

STATION SPECIALTIES SERVICE MANUAL

# STATION SPECIALTIES SERVICE MANUAL

VOLUME II

VOL II



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## **Station Specialties Service Manual Vol II**

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**STATION  
SPECIALTIES  
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VOL II**

## Introduction

The practices in this manual provide installation and maintenance information for special apparatus which complements the use of both the Station and Key Telephone Service Manuals. For information not included in this manual, refer to the standard BSP files.

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● 512-730-450	3	660A1, 660A1M, 2660A1, and 2660A1M			
512-730-455	2	622- and 2662-Type			

## KS-19594 DIALER MAINTENANCE

### 1. GENERAL

1.01 This section is reissued to:

- Change Table A
- Add information for replacing tape cartridge

Changes or additions in the body of the tables will be indicated by shaded areas.

1.02 Make a visual inspection of the system for obvious defects such as loose, displaced, or broken parts, blown fuses or tripped circuit breakers.

1.03 Maintenance of the dialer is limited to replacement of worn cords and defective units. Housings may be cleaned by using a damp KS-2423 cloth.

1.04 Maintenance of associated station equipment such as telephone sets, bells and buzzers, dials, is covered in the appropriate sections.

### 2. MAINTENANCE

**THINK** *Disconnect power cord before removing dialer or power supply housings. Power should remain disconnected when not required for immediate maintenance operation.*

**Note:** ⚡ Power must be applied to dialer (List 1) when testing dial-in (List 2) unit. Failure to do so may result in dial-in unit dialing slow or sticking when low digits are dialed.⚡

2.01 The more common defects, confirmation tests, and corrective action to be taken in maintaining the KS-19594 dialer are listed in Table A.

#### *KS-19594, List 1 Dialer Unit*

2.02 Should the directory tape fail to rotate to a new number when the selector wheel is turned or when the tape drive key is operated,

the tape cartridge has failed. Remove the tape cartridge and replace with a new cartridge.

(a) **Remove tape cartridge as follows:**

- (1) Raise the access cover on the front of the dialer.
- (2) Raise the front end of the dialer.
- (3) Press firmly on the release bar which rests on the top of the tape to cause the cartridge to snap out of the bottom of the dialer.
- (4) Pull the tape cartridge forward to clear the hinges.

(b) **To replace new tape cartridge:**

- (1) Raise the front end of the dialer.
- (2) Mate the hinge halves on the rear of the tape cartridges with the hinge halves at the rear of the opening in the bottom of the dialer.
- (3) Push upward on the tape cartridge to lock it into place.⚡

2.03 It is not possible to change tapes from one cartridge to another in the field. If the subscriber requests the tape from a faulty cartridge be returned in a new cartridge, this can be specified on the order when the cartridge is returned for repairs. If subscriber requests to keep old tape, which may be the only record of the telephone numbers listed, remove the tape by pulling it out of the cartridge and cutting each end from the tape spools.

2.04 Should the dialer fail to operate upon pressing the CALL button, remove the dialer housing in order to check voltages at the terminals shown in Fig. 1. Do not adjust the level of the 18-volt dc supply. If the 18 volts dc differs by more than 2 volts from its normal value, the power supply



## SECTION 512-125-300

is probably faulty. In this case, replace both dialer and power supply units.

**2.05** Should the voltages checked in 2.04 appear satisfactory, and the dialer operates but fails to reach the desired number, proceed as follows:

- (1) Select a blank space on the tape and record a known telephone number.
- (2) Connect a 1013A or 1011B (MD) test set across the **R** and **G** leads of the dialer telephone cord. Place the test set button in the monitoring position.
- (3) Initiate call, listen for pulsing clicks; if pulsing clicks are not heard or if heard and the wrong number is reached (and the associated telephone set operation is normal), replace the dialer, power supply, and dial-in units. The tape cartridge may be used in the replacement dialer.

**2.06** Should the dialer unit require replacement due to mechanical or electrical failure, proceed as follows:

- (1) Replace the defective dialer with a new unit.
- (2) Remove the tape cartridge from the defective dialer and place it in the new unit.
- (3) Return dialer unit through normal channels for repair.

### ***KS-19594, List 2 Dial-In Unit***

**2.07** Field maintenance of the KS-19594, List 2 dial-in unit is limited to replacement of

GE-1819 lamp in the WAIT lamp position. To replace the lamp proceed as follows:

- (1) Remove four cover retaining screws from the bottom of the unit.
- (2) Carefully remove the cover.
- (3) Remove and replace the defective GE-1819 lamp.
- (4) Replace the cover and retaining screws.

**2.08** If the dial-in unit is obviously defective, replace with a new unit.

### ***KS-19594, List 3 Power Supply***

**2.09** No field maintenance is authorized for the KS-19594, List 3 power supply.

### ***Cords and Cables***

**2.10** Field replacement of cords and cables associated with the various components of the dialer is limited to the 4-conductor cord between the power supply and dialer unit (KS-19594, List 8) and the 6-conductor cord between the dialer unit and the associated telephone set (KS-19594, List 9).

**2.11** If cords, other than those listed in 2.10, or the power supply cable require replacement, replace the associated components (ie dialing unit, power supply).

### ***Schematic***

**2.12** Fig. 2 shows a partial schematic of a typical dialer installation. SD-99436-01 contains a complete schematic of the various dialer components and CD-99436-01 gives a description of the circuits.

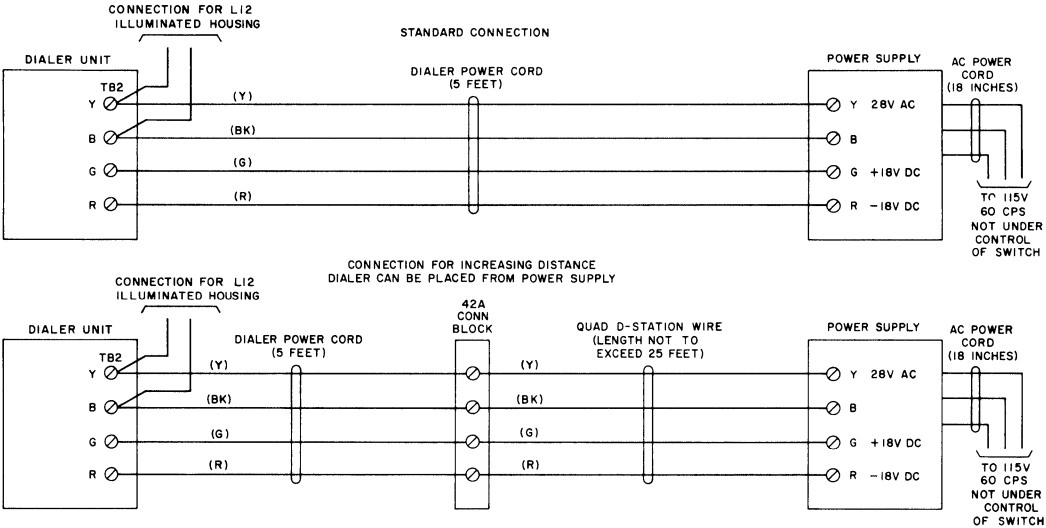


Fig. 1—Power Supply Connections

**TABLE A**  
**COMMON TROUBLES AND CORRECTIVE ACTION**

TROUBLE	PROBABLE CAUSE	CONFIRMATION TESTS	CORRECTIVE ACTION
<b>DIALER UNIT:</b>			
Tape will not advance manually or automatically.	Faulty tape cartridge	Try to advance or reverse tape using selector wheel and tape drive key.	Replace tape cartridge.
Tape operates manually but not automatically and dialer does not dial.	Faulty power supply	Using voltmeter, check voltages at dialer unit terminal board TB2 (Fig. 1).	Replace dialer and/or power supply units.
Tape operates, but dialer fails to reach desired number.	Faulty dialer unit, power supply, or dial-in unit	Check voltages (Fig. 1). Place 1013A or 1011B (MD) test set across <b>R</b> and <b>G</b> leads of dialer telephone cord. Record known number and initiate call.	If pulsing clicks are not heard; replace dialer unit. If pulsing clicks are heard and wrong number is reached: replace dialer, power supply, and dial-in units.
<b>DIAL-IN UNIT:</b>			
<b>(Note)</b>			
Wait lamp will not light.	Faulty GE-1819 lamp	Plug dial-in unit into jack on back of dialer, lamp should light, then extinguish.	Replace GE-1819 lamp.
Wrong numbers being recorded.	Faulty dial-in unit	Record and initiate call to known telephone number.	Replace dial-in unit.
<b>POWER SUPPLY</b>			
No output, low voltage, or higher than normal voltage.	Defect in power supply circuitry.	Use voltmeter to check power supply voltages (see Fig. 1).	Replace power supply.

◆Note: Power must be applied to dialer (List 1) when testing dial-in (List 2) unit. Failure to do so may result in dial-in unit dialing slow or sticking when low digits are dialed.◆

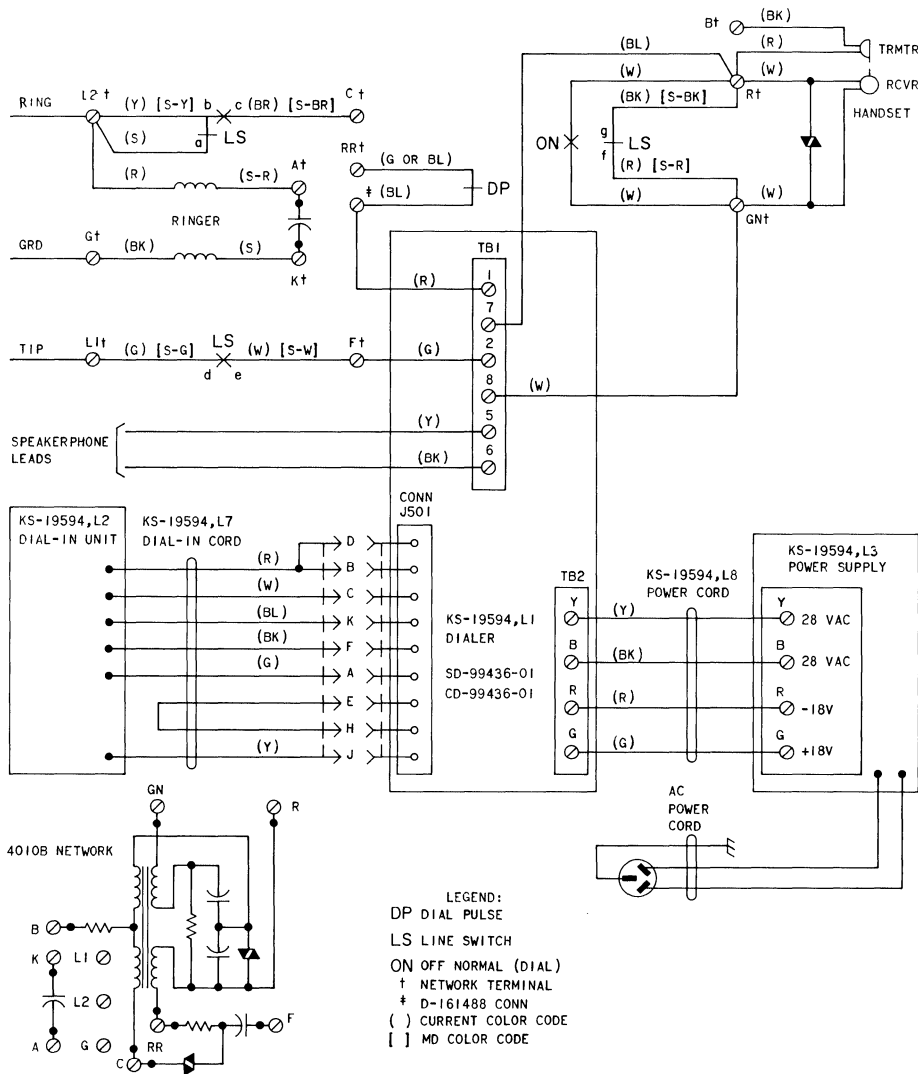


Fig. 2—Typical Installation Layout, KS-19594 Dialer

## KS-19594 DIALER

### TELEPHONE SETS EQUIPPED WITH ROTARY DIALS

### CONNECTIONS

#### 1. GENERAL

1.01 This section is reissued to:

- Add 630DA, 631DA, 636CA, and 637DA telephone sets, Table B.
- Add 832- and 833-type telephone sets, Table A.

**Note:** Refer to appropriate sections for connections to TOUCH-TONE® dial equipped telephone sets and switchboard and miscellaneous key equipment in Division 512.

#### 2. CONNECTIONS



*The power supply cord should not be connected to the AC power line receptacle when removing the housing or making any connections.*

2.01 **Power Supply Unit:** Refer to dialer installation section for mounting instructions.

#### 2.02 **Dialer Telephone Cord:**

- Standard six conductor cord
- Secure inside the equipment under a cord clamp or by taping to set mounting cord
- Dress wires to allow proper operation of equipment

#### 2.03 **Dial Pulsing Contacts (red and green cord conductors):**

- Place in series with ring side of line for 200-type telephone sets
- Place in series with the dial pulsing contacts on other type sets

#### 2.04 **Off Normal Contacts (blue and white cord conductors):** Place across receiver contacts in telephone sets.

#### 2.05 **Off Normal Contacts (yellow and black cord conductors):** Place across loudspeaker contacts in speakerphone sets.



*Test the operation of the dialer by recording and calling the telephone number usually called for job completion. For installations with speakerphones, be sure to test with speakerphone operating to insure proper connection to off normal contacts.*

#### 2.06 **Connection Index:**

Table A—Dialer Connections To Telephone Sets Equipped With Rotary Dials

Table B—Dialer Connections to CALL DIRECTOR® Telephone Sets and TRIMLINE® Telephone Sets Equipped With Rotary Dials

Fig. 1—KS-19594 Dialer, Power Supply Connections

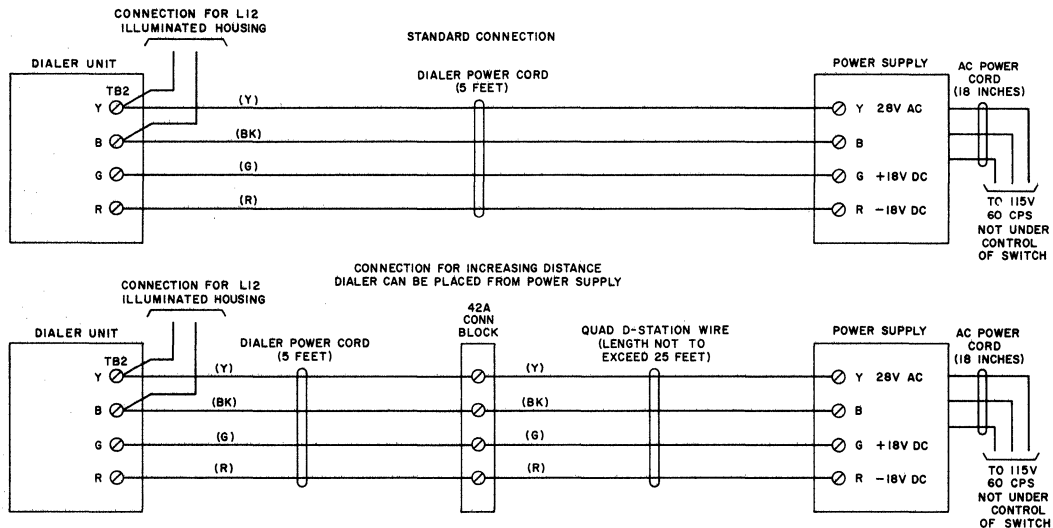


Fig. 1—KS-19594 Dialer, Power Supply Connections

TABLE A

## DIALER CONNECTIONS TO TELEPHONE SETS EQUIPPED WITH ROTARY DIALS

KS-19594 DIALER TEL CORD		200 SERIES		300 SERIES		
		ALL 200 SERIES EXCEPT THOSE LISTED AT THE RIGHT AND THE <i>TRIMLINE</i> SETS	200 SERIES TEL SETS USING 685A SUB- SCRIBER SETS	ALL 300 SERIES EXCEPT 329C, 332C, 334C	329C	332C, 334C
P U L S I N G	R	Move R inside wire from L1 of subscriber set to GRD terminal of subscriber set and Connect R of dialer tel cord to GRD term. of sub set	Remove R inside wire from term. L2 of sub- scriber set and Connect to R of dialer tel cord with D-161488 connector	Remove BR-Y or lead from term. 4 on dial and		
	G	L1 of subscriber set	L2 of subscriber set	Y terminal on dial		
O F F N O R M A L	W	Term. GN of induction coil in subscriber set	Term. GN of network in subscriber set	Term. GN on induction coil	Term. 2 on term. strip in subscriber set	E post on ringer term. strip
	BL	Term. R of induction coil in subscriber set	Term. B of network in subscriber set	Term. R on induction coil	Term. 14 on term. strip in subscriber set	Term. R on induction coil
S P E A K E R P H O N E	Y	Insulate and store in subscriber set	Term. 1 of term. strip in subscriber set	Insulate and store in tel. set		
	BK	Insulate and store in subscriber set	Term. G of network in subscriber set	Insulate and store in tel. set		

TABLE A (Cont)

## DIALER CONNECTIONS TO TELEPHONE SETS EQUIPPED WITH ROTARY DIALS

KS-19594 DIALER TEL CORD		400 SERIES			500 SERIES		
		ALL 400 SERIES EXCEPT THOSE LISTED AT RIGHT	440 AND 460 SERIES (4- AND 6- BUTTON SETS)	462AC 466AC	ALL 500 SERIES EXCEPT THOSE LISTED BY CODE	500E 500F 501F	500R 500S
P U L S I N G	R	Remove BR-Y lead from term. Y on dial,  and	Remove G lead from term. L2Y on in- duction coil,  and	Remove R lead of D9D or D15B cord from L1 on term. strip,  and	Remove BL dial lead from term. F of network,  and	Remove W lead from term. F of network;  and	Remove BL dial lead from term. F of network  and
	G	Term. Y on dial	Term. L2Y on induction coil	Term. L1 on term. strip	Term. F of network		
O F F - N O R M A L	W	Term. GN on induction coil		Term. W on dial	Term. GN of network		
	BL	Term. R on induction coil		Term. R of network			
S P E A K E R P H O N E	Y	Insulate and store in tel set			Insulate and store in tel set		Term. 1 of term. strip
	BK	Insulate and store in tel set			Insulate and store in tel set		Term. 6 of term. strip



TABLE A (Cont)

## DIALER CONNECTIONS TO TELEPHONE SETS EQUIPPED WITH ROTARY DIALS

KS-19594 DIALER TEL CORD		500 SERIES (Cont)					
		500AB 500AD	511C 511D 558D	558F	511F 511H	514B	532A, B 533A, B
P U L S I N G	R	Remove BL dial lead from term. F of network and Connect to R of dialer tel cord with D-161488 connector					
	G	Term. F of network					
O F - N O R M A L	W	Term. 9 of the TB1 term. strip	Term. GN of network	Term. GN of network	Term. GN of network	Term. 8 of the term. strip	Term. R of network
	BL	Term. 10 of the TB1 term. strip	Term. R of network	Term. R of network	Term. R of network	Term. 11 of the term. strip	Term. W of the 151B amplifier
S P E A K E R P H O N E	Y	Term. 14 of the TB1 term. strip	Term. 11 of the term. strip	Term. 8 of the term. strip	Term. 4 of the term. strip	Insulate and store	Term. W of the 151B amplifier
	BK	Term. 15 of the TB1 term. strip	Term. G of the term. strip	Term. 12 of the term. strip	Term. 8 of the term. strip	Insulate and store	Term. V of the 151-type amplifier

TABLE A (Cont)

## DIALER CONNECTIONS TO TELEPHONE SETS EQUIPPED WITH ROTARY DIALS

KS-19594 DIALER TEL CORD		500 SERIES (Cont)					
		535A, B	536A, B	544B, 545B 564H, 565B, E, H, L 565HB, 566MB	566MD	563HB	565G
P U L S I N G	R	Remove BL dial lead from term. F of network and Connect to R of dialer tel cord with D-161488 connector					
	G	Term. F of network					
O F - N O R M A L	W	Term. R of the network	Term. GN of the network	Term. GN of the network	Term. GN of the network	Term. 1 of the 241-type amplifier	Term. GN of the network
	BL	Term. W on the 151B amplifier	Term. R of the network	Term. R of the network	Term. R of the network	Term. 8 of the term. strip	Term. R of the network
S P E A K E R P H O N E	Y	Term. L. on the 151B amplifier	Term. L. on the 151B amplifier	Term. ON of the term. strip	Term. 15 on the key term. strip	Insulate and store	Term. ON of the term. strip
	BK	Term. V on the 151B amplifier	Term. V on the 151B amplifier	Term. ON1 of the term. strip	Term. 16 on the key term. strip	Insulate and store	Connect to O-W mtg. cord conductor with a D-161488 connector

TABLE A (Cont)

## DIALER CONNECTIONS TO TELEPHONE SETS EQUIPPED WITH ROTARY DIALS

KS-19594 DIALER TEL CORD		500 SERIES (Cont)					700 SERIES
		565GK 565HK 565LK	568HB	568HF	568HR	568HT	701B/D
P U L S I N G	R	Remove BL lead from term. F of network and Connect to R of dialer tel cord with D-161488 connector				Remove G dial lead from 2 on the term. strip and	Remove BL dial lead from term. F of the network, and Connect to R of dialer tel cord with D-161488 connector
	G	Term. F of network				Term. 2 on term. strip	Term. F of network
O F F N O R M A L	W	Term. GN of the network	Term. 2 of the term. strip	Term. 10 of the term. strip	Term. 9 of the term. strip	Term. 3 on term. strip	Term. GN of the network
	BL	Term. R of the network	Term. 4 of the term. strip	Term. 12 of the term. strip	Term. 10 of the term. strip	Term. 4 on term. strip	Term. R of the network
S P E A K E R P H O N E	Y	Term. 7 of the 589 or 636- type key term. strip	Term. ON of the term. strip	Term. 7 of the 589- or 636-type key term. strip		Term. ON on term. strip	Term. 5 of the E1 ringer
	BK	Term. 8 of the 589- or 636-type key term. strip	Term. ON1 of the term. strip	Term. 8 of the 589- or 636-type key term. strip		Term. ON1 on term. strip	Term. 6 of the E1 ringer

◆TABLE A (Cont)◆

DIALER CONNECTIONS TO TELEPHONE SETS EQUIPPED WITH ROTARY DIALS

KS-19594 DIALER TEL CORD		700 SERIES (Cont)				800 SERIES
		702B	702D 711B 712B* 713B	750A/B† 751A/B 754A/B	750A/B‡ 751C/D 753B	752A/B
P U L S I N G	R	Remove BL dial lead from term. F on network and Connect to R of dialer tel cord with D-161488 connector				
	G	Term. F on network				
O F F N O R M A L	W	Term. GN of network		Term. 13 on TB1	Term. GN on network	
	BL	Term. R of network		Term. 14 on TB1	Term. R on network	
S P E A K E R P H O N E	Y	Term. 1 of the 44A conn. block	Insulate and store in tel set		Term. 7 of term. strip	Term. 30 of term. strip 830A1M, 831A1M, 832-type, 833-type
						Term. 15 of term. strip 851A1M
	BK	Term. 2 of the 44A conn. block	Insulate and store in tel set		Term. 8 of term. strip	Term. 24 of term. strip 830A1M, 831A1M, 832-type, 833-type
						Term. 17 of term. strip 851A1M

\* Increase depth of housing mounting cord entrance hole 1/16-inch using a 3-1/2-inch half-round file.

† Early model.

‡ Current production.

◆ TABLE B ◆

DIALER CONNECTIONS TO CALL DIRECTOR TELEPHONE SETS AND TRIMLINE TELEPHONE SETS EQUIPPED WITH ROTARY DIALS

KS-19594 DIALER TEL CORD		ALL 600 SERIES EXCEPT THOSE LISTED BY CODE	608A 618A	608C 618B	610A	623A	630 631 632 634 635	636A 637A
P U L S I N G	R	Remove BL dial lead from F on the network  and  Connect to R of dialer tel cord with D-161488 connector			Remove Y dial lead from term. 6 on term. strip TS2  and	Remove BL dial lead from F on the network  and		
	G	Term. F on the network			Term. 6 on term. strip TS2	Term. F on the network		
O F - N O R M A L	W	Term. GN on the network	Term. 4 on term. strip TB3	Term. 5 on the 241-type amplifier	Term. 1 on term. strip TS2	Term. GN on the network		Term. 4 on term. strip TB1
	BL	Term. R on the network	Term. 6 on term. strip TB3	Term. L1 on the network	Term. 2 on term. strip TS2	Term. R on the network		Term. L1 on the network
S P E A K E R P H O N E	Y	Term. W on the dial	Term. 7 on term. strip TB3	Term. 4 on term. strip TB1	Insulate and store in tel set		Term. 11 on the term. block	Insulate and store in tel set
	BK	Term. BB on the dial	Term. 8 on term. strip TB3	Term. 5 on term. strip TB1	Insulate and store in tel set		Term. 12 on the term. block	Insulate and store in tel set

◆ TABLE B (Cont) ◆

DIALER CONNECTIONS TO *CALL DIRECTOR* TELEPHONE SETS AND *TRIMLINE* TELEPHONE WITH ROTARY DIALS

KS-19594 DIALER TEL CORD		CALL DIRECTOR SETS			
		636B 637C 638B 639C	636C 637D 638C 639D	630DA 631DA	636CA 637DA
P U L S I N G	R	Remove BL lead from F on the network and Connect to R of dialer tel cord with D-161488 connector		Remove BL lead from F on the network and Connect to R of dialer tel cord with D-161488 connector	
	G	F on the network		F on the network	
O F F - N O R M A L	W	Term. 3 on term. board TB1	Term. 1 on the 241-type amplifier	GN on network	L1 on network
	BL	L1 on the network		R on network	Term. 1 on 241B amp
S P E A K E R P H O N E	Y	Insulate and store		Insulate and store	
	BK	Insulate and store		Insulate and store	

◆ TABLE B (Cont) ◆

**DIALER CONNECTIONS TO *CALL DIRECTOR* TELEPHONE SETS AND  
*TRIMLINE* TELEPHONE SETS EQUIPPED WITH ROTARY DIALS**

KS-19594 DIALER TEL CORD		<i>TRIMLINE</i> SETS	
		220 HAND TEL SET	
P U L S I N G	R	Connect to G of inside wire (one side of CO line) at suitable connecting block. Disconnect G of D5AL mounting cord.	
	G	Connect to G of D5AL mounting cord at spare connecting block terminal, or use D-161488 connector	
O F - N O R M A L	W	Connect to G of D5AL mounting cord and G of dialer tel cord	
	BL	Connect to R of D5AL mounting cord and to R of inside wire at connecting block term.	
S P E A K E R P H O N E	Y	Insulate and store at connecting block	
	BK	Insulate and store at connecting block	

## KS-19594 DIALER

### TELEPHONE SETS EQUIPPED WITH TOUCH-TONE® DIALS

### CONNECTIONS

#### 1. GENERAL

1.01 This section is reissued to:

- Add 2832- and 2833-type telephone sets, Table B

#### 2. CONNECTION



*The power supply cord should not be connected to the AC power line receptacle when removing the housing or making any connections.*

2.01 **Power Supply Unit:** Refer to dialer installation section for mounting instructions.

#### 2.02 Dialer Telephone Cord:

- Standard six conductor cord
- Secure inside the equipment under a cord clamp or by taping to set mounting cord
- Dress wires to allow proper operation of equipment

2.03 **Dial Pulsing Contacts (red and green cord conductors):** Place in series with the green lead of TOUCH-TONE® dials.

2.04 **Off Normal Contacts (blue and white cord conductors):** Place across receiver contacts in telephone sets.

2.05 **Off Normal Contacts (yellow and black cord conductors):** Place across loudspeaker contacts in speakerphone sets.



*Test the operation of the dialer by recording and calling the telephone number usually called for job completion. For installations with speakerphones, be sure to test with speakerphone operating to insure proper connection to off normal contacts.*

#### 2.06 Connection Index:

Table A—Dialer Connections To Telephone Sets Equipped With TOUCH-TONE Dials

Table B—Dialer Connections to CALL DIRECTOR®, TRIMLINE® and COM-KEY Telephone Sets Equipped With TOUCH-TONE Dials

Fig. 1—KS-19594 Dialer, Power Supply Connections



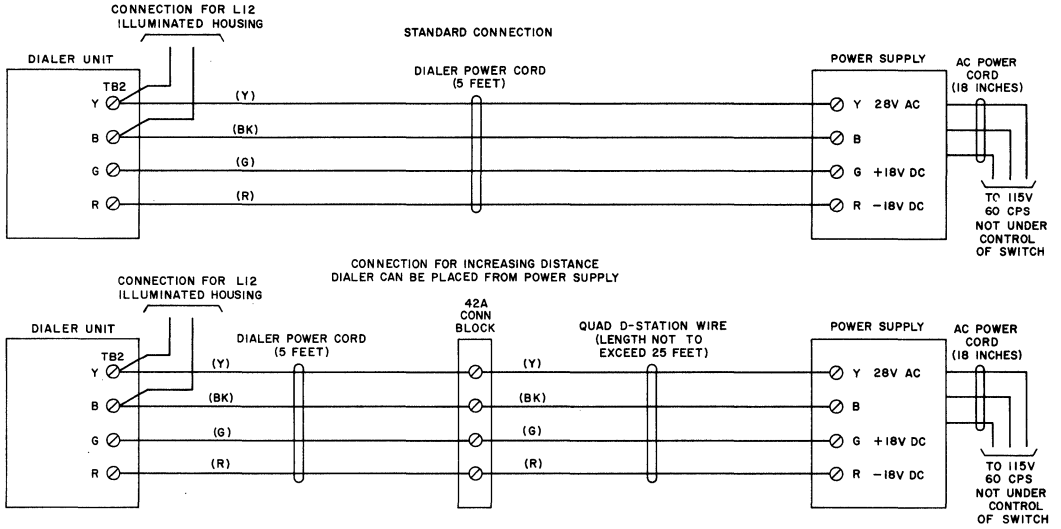


Fig. 1—KS-19594 Dialer, Power Supply Connections

TABLE A

DIALER CONNECTIONS TO TELEPHONE SETS EQUIPPED WITH *TOUCH-TONE* DIALS

KS-19594 DIALER TEL CORD		1500D 1500Y 1502B 1515B 1558D	1500M	1500S	1511F/H	1554B	1510F 1555B
P U L S I N G	R	Remove G dial lead from F on the network and	Remove G dial lead from 1 on the term. strip and	Remove G dial lead from 8 on the term. strip and	Remove G dial lead from F on the network and	Remove G dial lead from 1 on the term. strip and	Remove G dial lead from F on the network and
	Connect to R of dialer tel cord with D-161488 connector						
	G	Term. F on the network	Term. 1 on term. strip	Term. 8 on term. strip	Term. F on the network	Term. 1 on term. strip	Term. F on the network
O F F N O R M A L	W	With 25A3 or 25B3 dial term. GN on network					Term. GN on the network
		With 25W3 or 25Y3 dial term. R on network					
	BL	Term. 10 on term. strip	Term. E1 on term. strip	Term. 10 on term. strip	Term. L1 on the network	Term. 10 on term. strip	
S P E A K E R P H O N E	Y	Insulate and store		Term. 9 on term. strip	Term. 8 of the term. strip	Insulate and store in the tel set	
	BK	Insulate and store		Term. 6 on term. strip	Term. 4 of the term. strip	Insulate and store in the tel set	

TABLE A (Cont)

DIALER CONNECTIONS TO TELEPHONE SETS EQUIPPED WITH *TOUCH-TONE* DIALS

KS-19594 DIALER TEL CORD		1511D	1514B	1543DB (MD)	1563HB	1564HK 1564HL	1565GK 1565HK 1565LK	1568HT
P U L S I N G	R	Remove G dial lead from L1 on the network  and	Remove G dial lead from 2 on the term. strip  and	Remove G dial lead from L1 on the network  and			Remove G dial lead from L2 on the network  and	Remove G dial lead from 3 on the 636-type key term. strip and
	Connect to R of dialer tel cord with D-161488 connector							
G	Term. L1 on the network	Term. 2 on the term. strip	Term. L1 on the network			Term. L2 on the network	Term. 3 on the 636-type key term. strip	
O F F N O R M A L	W	Term. GN on the network	Term. 8 on the term. strip	Term. 1 on the term. strip	Term. 6 on the 241A amplifier	Term. R on the network	Term. GN on the network	Term. 2 on the 636-type key term. strip
	BL	Term. 13 on the term. strip	Term. 11 on the term. strip	Term. 2 on the term. strip	Term. 8 on the term. strip of 636-type key	Term. 7 on the term. strip of 636-type key	Term. 6 on the 636-type key term. strip	Term. 4 on the 636-type key term. strip
S P E A K E R P H O N E	Y	Term. 10 on the term. strip	Insulate and store in tel set				Term. 7 on the 636-type key term. strip	
	BK	Term. 12 on the term. strip	Insulate and store in tel set				Term. 8 on the 636-type key term. strip	

TABLE A (Cont)

DIALER CONNECTIONS TO TELEPHONE SETS EQUIPPED WITH *TOUCH-TONE* DIALS

KS-19594 DIALER TEL CORD		1702B 1702D 1712B 1713B	1750 1751 1753	1752	2500D	2511F	2554B 2558D	2702B 2702D 2712B 2713B
P U L S I N G	R	Remove G dial lead from F on the network  and		Remove G dial lead from N of the term. board  and	Remove G dial lead from F on the network  and			
	Connect to R of dialer tel cord with D-161488 connector							
O F F N O R M A L	G	Term. F on network		N of the term. board	Term. F on the network			
	W	With 25A3 or 25H4 dial Term. GN on network		Term. GN on the network	Term. R on the network			
BL	Term. 5 of the term. strip	Term. 13 of the term. strip	Term. 6 of the term. board					
S P E A K E R P H O N E	Y	Insulate and store in tel set		Term. 7 of the term. board	Insulate and store in tel set	Term. 4 of the term. strip	Insulate and store in tel set	
	BK	Insulate and store in tel set		Term. 8 of the term. board	Insulate and store in tel set	Term. 8 of the term. strip	Insulate and store in tel set	

TABLE A (Cont)

DIALER CONNECTIONS TO TELEPHONE SETS EQUIPPED WITH TOUCH-TONE DIALS

KS-19594 DIALER TEL CORD		2500M 2502B 2510F 2515B	2500Y	2500S	2514B	2555B	2563HB
P U L S I N G	R	Remove G dial lead from term. 1 of term. strip and	Remove G dial lead from F on the network and	Remove G dial lead from term. 1 of term. strip and	Remove G dial lead from RR on the network and	Remove G dial lead from F on the network and	Remove G dial lead from L1 on the network and
	Connect to R of dialer tel cord with D-161488 connector						
	G	Term. 1 of the term. strip	F on the network	Term. 1 of the term. strip	RR on the network	F on the network	L1 on the network
O F F  N O R M A L	W	R on the network			Term. 8 of the term. strip	R on the network	Term. 8 on of the term. strip.
	BL	S on the network			Term. 1 of the 241A amplifier term. strip	Term. 10 of the term. strip	S on the network
S P E A K E R P H O N E	Y	Insulate and store		Term. E2 of the term. strip	Insulate and store		
	BK	Insulate and store		Term. L1 of Net.	Insulate and store		

TABLE A (Cont)

DIALER CONNECTIONS TO TELEPHONE SETS EQUIPPED WITH *TOUCH-TONE* DIALS

KS-19594 DIALER TEL CORD		2564HL	2565GK	2565HK 2565HL	2751 2753	2754	2752	2830A1M 2831A1M	2851A1M
P U L S I N G	R	Remove G dial lead from L1 on the net. and	Remove G dial lead from G on the net. and	Remove G dial lead from L2 on the net. and	Remove G dial lead from F on the net. and	Remove G dial lead from term. 3 of the term. board and		Remove G dial lead from term. 8 of the term. board and	Remove G dial lead from term. 20 of the term. board and
	Connect to R of dialer tel cord with D-161488 connector								
	G	L1 on the net.	G on the net.	L2 on the net.	F on the net.	Term. 3 of the term. board	Term. 8 of the term. board	Term. 20 of the term. board	
O F F N O R M A L	W	GN on the net.	R on the network						
	BL	Term. 7 of the term. strip	S on the net.		Term. 13 on term. strip TB1	Term. 6 of the term. board	S of the network		
S P E A K E R P H O N E	Y	Insulate and store	Term. 7 of the 589- or 636-type key term. strip		Insulate and store		Term. 7 of the term. board	Term. 24 of the term. board	Term. 17 of the term. board
	BK	Insulate and store	Term. 8 of the 589- or 636-type key term. strip		Insulate and store		Term. 8 of the term. board	Term. 30 of the term. board	Term. 15 of the term. board

->TABLE B<-

DIALER CONNECTIONS TO *CALL DIRECTOR*, *TRIMLINE*, AND COM-KEY TELEPHONE SETS EQUIPPED WITH *TOUCH-TONE* DIALS

		TRIMLINE	CALL DIRECTORS					
		1220A AND 2220B HAND TEL SET	1616A2	1623A	1630 1631 1632 1634 1635 2631 2632	1636 1637 1638 1639 2636 2637	2630 2634 2635	2638 2639
P U L S I N G	R	Connect to G of inside wire (one side of CO line) at suitable connecting block. Disconnect G of D5AL mounting cord	Remove G dial lead from term. 6 on term. board TB2 and		Remove G dial lead from term. 4 on the term. block and			
	G	Connect to G of D5AL mounting cord at spare connecting block term., or use D-161488 connector	Term. 6 on term. board TB2		Term. 4 on the term. block			
O F F N O R M A L	W	Connect to G of D5AL mounting cord and G of the dialer tel cord	Term. 5 on the 241A amplifier	L1 on the network	GN on the network	Term. 5 on the 241A amplifier	R on the network	Term. 6 on the 241A amplifier
	BL	Connect to R of D5AL mounting cord and R of inside wire at connecting block term.	L1 on the network	L2 on the network	Term. L1 on the network			
S P E A K E R P H O N E	Y	Insulate and store	Term. 4 on term. board TB2	Term. 11 of term. block		Insulate and store	Term. 11 on term. block	Insulate and store
	BK	Insulate and store	Term. 5 on term. board TB2	Term. 12 of term. block		Insulate and store	Term. 12 on term. block	Insulate and store

→TABLE B (Cont)←

DIALER CONNECTIONS TO *CALL DIRECTOR, TRIMLINE, AND COM-KEY*  
 TELEPHONE SETS EQUIPPED  
 WITH *TOUCH-TONE* DIALS

		<u>CALL DIRECTORS</u>		COM-KEY
		2630DA 2631DA	2636CA 2637DA	2832-TYPE 2833-TYPE
P U L S I N G	R	Remove G dial lead from 12 on TS and connect to R of dialer tel cord with D-161488 connector		Remove G dial lead from F on network and connect to R of dialer tel cord with D-161488 connector
	G	Term. 12 on terminal strip		F on network
O F F N O R M A L	W	GN on network	Term. 5 on 241 amp	R on network
	BL	R on network	L1 term. on network	S on network
S P E A K E R P H O N E	Y	Insulate and store		Terminal 24 of the terminal board
	BK	Insulate and store		Terminal 30 of the terminal board



## KS-19594 DIALER SWITCHBOARD AND MISCELLANEOUS KEY EQUIPMENT CONNECTIONS

### 1. GENERAL

1.01 This section is reissued to:

- Change condition terminations of dialer telephone cord at equipment, Table A

Change or additions in the body of tables are indicated by shaded areas.

