling installations.

◆ TABLE F ◆

## STATION BUSY LAMP CONNECTIONS

LEAD	OPERATION
Hold Key (G-W)	Remove from term. 22 and connect to 27 or other spare term.
533K Diode (Ordered Separately)	Connect as shown or to same spare term. as above 
Mtg Cord (Y-O) (Note)	Remove from <input type="checkbox"/> 15 <input type="checkbox"/> 14 connect to 22

**Note:** Use spare mounting cord lead if (Y-O) lead is used to provide other options.

830A1M (MD) or 2830A1M (MD) (early version)

All other telephone sets.

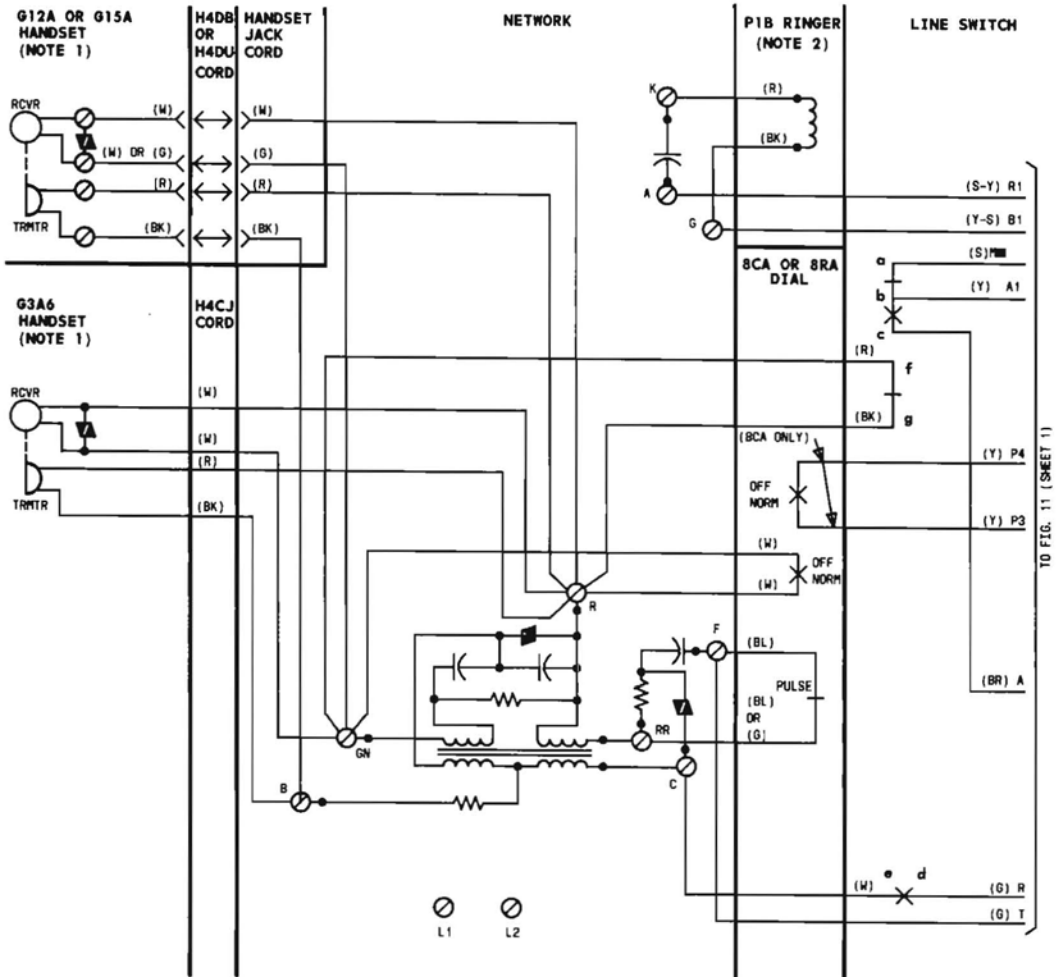
TABLE G

## I HOLD CONNECTIONS (NOTE)

LEAD		REMOVE FROM	CONNECT TO
Hold Key	(G-W)	22	7
	(BK-BL)	7	22
SP Lead — Use (Y-O)* or spare mounting cord conductor			13

**Note:** For additional information see SD-69530-01.

\* (Y-O) lead may be used unless connected for other options.



## NOTES:

- 830C(MD) TELEPHONE SET IS EQUIPPED WITH A G3A6 HANDSET WHICH IS WIRED DIRECTLY TO THE TELEPHONE SET. EARLY PRODUCTION 830-TYPE TELEPHONE SETS WERE EQUIPPED WITH A G12A HANDSET. 830CM TELEPHONE SETS ARE EQUIPPED WITH G15A HANDSET.
- EARLY PRODUCTION TELEPHONE SETS MAY BE E/M P1A RINGERS WHICH WILL HAVE (S), (S-R), AND (BL) LEADS WHICH ARE INSULATED AND STORED.

Fig. 6—Part of 830A1M(MD), C(MD), CT(MD), or CM (Equipped With Old Line Switch) Telephone Set, Connections

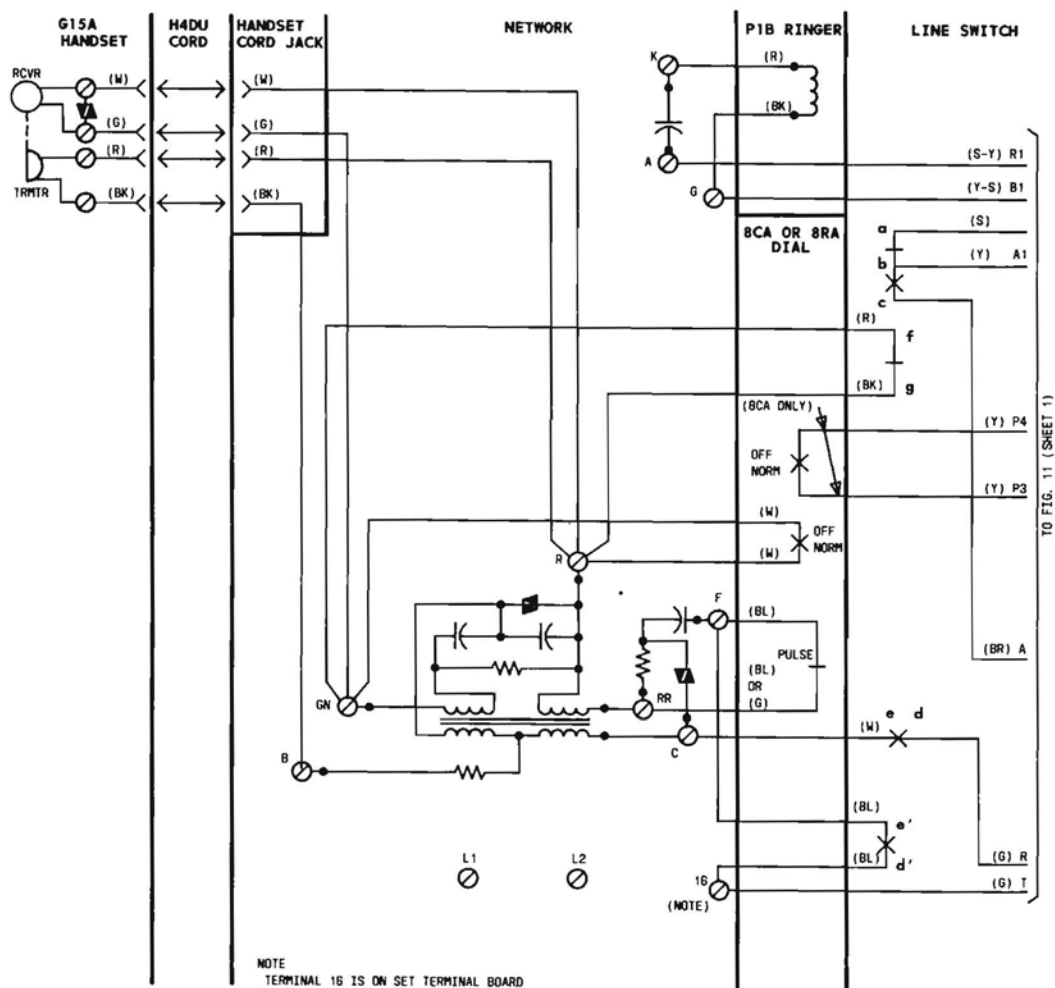


Fig. 7—Part of 830CM (Equipped With New Line Switch and Manufactured Before 2-77) Telephone Set, Connections



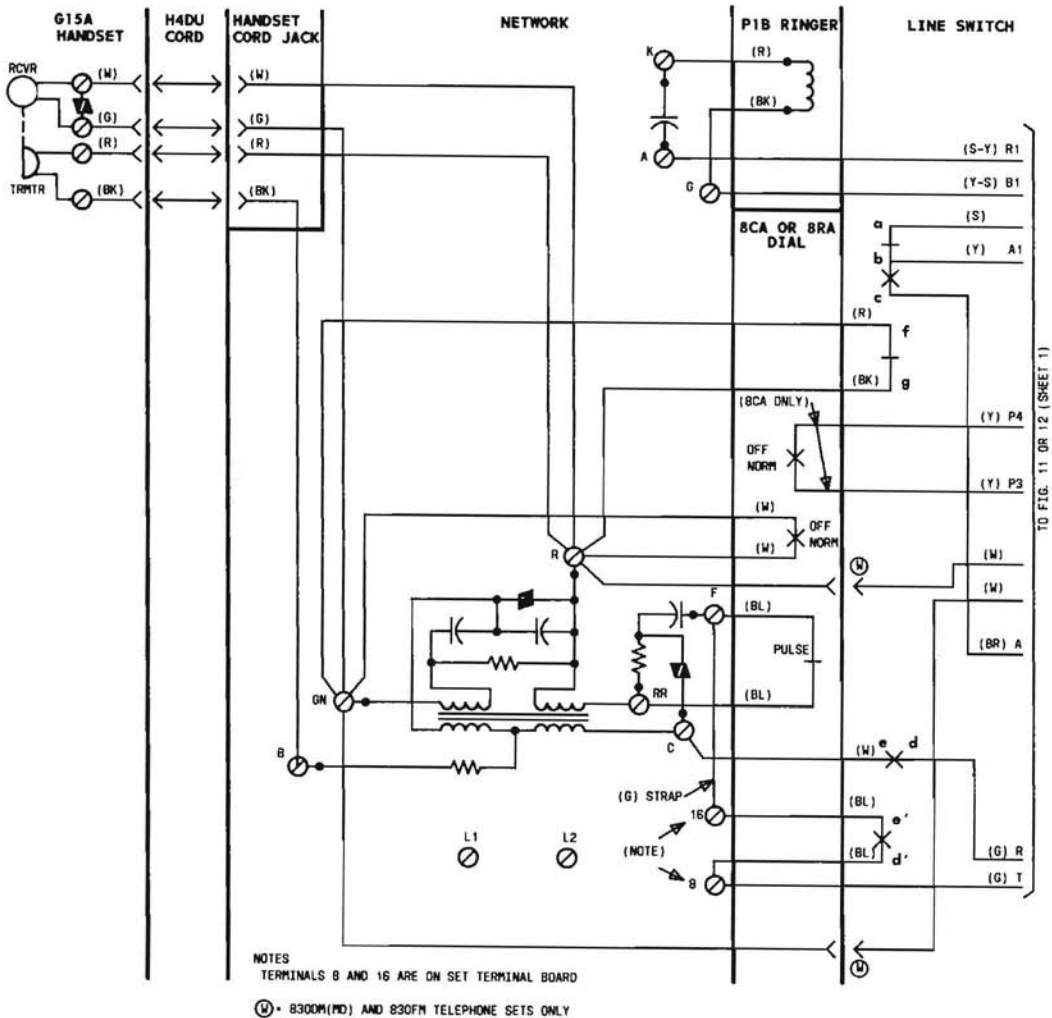
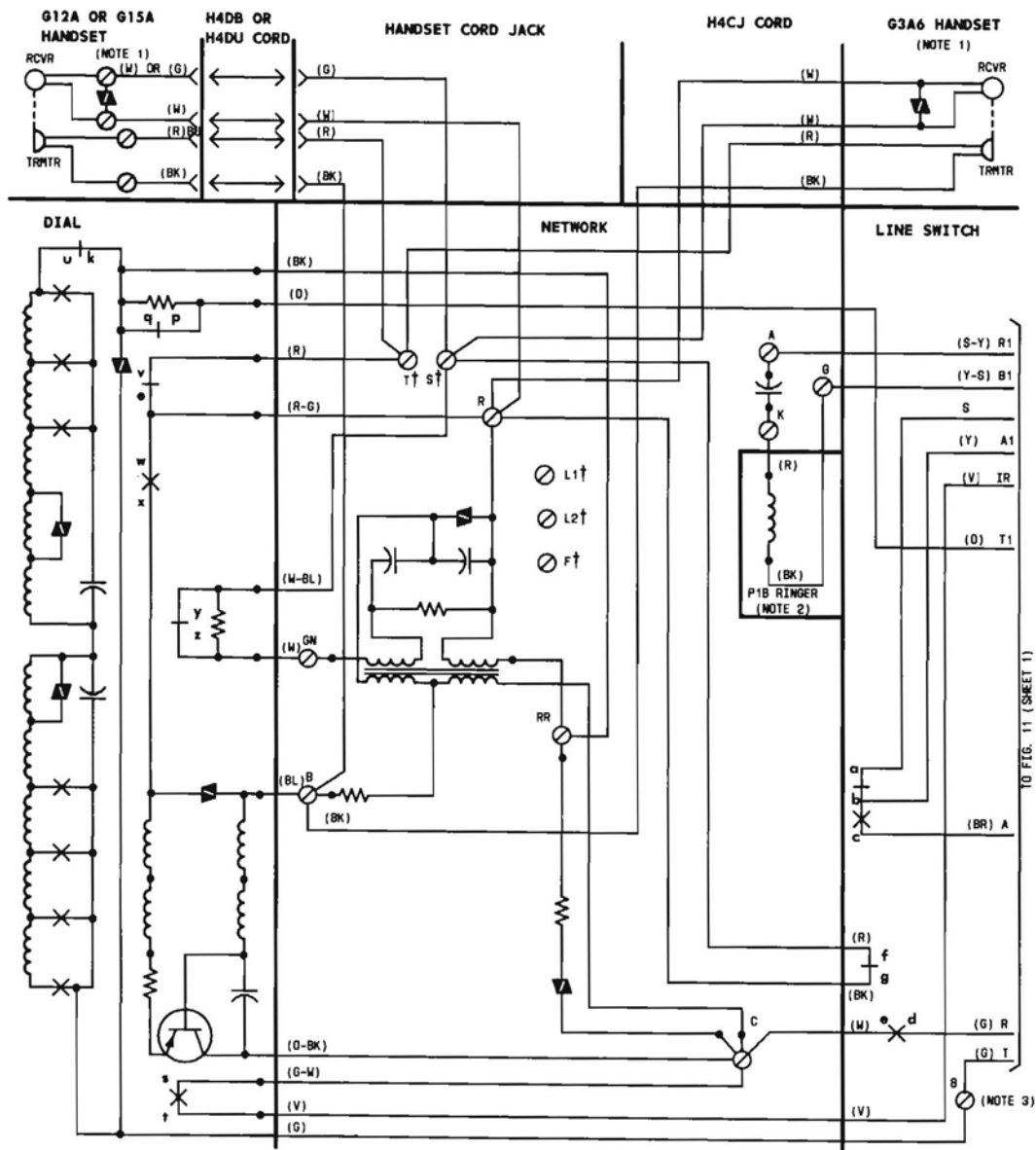


Fig. 8—Part of 830CM (Manufactured 2-77 or Later) or 830DM Telephone Set, Connections



TO FIG. 11 (SHEET 1)

Fig. 9—Part of 2830A1M(MD), B1M(MD), C(MD), CT(MD), or CM (Equipped With Old Line Switch) Telephone Set, Connections

## NOTES FOR FIG. 9:

1. 2830C(MD) TELEPHONE SET IS EQUIPPED WITH A G3AG HANDSET WHICH IS WIRED DIRECTLY TO THE TELEPHONE SET. EARLY PRODUCTION 2830-TYPE TELEPHONE SETS WERE EQUIPPED WITH A G12A HANDSET. 2830CM, TELEPHONE SETS ARE EQUIPPED WITH G15A HANDSET.
2. EARLY PRODUCTION TELEPHONE SETS MAY BE E/M P1A RINGERS WHICH WILL HAVE (S), (S-R), AND (BL) LEADS WHICH ARE INSULATED AND STORED.
3. TERMINAL 8 IS ON SET TERMINAL BOARD.

† IF SET HAS BEEN CONVERTED IN SERVICE CENTER TO A 2830-TYPE AND HAS A 4228AA NETWORK LEADS SHOWN TERMINATED ON S WILL BE ON L1 AND LEADS SHOWN TERMINATED ON T WILL BE ON L2 AND TERMINAL F CANNOT BE USED AS A SPARE TERMINAL.

**Fig. 9—Notes**

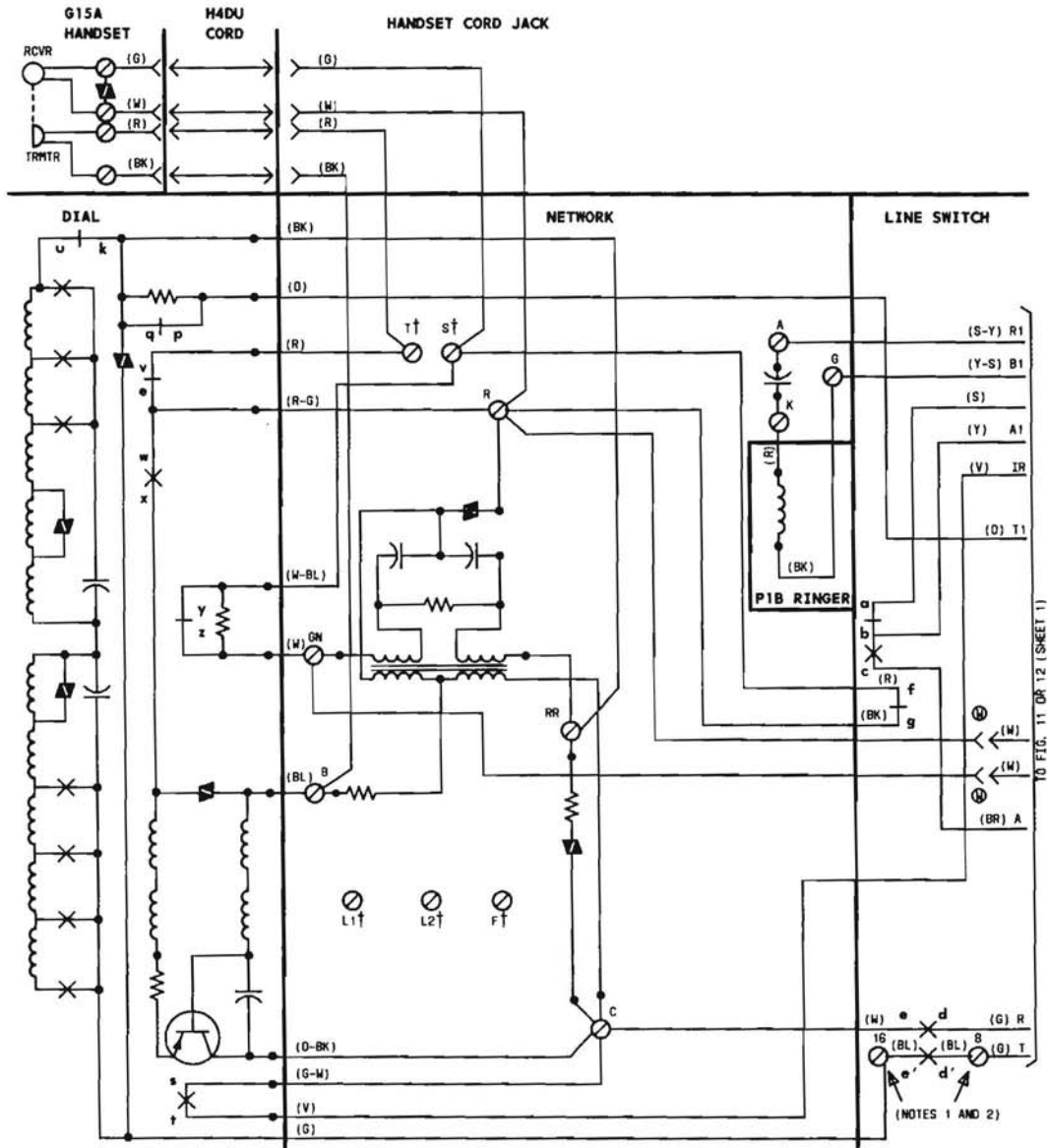


Fig. 10—Part of 2830CM, 2830DM (MD), or 2830FM Telephone Set, Connections

TO FIG. 11 OR 12 (SHEET 1)

## NOTES FOR FIG. 10:

1. ON CM SETS MANUFACTURED BEFORE 2-77 AND EQUIPPED WITH NEW LINE SWITCH, TERMINALS 8 AND 16 ARE REVERSED.
2. TERMINALS 8 AND 16 ARE ON SET TERMINAL BOARD

† IF SET HAS BEEN CONVERTED IN SERVICE CENTER TO A 2830-TYPE AND HAS A 4228AA NETWORK LEADS SHOWN TERMINATED ON S WILL BE ON L1 AND LEADS SHOWN TERMINATED ON T WILL BE ON L2 AND TERMINAL F CANNOT BE USED AS A SPARE TERMINAL.

Ⓢ • 2830DM(MD) OR 2830FM ELEPHONE SETS ONLY

Fig. 10—Notes

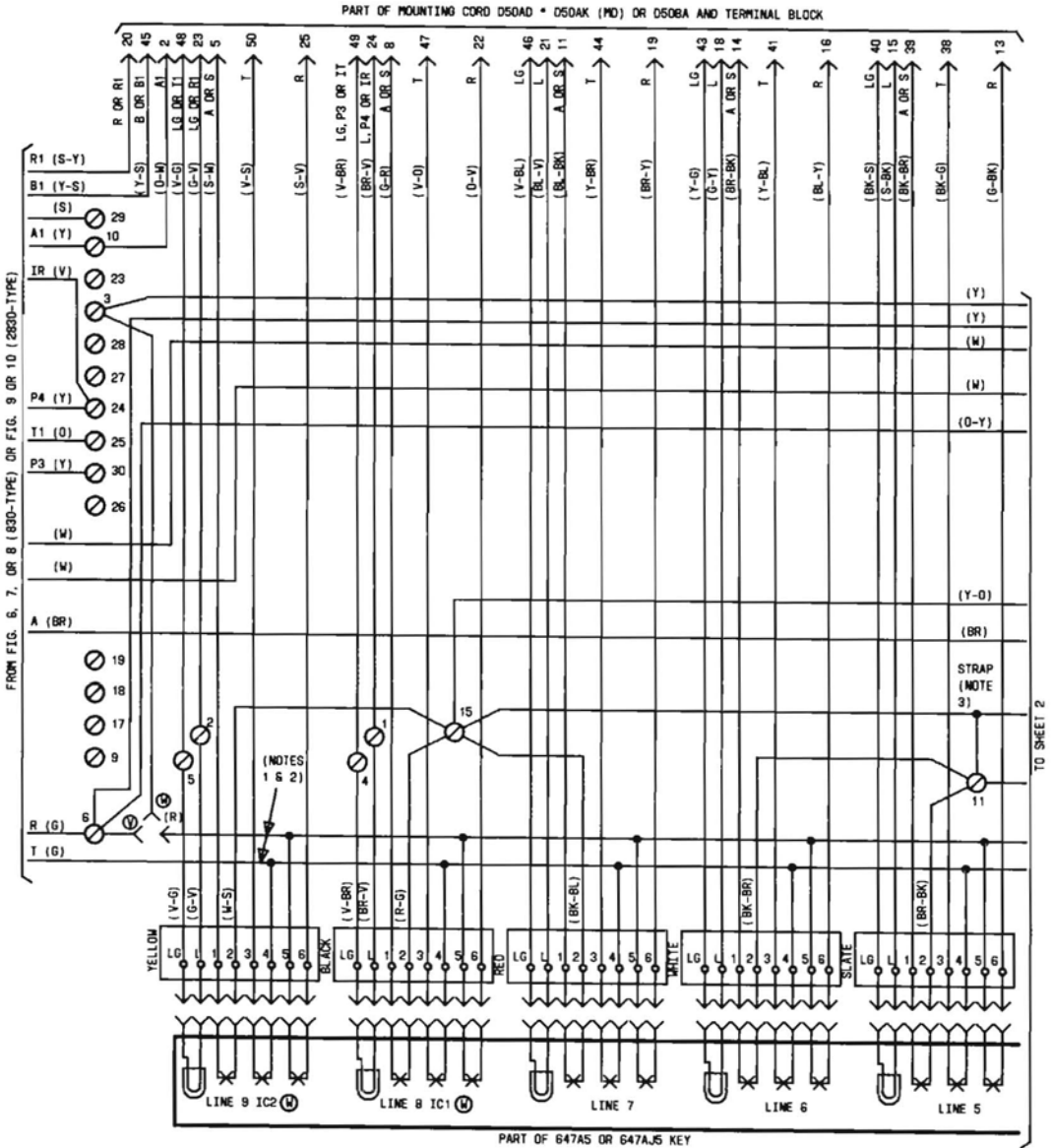


Fig. 11—830- or 2830-Type (Except 830FM and 2830FM) Telephone Set, Key and Mounting Cord Arrangement (Sheet 1 of 2)

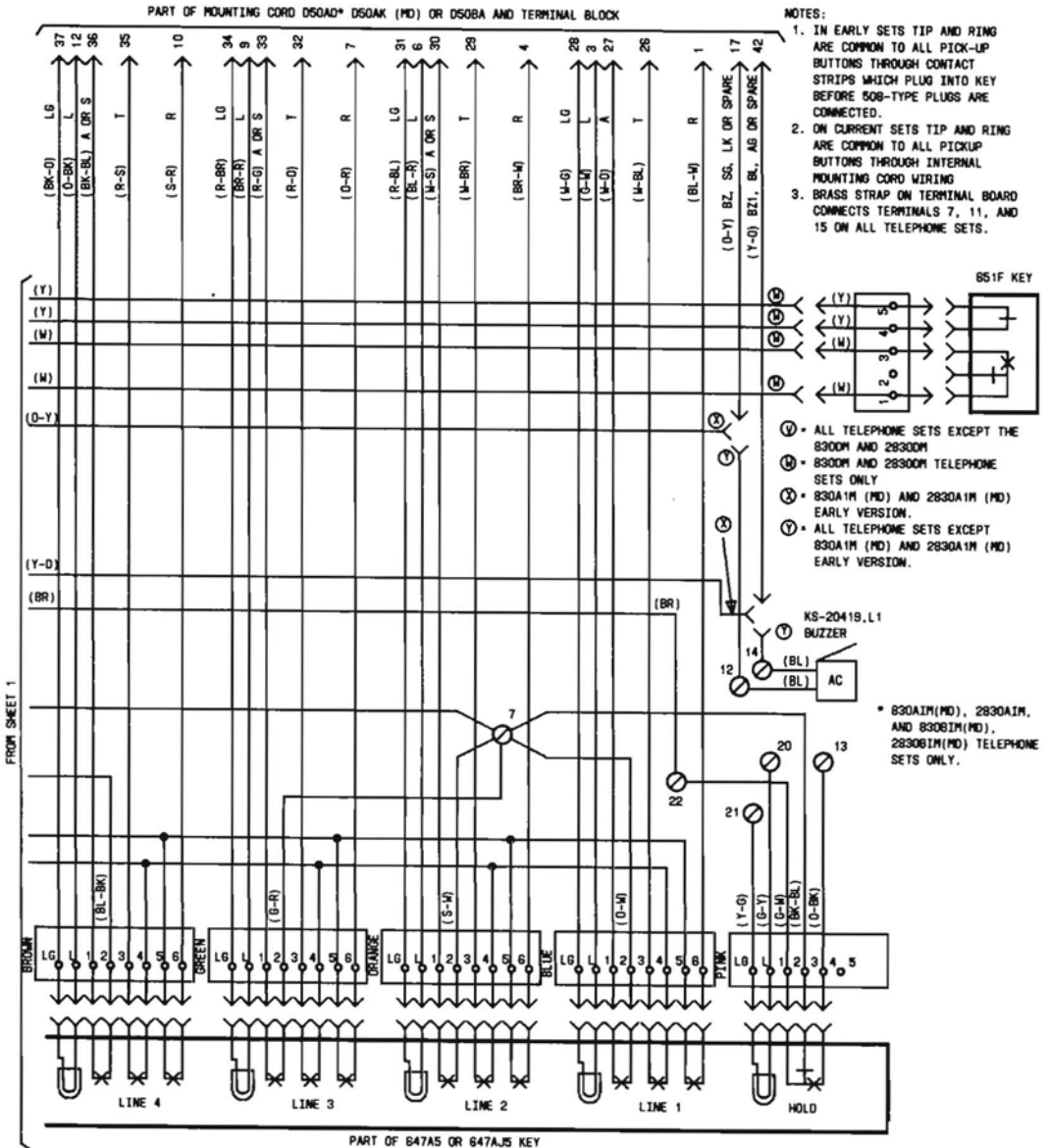


Fig. 11—830- or 2830-Type (Except 830FM and 2830FM) Telephone Set, Key and Mounting Cord Arrangement (Sheet 2 of 2)

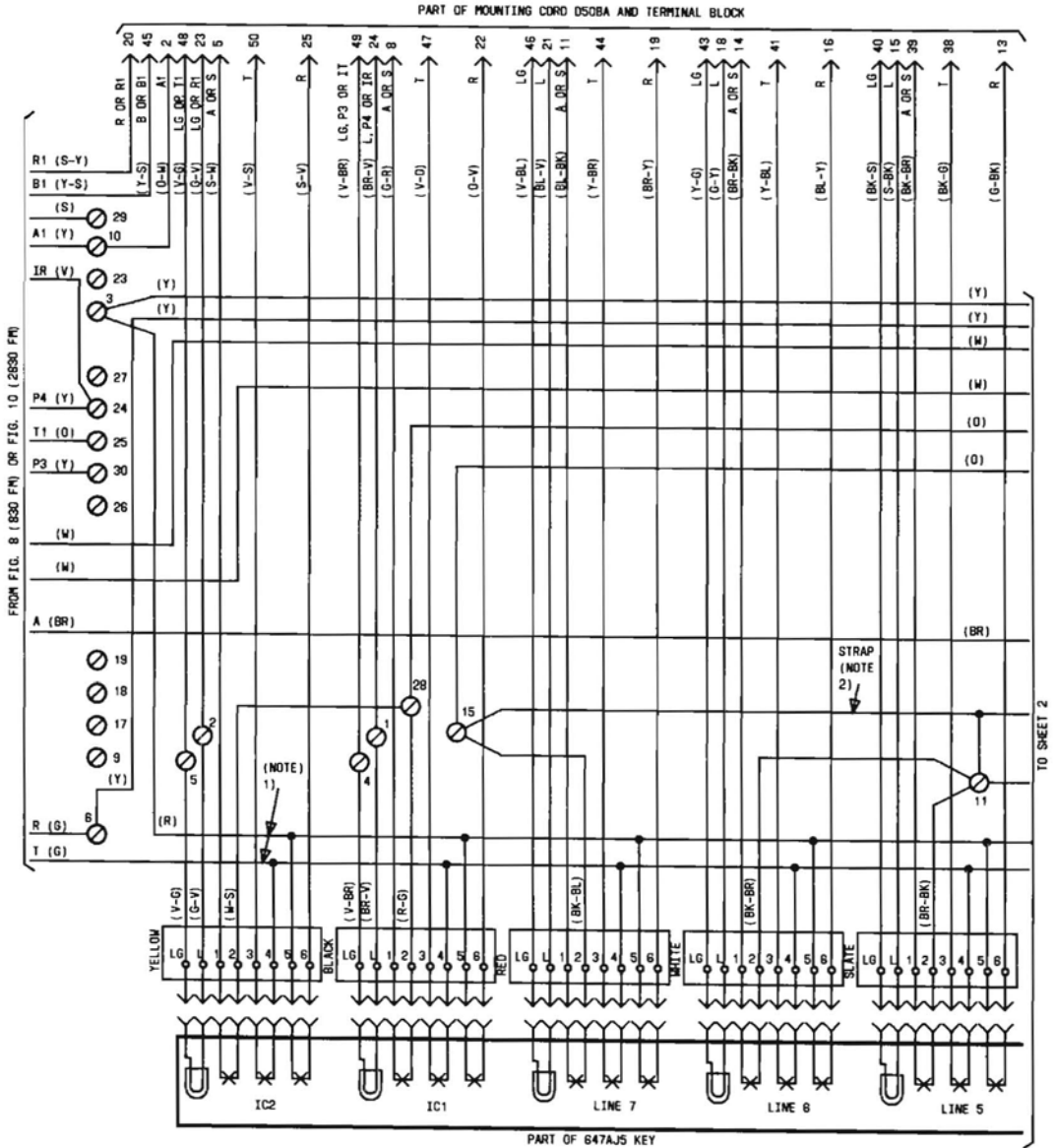


Fig. 12—830FM or 2830FM Telephone Set, Key and Mounting Cord Arrangement (Sheet 1 of 2)



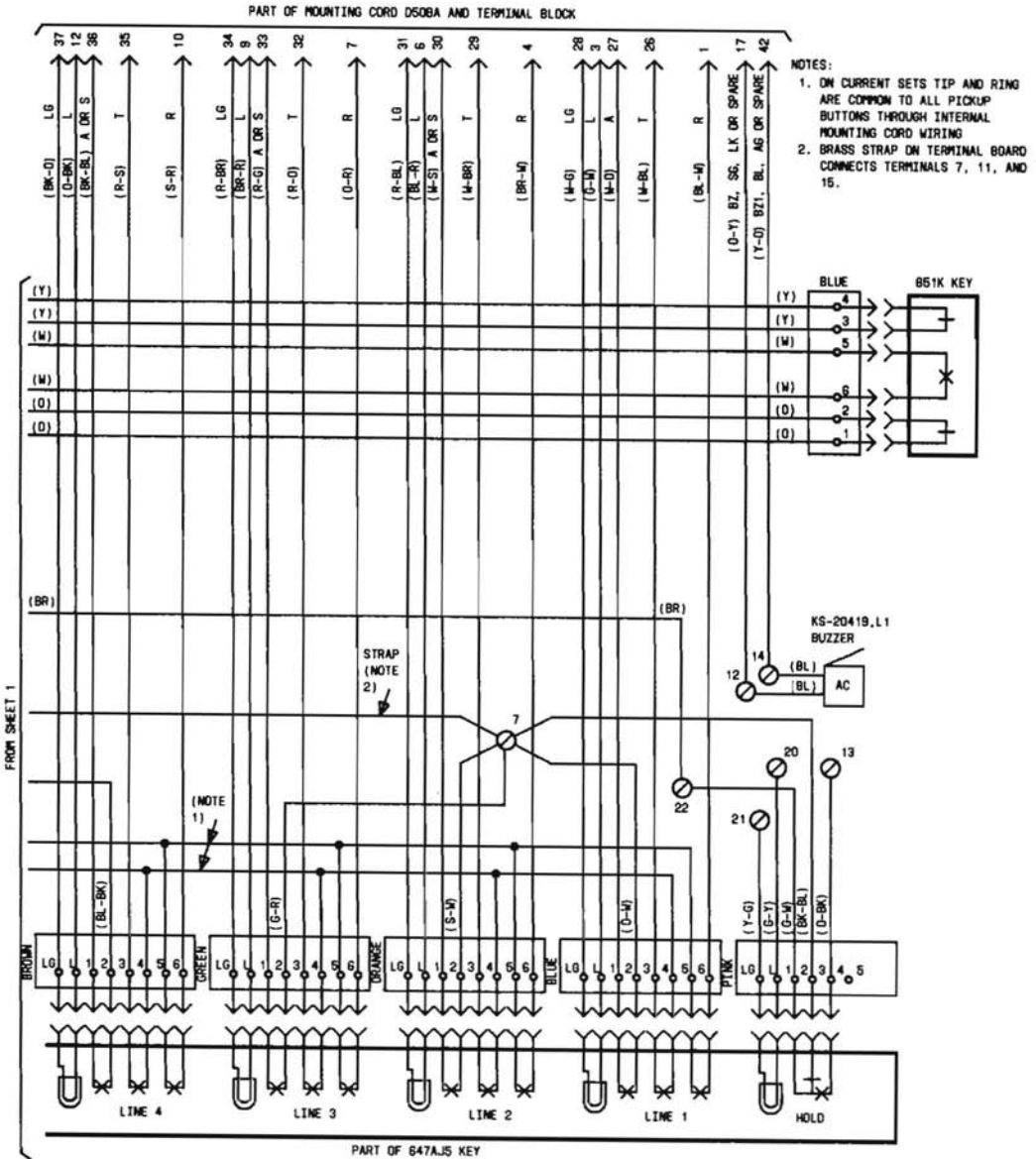


Fig. 12—830FM or 2830FM Telephone Set, Key and Mounting Cord Arrangement (Sheet 2 of 2)

TABLE H

## 2A1 MATRIX BLOCK

LINE		LINE TERM. (LEFT)	STATION TERM. (RIGHT)
1	T	1	1
	R	5	5
2	T	7	7
	R	11	11
3	T	13	13
	R	17	17
4	T	19	19
	R	23	23
5	T	25	25
	R	29	29
6	T	31	31
	R	35	35
7	T	37	37
	R	41	41
8*	T	43	43
	R	47	47

\*If more than 8 lines are provided, additional 2A1 matrix blocks are required.

TABLE I

3-TYPE (MD) OR 4A  
SPEAKERPHONE MODIFICATION FOR  
TELEPHONE SETS EQUIPPED WITH NEW  
LINE SWITCH (NOTE)

TEL. SET	LEAD COLOR	REMOVE FROM TERM.	CONNECT TO TERM.
830FM, DM, CM, or 2830FM, DM, CM (MFR 2-77 or later)	G	16	8
830CM (MFR before 2-77)	G	16	F
2830CM (MFR before 2-77)	G	8	16

*Note:* The new line switch can be identified by two additional leads which are (BL). No modification is required on sets equipped with the old type line switch. [no (BL) leads].

## 831- AND 2831-TYPE TELEPHONE SETS

### IDENTIFICATION, INSTALLATION, MAINTENANCE, AND CONNECTIONS

#### 1. GENERAL

1.01 This section contains information for the 831- and 2831-type telephone sets.

1.02 This section is reissued to:

- Show 831DM and 2831DM telephone set MD
- Show G12A handset (A&M Only)
- Show 3-type speakerphone MD
- Show 533K diode for use with Station Busy Lamp, and Dial Restriction
- Add information on 831FM and 2831FM telephone sets
- Add Table A, ordering guide and replaceable components
- Remove information on P-90D170 polarity guard
- Remove information on D-180656 Kit of Parts (wall mounting arrangement)

Since this reissue covers a general revision, arrows ordinarily use to indicate changes have been omitted.

#### 2. IDENTIFICATION

##### A. Purpose

2.01 The 831- (Rotary dial) and 2831- (TOUCH-TONE® dial, Fig. 1) type telephone sets are obtainable as modular or complete desk-type, 20-button, key telephone sets equipped to provide standard key system features. Refer to Table A for available colors.

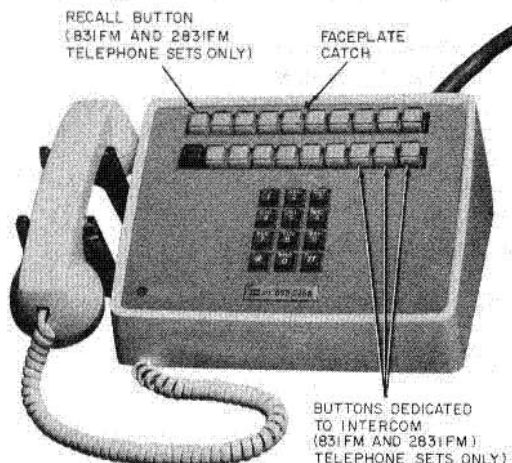


Fig. 1—2831DM (MD) or 2831FM Telephone Set

##### B. Application

2.02 Used with central office, PBX or intercommunication line circuits in 1A1, 1A2, or 6A key telephone system (KTS). These sets are not equipped for use with 1A KTS.

2.03 All 831- and 2831-type telephone sets may be used with the 3-type (MD) or 4A speakerphone system. When used with 3-type speakerphone, a D10R auxiliary mounting cord may be required due to the limited number of mounting cord conductors.

##### C. Optional Components

##### 2.04 Optional Components (order separately):

- Diode, 533K (for use with station busy lamp)

#### NOTICE

Not for use or disclosure outside the Bell System except under written agreement

- Diode, 533K for dial restriction (831-type sets only)
- Buzzer, KS-8109L2
- Buzzer, KS-20419L1 (one provided with set)
- 819041971 (P-90D197) adhesive backed Polarity Guard, 2831-type
- Lamp, 51A (hold button for message waiting)
- Dial, 8CA-58 (for 831-type set used with speakerphone).

#### D. Ordering Guide

2.05 For telephone set, faceplate, and replaceable components ordering guide, refer to Tables A and B.

#### E. Design Features

2.06 Design features for the 831- and 2831-type sets are as follows:

- Modular set
- 20-button; a HOLD button and 19 pickup buttons (all telephone sets except the [831DM (MD), 831FM, 2831DM (MD), and 2831FM], all pickup buttons are convertible to signaling
- 20-button; a HOLD button, 15 pickup, 3 intercom, and 1 RECALL button [831DM (MD), 831FM, 2831DM (MD), and 2831FM

only], all intercom and pickup buttons are convertible to signaling

- Automatic Button Restoration (ABR) with preselect [831DM (MD), 831FM, 2831DM (MD), and 2831FM] telephone set only
- Multiline Conferencing (MLC) 831DM (MD), 831FM, 2831DM (MD), and 2831FM telephone sets only, on pickup lines only (no conferencing on intercom lines or pickup-to-intercom lines)
- Hold button can be illuminated (lamp ordered separately)
- KS-20419L1 buzzer provided and connected to dedicated mounting cord leads
- Provisions for mounting KS-8109L2 buzzer or additional KS-20419L1 buzzer(s) on base pan
- Provision for polarity guard assembly (optional) on all 2831-type telephone sets except 2831DM or 2831FM sets
- Plug-in handset [G12A (A&M Only) or G15A]
- An access hole is provided in the P1-type ringer for ringer biasing spring adjustment (refer to Section 501-259-101)
- Limited number of mounting cord conductors restricts number of optional features which may be simultaneously provided. If additional

TABLE A  
TELEPHONE SETS ORDERING GUIDE AND REPLACEABLE COMPONENTS

TEL SET	BASE	HOUSING	DIAL	KEY	FACE-PLATE	HANDSET	HANDSET CORD	LAMP
831CM	831CM	832A.*	8RA-58	647A5C 647B5	833A.*	G15A.*	H4DU.*	51A
831FM	831FM	832A.*	8RA-58	647AH5, 647AL5C	833A.*	G16A.*	H4DU.*	51A
2831CM	2831CM	832A.*	35AF3A	647A5C, 647B5	2833A.*	G15A.*	H4DU.*	51A
2831FM	2831FM	832A.*	35AF3A	647AH5, 647AL5C	2833A.*	G15A.*	H4DU.*	51A

\* See Table B for color suffix.

TABLE B  
COLOR ORDERING GUIDE

HOUSING, HANDSET, AND HANDSET CORD		FACEPLATE	
COLOR	SUFFIX	COORDINATED COLOR	SUFFIX
Black	-03	Charcoal	-70
Ivory	-50	Muted Ivory	-80
Green	-51	Light Green	-71
Red	-53	Muted Red	-69
Yellow	-56	Light Yellow	-72
White	-58	Light Gray	-73
Light Beige	-60	Muted Beige	-75
Aqua Blue	-62	Muted Blue	-76

conductors are required, an auxiliary D10R cord may be used

- 3-type (MD) or 4A speakerphone (paragraph 2.03)
- Tip and ring are common to all pickup buttons through internal mounting cord wiring (current sets) and control strips (early sets).

#### F. Operating Features

**2.07** The operating features for the 831- and 2831-type telephone sets are the same as all standard key type telephone sets with the following exception. The 831DM (MD), 831FM, 2831DM (MD), and 2831FM telephone sets provide the following additional features.

(a) **Multiline Conferencing:** Any combination of pickup buttons may be simultaneously depressed, for this feature, however, it is not possible to conference CO/PBX lines with the dedicated intercom lines or intercom lines with each other.



**When lines are conferenced, distant stations may have difficulty hearing each other and transmission quality is not guaranteed.**

(b) **Automatic Button Restoration (ABR):**  
The ABR feature releases locked-down buttons when the handset is restored. The buttons may

be preset without removing the handset from the cradle.

(c) **Line Recall:** An amber-capped recall button is provided to simulate switchhook flash without releasing the buttons. This button is located on the left end of the top 10-button key.

(d) **Intercom:** Three buttons are dedicated to the intercom feature. These buttons are located on the right end of the lower 10-button key and may be converted in the standard manner to provide signaling or may be used for CO/PBX lines. However, CO/PBX lines when terminated at these positions will not be conferenceable.

### 3. INSTALLATION

**3.01** Install the completely assembled telephone set or assemble the required components to the telephone set base (Fig. 2).

**Note:** On current production keys the cap must be properly oriented to lock the cap on the button.

**3.02** Individual signaling may be provided by converting a locking key button to nonlocking. Remove the 812857738 (P-28E773) locking pin from the button to be converted and modify per Table C.

**3.03** If an additional buzzer is required, plastic screw grommets and mounting screws are provided for installation. The additional KS-8109L2 or KS-20419L1 buzzer must be ordered separately.

#### 3.04 Dial Restriction.

(1) 831-Type Telephone Set.

(a) Install a 533K diode between terminals RR and F of the network as shown in Fig. 4.

(b) Wire telephone set as shown in Table E.

(2) 2831-Type Telephone Set: Wire telephone set as shown in Table E.

(3) Installations as described above will restrict dialing on all lines of the respective telephone

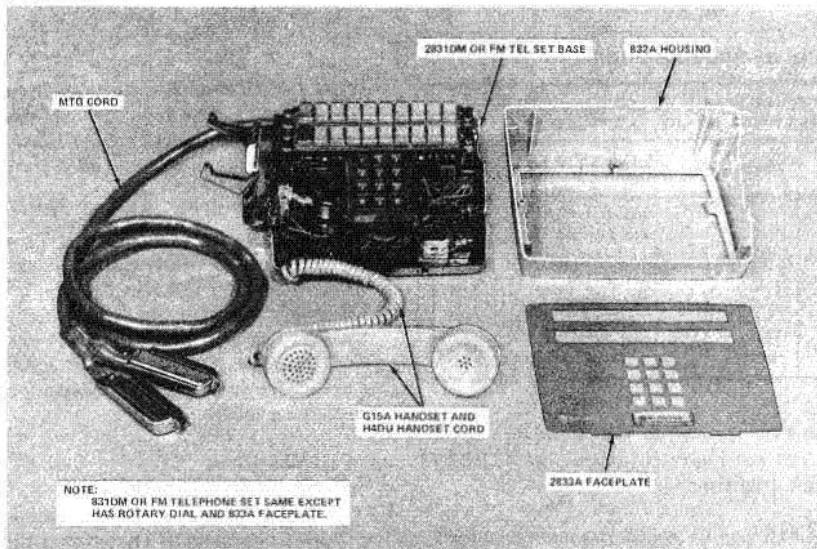


Fig. 2—Station Modular Arrangement, 2831DM (MD) or 2831FM Telephone Set

set. To permit dialing on selective lines, reverse tip and ring leads of the line involved at the distribution terminal or 66-type connecting block. When a 2A1 matrix block is used, the reversing of conductors must be done on the telephone set side of the matrix block.

(4) For additional restriction information, refer to Section 500-155-100.

**3.05** Polarity guard (2831-type except the 2831DM and 2831FM; see paragraph 3.06) should be used only when specified by local instructions for end-to-end signaling installations where battery and ground reversals may be encountered. An 819041971 (P-90D197) polarity guard assembly (adhesive backed) is installed wherever space permits. Connect per Table F.

**3.06** The 831DM, 831FM, 2831DM, and 2831FM telephone set employs the 2A1 matrix block in lieu of the polarity guard described in paragraph 3.05. The unit provides eight polarity guard circuits. One polarity guard circuit is required for each line which is conferenceable by multibutton depression. The polarity guard is located between the station

side of the line circuit and the station cut-down field.

**3.07** Where conditions warrant, G3A6, G12A, or G15A handset can be replaced with other types as follows:

- For impaired hearing — G6-type
- For weak speech — G7-type
- For noisy location—G8-type.

Refer to Division 501 for connections of these handsets. When either of these handsets are used, an H4DU or H4CJ or equivalent handset cord must be used (see paragraph 3.08).

**3.08** *Installing Spade-Tipped Handset Cords in Early Production Sets Equipped with G12A Handset:* To install spade-tipped handset cord (H4CJ or equivalent) remove J Hook Stayband from the cord. Cut back and remove cord sheath to stayband marks. Thread spade-tipped conductors through plug (Fig. 3) (spade tips must be bent to clear cord entrance). Pull cord until about 1/4-inch of cord sheath is in the central

cavity of the plug. Separate the conductors into two groups and tie an overhand knot, pulling the knot to the cord sheath. Pull the cord from plug until strain relief position is attained by knot entering sheath and resting against plug. Feed spade-tipped conductor straight through jack 812266203 (P-22F620) and connect to proper terminals. Insert plug in jack.

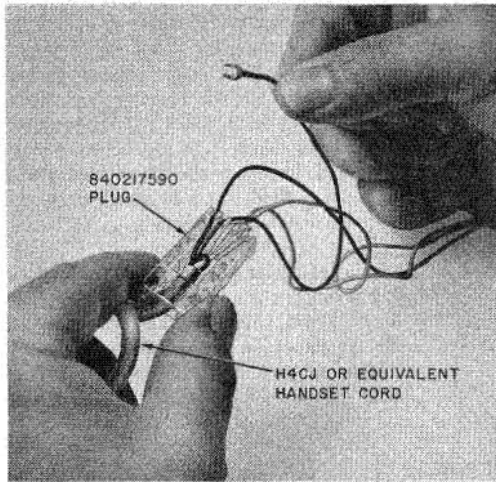


Fig. 3—Installing Spade-Tipped Handset Cord Leads

**Note:** On later version of the telephone set base, a plug is not required and a notch is provided on front lip of base pan for J Hook Stayband of nonmodular type cords.

- 3.09 When adding speakerphone to 831-type telephone sets, the 8RA dial must be replaced by an 8CA dial (order separately) to provide the additional off-normal contacts required for speakerphone connections.
- 3.10 When using speakerphone with telephone sets equipped with the new line switch assembly, make wiring changes shown in Table I. The new line switch can be identified by two additional leads which are Blue (BL).
- 3.11 The 831FM and 2831FM telephone sets may be used in all cases to directly replace the 831DM (MD) 2831DM (MD) telephone sets, respectively.

However, due to wiring changes, the DM codes can not always be used to replace the FM codes.

#### 4. MAINTENANCE

- 4.01 Maintenance of the 831- and 2831-type telephone set should be limited to checking for loose or broken connections and replacement of items per local instructions.
- 4.02 Early manufactured cords in neutral light pearl-gray (-82) and dark gray-brown (-83) are rated MD. All new mounting cords will be satin-silver (-87).
- 4.03 Current sets are equipped with a P1B ringer which does not have the (S-R), (S), (BL) leads. For maintenance purposes, either the P1B or P1A ringer may be used. (If P1A ringer is provided, insulate and store the unused leads.)
- 4.04 For maintenance of keys, buzzers, dials, speakerphone components, and polarity guard, refer to appropriate sections pertaining to these items.
- 4.05 The current production 647-type keys have been modified for easy lamp replacement by merely removing the button cap and inserting a 553-type tool through the hole in the top of the button. In early production models it is necessary to remove faceplate, key collar, and button for lamp replacement.

**Note:** When installing or replacing the 647-type key for maintenance in the 831- and 2831-type key telephone set, the 812857704 (P-28E770) latch bar spring must be removed to prevent mechanical stress on the latch bar to pivot bar action. For information on removal procedures, refer to Section 512-230-101.



**Telephone sets should NOT be carried by the handset cradle. Line switch failure may be caused by applying excessive strain to the handset cradle and the line switch mounting arrangement.**

#### 5. CONNECTIONS



**Due to the limited number of mounting cord conductors the telephone sets do not follow standard wiring**

**arrangements (Fig. 5 through 14).**

- 5.01** To provide mounting cord lead for illuminating the HOLD button the ringer or buzzer leads must be used, meaning, only two of the three options (ringer, buzzer, or hold lamp) may be provided at the same time.
- 5.02** To provide station busy lamp, modify the telephone set wiring and connect the 533K diode (ordered separately) per Table G.
- 5.03** To provide priority hold (I HOLD) modify the telephone set per Table H.
- 5.04** To provide 3-type (MD) speakerphone leads in the mounting cord, the buzzer leads along with the lamp and lamp ground leads from the last two pickup buttons of the key must be used. An auxiliary D10R cord may be used if these leads are not available. Refer to Section 512-620-485 for connections and Table J.
- 5.05** To provide 4A speakerphone connections refer to Section 512-740-470 and Table J.
- 5.06** To provide polarity guard for all 2831-type telephone sets except the 2831DM and 2831FM refer to Table F. The 2A1 matrix block is used as a polarity guard for the 2831DM and 2831FM telephone sets (see paragraph 5.08).
- 5.07** For schematic information, refer to Fig. 5 through 14.
- 5.08** The 2A1 matrix block (ordered separately) provides the polarity guard function to telephone set with multiline conferencing via multibutton depression. The matrix block consists of a 66-type molded plastic connecting block, containing quick-connect terminals wired and equipped with eight diode bridges for eight lines. The matrix block is connected between the line circuit and the station cut-down field. For connections to the 2A1 matrix block, refer to Table I.



***If a station requires line ringing on a particular line, connect the ringing leads from the key telephone set to the appropriate terminals on the LINE SIDE of the matrix block, not to the station side.***



TABLE C

**PICKUP-SIGNAL KEY CONVERSION  
(ALL TELEPHONE SETS EXCEPT DM AND FM)**

CONVERSION OPTION (NOTE)	647B5 KEY LEADS (UPPER KEY)									
	O-W	S-W	G-R	BL-BK	BR-BK	BK-BR	BK-BL	R-G	W-S	V-BR
PPPPPPPPPP	19	19	19	23	23	23	26	26	26	26
PPPPPPPPPS	19	19	19	23	23	23	26	26	26	27
PPPPPPPPSS	19	19	19	23	23	23	26	26	27	27
PPPPPPPPSSS	19	19	19	23	23	23	26	27	27	27
PPPPPPSSSS	19	19	19	23	23	23	27	27	27	27
PPPPSSSSSS	19	19	19	23	23	27	27	27	27	27
<b>647A5C KEY LEADS (LOWER KEY)</b>										
CONVERSION OPTION (NOTE)	O-W	S-W	G-R	BL-BK	BR-BK	BK-BR	BK-BL	R-G	W-S	
HPPPPPPPPP	7	7	7	11	11	11	15	15	15	
HPPPPPPPPS	7	7	7	11	11	11	15	15	27	
HPPPPPPPPSS	7	7	7	11	11	11	15	27	27	
HPPPPPPSSS	7	7	7	11	11	11	27	27	27	
HPPPPSSSSS	7	7	7	11	11	27	27	27	27	
HPPSSSSSSS	7	7	7	11	27	27	27	27	27	

Note: Move (O-Y) mounting cord lead from terminal ⑥ ⑫ to terminal 27. Beyond five signal conversions strap terminal 27 to 28 and move the signal leads consecutively to terminal 28. Example: (BR-BK) lead from terminal 23 to 28 then (BL-BK) lead from 23 to 28 etc.

○ 831A1M (MD) or 2831A1M (MD) early version.

□ All other telephone sets except DM and FM.

♦TABLE D♦  
 PICKUP SIGNAL KEY CONVERSION [831DM(MD), 831FM, 2831DM(MD), OR 2831FM TELEPHONE SET]

CONVERSION OPTION (NOTE)	647AH5 KEY LEADS								
	BL	BL	BL	BL-BK	BR-BK	BK-BR	BK-BL	R-G	W-S
HPPPPPPPPP	Connected via internal mounting cord wiring and terminated on Term. 7 and can not be converted to signaling.			17	17	17	11	11	11
HPPPPPPPPS				17	17	17	11	11	27
HPPPPPPPSS				17	17	17	11	27	27
HPPPPPPSSS				17	17	17	27	27	27
HPPPPPSSSS				17	17	27	27	27	27
HPPPPSSSSS				17	27	27	27	27	27

**Note:** Move (O-Y) mounting cord lead from terminal 12 to terminal 27. For sixth signal conversion strap terminal 27 to a spare terminal and move the (BL-BK) signal lead from 17 to spare terminal selected.

TABLE E

## DIAL RESTRICTION MODIFICATIONS (NOTE 1)

TELEPHONE SET	LEAD		REMOVE FROM		CONNECT TO	
	FUNCTION	COLOR	NET.	SET	NET.	SET
831FM and 2831FM	Line Tip	G		8		3
	Line Tip	G		8		3
	Line Ring	R		3		8
	Line Ring	R		3		8
831CM and 2831CM Mfg. 2-77 or later (Note 3)	Line Tip	G		8		6
	Line Tip	G		8		6
	Line Ring	R		6		8
	Line Ring	R		6		8
831CM and 2831CM E/W New Line Switch and Mfg. before 2-77 (Notes 2 and 3)	Line Tip	G		16		6
	Line Tip	G		16		6
	Line Ring	R		6		16
	Line Ring	R		6		16
831A1M, 831B1M, 831C, 831CT, or 831CM E/W Old Line Switch	Line Tip	G	F			6
	Line Tip	G	F			6
	Line Ring	R		6	F	
	Line Ring	R		6	F	
2831 A1M, 2831B1M, 2831C, 2831CT, or 2831CM E/W Old Line Switch (Note 3)	Line Tip	G		8		6
	Line Tip	G		8		6
	Line Ring	R		6		8
	Line Ring	R		6		8

*Note 1:* Rotary dial telephone set must have a 533K diode (ordered separately) installed between RR and F of the network see Fig. 4.

*Note 2:* The new line switch can be identified by two additional leads which are (BL).




*Note 3:* On TOUCH-TONE sets dial restriction and polarity guard cannot be provided simultaneously.


**TABLE F**  
**POLARITY GUARD CONNECTIONS FOR 2831-TYPE**  
**TELEPHONE SET**


WIRE OR LEAD	COLOR	REMOVE FROM	CONNECT TO	
		NET.	GUARD ASSY	NET.
Dial	BK	RR	T	
	G-W	C	S	
Line Switch	W	C	S	
Guard Assembly	G			RR
	W			C

*Note:* For use when specified by local instructions for end-to-end signaling installations.

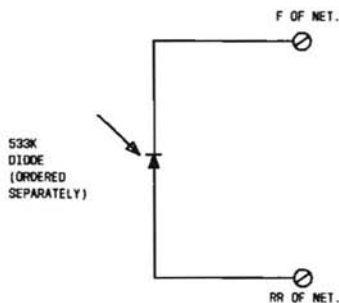
**TABLE G**  
**STATION BUSY LAMP CONNECTIONS**

LEAD	OPERATION
Hold Key (G-W)	Remove from terminal 22 and connect to 27 or other spare terminal
533K Diode (Ordered Separately)	Connect as shown or to same spare terminal as above 
Mtg Cord (Y-O) (Note)	Remove from   and connect to 22

 831A1M (MD) or 2831A1M (MD) early version

 All other telephone sets

*Note:* Use spare mounting cord lead if (Y-O) lead is used to provide other options.



**Fig. 4—Installing Diode for Dial Restriction**

**TABLE H**  
**I HOLD CONNECTIONS (NOTE)**

LEAD	REMOVE FROM	CONNECT TO
Hold Key	(G-W)	22
	(BK-BL)	7
SP Lead — Use (Y-O)* or spare mounting cord conductor		13

*Note:* For additional information see SD-69530-01

\* (Y-O) lead may be used unless connected for other options

**TABLE I**  
**2A1 MATRIX BLOCK**

LINE		LINE TERM. (LEFT)	STATION TERM. (RIGHT)
1	T	1	1
	R	5	5
2	T	7	7
	R	11	11
3	T	13	13
	R	17	17
4	T	19	19
	R	23	23
5	T	25	25
	R	29	29
6	T	31	31
	R	35	35
7	T	37	37
	R	41	41
8*	T	43	43
	R	47	47

\*If more than 8 lines are provided, additional 2A1 matrix blocks are required.

TABLE J

## 3-TYPE OR 4A SPEAKERPHONE MODIFICATION FOR TELEPHONE SETS EQUIPPED WITH NEW LINE SWITCH (NOTE)

TELEPHONE SET	LEAD COLOR	REMOVE FROM TERM.	CONNECT TO TERM.
831FM, DM, CM or 2831FM, DM, CM Mfg. 2-77 or later	G	16	8
831CM Mfg. before 2-77	G	16	F
	G		
2831CM Mfg. before 2-77	G	8	16

*Note:* The new line switch can be identified by two additional leads which are (BL). No modification is required on sets equipped with old type line switch, [no (BL) leads].

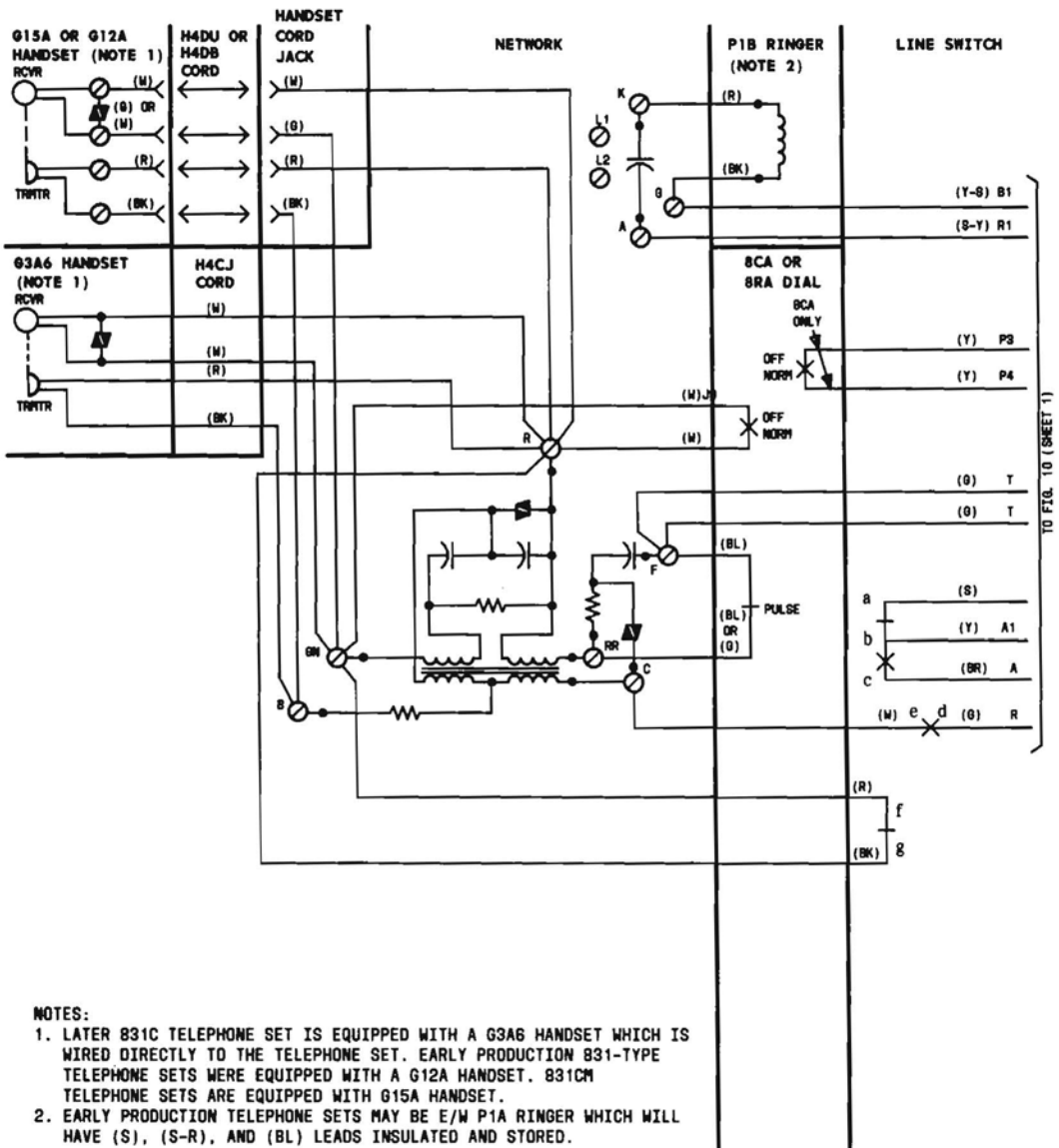


Fig. 5—Part of 831A1M (MD), B1M (MD), C (MD), CT (MD), or CM (Equipped With Old Line Switch) Telephone Set, Connections

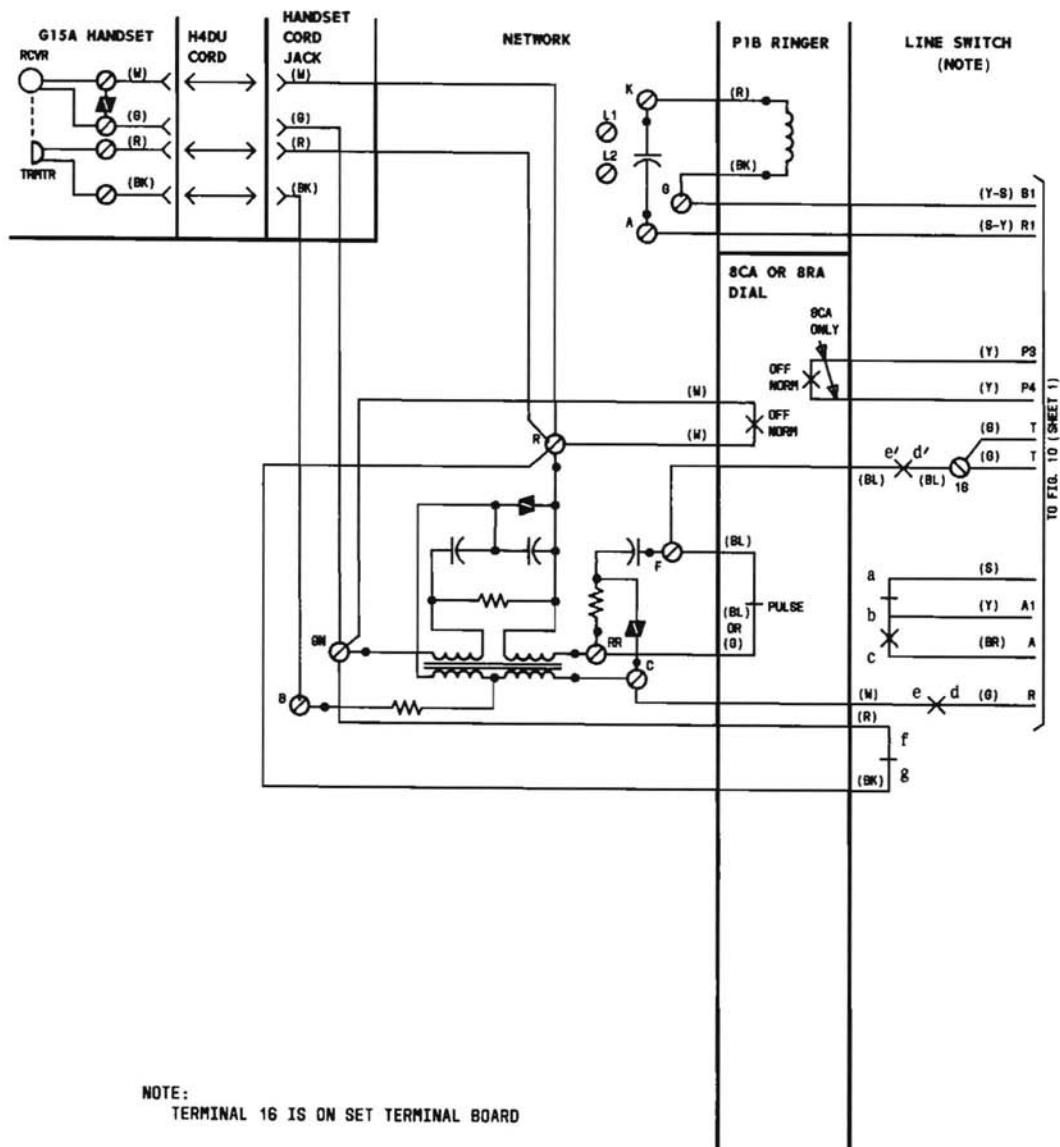


Fig. 6—Part of 831CM (Equipped With New Line Switch and Manufactured Before 2-77) Telephone Set, Connections



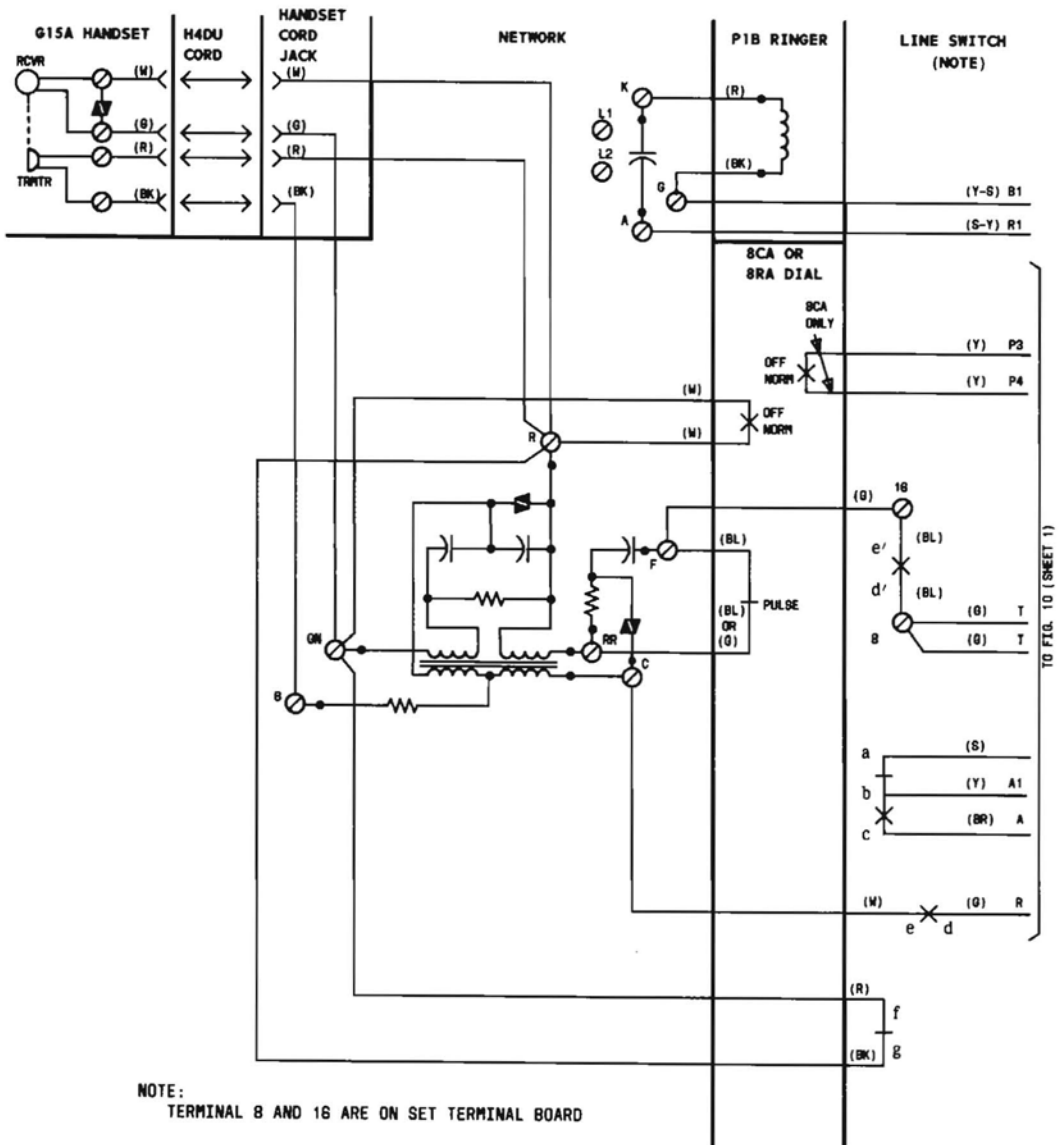
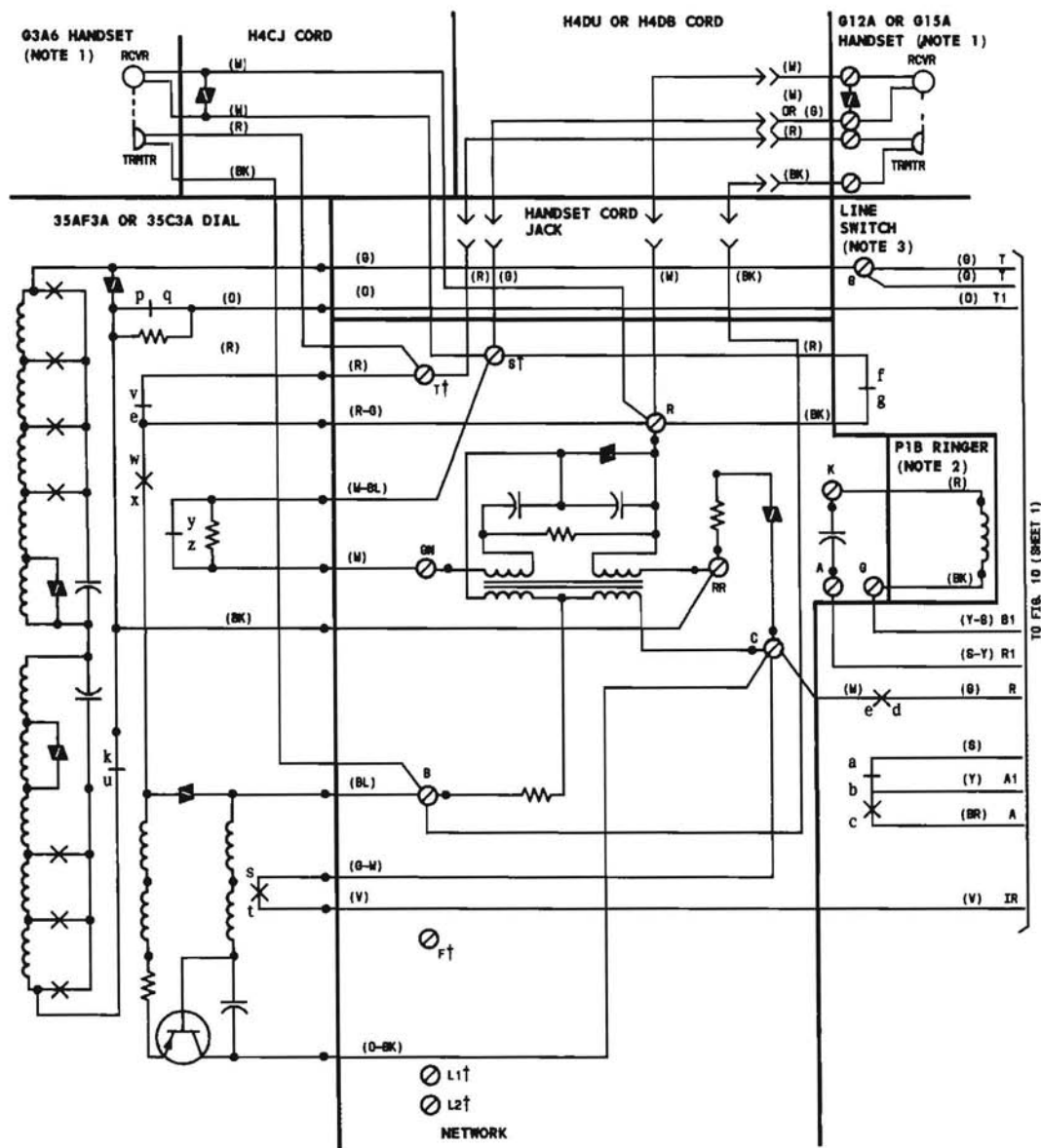


Fig. 7—Part of 831CM (Manufactured 2-77 or Later) Telephone Set, Connections



TO FIG. 10 (SHEET 1)

Fig. 8—Part of 2831A1M (MD), B1M (MD), C (MD), CT (MD), or CM (Equipped With Old Line Switch) Telephone Set, Connections

## NOTES FOR FIG. 8:

1. LATER 2831C TELEPHONE SET IS EQUIPPED WITH A G3A6 HANDSET WHICH IS WIRED DIRECTLY TO THE TELEPHONE SET. EARLY PRODUCTION 2831-TYPE TELEPHONE SETS WERE EQUIPPED WITH A G12A HANDSET. 2831CM TELEPHONE SETS ARE EQUIPPED WITH G15A HANDSET.
2. EARLY PRODUCTION TELEPHONE SETS MAY BE E/W P1A RINGER WHICH WILL HAVE (S), (S-R), AND (BL) LEADS WHICH ARE INSULATED AND STORED.
3. TERMINAL B IS ON SET TERMINAL BOARD.