### 2. CONNECTIONS



*The power supply cord should not be connected to the AC power line receptacle when removing the housing or making any connections.*

2.01 **Power Supply Unit:** Refer to dialer installation section for mounting instructions.

#### 2.02 Dialer Telephone Cord:

- Standard six conductor cord.
- Secure inside the equipment under a cord clamp or by taping to set mounting cord or cable.
- Dress wires to allow proper operation of equipment.

2.03 Refer to appropriate tables and figures in this section for terminations of dialer cord leads.



*Test the operation of the dialer by recording and calling the telephone number usually called for job completion. For installation with speakerphones, be sure to test with speakerphones operating to insure proper connection to off normal contacts.*

#### 2.04 Connection Index:

Table A—Dialer Connections To Consoles, Key Equipment, Apparatus Units, and Key Mountings

Table B—Dialer Connections To Switchboards

Fig. 1—KS-19594 Dialer, Power Supply Connections

Fig. 2—KS-19594 Dialer Connections to Switchboards With Both Rotary and TOUCH-TONE Dials

Fig. 3—KS-19594 Dialer Connections Requiring a KTU, to Switchboards With Both Rotary and TOUCH-TONE Dials

Fig. 4—KS-19594 Dialer Connections to Switchboards With TOUCH-TONE Dials Only

Fig. 5—KS-19594 Dialer Connections Requiring a KTU, To Switchboards With TOUCH-TONE Dials Only

TABLE A

## DIALER CONNECTIONS TO CONSOLES, KEY EQUIPMENT, APPARATUS UNITS, AND KEY MOUNTINGS

KS-19594 DIALER TEL CORD		CONSOLES WITH ROTARY DIALS					
		1A 2A	3A	4A	3C1 3C2 4B1 4B2	5A 5B 6A 6B	10A, 11A FOR USE WITH 2A AUTOMATIC CALL DISTRIBUTION SYSTEM
P U L S I N G	R	Remove BL dial lead from 1 of the dial term. strip and	Remove Y dial lead from 6 of term. strip TS1  and		Remove BL dial lead from 2 of term. strip TS2  and	Remove BL lead from F of the network  and	
	Connect to R of dialer tel cord with D-161488 connector						
	G	1 of the dial term. strip	6 of term. strip TS1		2 of term. strip TS2	F of the network	
O F - N O R M A L	W	GN* term. on the network	1 of term. strip TS2		GN term. on the network		
	BL	R* term. on the network	2 of term. strip TS2	14 of term. strip TS2	R term. on the network		
S P E A K E R P H O N E	Y	Insulate and store in the console					
	BK	Insulate and store in the console					

\* Connect to terminals 3 and 4 of dial terminal strip when console is used with 757A PBX.

TABLE A (Cont)

DIALER CONNECTIONS TO CONSOLES, KEY EQUIPMENT, APPARATUS UNITS, AND KEY MOUNTINGS

KS-19594 DIALER TEL CORD		CONSOLES WITH ROTARY DIALS (Cont)					
		10A, 11A FOR USE WITH 3A ACD SYS	10B 11B	12A1	12B1	14A1 14A3 15A1 15A3	14-TYPE
P U L S I N G	R	Remove BL dial lead from 7 of term. board TB1 and	Remove BL dial lead from 3 of term. board TB1 and	Remove BL dial lead from 9 of term. board TB3 and	Remove BL dial lead from 2 of term. board TB2 and	Remove BL dial lead from 8 of term. board and	Remove BL dial lead from 9 of term. board TB1 and
	Connect to R of dialer tel cord with D-161488 connector						
	G	7 of term. board TB1	3 of term. board TB1	9 of term. board TB3	2 of term. board TB2	8 of term. board	9 of term. board TB1
O F - N O R M A L	W	GN term. on the network					
	BL	R term. on the network					
S P E A K E R P H O N E	Y	Insulate and store in console					TB1-4*
	BK	Insulate and store in console					TB1-9*

◆ \* This is not a speakerphone function. ◆

TABLE A (Cont)

## DIALER CONNECTIONS TO CONSOLES, KEY EQUIPMENT, APPARATUS UNITS, AND KEY MOUNTINGS

KS-19594 DIALERS TEL CORD		APPARATUS UNITS WITH ROTARY DIALS			KEY EQUIPMENT WITH ROTARY DIALS		KEY MOUNTINGS WITH ROTARY DIALS		
		12A, 14A FOR USE WITH 2A AUTOMATIC CALL DISTRIBUTION SYSTEM	12A, 14A FOR USE WITH 3A AUTOMATIC CALL DISTRIBUTION SYSTEM	12B, 14B FOR USE WITH 2A OR 3A AUTOMATIC CALL DISTRIBUTION SYSTEM	4A USING 634(MD) SUBSCRIBER SET AND 6026 TYPE CONTROL KEY	4A USING 685 SUB- SCRIBER SET AND 6026 TYPE CONTROL KEY	400 SERIES USING 688-TYPE OR 690-TYPE SUBSCRIBER SET	700 SERIES USING 750-TYPE APPARATUS UNIT	700 SERIES USING 751-TYPE APPARATUS UNIT
P U L S I N G	R	Remove BL dial lead from F of the network and	Remove BL dial lead from term. 5 of TB1 and	Remove BL dial lead from term. 3 of TB1 and	Remove G inside wire from L2-GN sub set and	Remove G inside wire from L2 in sub set and	Remove BL dial lead from F of the network and	Remove Y lead from Y term. of the dial  and	
	Connect to R of dialer tel cord with D-161488 connector								
	G	F of the network	5 term. of TB1	3 term. of TB1	L2-GN term. in sub set	L2 term. in sub set	F term. of the network	Y term. of the dial	
O F F - N O R M A L	W	GN term. of the network			BK term. of the sub set	GN term. of the network		1 term. of the apparatus unit term. strip	17 term. of the handset mounting
	BL	R term. of the network						2 term. of the apparatus unit term. strip	16 term. of the handset mounting
S P E A K E R P H O N E	Y	Insulate and store							
	BK	Insulate and store							

TABLE A (Cont)

## DIALER CONNECTIONS TO CONSOLES, KEY EQUIPMENT, APPARATUS UNITS, AND KEY MOUNTINGS

KS-19594 DIALER TEL CORD		CONSOLES WITH TOUCH-TONE DIALS				
		1A 2A	1B 2B	3C3 3C4 4B3 4B4	5B 6B	10B 11B
P U L S I N G	R	Remove G dial lead from term. 7 of the term. board  and		Remove G dial lead from 11 of term. strip TS2  and	Remove G dial lead from 11 of term. strip TS2  and	Remove G dial lead from 1 of the 151E amplifier and
	Connect to R of dialer tel cord with D-161488 connector					
	G	Term. 7 of the term. board		11 of term. strip TS2	11 of term. strip TS2	1 of 151E amplifier
O F F - N O R M A L	W	GN term. on the network*		GN term. on the network	3 of term. strip TS2	GN term. on the network
	BL	R term. on the network*		R term. on the network	4 of term. strip TS2	R term. on the network
S P E A K E R P H O N E	Y	Insulate and store				
	BK	Insulate and store				

\* Connect to terminals 9 and 10 of the TT dial terminal board when console is used with 757A PBX

TABLE A (Cont)

## DIALER CONNECTIONS TO CONSOLES, KEY EQUIPMENT, APPARATUS UNITS, AND KEY MOUNTINGS

KS-19594 DIALER TEL CORD		CONSOLES WITH TOUCH-TONE DIALS			APPARATUS UNIT WITH TOUCH-TONE DIAL	KEY MOUNTING WITH TOUCH-TONE DIAL
		12B2	14A2 14A4 15A2 15A4	14-TYPE†	12B, 14B FOR USE WITH 2A OR 3A ACD SYS	1400 SERIES USING 1690-TYPE SUB SET
P U L S I N G	R	Remove G dial lead from 7 of term. strip TB4  and  Connect to R of dialer tel cord with D-161488 connector	Remove G dial lead from 4 of the term. board  and	10 of Term. strip TB1 and remove strap between term. strip TB1 8 and 9	Remove G dial lead from term. 1 of the 151E amplifier  and  Connect to R of dialer tel cord with D-161488 connector	Remove G dial lead from L1 of the net- work  and
	G	7 of term. strip TB4	4 of the term. board	9 of the term. strip TB1	Term. 1 of the 151E amplifier	L1 of the network
O F F - N O R M A L	W	GN term. on the network				
	BL	R term. on the network				
S P E A K E R P H O N E	Y	Insulate and store		TB1-4*	Insulate and store	
	BK	Insulate and store		TB1-9*	Insulate and store	
61A Filter Leads	R Y BK			TB1-8 TB1-10 TB1-9		

♦ \* This is not a speakerphone function.

† Add 61A filter (ordered separately) for RF suppression.♦

**TABLE B**  
**DIALER CONNECTIONS TO SWITCHBOARDS**

KS-19594 DIALER TEL CORD		SWITCHBOARDS		
		551A, B, D 552A, B, D, E 605A (NOTES 1, 2, 8)	555 556A 557A, B (NOTES 3, 4, 5, 8)	608A, B, D (NOTES 6, 7, 8)
P U L S I N G	R	Term. 3 of 10-141 term. strip		Term. 3 of 10-141 term. strip
	G	Term. 5 of 10-141 term. strip	Term. 2 of 10-141 term. strip	Term. 5 of 10-141 term. strip
O F - N O R M A L	W	Term. 1 of 10-141 term. strip	Term. 8 of 10-141 term. strip	Term. 1 of 10-141 term. strip
	BL	Term. 2 of 10-141 term. strip	Term. 9 of 10-141 term. strip	Term. 2 of 10-141 term. strip
S P E A K E R P H O N E	Y	Insulate and store		
	BK	Insulate and store		

**SECTION 512-125-430**

Note 1: Mount 10-141 terminal strip under keyshelf adjacent to wire entrance hole for dial. Rewire 6044B dial mounting as follows:

ROTARY OR ROTARY AND TOUCH-TONE DIALS (FIG. 2)				
LEAD	REMOVE FROM 6044B	CONNECT TO 10-141	CONNECT STRAPS	
			FROM 6044B	TO 10-141
R	R	1	R	1
G or BL	GN	2	GN	2
BL	B	3		
Y	Y	4	Y	4
			B	5

TOUCH-TONE DIAL ONLY (FIG. 4)*				
LEAD	REMOVE FROM 6044B	REMOVE FROM 10-141	CONNECT STRAP	
			FROM 10-141	TO 10-141
R	R	1		
G or BL	GN	2		
BL	B	5		
Y	Y	4	4	5

\* 551 PBX — Place strap from 1 of B relay to 2RT of F relay.

Note 2: If dialer is disconnected, leave 10-141 terminal strip in place and strap 3 to 5.

Note 3: Mount 17B KTU in 105B apparatus box on side of switchboard and 10-141 terminal strip under keyshelf adjacent to wire entrance hole for dial. Rewire 6044B dial mounting as follows:

ROTARY OR ROTARY AND TOUCH-TONE DIALS (FIG. 3)					
LEAD	REMOVE FROM 6044B	CONNECT TO 10-141	CONNECT STRAPS		
			FROM 10-141	TO 6044B	TO 17B
R	R	1	1	R	9
G or BL	GN	3	3		7
BL	B	7	7		5
Y	Y	4	4	Y	
W	W	6	6	W	
			2	GN	
			5	B	4
			8		1



**Note 4:** Connect terminal 9 of 10-141 terminal strip to PBX ground and terminal 3 of 17B KTU to PBX battery. If PBX battery is -48 volts, connect 1000-ohm resistor (KS-13490L1) in battery lead to 17B KTU:

TOUCH-TONE DIALS ONLY (FIG. 5)					
LEAD	REMOVE FROM 6044B	REMOVE FROM 10-141	CONNECT STRAPS		
			FROM 10-141	TO 10-141	TO 17B
R	R	1	1		9
G or BL	GN	2			
B	B	5	5		4
Y	Y	4	4	2	
W	W	6	6	5	
			3		7
			7		5
			8		1

**Note 5:** If dialer is disconnected, remove 17B KTU. Leave 10-141 terminal strip and strap terminals 2 to 3 and 5 to 7.

**Note 6:** Mount 10-141 terminal strip under keyself adjacent to wire entrance hole for dial. Rewire 6044B dial mounting as follows using strapwire and D-161488 connectors to extend wiring from KS-16323 connector:

ROTARY OR ROTARY AND TOUCH-TONE DIALS (FIG. 2)				
LEAD FROM KS-16323 CONN PIN NUMBER	REMOVE FROM 6044B	CONNECT TO 10-141	CONNECT STRAPS	
			FROM 10-141	TO 6044B
1	B	3		
2	Y	4	4	Y
3	R	1	1	R
21	GN	2	2	GN
			5	B

TOUCH-TONE DIAL ONLY (FIG. 4)				
LEAD FROM KS-16323 CONN PIN NUMBER	REMOVE FROM 6044B	REMOVE FROM 10-141	CONNECT STRAP	
			FROM 10-141	TO 10-141
1	B	5		
2	Y	4	4	5
3	R	1		
21	GN	2		

**Note 7:** If dialer is disconnected, leave 10-141 terminal strip in place and strap terminals 3 and 5.

**Note 8:** Dialer may be connected as shown in Table B to any PBX equipped with rotary or both rotary and TOUCH-TONE dials or TOUCH-TONE dials only. See Fig. 2, 3, 4, and 5. Dialer connections to an early model PBX should be engineered locally.

SECTION 512-125-430

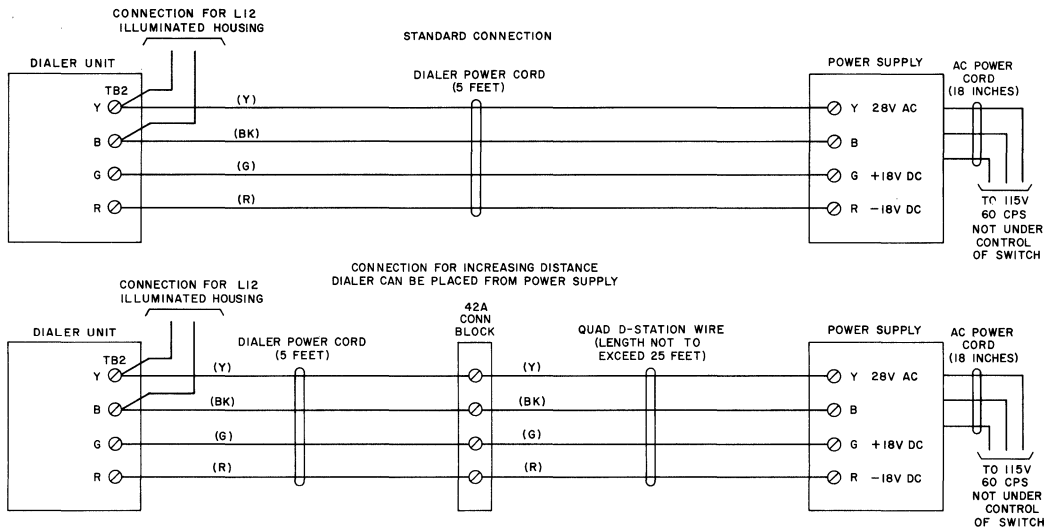


Fig. 1—KS-19594 Dialer, Power Supply Connections

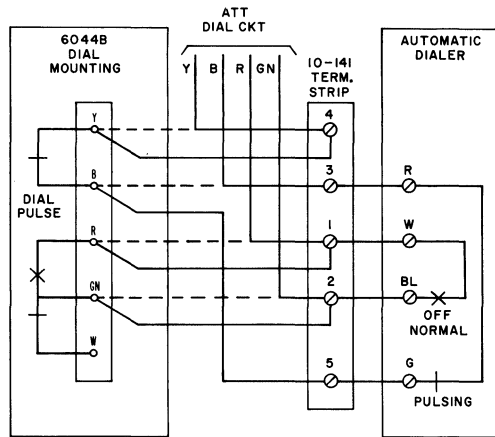


Fig. 2—KS-19594 Dialer Connections to Switchboards With Both Rotary and TOUCH-TONE Dials

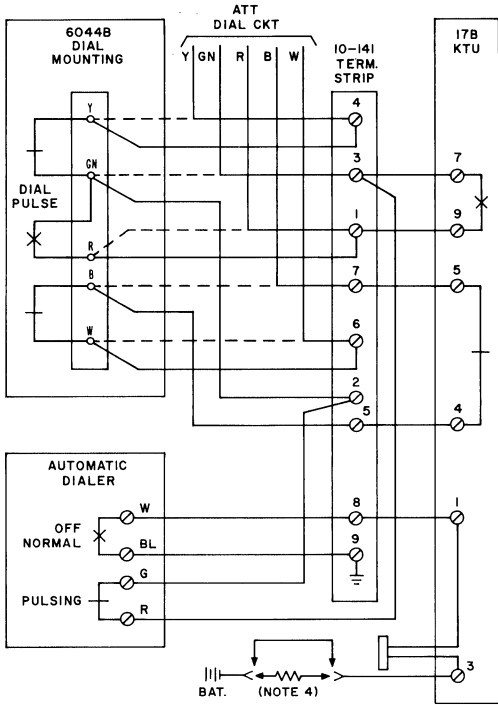


Fig. 3—KS-19594 Dialer Connections Requiring a KTU, to Switchboards With Both Rotary and TOUCH-TONE Dials

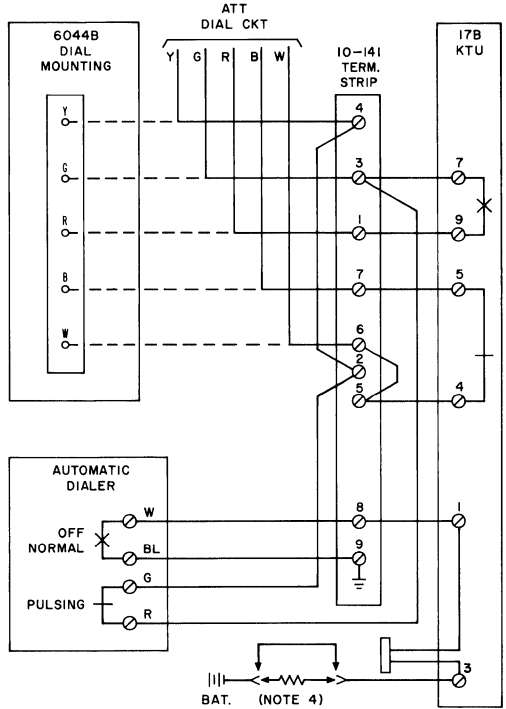


Fig. 5—KS-19594 Dialer Connections, Requiring a KTU, to Switchboards With TOUCH-TONE Dials Only

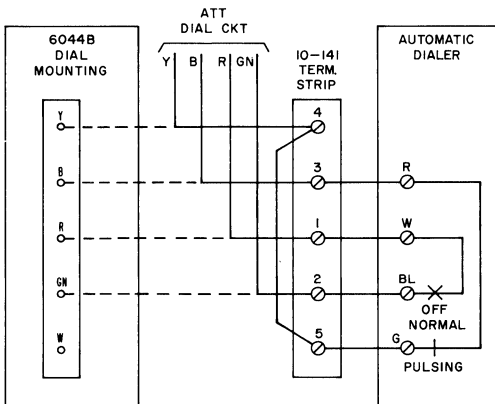


Fig. 4—KS-19594 Dialer Connections to Switchboards With TOUCH-TONE Dials Only

## KEY EQUIPMENT—4A

### IDENTIFICATION, INSTALLATION, AND MAINTENANCE

#### 1. GENERAL

1.01 This section is reissued to:

- Add 1035C3A dial, show 1025A3 and 1025W3A dials MD; Table A
- Show 688A and B subscriber sets MD.

1.02 The 688-type subscriber set contains a transistor amplifier to compensate for the low output level of the transmitter of the 52-type head telephone set. It is recommended that the 688-type subscriber set be used in all new installations in preference to the 685-type subscriber set which is not equipped with an amplifier.

#### 2. IDENTIFICATION

2.01 The basic 4A key equipment (Fig. 1) consists of:

- Subscriber set
- Dial
- Head telephone set
- Key

2.02 The 4A key equipment utilizes a head telephone set to permit hands-free operation. The circuit provides:

- Two-way service between a central office or PBX and the subscriber station.
- Hold feature, if desired.

**Note:** 4A key equipment should not be used where tip party identification is required.

2.03 See Table A for selection of components for the various configurations of the 4A key equipment.

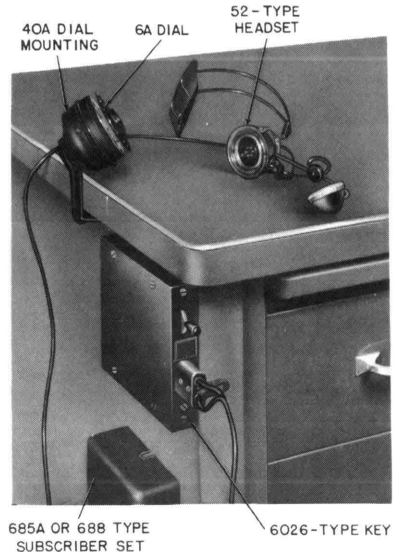


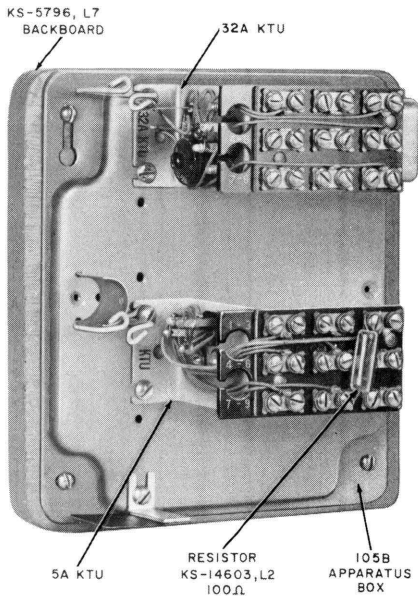
Fig. 1—Typical 4A Key Equipment Installation

#### 3. INSTALLATION

3.01 Install components of 4A key equipment such as subscriber sets, 105-type apparatus boxes, dials, etc, following standard practices for the apparatus involved.

3.02 In selecting a mounting location for the 6026-type key, avoid knee well installations or other locations where damage or accidental operation of equipment or injury to customer might occur.

3.03 When installing the key on the side of a desk or table, the face of the key should be flush with the edge of the desk or table (Fig. 1).



**Fig. 2—Battery Feed Filter and Holding Relay Equipment**

**3.04** The 6026-type key housing can be reversed for mounting on either the right or left side of a desk or table.



*To minimize crosstalk, wiring between the subscriber set and 6026-type key should not exceed 10 feet. Avoid paralleling with other telephone wires.*

**3.05** When required, the 5A and 32A KTU's (Fig. 2) may be located remotely from the subscriber set and 6026-type key.

**3.06** Dial mountings may be installed on top of or at either end of a desk or table. The

6000D, 6044B, or 6044D dial mountings require drilling through the top of the desk or table for passage of the wires.



*Obtain customer's permission before drilling hole in desk or table.*

**3.07** Where drilling is not permissible, install dial mounting as follows:

- (a) For side of desk, where top overhang permits, attach a 40A dial mounting to the overhang (Fig. 1).
- (b) Where a greater angle is desired, use a 43A dial mounting in conjunction with a G1 handset mounting (line switch removed).

**3.08** To install a filter on a 6-type dial in a mounting, use another 64A dial adapter as an extra spacer. A 61A filter, a P-295735 mounting bracket, three No. H-36 RHM screws, and two 1/4-inch No. 4 self-tapping screws are also required. Mount filter on the underside of mounting bracket with self-tapping screws. A D-161488 connector may be used to connect filter leads to the dial and key.



*When a 688B (MD) or 688C subset is used, wiring changes must be made at the 6026B or 6026D key. See connections section for these required changes.*

#### 4. MAINTENANCE

**4.01** Maintenance of subscriber sets, ringers, dials, batteries, head telephone sets, key telephone units, and associated apparatus is covered in the particular section on each item.

**4.02** Use PBX installation and maintenance sections as guides for correcting troubles on relays, keys, or jacks.

**4.03** Make circuit operation tests in accordance with SD-69087-01.

♦ TABLE A ♦

## COMPONENT PARTS OF 4A KEY EQUIPMENT

EQUIPMENT		REMARKS
Adapter, dial	52D	Used with 40A, 6000D dial mounting in addition to the 64A dial adapter.
	59B	Used with the 6044B dial mounting.
	59D	Used with the 6044D dial mounting.
	64A	Used with 40A, 6000D dial mounting in addition to the 52D dial adapter.
Box, apparatus, 105 type		For mounting key telephone units (Fig. 2).
Dial, 6 type*		Used with 40A, 43A, 6000D, 6044B or D dial mounting (Fig. 1).
Dial, 1025A3 and 1025W3 (MD)		Use D10P or D10R mounting cord — specify length when ordering.
Dial, 1035C3A		Use D14M mounting cord — specify length when ordering.
Filter, 61A		Used to suppress radio frequency induction due to dialing.
Key, 6026B		3-position lever-type key arranged for "OFF", talking, and holding; equipped with 361C jack, 215A jack, 3B varistor, and terminal block (Fig. 1).
Key, 6026D		Similar to the 6026B key, but arranged for "OFF" and talking only; 2-position lever-type key (Fig. 1).
Mounting, dial	40A	For fastening to the underside of a desk top overhang (Fig. 1).
	43A	To hold dial at 45, 60, 75, or 90 degree angle from a horizontal position.
	6000D	Mounted on top of a desk at a 20-degree angle.
	6044B, D	Mounted on top of a desk at a 37-degree angle.
Resistor, 100 ohm KS-14603, List 2D		Used with a 5A KTU (Fig. 2).
Set, subscriber, 685A		Common battery talking, common battery signaling (Fig. 1).
Set, subscriber, 688A (MD), B (MD), and C		Common battery talking, common battery signaling.
Set, head telephone 52- or 53-type		Attendant telephone (Fig. 1).
Units, key telephone (Fig. 2)	5A	Hold relay.
	32A	Used as a transmitter current limiting network when the total loop conductor to the central office or nearest long line termination is less than 300 ohms. This includes both station and central office conductor loops in the case of PBX extensions.

\* When installing the 6J, K, or L, dial, use a 6044D dial mounting.

## KEY EQUIPMENT—4A

### COMMON BATTERY TALKING—COMMON BATTERY SIGNALING

### CONNECTIONS

#### 1. GENERAL

**1.01** This section contains connections for the 4A key equipment. Refer to SD-69087-01 for full schematics of components used in the system.



*To minimize the possibility of crosstalk, the wiring between the subscriber set, 6026-type key, and dial should not exceed 10 feet. Avoid paralleling with other telephone wires.*

**1.02** This section is reissued to:

- Revise Fig. 3, 10, 11, and 12 to show factory strap between terminals 4 and 5 of 6026B key which is to be removed.

#### 2. CONNECTION INDEX

Fig. 1—685A Subset and Rotary Dial, With Hold

Fig. 2—685A Subset and Rotary Dial, With or Without A Lead Control

Fig. 3—688C Subset and Rotary Dial, With Hold

Fig. 4—688A (MD) Subset and Rotary Dial, A Lead Control

Fig. 5—688B (MD) Subset and Rotary Dial, A Lead Control

Fig. 6—688C Subset and Rotary Dial, A Lead Control

Fig. 7—688C Subset and 1025A3 (MD) Dial, A Lead Control

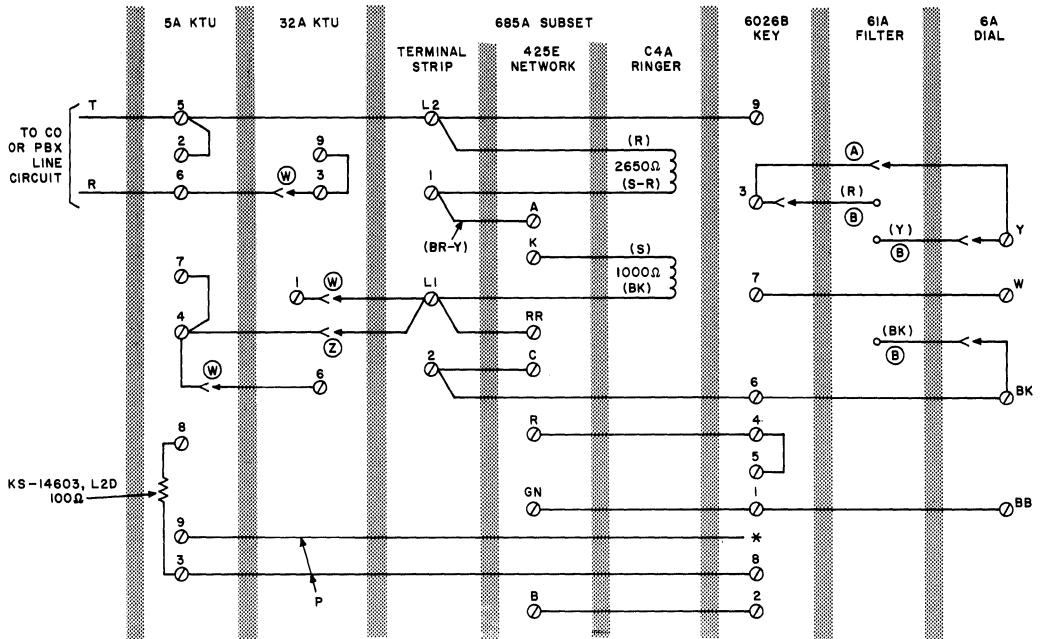
Fig. 8—688C Subset and 1025W3A (MD) Dial, A Lead Control

Fig. 9—688C Subset and 1035C3A Dial, A Lead Control

Fig. 10—688C Subset and 1025A3 (MD) Dial, With Hold

Fig. 11—688C Subset and 1025W3A (MD) Dial, With Hold

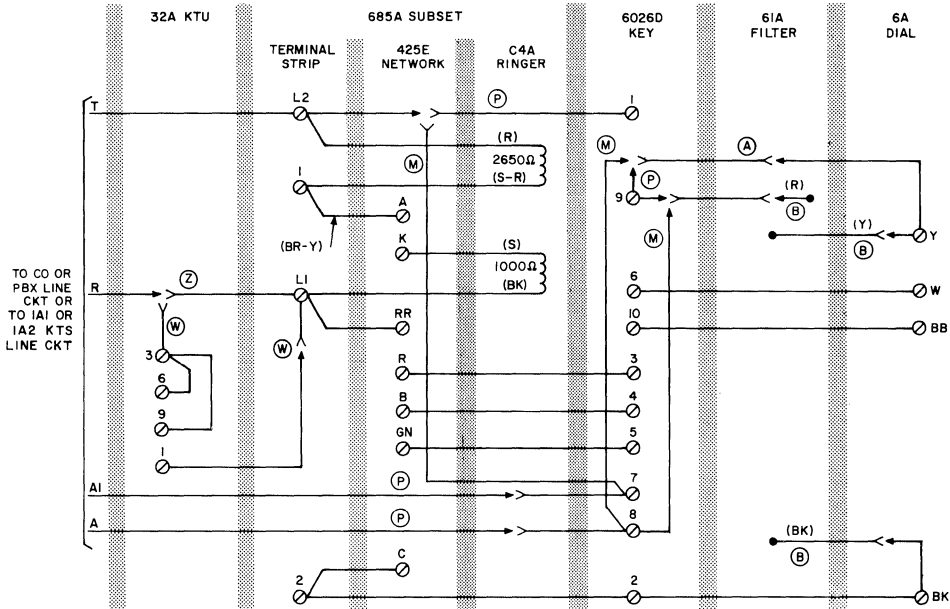
Fig. 12—688C Subset and 1035C3A Dial, With Hold



- \* INSULATE AND STORE
- (W) LOOP LESS THAN 300 OHMS
- (Z) LOOP MORE THAN 300 OHMS
- (A) WITHOUT 61A FILTER
- (B) WITH 61A FILTER

Fig. 1—685A Subset and Rotary Dial, With Hold





- (M) WITHOUT HOLD AND WITHOUT A LEAD CONTROL
- (P) WITHOUT HOLD AND WITH A LEAD CONTROL
- (W) LOOP LESS THAN 300 OHMS
- (Z) LOOP MORE THAN 300 OHMS
- (A) WITHOUT 61A FILTER
- (B) WITH 61A FILTER

Fig. 2—685A Subset and Rotary Dial, With or Without A Lead Control

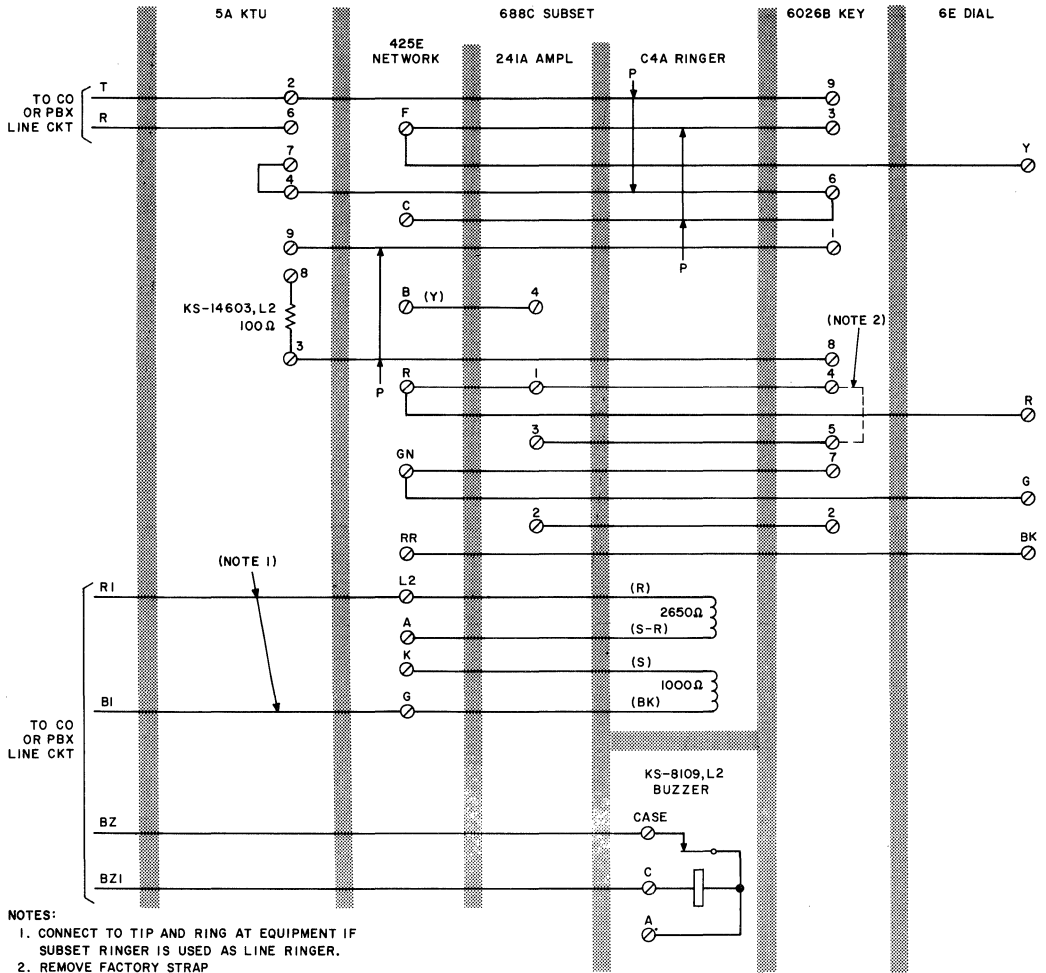
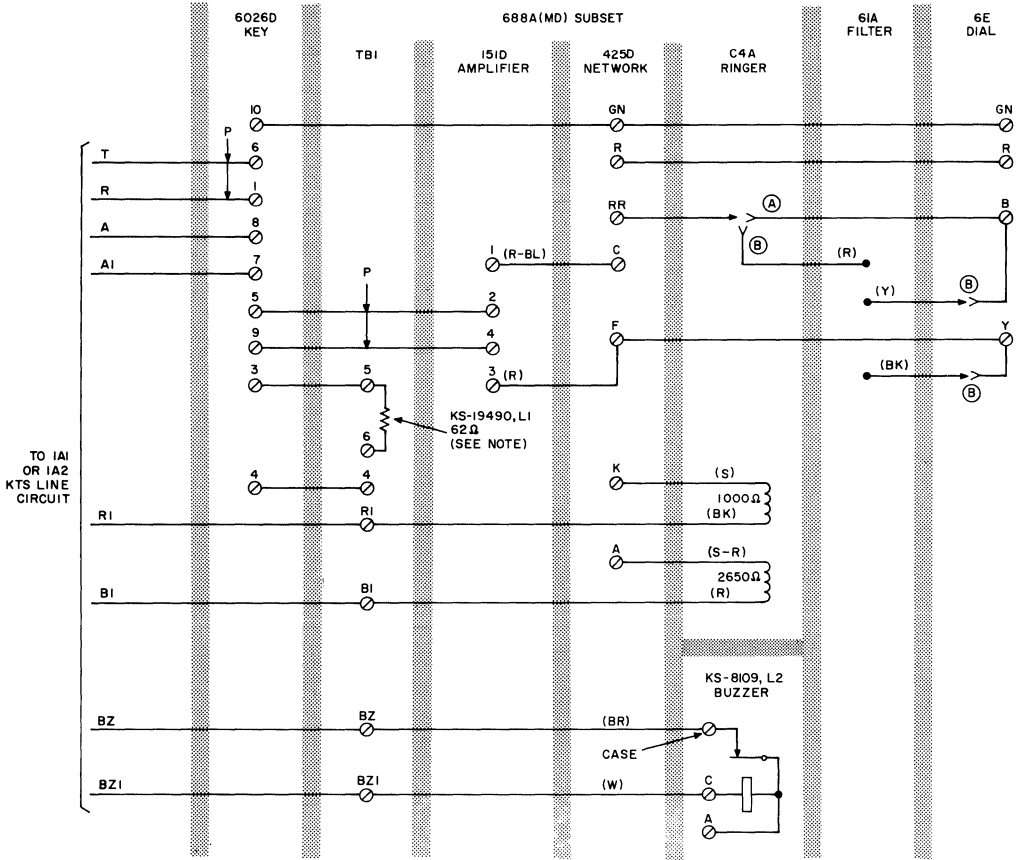


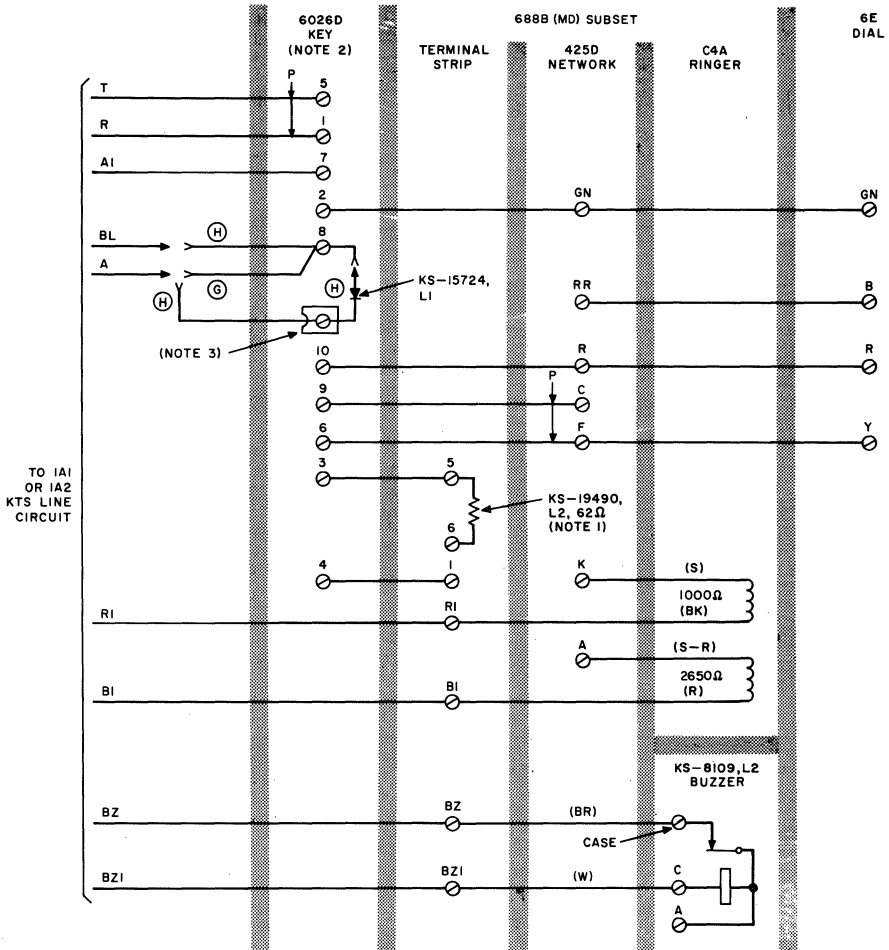
Fig. 3—688C Subset and Rotary Dial, With Hold



NOTE:  
IF MORE TRANSMITTER GAIN IS REQUIRED,  
REPLACE WITH A 30 OHM RESISTOR.

- (A) WITHOUT 61A FILTER
- (B) WITH 61A FILTER

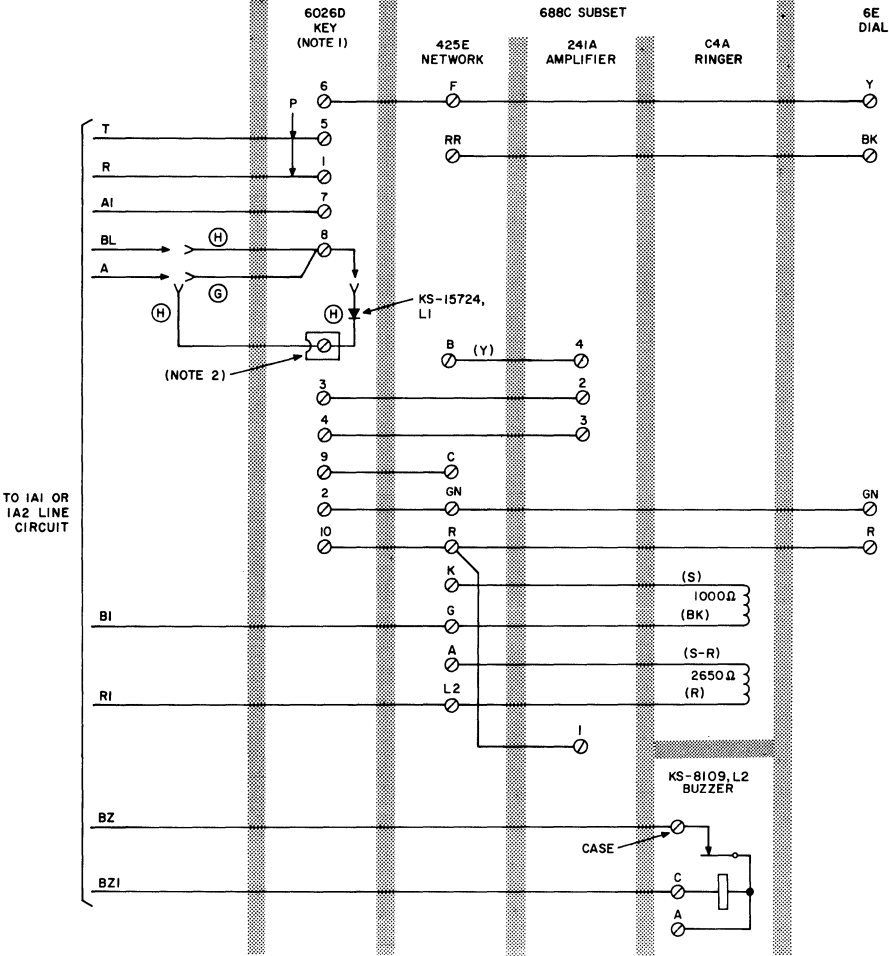
Fig. 4—688A (MD) Subset and Rotary Dial, A Lead Control



NOTES:

1. IF MORE TRANSMITTER GAIN IS REQUIRED, REPLACE WITH 30Ω RESISTOR.
  2. MODIFY KEY BY MOVING (BK) SPADE-TIPPED LEAD CONNECTED TO VARISTOR FROM TERMINAL 3 TO 2.
  3. USE D-161488 CONNECTOR.
- ⓐ WITHOUT BUSY LAMP.
- ⓑ WITH BUSY LAMP.

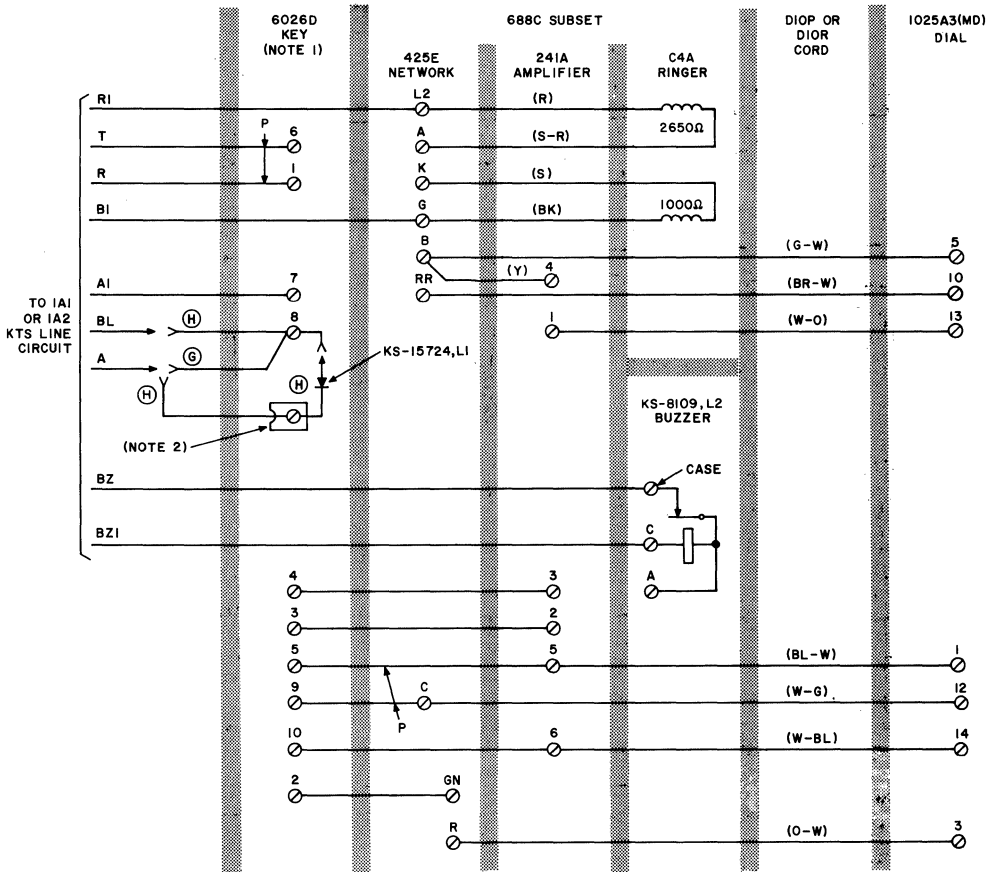
Fig. 5—688B (MD) Substation and Rotary Dial, A Lead Control



NOTES:

- 1. MODIFY KEY BY MOVING (BK) SPADE - TIPPED LEAD CONNECTED TO VARISTOR FROM TERMINAL 3 TO 2.
- 2. USE D-161488 CONNECTOR.
- ⓐ WITHOUT BUSY LAMP
- ⓑ WITH BUSY LAMP

Fig. 6—688C Subset and Rotary Dial, A Lead Control



NOTES:

1. MODIFY KEY BY MOVING (BK) SPADE-TIPPED LEAD CONNECTED TO VARISTOR FROM TERMINAL 3 TO 2.
2. USE D-161488 CONNECTOR.

- (G) WITHOUT BUSY LAMP
- (H) WITH BUSY LAMP

Fig. 7—688C Subset and 1025A3 (MD) Dial, A Lead Control

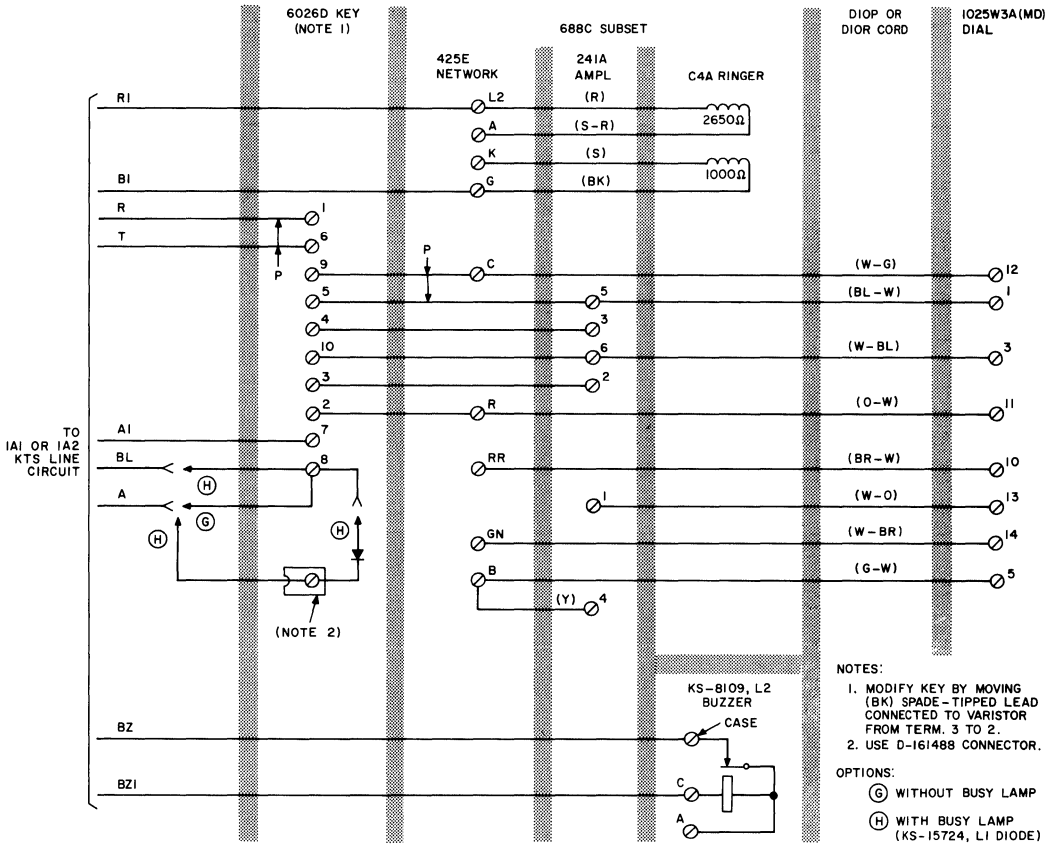


Fig. 8—688C Subset and 1025W3A (MD) Dial, A Lead Control

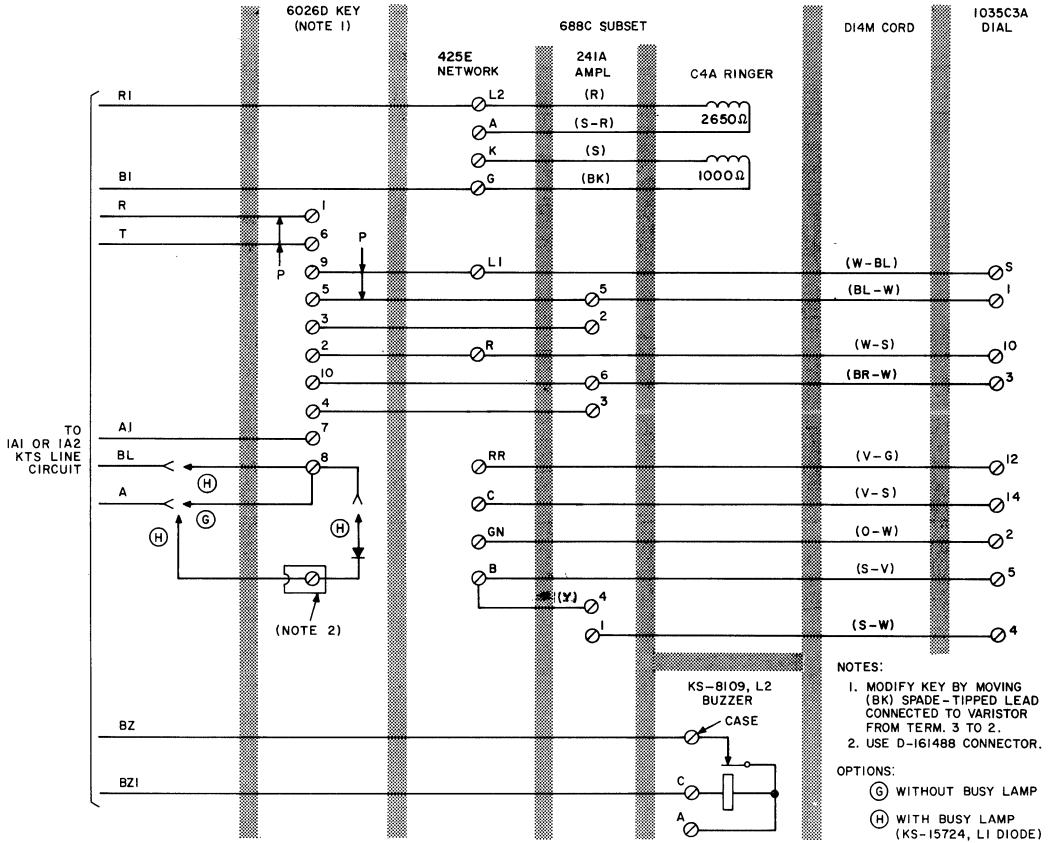


Fig. 9—688C Subset and 1035C3A Dial, A Lead Control



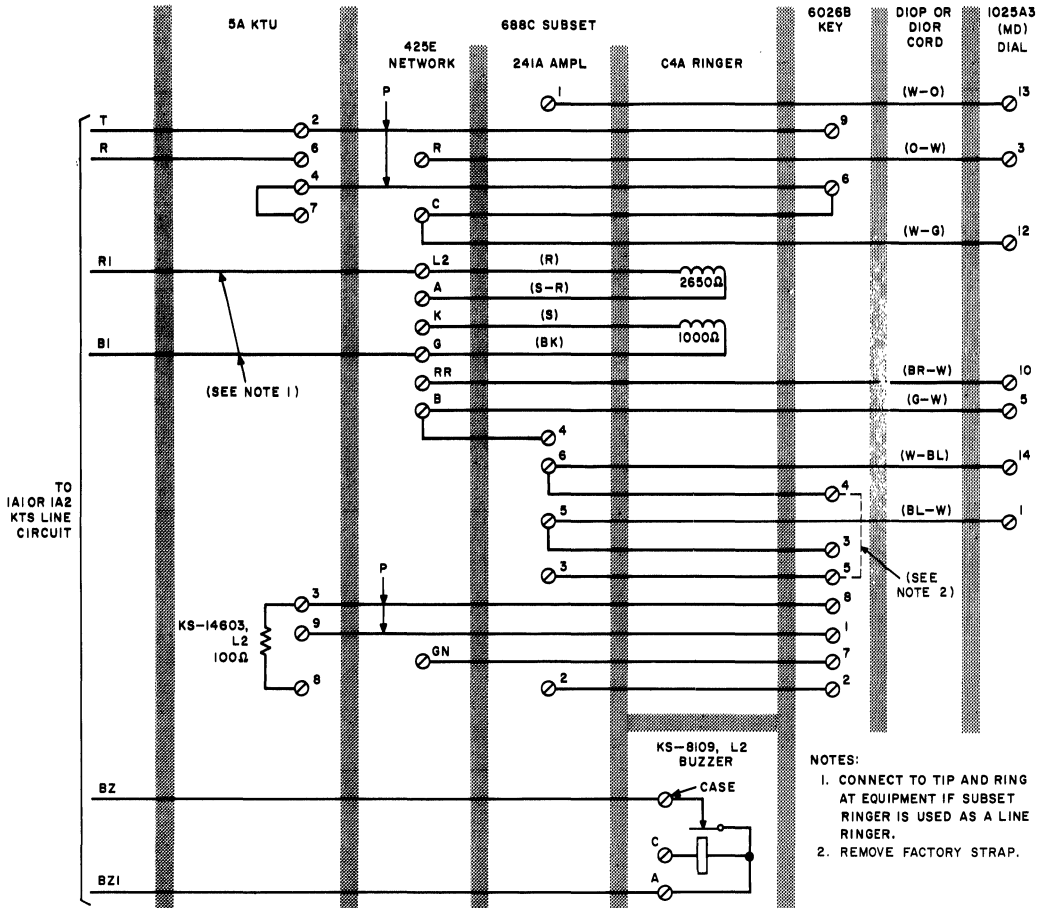


Fig. 10—688C Subset and 1025A3 (MD) Dial, With Hold

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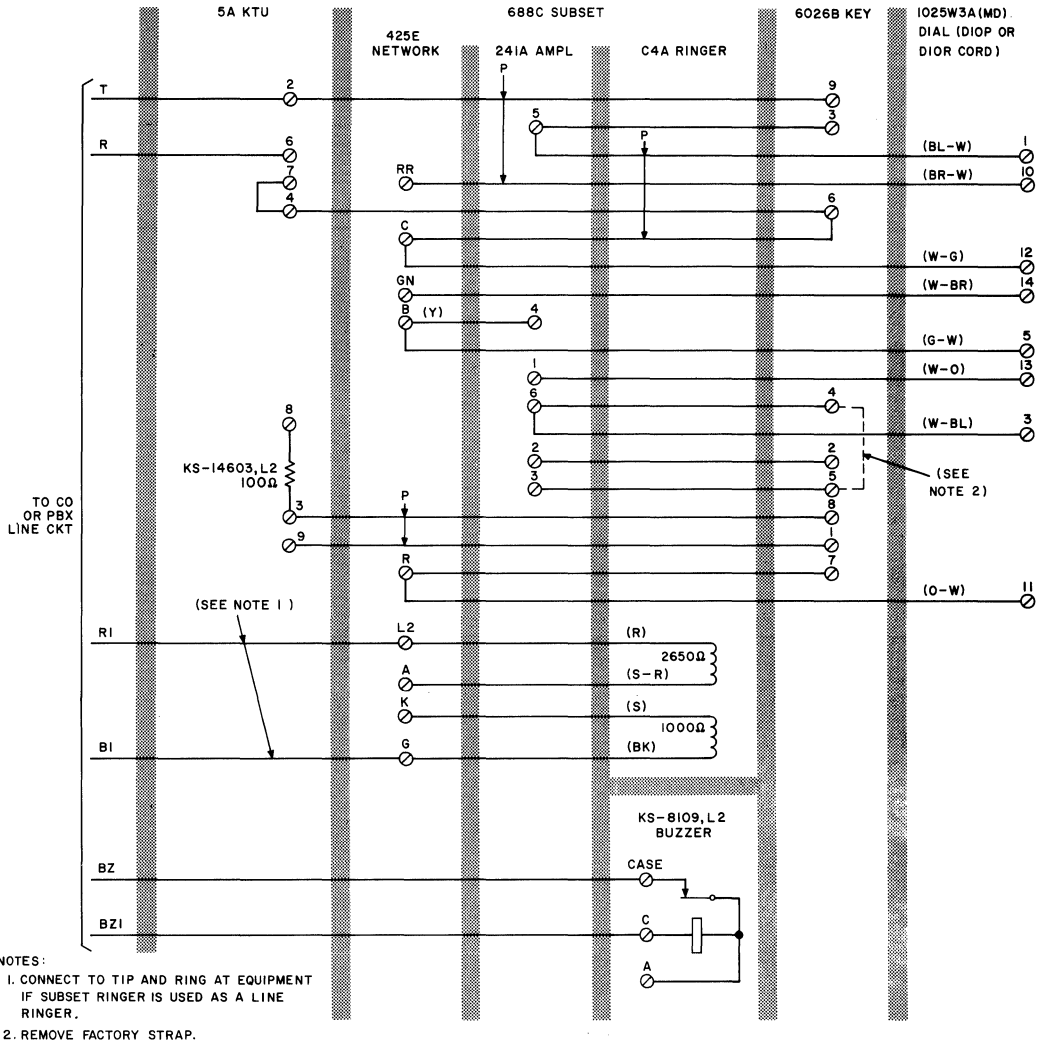


Fig. 11—688C Subset and 1025W3A (MD) Dial, With Hold

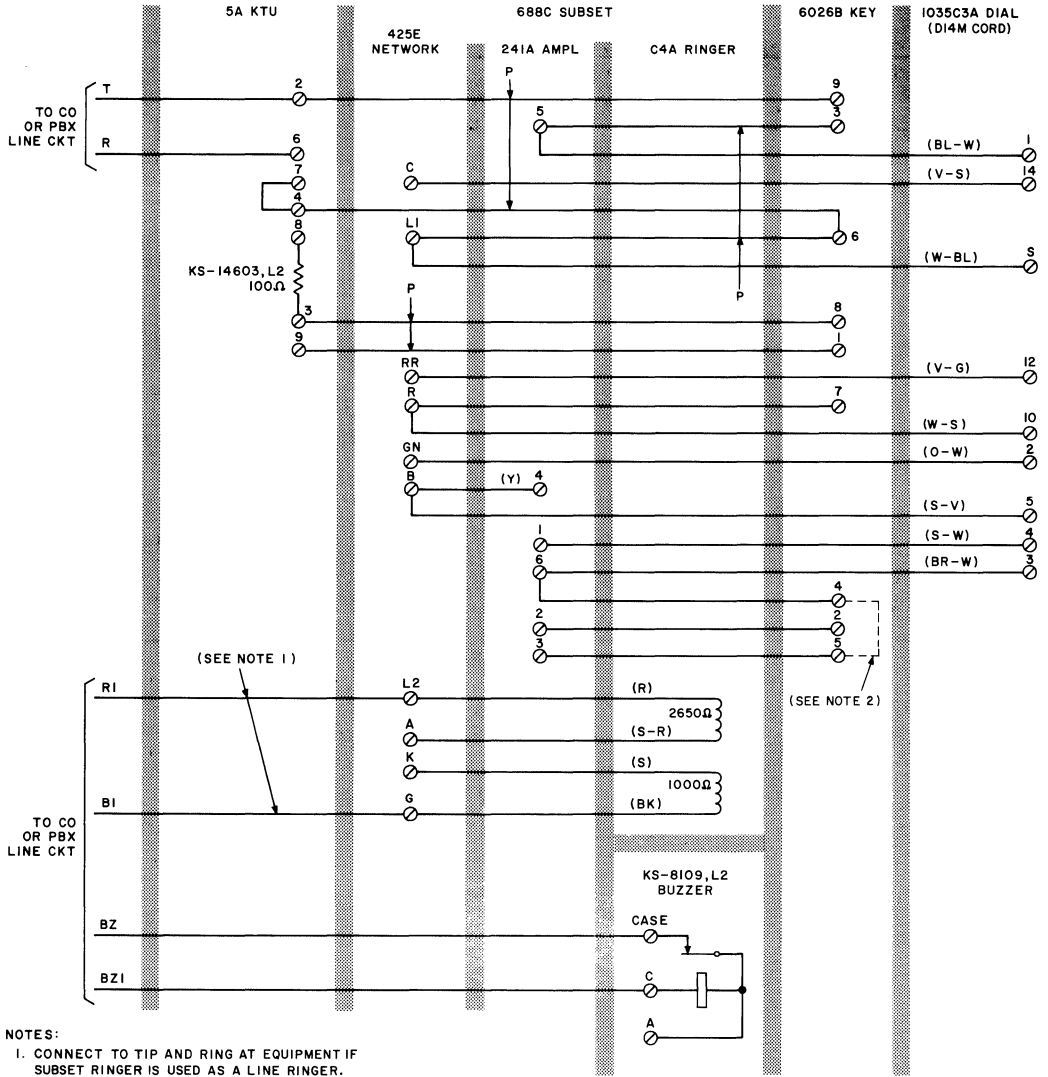


Fig. 12—688C Subset and 1035C3A Dial, With Hold

## APARTMENT DOOR ANSWERING TELEPHONE SETS—2755A IDENTIFICATION, INSTALLATION, AND OPERATION

### 1. GENERAL

1.01 This section is reissued to:

- Show compatibility with Nos. 1 and 2 ESS Office
- Provide additional installation information

1.02 Apartment Door Answering Service (ADAS) is an apartment building lobby-to-apartment communication system which utilizes the tenant's regular exchange service, special central office equipment, and a 2755A TOUCH-TONE® dial panel type telephone set (Fig. 1, 2, and 3) installed in the outer lobby of an apartment building.

1.03 This system provides telephone communication between a visitor and tenant, established by the visitor dialing a 3-digit code associated with the desired apartment and the tenant dialing a single digit to release the lobby door latch to admit the visitor to the building interior.

1.04 Station number assignments should be made in accordance with Section 682-000-012, Numbering and Identifying Special Services and Channels, unless otherwise specified by local instructions.

### 2. IDENTIFICATION

#### Ordering Guide

#### 2.01 *Basic Telephone Set:*

Set, Telephone, 2755A-52

**Note:** -52 indicates gray handset. Door panel and frame are stainless steel.

#### 2.02 *Replaceable Components:*

- Assembly, Lock, KS-19277

- 840358303 or P-15E766 Hook
- P-23F543 Stud Fastener
- P-23F553 Door and Frame Assembly
- P-26E153 Dial and Housing Assembly (includes 35G3A dial) or
- P-90D275 Dial and Housing Assembly (includes 35T3A dial) or
- P-840155402 Dial and Housing Assembly (includes 70A dial)◆
- P-269601 Instruction Card
- P-90D240 Network and Chassis Assembly
- Set, Hand, ◆G3AH-52,◆ G3AD-52, or G3P-52 (MD) (Includes a 2-foot, 5-inch H4CY armored cord)

#### 2.03 *Associated Apparatus or Equipment (ordered separately):*

- Box, Apparatus, 118A
- Relay, KS-16626L12

#### 2.04 *Optional Apparatus or Equipment (ordered separately):*

- Ringer, C4A or C4B

#### 2.05 *Application:*

- Initially intended for apartment door answering service, to screen persons desiring admittance to an apartment building interior.
- Used in conjunction with a tenants regular exchange service.

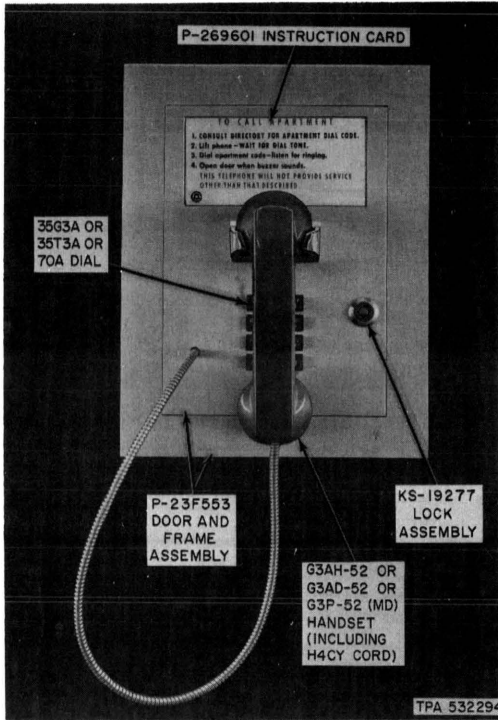


Fig. 1—2755A Telephone Set

2.06 General Description of ADAS:

- (a) Apartment Door Answering Service (ADAS) includes a lobby door opening feature activated by the tenant's exchange telephone. A typical installation of a 2755A telephone set is shown in Fig. 4.
- (b) This service can be used with the tenants residence or business service on individual or 2-party ringing service. Where a tenant has more than one exchange line, the service is limited to only one line and all extensions associated with that line which are located in the apartment.
- (c) The lobby telephone(s) and KS-16626L12 relay(s) which operates the door release mechanism are connected to the Common Control equipment located in the telephone central office.

(d) One system may serve a maximum of four entrances and 400 terminations in the same apartment building.

(e) A 2755A panel type telephone set equipped with a 12-button TOUCH-TONE dial must be installed at each lobby entrance. A maximum of four entrances in the same apartment building can be provided. A KS-16626L12 relay must be associated with each entrance, and a cable pair to the central office must be furnished for each 2755A telephone set and KS-16626L12 relay.

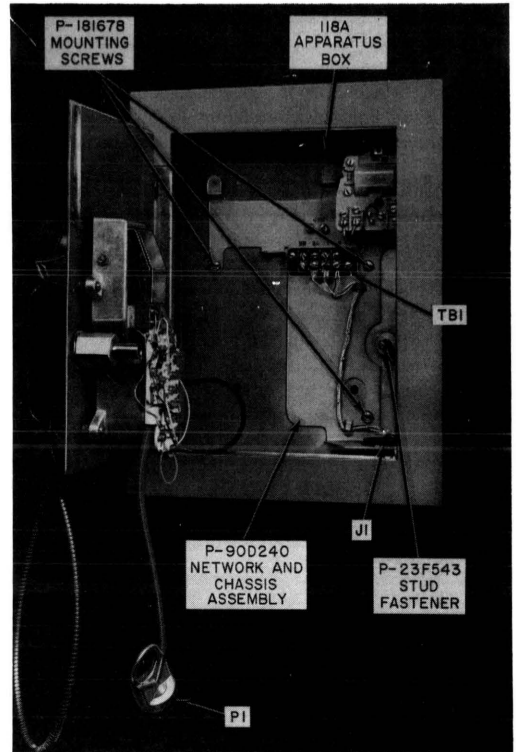
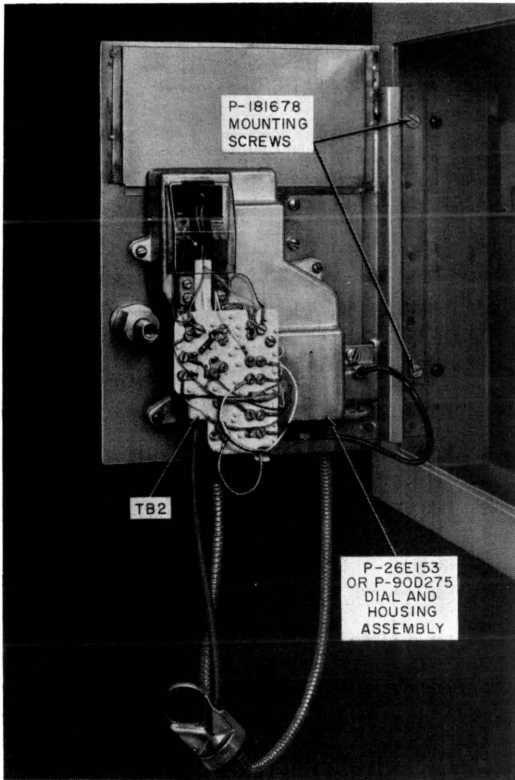


Fig. 2—2755A Telephone Set, Installed in 118A Apparatus Box

(f) The customer provides and maintains a building directory which indicates the 3-digit dial code assigned to each apartment. A directory



**Fig. 3—2755A Telephone Set, Rear View of Door Assembly**

should be provided at each entrance where a lobby telephone is installed.

### 2.07 *Tenant's Apartment:*

(a) This system utilizes the tenants regular exchange service facilities. Where a tenant does not have exchange service or an apartment is vacant, a standard black rotary dial telephone is connected directly to the control equipment for ADAS. This station does not have access to the DDD network.

(b) Calls may be received from the lobby telephone and the door opening feature activated only by telephones or extensions located in the tenant's apartment. Each apartment using

ADAS must be connected to the control equipment via cut-through relays located at the central office. Off premise extensions, answering service lines, etc., must be connected from their separate cable pairs directly to the originating equipment to prevent unauthorized access to ADAS.

### 2.08 *Control Equipment:*

(a) The control equipment for ADAS is located in the central office which serves the tenant's apartment (Fig. 6). The system is integrated with and dependent on the exchange network and existing central office facilities.

## 3. INSTALLATION

### 3.01 *Customer Provides and Maintains the Following:*

(a) A wall opening 11-9/16 inches high by 8-3/4 inches wide by 2-3/4 inches deep for each 2755A telephone set to be installed. Locate the opening 63 inches from the floor surface to the top of the opening. A minimum of 1-1/2 inches clearance from any edge of the opening to an abutting structure or outside corner is required for the steel molding of P-23F553 door and frame assembly (Fig. 1). The 118A apparatus box to be installed in the opening by the customer is supplied by the telephone company.♦

(b) A wall directory located by or above each lobby telephone listing the tenants name, apartment number, and 3-digit number code.

(c) Conduit, 3/4-inch size from the apparatus box to basement or other agreed location near the apartment buildings main terminal box.

(d) A lobby door opener or releaser and associated uninterrupted separately fused power supply which conforms to the applicable electrical code.

(e) Wiring from the door releaser and power supply to the telephone company supplied KS-16626L12 power relay. Refer to Section 463-110-400 for connections to relay.

(f) Connections from the door releaser and power supply to the power relay will be made by the customers electrician. The KS-16626L12 relay contacts are rated at 5 amperes, 115 volt ac 60 Hz.

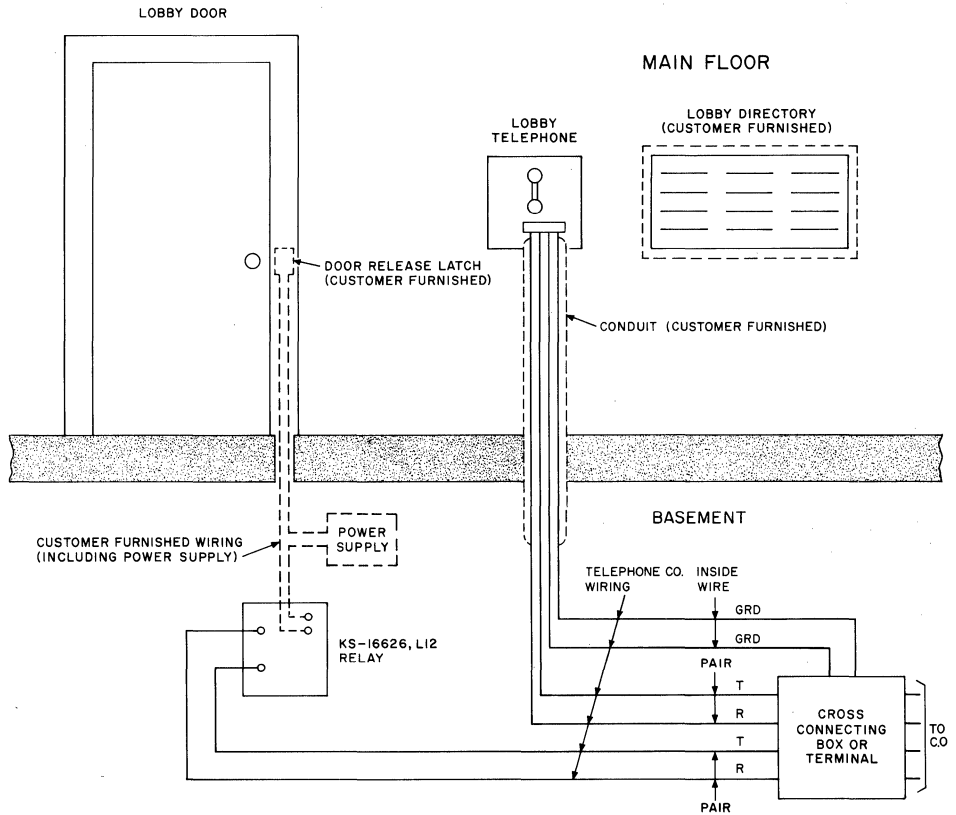


Fig. 4—Typical Installation of 2755A (Apartment Building) Telephone Set

**3.02 Installing 2755A Telephone Set in 118A Apparatus Box, Telephone Company Function:**

(a) Component part subassemblies of the 2755A telephone set are shipped from the factory assembled as the:

- P-90D240 network and chassis assembly
- C4-type ringer optional (ordered separately)
- P-339688 grommet, for ringer mounting (ordered separately)

● P-23F553 door and frame assembly includes:

● 840155402, ● P-26E153, or P-90D275 dial and housing assembly

840358303 or P-15E766 hook

KS-19277 lock assembly

Mounting hardware consists of seven P-181678 screws shipped loose with the telephone set assemblies.

(b) Install steel P-23F543 stud fastener (shipped loose with set assemblies) in 118A apparatus box (Fig. 2). Screw shorter end of stud fastener colored red into threaded standoff nut located

at back right side of the apparatus box. Stud should be fully seated.



**When installing the stud fastener in the apparatus box, use an adjustable wrench or equivalent to securely fasten stud fastener. Do not use long-nosed pliers.**

(c) Position P-23F553 door and frame assembly so the mounting holes located in the frame align with the mounting holes in the apparatus box. Use four P-181678 mounting screws to secure door and frame assembly to the apparatus box (Fig. 3).

(d) Install instruction card (shipped loose) in location shown in Fig. 1.



**Be careful not to scratch or damage painted surface on back side of instruction card when installing card.**

(e) Install the P-90D240 network and chassis assembly (Fig. 5) in the apparatus box using three P-181678 mounting screws. Position assembly as shown in (Fig. 2).

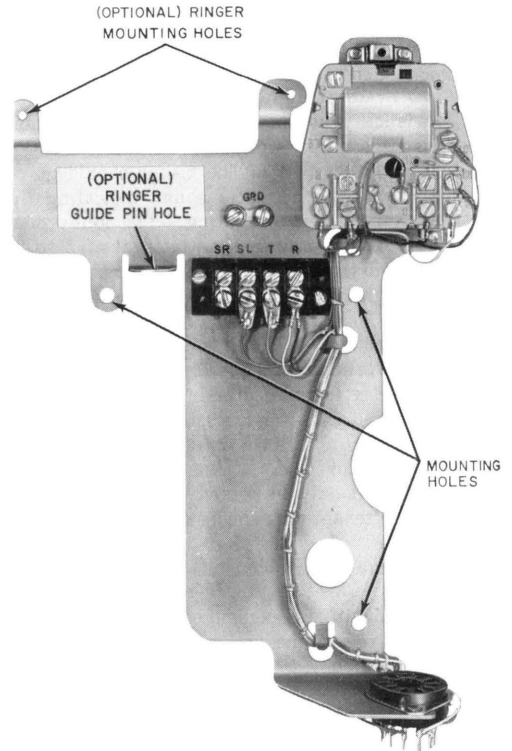
(f) Should a ringer be required, provisions have been made to install a C4-type ringer on the upper left arm of the network and chassis assembly (Fig. 5).

(g) Refer to Section 512-520-400 for connections when C4-type ringer is required.

(h) Connect P1 plug of the P-840155402, P-26E153, or P-90D275 dial and housing assembly to J1 jack of the P-90D240 network and chassis assembly.