† IF SET HAS BEEN CONVERTED IN SERVICE CENTER TO A 2831-TYPE AND HAS A 4228AA NETWORK LEADS SHOWN TERMINATED ON S WILL BE ON L1, LEADS SHOWN TERMINATED ON T WILL BE ON L2 AND TERMINAL F CANNOT BE USED AS A SPARE TERMINAL.



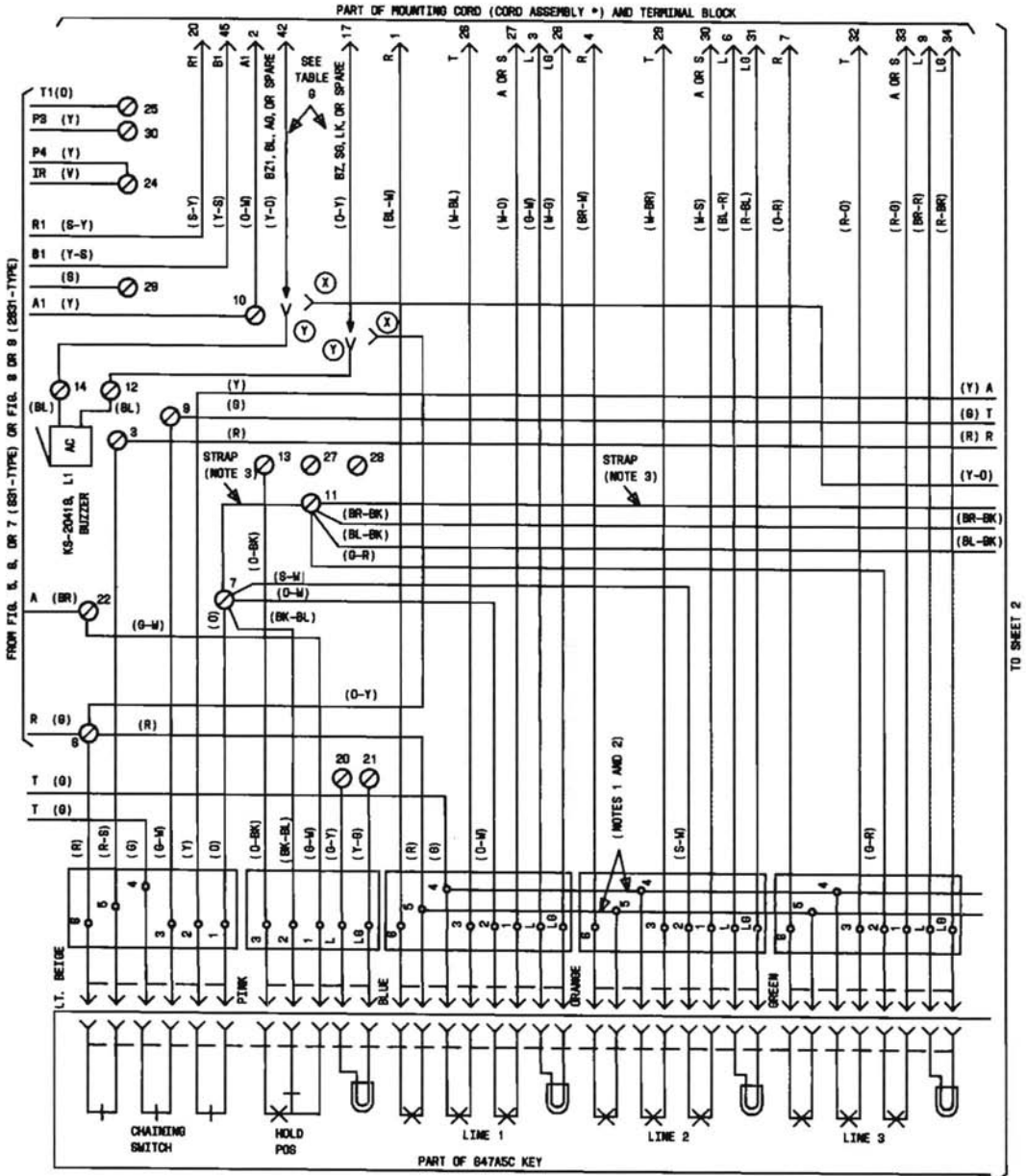


Fig. 10—831A1M (MD), B1M (MD), C (MD), CT (MD), CM or 2831A1M (MD), B1M (MD), C (MD), CT (MD), CM Telephone Set, Key and Mounting Cord Arrangement (Sheet 1 of 4)

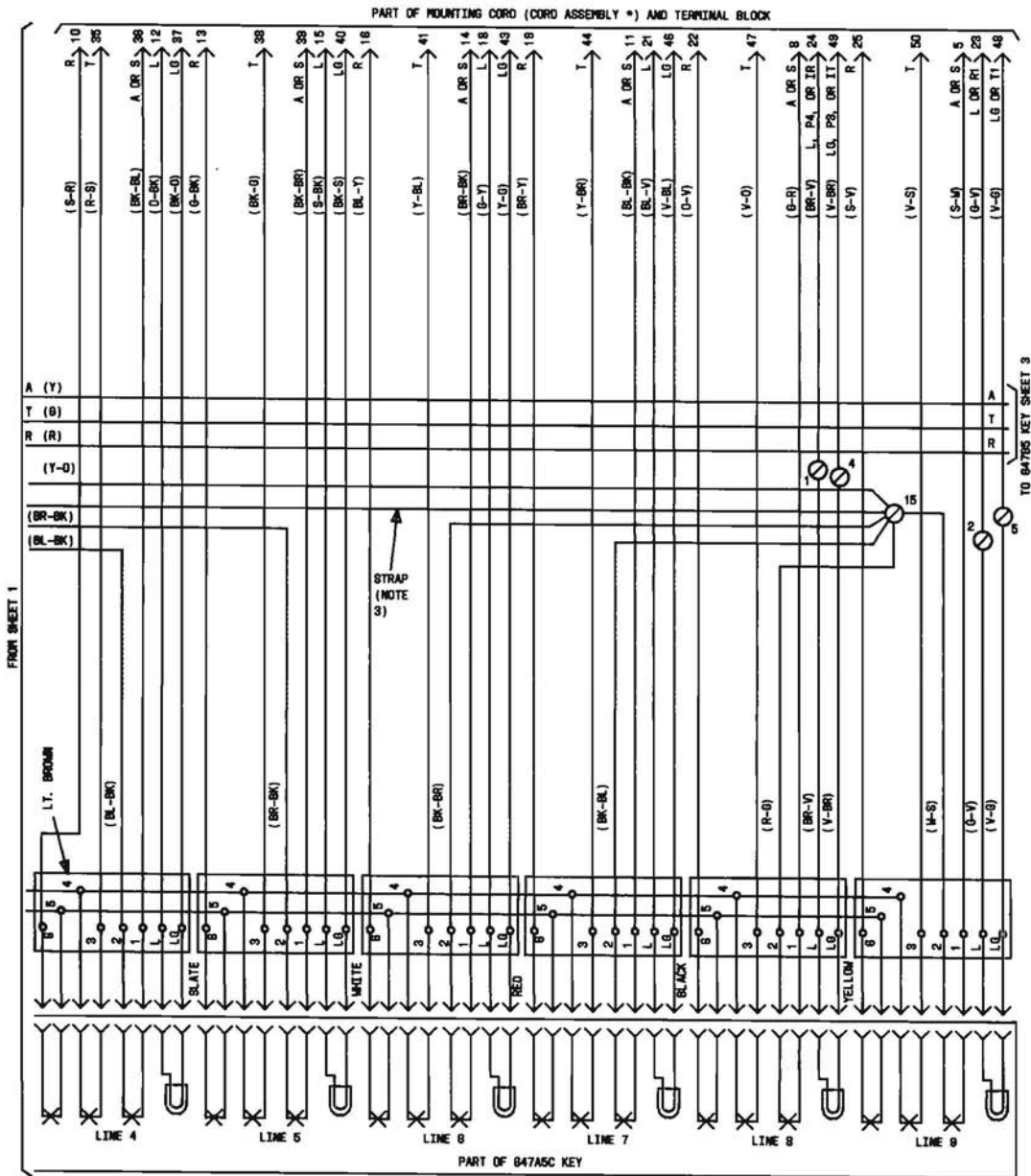


Fig. 10—831A1M (MD), B1M (MD), C (MD), CT (MD), CM or 2831A1M (MD), B1M (MD), C (MD), CT (MD), CM Telephone Set, Key and Mounting Cord Arrangement (Sheet 2 of 4)

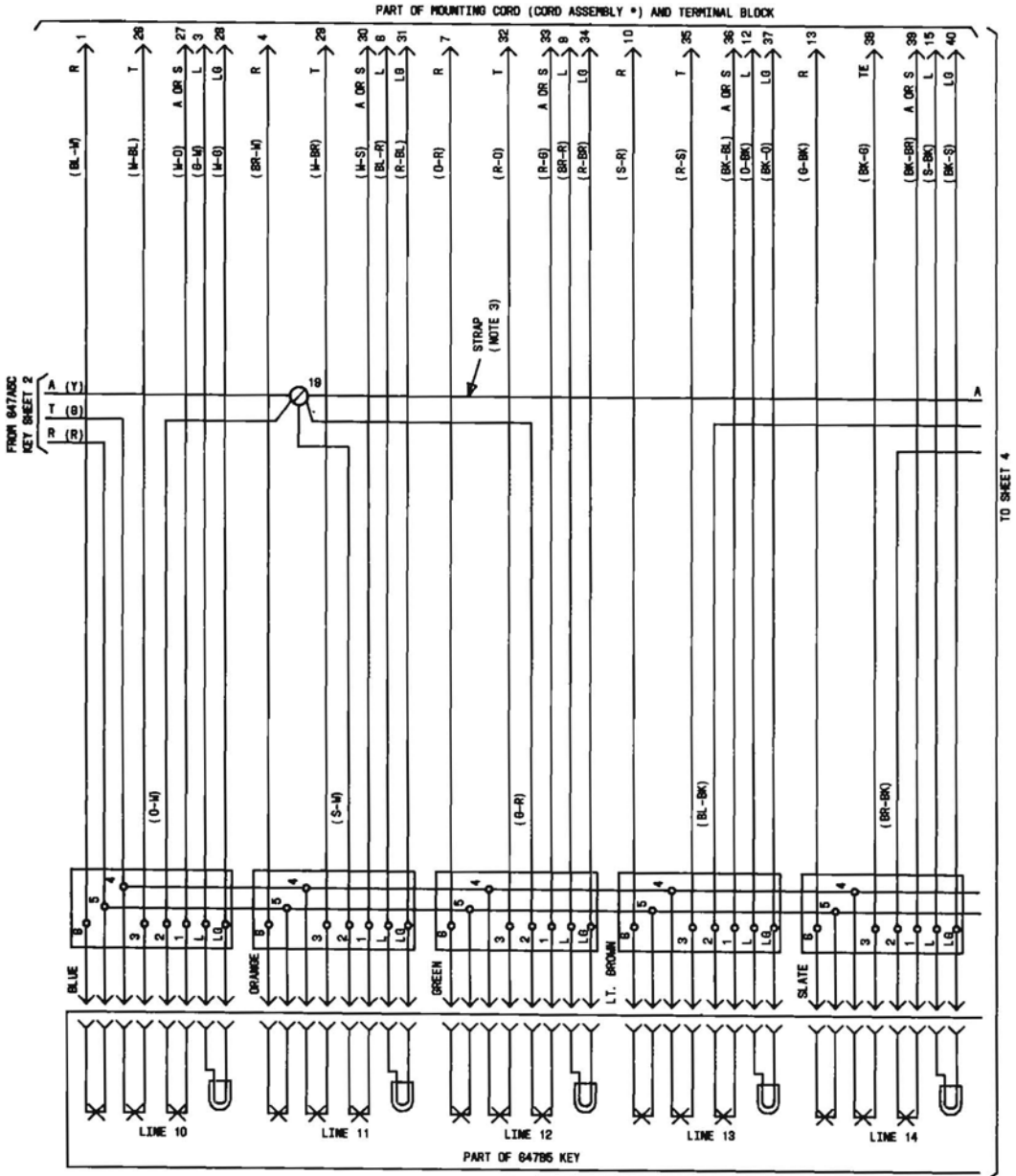


Fig. 10—831A1M (MD), B1M (MD), C (MD), CT (MD), CM or 2831A1M (MD), B1M (MD), C (MD), CT (MD), CM Telephone Set, Key and Mounting Cord Arrangement (Sheet 3 of 4)





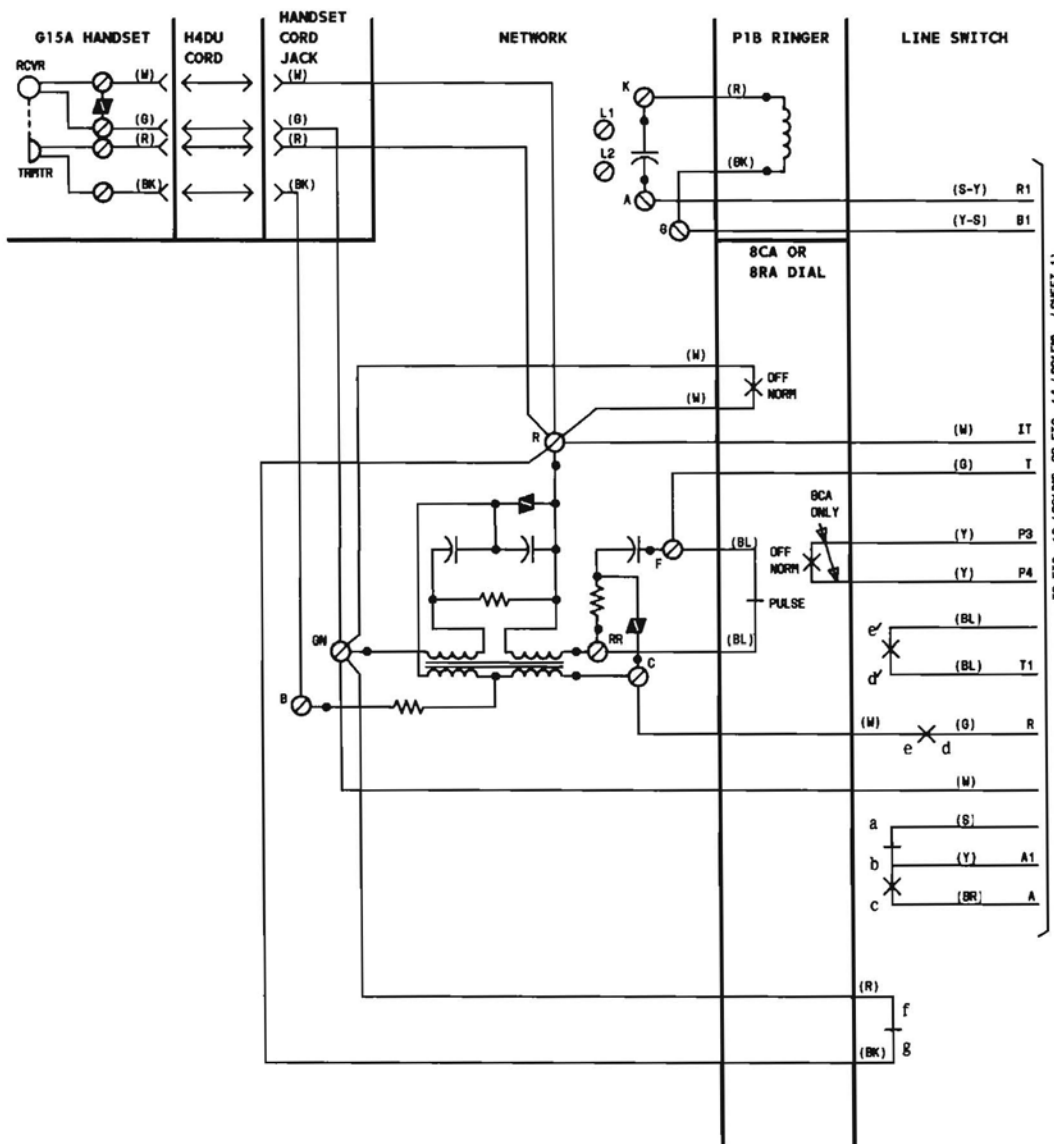
## NOTES FOR FIG. 10:

1. IN EARLY SETS TIP AND RING ARE COMMON TO PICK-UP BUTTONS THROUGH CONTACT STRIPS WHICH PLUG INTO KEY BEFORE 508-TYPE PLUGS ARE CONNECTED.
2. ON CURRENT SETS TIP AND RING ARE COMMON TO ALL PICK-UP BUTTONS THROUGH INTERNAL MOUNTING CORD WIRING.
3. BRASS STRAP ON TERMINAL BOARD CONNECTS TERMINALS 7, 11, AND 15 AND 19, 23 AND 26.

\* 831A1M (MD), 2831A1M (MD), AND 831B1M (MD), 2831B1M (MD) TELEPHONE SETS ONLY

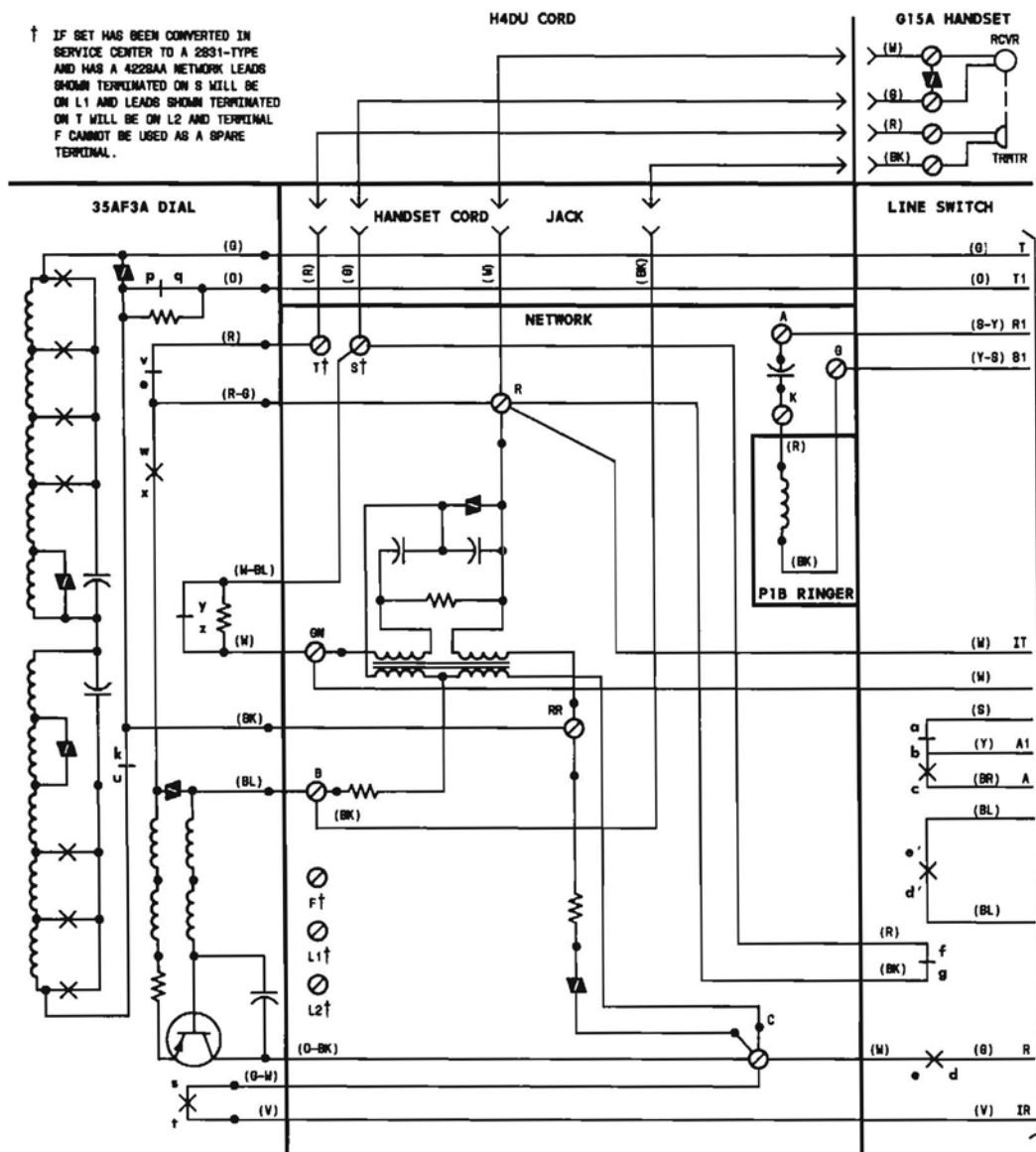
(X) 831A1M (MD), AND 2831A1M (MD) EARLY VERSION

(Y) ALL OTHER SETS



TO FIG. 13 (831DM) OR FIG. 14 (831FM). (SHEET 1)

Fig. 11—Part of 831DM (MD) or 831FM Telephone Set, Connections



TO FIG. 13 (2831DM) OR FIG. 14 (2831FM). (SHEET 1)

Fig. 12—Part of 2831DM (MD) or 2831FM Telephone Set, Connections

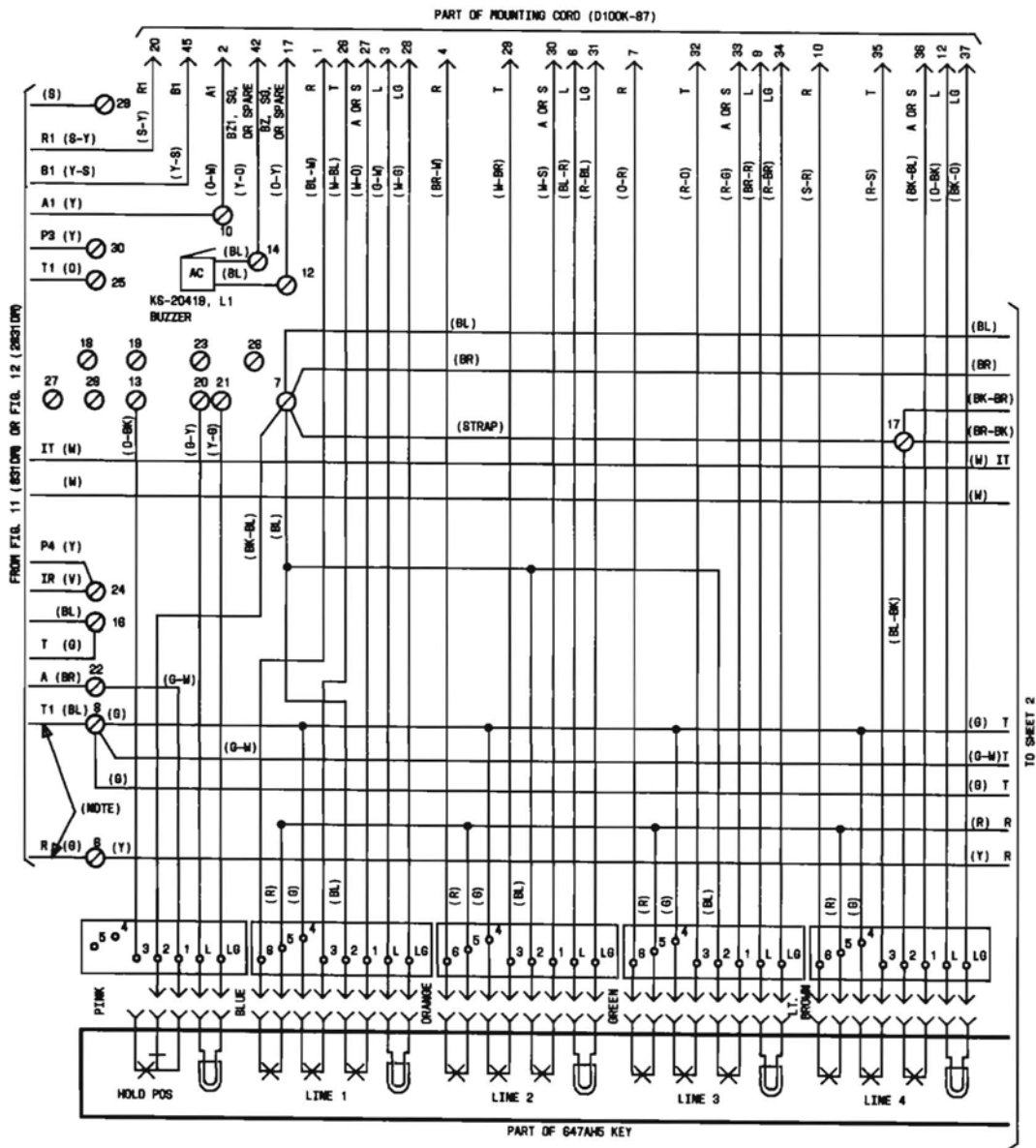


Fig. 13—831DM (MD) or 2831DM (MD) Telephone Set, Key and Mounting Cord Arrangement (Sheet 1 of 4)











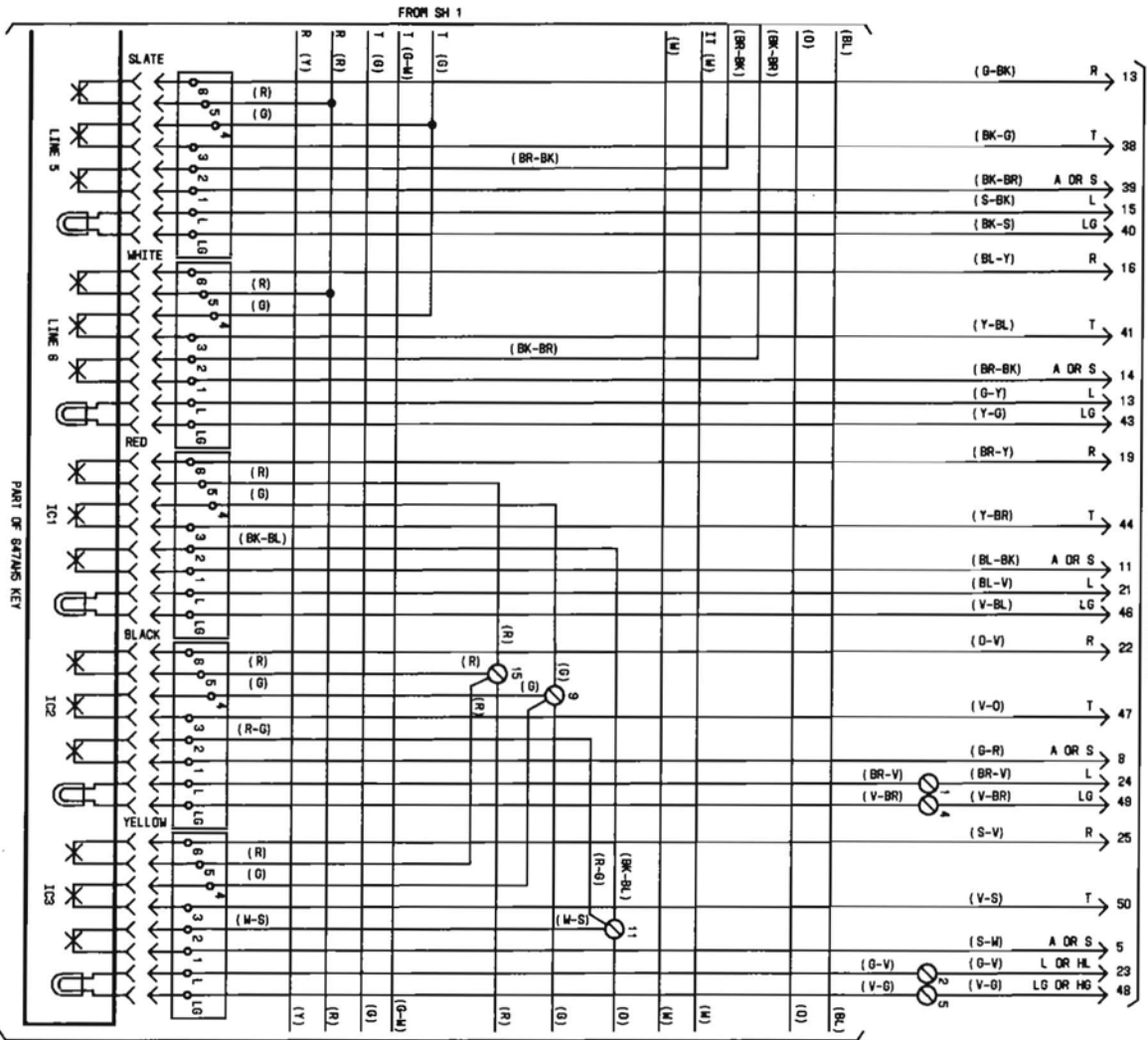


Fig. 14—831FM or 2831FM Telephone Set, Key and Mounting Cord Arrangement (Sheet 2 of 4)

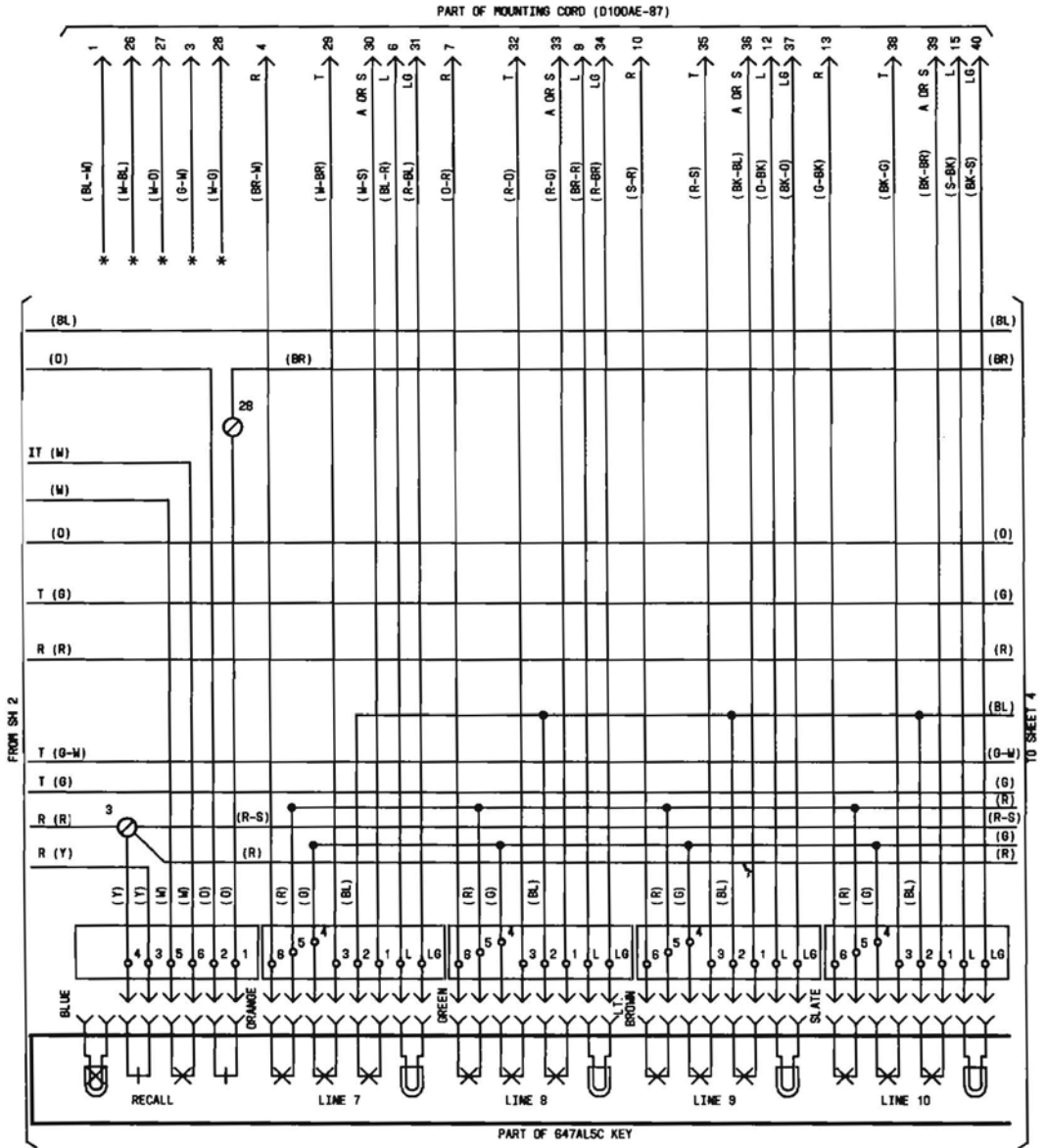


Fig. 14—831FM of 2831FM Telephone Set, Key and Mounting Cord Arrangement (Sheet 3 of 4)

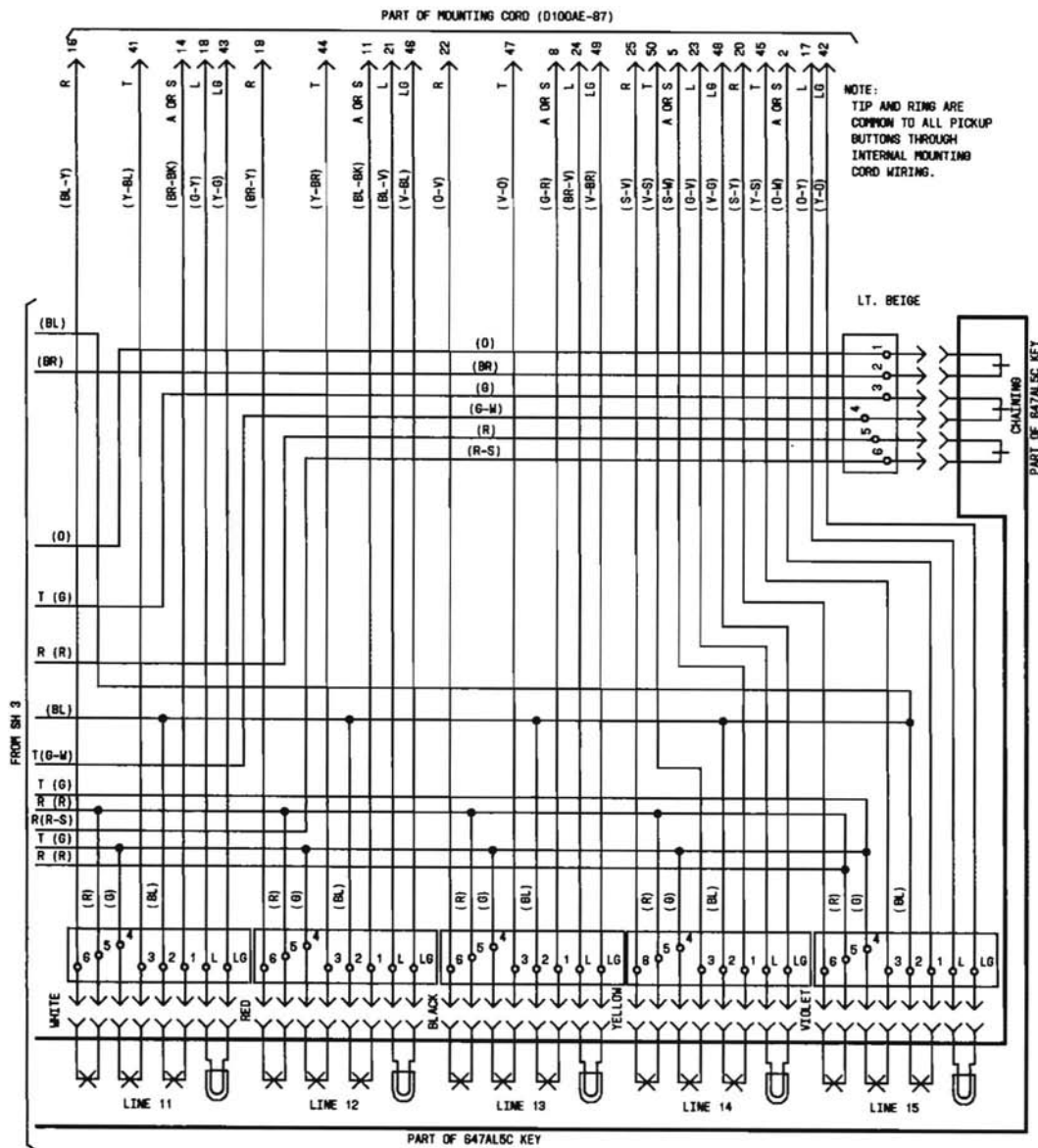


Fig. 14—831FM or 2831FM Telephone Set, Key and Mounting Cord Arrangement (Sheet 4 of 4)



## 6017-, 6026-, KS-21254, AND KS-21776 TYPE SEPARATELY MOUNTED KEYS IDENTIFICATION, INSTALLATION, AND CONNECTIONS

### 1. GENERAL

1.01 This section contains information on 6017, 6026, KS-21254 (MD), and KS-21776 lever type separately mounted keys.

1.02 This section is reissued to:

- Add information on KS-21776, Lists 1 through 9 keys
- Include schematic drawings of KS-21254, Lists 1 through 4 keys.
- Show KS-21254 type keys MD, replaced by certain KS-21776 type keys, Table B
- Show 6017A, B, C, D, H, and J keys rated (A&M Only) Table A.

### 2. IDENTIFICATION

2.01 These keys are referred to as lever type and are used to perform general switching functions in station equipment and systems.

#### A. Ordering Guide

2.02 Refer to Tables A and B for ordering information.

#### B. Design Features

2.03 **6017-Type Key (Fig. 1):**

- Consists of a key unit and terminal strip mounted in a gray plastic housing
- Not equipped with a designation card holder. A 98A designation strip is available but must be ordered separately. Use a 804768828 (P-476882) designation card or make from good grade of paper approximately 9/16-inch by 5/16-inch.

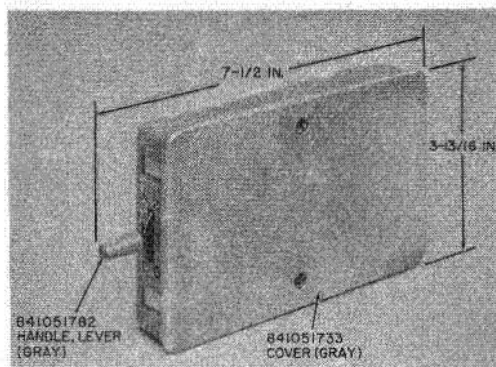


Fig. 1—6017-Type Keys

2.04 **6026-Type Key (Fig. 2):**

- Consists of a key unit, jacks for a 52- or 53-type head telephone set, and a terminal strip mounted in a black metal housing
- This type key is supplied with a designation card holder. Use a E-1164 or E-1165 designation card (cut to size).

2.05 **KS-21254 Type Key (MD) (Fig. 3, 4, 5, or 6).**

- Consists of a toggle switch (two or four pole), flexible wiring strip with 6 or 12 screw terminals for making electrical connections, and molded plastic cover held to base by serrated locking or hex nut at front (Fig. 3) and snap fit at the rear. Cover has a simplified schematic molded inside.
- Contacts are gold plated, suitable for voice and data transmission paths. Contacts also

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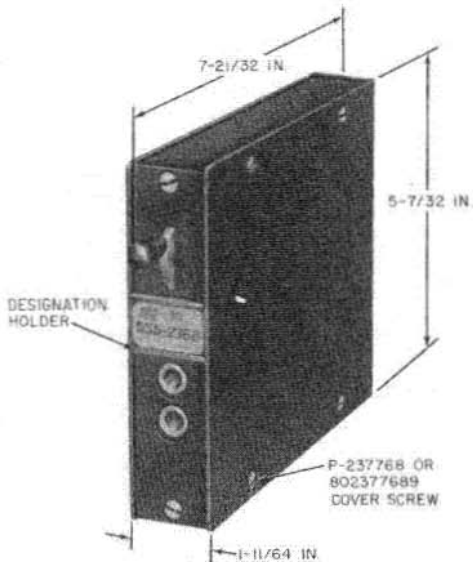


Fig. 2—6026-Type Keys

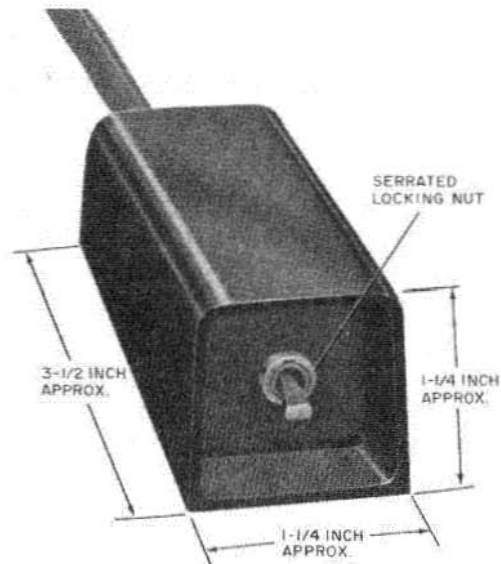


Fig. 3—KS-21254 Type Key (MD)

satisfactory for low energy level circuits associated with solid state devices.

- Electrical cord channel is provided with four teeth-like protrusions which act as a cord stay to prevent cord from being dislodged (Fig. 4)
- Will mount on 77A mounting bracket (ordered separately) so key can be attached to baseplate of telephone set (Fig. 5 and 6)
- Key can be fastened to desk, wall, etc. by appropriate hardware not furnished with key.

#### 2.06 ♦KS-21776 Type Key (Fig. 7, 8, or 9).

- All list number keys (Table B) are available in two different types (A and B).

(a) There are two types of keys, one type (Fig. 8) consists of:

- (1) Toggle switch (two or four pole).

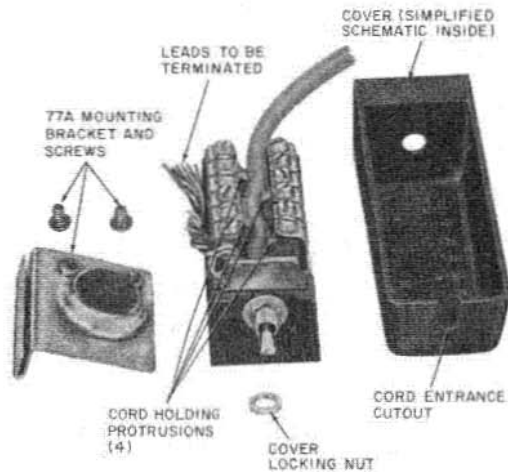


Fig. 4—KS-21254, List 4 Key (MD) Cover Removed and 77A Mounting Bracket



Fig. 5—KS-21254 Type Key (MD) Installed With 2500-Type Telephone Set

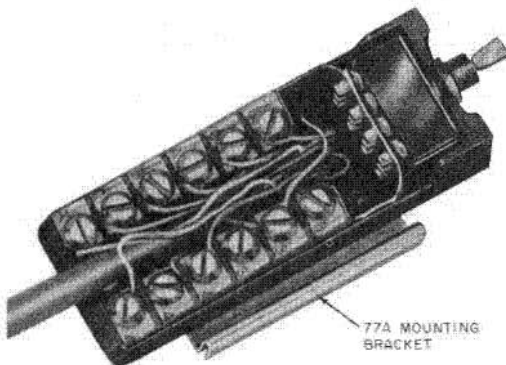


Fig. 6—Interior View of KS-21254, List 4 Key (MD) Showing Leads Terminated

(2) Flexible wiring strip (six or twelve terminal).

(3) Electrical cord channel is provided with four teeth-like protrusions which act as a cord stay to prevent cord from being dislodged.

**Note:** These keys can be mounted on 77A mounting bracket or can be fastened to desk, wall, etc. by appropriate hardware. The bracket and hardware must be ordered separately or furnished locally.

(b) The other type (Fig. 9) consists of.

- (1) Toggle switch (two or four pole).
- (2) Screw terminals (6 or 12).
- (3) Auxiliary mounting bracket.
- (4) Pan head mounting screws (2).
- (5) Double-sided adhesive tape (fastened to auxiliary mounting bracket).

**Note:** These keys are not intended to be mounted with the 77A mounting bracket.



*All key covers must be ordered separately (Table B). A simplified schematic is provided on a stick-on decal which is furnished with each key and should be placed inside cover.*

- Contacts of toggle switch on both type keys are gold plated and suitable for voice and data transmission paths. Contacts also satisfactory for low energy level circuits associated with solid state devices
- Replaces certain 6017- and KS-21254 type keys, refer to Table B.4

### 3. INSTALLATION

#### 3.01 6017- or 6026-Type Keys.

- (a) Locate key where readily accessible to user and designation strip can be seen.
- (b) Face of key should be flush with edge of desk or table. Discourage knee well installations because of space limitations and possible accident hazards.
- (c) To limit number of holes in customer's furniture, key and associated equipment may be mounted on a common backboard.
- (d) Keys are furnished for right-hand mounting on desk or table. To mount 6017-type key

on left side, remove screws holding key to box and invert key. For 6026-type key, reverse cover and back.

(e) A 14A guard (ordered separately) is available to prevent accidental operation of 6017-type keys in special service applications. Mounting screws furnished with guard. To mount 14A guard.

- (1) Unscrew key lever handle and remove.
- (2) Remove four screws securing key to housing.
- (3) Place guard over lever.
- (4) Secure guard and key to housing with screws provided with guard.
- (5) Replace key lever handle.

(f) The 10A guard is another type designed to hold a 6017-type key in the operated or nonoperated position. The guard fits over the key lever and is held in either position by the lever handle being tightened against it. The lever handle must be unscrewed to change the lever position and then retightened. The 10A guard is used in special service applications and must be ordered separately.

### 3.02 ♦KS-21254 Keys MD.♦

- (a) Locate key where readily accessible by attaching to telephone set using 77A mounting bracket or fasten key to desk, wall, etc. using appropriate hardware not furnished with key.
- (b) Terminate electrical connections as required. A simplified schematic of the key is shown inside the key cover (Fig. 4).



**Place leads between screwhead and washer. Do not place leads between flexible wiring strip and washer. For KS-21254, Lists 1, 2, and 3 keys, use only terminals 2A, B, C and 4A,**

**B, C. The other terminals are not connected for these keys. For List 4 key, all terminals are connected.**

### 3.03 ♦KS-21776 Key.

- (a) Locate the key with flexible wiring strip where readily accessible by attaching to the telephone set using 77A mounting bracket or fasten key to desk, wall, etc. by using the appropriate hardware not furnished with key.
- (b) Locate the key with screw terminals where readily accessible by attaching to the telephone set using the auxiliary mounting bracket furnished with each key and the double-sided adhesive tape attached to the mounting bracket. May be fastened to desk, wall etc. by pan head mounting screws furnished with key.

**Caution: The double-sided adhesive tape should not be used to fasten the key to surfaces other than the auxiliary mounting bracket.**

- (c) Terminate electrical connections as required. The stick-on schematic decal furnished with all keys should be placed inside the key cover as shown in Fig. 8.♦

## 4. CONNECTION INDEX

- Fig. 10—6017-Type Lever Keys, Schematics  
 Fig. 11—6026-Type Lever Keys, Schematics  
 Fig. 12—KS-21254 Type Keys, Schematics  
 Fig. 13—KS-21776 Type Keys, Schematics



◆ TABLE A ◆

## ORDERING GUIDE 6017—AND 6026—TYPE KEYS

KEY (SEE NOTE)	PRINCIPLE USE	KEY (SEE NOTE)	PRINCIPLE USE
6017A†	Station Switching	6017Y	1A Key Private Line Circuit
6017B†	2-Line Pickup	6017AA	Station Signal — Key Equipment 102A
6017C†	Station Ringing Key	6017AB 6017AC 6017AK 6017AL*	General
6017D†	4-Wire Private Line Systems		
6017E	3-Line Pickup		
6017G	Switching Key Used in No. 750A or 755A PBX		
6017H†	Signal Control — 2-Wire Line — Station and Control Circuit	6017AM	5A Key Equipment
		6017AN	5B Key Equipment
6017J†	Line Cutoff in 1A and 1A1 Key Telephone Systems	6017AP 6017AR	Data Application — 4-Wire Line — Equipped with 14A guard-stamped LINE and TEST at front and rear lever positions, respectively.
6017K	5A Key Equipment With 100-Type Loudspeaker	6026B 6026C	4A Key Equipment with Hold
6017L	5B Key Equipment With 100-Type Loudspeaker		4-Wire Private Line Termination
6017M 6017P	Loudspeaker and Paging Systems	6026D	4A Key Equipment (without hold, may be used with 1A, 1A1, or 1A2 Key Telephone System)
6017R	750A or 755A PBX Control		
6017S 6017T 6017U	2A Key Telephone Systems		

\* Contacts must be wired to terminal as required. See Fig. 3.

† (A&M Only).

Note: Early 6017- and current 6026-type keys are furnished in a black metal housing with a black handle but are available with red or white handle when specified on order. Current 6017-type key are furnished with a gray plastic cover and gray handle.

◆ TABLE B ◆

## ORDERING GUIDE KS-21776 TYPE KEYS

KEY CODE (NOTES 1 AND 2)	FUNCTION	KEY LEVER POSITION			REPLACES (6017-TYPE)	REPLACES (KS-21254 TYPE)
		UP	CENTER	DOWN		
KS-21776L1	2PDT	On	None	On	6017B*	List 2
KS-21776L2	2PTT	On	Off	On	6017A*	List 1
KS-21776L3	2PDT	On	None	On†	6017C*	List 3
KS-21776L4	4PTT	On	On	On	—	—
KS-21776L5	4PDT	On	None	On	6017D*, H,* & J*	List 4
KS-21776L6	4PTT	On	Off	On	—	—
KS-21776L7	4PDT	On	None	On†	—	—
KS-21776L8	4PTT	On†	Off	On†	—	—
KS-21776L9	4PTT	On	Off	On†	—	—

\* (A&M Only).

† Indicates a momentary or nonlocking position.

Note 1. Key covers must be ordered separately as follows:

Cover, KS-21776L101 with color suffix added. Black (-03), Ivory (-50), Green (-51), Red (-53), Yellow (-56), White (-58), Light Beige (-60), or Light Gray (-61).

Note 2. The base of all KS-21776 type may be black or the same color as the key cover.

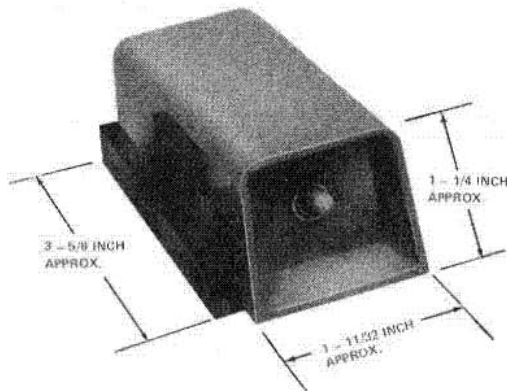


Fig. 7—KS-21776 Type Key

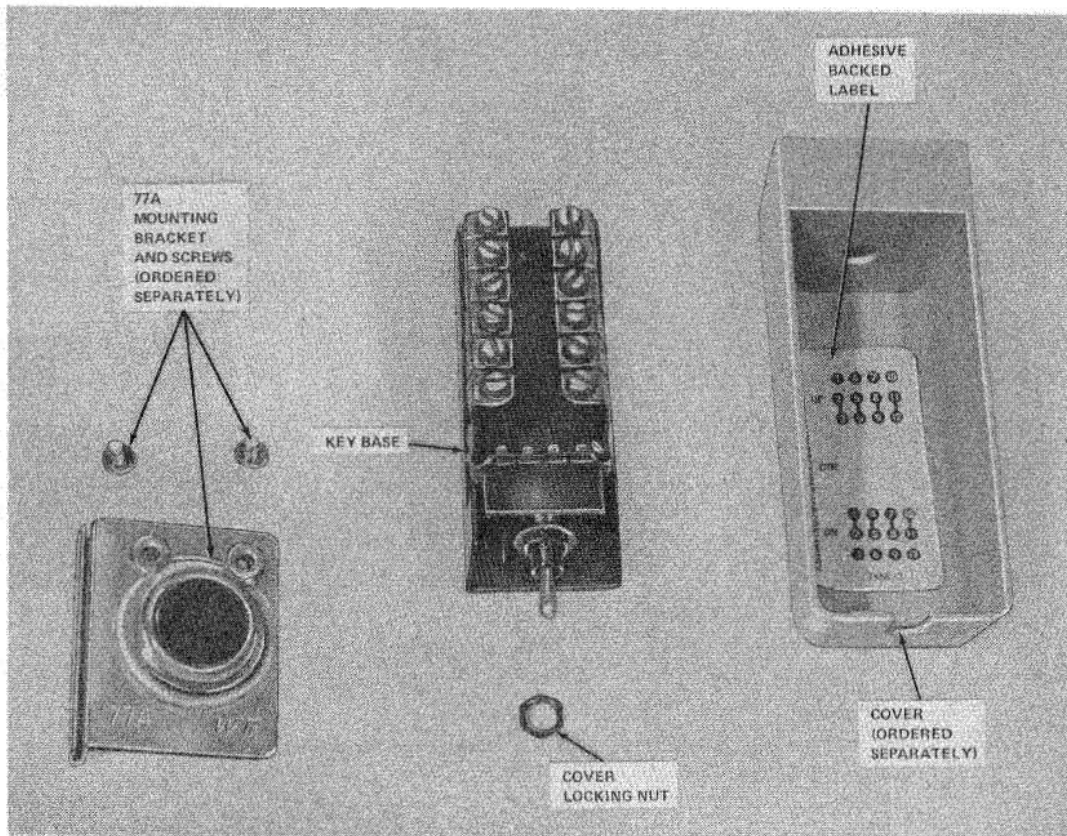


Fig. 8—KS-21776 Type Key With Flexible Wiring Strip

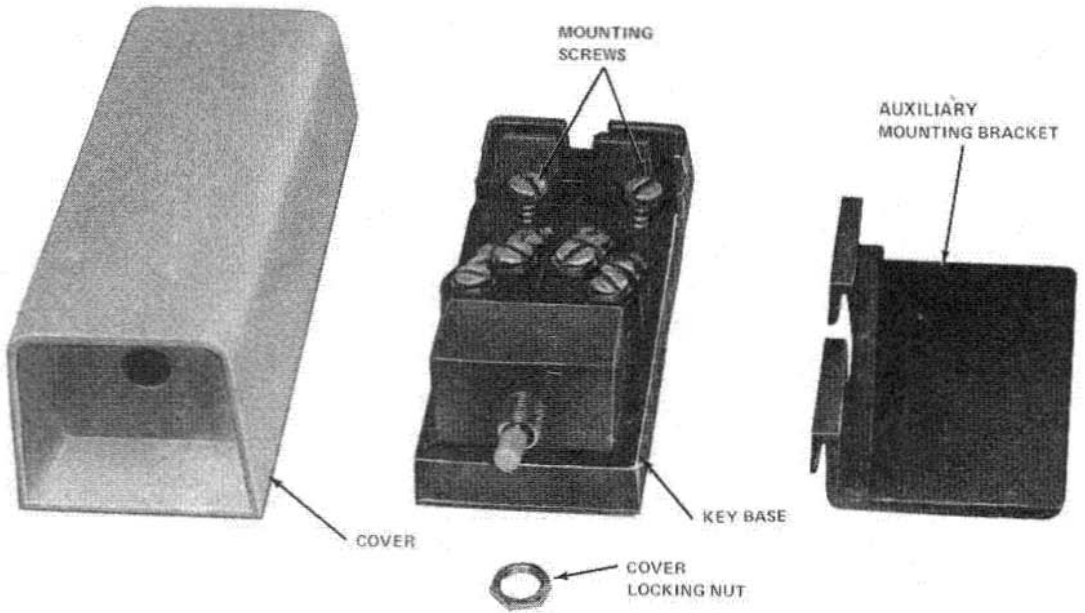


Fig. 9—KS-21776 Type Key With Screw Terminals

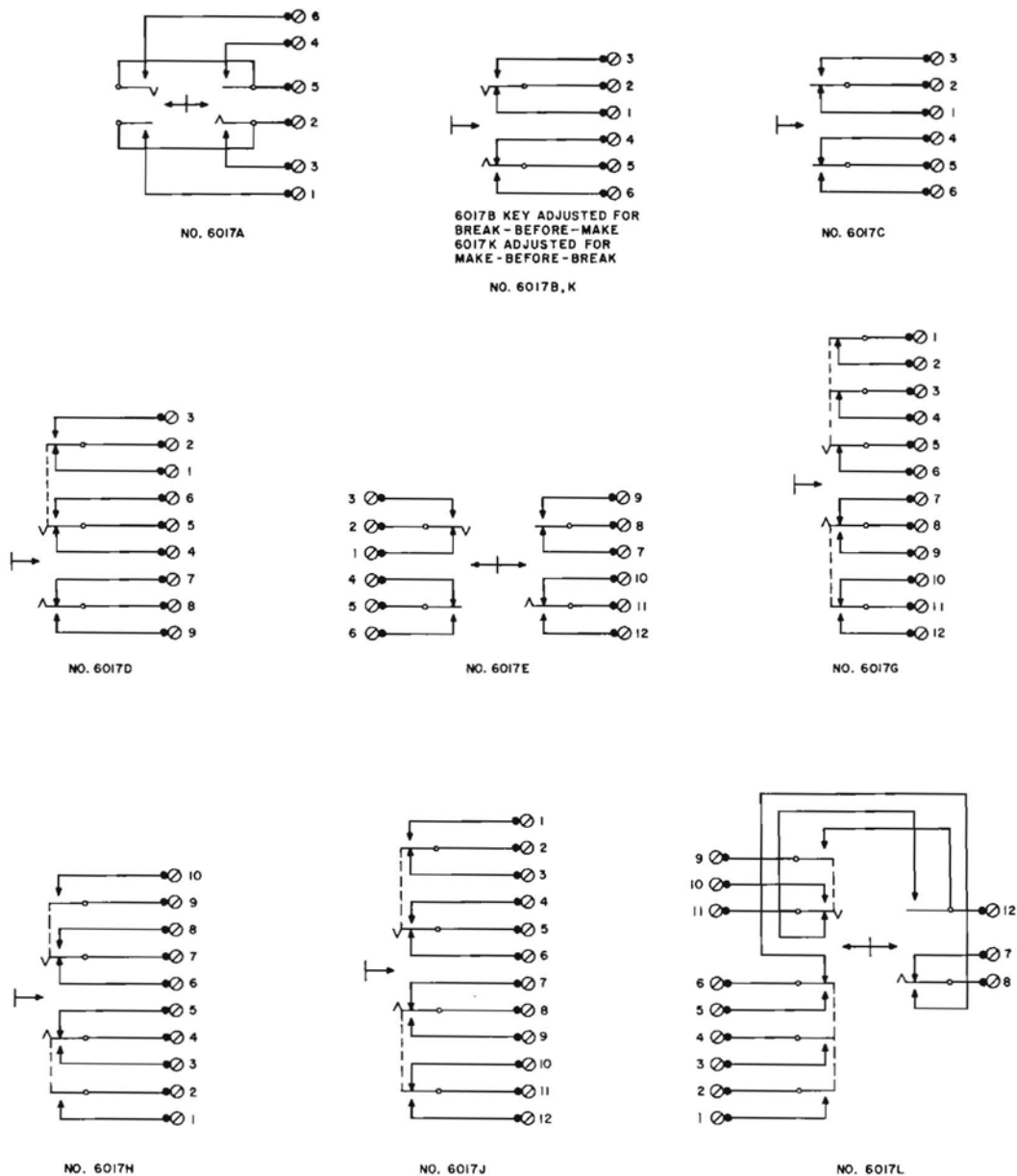


Fig. 10—6017-Type Keys, Schematics (Sheet 1 of 4)

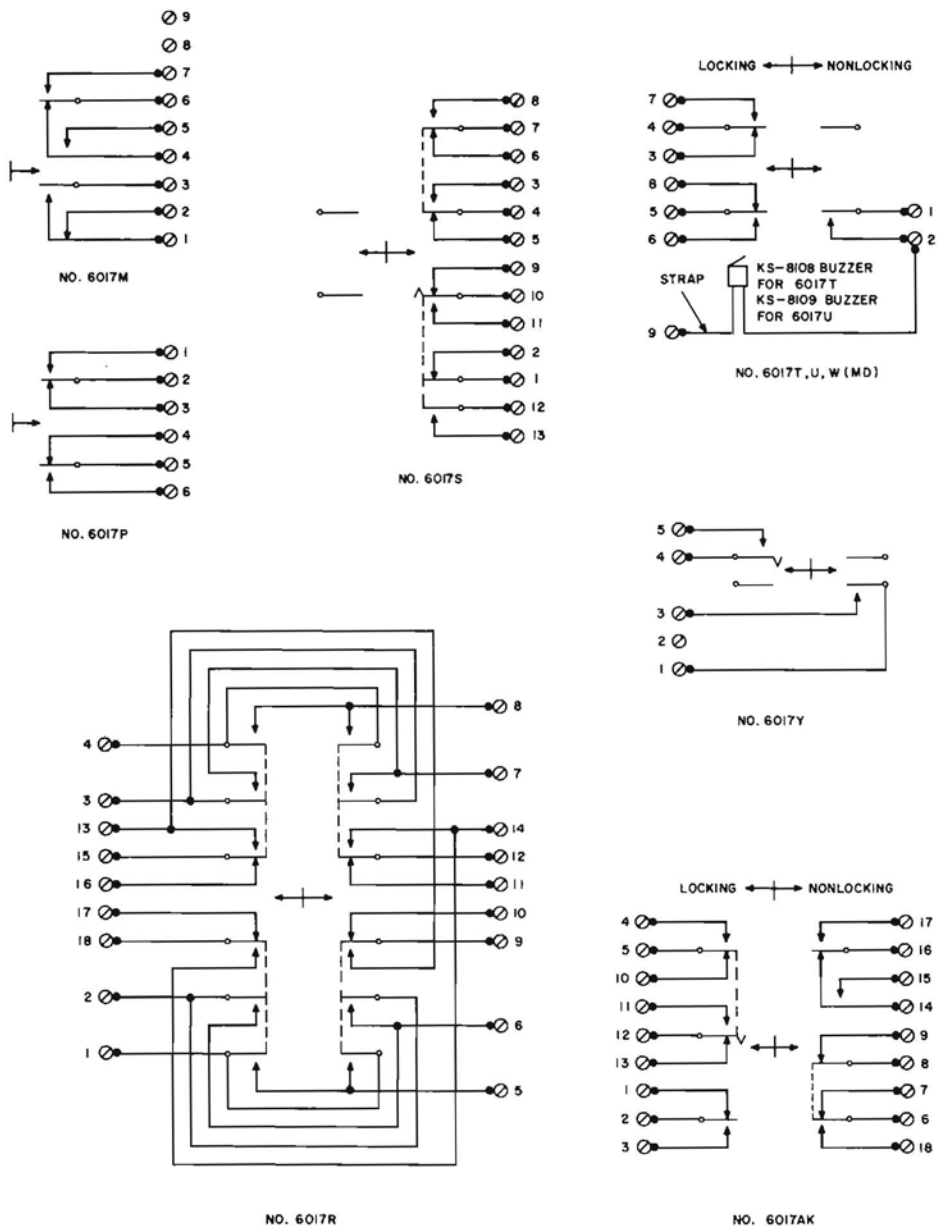


Fig. 10—6017-Type Keys, Schematics (Sheet 2 of 4)

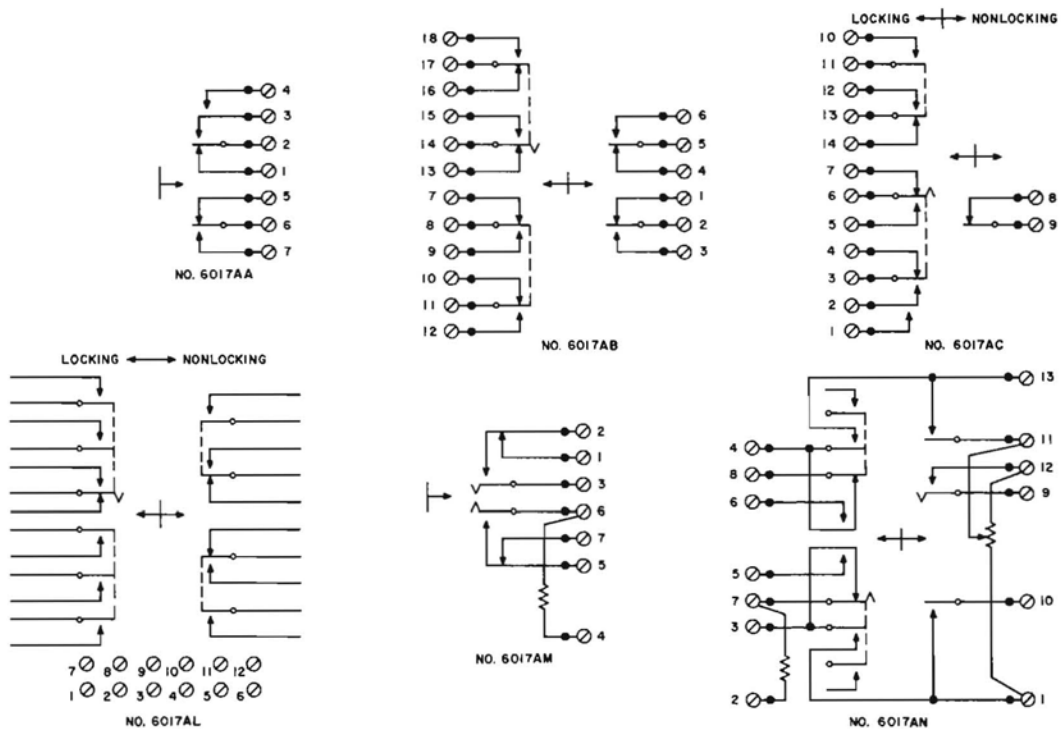


Fig. 10—6017-Type Keys, Schematics (Sheet 3 or 4)

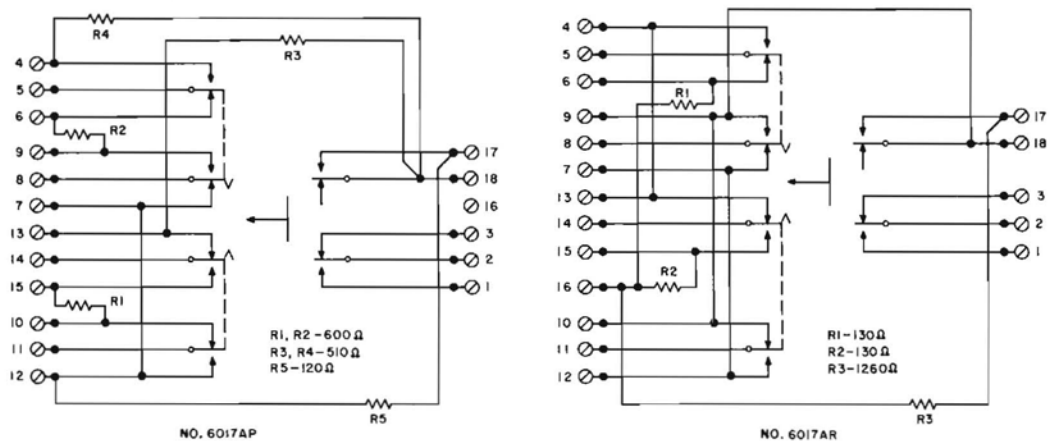
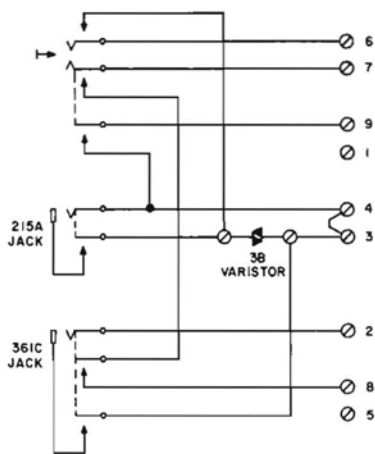
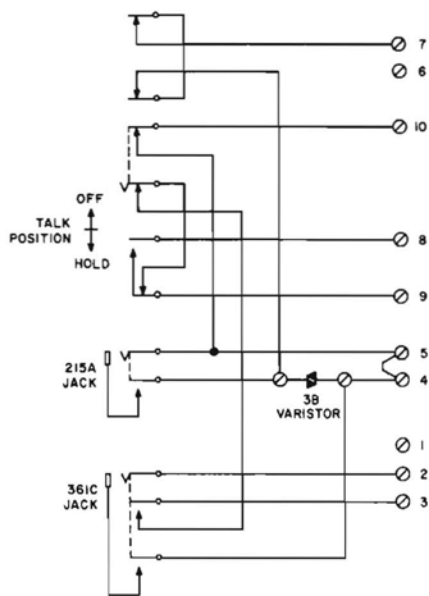