**Caution:** *Once the connection has been made the door assembly can only be partially opened. To fully open the door, it is necessary that they be disconnected. Make sure all cables and handset conductors are properly dressed before closing and locking the door of set.*

### 3.03 Dedicated Cable Pairs:



**Fig. 5—P-90D240 Network and Chassis Assembly**

(a) A dedicated cable pair is required from each lobby telephone back to the common control equipment if more than one entrance is equipped.

(b) A dedicated cable pair is required from each KS-16626L12 relay back to the common control equipment if more than one entrance is equipped.

## 4. OPERATION

**4.01** Visitor lifts receiver of the lobby telephone, receives dial tone, and dials the 3-digit code number of the apartment he wishes to visit.

**4.02** The tenant's telephone rings with a distinctively different ring to distinguish between exchange and lobby calls. A normal ringing signal is heard in the lobby set receiver. This signal continues



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until the call is answered by the tenant, or the visitor goes on hook.

**4.03** After the tenant answers a lobby call and wishes to admit a visitor, he may release the door latch at any time during the conversation by dialing the digit "4". The visitor should go on hook and wait for a buzzer sound indicating the door release latch is operating. The lobby door must be opened within a time interval of 5 to 20 seconds, as determined by the apartment manager, after the digit "4" is dialed. The tenant may hang up when he hears a ringing signal indicating that the door latch release circuit is operating.◆

**4.04** When a tenant is talking on an exchange call and a visitor dials the apartment code from the lobby, a call waiting tone will be superimposed on tenant's line every 5 seconds. This tone will only be heard by the apartment tenant. The tenant may choose to:

- (a) Disregard the lobby call.
- (b) Terminate the exchange call, hang up and after the distinctive lobby call ring is heard, answer the lobby call.
- (c) Hold the exchange call and transfer to the lobby call automatically by depressing and releasing the line switch once. The tenant after dealing with the lobby visitor as he desires, may return to the exchange call again by depressing and releasing the line switch once.

**4.05** If a tenant receives an incoming exchange call while he is talking to the lobby telephone he will hear a call waiting tone every 5 seconds. The tenant may choose to:

- (a) Disregard the exchange call.
- (b) Complete the lobby call and hang up to allow connection to the incoming exchange call in the normal manner.
- (c) Hold the lobby call and transfer to the exchange call by depressing and releasing

the line switch once. He can return to the lobby call in the same manner.

**4.06** When an exchange or a lobby call is being held, the call waiting remains superimposed on the line as a reminder to the tenant that he is holding another call. Should the tenant inadvertently hang up, he is automatically rung back on either type of call, providing the held party does not abandon, thus canceling the callback feature.

**4.07** Where a tenant with more than one central office line holds an exchange call on the line associated with ADAS to answer a second line, the call waiting tone will not be heard unless the tenant returns to the original call.

**4.08** If a tenant has a manual cutoff associated with the ringer on his exchange service, he will not receive the ringing signal from the lobby telephone when the cutoff is operated.

**4.09** Tenants with party-line service may receive calls from the lobby telephone even though another party is using the exchange line. Party lines must be central office bridged at the originating equipment using separate cable pairs.

**4.10** Where lobby telephones are located at more than one entrance (served from the same common equipment) only one lobby call can be completed at a time. While a lobby call is in progress a call placed from another lobby telephone will receive a busy signal which automatically returns to dial tone when the first call is completed. Multiple entries are served in sequence. Therefore when the first call is completed that entrance is placed last in the sequence and must wait until the other lobbies have completed their calls, if any.

**4.11** There is a 36 second overall timer (connect, or talking timer) which prevents one lobby from monopolizing the ADAS and also discourages the use of ADAS for soliciting sales or other annoyance calls. This timer is used in both the single and multiple lobby configurations.

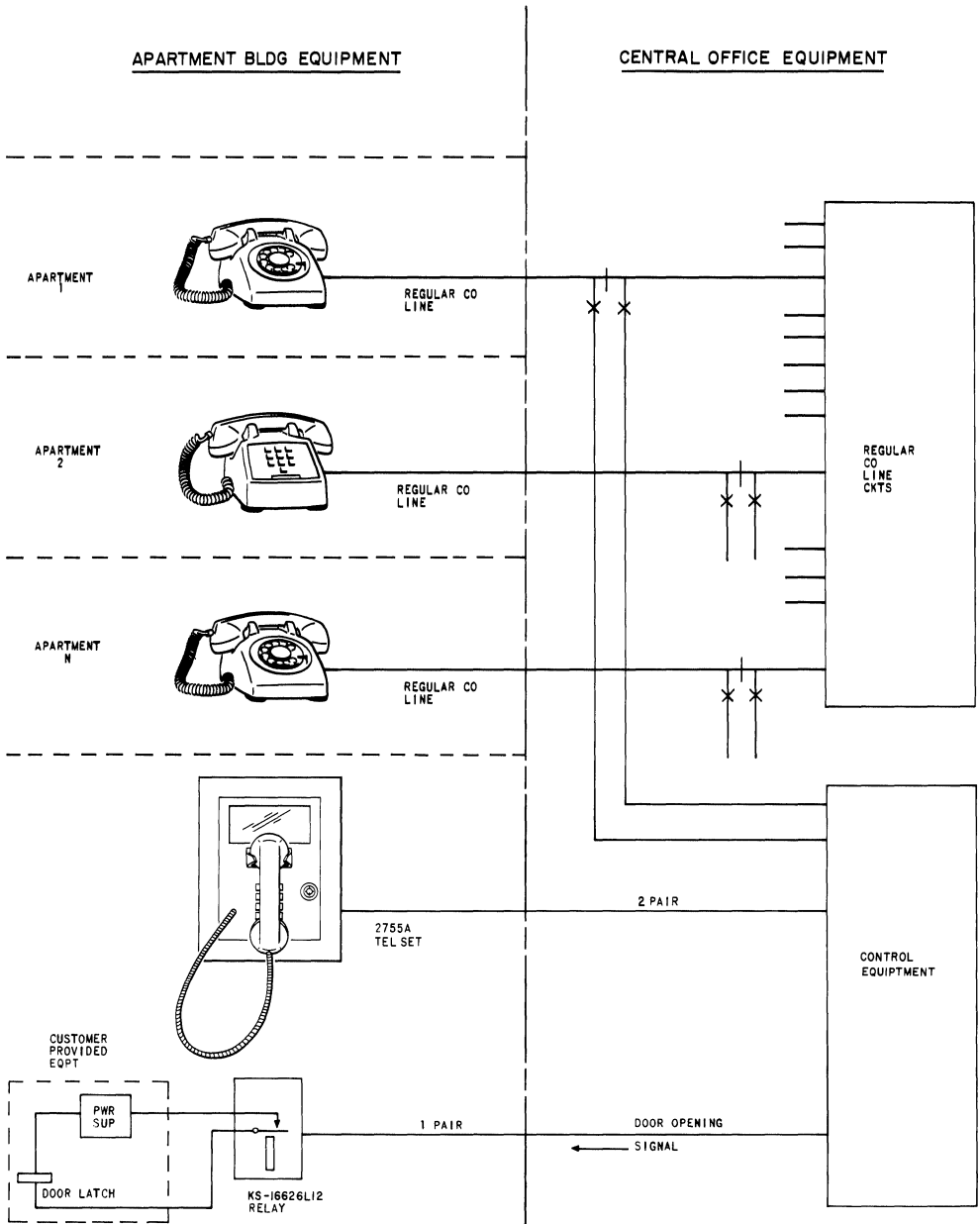


Fig. 6 → Block Diagram—Apartment Door Answering Service ←

## APARTMENT DOOR ANSWERING TELEPHONE SETS—2755A CONNECTIONS AND MAINTENANCE

### 1. GENERAL

1.01 This section is reissued to:

- Add information for use with No. 1 and No. 2 ESS office, Part 4
- Add C4B ringer connections

1.02 These sets are not equipped with an internal ringer from the factory. Should a ringer be required, install a C4A or C4B ringer (ordered separately). Refer to Section 512-520-100 for installation information and Table A or B for connections.

1.03 Apartment Door Answering Service (ADAS) does not permit placing calls from an apartment to lobby telephone or placing outside exchange calls from the lobby set because its cable pair (tip and ring) is dedicated to ADAS from the lobby telephone back to the special central office equipment.

1.04 Part 4 provides operation procedures and tones received at the lobby and tenants station when ADAS is employed and Tables A and B provide (optional) ringer connections.

### 2. CONNECTIONS

#### Grounding

2.01 Provide best signal ground available. See Section 460-100-201. Connect ground pair of inside wire or cable at ground terminal located above TB1 on network and chassis assembly, and connect tip and ring leads (Fig. 1) to proper terminals at TB1.

#### 2.02 Connection Index

Table A—Connections For (Optional) C4A Ringer

Table B—Connections For (Optional) C4B Ringer

Fig. 1—2755A Telephone Set, Connections

Fig. 2—2755A Telephone Set, Connections Using 70A Dial

### 3. MAINTENANCE

3.01 Field maintenance of the 2755A telephone set consists of replacement of defective components, cleaning exterior of set, and central office testing and troubleshooting functions.

3.02 Component parts of the lobby telephone set are primarily coin telephone set components. Refer to identification Section 512-520-100, for a list of replaceable components.



*When maintenance conditions require the door assembly of the 2755A telephone set to be fully opened, partially open the door and disconnect P1 from J1 to prevent damage to the plug and jack.*

#### Handset and Armored Cord

3.03 The transmitter and receiver caps are cemented to the handset handle at the factory. Replace complete handset if defective.

#### Dial

3.04 Do not attempt adjustments of the 35-type dial in the field. If inoperative, replace complete dial and housing assembly.

#### Network

3.05 Network is riveted to chassis assembly at factory. If defective replace complete assembly.

## SECTION 512-520-400

### Testing and Troubleshooting

**3.06** Since the lobby and tenant telephone ADAS functions can be simulated at the central office control equipment, testing or troubleshooting of ADAS can be performed at the central office. Test procedures will be covered in Section 201-840-501 or 201-840-502.¶

**3.07** The resistor across terminals T and SL of TB1 or the ringer coil in the lobby set allows a continuity check to be performed from the central office (ADAS) control equipment to verify that tip and ring is available at the lobby telephone set.

**3.08** When the lobby set is off-hook, normal dial tone should be heard.

**3.09** Access to the central office dial and ringer test circuits from the lobby telephone is not possible unless tip and ring are connected from the ADAS central office equipment to the central office local test board.

### 4. OPERATION

**4.01** Visitor lifts receiver of the lobby telephone, receives dial tone, and dials the 3-digit code number of the apartment he wishes to visit.

**4.02** The tenant's telephone rings with a distinctively different ring to distinguish between exchange and lobby calls. A normal ringing signal is heard in the lobby set receiver. This signal continues until the call is answered by the tenant or the visitor goes on hook.

**4.03** After the tenant answers a lobby call and wishes to admit a visitor, he may release the door latch at any time during the conversation by dialing the digit "4". The visitor should go on hook and wait for a buzzer sound indicating the door release latch is operating. The lobby door must be opened within a time interval of 5 to 20 seconds, as determined by the apartment manager, after the digit "4" is dialed. The tenant may hang up when he hears a ringing signal indicating that the door latch release circuit is operating.

**4.04** When a tenant is talking on an exchange call and a visitor dials the apartment code from the lobby, a call waiting tone will be superimposed on tenants line every 5 seconds. This

tone will only be heard by the apartment tenant. The tenant may choose to:

- (a) Disregard the lobby call.
- (b) Terminate the exchange call, hang up and after the distinctive lobby call ring is heard, answer the lobby call.
- (c) Place the exchange call on hold and simultaneously transfer to the lobby call by depressing and releasing the line switch once. After dealing with the lobby visitor as he wishes, the tenant may return to the exchange call again by depressing and releasing the line switch once.

**4.05** If a tenant receives an incoming exchange call while talking to a visitor using the lobby telephone, he will hear a call waiting tone every 5 seconds. The tenant may choose to:

- (a) Disregard the exchange call.
- (b) Complete the lobby call and hang up to allow connection to the incoming exchange call in the normal manner.
- (c) Place the lobby call on hold and transfer to the exchange call by depressing and releasing the line switch once. He can return to the lobby call in the same manner.

**4.06** When an exchange or a lobby call is being held, the call waiting tone remains superimposed on the tenants line as a reminder to him that he is holding a call. Should the tenant inadvertently hang up, he is automatically rung back on either type call, providing the held party does not go on hook and cancel the call back feature.

**4.07** When a tenant with more than one central office line holds an exchange call on the line associated with ADAS to answer an exchange call on a second line, the call waiting tone from a lobby call will not be heard unless the tenant returns to the original exchange call.

**4.08** If a tenant has a manual cutoff associated with the ringer on his exchange service, he will not receive the ringing signal from the lobby telephone when the cutoff is operated.

**4.09** Tenants with party-line service may receive calls from the lobby telephone even though another party is using the exchange line. Party lines must be central office bridged at the originating equipment using separate cable pairs.

**4.10** Where lobby telephones are located at more than one entrance (served from the same control equipment) only one lobby call can be completed at a time. While a lobby call is in progress a call placed from another lobby telephone will receive a busy signal which automatically returns to dial tone when the first call is completed. Multiple entries are served in sequence. Therefore when the first call is completed that entrance is placed last in the sequence and must wait until the other lobbies have completed their calls, if any.

**4.11** There is a 36 second overall timer (connect, or talking timer) which prevents one lobby from monopolizing the ADAS system, and also discourages the use of ADAS for soliciting sales or other annoyance calls. This timer is used in both the single and multiple lobby configurations.

TABLE A

CONNECTIONS FOR (OPTIONAL) C4A RINGER  
(SEE NOTE)

WIRE OR LEAD		REMOVE FROM TB1	CONNECT TO TB1
C4A Ringer	BK		T
	S		SL
	R		R
	S-R		SR
Strap	BK	R	SR
Resistor		T ↔ SL	

*Note:* Connections are for individual or bridged service.

◆TABLE B◆

CONNECTIONS FOR (OPTIONAL) C4B RINGER  
(SEE NOTE)

WIRE OR LEAD		REMOVE FROM TB1	CONNECT TO TB1
C4B Ringer	BK		T
	R		SL
Resistor		T ↔ SL	

*Note:* Connections are for individual or bridged service.

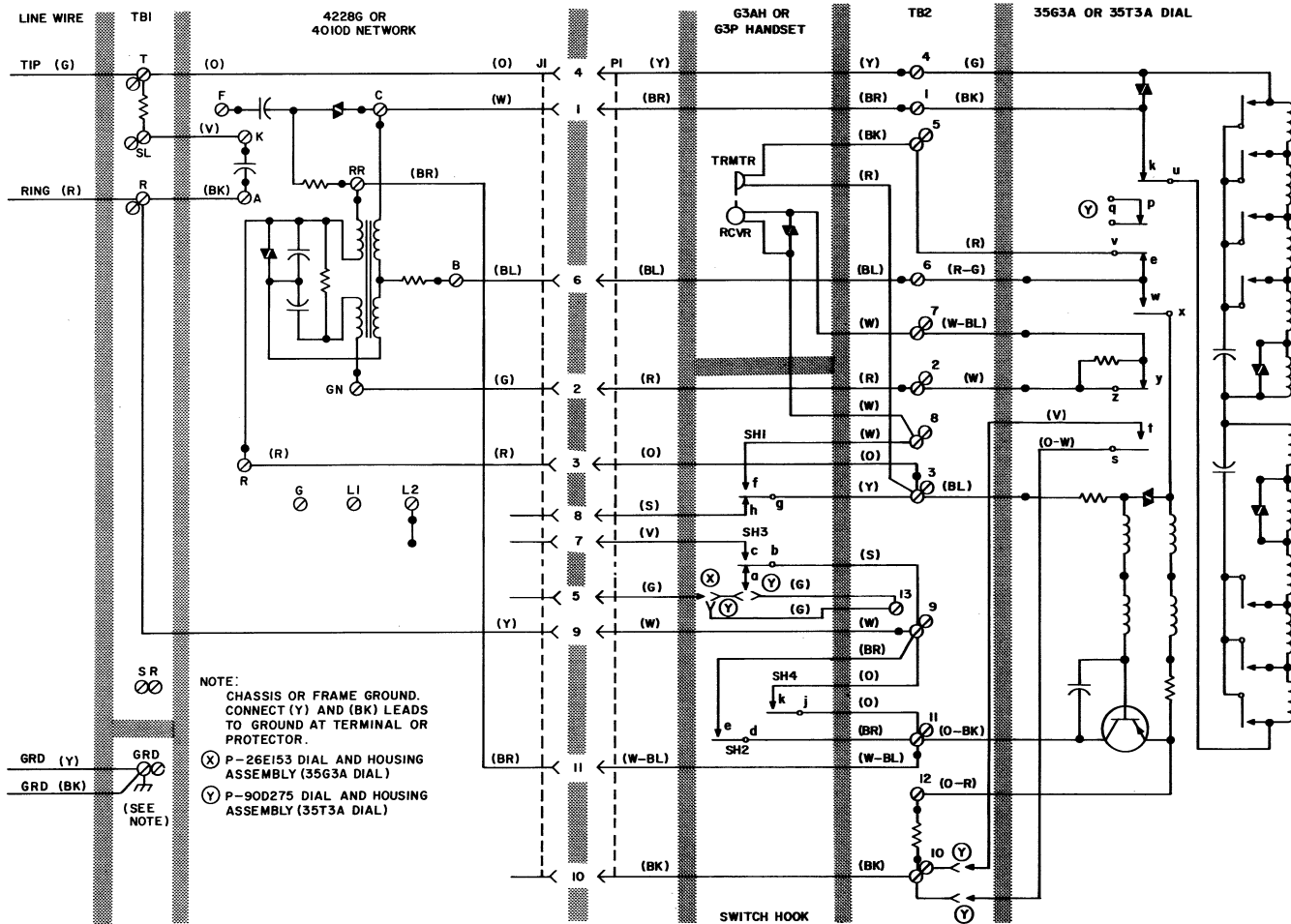


Fig. 1—2755A Telephone Set, Connections

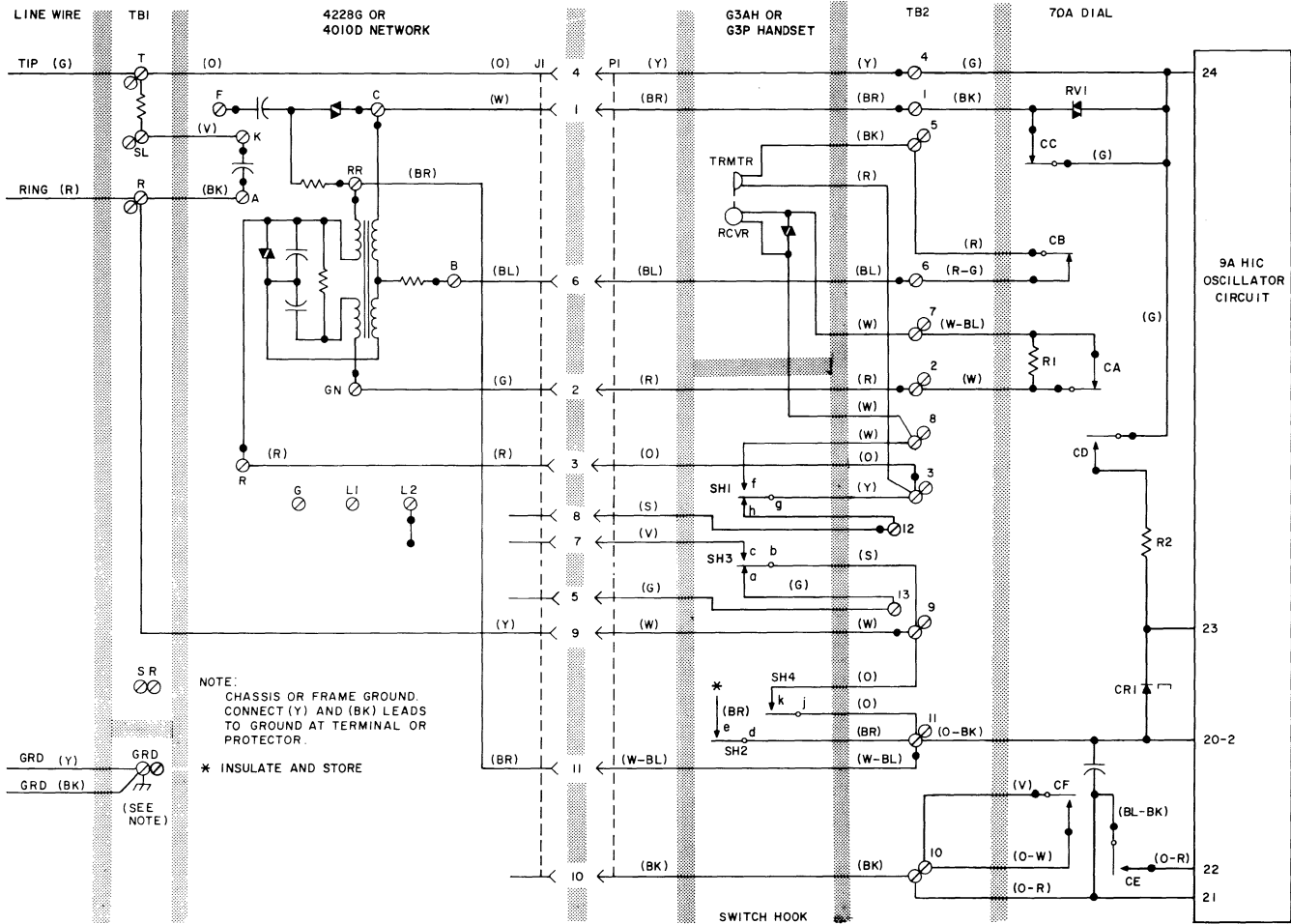


Fig. 2—2755A Telephone Set, Connections Using 70A Dial

## SPEAKERPHONE SYSTEM—3-TYPE

### 1. GENERAL

1.01 This section is reissued to:

- Add 670A and 671A transmitter schematics (Fig. 6 and 7)
- Revise Fig. 2 and 5
- Include 55D control unit

- Rotary or TOUCH-TONE service—55B

- MOD II-C PICTUREPHONE® set—55D (not to be used for telephone set speakerphone)◆

*Note:* The 55A control unit can be modified at the distributing house for TOUCH-TONE use. Modified units are identified by an asterisk following the code. Order as: Unit, Control, 55A—modified for TOUCH-TONE service.

### 2. IDENTIFICATION

2.01 The 3-type speakerphone system consists primarily of a loudspeaker, transmitter, and control unit 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 muting for private conversation
- Visual indication when system is in use
- Cutoff common ringer or other signaling devices when desired.

2.02 Components of the 3-type speakerphone system are shown in Fig. 1, along with features of each component.

2.03 Apparatus which makes up the 3-type speakerphone system is ordered separately. Replaceable parts should be limited to those parts available through supply channels, i.e., lamps, mounting cords, etc.

2.04 Control units are coded as follows:

- Rotary dial service—55A (MD)
- Rotary or TOUCH-TONE® service—55A\* (See note)

2.05 The 55-type control unit features:

- Four plug-in printed wiring boards incorporating transistorized amplifiers and associated transmission transformers
- Voice-switching circuitry to control transmit and receive level
- Metal basepan for wall or desk mounting.

2.06 The 3-type speakerphone circuitry:

- (1) The 3-type speakerphone incorporates a voice-switching circuit which permits a substantial increase in receiving volume, eliminates singing, and essentially eliminates far-end talker echo.
- (2) When there is no transmission of speech, gain is automatically removed from the transmitter circuit and added to the loudspeaker circuit. This 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 receiver volume control. The gain change is smaller at the lower (counterclockwise) settings and greater at the higher (clockwise) settings.
- (4) A circuit, referred to as a switch guard, utilizes the voltage across the loudspeaker



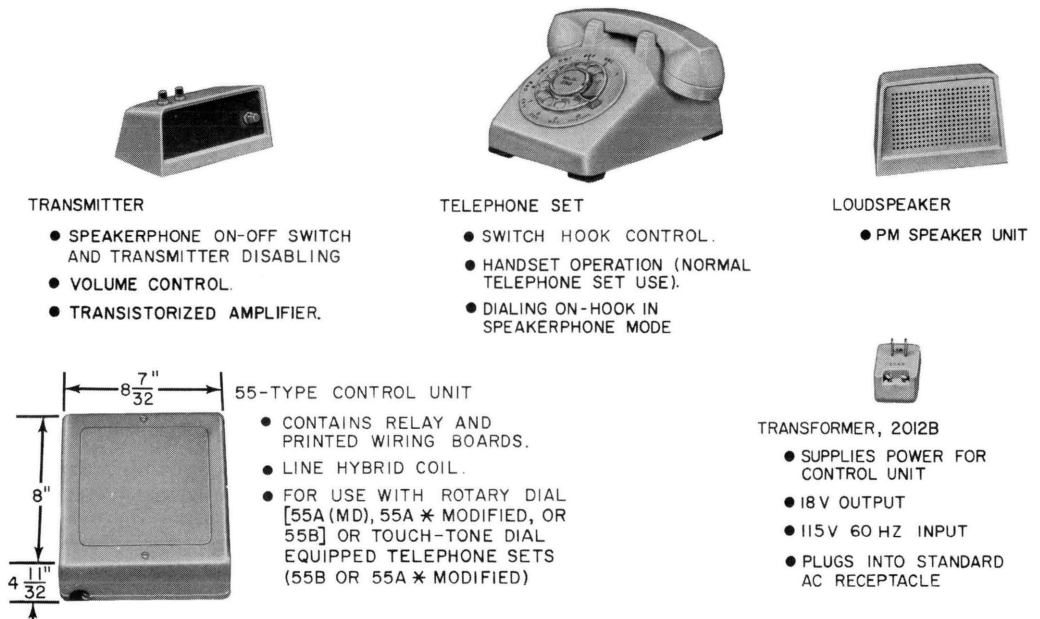


Fig. 1—Typical 3-Type Speakerphone System, Basic Components

to reduce the possibility that surrounding room noise will cause false operation of the switching circuit while receiving speech.

(5) A predetermined voice level is necessary to switch from the receiving to the transmitting condition. In the presence of steady room noise, a special circuit automatically raises the required threshold level to prevent operation of the switching control circuit by the noise. Talkers will still switch satisfactorily because they increase their levels under noisy conditions.

### Loudspeakers

**2.07 External**—760A equipped with R2FK mounting cord. Consist of permanent magnet, dynamic loudspeaker mounted on a metal base with plastic housing.

**2.08 Internal**—762A used with 752-, 1752-, and 2752-type panel sets. Consists of a P-21F246 speaker, neoprene rubber acoustic shield, plastic cover, and 13-inch spade-tipped leads.

### Transmitters

**2.09** External 666-type transmitters consists of an AC1 transmitter unit, transistorized amplifier, etc. The 666A (MD) is equipped with a T11A mounting cord. The 666B has a T7A cord.

**2.10** External 670A and 671A are used in conference arrangements of 3-type speakerphone:

- 670A consists of an AC1 transmitter unit, transistorized amplifier, ON-OFF switch with 2-position ON switch for control of auxiliary 671A transmitters, volume control, plastic housing, and T9A mounting cord.

- 671A consists of an AC1 transmitter unit and used as auxiliary station in conference arrangement, encased in a plastic housing; no cord is provided.

**2.11** In areas where R.F. interference is a problem, install a modified 666B or 670A transmitter. These transmitters have been modified by the

Western Electric service center. Modified units are identified by a stamp "MOD FOR RF" located near unit code stamping. Order units as follows: "Transmitter, 666B or 670A Modified per Specification X-4200."

**2.12** Internal transmitters are all modular, designed to be an integral part of the telephone set or console. Connections are made through a KS-type connector or receptacle block and plugs. Components are similar to those in external transmitters.

- 667B—used in CALL DIRECTOR® sets equipped with 590- or 650-series keys.
- 672A—used in 3640 and 3641 CALL DIRECTOR telephone sets
- 673A—used in nurses console in 3A hospital interphone system
- 674A—intended for use in 3673A-type telephone set
- 674B—use in 2671-type CALL-A-MATIC® telephone set
- 679—used in current production CALL DIRECTOR sets equipped with 635-type keys.

### **Power Supply**

**2.13** Power to operate the 55-type control units must be supplied by a 2012B transformer (ordered separately). Due to lower voltage rating, a 2012A transformer should not be used.

## **3. INSTALLATION**

**3.01** The telephone set intended for use in 3-type speakerphone system must meet the following requirements:

- (1) Provide a set of line switch transfer contacts to disconnect the speakerphone when the handset is lifted.
- (2) Rotary dial sets dialed in an on-hook condition must provide two sets of off-normal (make) contacts in the dial for loudspeaker and receiver muting during dialing.

(3) TOUCH-TONE sets dialed in the on-hook condition must provide a set of make contacts (s and t) in the dial common switch to connect line power (IR) from the control unit to the dial oscillator. If a polarity guard is provided these contacts (s and t) must be isolated from the oscillator by the polarity guard.

### **3.02** Planning an installation:

- (1) Avoid placing apparatus with plastic covers or parts in locations where ambient temperatures may exceed 140 degrees F.
- (2) Control unit chassis is part of the electrical circuit and must be mounted on an insulated surface.
- (3) Control unit can be located a maximum of 100 feet from other system components (transmitter, loudspeaker, etc.) when (A1) leads are connected between both the control unit and transmitter and the control unit and the telephone set.
- (4) Locate transformer no more than 100 feet from control unit. The AC receptacle should not be controlled by a switch.
- (5) Place loudspeaker and transmitter within convenient reach of user and with nominal 3 feet spacing between the units and not facing one another.
- (6) There should be no obstructions between the user, loudspeaker, and transmitter.
- (7) To prevent inductive interference on conference system installations, use no more than 30 feet of shielded cable from master 670A transmitter to auxiliary 671A transmitters. Refer to section on speakerphone conference system for connections.
- (8) Make connections as shown in appropriate figures of this section or other sections in Division 512 for specific telephone set connections.

**3.03** The 55-type control unit can be used where necessary to cut off common ringers or signals to prevent pickup by speakerphone. This feature can be provided through break contacts of K1 relay in control unit. Refer to section in Division 512 for specific telephone set involved.

**D-180196 Kit of Parts**

**3.04** The 667B transmitter, when installed in certain CALL DIRECTOR telephone sets is subject to pickup of mechanical spring vibrations when a held line button is released and the speakerphone system is on. This vibration is transmitted through the control unit and back over the line. To eliminate this condition the 667B transmitter should be replaced with one modified by Western Electric service center, ordered as follows: "Transmitter, 667B, Modified per D-180196."

**3.05** Packed with the modified 667B transmitter is a piece of split vinyl tubing to be assembled to the key pivot bar spring of the telephone set during installation of the transmitter.

**Note:** CALL DIRECTOR telephone sets may be ordered with the modification installed by specifying "Modified per D-180196."

**4. OPERATION**

**Note:** 3-type 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 button and release. ON lamp will illuminate indicating speakerphone is in the talking condition. Listen for dial tone transmitted through loudspeaker. Telephone set handset is not lifted (except where handset covers dial).
- (2) Operate dial of telephone set in normal manner.
- (3) When complete number is dialed, ringing tones, busy signals, and called party answer will be heard from the loudspeaker.
- (4) When called party answers, transmitter and loudspeaker 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 settings.

- (5) When originating calls from telephone sets which require off-hook dialing, the ON button

must be depressed and held upon completion of dialing until the handset is restored.

**4.02** To answer an incoming call using speakerphone:

- (1) Telephone set ringer signals an incoming call.
- (2) Depress ON button on transmitter. Ringing is tripped and system is automatically connected to the line by the control unit.

**4.03** To disable transmitter when it is desired not to transmit conversation in the room to a distant party:

- (1) Depress ON 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, distant party can still be heard over the loudspeaker.

- (2) After private conversation is completed and it is desired to transmit to distant party again, release ON 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 control unit will be restored to the idle condition.

**4.05** Transferring from handset to speakerphone operation:

- (1) After dialing or during a conversation depress and hold ON button of transmitter.
- (2) Return handset to mounting, and release ON button.
- (3) Adjust volume as required.

**4.06** Transferring from speakerphone to handset operation. Lift handset during speakerphone operation to automatically transfer to handset operation. When it is necessary to transfer back to speakerphone, refer to 4.05 to prevent disconnect.

### ***Conference Speakerphone Arrangement***

**4.07** The 670A (master) transmitter may initiate and receive calls with or without the 671A auxiliary transmitters in the circuit. To operate with master transmitter and auxiliary transmitters, turn the ON button so the white line is parallel to the front of the transmitter. To operate the master independently, turn the ON button so the white line is perpendicular to the front of the transmitter.

**4.08** Disabling the 670A transmitter also disables the 671A transmitters if the auxiliary transmitters are connected to the master circuit. (White line of the ON button is parallel to the front of the transmitter.)

### **5. MAINTENANCE**



***Remove power from 55-type control unit before attempting any maintenance of speakerphone components.***

### ***Tests and Adjustments***

**5.01** When system is installed or maintenance is performed on any component, make the following tests of speakerphone operation:

- (1) Place a call to the test desk and switch to speakerphone.
- (2) Adjust loudspeaker volume to moderately loud listening level by turning volume control of transmitter clockwise.
- (3) Have test center repeat the question "In what suburb does Joe live?" several times.
- (4) If choppiness is detected in the sentence, particularly in the first b in ***suburb*** and the t in ***what***, make loudspeaker adjustment per 5.02.
- (5) Repeat this test at a high listening level by turning the volume control to the extreme clockwise position.

**5.02** An alternate loudspeaker connection is provided in each 55-type control unit to compensate for room conditions which causes voice-switching during reception. The effect of voice-switching is to chop portions of the incoming speech. To compensate for this condition, move loudspeaker lead (SP1) from terminal 33 to terminal 24 [55A (MD) or 55A\* Modified] or terminal 29 to terminal 30 (55B).

**5.03** If radio frequency interference is experienced:

- (1) In 666A (MD) transmitter; place KS-13814L7 (0.02 mf) capacitor across terminals of AC1 transmitter unit, and/or place a 542C capacitor (0.25 mf) between terminal 9 of the terminal strip and one of the mounting screws used to secure the printed wiring board to the base.
- (2) In 667A (MD) or 667B transmitter; solder a KS-13814L7 (0.02 mf) capacitor for terminal B to terminal D of the printed wiring board assembly or ground the transmitter unit case to the transmitter mounting plate.

**5.04** If voice-switching caused by external audible signaling devices is encountered:

- (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 cutoff feature of 55-type control unit. Use the leads to common signal control and common ringer or buzzer circuit for this cutoff feature.

### ***Cleaning***

**5.05** Clean plastic covers and housings with water dampened KS-2423 cloth or equivalent. Do not use scouring powders or cleaners.