Fig. 10—6017-Type Keys, Schematics (Sheet 4 of 4)

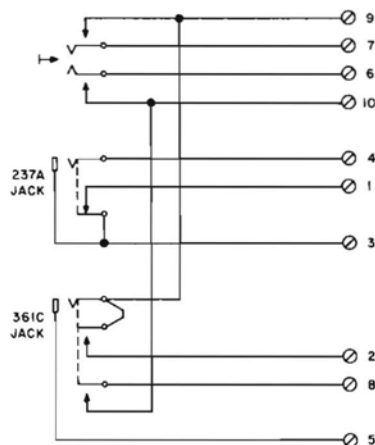




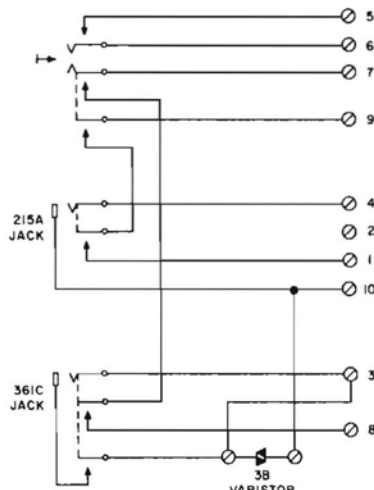
6026A



6026B



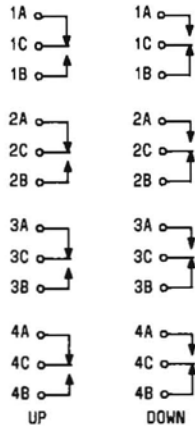
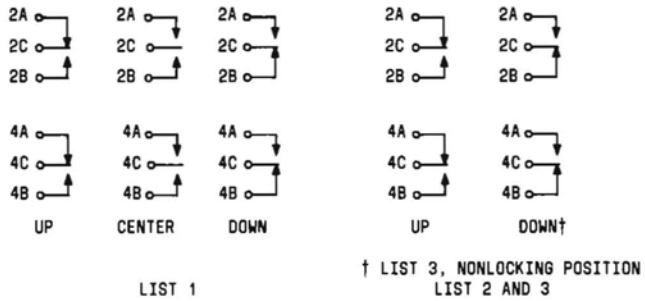
6026C



6026D

Fig. 11—6026-Type Keys, Schematic





LIST 4

Fig. 12—KS-21254 Type Keys (MD), Schematic

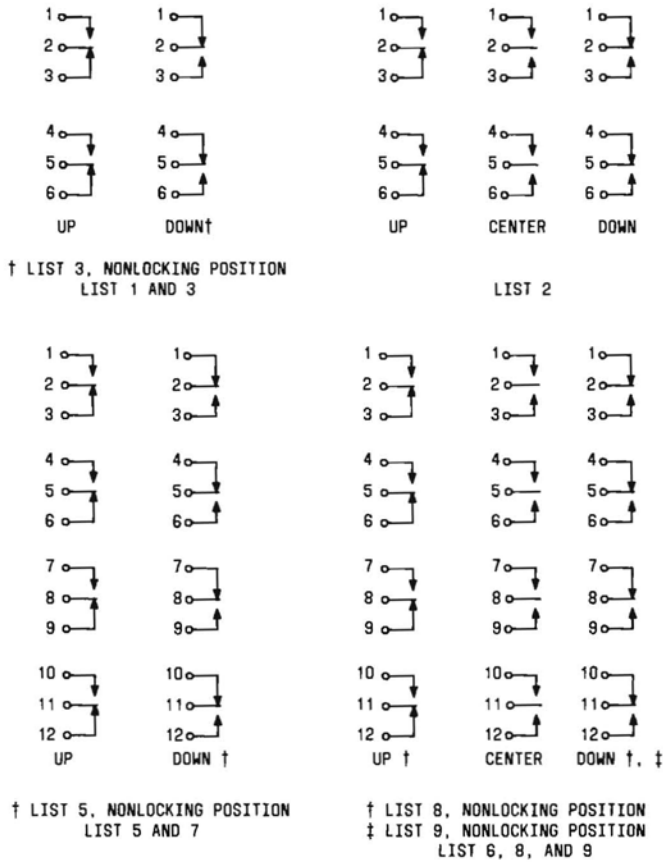
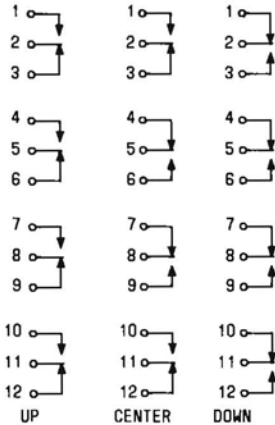
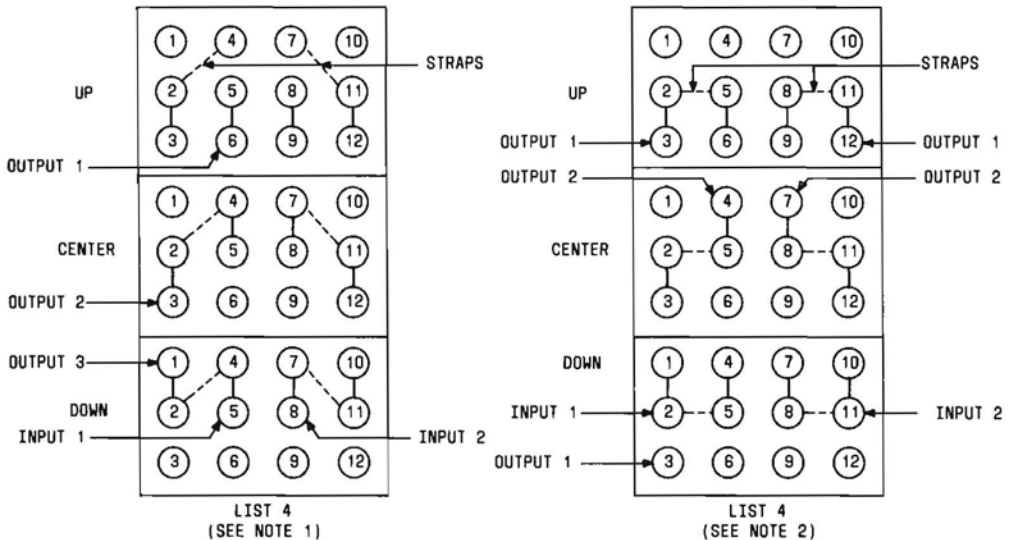


Fig. 13—KS-21776 Type Keys, Schematics (Sheet 1 of 2)



LIST 4



LIST 4  
(SEE NOTE 1)

LIST 4  
(SEE NOTE 2)

NOTES:

1. LIST 4 MAY BE CONVERTED TO A TWO POLE SWITCH WITH EACH POLE HAVING ONE INPUT AND THREE OUTPUTS BY ADDING TWO STRAPS AS SHOWN.
2. LIST 4 MAY BE CONVERTED TO A TWO POLE DOUBLE THROW MAKE-BEFORE-BREAK SWITCH BY THE ADDITION OF TWO STRAPS AS SHOWN. TERMINALS 6 & 9 ARE NOT USED.

Fig. 13—KS-21776 Type Keys, Schematics (Sheet 2 of 2)



## 6040-, 6041-, 6050-, AND 6051-TYPE SEPARATELY MOUNTED KEYS IDENTIFICATION, INSTALLATION, AND CONNECTIONS

### 1. GENERAL

1.01 This section contains information for 6040-, 6041-, 6050-, and 6051-type keys (Fig. 1, 2, and 3).

1.02 This section is reissued to add:

- Station busy lamp battery information
- 652-type jack in 6040- and 6041-type keys
- Information on knockout section in housing of 6050- and 6051-type keys
- D50BE cord
- B25G and B50C connector cables
- Reference to Table D
- Comcode ordering information.

1.03 The 6040-, 6041-, 6050-, and 6051-type keys connected to a single line telephone set provides for the key features of a multibutton telephone set and connects the single line station to any one of a number of lines.

### 2. IDENTIFICATION

#### A. Purpose

2.01 These keys are used in conjunction with a single line telephone set to furnish station control features in 1A, 1A1, 1A2, and 6A KTS (Fig. 4 and 5).

#### B. Ordering Guide

2.02 Refer to Tables A through D.

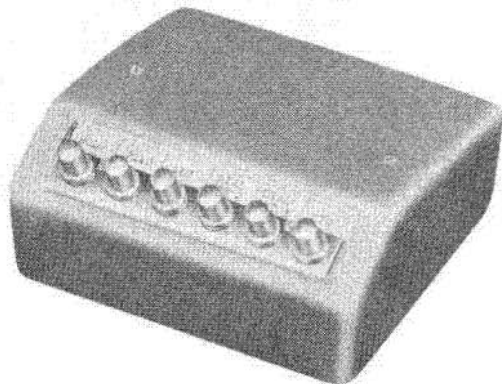


Fig. 1—6040-Type Key

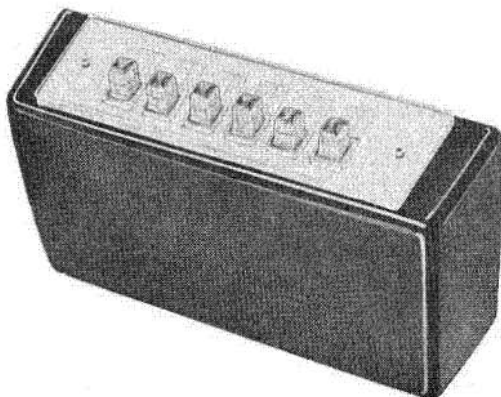


Fig. 2—6050-Type Key

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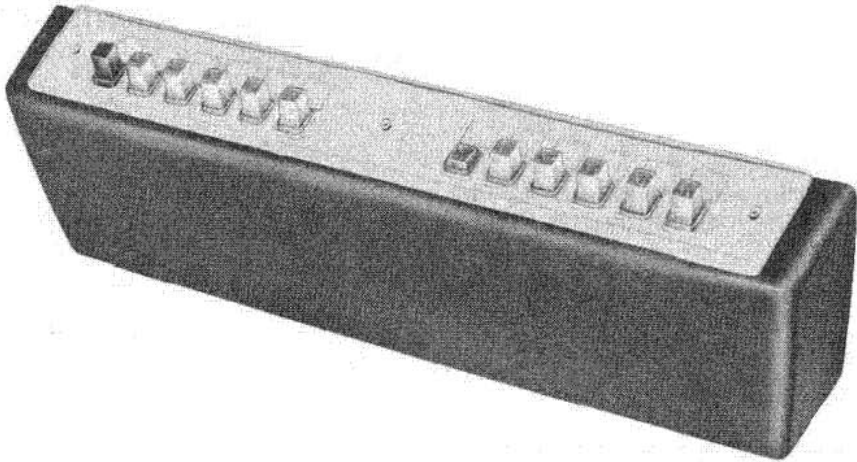


Fig. 3—6051-Type Key

### C. Design Features

- 2.03** Choice of location when installing:
- Top of desk or table using mounting cord
  - Fastened to side of desk, table, or wall using connector cable or inside wiring cable.
- 2.04** Key buttons are equipped to illuminate the individual buttons and their associated designation areas.
- 2.05** Pickup buttons convertible to signaling or intercom options (Table D).
- 2.06** ♦Currently available 6040- and 6041-type keys are equipped with a 652-type jack as shown in Fig. 9, 10, and 11. This jack accepts a modular mounting cord plug allowing modular telephone sets to be used with these keys.
- 2.07** The 6050- and 6051-type key housings are designed with a knockout section. This knockout will accommodate the 652-type jack of the D50BE cord (6050) and B25G or B50C cable connector (6051). Similar to the 6040- and 6041-type keys, the jack permits modular telephone sets to be used with 6050- and 6051-type keys.♦

### D. Operating Features

- 2.08** *Hold or Release Key:* Nonlocking, releases any locked pickup key. Does not release cutoff keys. Can be illuminated in 6050-type and 6040G, 6041G, 6040J, and 6041J keys.
- 2.09** *Pickup:* Locking, when depressed, releases any other pickup keys. Some pickup keys convertible to nonlocking for signaling options (Table D) by removal of screw detail. Will not release cutoff keys. Buttons are illuminated.
- 2.10** *Cutoff Key:* Turnbutton, locking in either position. Does not release other keys in 6040- or 6041-type keys. Can be modified to release locked keys in 6050- and 6051-type keys by removal of 811258193 (P-12E819) bushing. Button illuminated on 6050C and 6051C keys only.

### 3. INSTALLATION

- 3.01** Locate keys where accessible to user and where designation strip can be seen clearly.
- 3.02** Unless otherwise instructed, block unused buttons with 811218585 (P-12A858) blocking rings.



♦TABLE A♦

## SEPARATELY MOUNTED KEYS

KEY (NOTE 1)	MTG CORD OR CONN CABLE	KEY MOUNTING	KEY UNIT (NOTE 2)	CONNECTION DIAGRAM
6040A† 6041A†	D40A*		589H	—
6040B† 6041B†	D40A*		589J†	—
6040C† 6041C†	D37A*		589K†	—
6040D† 6041D†	D20G		589L	—
6041E			589M	—
6040G 6041G	D50N-87		636A	Fig. 9
6040H 6041H	D50S-87		636B	Fig. 10
6040J 6041J	D50T-87		589AJ	Fig. 11
6040K 6041K	D20H-87		589AN	—
6050A	D50P-87, D50BE-87 Cord or A25A Conn Cable	397A	599A	Fig. 12
6050B			598A	Fig. 13
6050C			599B	Fig. 14
6051A	A50A, B25C, B25G, B50B, or B50C Conn Cable	398A	598A - 599A	Fig. 17 & 18
6051B			598A - 599A	Fig. 17 & 18
6051C			598A - 599A	Fig. 17 & 20

\* For maintenance purposes, replace with D42A.

† MD.

Note 1. Add color suffix to key code. (Refer to Table B).

Note 2. 598 and 599 keys are electrically identical and respectively interchangeable with the 656 and 657 keys of the same letter code.

**3.03** When installing keys provide a means of identifying the key code for future installation or repair visits. Stencil or mark key code on base assembly or inside housing.

**A. 6040- and 6041-Type Keys**

**3.04** Use Form E-4227 designation cards for both 6040- and 6041-type keys.

**3.05 6040-Type Keys** are equipped with mounting cord for connection to key cable. Designed to be installed unattached on desk or table top.

**3.06** Install KS-8035 friction pads (order separately) to base of 6040-type keys when the key is installed on a desk or table top. The friction pads prevent the key from sliding or marring the surface.

TABLE B

## COVERS AND HOUSINGS FOR 6040-, 6041-, 6050-, AND 6051-TYPE KEYS

COLOR AND SUFFIX	COVERS FOR 6040A, B, C, D, G, H, J, AND K 6041A, B, C, D, G, H, J, AND K	COVERS FOR 6041E	HOUSINGS FOR 6050A, B, AND C	HOUSINGS FOR 6051A, B, AND C
Black (-03)	818156036 (P-81E603)	818189037 (P-81H903)	818110033 (P-81A003)	818154031 (P-81E403)
Ivory (-50)	818156507 (P-81E650)	818189508 (P-81H950)	818110504 (P-81A050)	818154502 (P-81E450)
Green (-51)	818156515 (P-81E651)	818189516 (P-81H951)	818110512 (P-81A051)	818154510 (P-81E451)
Red* (-53)	818156531 (P-81E653)	818189532 (P-81H953)	818110538 (P-81A053)	818154536 (P-81E453)
Yellow* (-56)	818156564 (P-81E656)	818189565 (P-81H956)	818110561 (P-81A056)	818154569 (P-81E456)
White (-58)	818156580 (P-81E658)	818189581 (P-81H958)	818110587 (P-81A058)	818154585 (P-81E458)
Lt. Beige (-60)	818156606 (P-81E660)	818189607 (P-81H960)	818110603 (P-81A060)	818154601 (P-81E460)
Aqua Blue* (-62)	818156622 (P-81E662)	818189623 (P-81H962)	818110629 (P-81A062)	818154627 (P-81E462)

\* Nonpromoted colors.

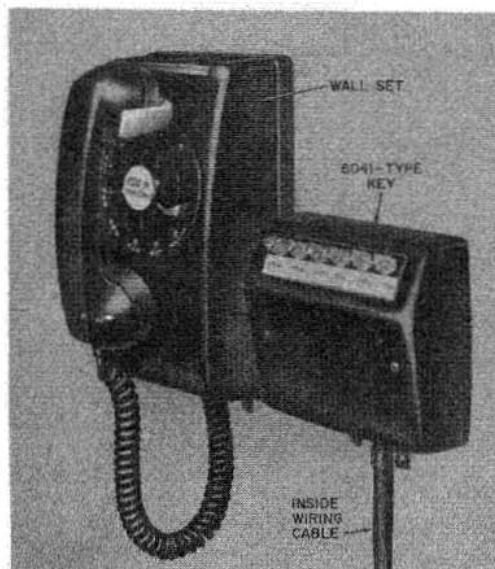


Fig. 4—Typical Installation of 6041-Type Key

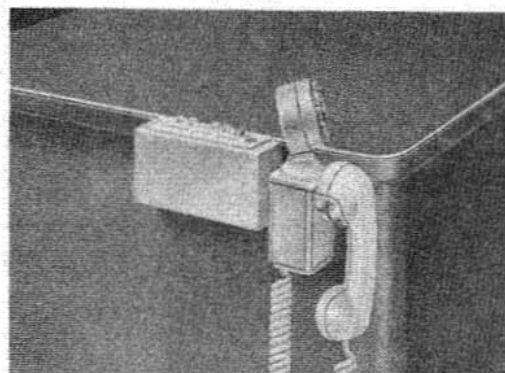


Fig. 5—Typical Installation of 6050-Type Key

3.07 **6041-Type Keys** may be mounted to wall or other vertical surface. The key cable is connected directly to the terminal board (Fig. 6).

**B. 6050- and 6051-Type Keys**

3.08 May be attached to a wall, desk or other vertical surface. Mounting may be on the

left or right side of desk or table by turning key unit 180 degrees within key mounting, as necessary.

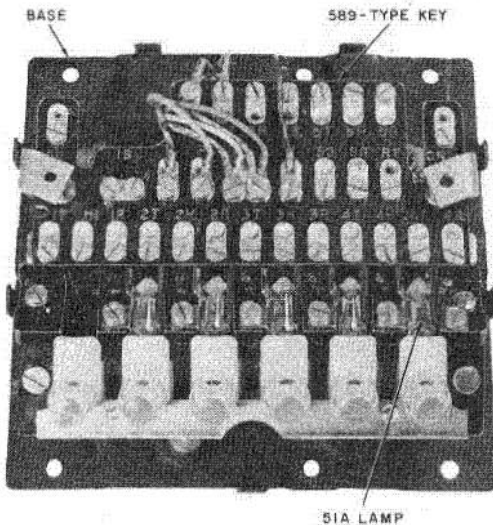


Fig. 6—6041-Type Key, Internal View

- 3.09 Key can be mounted so that cable enters from front, rear, top, or bottom (Fig. 7).
- 3.10 When necessary to assemble 6051-type key, remove latch bar tension spring from second 598A, 656A, 599A, or 657A key, as only one is required. A link assembly is required to connect the two latch bars together (Fig. 8).
- 3.11 An insulation shield (Fig. 8) should be installed on the 6050- and 6051-type keys.
- 3.12 Use Form E-4646 designation strips with 6050- and 6051-type keys.

#### 4. CONNECTIONS INDEX

##### A. Line Connections

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##### E. Station Busy Lamp Option

Fig. 15—6050A and 6050C Keys

Fig. 16—6050B Key

Fig. 21—6051A and 6051C Keys

Fig. 22—6051B Key

##### F. Connector Cable Connections

Fig. 23—B25C and B25G Connector Cable Connections to 6051A Key

Fig. 24—B50B and B50C Connector Cable Connections to 6051-Type Key

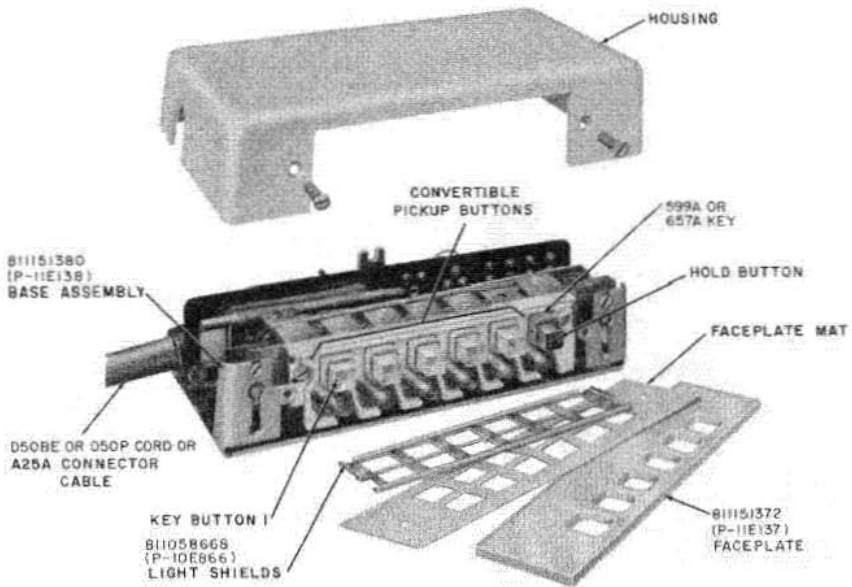


Fig. 7—6050A Key

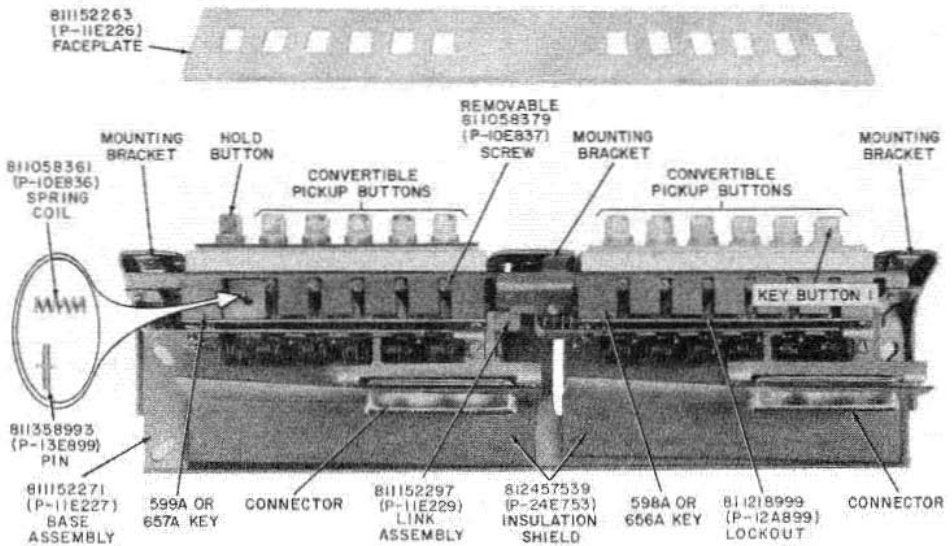
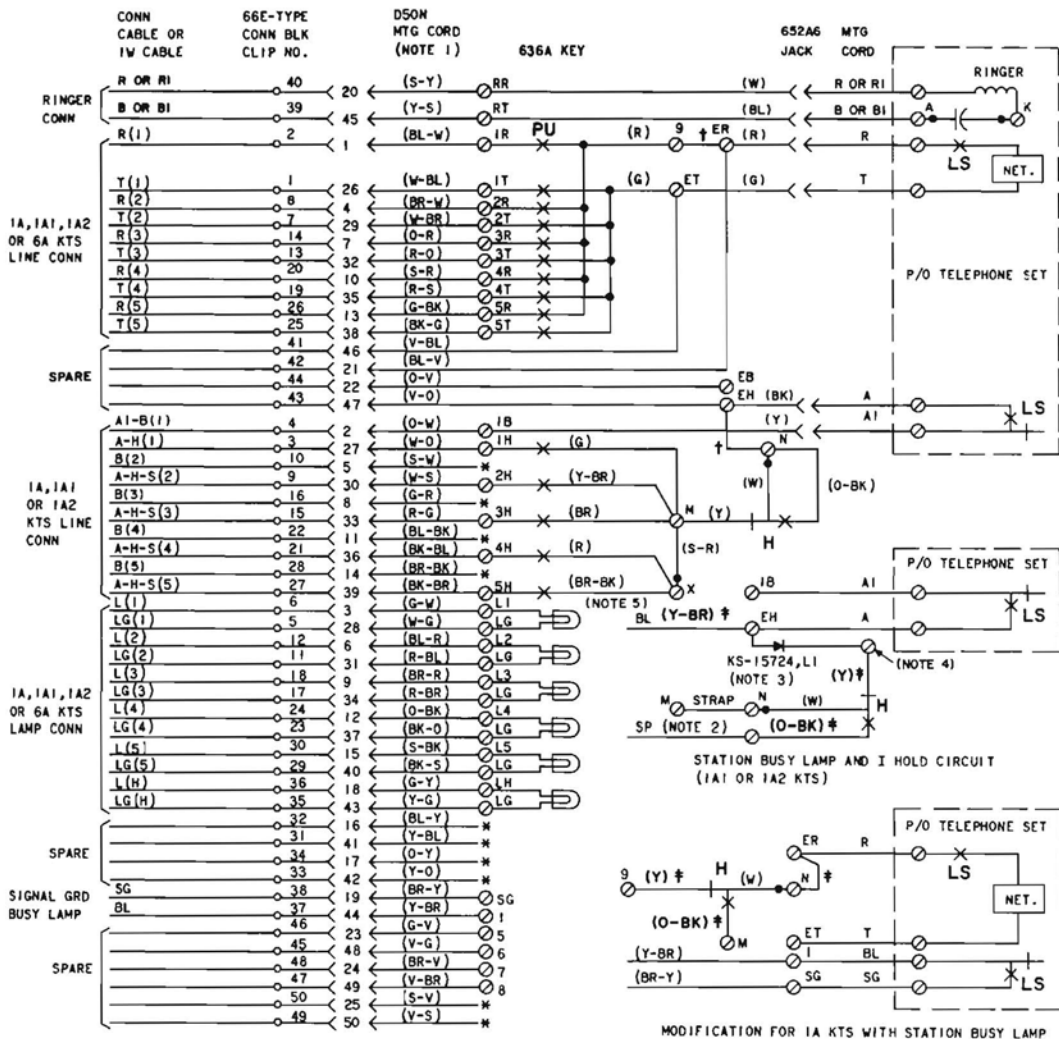


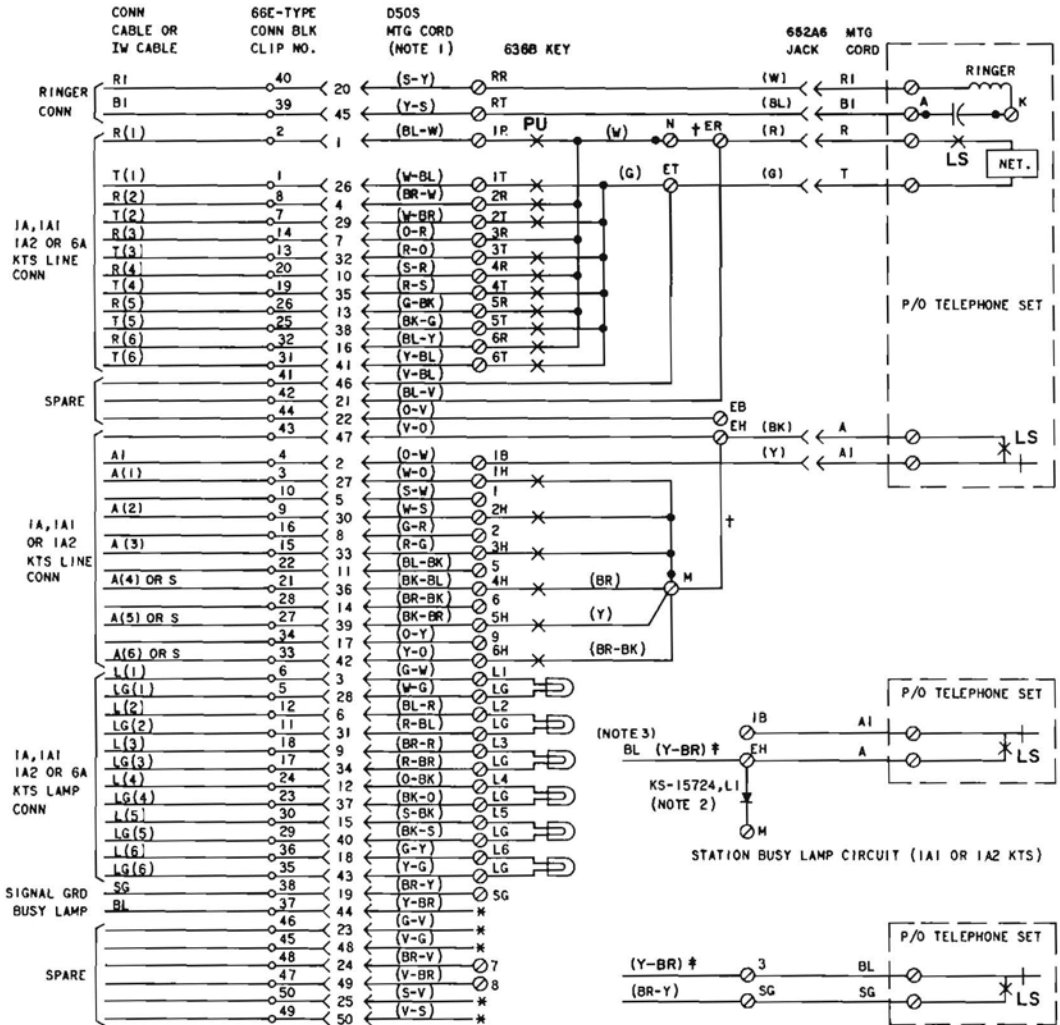
Fig. 8—6051A Key



- NOTES:
1. CONNECTIONS SHOWN FOR 6040G USING 66E-TYPE CONNECTING BLOCK. MOUNTING CORD MAY BE PLUGGED DIRECTLY INTO CONNECTOR CABLE. IF 6041G IS USED, TERMINATE 1W CABLE ON KEY TERMINAL BOARD. COLORS OF 1W CABLE, CONNECTOR CABLE AND MOUNTING CORD ARE THE SAME.
  2. USE SPARE TERMINAL AND CONDUCTOR FOR SP LEAD (I HOLD).
  3. ORDER AND INSTALL DIODE SEPARATELY.
  4. USE SPARE TERMINAL OR D-161488 CONNECTOR.
  5. USE "B" BATTERY SUPPLY FROM KTS IF AVAILABLE. DO NOT USE 10V AC LAMP BATTERY FOR BUSY LAMP.

- \* - INSULATED AND STORED
- † - ADD STRAP
- ‡ - LEADS INVOLVED IN MODIFICATION
- PU - PICKUP KEY
- H - HOLD KEY
- LS - LINE SWITCH

Fig. 9—6040G or 6041G Key, Connections



NOTES:

1. CONNECTIONS SHOWN FOR 6040H USING 66E-TYPE CONNECTING BLOCK. MOUNTING CORD MAY BE PLUGGED DIRECTLY INTO CONNECTOR CABLE. IF 6041H KEY IS USED, TERMINATE IW CABLE ON KEY TERMINAL BOARD. COLORS OF IW CABLE, CONNECTOR CABLE, AND MOUNTING CORD ARE THE SAME.
2. ORDER AND INSTALL SEPARATELY.
3. USE "B" BATTERY SUPPLY FROM KTS IF AVAILABLE. DO NOT USE 10V AC LAMP BATTERY FOR BUSY LAMP.

- \* - INSULATED AND STORED
- † - ADD STRAP
- ‡ - LEADS INVOLVED IN MODIFICATION
- PU - PICKUP KEY
- LS - LINE SWITCH

Fig. 10—6040H or 6041H Key, Connections

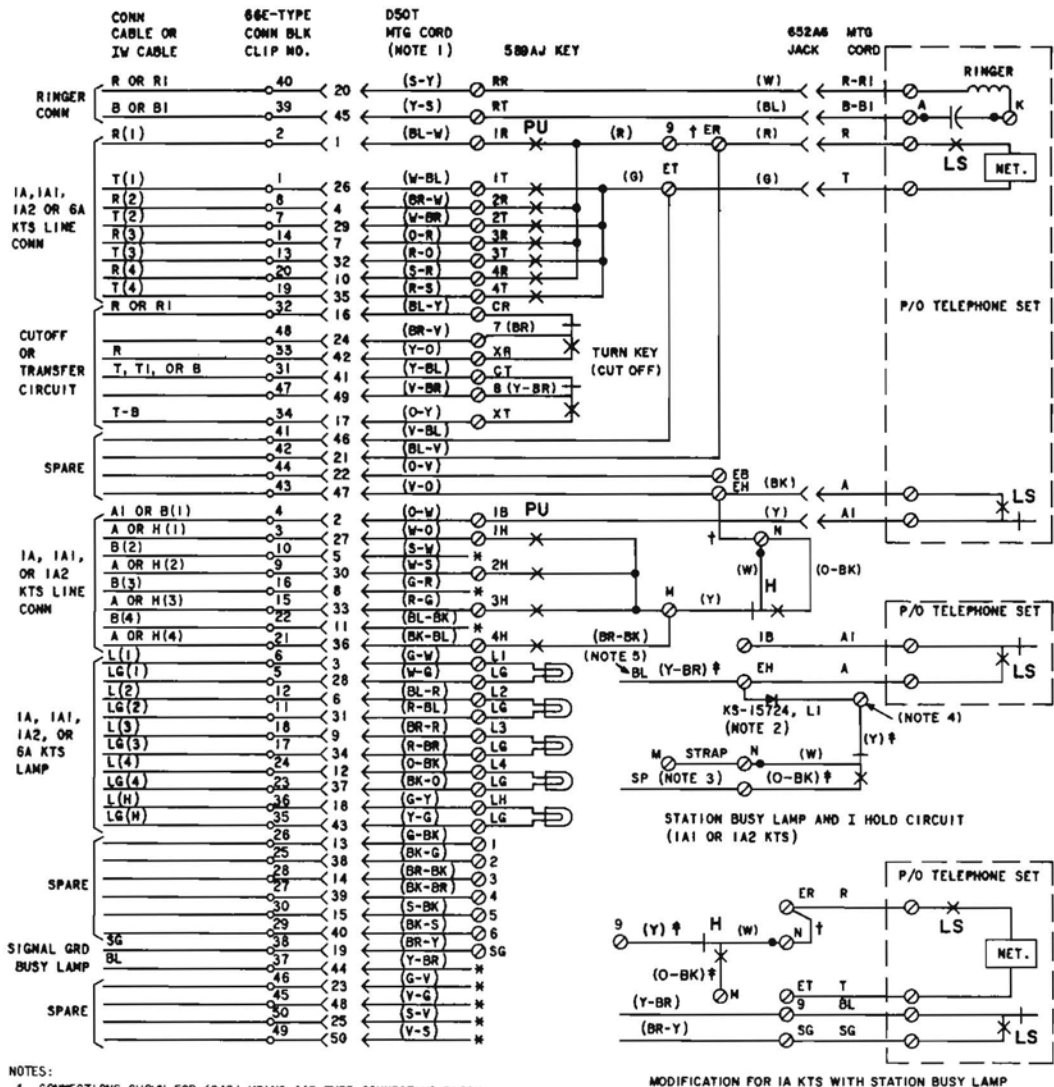


Fig. 11—6040J or 6041J Key, Connections

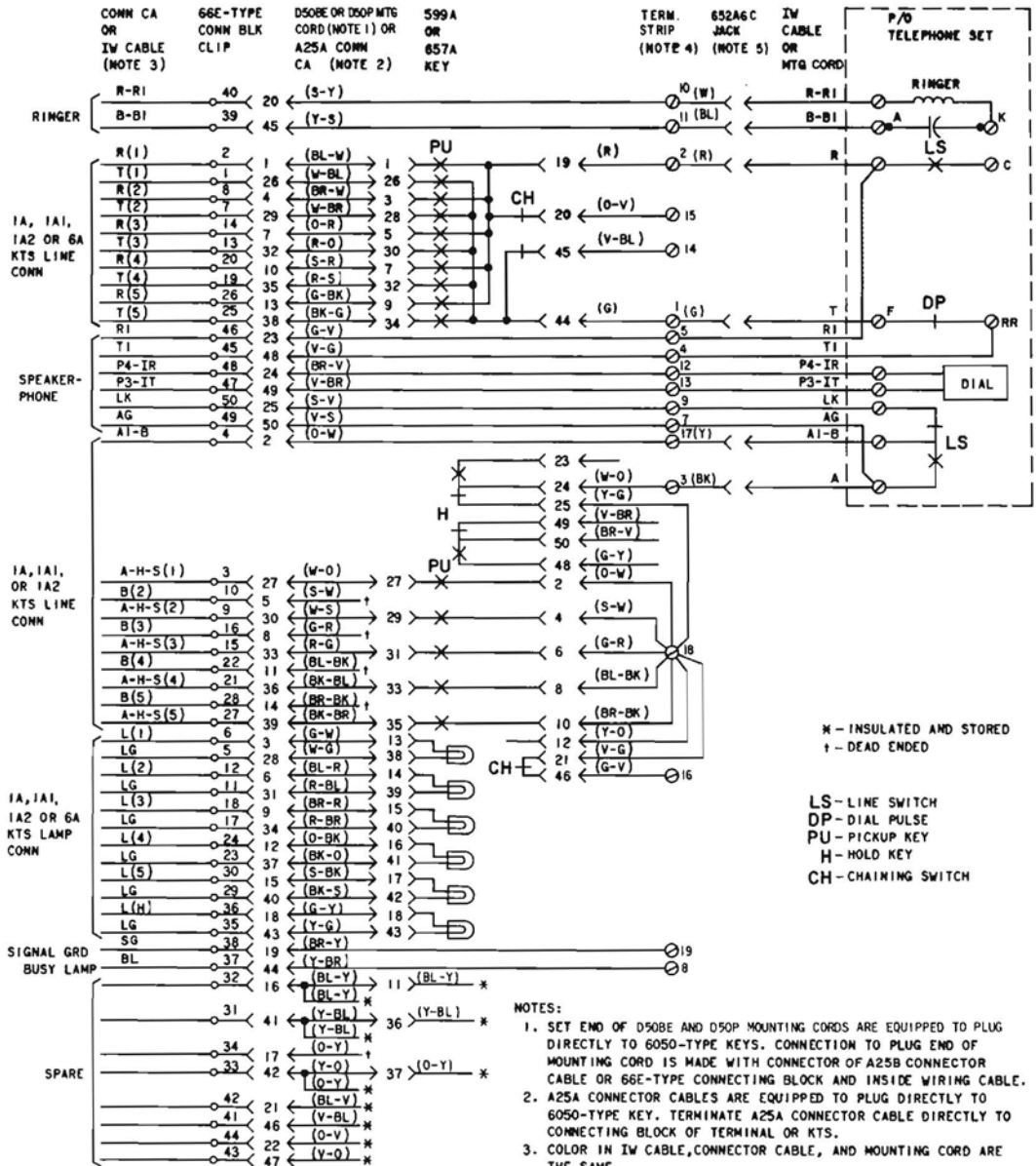


Fig. 12—6050A Key, Connections



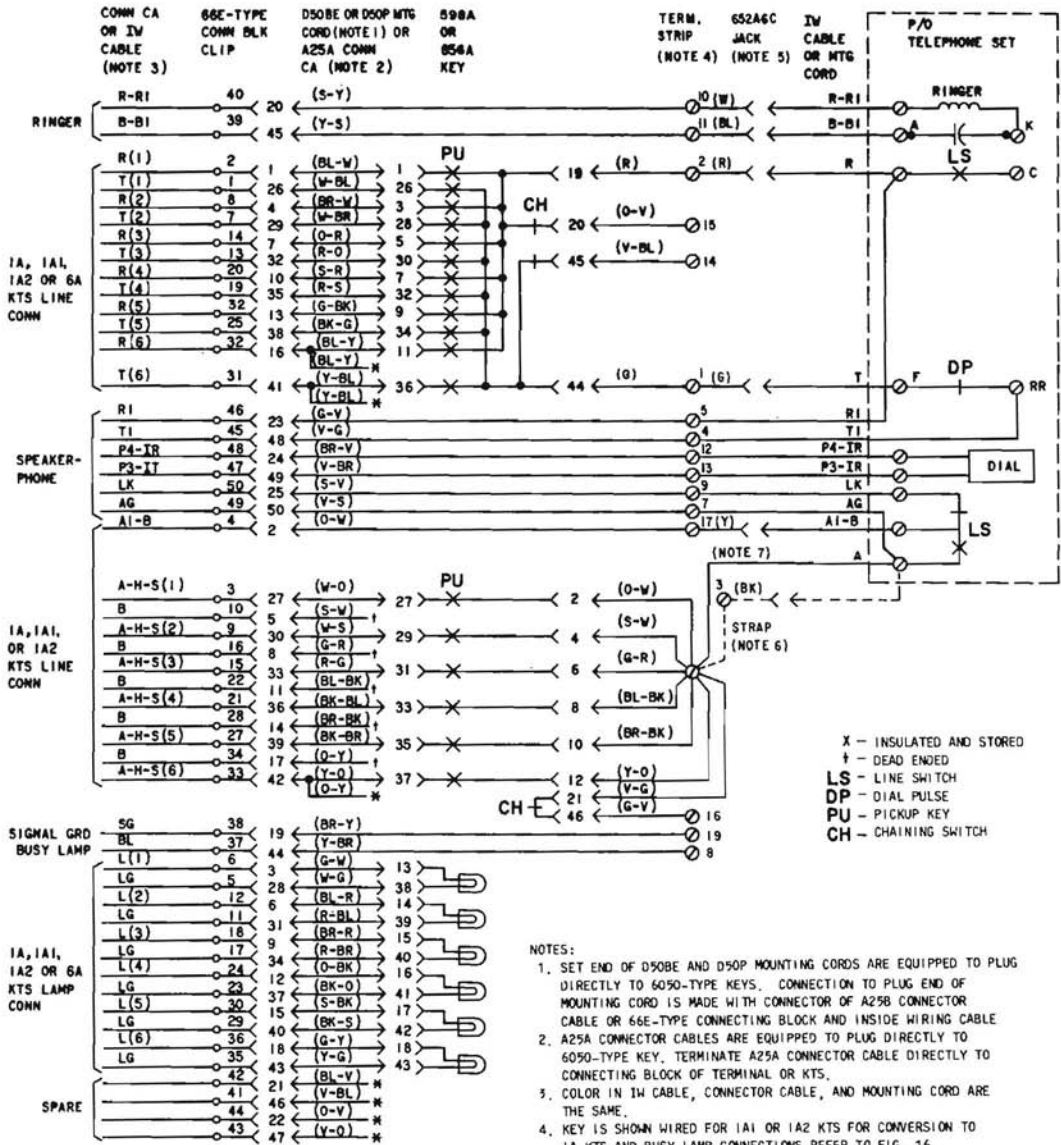
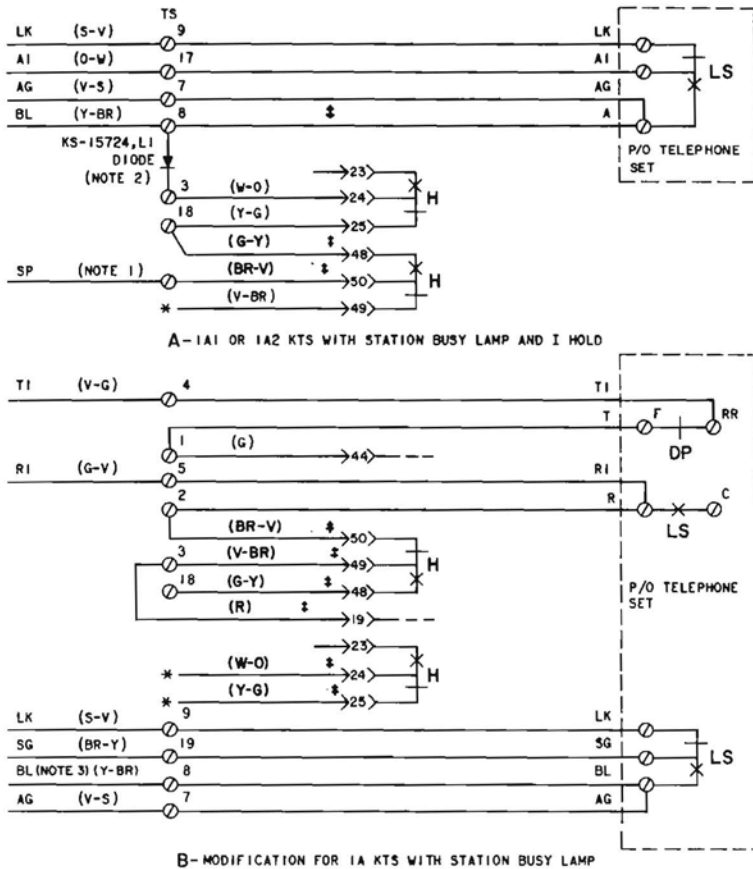


Fig. 13—6050B Key, Connections





## NOTES:

1. USE SPARE TERMINAL AND CONDUCTORS FOR SP LEAD (I HOLD)
2. ORDER AND INSTALL DIODE SEPARATELY
3. USE "B" BATTERY SUPPLY FROM KTS IF AVAILABLE. DO NOT USE 10V AC LAMP BATTERY FOR BUSY LAMP.

\* INSULATED AND STORED

† LEADS INVOLVED IN MODIFICATION

## LEGEND:

H - HOLD

DP - DIAL PULSE

LS - LINE SWITCH

Fig. 15—Station Busy Lamp, I Hold and 1A KTS Options—6050A and 6050C Keys

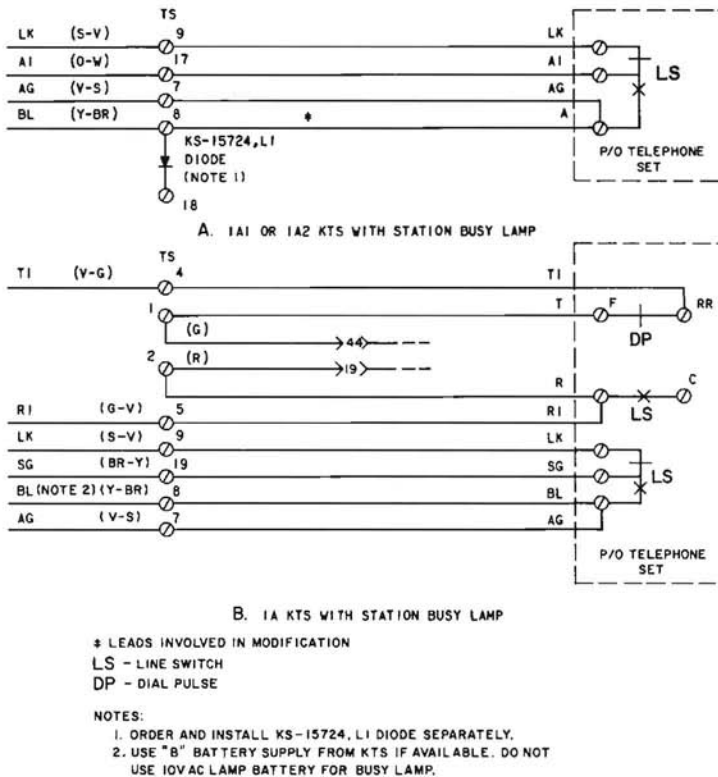


Fig. 16—Station Busy Lamp Option with 1A1, 1A2, or 1A KTS—6050B Key

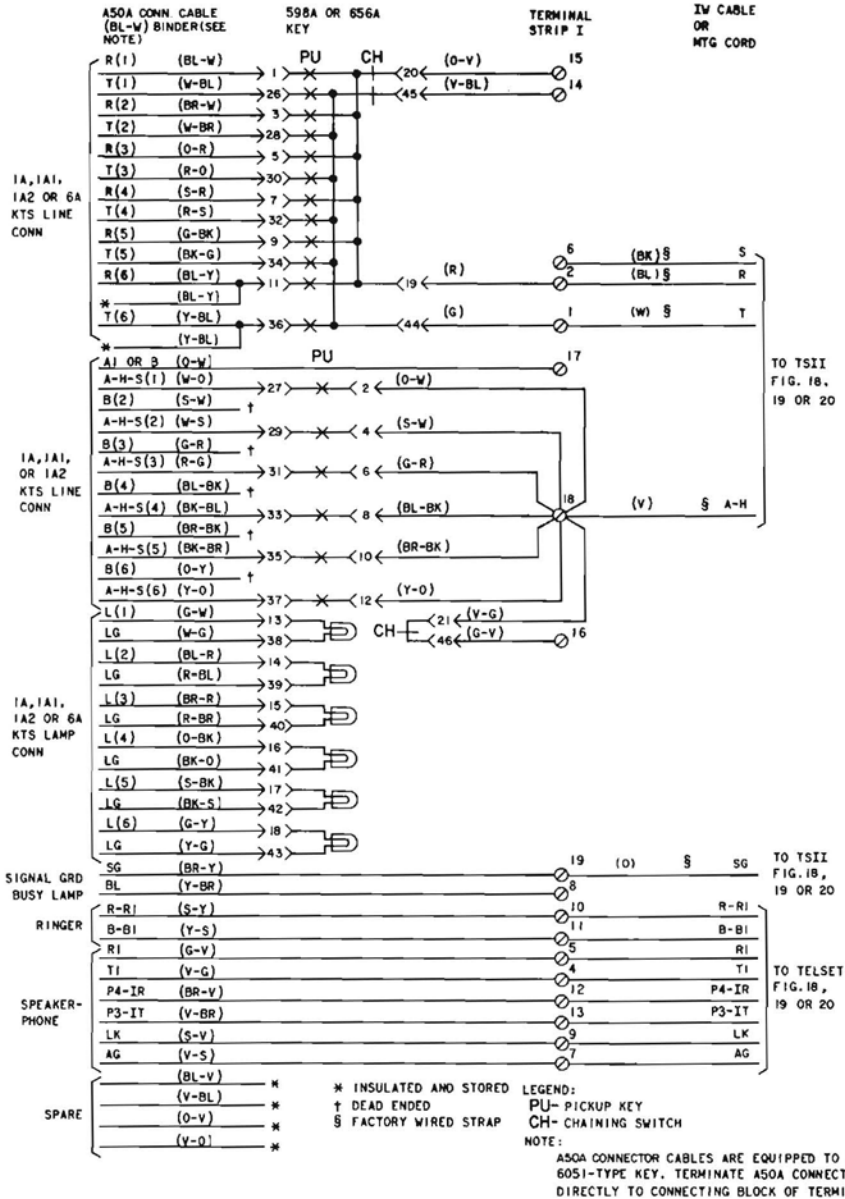


Fig. 17—6051A, 6051B, and 6051C Key Connections (First Key Module)

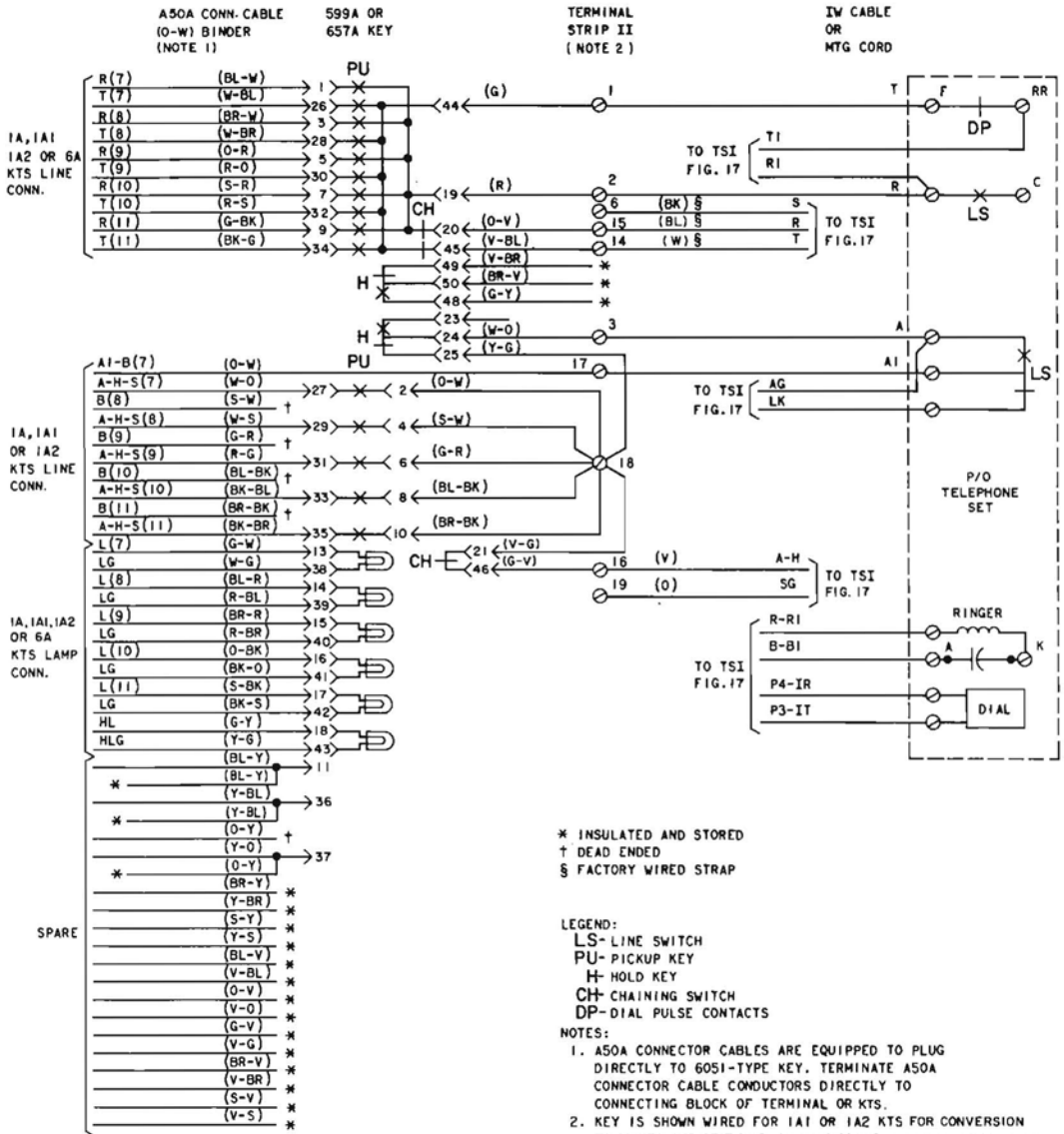


Fig. 18—6051A Key, Connections (Second Key Module)

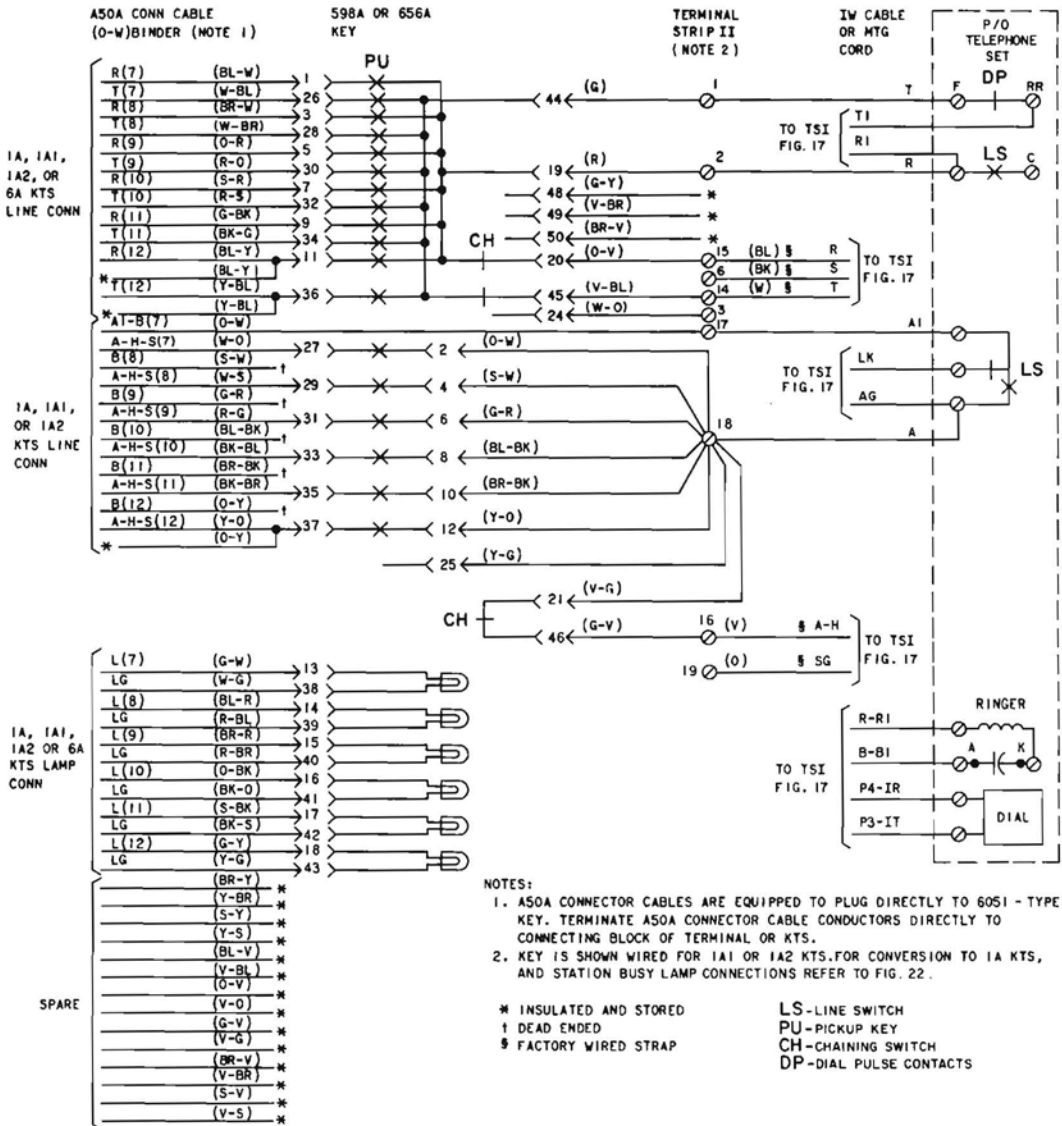


Fig. 19—6051B Key, Connections (Second Key Module)

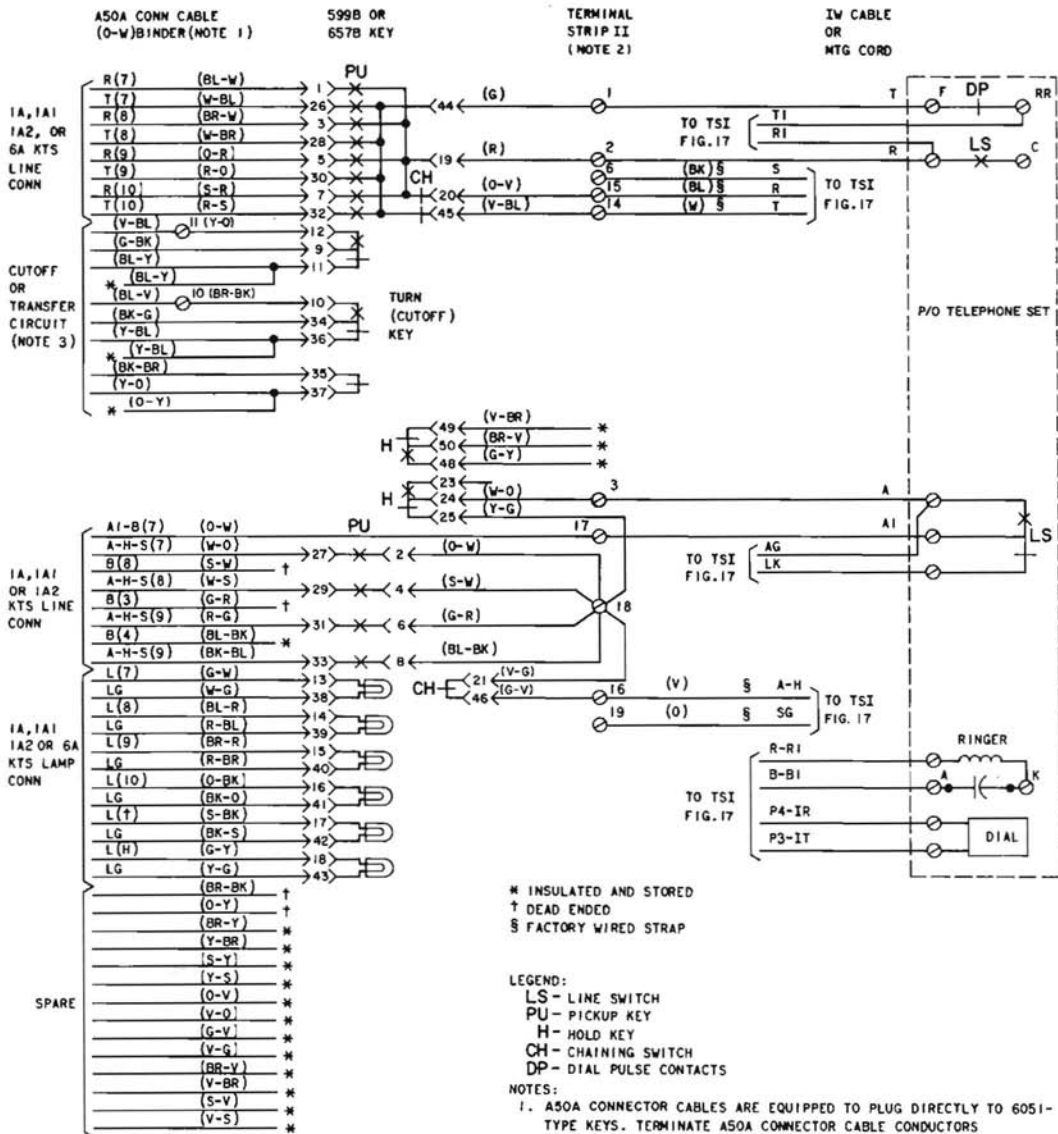
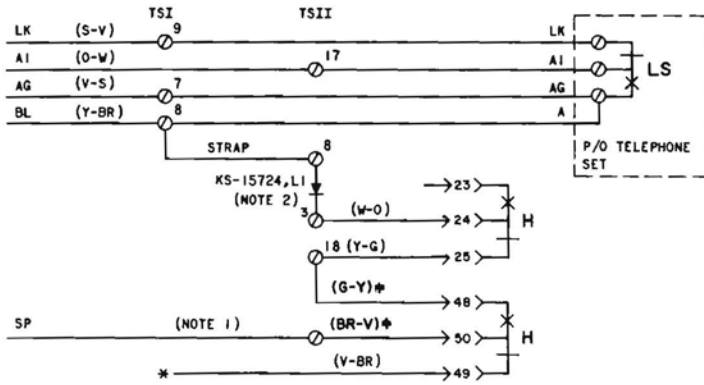
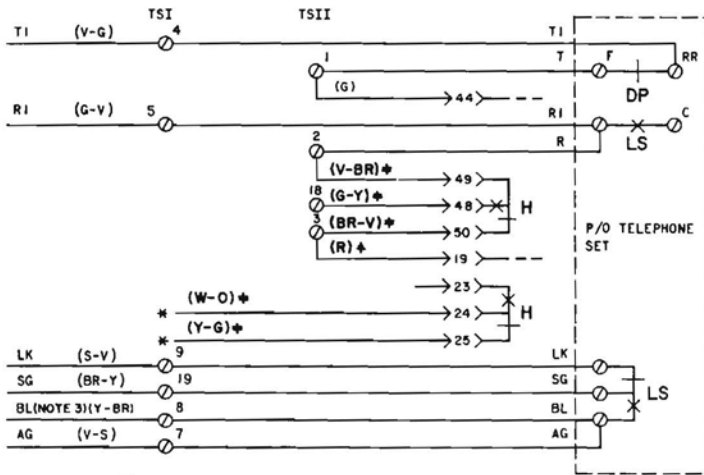


Fig. 20—6051C Key, Connections (Second Key Module)¶





A 1A1 OR 1A2 KTS WITH STATION BUSY LAMP AND I HOLD



B - MODIFICATION FOR 1A KTS WITH STATION BUSY LAMP

NOTES:

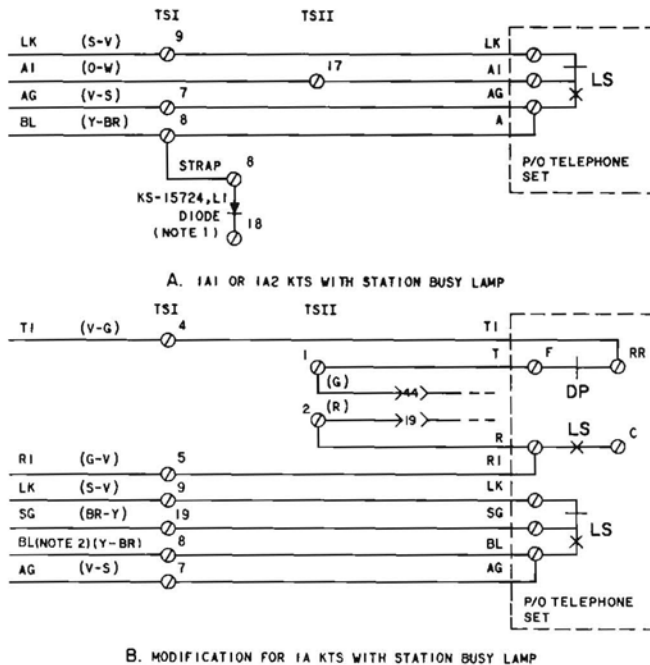
1. USE SPARE TERMINAL AND CONDUCTORS FOR SP LEAD (I HOLD)
2. ORDER AND INSTALL DIODE SEPARATELY
3. USE "B" BATTERY SUPPLY FROM KTS IF AVAILABLE. DO NOT USE 10V AC LAMP BATTERY FOR BUSY LAMP.

- \* INSULATED AND STORED
- ◆ LEADS INVOLVED IN MODIFICATION

LEGEND:

- H - HOLD
- LS - LINE SWITCH
- DP - DIAL PULSE

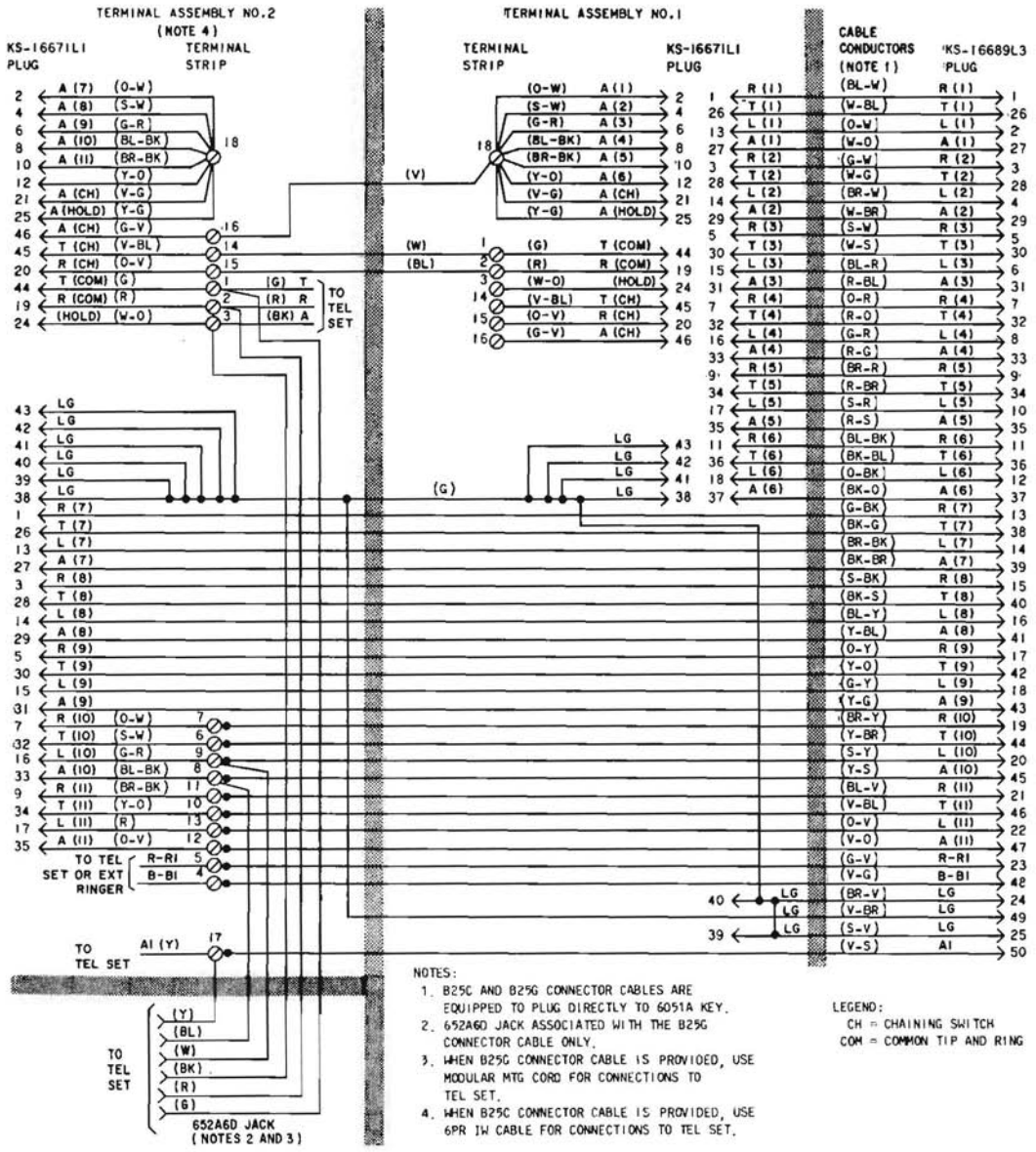
Fig. 21—◆Station Busy Lamp, I Hold and 1A KTS Options—6051A and 6051C Keys◆



- NOTES:
1. ORDER AND INSTALL DIODE SEPARATELY.
  2. USE "B" BATTERY SUPPLY FROM KTS IF AVAILABLE.  
DO NOT USE 10V AC LAMP BATTERY FOR BUSY LAMP.