SECTION 512-620-100

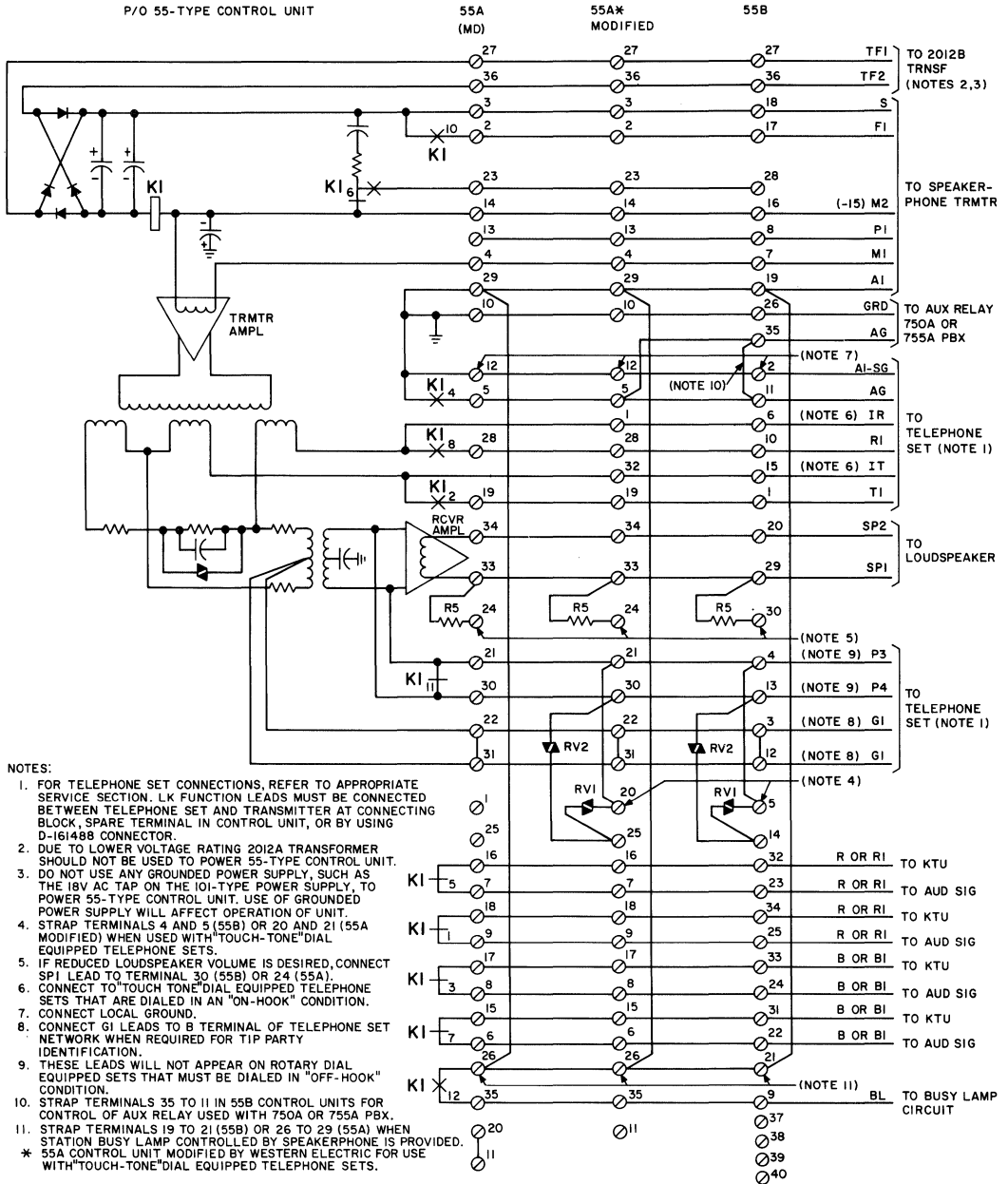


Fig. 2—55-Type Control Unit Connections

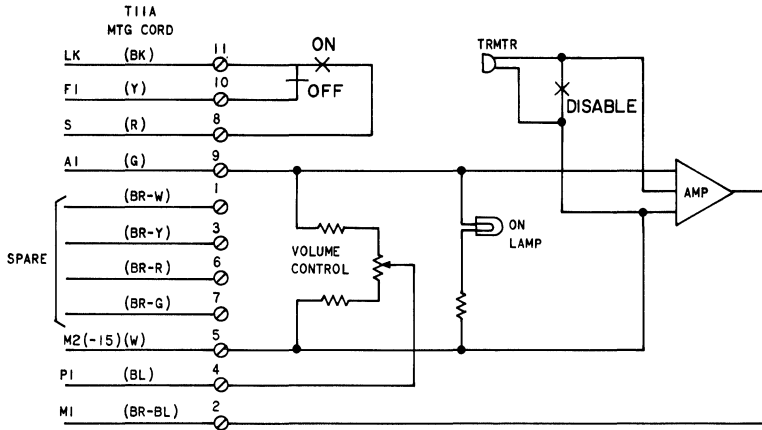


Fig. 3—666A (MD) Transmitter Connections

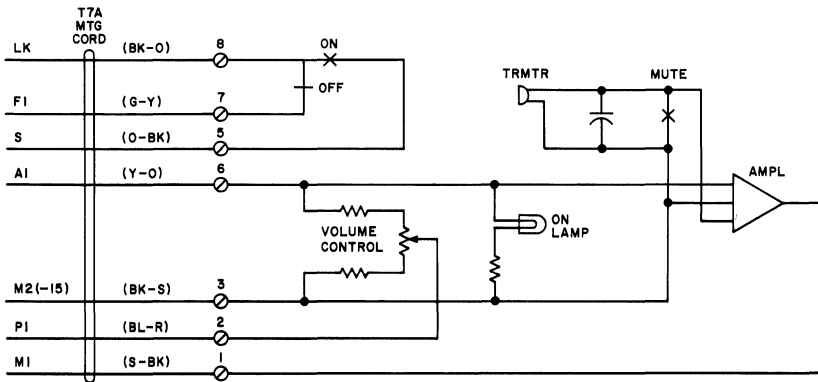


Fig. 4—666B Transmitter Connections

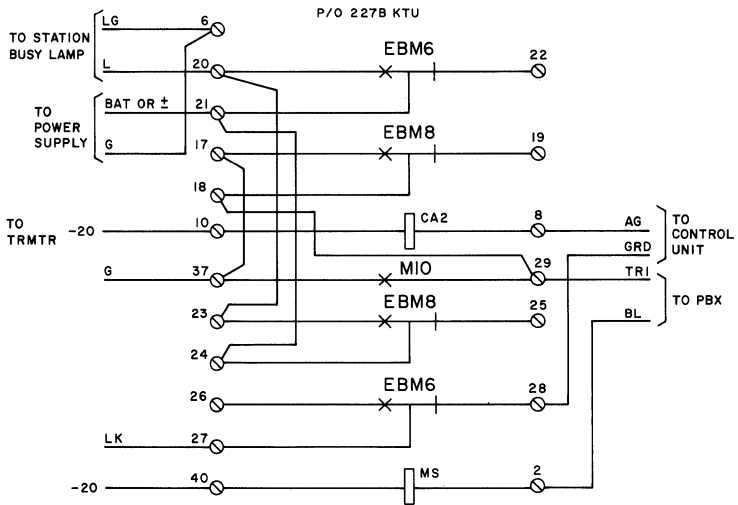


Fig. 5—Auxiliary Relay Circuit for Use With 750A or 755A PBX

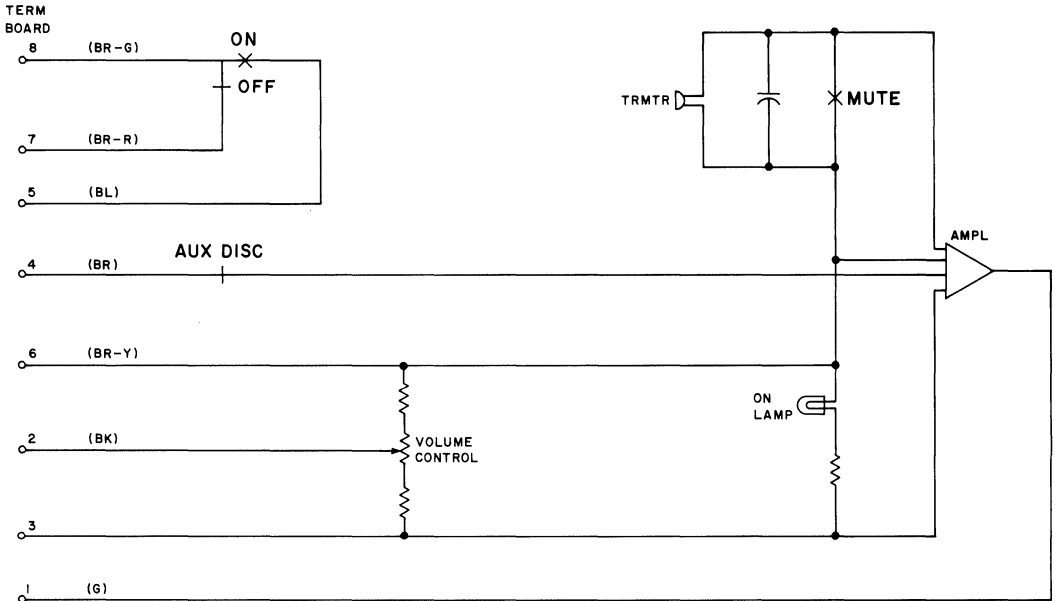


Fig. 6 - 670A Transmitter

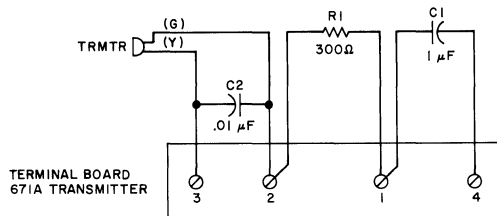


Fig. 7 - 671A Transmitter

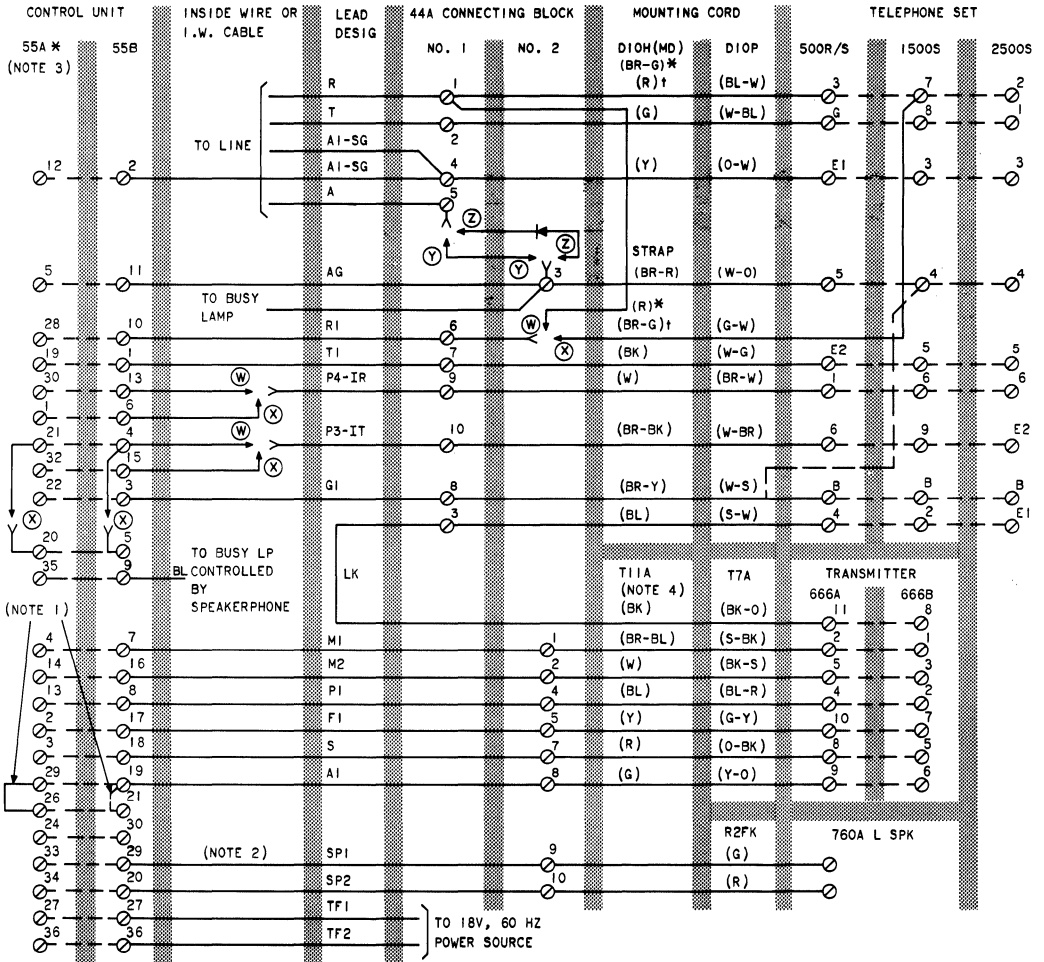


**SPEAKERPHONE SYSTEM 3-TYPE**  
**500R/S, 1500S, AND 2500S TELEPHONE SET**  
**CONNECTIONS**

**1. GENERAL**

**1.01** This section is reissued to add information on the 1500S and 2500S telephone sets, formerly contained in Sections 512-621-402 and 512-622-405 which are hereby canceled.

**1.02** Refer to the appropriate Reference or Service section in the Division 502 for complete wiring information of the telephone set. Information on the components of the 3-type speakerphone system will be found in Section 512-620-100.



- NOTES:
1. ADD STRAP FOR BUSY LAMP CONTROLLED BY SPEAKERPHONE ONLY.
  2. IF REDUCED LOUDSPEAKER VOLUME IS DESIRED, MOVE SPI LEAD TO TERM. 30 (55B) OR 24 (55A).
  3. MODIFIED FOR TOUCH-TONE USE.
  4. INSULATE AND STORE UNUSED LEADS.

\* COLOR CODE USED ON 500R/S  
 † COLOR CODE USED ON 1500S

- (W) 500R/S
- (X) 1500S, 2500S
- (Y) WITHOUT BUSY LAMP
- (Z) WITH BUSY LAMP KS-15724, LI DIODE

Fig. 1—500R/S Telephone Set—Speakerphone Connections

**SPEAKERPHONE SYSTEM—3-TYPE**  
**511-, 1511-, AND 2511-TYPE TELEPHONE SETS**  
**CONNECTIONS AND MAINTENANCE**

**1. GENERAL**

**1.01** These sets are supplied factory-wired for use with 3-type speakerphone. Refer to Division 502 for complete telephone set wiring schematics.

**1.02** This section is reissued to:

- Include information on 1511- and 2511-type telephone sets
- Show 1511-type sets MD

**1.03** Information on the 1511-type sets was formerly found in Section 512-621-410 and 2511-type in Section 512-622-410 which are hereby canceled.

**2. MAINTENANCE**

**2.01** For the 511-, 1511-, and 2511-type telephone set maintenance information refer to the appropriate Reference section in Division 502. Refer to Division 512 for maintenance of speakerphone components used with these sets.

**SECTION 512-620-415**

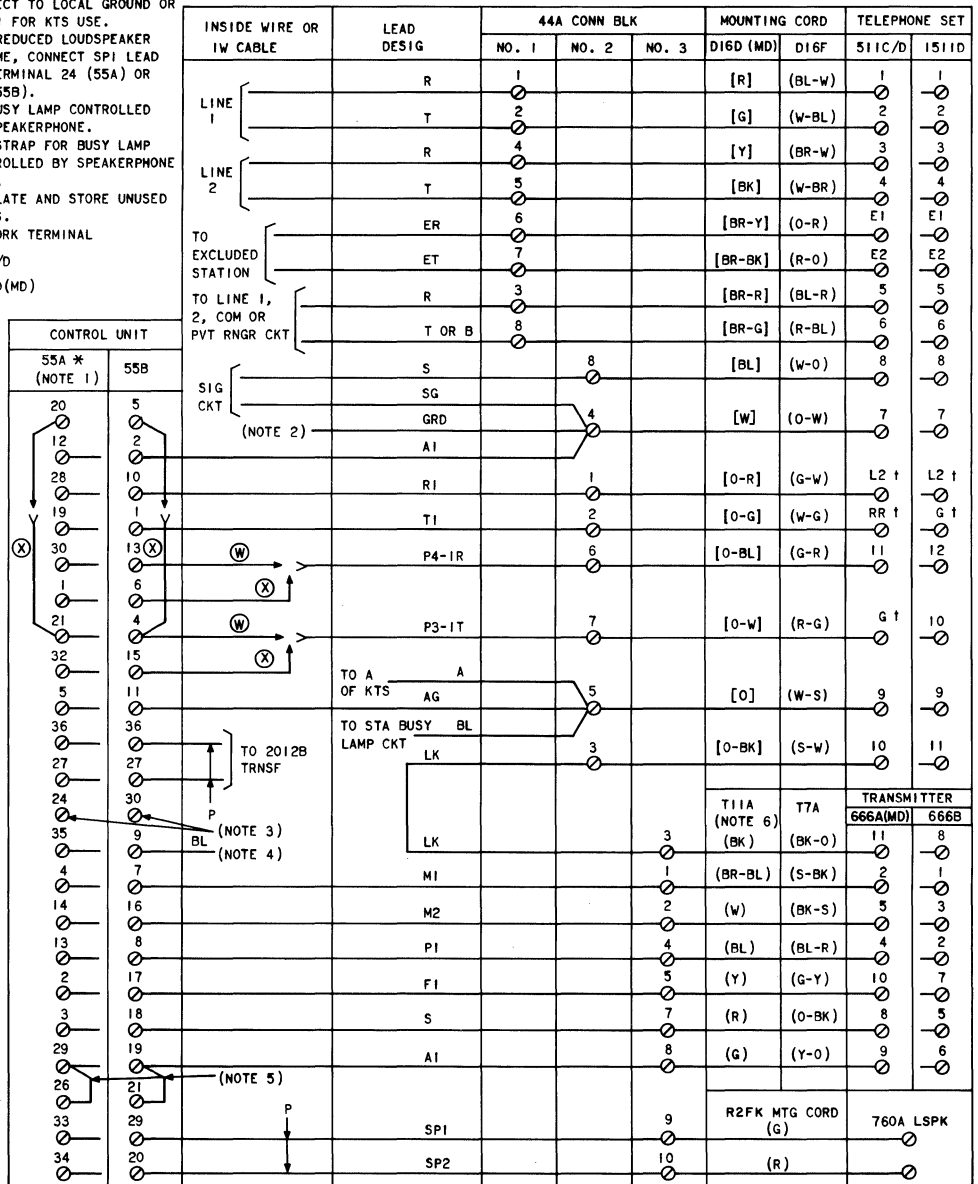
**NOTES:**

1. MODIFIED FOR "TOUCH-TONE" USE.
2. CONNECT TO LOCAL GROUND OR TO A1 FOR KTS USE.
3. FOR REDUCED LOUDSPEAKER VOLUME, CONNECT SPI LEAD TO TERMINAL 24 (55A) OR 30 (55B).
4. TO BUSY LAMP CONTROLLED BY SPEAKERPHONE.
5. ADD STRAP FOR BUSY LAMP CONTROLLED BY SPEAKERPHONE ONLY.
6. INSULATE AND STORE UNUSED LEADS.

1 NETWORK TERMINAL

(W) 511C/D

(X) 1511D(MD)



**Fig. 1—511C/D and 1511D (MD) Telephone Set, Connections to 3-Type Speakerphone System**

NOTES:

1. MODIFIED FOR "TOUCH-TONE" USE.
2. CONNECT TO LOCAL GROUND OR TO AI FOR KTS USE.
3. FOR REDUCED LOUDSPEAKER VOLUME, CONNECT SPI LEAD TO TERMINAL 24 (55A) OR 30 (55B).
4. TO BUSY LAMP CONTROLLED BY SPEAKERPHONE.
5. ADD STRAP FOR BUSY LAMP CONTROLLED BY SPEAKERPHONE ONLY.
6. INSULATE AND STORE UNUSED LEADS.

- † NETWORK TERMINAL
- ⓪ 511F
- ⓧ 1511F (MD), 2511F

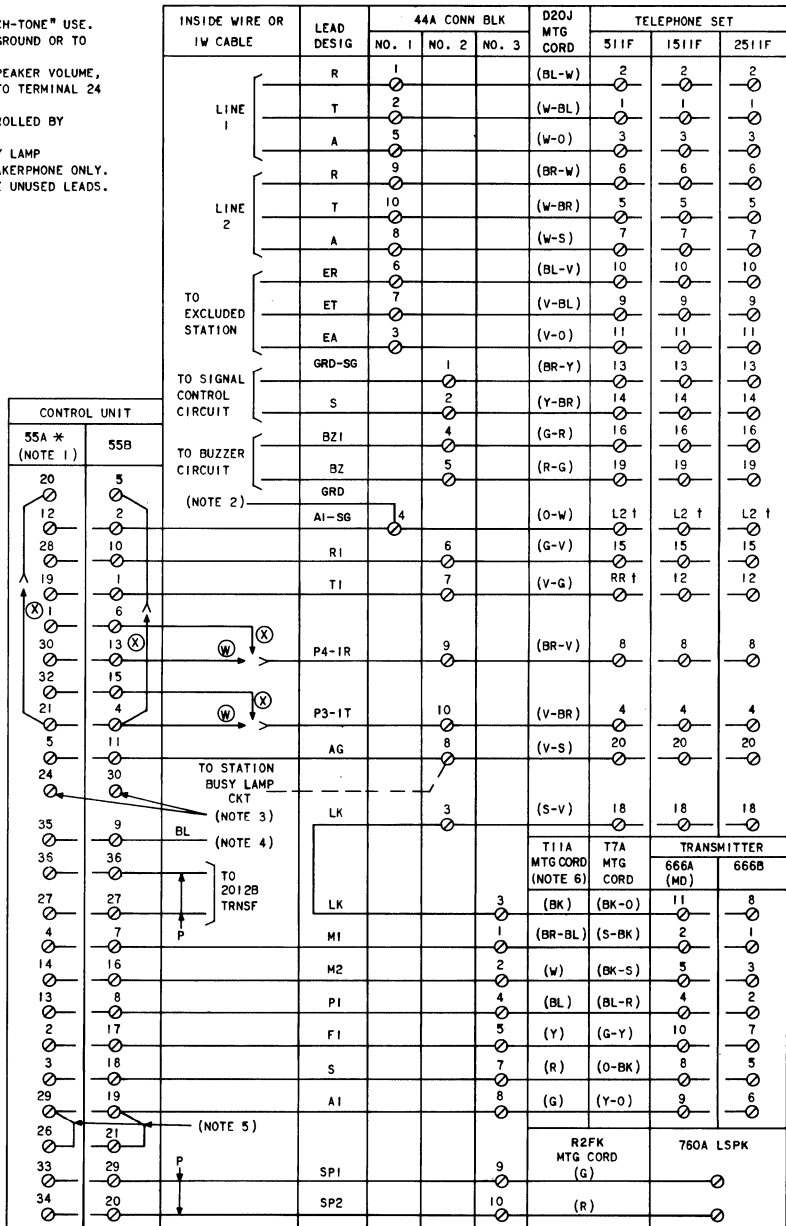


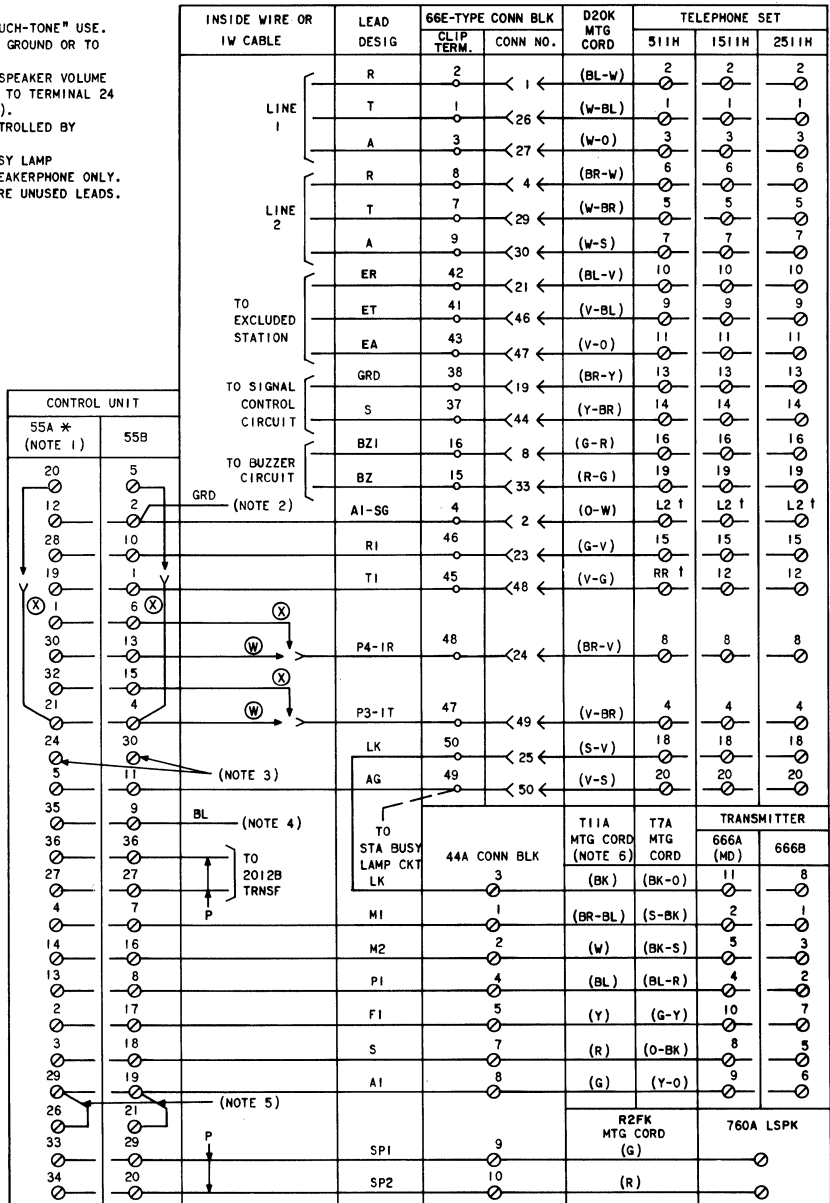
Fig. 2—511F, 1511F (MD), and 2511F Telephone Set, Connections to 3-Type Speakerphone System

**SECTION 512-620-415**

**NOTES:**

1. MODIFIED FOR "TOUCH-TONE" USE.
2. CONNECT TO LOCAL GROUND OR TO A1 FOR KTS USE.
3. FOR REDUCED LOUDSPEAKER VOLUME CONNECT SPI LEAD TO TERMINAL 24 (55A) OR 30 (55B).
4. TO BUSY LAMP CONTROLLED BY SPEAKERPHONE.
5. ADD STRAP FOR BUSY LAMP CONTROLLED BY SPEAKERPHONE ONLY.
6. INSULATE AND STORE UNUSED LEADS.

- † NETWORK TERMINAL  
 (W) 511H  
 (X) 1511H(MD), 2511H



**Fig. 3—511H, 1511H (MD), and 2511H Telephone Set, Connections to 3-Type Speakerphone System**

**SPEAKERPHONE SYSTEM—3-TYPE**  
**558-, 1558-, AND 2558-TYPE TELEPHONE SETS**  
**CONNECTIONS AND MAINTENANCE**

**1. GENERAL**

**1.01** These sets are supplied factory-wired for use with 3-type speakerphone. Refer to Division 502 for complete telephone set wiring schematics.

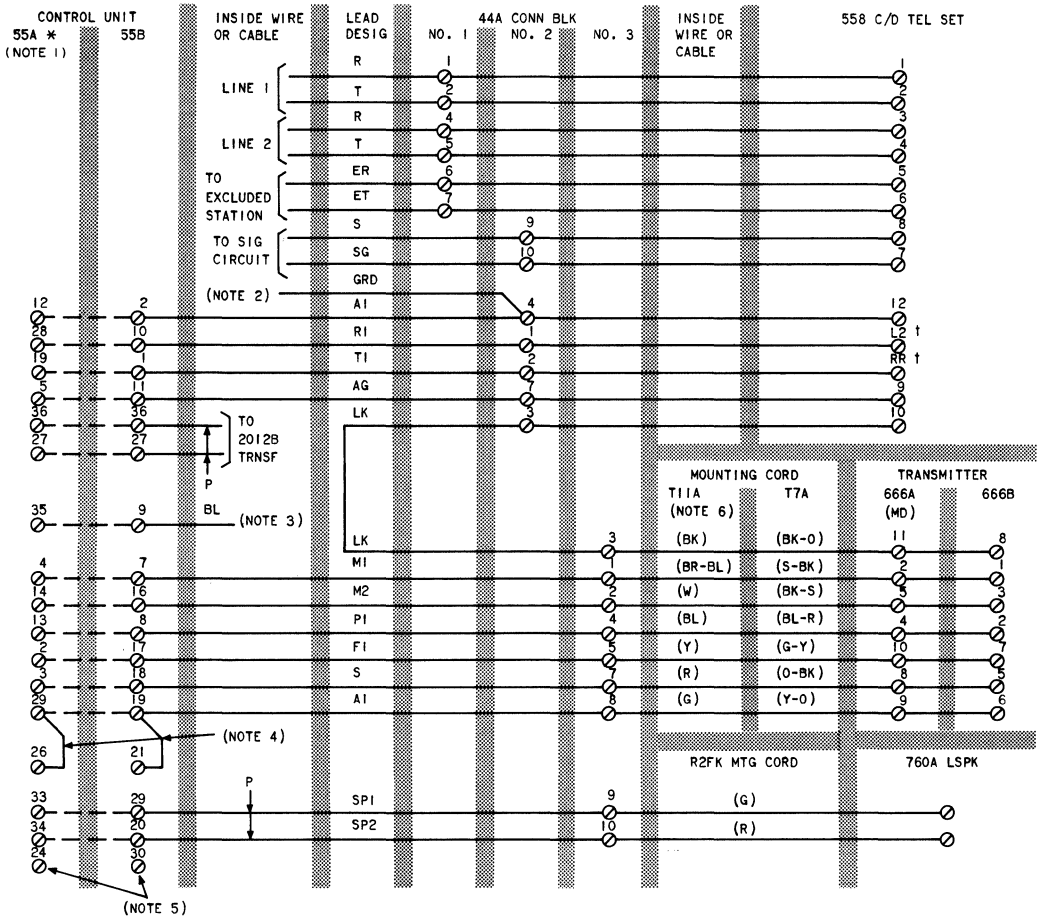
**1.02** This section is reissued to:

- Include information on 1558- and 2558-type telephone sets
- Show 1558D set MD

**1.03** ♦Information on the 1558-type sets was formerly found in Section 512-621-413 and 2558-type in Section 512-622-413 which are hereby canceled.♦

**2. MAINTENANCE**

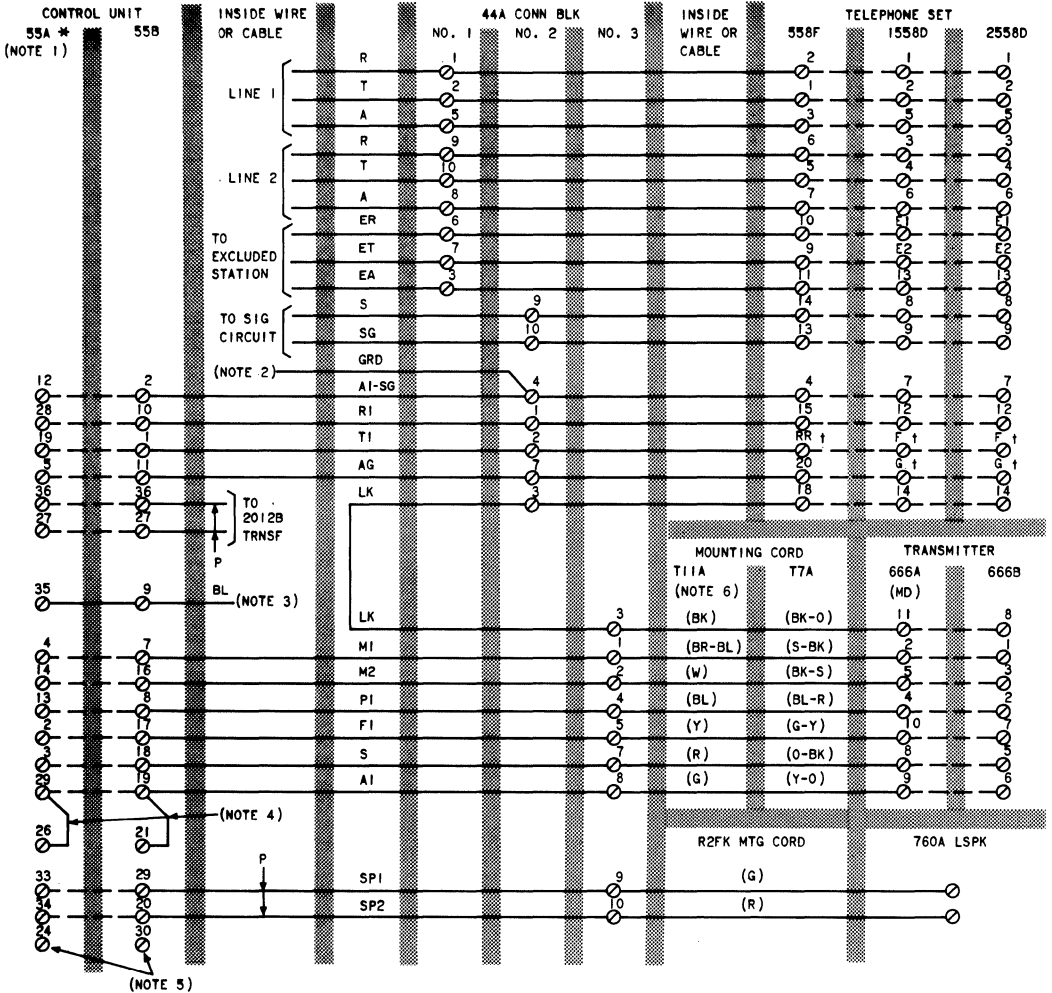
**2.01** For maintenance information refer to the appropriate Reference section for the 558-, 1558-, and 2558-type sets located in Division 502. Refer to Division 512 for maintenance of speakerphone components used with these sets.



- NOTES:
1. MODIFIED FOR "TOUCH-TONE" USE.
  2. CONNECT TO LOCAL GROUND OR TO A1 FOR KTS USE.
  3. TO BUSY LAMP CONTROLLED BY SPEAKERPHONE.
  4. ADD STRAP FOR BUSY LAMP CONTROLLED BY SPEAKERPHONE ONLY.
  5. FOR REDUCED LOUDSPEAKER VOLUME, CONNECT SPI LEAD TO TERMINAL 24 (55A) OR 30 (55B).
  6. INSULATE AND STORE UNUSED LEADS.
- † NETWORK TERMINAL

Fig. 1—558C/D Telephone Set Connections to 3-Type Speakerphone System





- NOTES:
1. MODIFIED FOR "TOUCH-TONE" USE.
  2. CONNECT TO LOCAL GROUND OR TO AI FOR KTS USE.
  3. TO BUSY LAMP CONTROLLED BY SPEAKERPHONE.
  4. ADD STRAP FOR BUSY LAMP CONTROLLED BY SPEAKERPHONE ONLY.
  5. FOR REDUCED LOUDSPEAKER VOLUME, CONNECT SPI LEAD TO TERMINAL 24 (55A) OR 30 (55B).
  6. INSULATE AND STORE UNUSED LEADS.
- † NETWORK TERMINAL

Fig. 2—558F, 1558D (MD), and 2558D Telephone Set, Connections to 3-Type Speakerphone System

## SPEAKERPHONE SYSTEMS—3-TYPE

### 565-, 1565-, AND 2565-TYPE TELEPHONE SETS

### CONNECTIONS

#### 1. GENERAL

**1.01** This section shows connections between components of the 3-type speakerphone system and the 565-, 1565-, and 2565-type telephone sets.

**1.02** This section is reissued to show:

- Connection information for the 1565- and 2565-type telephone sets formerly found in Sections 512-621-415 and 512-622-415 which are hereby canceled
- KS-19252L1 bridging adapter

Since this reissue covers a general revision, arrows ordinarily used to indicate changes have been omitted.

**1.03** The connections in this section are for use with 1A1 or 1A2 KTS. For conversion to 1A KTS or for complete telephone set connections refer to the appropriate section in Division 502.

**1.04** These sets may be used with the 55B or 55A\* modified control unit. Modified 55A

control units are identified by an asterisk following the code. The 565-type telephone set may be used with 55A (MD) control unit.

**1.05** When using a 666-type transmitter unit equipped with a T11A cord, insulate and store the spare conductors.

#### 2. CONNECTIONS

Fig. 1—Connections for 565-Type Telephone Set Using 66E-Type Connecting Block

Fig. 2—Connections for 565-Type Telephone Set Using 149-Type Adapter

Fig. 3—Connections for 1565- or 2565-Type Telephone Set Using 66E-Type Connecting Block

Fig. 4—Connections for 1565- or 2565-Type Telephone Set Using 149-Type Adapter

Fig. 5—Use of KS-19252L1 Bridging Adapter

SECTION 512-620-420

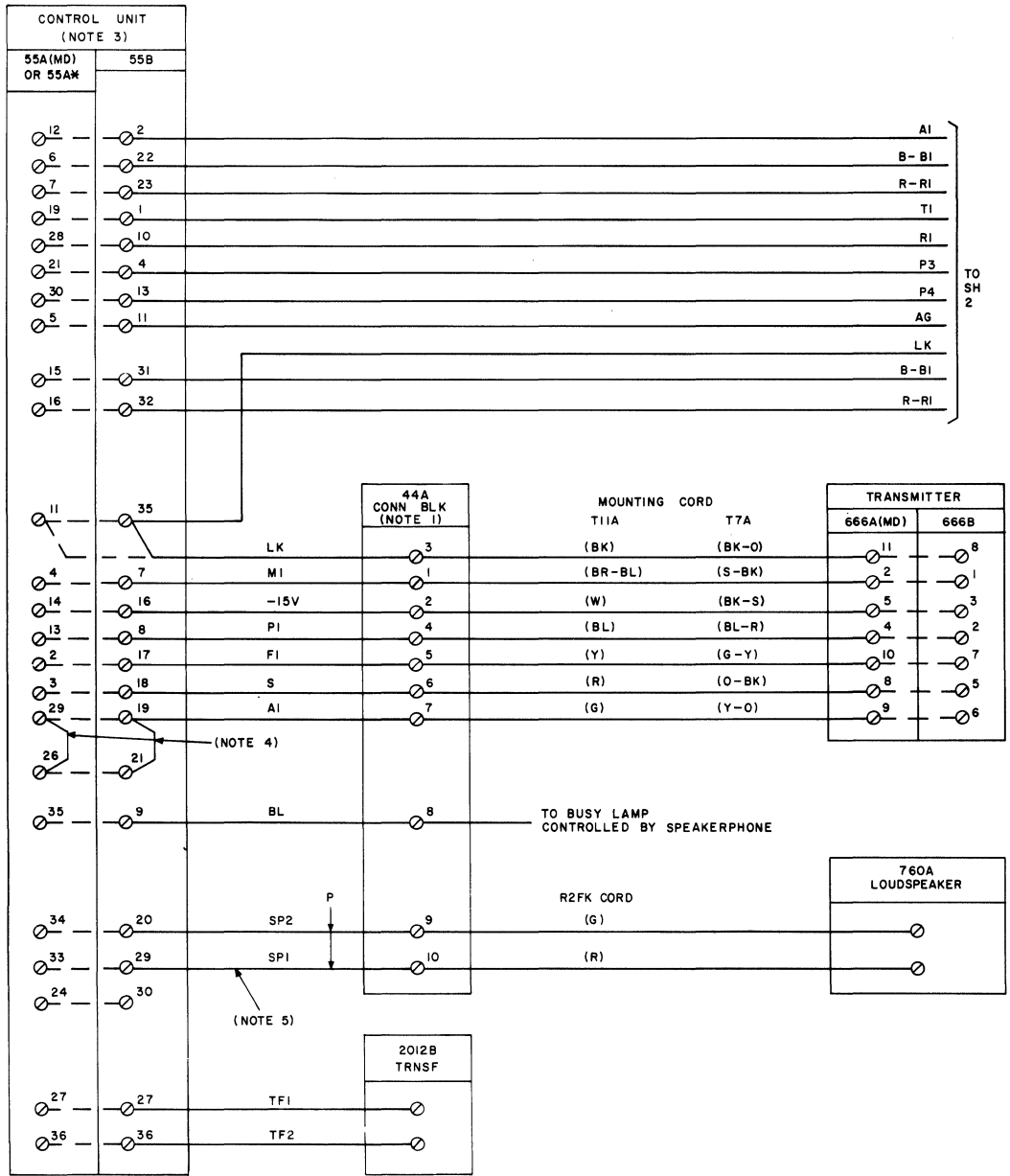


Fig. 1—Connections for 565-Type Telephone Set Using 66E-Type Connecting Block (Sheet 1 of 2)

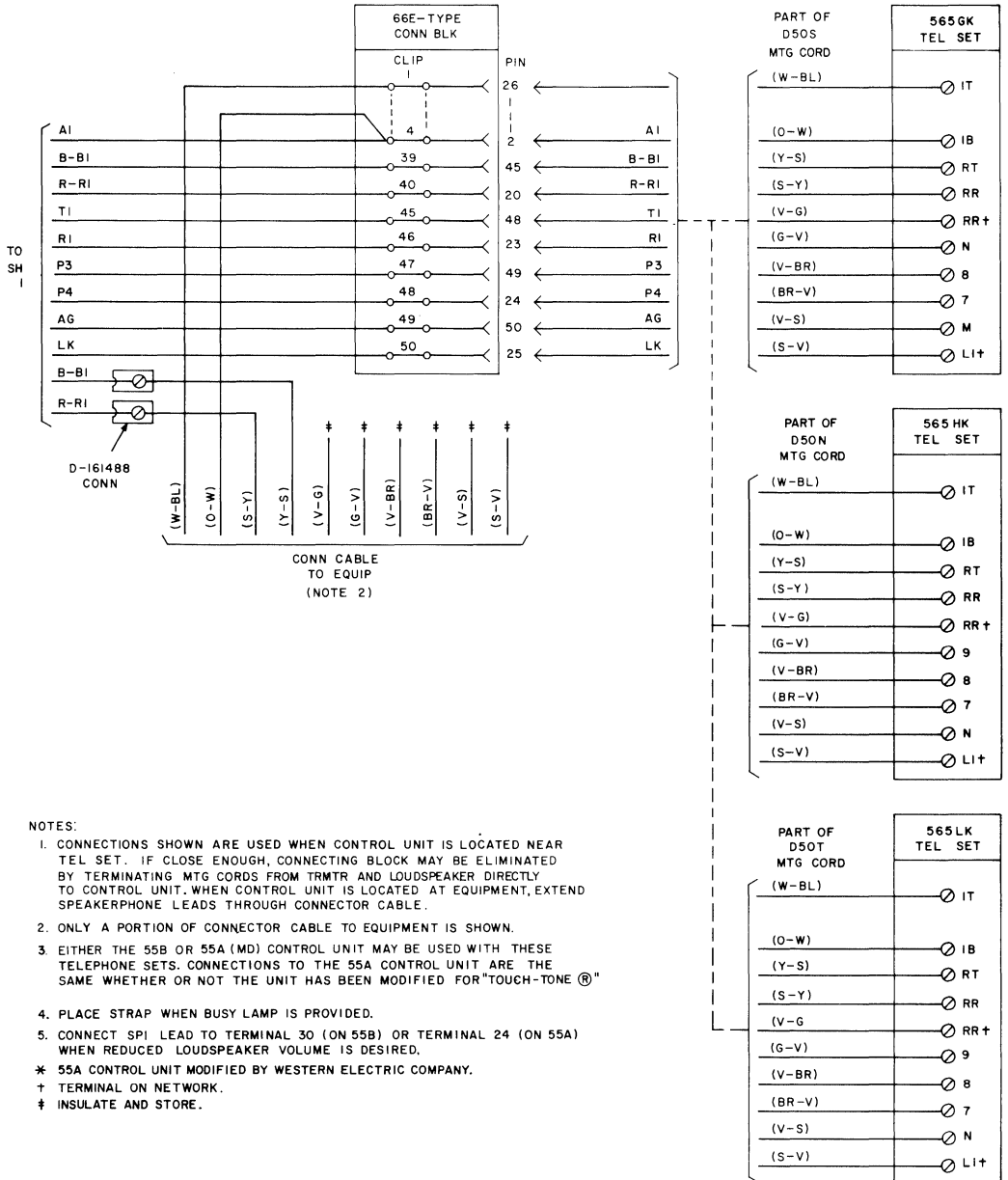
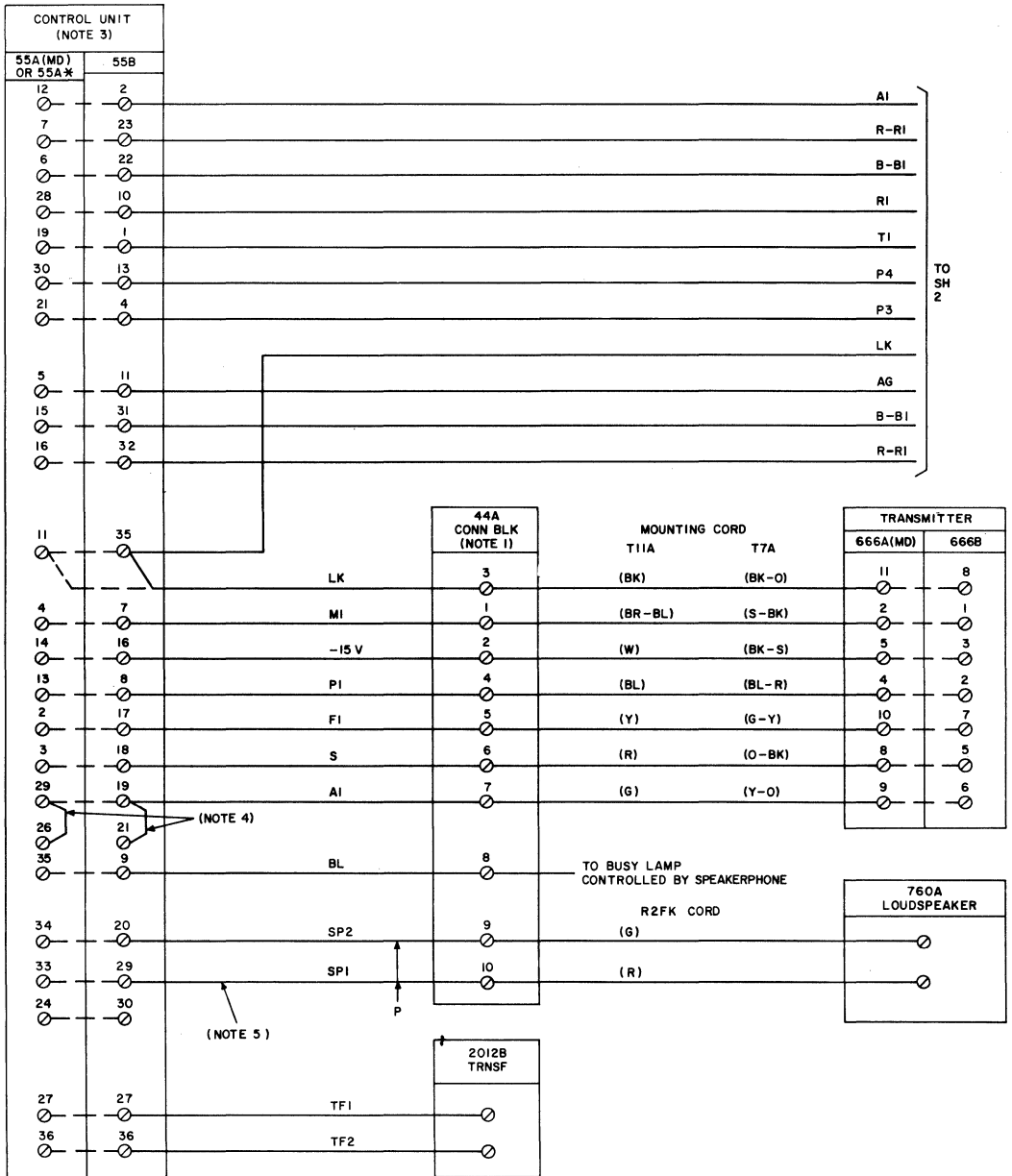


Fig. 1—Connections for 565-Type Telephone set Using 66E-Type Connecting Block (Sheet 2 of 2)

**SECTION 512-620-420**



**Fig. 2—Connections for 565-Type Telephone Set Using 149-Type Adapter (Sheet 1 of 2)**

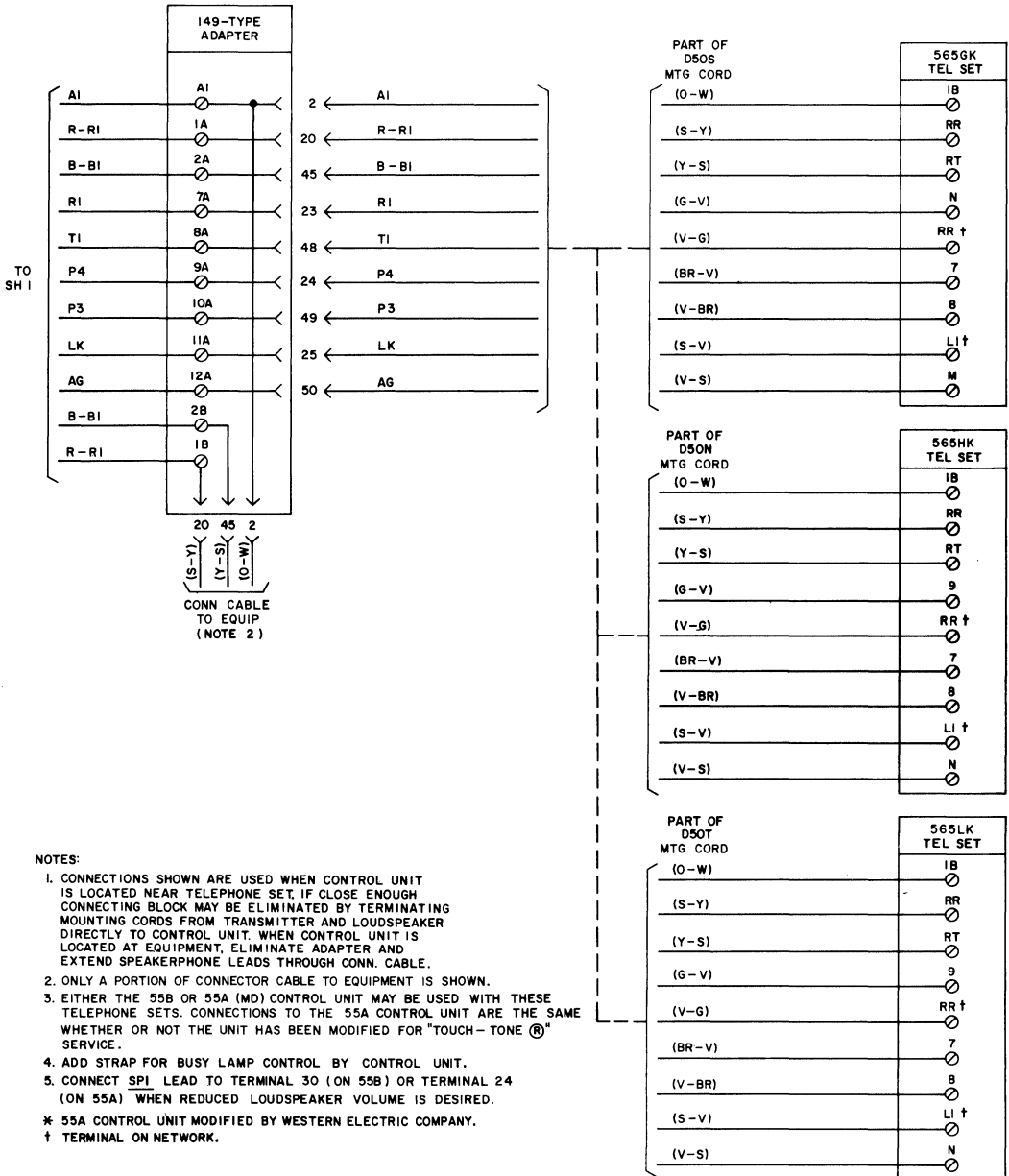


Fig. 2—Connections for 565-Type Telephone Set Using 149-Type Adapter (Sheet 2 of 2)

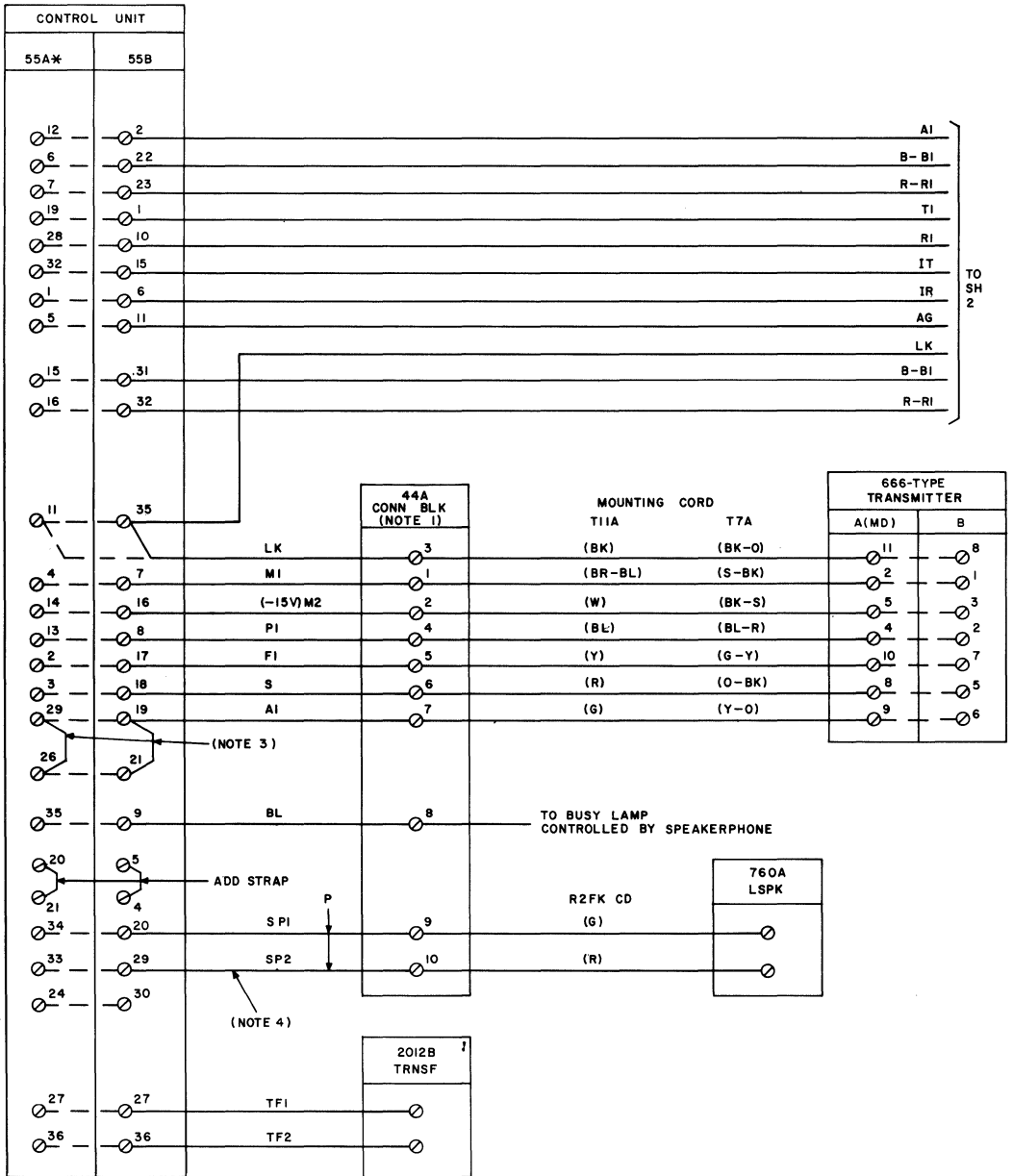
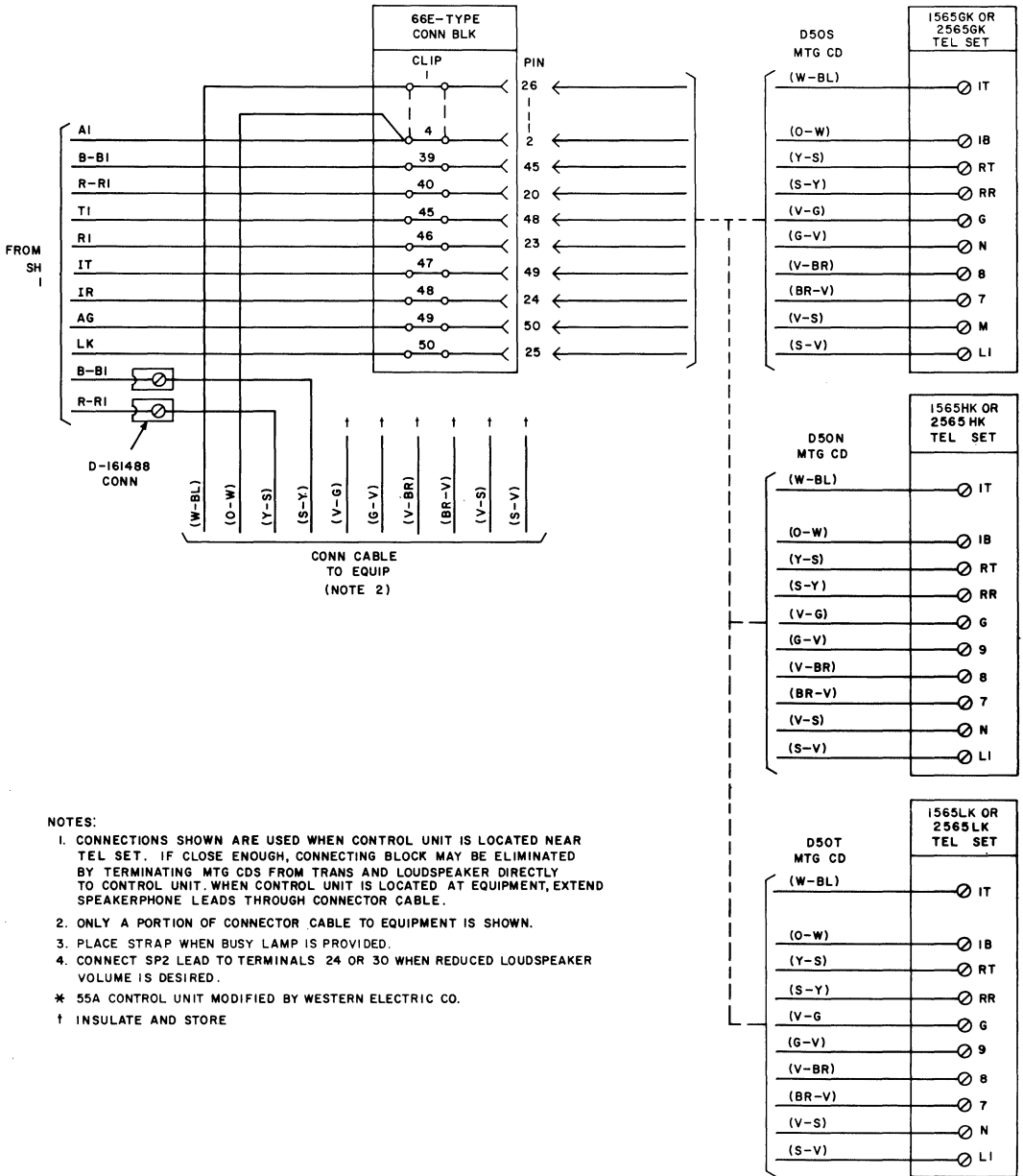


Fig. 3—Connections for 1565- or 2565-Type Telephone Set Using 66E-Type Connecting Block (Sheet 1 of 2)



NOTES:

1. CONNECTIONS SHOWN ARE USED WHEN CONTROL UNIT IS LOCATED NEAR TEL SET. IF CLOSE ENOUGH, CONNECTING BLOCK MAY BE ELIMINATED BY TERMINATING MTG CDS FROM TRANS AND LOUDSPEAKER DIRECTLY TO CONTROL UNIT. WHEN CONTROL UNIT IS LOCATED AT EQUIPMENT, EXTEND SPEAKERPHONE LEADS THROUGH CONNECTOR CABLE.
  2. ONLY A PORTION OF CONNECTOR CABLE TO EQUIPMENT IS SHOWN.
  3. PLACE STRAP WHEN BUSY LAMP IS PROVIDED.
  4. CONNECT SP2 LEAD TO TERMINALS 24 OR 30 WHEN REDUCED LOUDSPEAKER VOLUME IS DESIRED.
- \* 55A CONTROL UNIT MODIFIED BY WESTERN ELECTRIC CO.  
 † INSULATE AND STORE

Fig. 3—Connections for 1565- or 2565-Type Telephone Set Using 66E-Type Connecting Block (Sheet 2 of 2)



SECTION 512-620-420

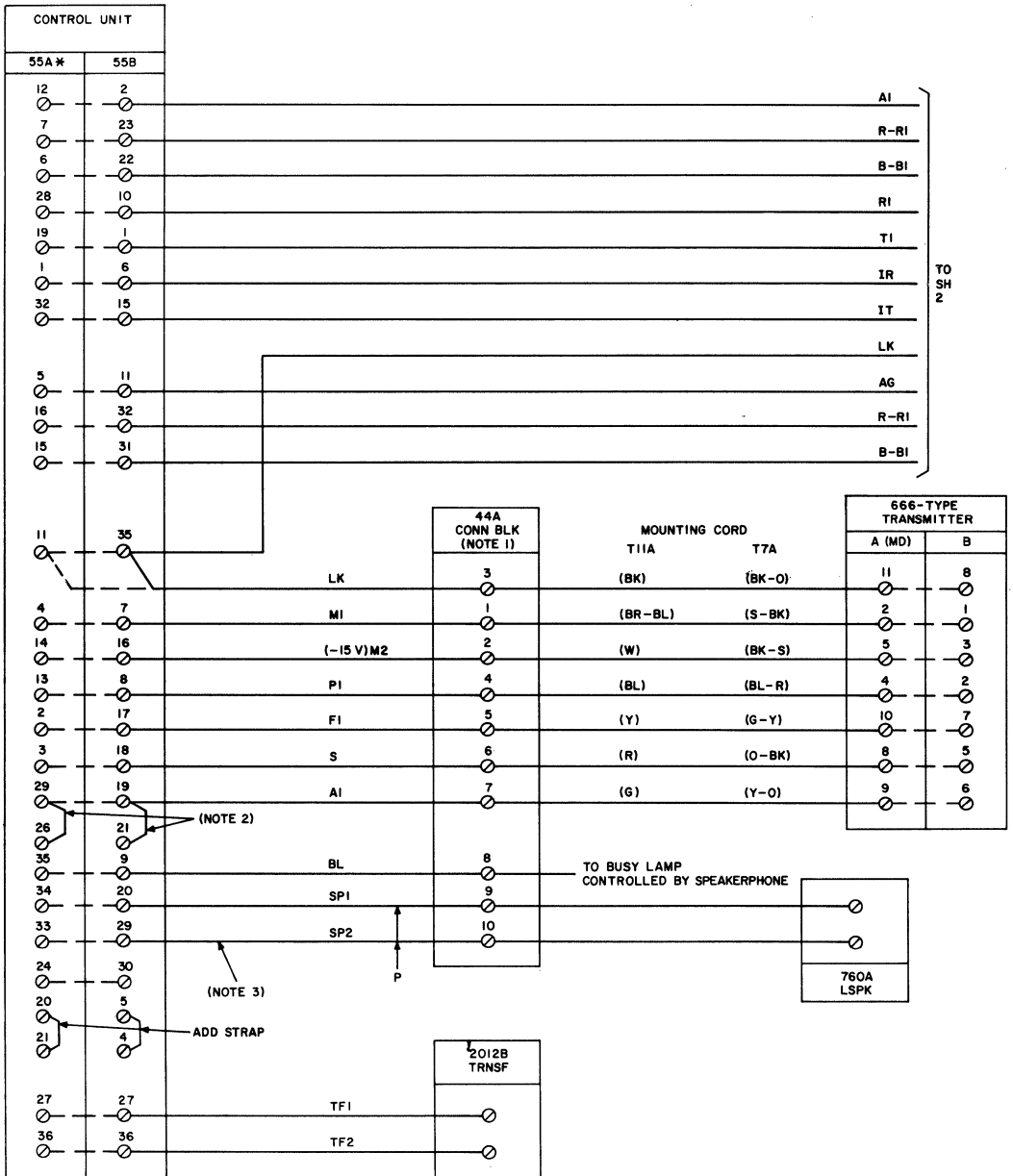
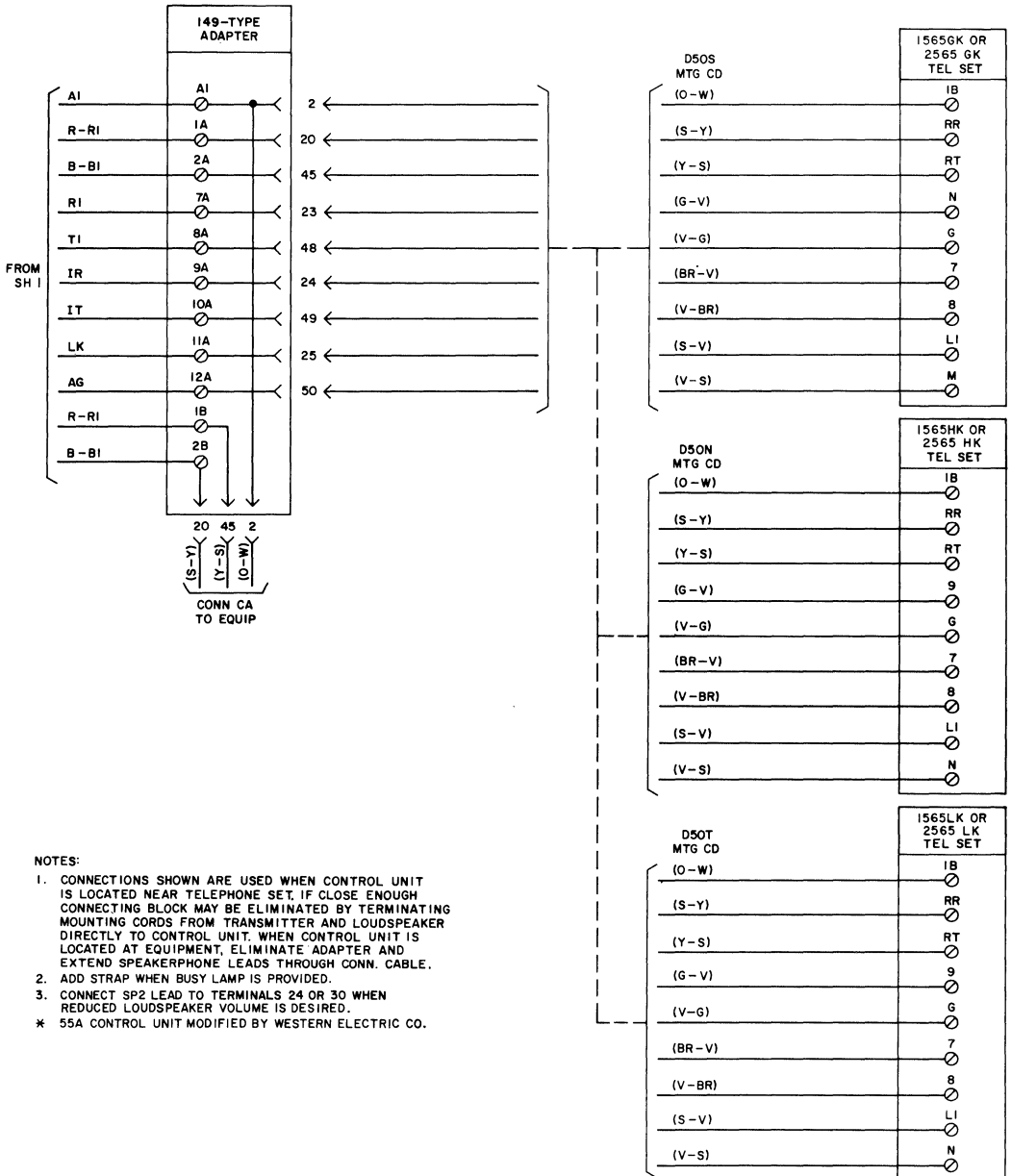


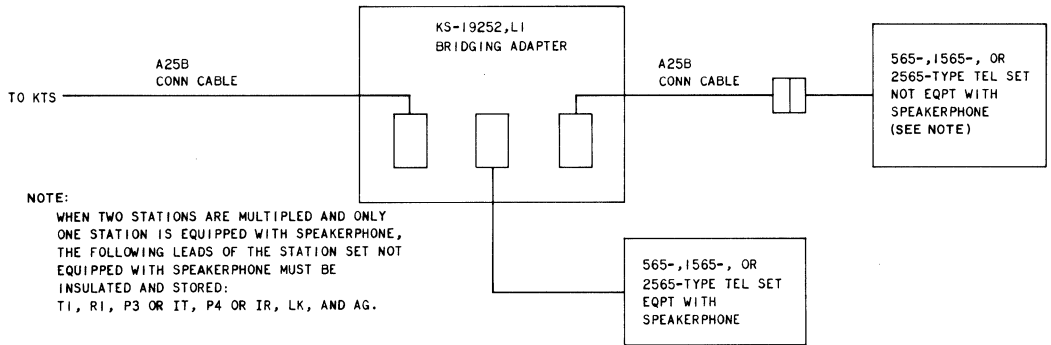
Fig. 4—Connections for 1565- or 2565-Type Telephone Set Using 149-Type Adapter (Sheet 1 of 2)



NOTES:

1. CONNECTIONS SHOWN ARE USED WHEN CONTROL UNIT IS LOCATED NEAR TELEPHONE SET, IF CLOSE ENOUGH CONNECTING BLOCK MAY BE ELIMINATED BY TERMINATING MOUNTING CORDS FROM TRANSMITTER AND LOUDSPEAKER DIRECTLY TO CONTROL UNIT. WHEN CONTROL UNIT IS LOCATED AT EQUIPMENT, ELIMINATE ADAPTER AND EXTEND SPEAKERPHONE LEADS THROUGH CONN. CABLE.
  2. ADD STRAP WHEN BUSY LAMP IS PROVIDED.
  3. CONNECT SP2 LEAD TO TERMINALS 24 OR 30 WHEN REDUCED LOUDSPEAKER VOLUME IS DESIRED.
- \* 55A CONTROL UNIT MODIFIED BY WESTERN ELECTRIC CO.

Fig. 4—Connections for 1565- or 2565-Type Telephone Set Using 149-Type Adapter (Sheet 2 of 2)



**Fig. 5—Using KS-19252L1 Bridging Adapter**

**SPEAKERPHONE SYSTEM—3-TYPE**  
**630-, 631-, 1630-, 1631-, 2630-, AND 2631-TYPE TELEPHONE SETS**  
**CONNECTIONS**

**1. GENERAL**

**1.001** This addendum supplements Section 512-620-440, Issue 4.

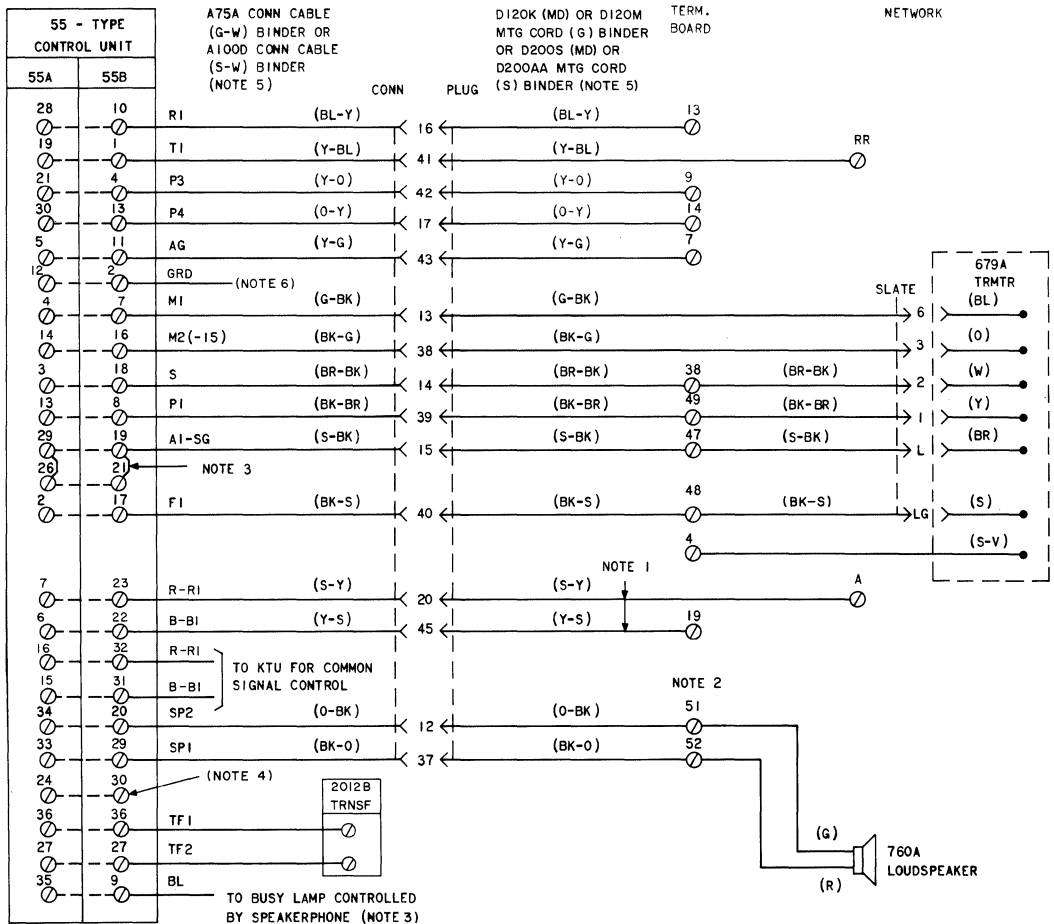
**1.002** This addendum is issued to revise Fig. 4 and 6 to show mounting cord D120K (MD) replaced by D120M and mounting cord D200S (MD) replaced by D200AA.

**3. CONNECTIONS**

The following changes apply to Part 3 of this section:

(a) Fig. 4—revised

(b) Fig. 6—revised



- NOTES:
1. WHEN CONTROL UNIT IS USED TO CUT OFF RINGER OR BUZZER IN SET, CONNECT THESE LEADS AS SHOWN. INSULATE AND STORE S-Y AND Y-S FROM BL BINDER.
  2. INSULATE AND STORE O-BK AND BK-O TO BR PLUG.
  3. STRAP 26 TO 29(55A) OR 21 TO 19(55B) WHEN BUSY LAMP IS CONTROLLED BY SPEAKERPHONE. USE DC LAMP OR BUSY LAMP CONTROL CIRCUIT PER SD-69403-01.
  4. CONNECT SP1 LEAD TO 24(55A) OR 30(55B) WHEN REDUCED LOUDSPEAKER VOLUME IS DESIRED.
  5. D120K MTG CORD AND A75A CONN CABLE USED WITH 630DA TELEPHONE SET AND D200S MTG CORD AND A100D CONN CABLE USED WITH 631DA TELEPHONE SET.
  6. CONNECT LOCAL GROUND.

Fig. 4—630DA or 631DA Telephone Set, Connections

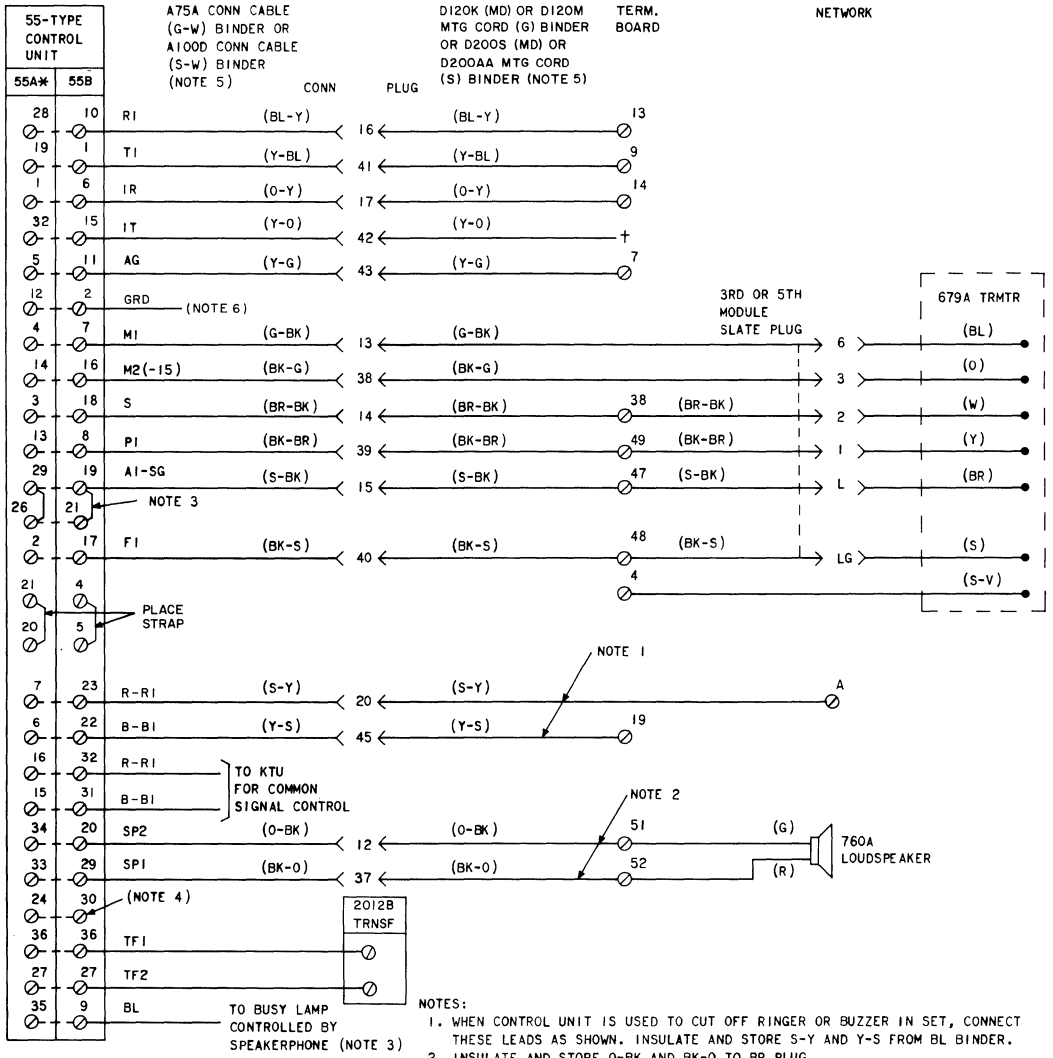


Fig. 6—2630A or 2631DA Telephone Set, Connections

## SPEAKERPHONE SYSTEM—3-TYPE

### 630-, 631-, 1630-, 1631-, 2630-, AND 2631-TYPE TELEPHONE SETS

#### CONNECTIONS

##### 1. GENERAL

**1.01** This section covers connection information for the 630-, 631-, 1630-, 1631-, 2630-, and 2631-type 18- or 30-button, rotary or TOUCH-TONE® dial telephone set when used with the 3-type speakerphone system.

**1.02** This section is reissued to revise Fig. 1, 2, 3, 4, 5, 6, 8, and 10.

**1.03** All of these sets with a single letter in the code are rated MD.

##### 2. MODIFICATION

**2.01** Codes -11, -12, and -13 of the 630-, 1630-, and 2630-type telephone sets and codes -16, -17, and -18 of the 631-, 1631-, and 2631-type telephone sets are factory-wired for speakerphone. Other codes can be modified by installing a transmitter in the third or fifth module and making the necessary wiring changes. In rotary sets replace the 8R dial with an 8C dial, where required.

**630A(MD), 630B(MD), 630C(MD), 630D(MD), 631A(MD), 631B(MD), 631C(MD), 631D(MD), 1630D(MD), 1631D(MD), 2630D(MD), AND 2631D(MD) TELEPHONE SETS**

**2.02** Convert as follows:

- (a) Remove telephone set faceplate and housing. (See Section 502-600-100 for procedures.)
- (b) Remove key unit or apparatus blank in right-hand module position (third or fifth module) and plug in a 667B transmitter (ordered separately).
- (c) Connect spade-tipped leads of transmitter as shown in Fig. 1, 2, 3, 5 and Table A.
- (d) Install housing. (See Section 502-600-100 for procedures.)

(e) Install new faceplate and mat (ordered separately) in which cutouts for the transmitter are provided. Refer to the appropriate Reference section in Division 502 for ordering information.

#### **630DA, 631DA, 2630DA, AND 2631DA**

**2.03** Convert as follows:

- (a) Remove faceplate and housing. (See Section 502-600-100 for procedures.)
- (b) Disconnect line plugs from key unit or apparatus blank in third module and remove key.
- (c) Install 679A transmitter in third or fifth module and connect slate plug to receptacle on rear of transmitter. Insulate and store balance of plugs.
- (d) Modify set per Fig. 4, 5 and Table C.
- (e) Replace housing. (See Section 502-600-100 for procedures.)
- (f) Install proper faceplate and mat. Refer to the appropriate Reference section for ordering information.

##### 3. CONNECTIONS



**For proper operation of the 3-type speakerphone system, ground must be present on the A1-lead. Connect ground to the appropriate terminal on the telephone set or at the 55-type control unit.**

**3.01** Where required, ringer and buzzer operation can be interrupted through break contacts of the 55-type control unit to prevent pickup while using speakerphone.

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**3.02** Connections are also shown for busy lamp controlled by speakerphone. Where it is desired to have the busy lamp controlled by speakerphone and line switch, refer to the Service section for the set involved.

**3.03** Either the 55A (MD) or 55B control unit may be used with sets equipped with rotary dials. Connections to the 55A control unit are the same, whether or not the unit has been modified for TOUCH-TONE service.

**3.04** A 55B control unit or a 55A modified for TOUCH-TONE service must be used with sets equipped with TOUCH-TONE dials. Modified 55A units are indicated by an asterisk following the code stenciled on the unit.

**3.05** To retain the maximum number of keys in the 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 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 (D10R) may be used. When control unit is located at key equipment extend speakerphone leads using mounting cord and connector cable.

**3.06** Installation and maintenance information for these sets is found in Section 502-600-100. Refer to Section 512-620-100 for installation and maintenance of speakerphone components.