LEGEND:  
 LS LINE SWITCH  
 DP DIAL PULSE

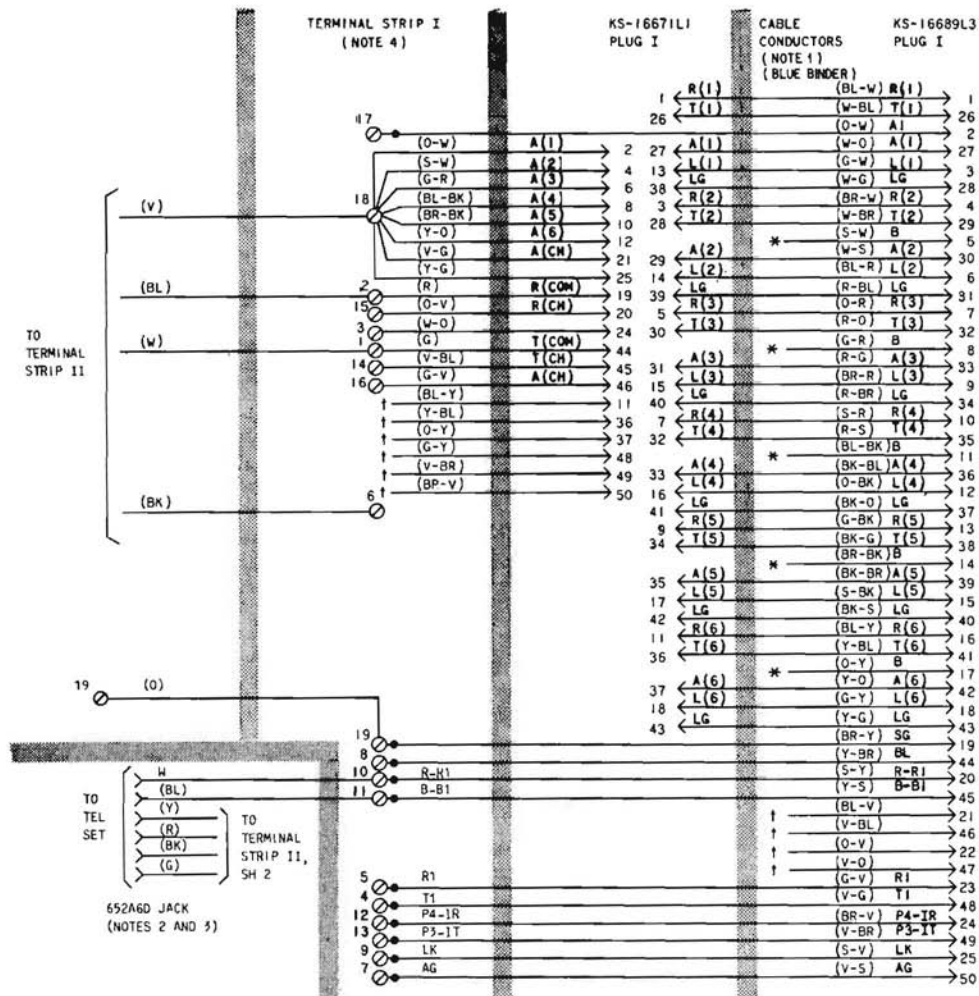
Fig. 22—Station Busy Lamp and 1A KTS Options—6051B Key



- NOTES:
1. B25C AND B25G CONNECTOR CABLES ARE EQUIPPED TO PLUG DIRECTLY TO 6051A KEY.
  2. 652A60 JACK ASSOCIATED WITH THE B25G CONNECTOR CABLE ONLY.
  3. WHEN B25C CONNECTOR CABLE IS PROVIDED, USE MODULAR MTG CORD FOR CONNECTIONS TO TEL SET.
  4. WHEN B25G CONNECTOR CABLE IS PROVIDED, USE 6PR 1W CABLE FOR CONNECTIONS TO TEL SET.

LEGEND:  
 CH = CHAINING SWITCH  
 COM = COMMON TIP AND RING

Fig. 23—B25C and B25G Connector Cable Connections to 6051A Key



NOTES:

1. B50B AND B50C CONNECTOR CABLES ARE EQUIPPED TO PLUG DIRECTLY TO 6051-TYPE KEYS.
2. 652A60 JACK ASSOCIATED WITH THE B50C CONNECTOR CABLE ONLY.
3. WHEN B50C CONNECTOR CABLE IS PROVIDED, USE MODULAR MTG CORD FOR CONNECTIONS TO TELEPHONE SET.
4. WHEN B50B CONNECTOR CABLE IS PROVIDED, USE 6 PR TW CABLE FOR CONNECTIONS TO TELEPHONE SET.

LEGEND:

- CH - CHAINING SWITCH
- COM - COMMON TIP AND RING
- \* - DEAD ENDED
- † - DEAD DRESSED

Fig. 24—B50B and B50C Connector Cable Connections to 6051-Type Key (Sheet 1 of 2)♦



♦TABLE C♦

## FACEPLATE MATS FOR 6050- AND 6051-TYPE KEYS

HOUSING COLOR	COORDINATED COLOR FACEPLATE MATS		FACEPLATE MATS			
	6050 KEY	6051 KEY	6050 KEY		6051 KEY	
			SILVER	GOLD	SILVER	GOLD
Black	818379703 (P-83G970)	818770703 (P-87G070)	818379786 (P-83G978)	818379794 (P-83G979)	818770786 (P-87G078)	818770794 (P-87G079)
Ivory	818379802 (P-83G980)	818770802 (P-87G080)				
Green	818379711 (P-83G971)	818770711 (P-87G071)				
Red	818379695 (P-83G969)	818770695 (P-87G069)				
Yellow	818379729 (P-83G972)	818770729 (P-87G072)				
White	818379737 (P-83G973)	818770737 (P-87G073)				
Lt. Beige	818379752 (P-83G975)	818770752 (P-87G075)				
Aqua Blue	818379760 (P-83G976)	818770760 (P-87G076)				

**TABLE D**  
**KEY FEATURES**

KEY	FEATURES*	PRINCIPAL USE
6040A, 6041A 6040B, 6041B 6040C, 6041C	H P P P <sub>s</sub> P <sub>s</sub> P <sub>s</sub> P P P P <sub>s</sub> P <sub>s</sub> P <sub>s</sub> H P P P P <sub>s</sub> C	1A, 1A1, 1A2, or 6A Key Telephone Systems
6040D, 6041D†	H P P P P L	755 PBX (see SD-66507-01)
6041E	R P <sub>s</sub> P <sub>s</sub> P <sub>s</sub> S <sub>P</sub> S <sub>P</sub>	No. 15 Automatic Call Distribution System
6040G, 6041G 6040H, 6041H 6040J, 6041J	H P P P <sub>s</sub> P <sub>s</sub> P <sub>s</sub> P P P P <sub>s</sub> P <sub>s</sub> P <sub>s</sub> H P P P P <sub>s</sub> C	1A, 1A1, 1A2, or 6A Key Telephone Systems
6040K, 6041K†	H P P P P L	755 PBX (see SD-66507-01)
6050A 6050B 6050C 6051A 6051B 6051C	H P <sub>s</sub> P <sub>s</sub> P <sub>s</sub> P <sub>s</sub> P <sub>s</sub> P <sub>s</sub> P <sub>s</sub> P <sub>s</sub> P <sub>s</sub> P <sub>s</sub> P <sub>s</sub> H P <sub>s</sub> P <sub>s</sub> P <sub>s</sub> P <sub>s</sub> C H P <sub>s</sub> P <sub>s</sub> P <sub>s</sub> P <sub>s</sub> P <sub>s</sub>   P <sub>s</sub> P <sub>s</sub> P <sub>s</sub> P <sub>s</sub> P <sub>s</sub> P <sub>s</sub> P <sub>s</sub> P <sub>s</sub> P <sub>s</sub> P <sub>s</sub> P <sub>s</sub> P <sub>s</sub>   P <sub>s</sub> P <sub>s</sub> P <sub>s</sub> P <sub>s</sub> P <sub>s</sub> P <sub>s</sub> H P <sub>s</sub> P <sub>s</sub> P <sub>s</sub> P <sub>s</sub> C   P <sub>s</sub> P <sub>s</sub> P <sub>s</sub> P <sub>s</sub> P <sub>s</sub> P <sub>s</sub>	1A, 1A1, 1A2, or 6A Key Telephone Systems

\*H-Hold, P-Pickup, S-Signal, C-Cutoff, L-Local, P<sub>s</sub> or S<sub>P</sub>-Convertible Pickup or Signal, R-Release.

† Refer to Section 502-541-419 for additional information.

TABLE E

LINE CONNECTIONS TO 6040A, 6040B, 6040C, KEYS WITH D40A (MD) AND  
D37A (MD) CORDS AND 6041A, 6041B, 6041C KEYS CABLE CONNECTED

CABLE COLOR	D40A MTG CORD			6040A-6041A† KEYS		6040B-6041B† KEYS		D37A MTG CORD			6040C-6041C† KEY	
	44A CONN BLK		CORD COLOR	LEAD DESIG	KEY TERM.	LEAD DESIG	KEY TERM.	44A CONN BLK		CORD COLOR	LEAD DESIG	KEY TERM.
	NO.	TERM.						NO.	TERM.			
W-BL BL-W	2 1	G R	T R	1T 1R	T R	1T 1R	1 1	2 1	G R	T R	1T 1R	
W-O O-W	5 4	BK Y	A or H A1 or B	1H 1B	A A1	1H 1B	1 1	5 4	BK Y	A or H A1 or B	1H 1B	
W-G G-W	7 6	S-BK S-Y	LG L1	LG L1	LG L	LG L1	1 1	7 6	S-BK S-Y	LG L	LG L1	
W-BR BR-W	10 9	W BL	T R	2T 2R	T R	2T 2R	1 1	10 9	W BL	T R	2T 2R	
W-S S-W	8 3	BR-G BR-R	A or H B	2H *	A L(6)	2H 6	1 1	8 3	BR-G BR-R	A or H B	2H *	
R-BL BL-R	2 1	S-BL	LG L2	2	LG L	2	1 1	2 1	S-BL	LG L	2	
R-O O-R	5 4	BR-BK BR-Y	T R	3T 3R	T R	3T 3R	1 1	5 4	BR-BK BR-Y	T R	3T 3R	
R-G G-R	7 6	BR-W BR-BL	A-H-S B	3H *	A G	3H SG	1 1	7 6	BR-W BR-BL	A or H B	3H *	
R-BR BR-R	10 9	S-W	LG L3	3	LG L	3	1 1	10 9	S-W	LG L	3	
R-S S-R	8 3	R-Y R-G	T R	4T 4R	T R	4T 4R	1 1	8 3	R-Y R-G	T R	4T 4R	
BK-BL BL-BK	2 1	R-BL R-BK	A-H-S B	4H *	A A(6)	4H 6H	1 1	2 1	R-BL R-BK	A-H-S B	4H *	
BK-O O-BK	5 4	S-BR	LG L4	4	LG L	4	1 1	5 4	S-BR	LG L	4	
BK-G G-BK	7 6	G-Y R-W	T R	5T 5R	T R	5T 5R	1 1	7 6	S-G S-R	T1-B R1	CT CR	
BK-BR BR-BK	10 9	G-BL G-BK	A-H-S B	5H *	A	5H	1 1	PLACE STRAP	Y-BK		* *	
BK-S S-BK	8 3	BR	LG L5	5	LG L	5	1 1				* *	
Y-BL BL-Y		PLACE STRAP					1 1		O-W O		* *	
Y-O O-Y												
Y-G G-Y												
Y-BR BR-Y	2 1	Y-BK G-W	G	SG	T(6) R(6)	6T 6R	1 1	10 9	G-W	G	† SG	
Y-S S-Y	5 4	Y-W Y-BL	B1 R1	RT RR	B R	RT RR	1 1	8 3	Y-W Y-BL	B1 R1	RT RR	
V-BL BL-V	7 6	BK-W BK-BL		ET ER		ET ER	1 1	2 1	BK-W BK-BL		ET ER	
V-O O-V	10 9	S BL-W		EH EB		EH EB	1 1	5 4	S BL-W		EH EB	
V-G G-V							1 1	7 6	O-G O-R	T-B R	XT XR	
V-BR BR-V	8 3	O-BL O-BK		ON ON1		ON *	1 1	10 9	O-BL O-BK		ON ON1	
V-S S-V							1 1	8 3			* *	

\*Insulate and store.

†6041-type keys not provided with mounting cords, terminate cable conductors directly to key terminals.



TABLE F

LINE CONNECTIONS TO 6040A, 6040B, 6040C, KEYS WITH D42A CORD  
AND 6041A, 6041B, 6041C KEYS CABLE CONNECTED

CABLE AND MTG CORD (NOTE)		66E3 OR 66E4 CONN BLK TERMINAL		6040A-6041A† KEYS		6040B-6041B† KEYS		6040C-6041C† KEYS	
PIN NO.	CONDUCTOR COLOR			LEAD DESIG	KEY TERM.	LEAD DESIG	KEY TERM.	LEAD DESIG	KEY TERM.
26	W-BL BL-W	1	2	T R	1T 1R	T R	1T 1R	T R	1T 1R
27	W-O O-W	3	4	A or H A1 or B	1H 1B	A A1	1H 1B	A or H A1 or B	1H 1B
28	W-G G-W	5	6	LG L	LG 1	LG L	LG 1	LG L	LG 1
29	W-BR BR-W	7	8	T R	2T 2R	T R	2T 2R	T R	2T 2R
30	W-S S-W	9	10	A or H B	2H *	A B	2H *	A or H B	2H *
31	R-BL BL-R	11	12	LG L	2	LG L	2	LG L	2
32	R-O O-R	13	14	T R	3T 3R	T R	3T 3R	T R	3T 3R
33	R-G G-R	15	16	A or H B	3H *	A B	3H *	A or H B	3H *
34	R-BR BR-R	17	18	LG L	3	LG L	3	LG L	3
35	R-S S-R	19	20	T R	4T 4R	T R	4T 4R	T R	4T 4R
36	BK-BL BL-BK	21	22	A or H B	4H *	A B	4H *	A-H-S B	4H *
37	BK-O O-BK	23	24	LG L	4	LG L	4	LG L	4
38	BK-G G-BK	25	26	T R	5T 5R	T R	5T 5R	T-T1-B R-R1	CT CR
39	BK-BR BR-BK	27	28	A or H B	5H *	A	5H		* *
40	BK-S S-BK	29	30	LG L	5	LG L	5		*
41	Y-BL BL-Y	31	32	*	*	T R	6T 6R		* *
42	Y-O O-Y	33	34						
43	Y-G G-Y	35	36						
44	Y-BR BR-Y	37	38	SIG GRD	* SG	L SG	6 SG	SIG GRD	SG
45	Y-S S-Y	39	40	B R	RT RR	B R	RT RR	B R	RT RR
46	V-BL BL-V	41	42		ET ER		ET ER		ET ER
47	V-O O-V	43	44		EH EB		EH EB		EH EB
48	V-G G-V	45	46		* *	A	6H		XT XR
49	V-BR BR-V	47	48		ON ON1		ON		ON ON1
50	V-S S-V	49	50		* *		* *		* *

\*Insulate and store.

†6041-type keys not provided with mounting cords, terminate cable conductors directly to key terminals.

Note: Pins 28, 31, 34, 37, 40, and 43 in the plug of D42A cord are strapped together.

TABLE G

## PICKUP-SIGNAL KEY OPTIONS

6040A, 6041A, 6040G, AND 6041G KEYS

CONVERSION OPTIONS	636A KEY LEADS			
	Y-BR	BR	S-R	BR-BK
HPPPPP (Note)	M	M	M	X
HPPPPS	M	M	M	SG
HPPSSS	M	M	SG	X
HPPSSS	M	X	SG	X
HPPPP*S*	M	M	5H	EH†
HPPP*P*S*	M	X	5H	EH†
HPP*P*P*S*	X	X	5H	EH†

TABLE H

## PICKUP-SIGNAL KEY OPTIONS

6040B, 6041B, 6040H, AND 6041H KEYS

CONVERSION OPTIONS	636B KEY LEADS		
	BR	Y	BR-BK
PPPPPP (Note)	M	M	M
PPPPPS	M	M	SG
PPPPSS	M	SG	SG
PPSSSS	SG	SG	SG
PPPPP*S*	M	6H	EH†
PPPP*P*S*	6H	6H	EH†

\*These arrangements use line switch controlled ground for common signal key used with private or intercommunicating lines. Common signal should be used to operate a common signal relay. Do not wire directly to a buzzer.

†Use A1 control lead for 1A1 or 1A2 KTS and SG lead for 1A KTS.

TABLE I

## PICKUP-SIGNAL KEY OPTIONS

6040C, 6041C, 6040J, AND 6041J KEYS

CONVERSION OPTIONS	589AJ KEY LEADS	
	(G)	[S-BR] OR (BR-BK)
HPPPPC (Note)	M	M
HPPPSC	M	SG

**Note:** To convert from pickup (locking) to signaling (nonlocking) remove the 811218925 (P-12A892) screw detail at the key position being converted.

( ) Current Color

[ ] MD Color

**TABLE J**  
**CUTOFF KEY OPTIONS—6040C, 6041C, 6040J, AND 6041J KEYS**

CUTOFF	COM OR PVT LINE RINGER CIRCUIT		EXT STA OR EXT RINGER		LOCAL RINGER		CUTOFF KEY LEADS	
	R	B	R OR R1	T, T1, OR B	R	B	R-W OR BR	G-W OR Y-BR
Of local COM or PVT line ringer and transfer of local ringer	RR	RT	CR	CT	XR	XT	RR	RT
Of local line ringer and transfer of EXT STA or EXT ringer			XR	XT	CR	CT	R*	T*
EXT STA or EXT line ringer			CR	CT			R*	T*

\*Terminals of line involved.

**TABLE K**  
**PICKUP SIGNAL CONVERSION—6050- AND 6051-TYPE KEYS**

KEY	CONVERSION OPTIONS (NOTE)	KEY LEADS					
		(O-W) [BK]	(S-W) [BR-G]	(G-R) [BR-W]	(BL-BK) [R-BL]	(BR-BK) [G-BL]	(Y-O) [S-BR]
599A	HPPPPP	18	18	18	18	18	*
	HPSSSS	18	19	19	19	19	*
598A	PPPPPP	18	18	18	18	18	18
	SSSSSS	19	19	19	19	19	19
599B	HPPPPC	18	18	18	18	*	*
	HPSSSC	18	19	19	19	*	*

**Note:** A pickup key (locking) may be converted to signaling (nonlocking) by removing the screw detail (Fig. 8) from the plunger at the key position to be converted. The keys and their associated cords are readily adaptable for individual signaling but not for common signaling.

\*Not a pickup key

( ) Current color

[ ] MD color



## 549- AND 551-TYPE PUSHBUTTON KEYS IDENTIFICATION, INSTALLATION, MAINTENANCE, AND CONNECTIONS

### 1. GENERAL

1.01 This section contains information on the 549- and 551-type keys. The 549A1-, B1-, C1-, and D1-type keys replace the 549A-, B-, C-, and D-type keys, respectively, which are rated MD. They are similar to the 549A-, B-, C-, and D-type keys except they are plastic instead of metal and are provided with a snap-in designation window.

1.02 This section is reissued to:

- Show 549A-, B-, C-, and D-type keys MD
- Add comcode information, Table A
- Add Fig. 4

### 2. IDENTIFICATION

#### 2.01 Purpose:

- (a) Selective signaling to as many as eight locations.

(b) For low voltage use.

#### 2.02 Ordering Guide:

- (a) Refer to Tables A and B.

#### 2.03 Design Features:

- (a) 549A-, B-, C-, and D-type (MD) keys (Fig. 1 and 2):
- Four or eight round nonlocking pushbutton keys
  - Metal housing with stay hook depression or provision to anchor wing band
  - Provided with an escutcheon plate, face strip, and designation card
  - Pads of cork and rubber to protect furniture and prevent slipping

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- Screw holes under escutcheon plate for mounting.

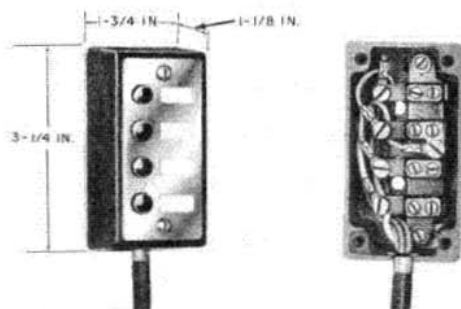


Fig. 1— $\Phi$ 549A (MD) or 549B (MD) Key (4 Pushbuttons)  $\Phi$

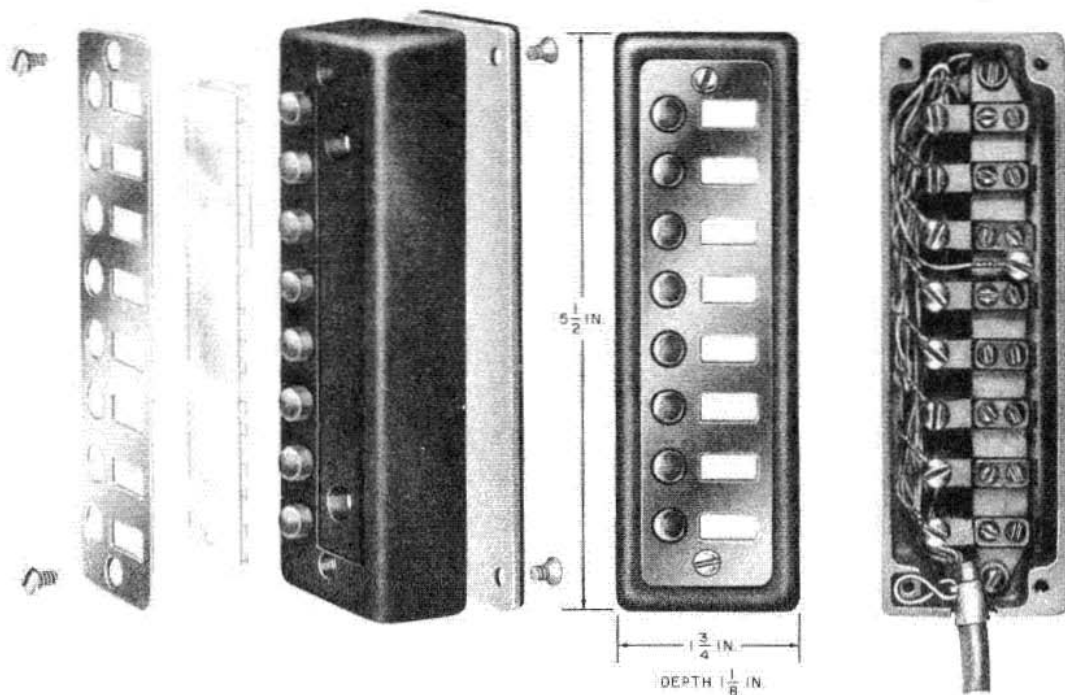


Fig. 2— $\Phi$ 549C (MD) or 549D (MD) Key (8 Pushbuttons)  $\Phi$

◆ TABLE A ◆

ORDERING GUIDE AND  
PIECE PART INFORMATION  
(549A1, B1, C1, AND D1 KEYS)

KEY CODE*	NO. OF PUSHBUTTONS	CORD	WINDOW	DESIG. CARD NO.	COLOR AVAILABILITY
549A1	4	M5M-87	841025570	841027972	Black (-03) Ivory (-50) Green (-51) Red (-53) Yellow (-56) White (-58) Lt. Beige (-60) Aqua Blue (-62)
549B1		See Note			
549C1	8	D10R-87	841025562	841027931	
549D1		See Note			

\* When ordering, add suffix for desired color.

*Note:* Cords are not provided with 549B1 and D1 keys and must be ordered separately. Order M5M-87 (5 feet 6 inches long), for the 549B1 key or the D10R-87 (available in 5 feet 6 inches, 7 feet, 14 feet, and 25 feet) for the 549D1 key. Specify the desired length in ordering information.

◆ TABLE B ◆

PIECE PARTS INFORMATION  
(549A, B, C, D, AND 551A KEYS)

KEY CODE	NO. OF PUSHBUTTONS	CORD	FACE STRIP	DESIG. CARD NO.	COLOR AVAILABILITY
549A (MD)	4	M5M-87	802398461	804586527 (P-458652)	Black (-03) Ivory (-50) Green (-51) Red (-53) Yellow (-56) White (-58) Lt. Beige (-60) Aqua Blue (-62)
549B (MD)		See Note	(P-239846)		
549C (MD)	8	D10R-87	804723997	E-2804†	
549D (MD)		See Note	(P-472399)		
551A*	1		804709343 (P-470934)		

\* When ordering, add suffix for desired color.

† Trim Form E-2804 to same size as face strip and use for designation strip.

*Note:* Cords are not provided with 549B (MD) and D (MD) keys and must be ordered separately. Order M5M-87 (5 feet 6 inches long) for the 549B (MD) key or the D10R-87 (available in 5 feet 6 inches, 7 feet, 14 feet, and 25 feet) for the 549D (MD) key. Specify the desired length in ordering information.

(b) #549A1-, B1-, C1-, and D1-type keys (Fig. 3 and 4):

- Four or eight square nonlocking pushbutton keys
- Plastic housing with cord depression to anchor cord wing band or pin to anchor cord S hook assembly
- Provided with window and snap-in designation strip (Fig. 5)
- Cork pad to protect furniture and prevent slipping
- Screw holes under window for mounting to wall, desk, etc. Early model keys were furnished with two screws (Fig. 3 and 4) for mounting key to 75A or 76A bracket, (ordered separately). Current model keys, the mounting screws (4) are furnished with the mounting brackets.♦

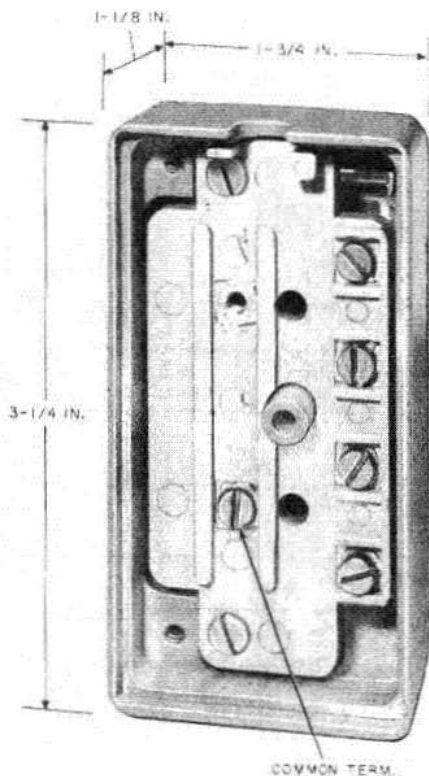
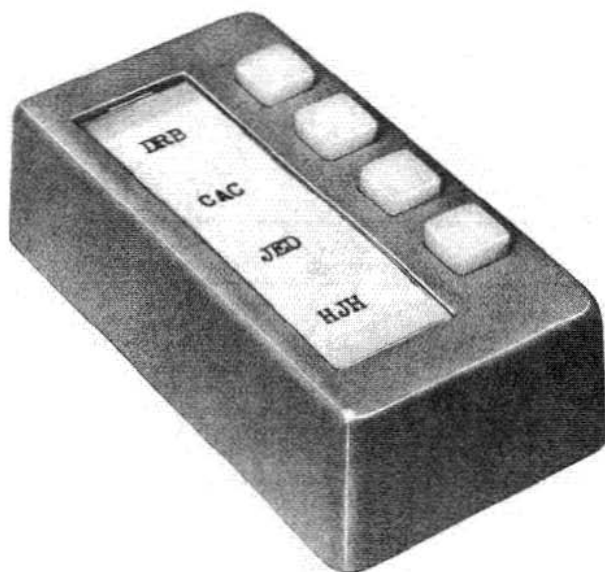


Fig. 3—549B1 Key (4 Pushbuttons)



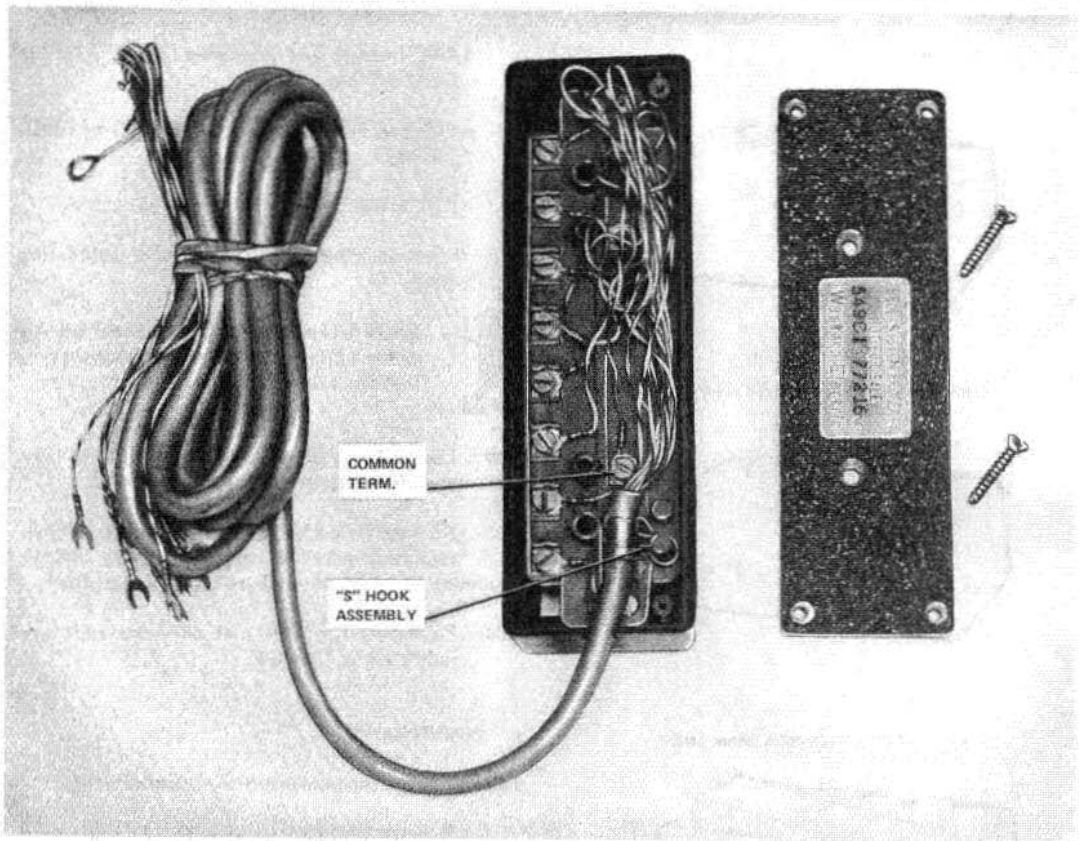
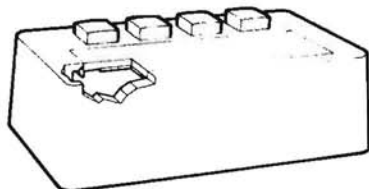


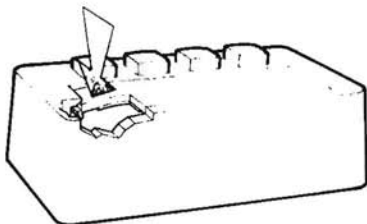
Fig. 4—Interior View of 549C1 Key

(c) 551-Type Key (Fig. 6):

- Single nonlocking pushbutton key
- Molded plastic base, shell, and button
- Cover fastened by a single nickel-plated screw
- Transparent face strip for holding designation form
- Screw holes for mounting
- Screw terminals in base for terminating wires
- Wire entrance notch in base and cover.



I. DEPRESS EITHER END, SEE ARROW



2. SLIDE IN DIRECTION OF ARROW AND WINDOW WILL POP OUT

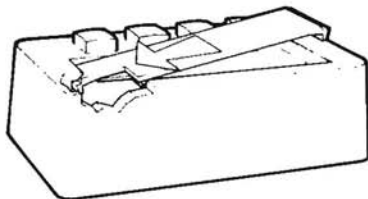


Fig. 5—Removing Designation Strip

### 3. INSTALLATION

3.01 Brackets with mounting screws (ordered separately) are available for mounting the 549- and 551-type keys on the side of a telephone set.

- 75A bracket for mounting a 549A, A1 or 549B, B1 key
- 76A bracket for mounting 549C, C1 or 549D, D1 key
- 77A bracket for mounting a 551A key.

Refer to Section 463-215-100 for method of installation of brackets.



**Store excess cord with inside wiring cable clamps fastened with screws or inside wiring nails.**

- 3.02 Locate key where readily accessible to user and designation strip can be seen.
- 3.03 No specific backboards are provided. When required, select a backboard large enough to mount the key, as well as other apparatus.
- 3.04 Fasteners for 549- and 551-type keys are indicated in Table C.

### 4. MAINTENANCE

#### 4.01 Cord Replacement or Installation:

- Replace D9G (MD) cord with a D10R-87 cord or install a D10R-87 cord in 549D1 key (8-button key)
- Fasten cord in "S" hook depression (Fig. 2) or under key assembly mounting screw (Fig. 7).

**Note:** The 549C1 and D1 keys have a pin (Fig. 4) instead of a screw on which to anchor the cord "S" hook.

- Install an M5M-87 cord in 549B1 key. Provisions provided between key cover and terminal strip to anchor cord wing band.



**Do not allow the "S" hook to contact the brass strip of the contact pile up or terminal screws.**

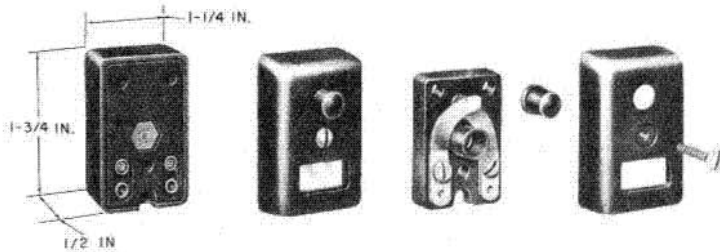


Fig. 6—551A Key

## ◆ TABLE C ◆

## FASTENERS FOR 549- AND 551-TYPE KEYS

KEY TYPE	SURFACE	FASTENER (NOTE)
549	Hardwood	1-1/2 in. No. 8 PH Screws
	Softwood	
	Metal	
551	Hardwood	1/2 in. No. 7 PH Screws
	Softwood	
	Metal	

Note: Drill lead hole as follows:  
 No. 6 screw — 1/16 in. drill  
 No. 8 screw — 3/32 in. or No. 33 drill

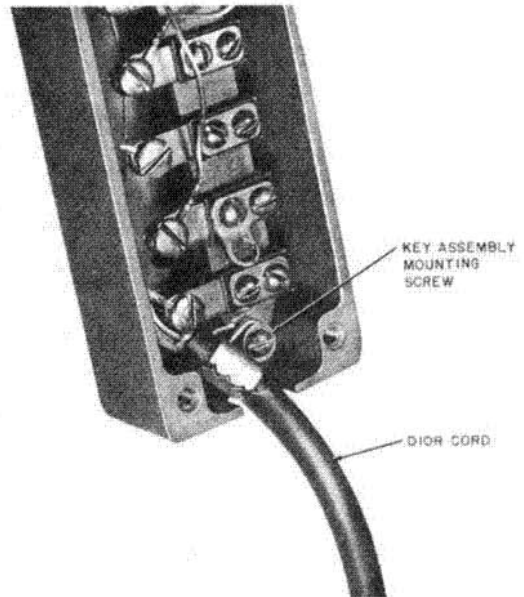


Fig. 7—Fastening D10R-87 Cord in 549C (MD) Keys

**4.02 Pushbuttons:**

- Should seat freely in their sockets
- Inspect for foreign matter between sockets and buttons
- Clean buttons and sockets with approved cleaning cloth.

**4.03 Operating Springs:**

- Should bring pushbuttons up to a positive stop

- Adjust with a 466A tool
- Clean contacts with a 265C tool.

**5. CONNECTIONS**

5.01 Fig. 8 shows connections for the 549-type keys. Substitute inside wire of sufficient capacity when using keys without cords.



## 4A SPEAKERPHONE COMPONENTS

### IDENTIFICATION, INSTALLATION, OPERATION, AND MAINTENANCE

#### 1. GENERAL

1.01 This section contains information for the 4A speakerphone system.

1.02 This section is reissued to:

- Show 680A and 680AD transmitters MD
- Add information on 680AE transmitter
- Add safety information for the 85B1 power unit

Since this reissue covers a general revision, arrows ordinarily used to indicate changes have been omitted.

#### 2. IDENTIFICATION

2.01 The 4A speakerphone system is a hands-free voice switching system for use as a telephone adjunct and is a replacement for the 3-type speakerphone system which is manufacture discontinued (MD).

2.02 The 4A speakerphone system consists of a transmitter, loudspeaker set, power unit, and either a connecting block or adapter that when connected to a suitable telephone set, provides:

- Hands-free telephone operation
- On-hook dialing (when dial is not obstructed)
- Automatic switching from speakerphone to handset operation
- Transmitter cutoff for private conversation
- Visual indication when system is in use
- Cutoff common ringer or other signaling devices when desired.

2.03 Components of the 4A speakerphone system are shown in Fig. 3.

2.04 This system may be used with the 1A, 1A1, or 1A2 key telephone systems and all PBXs.

2.05 For additional schematic and circuit information refer to SD- and CD-69909-01, respectively.

#### A. Ordering Guide

2.06 Components which make up the various arrangements of the 4A speakerphone system are ordered separately as follows:

- Set, Loudspeaker, 108AA-\* (includes 7-foot D20N mounting cord)
- Transmitter, 680AE-\* (includes 7-foot, D8S mounting cord)
- Transmitter, 680AE14-\* (same as 680AE except includes 14-foot D8S mounting cord)
- Unit, Control 80B-49† (one required for each 4-wire or combination of 2-wire/4-wire station equipped with 4A speakerphone)
- Unit, Power, 85B1-49
- Block, Connecting, 82B-49†
- Adapter, 223C-49†
- Adapter, 223D-49†

\*Add color suffix; refer to paragraph 2.08.