**TABLE A**  
**CONNECTIONS FOR 667-TYPE TRANSMITTER LEADS**

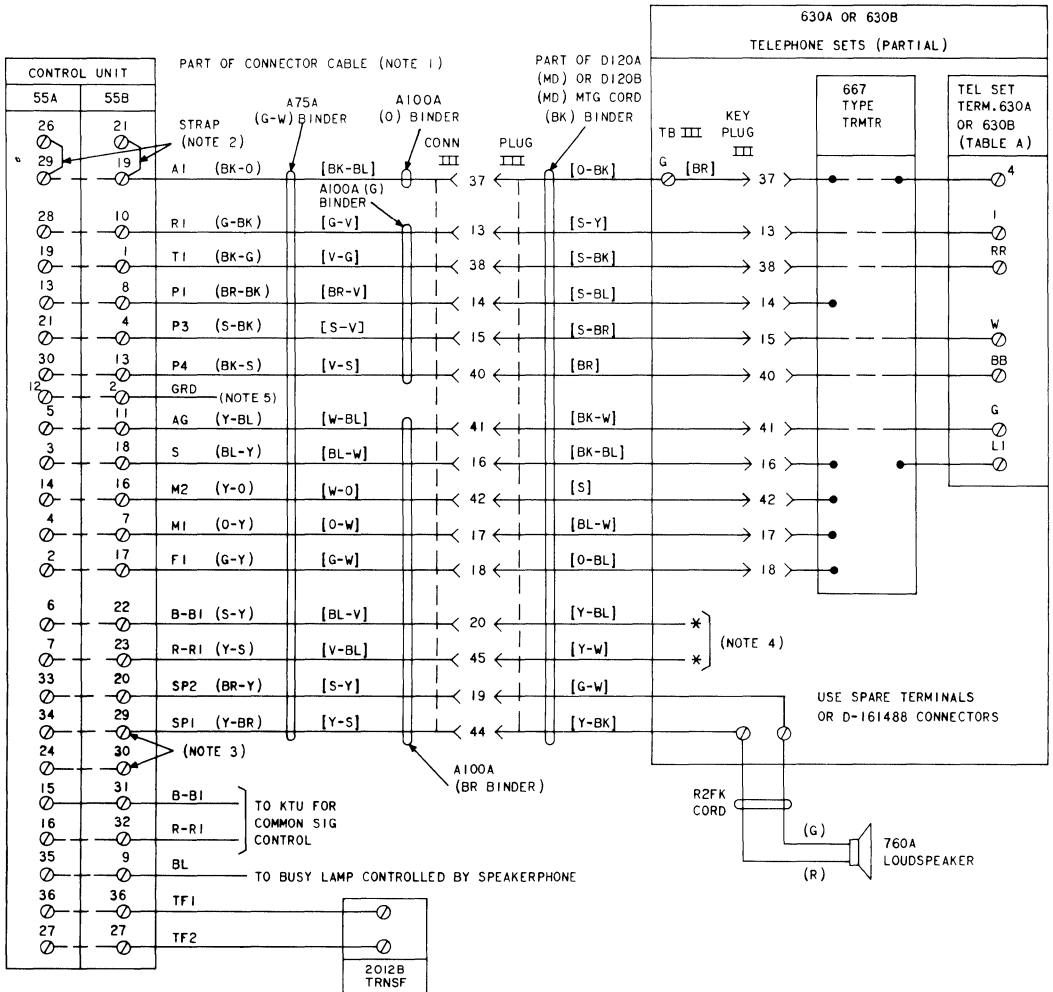
LEAD DESIG	TRANSMITTER		CONNECT TO*			
	667A (MD)	667B	630A 630B 630C TEL SETS	631A 631B 631C TEL SET	630D 631D TEL SET	1630D, 1631D 2630D, 2631D TEL SET
R1	O-R	BL-Y	1	2	2	
T1	O-G	Y-BL	RR†	RR†	10	
P3 or IR	O-W	Y-G	W‡	11	11	
P4 or IT	O-BL	G-Y	BB‡	12	12	
AG	O	O-Y	G†	5	5	
A1	Y	O-V	4	1	1	
LK	O-BK	Y-O	L1†	9	9	

\* Terminals on telephone set terminal board except where otherwise noted.

† Terminals on network.

‡ Terminals on dial.





NOTES:

1. IF CONTROL UNIT IS LOCATED AT KEY EQUIPMENT EXTEND SPEAKERPHONE CONNECTIONS THROUGH APPROPRIATE LEADS IN (O), (G) AND (BR) BINDER GROUPS OF A100A (MD) OR (G-W) BINDER GROUP OF A75A CONNECTOR CABLE. FOR OTHER LOCATIONS CONNECT TO CONTROL UNIT USING A25-TYPE CONNECTOR CABLE, EVEN COUNT COLOR CODE ONLY.
  2. ADD STRAP FOR STATION BUSY LAMP CONTROLLED BY SPEAKERPHONE
  3. CONNECT SPI LEAD TO TERMINAL 30 (ON 55B) OR TERMINAL 24 (ON 55A) WHEN REDUCED LOUDSPEAKER VOLUME IS DESIRED.
  4. CONNECT [Y-BL] [Y-W] TO BUZZER OR RINGER (IN PLACE OF EXISTING LEADS) TO PROVIDE AUTOMATIC CUTOFF OF COMMON AUDIBLE SIGNAL DURING SPEAKERPHONE OPERATION.
  5. CONNECT LOCAL GROUND.
- \* INSULATED AND STORED  
 ( ) CURRENT COLOR CODE  
 [ ] MD COLOR CODE

Fig. 1—630A or 630B Telephone Set, Connections

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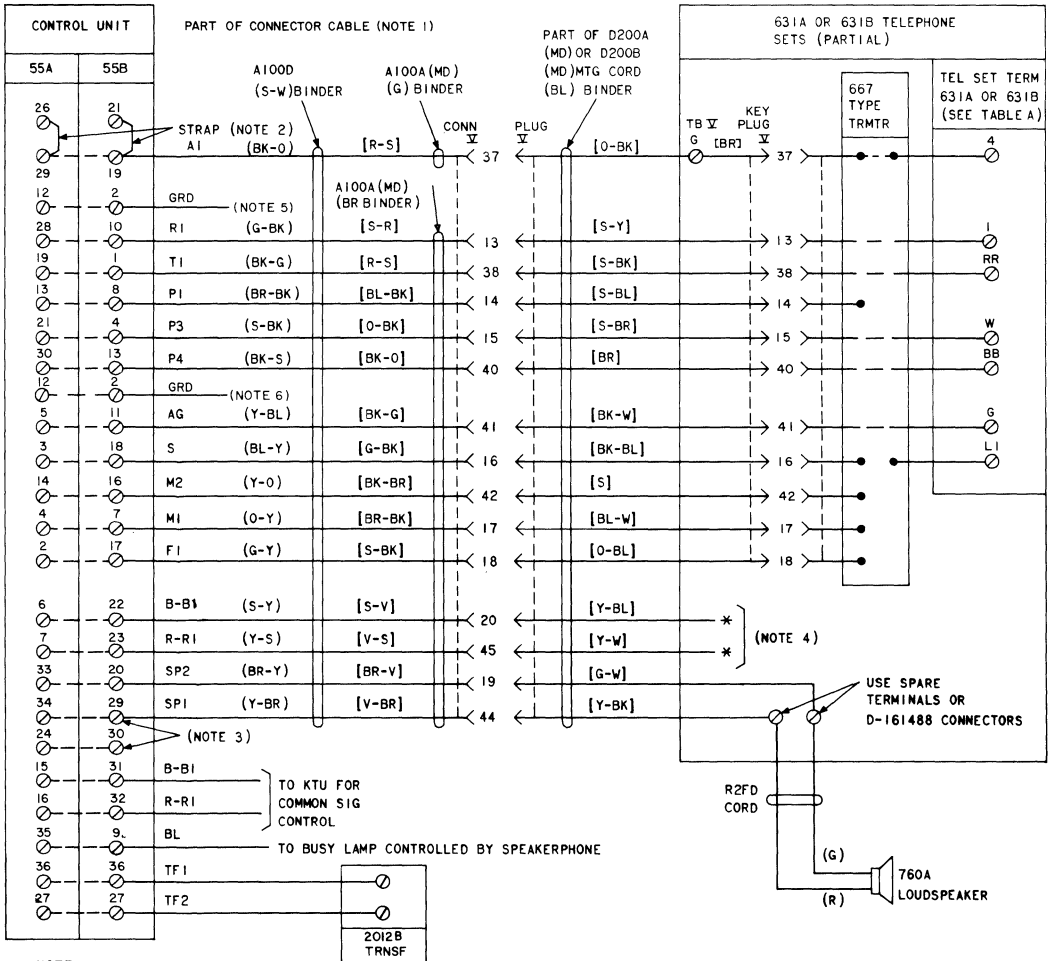


Fig. 2—631A or 631B Telephone Set, Connections

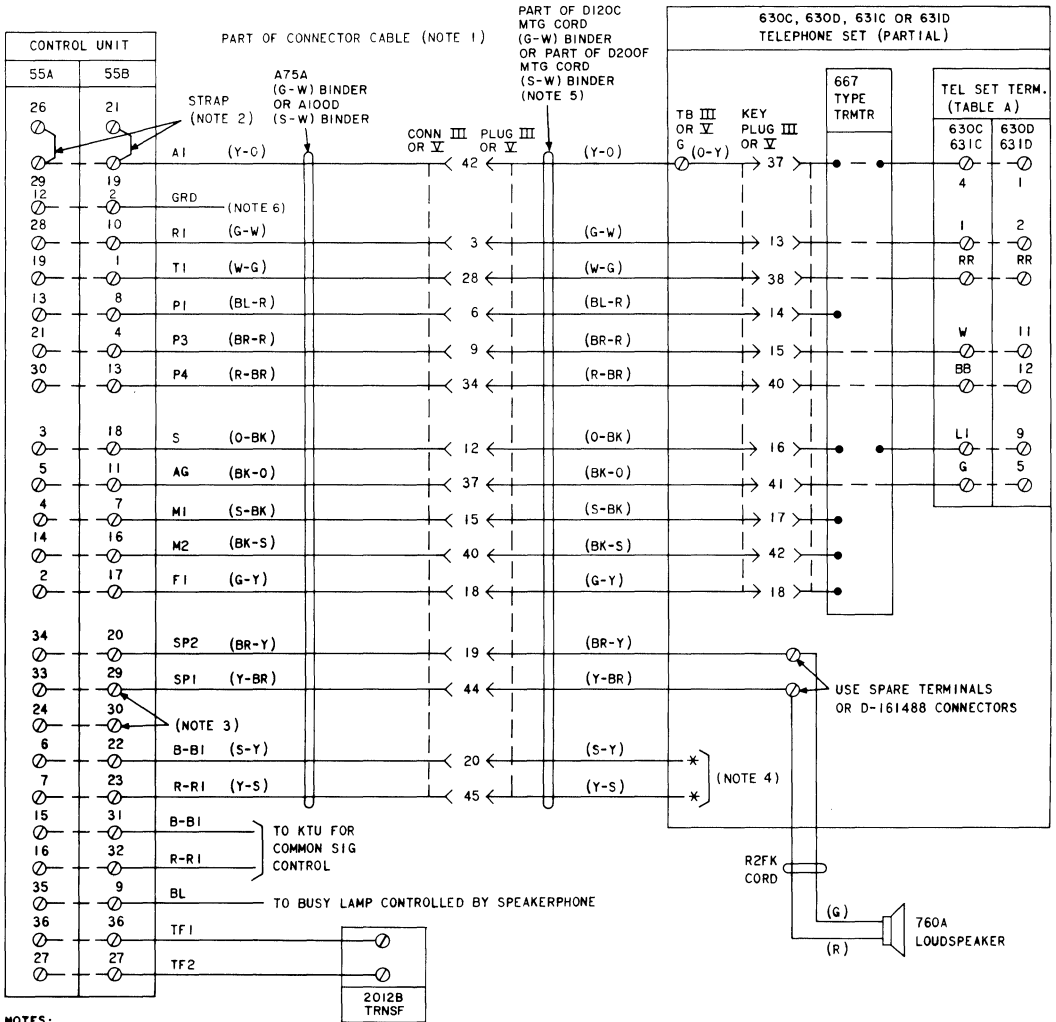


Fig. 3—630C, 630D, 631C, or 631D Telephone Set, Connections

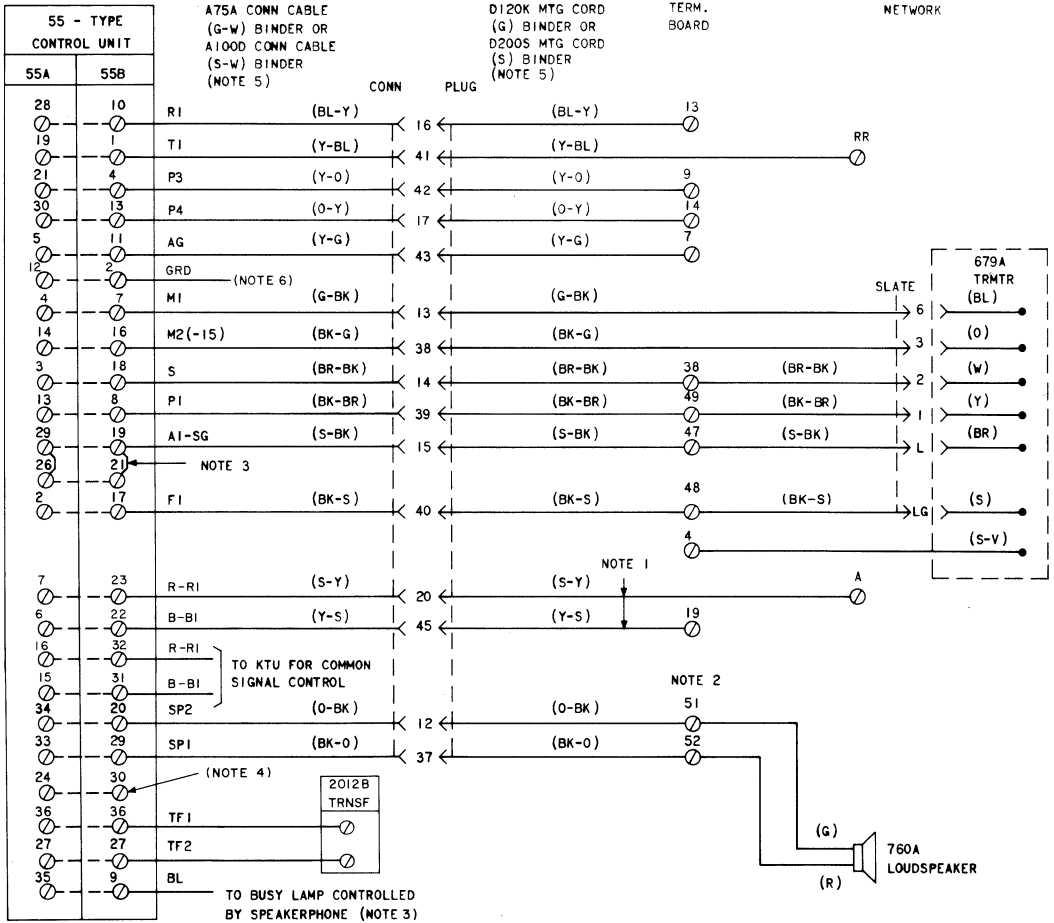
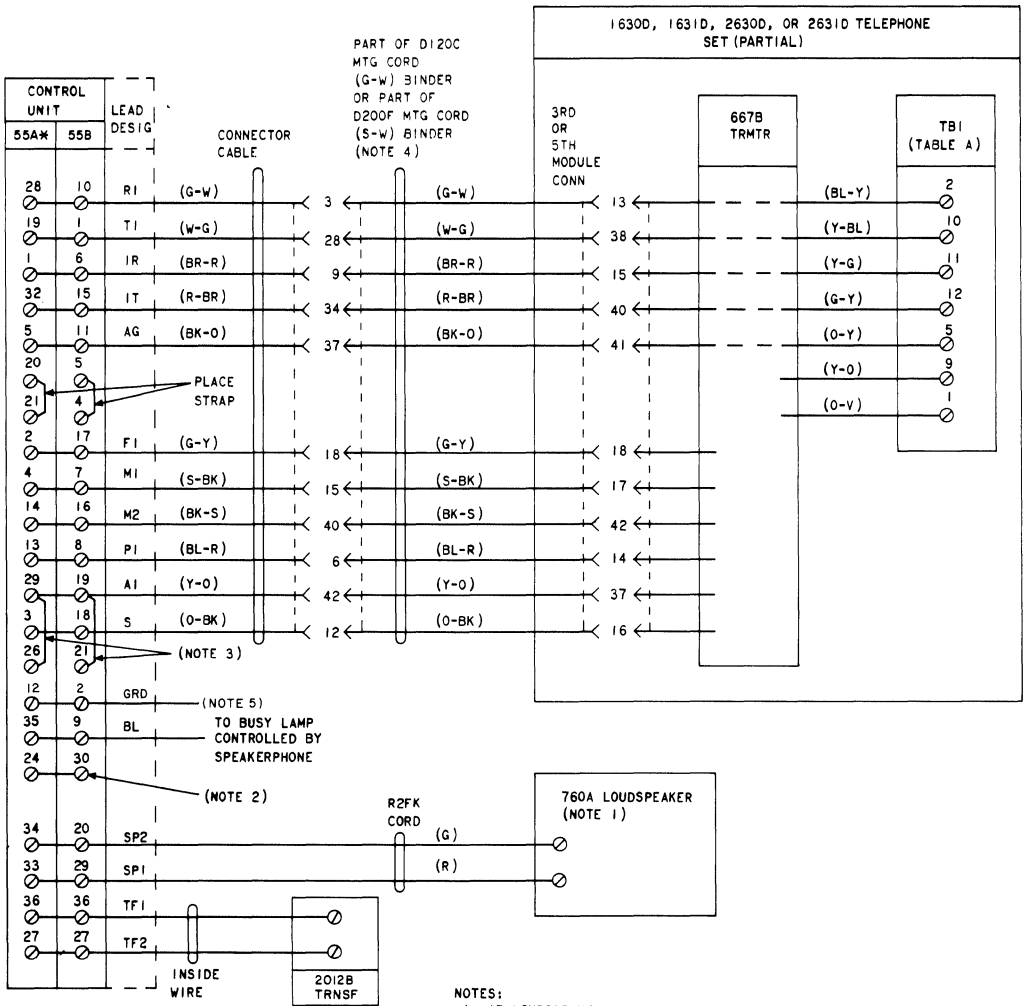


Fig. 4—630DA or 631DA Telephone Set, Connections

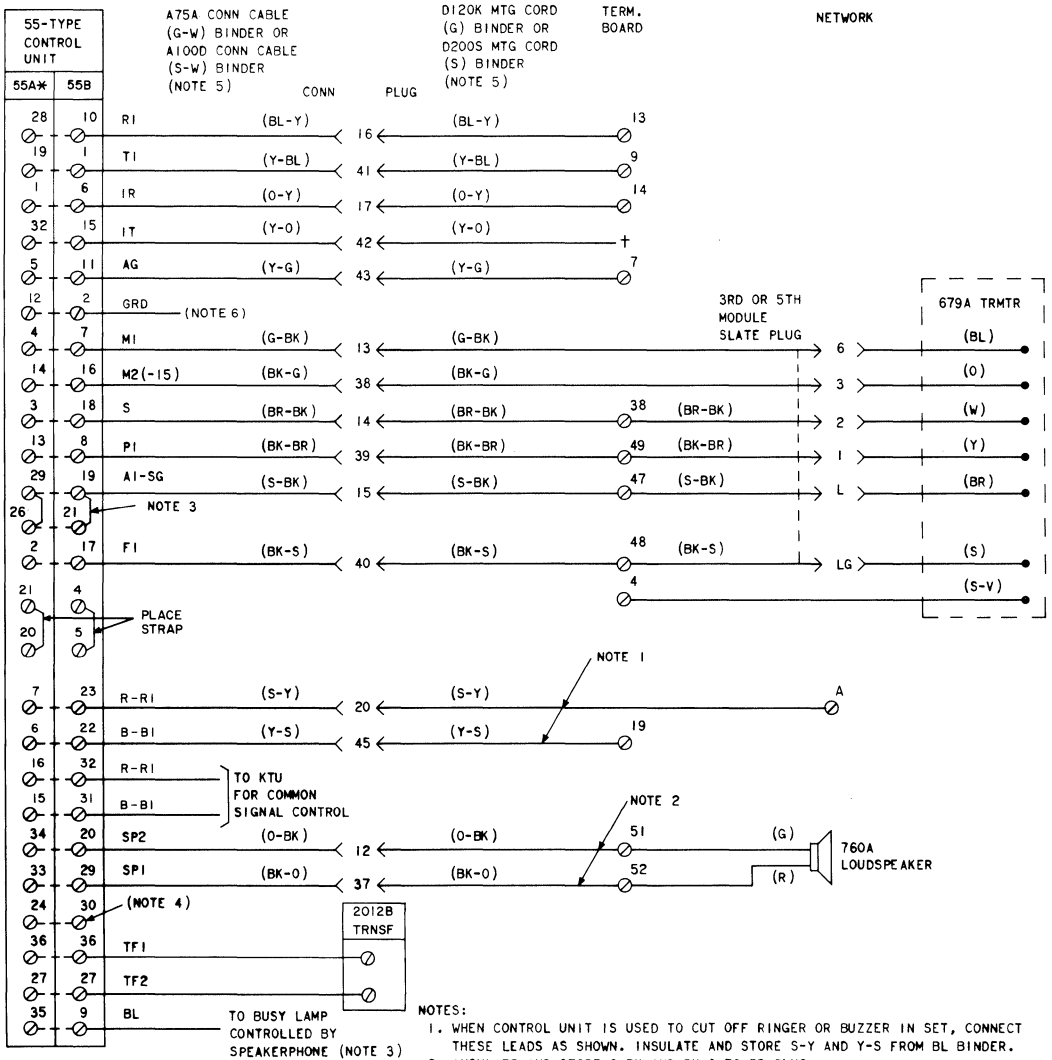


NOTES:

1. IF LOUDSPEAKER IS LOCATED MORE THAN MOUNTING CORD LENGTH FROM CONTROL UNIT, EXTEND MOUNTING CORD USING INSIDE WIRE AND D-161488 CONNECTORS OR SUITABLE CONNECTING BLOCK.
  2. IF REDUCED LOUDSPEAKER VOLUME IS DESIRED, CONNECT SP1 LEAD TO TERMINAL 24 (55A) OR 30 (55B).
  3. PLACE STRAP WHEN BUSY LAMP IS CONTROLLED BY SPEAKERPHONE USE DC LAMP OR BUSY LAMP CONTROL CIRCUIT PER SD-69403-01.
  4. D120C MTG CORD USED WITH 1630D OR 2630D SET AND D200F MTG CORD USED WITH 1631D OR 2631D SET.
  5. CONNECT LOCAL GROUND.
- \* 55A CONTROL UNIT MODIFIED FOR TOUCH-TONE.

Fig. 5—1630D, 1631D, 2630D, or 2631D Telephone Set, Connections

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- NOTES:
1. WHEN CONTROL UNIT IS USED TO CUT OFF RINGER OR BUZZER IN SET, CONNECT THESE LEADS AS SHOWN. INSULATE AND STORE S-Y AND Y-S FROM BL BINDER.
  2. INSULATE AND STORE O-BK AND BK-O TO BR PLUG.
  3. STRAP 26 TO 29 (55A) OR 21 TO 19 (55B) WHEN BUSY LAMP IS CONTROLLED BY SPEAKERPHONE. USE DC LAMP OR BUSY LAMP CONTROL CIRCUIT PER SD-69403-01.
  4. CONNECT SPI LEAD TO 24 (55A) OR 30 (55B) WHEN REDUCED LOUDSPEAKER VOLUME IS DESIRED.
  5. D120K MTG CORD AND A75A CONN CABLE USED WITH 2630DA TEL SET AND D200S MTG CORD AND A100D CONN CABLE USED WITH 2631DA TEL SET.
  6. CONNECT LOCAL GROUND.
- \* 55A CONTROL UNIT MODIFIED FOR TOUCH-TONE.  
† INSULATED AND STORED.

Fig. 6—2630DA or 2631DA Telephone Set, Connections

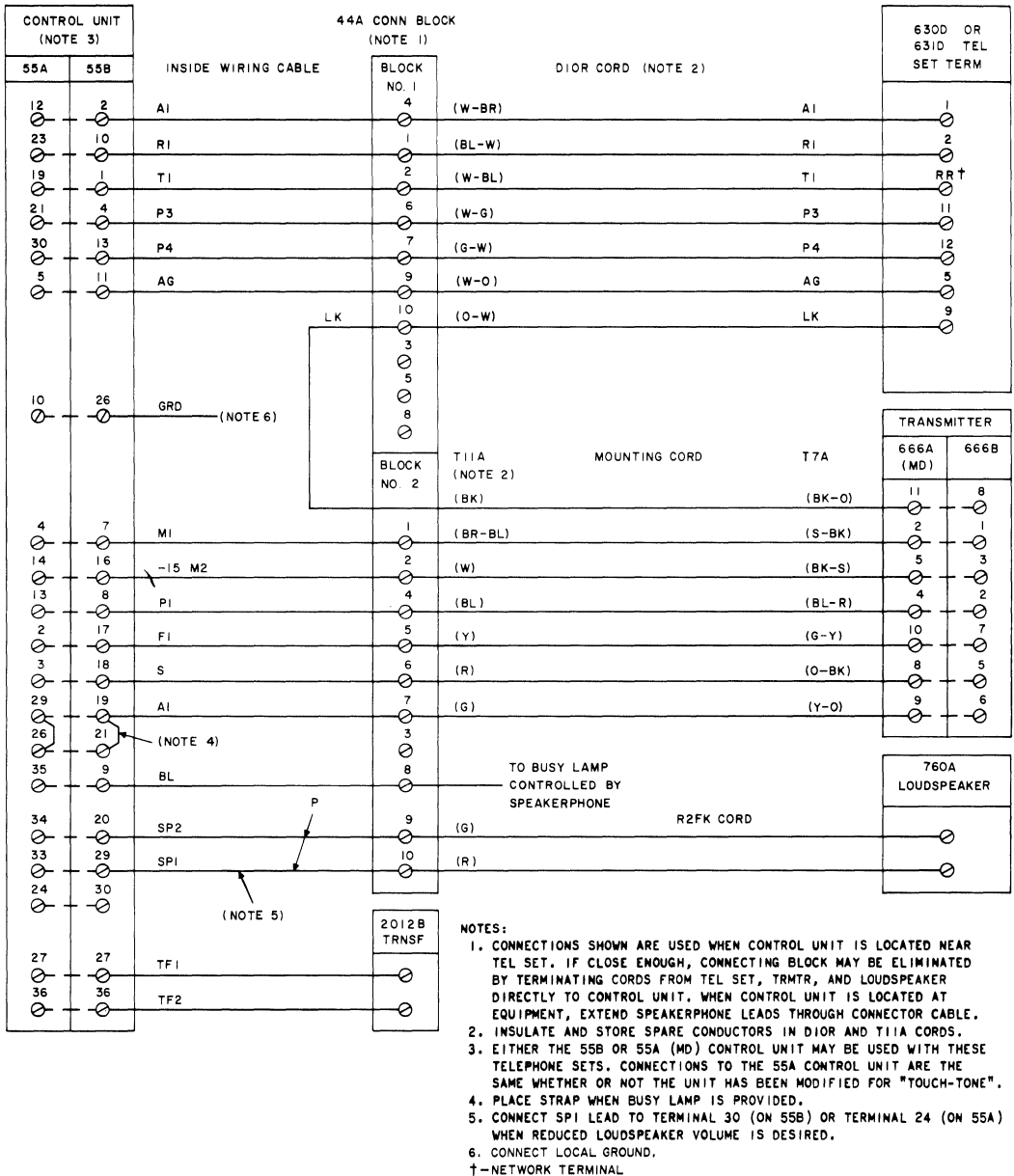


Fig. 7—630D or 631D Telephone Set Connections Using Auxiliary Cord and External Transmitter

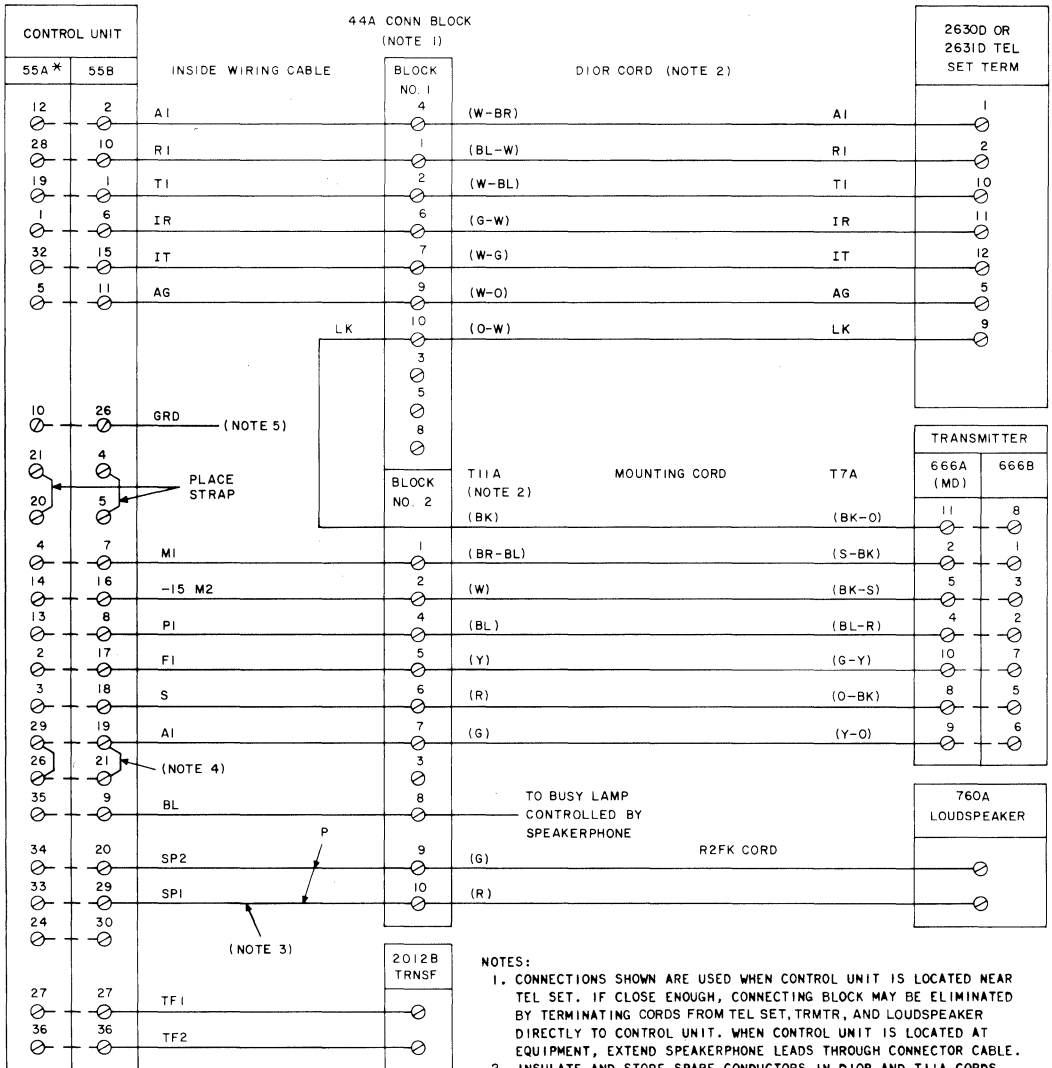


Fig. 8—2630D or 2631D Telephone Set Connections Using Auxiliary Cord and External Transmitter



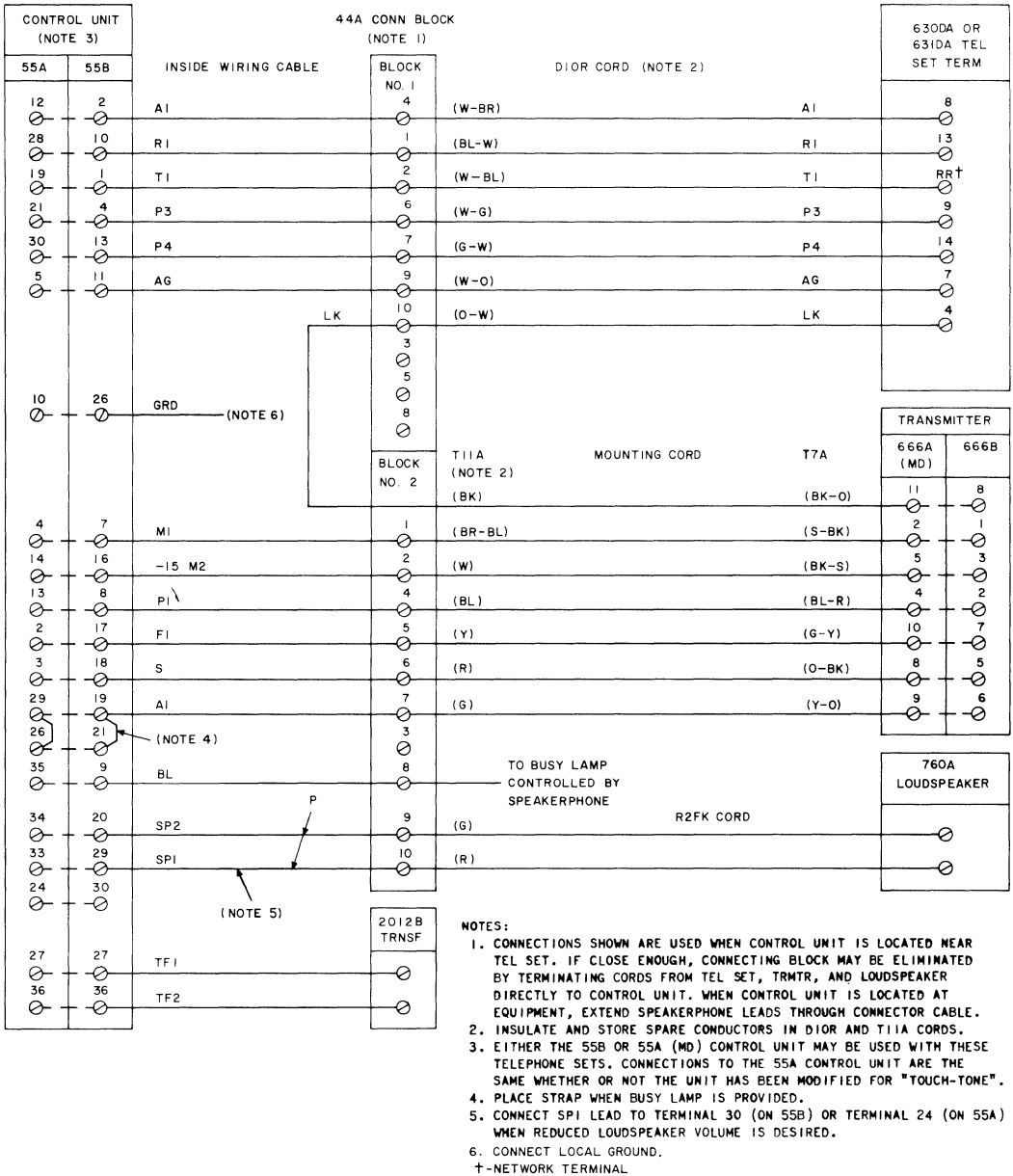


Fig. 9—630DA or 631DA Telephone Set Connections Using Auxiliary Cord and External Transmitter

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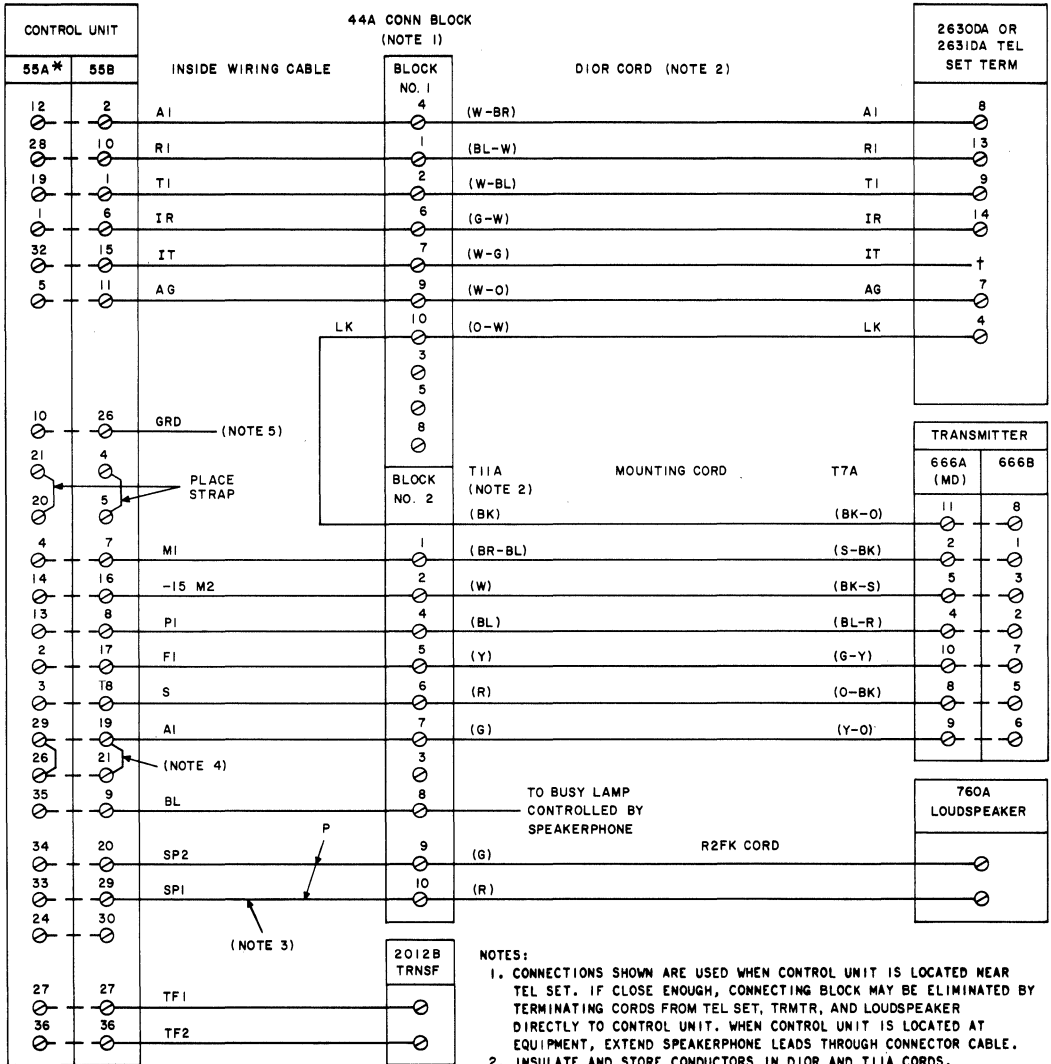


Fig. 10—2630DA or 2631DA Telephone Set Connections Using Auxiliary Cord and External Transmitter

TABLE B

CONNECTIONS FOR EXTERNAL SPEAKERPHONE  
630D OR 631D TELEPHONE SETS

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.

TABLE C

CONNECTIONS FOR EXTERNAL SPEAKERPHONE  
2630D OR 2631D TELEPHONE SET

WIRE OR LEAD	COLOR	LEAD DESIG.	REMOVE FROM	CONNECT TO
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.

TABLE D

SPEAKERPHONE CONNECTIONS USING  
INTERNAL TRANSMITTER  
630DA OR 631DA TELEPHONE SET

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
	BR-BK	S	*	38
Slate Key Plug	BR-BK		30	
679A TRMTR	S-V	LK		4

\* Insulated and stored location.

† Terminal on network.

**Notes:** 1—Connections shown are used when transmitter is part of telephone set and speakerphone leads are connected through the mounting cord.

2—When control unit is located near the telephone set an A25B connector cable may be plugged into the 3rd mounting cord plug (630DA) or 5th plug (631DA) and terminate on the control unit.

3—Mounting cord conductors from (G) (630DA) or (S) (631DA) binder.

4—Connect the slate plug from the 3rd or 5th module to the 679A transmitter. All other plugs in the module are insulated and stored.