†Only one of these four components required per installation, depending on telephone set type.

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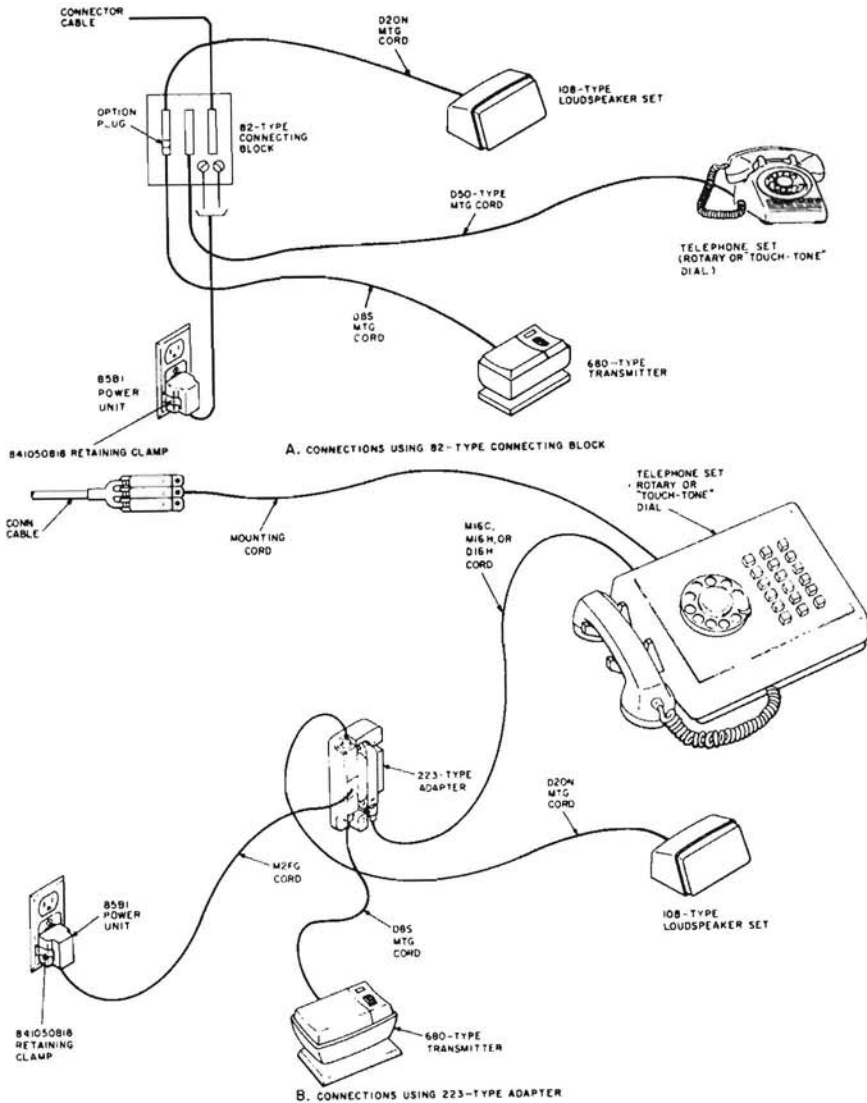


Fig. 1—Typical Arrangements of 4A Speakerphone System

2.07 A 14-foot cord may be ordered for field replacement for the loudspeaker set or 223-type adapter. Example:

Cord, D20N-87, 14 feet (108-type loudspeaker set)

Cord, D16H-50, 14 feet (223C adapter)

Cord, M16H-87, 14 feet (223D adapter)

2.08 The transmitter and loudspeaker set will be shipped in four promoted colors: Black (-03),

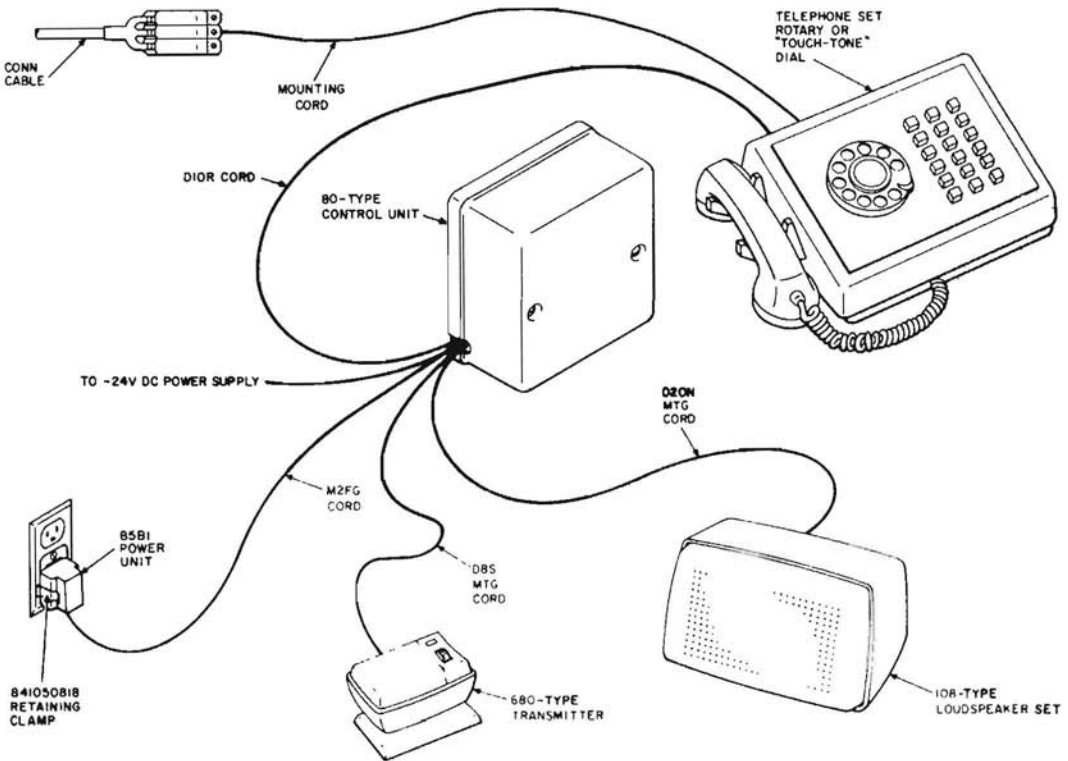


Fig. 2—Typical Arrangement of 4A Speakerphone System With 2- or 4-Wire Telephone Set

Green (-51), White (-58), and Light Beige (-60). The following kits may be ordered if a color change is desired. Each kit contains all necessary color significant parts to convert both the loudspeaker and transmitter.

Kit of Parts	Color
D-180507	Black
D-180508	Ivory
D-180509	Moss Green
D-180510	Red
D-180511	Yellow

D-180512	White
D-180513	Lt. Beige
D-180514	Lt. Gray
D-180515	Aqua Blue

### 2.09 4A Speakerphone System Circuits.

- (1) The 4A speakerphone incorporates a voice-switching circuit which eliminates singing and essentially eliminates far-end talker echo.
- (2) When there is no transmission of speech, loss is automatically inserted in the transmit circuit and gain is added to the receive circuit.

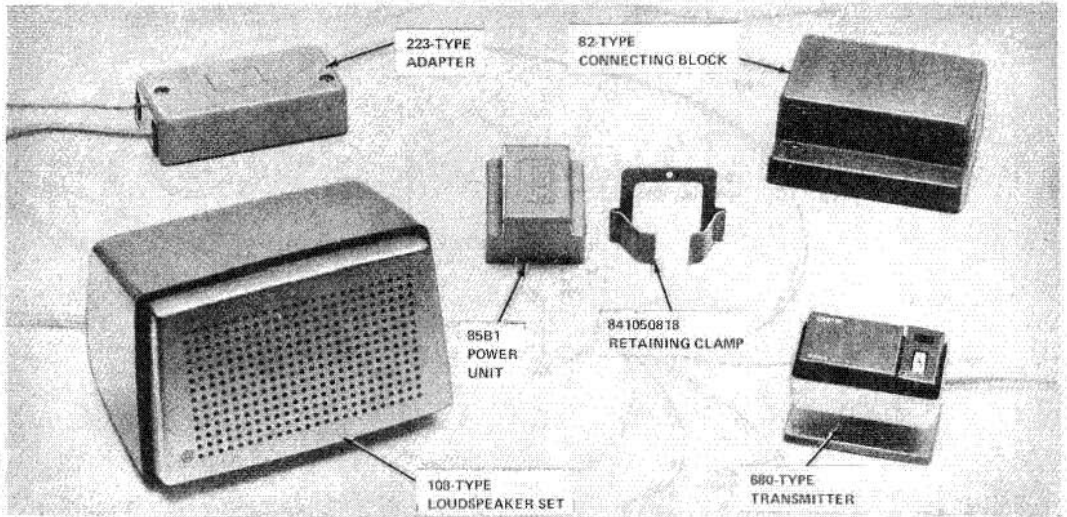


Fig. 3—Components of 4A Speakerphone System

This simultaneous transfer of loss and gain avoids a singing condition while receiving.

(3) When speech is transmitted, the gain of the transmitter circuit increases to normal. Simultaneously, the gain of the loudspeaker circuit lowers to avoid singing as a result of the increased transmitter gain. The amount of the gain change depends upon the setting of the volume control.

(4) A circuit, referred to as a switchguard, utilizes the voltage in the loudspeaker circuit to prevent false operation of the switching circuit from the receive speech output of the loudspeaker which is picked up by the microphone.

(5) A predetermined voice level is necessary to switch from the receiving to the transmitting condition. In the presence of steady room noise, such as a fan or an air conditioner, a special circuit, called noise-guard circuit, automatically raises the required threshold level to prevent operation of the switching control circuit by the noise. Talkers should still switch satisfactorily because they generally increase their speaking levels under noisy conditions.

## B. Radio Frequency Interference (RFI) and/or Static Electricity Discharge Protection

2.10 In areas where RFI and/or static electricity is a problem, install a 680AD (MD) or 680AE transmitter and a 108AA loudspeaker set.

C. 680A (MD), 680A14 (MD), 680AR (MD), 680AR14 (MD), 680AD (MD), 680AD14 (MD), 680AE, or 680AE14 Transmitter

2.11 The transmitter is a small unit incorporating the microphone, preamplifier, an indicator lamp, and the operating controls for the speakerphone. The controls include the ON OR QUIET button, the OFF button, and the volume control. The control button and a stationary button comprise the color significant portions of the transmitter. The ON OR QUIET button activates the system and, if held depressed, disables the microphone so that the speakerphone user may conduct a private conversation without the party at the far end hearing. The OFF button simply turns off the system. The volume control varies the received sound level, but has no effect on the level of speech transmitted to the telephone line. The indicator lamp lights when the system is on.



2.12 The 680AE transmitter provides RFI and static discharge protection and replaces all other 680-type transmitters listed previously.

**Note:** Whenever the 680AD transmitter is used with either a 108A or 108AR loudspeaker set it is necessary to install a 106A varistor (shipped with the transmitter) between terminals 7 (TVL) and 5 (GRD) in the loudspeaker set to prevent damage to the loudspeaker set from discharge of static electricity.

**D. 108A (MD), 108AR (MD), or 108AA Loudspeaker Set**

2.13 The loudspeaker set contains the electronic circuitry, the loudspeaker, and the relay and transformer necessary to couple to the telephone system. The electronics, loudspeaker, and cord comprise the non-color-significant subassembly, and a color significant plastic housing completes the set.

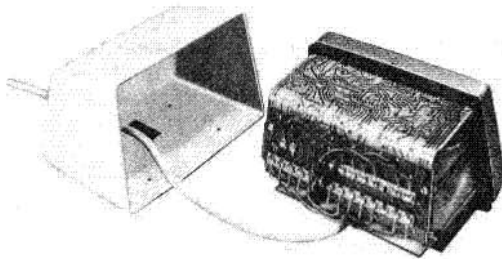


Fig. 4—Typical 108-Type Loudspeaker Set With Cover Removed

2.14 The 108AA loudspeaker replaces the 108A and 108AR loudspeakers and provides the following additional options or features:

- Improved RFI suppression
- Protection against discharge of static electricity
- Provision for increased switchguard action by means of screw terminal connections. (Refer to paragraph 5.02.)

**Note:** Whenever the 108A or 108AR loudspeaker set is used with the 680AD transmitter it is necessary to install a 106A

varistor (shipped with the transmitter) between terminal 7 (TVL) and 5 (GRD) in the loudspeaker set to prevent damage to the loudspeaker set from discharge of static electricity.

**E. 82A (MD) or 82B Connecting Block**

2.15 The 82-type connecting block is used to interconnect the 4A speakerphone system (680-type transmitter, 108-type loudspeaker set, and the 85B1 power unit) for use with plug-ended 6-button key telephone sets. A reversible option plug provides the key system options, ringer cutoff or operation of an auxiliary relay. The connecting block includes three 50-pin connectors, one for the telephone set, one for the key system connector cable, and one that accepts the transmitter and loudspeaker set connectors with the reversible option plug. The arrow on the plug of the D20N mounting cord should point to the option required on the option plug. There are seven screw terminals on the 82A and eleven screw terminals on the 82B connecting block (Fig. 9 and 10).

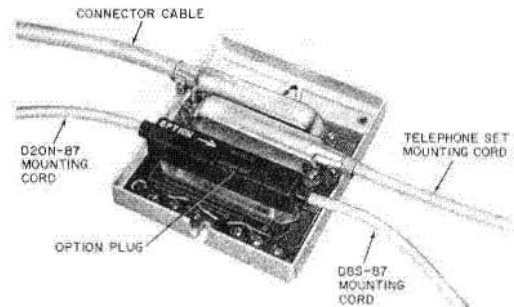


Fig. 5—82-Type Connecting Block With Cover Removed

2.16 The 82B is the same as the 82A connecting block with the exception that on the 82B access to terminals 10 and 35 from the speakerphone plug and terminals 21 and 46 from the telephone set and line receptacle are made available by means of screw-type terminals (Fig. 9).

**F. 223A (MD), 223C, or 223D Adapters**

2.17 The 223-type adapter (Fig. 6) interconnects the 680-type transmitter, the 108-type loudspeaker set, the 85B1 power unit and certain

codes of telephone sets. The adapter consists of a plastic housing and a cord with a 50-pin connector on one end and either spade-tipped terminations or a post-type connector on the other end. The connector end accepts plugs from the transmitter and loudspeaker set and the plug from an M2FG cord (furnished with the adapter) which connects to the 85B1 power unit. The cord from the adapter connects to the telephone set. Three codes of the 223-type adapter are described as follows.

(a) **223A (MD) Adapter:** This adapter is equipped with an M16C cord having a 50-pin connector on one end and spade-tipped conductors on the other end for connection to telephone sets with screw terminal fields, see Fig. 11.

(b) **223C Adapter:** This adapter is equipped with a D16H-50 cord having a 953-type connector for connection to telephone sets equipped with square-post connection fields, see Fig. 12.

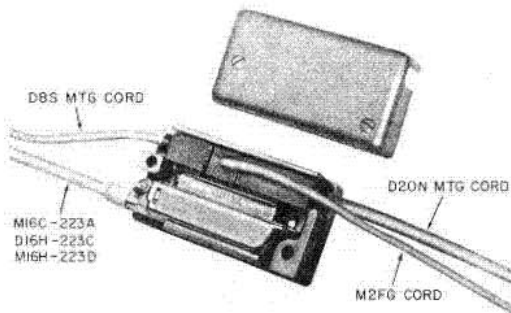


Fig. 6—223A (MD), 223C, or 223D Adapter

(c) **223D Adapter:** This adapter is the same as the 223A adapter except that it is equipped with a M16H-87 cord instead of the M16C (MD) cord. The (O-R) lead of the M16H cord is connected through to provide a remote ON lead for enabling the one-touch calling feature of the TOUCH-A-MATIC® telephone sets and adjunct dials, see Fig. 11.

#### G. 80A (MD) or 80B Control Unit

2.18 One 80-type control unit is required for each 4-wire or combination 2-wire/4-wire station used with 4A speakerphone.

2.19 The 80-type control unit (Fig. 2 and 7) provides for connecting the 4A speakerphone system to either a 2- of 4-wire telephone transmission network. All standard operating features of the 4A speakerphone system are retained. Attached to the chassis of the control unit is a connector (same as that used in the 223-type adapter) to which the 108-type loudspeaker set, the 680-type transmitter and the 85B1 power unit are connected.

2.20 The 80B control unit replaces the 80A control unit. The 80B is the same as the 80A with one exception; an additional connection from the 4A speakerphone system has been added on a screw terminal of the 80B which is required for enabling the one-touch calling feature with TOUCH-A-MATIC telephone sets and dials.

2.21 For additional schematic and circuit information, refer to SD- and CD-69923-01, respectively. For typical connection information, refer to Section 512-730-460.

#### H. 85B1 Power Unit

2.22 The power unit transforms the local customer-provided 115-volt, 60 Hz power to the voltage required to operate the 4A speakerphone system.

2.23 A retaining clamp (841050818) (Fig. 1 and 2) will be shipped with the 85B1 power unit.

### 3. INSTALLATION

#### A. Telephone Sets

3.01 The telephone sets specified for use in 4A speakerphone system provide the following features.

- (1) A set of normally closed (with handset on-hook) line switch contacts to disconnect the speakerphone when the handset is lifted.
- (2) Two sets of off-normal (make) contacts in the dial (rotary dial sets dialed in an on-hook condition) to short loudspeaker receive path and handset receiver during dialing.
- (3) A set of make contacts (s and t) in the dial common switch (TOUCH-TONE® sets dialed in the on-hook condition) to connect line power IR lead from the loudspeaker set to the dial oscillator. If a polarity guard is provided these

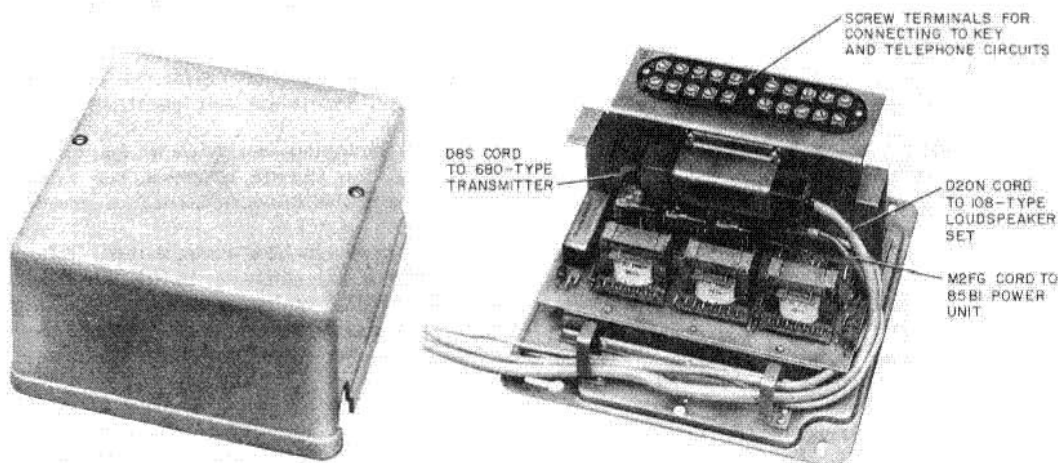


Fig. 7—80-Type Control Unit With Cover Removed

contacts (s and t) are isolated from the oscillator by the polarity guard.

**3.02** Certain wiring precautions must be observed when multiplying sets wired for speakerphone. The T1, R1, IR or P4, IT or P3, LK and AG leads should be disconnected at or as close as possible to the set in those stations not having speakerphone. Even though none of the multiplied sets have speakerphone, the leads involved should be disconnected. Failure to do so can result in:

- Tip and ring cross through the T1 and R1 leads.
- False operation of an A relay through the AG lead.
- Shorting the receiver input to loudspeaker set, disabling the loudspeaker through the P3 and P4 leads.

**3.03** An 85B1 power unit (UL approved) can be used to power only one speakerphone system. When power is provided via connector cable from a remote location the 85B1 power unit should be located less than 85 feet from the 108-type loudspeaker set when using 26 gauge wire or less than 125 feet from the 108-type loudspeaker set when using 24 gauge wire.

**3.04** A retaining clamp (841050818) (Fig. 1 and 2) should be mounted to the ac receptacle to hold the power unit securely and to prevent accidental loss of power.

**Danger:** For safety, securely attach retaining clamp to ac outlet using outlet cover screw **BEFORE** attempting to install 85B1 power unit. See Fig. 8. The power unit and any other cord plugged into the ac outlet should always be unplugged completely from outlet **BEFORE** attempting to attach or remove the clamp. This will prevent the possibility of a loosened retainer clamp or metallic outlet cover making contact with the ac prongs of the 85B1 power unit when partially withdrawn from outlet. Do not use retaining clamp on outlets where the cover mounting screw holds the duplex outlet in the box.

**Warning:** Care should be taken to trim and dress leads connecting to low voltage output of 85B1 power unit to assure that inadvertent connection to conducting surfaces or other power sources does not occur. If more than one power unit is plugged into a multiple receptacle

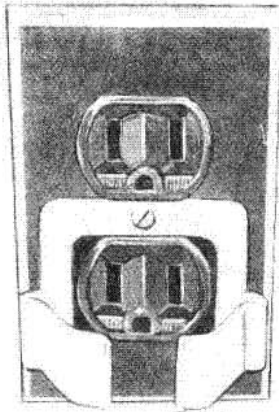


Fig. 8—841050818 Retaining Clamp Mounted on AC Outlet Box Using Outlet Cover Screw

*strip, there must be at least one-inch separation between power units. Only UL listed receptacle strips with adequate power rating shall be used. Use of a continuous terminal power strip that allows the secondary output terminals of the power unit to be in close proximity to the ac line source is not recommended.*

### C. Planning An Installation

3.05 When planning an installation, observe the following.

- (1) Avoid placing apparatus with plastic covers or parts in location where ambient temperatures may exceed 140 degrees F.
- (2) Install 85B1 power unit observing procedures in paragraph 3.03 and 3.04.
- (3) Place loudspeaker set and transmitter within convenient reach of user and a minimum of one foot apart.

- (4) Transmitter must be at least two feet from transformer or any ac powered device.
- (5) There should be no obstructions between the user, loudspeaker set, and transmitter.
- (6) Make connections as shown in appropriate section for specific telephone set which indicate grandfathered and registered arrangements.
- (7) If 82-type connecting block is used, install audible signal cutoff using the RING CUTOFF or AUX RELAY option as needed. Use the leads to common signal control and common ringer or buzzer circuit for this cutoff feature (Fig. 10).
- (8) For station busy lamp circuit with 4A speakerphone system, refer to the appropriate Service section for telephone set involved.

### 4. OPERATION

**Note:** The 4A speakerphone system permits normal use of the telephone set for originating, receiving, or transferring calls.

4.01 To originate a call using speakerphone.

- (1) Depress transmitter ON OR QUIET button and release. The ON lamp will light indicating speakerphone is turned on, listen for dial tone transmitted through loudspeaker set. Telephone handset is not lifted during dialing (except where handset covers dial [paragraph 4.01(3)]).
- (2) Operate dial of telephone set in normal manner.
- (3) When originating calls from telephone sets which require off-hook dialing, dial in the normal manner, then depress and hold the ON OR QUIET button until the handset is restored.
- (4) When the complete number is dialed, ringing tones, busy signals or called party answer will be heard from the loudspeaker set.
- (5) When the called party answers, the transmitter and loudspeaker set are used to carry on a hands-free conversation. Adjust volume level as desired.

**Note:** Best *operational* results are obtained at the lowest acceptable volume setting.

**4.02** To answer an incoming call using speakerphone, depress ON OR QUIET button on transmitter. Ringing is tripped and system is automatically connected to the line through the loudspeaker set.

**4.03** To disable the transmitter when it is desired not to transmit conversation in the room to a distant party.

- (1) Depress ON OR QUIET button to full extent of its travel and hold down during entire time transmitter is to be disabled.

**Note:** With transmitter disabled, conversation will not be transmitted to the distant party, however, the distant party can still be heard over the loudspeaker.

- (2) After private conversation is completed and it is desired to transmit to the distant party again, release ON OR QUIET button. System is now restored to full hands-free capability.

**4.04** To terminate a call on speakerphone, depress OFF button on transmitter. ON lamp will extinguish, and speakerphone system will be restored to the OFF condition.

**4.05** To transfer from handset to speakerphone operation.

- (1) Depress and hold ON OR QUIET button of transmitter.
- (2) Return handset to mounting, and release ON OR QUIET button.
- (3) Adjust volume as required.

**4.06** To transfer from speakerphone to handset operation, lift handset which will automatically turn off speakerphone.

## 5. MAINTENANCE



**Remove power from 4A speakerphone system before attempting any maintenance of speakerphone components. Observe procedures in paragraph 3.04.**

## A. Tests and Adjustments

**5.01** When system is installed or maintenance is performed on any component, make the following tests.

- (1) Place a speakerphone call to the test desk.

**Note:** Excessively loud TOUCH-TONE signals will result at loudspeaker output during dialing if connections of IT and IR leads are reversed in the telephone set. Speakerphone test call should verify that TOUCH-TONE signals are not excessively loud.

- (2) Adjust loudspeaker volume to moderately loud listening level.
- (3) Have test center repeat the question "In what suburb does Joe live?" several times.
- (4) If clipping is detected in the sentence, particularly in the first b in **suburb** and the t in **what**, increase the distance between the transmitter and loudspeaker set. If condition still exists, see paragraph 5.02.
- (5) Repeat this test at a high listening level by turning the volume control to maximum volume.

**5.02** An alternate loudspeaker connection is provided in each 108AA loudspeaker to compensate for room conditions which cause voice-switching during reception. The effect of voice-switching is to clip portions of the incoming speech. To compensate for this condition, proceed as follows.

- (1) Remove cover of 108AA loudspeaker to access terminal strip (paragraph 5.06).
- (2) Move red loudspeaker lead from terminal 29 to terminal 32.

**Note:** Use care when locating spade tip lead on terminal so as not to contact adjacent circuit paths.

**5.03** If voice-switching is caused by external telephone audible signaling devices; proceed as follows.

- (1) Place audible signaling devices away from transmitter unit, if possible.
- (2) Lower volume of audible signaling devices to level that will not cause voice-switching feature to operate.
- (3) Install audible signal cutoff using the RING CUTOFF or AUX RELAY option as needed. Use the leads to common signal control and common ringer or buzzer circuit for this cutoff feature (Fig. 10).

5.04 If speakerphone fails to operate properly, refer to Table A for trouble analysis.

#### B. Cleaning

5.05 Clean plastic covers and housings with water dampened KS-2423 cloth or equivalent. Do not use scouring powders or cleaners.

#### C. Removal of Plastic Parts



***Do not attempt any changes or repairs to either the 680-type transmitter or 108-type loudspeaker set other than to replace the loudspeaker set mounting cord or the respective plastic parts for either the transmitter or loudspeaker set.***

5.06 The plastic housing on the 108-type loudspeaker set is held in place by two screws located on the bottom of the set. To remove the plastic housing, remove the two screws from the bottom of the set and slide the cover off the chassis (Fig. 4).

**Note:** Do not remove the circuit board from the chassis.

5.07 The plastic covers on the 680-type transmitter snap into place. First, remove the stationary cover by squeezing with fingers on the front and back surface and lifting gently. Second, pry up the rocker cover lifting along the edge adjacent to the thumb wheel.



***The loudspeaker set and transmitter are designed so that color significant components can be easily changed. In order to reduce shelf inventory it is suggested that the kits listed in paragraph 2.08 be stocked instead of extra loudspeaker sets and transmitters.***

#### D. Change of Loudspeaker Set Card

5.08 First remove housing as in paragraph 5.06.

Two of the mounting cord leads are secured individually, the rest are permanently connected to plastic wafer strips (see Fig. 4). Loosen, but do not remove screws that secure individual leads and wafer strips. ***Do not attempt to remove spade tips from wafer strips.*** Next remove the screw that fastens the stay band of the cord. Slide the spade tips and wafers through the hole in the bottom of the plastic chassis. To install the new cord, reverse the procedures.

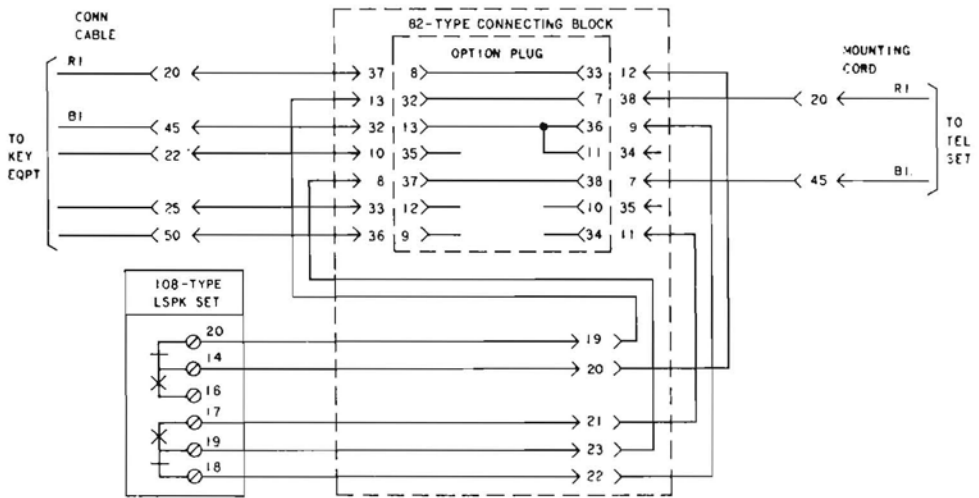
**Note:** Be careful not to damage the circuit board, particularly the flexible areas of the bends.

TABLE A  
4A SPEAKERPHONE SYSTEM TROUBLE ANALYSIS

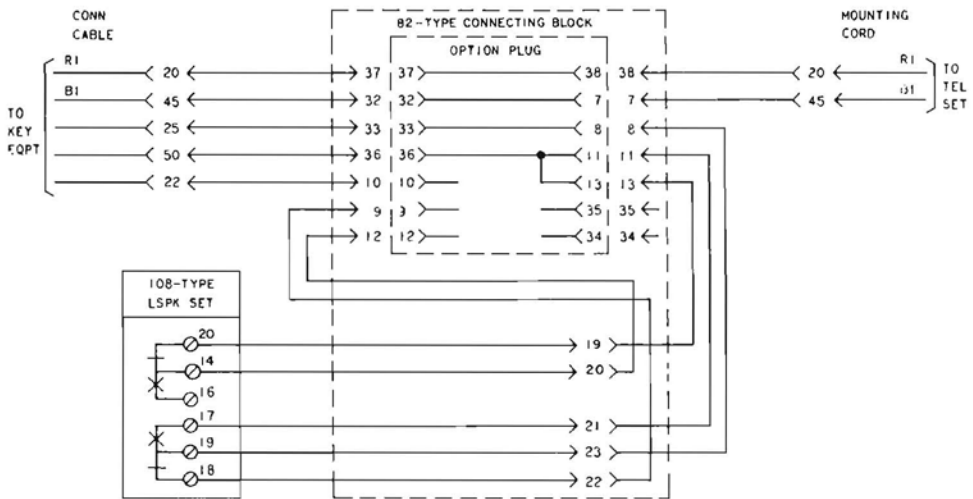
TROUBLE INDICATION	PROBABLE CAUSE	CHECK
Speakerphone inoperative; indicator does not light	No power, or open wiring	Power supply outlet with a neon lamp voltage tester or equivalent, or check LK lead for open
Lamp does not light but K-relay (108-type loudspeaker set) operates and releases when ON OR QUIET button is released	Loose connection in local wiring	Switchhook contacts or A1 and LK leads for open
Rotary dial pulses heard over loudspeaker	Dial wiring	For proper dial P3 and P4 leads
No dial tone heard when speakerphone is ON, but can be heard in handset	Open wiring	R1 and T1 leads from telephone set
No dial tone heard on speakerphone or handset	Open wiring	Tip or ring from line
Dial tone cannot be broken with dial when on speakerphone	Incorrect wiring	Connection of tip and ring from telephone line to telephone set
TOUCH-TONE dial inoperative when speakerphone is ON	Dial wiring	For proper T1, R1, IT, and IR leads
Excessively loud TOUCH-TONE signals at loudspeaker output during dialing	Incorrect Connections	For proper IT and IR connections
Noise on speech transmission associated with fluorescent lamp operation	Electro-magnetic pickup	Position transmitter on different area of desk, table etc, to reduce noise.
Noise on speech transmission associated with radio frequency interference	High level radio frequency AM, FM, etc. in immediate area	Install 680AR, 680AD, or 680AE transmitter and 108AR or 108AA loudspeaker set.







A. OPTION PLUG POSITIONED FOR RINGER CUTOFF



B. OPTION PLUG POSITIONED FOR AUXILIARY RELAY OPERATION

Fig. 10—Wiring Involved in Options at 82-Type Connecting Block

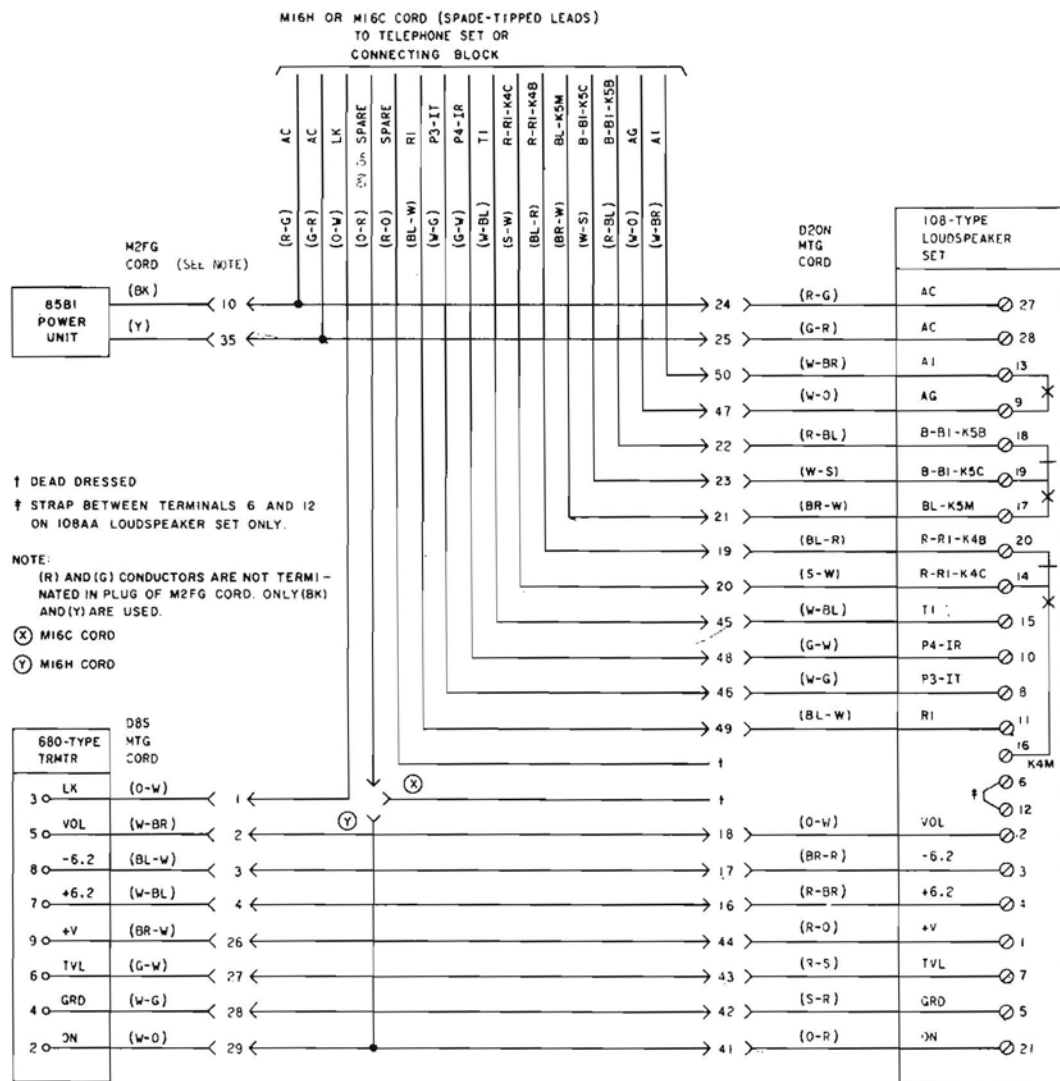


Fig. 11—4A Speakerphone System Connections Using 223A (MD) or 223D Adapter