5—Set intended for speakerphone use must be equipped with an 8C dial for the second set of off-normal contacts (P3 and P4 leads).

6—Connect to L2† if busy lamp is also furnished.

TABLE E

EXTERNAL SPEAKERPHONE CONNECTIONS  
USING MOUNTING CORD LEADS (NOTE 1)  
630DA OR 631DA TELEPHONE SET

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 2)
G-Y	LK	*	4

\* Insulated and stored.

† Network terminal.

Notes: 1—Connections shown are used when control unit and apparatus unit are at same location. Leads are in (BL) binder.

2—Connect to L2† if busy lamp is also furnished.

TABLE G

EXTERNAL SPEAKERPHONE CONNECTIONS  
USING MOUNTING CORD LEADS (NOTE 1)  
2630DA OR 2631DA TELEPHONE SET

COLOR	LEAD DESIG	REMOVE FROM	CONNECT TO
Y-BL	T1	2	9
BL-Y	R1	1	13
Y-O	IT	3	*
O-Y	IR	†	14
Y-G	AG	*	7
G-Y	LK	*	4

\* Insulate and store.

† Stored location.

Notes:

1. Connections shown are used when control unit and apparatus unit are at same location. Leads are in (BL) binder.
2. Lamp in hold position cannot be supplied due to lack of spare lead conductors.

TABLE F

SPEAKERPHONE CONNECTIONS USING  
INTERNAL TRANSMITTER  
2630DA OR 2631DA TELEPHONE SET

WIRE OR LEAD		LEAD DESIG	REMOVE FROM	CONNECT TO
Mtg Cord (Note 1)	Y-BL	T1	46	9
	BL-Y	R1	44	13
	Y-O	IT	39	*
	O-Y	IR	†	14
	Y-G	AG	43	7
	BR-BK	S	†	38
Plug Strap	BR-BK		30	
679A TRMTR	S-V	LK		4

\* Insulate and store.

† Stored location.

Notes:

1. Mounting cord conductors from G (2630DA) or S (2631DA) binder.
2. Connect the slate plug from the 3rd or 5th module to the 679A transmitter. All other plugs in the module are insulated and stored.

## SPEAKERPHONE SYSTEM—3-TYPE

### 632-, 1632-, AND 2632-TYPE TELEPHONE SETS

### CONNECTIONS AND MAINTENANCE

#### 1. GENERAL

**1.01** This section contains the modification and connection information for the 632-, 1632-, and 2632-type telephone set when used with the 3-type speakerphone system. Maintenance of components installed in the set, as a result of the modification, is also covered.

**1.02** This section is reissued to include connection and maintenance information on 1632- and 2632-type telephone formerly found in Sections 512-621-432 and 512-622-432 which are hereby canceled.

Since this reissue covers a general revision, arrows ordinarily used to indicate changes have been omitted.

#### 2. MODIFICATION

**2.01** The 632A-11, -12, or -13, and 632C-11, -12, or -13; 1632C-11, -12, or -13; and 2632C-11, -12, or 13 telephone sets contain a 667B transmitter in the third module position and are wired for use with 3-type speakerphone. Other codes of 632-, 1632-, and 2632-type telephone sets may be converted for use with 3-type speakerphone by installing a 667B transmitter in the third module position.

**2.02** To install 667B transmitter:

- (1) Remove telephone set faceplate, mat, and housing. See Section 502-600-100 for procedures.
- (2) Remove key unit or apparatus blank in right-hand module position and plug in a 667B transmitter (ordered separately).
- (3) Connect transmitter spade-tipped leads as shown in Fig. 1 for 632-type, Fig. 2 for 1632-type, and Fig. 3 for 2632-type.

- (4) If a 632-type set is equipped with 8R dial, replace with 8C dial (ordered separately).
- (5) Install housing using reverse procedure.
- (6) Install new faceplate and mat (ordered separately) in which transmitter cutouts are provided.

#### 3. CONNECTIONS



*For proper operation of the 3-type speakerphone system, ground must be present on the A1-lead. Connect ground to the appropriate telephone set terminal or at the 55-type control unit.*

**3.01** A 55B control unit or a 55A\* modified for TOUCH-TONE® service must be used with the 1632- and 2632-type telephone sets. The modified 55A\* control unit may also be used with the 632-type telephone set. Modified 55A\* control units are indicated by an asterisk following the code stenciled on the unit.

**3.02** Upon customer's request, services such as interrupted buzzer or ringer and station busy lamp control can be connected through relay contacts of the 55-type control unit.

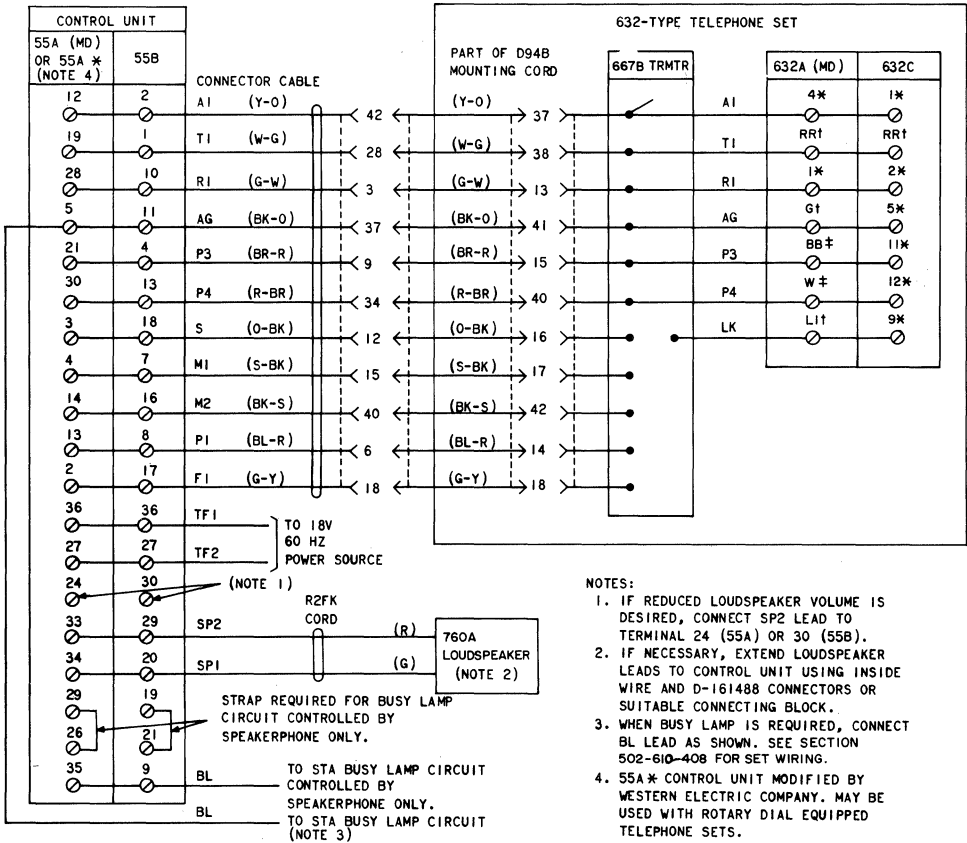
**3.03** Connection is also shown for station busy lamp controlled by speakerphone. Where it is desired to have the busy lamp controlled by both speakerphone and line switch, refer to the Service section for the set involved.

#### 4. MAINTENANCE

**4.01** Maintenance of these telephone sets is found in Section 502-600-100. Maintenance for speakerphone components is provided in Section 512-620-100.

**4.02** The 667B transmitter is subject to pickup and amplification of mechanical spring vibrations when used in some CALL DIRECTOR® telephone sets. This complaint can be eliminated by the installation of a factory modified transmitter, ordered as follows: "Transmitter, 667B, Modified per D-180196."

**4.03** Packed with the modified 667B transmitter is a piece of split vinyl tubing which shall be assembled to the key pivot bar of the telephone set when installing the transmitter.



**Fig. 1—632-Type Telephone Set, Connections To 3-Type Speakerphone System**

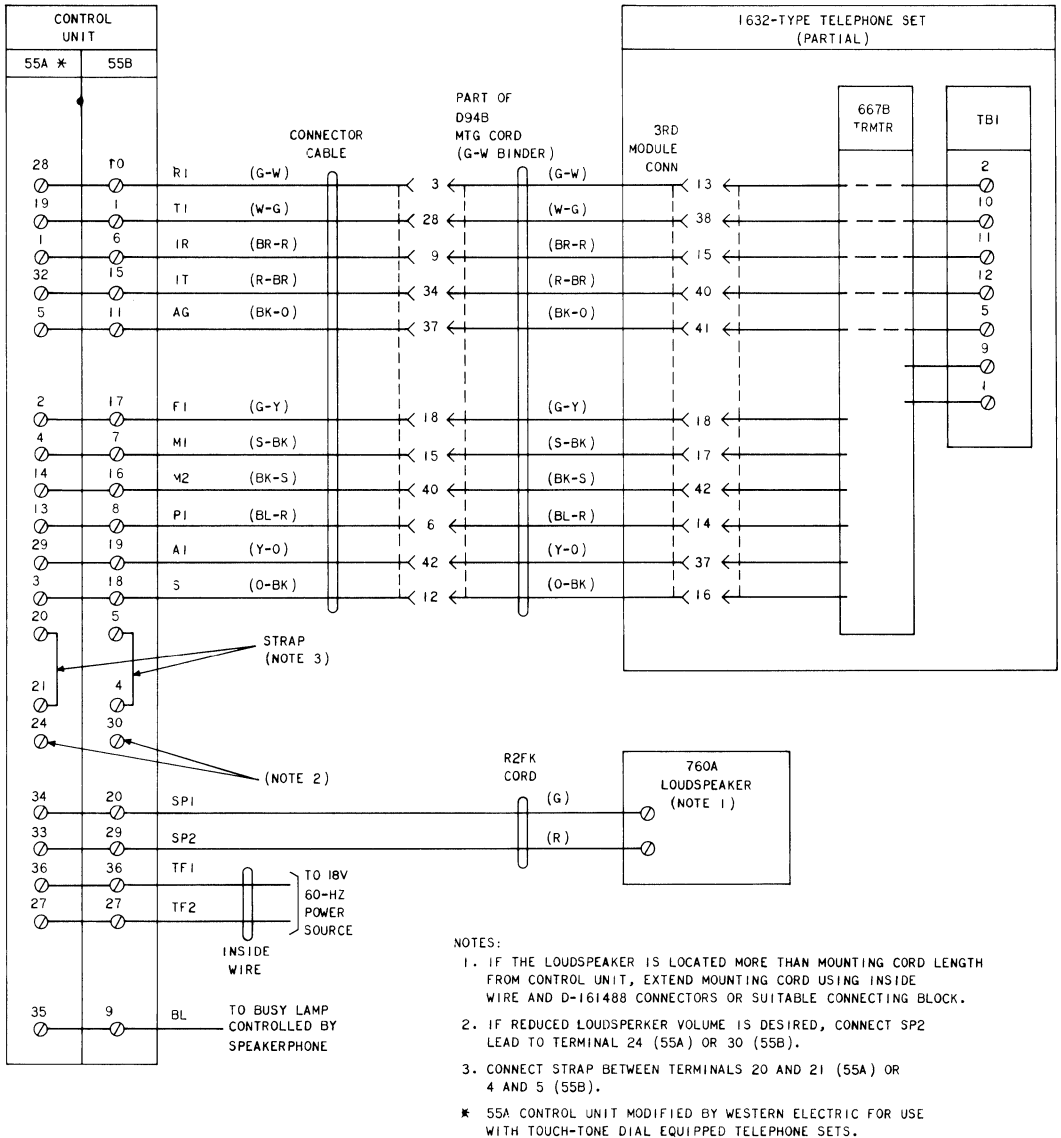


Fig. 2—1632-Type Telephone Set, Connections to 3-Type Speakerphone System

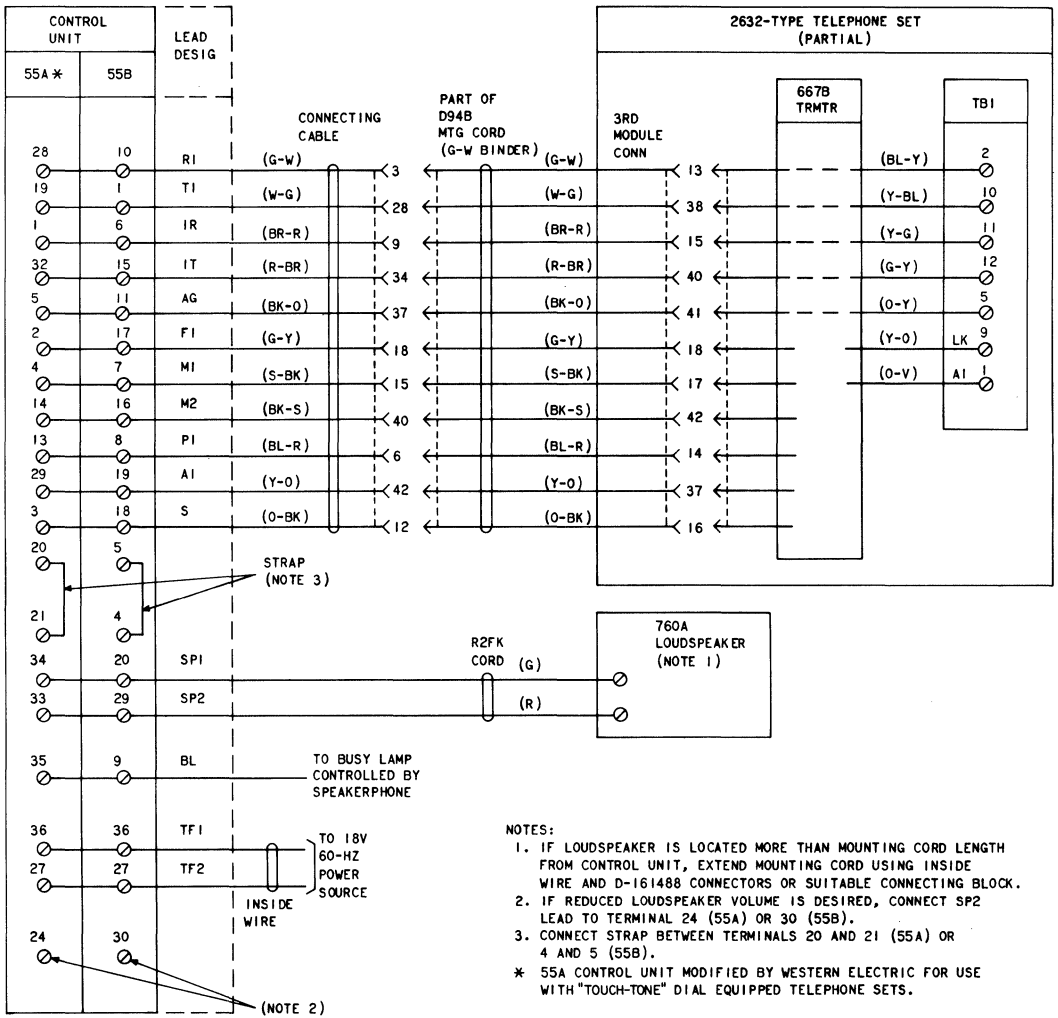


Fig. 3—2632-Type Telephone Set, Connections to 3-Type Speakerphone System



## SPEAKERPHONE SYSTEM—3-TYPE

### 660A1 TELEPHONE SET

### CONNECTIONS AND MAINTENANCE

#### 1. GENERAL

1.01 This section is reissued to change section reference in 3.01.

1.02 Telephone sets equipped with an 8R dial must be equipped with an 8C dial when connected for use with 3-type speakerphone in addition to other modifications, see Table A.

#### 2. CONNECTION INDEX

Table A—660A1 Telephone Set—Modification for Speakerphone

Fig. 1—660A1 Telephone Set, Connections To 3-Type Speakerphone

Fig. 2—660A1 Telephone Set Wired For Speakerphone

#### 3. MAINTENANCE

3.01 ♦Refer to Division 502 for maintenance information for the 660A1 telephone set and to Division 512 for maintenance of 3-type speakerphone components. ♦

**TABLE A**  
**660A1 TELEPHONE SET — MODIFICATION FOR SPEAKERPHONE**

WIRE OR LEAD	1A1 OR 1A2 KEY TEL SYS	INDIVIDUAL OR BRIDGED	RING PARTY	TIP PARTY													
Line Switch	(BR) [S-G] (Y) [S-W] (W) [S-BR]	TB1-1 TB1-P2 C of net	* TB1-P2 C of net	* TB1-P2 C of net	* TB1-P2 C of net												
Ringer Straps	(R) (BK)	L1 of net F of net	L1 of net F of net	L1 of net TB1-P2	F of net TB1-P2												
8C Dial (Note 1)	(Y) (Y) (W) (W) (BL) (G) or (BL)	TB2	<table style="display: inline-table; vertical-align: middle;"> <tr><td style="font-size: 2em;">{</td><td>1</td></tr> <tr><td></td><td>2</td></tr> <tr><td></td><td>3</td></tr> <tr><td></td><td>4</td></tr> <tr><td></td><td>5</td></tr> <tr><td></td><td>6</td></tr> </table>			{	1		2		3		4		5		6
{	1																
	2																
	3																
	4																
	5																
	6																
Add Straps	M1W cord or equivalent	TB2-1 to 41-type dial, terminal 1 TB2-2 to 41-type dial, terminal 2															
D10R Mounting Cord (Note 2)	R (BL-W) T (W-BL) A1 (O-W)	TB1-L1 F of net. TB1-P2															
	T1 (W-O) P4 (G-W) P3 (W-G)	41-type dial, terminal 6 41-type dial, terminal 1 41-type dial, terminal 2															
	A (BR-W)	TB1-1	*	*	*												
	LK (W-BR) P1 (S-W) P2 (W-S)	TB1-L2 41-type dial, terminal P1 41-type dial, terminal P2															

Notes: 1. Replace 8R dial with 8C dial (order separately)  
2. Replace D6AF cord with D10R (order separately)

\* Insulate and store.  
( ) Current color code.  
[ ] MD color code.

SECTION 512-620-460

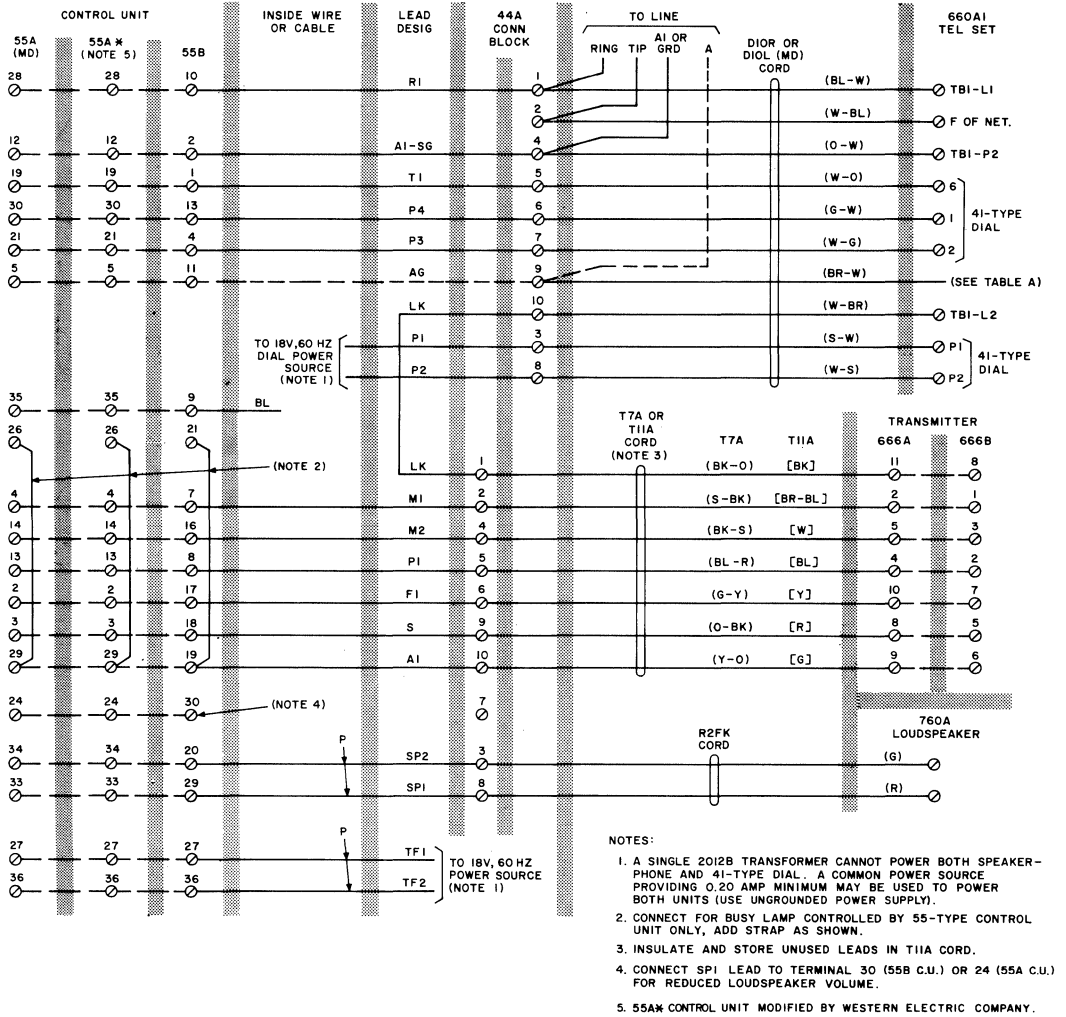


Fig. 1—660A1 Telephone Set, Connections to 3-Type Speakerphone

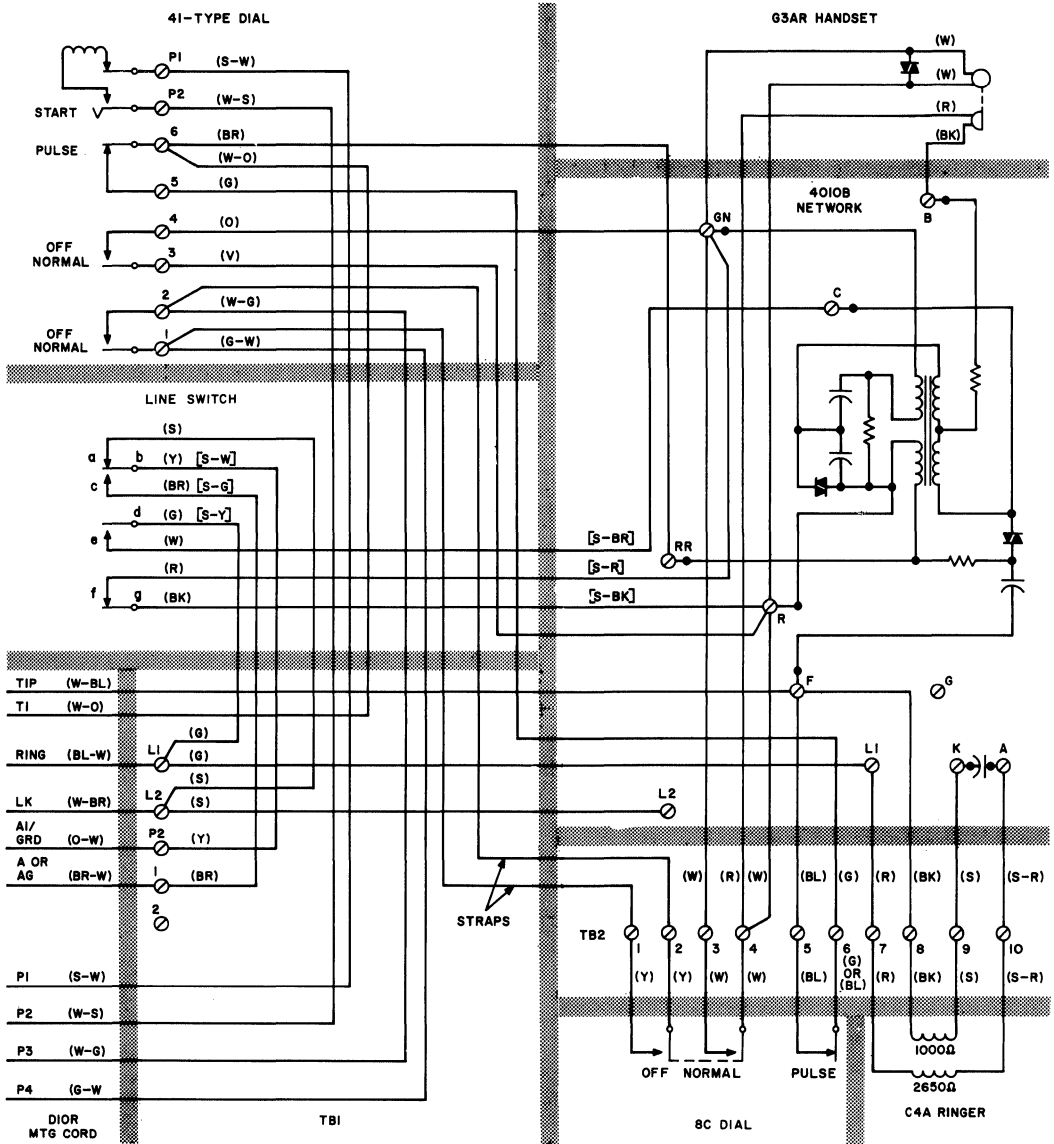


Fig. 2—660A1 Telephone Set Wired for Speakerphone

## SPEAKERPHONE SYSTEM—3-TYPE

### 662-TYPE TELEPHONE SET

### CONNECTIONS AND MAINTENANCE

#### 1. GENERAL

**1.01** This section covers connection of the 662-type telephone set when used with the 3-type speakerphone system.

**1.02** This section is reissued to:

- Remove information from Fig. 1 permitting maximum separation of 500 feet between control unit and transmitter and loudspeaker
- Add 2.03

#### 2. CONNECTIONS



*For proper operation of the 3-type speakerphone system, ground must be present on the A1-lead. Connect A1 ground to the appropriate terminal on the telephone set or at the 55-type control unit for 1A1 and 1A2 KTS. Connect SG ground for 1A KTS.*

**2.01** Where required, ringer and buzzer operation can be interrupted through break contacts of the 55-type control unit to prevent pickup during use of speakerphone.

**2.02** Connections are also shown for busy lamp controlled by speakerphone. Where it is desired to have busy lamp controlled by speakerphone and line switch, refer to Service section for the 662-type telephone set.

**2.03** Sets are presently being manufactured with an 8R dial which must be replaced with an 8C dial when speakerphone is supplied. In addition straps must be added from 1 and 2 of the 41-type dial terminal board to 3 and 4, respectively, of TB1 to parallel the P3 and P4 leads with the off-normal contacts of the 8C and 41-type dials (Fig. 1).

#### 3. MAINTENANCE

**3.01** Maintenance of the 662-type telephone set is covered in Division 502. Maintenance of speakerphone components is covered in Division 512.

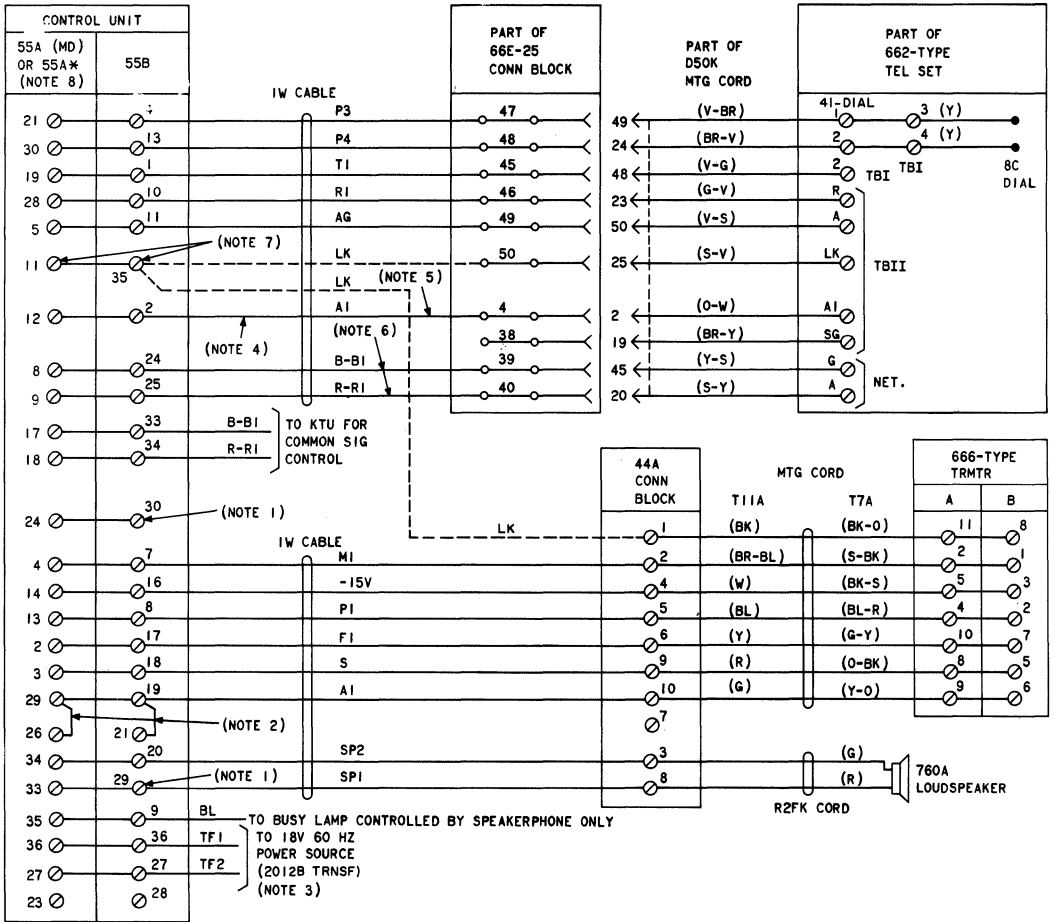


Fig. 1—662-Type Telephone Set, Connections

## SPEAKERPHONE SYSTEM—3-TYPE

### 701B, 702B, 1702B, AND 2702-TYPE TELEPHONE SETS

### CONNECTIONS AND MAINTENANCE

#### 1. GENERAL

**1.01** This section contains information for maintenance and connection of 701B, 702B, 1702B, and 2702-type telephone sets to provide 3-type speakerphone service.

**1.02** This section is reissued to include information on the 702B, 1702B, and 2702-type telephone sets formerly found in Sections 512-620-472, 512-621-472, and 512-622-472.

**1.03** Control units designated 55A\* have been modified by Western Electric Company to the 55B configuration for use with TOUCH-TONE<sup>®</sup> dial equipped sets.

#### 2. CONNECTION INDEX

Table A—701B Telephone Set, Modifications for 3-Type Speakerphone

Table B—702B and 1702B Telephone Sets, Modification for 3-Type Speakerphone

Table C—2702-Type Telephone Set, Modification for 3-Type Speakerphone

Fig. 1—701B Telephone Set, Wired for 3-Type Speakerphone

Fig. 2—701B Telephone Set, Speakerphone Connections

Fig. 3—702B Telephone Set, Wired for 3-Type Speakerphone

Fig. 4—702B and 1702B Telephone Set, Speakerphone Connections

Fig. 5—1702B Telephone Set (Early Production Model) Using 25H4 (MD) Dial, Wired for 3-Type Speakerphone

Fig. 6—1702B Telephone Set, (Current Production Model) Using 25P4 Dial, Wired for 3-Type Speakerphone

Fig. 7—2702-Type Telephone Set, Wired for 3 Type Speakerphone and KTS Use

Fig. 8—2702-Type Telephone Set, Connections to 3-Type Speakerphone

#### 3. MAINTENANCE

**3.01** Refer to Division 502 for maintenance of PRINCESS<sup>®</sup> telephone set components and Section 512-620-100 for maintenance of 3-type speakerphone components.

**3.02** A defective 25H4 (MD) dial on 1702B telephone sets may be replaced with 25P4 dial providing set wiring is changed to agree with Fig. 6.

**TABLE A**  
**701B TELEPHONE SET**  
**MODIFICATION FOR 3-TYPE SPEAKERPHONE**

WIRE OR LEAD	COLOR	REMOVE FROM		CONNECT TO
		NET.	TERM. STRIP	
Line Switch	S-W	F		C of Network
	S-BR	C		Insulate and Store (Note 2)
D6AB Mounting Cord	R		L2	F of Network (Note 1)
	BL		4	Insulate and Store (Note 2)
Strap (M1W Cord or Equivalent)				Between 3 and L2 of Terminal Strip

- Notes:*
1. Extend (R) mounting cord lead using M1W cord and D-161488 connector, if necessary.
  2. When used with KTS, connect (BL) mounting cord conductor to (S-BR) line switch lead using D-161488 connector.

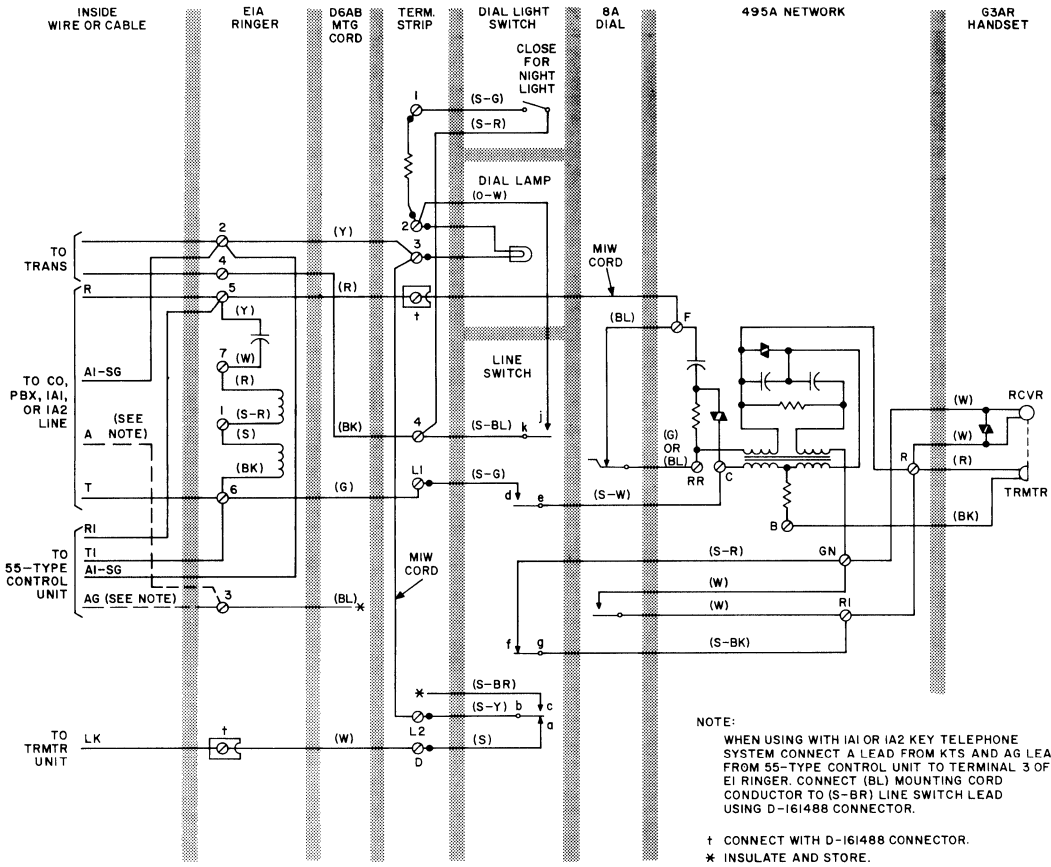


Fig. 1—701B Telephone Set—Wired for 3-Type Speakerphone



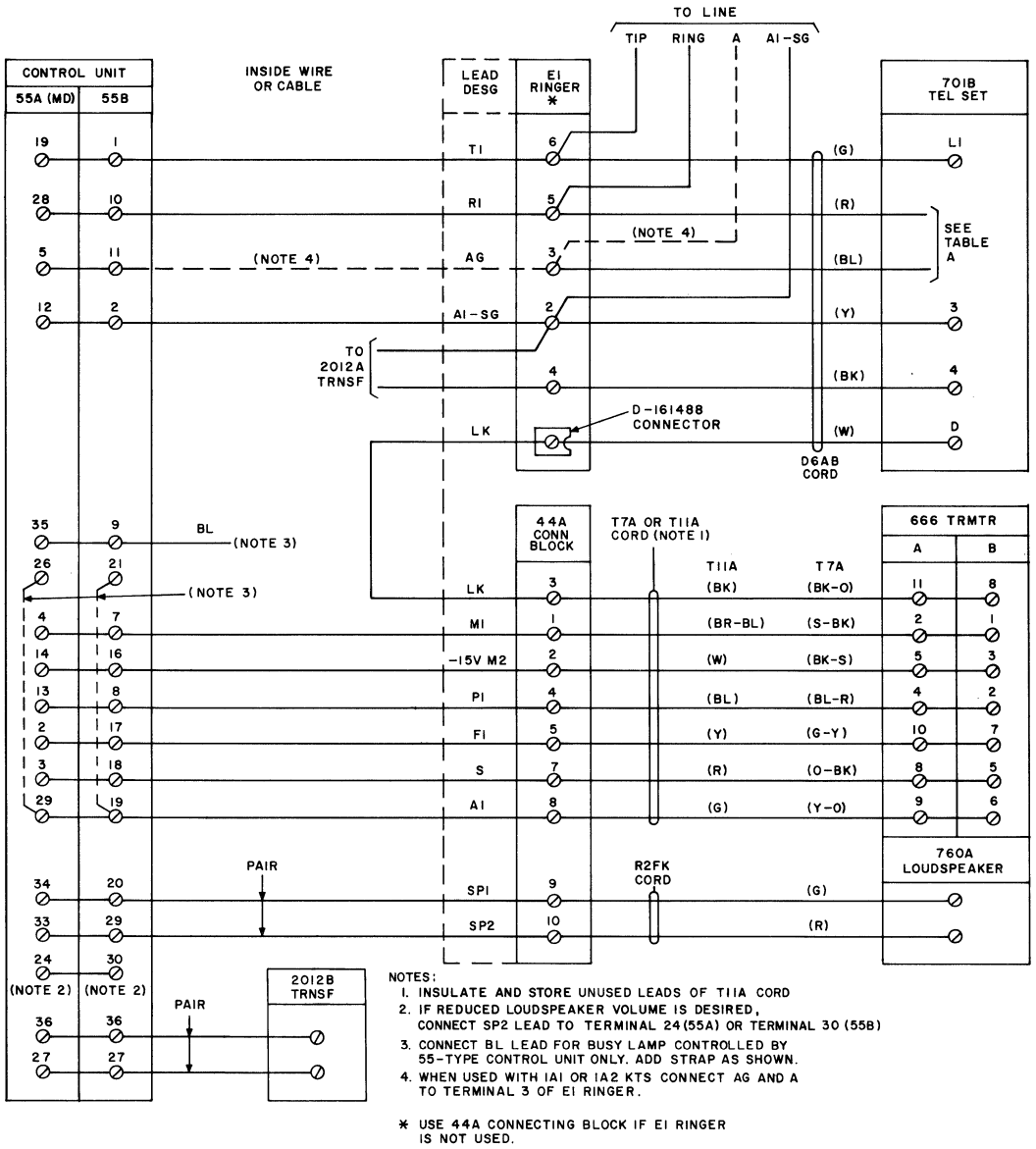



Fig. 2—701B Telephone Set—Speakerphone Connections

TABLE B  
702B AND 1702B TELEPHONE SETS  
MODIFICATION FOR 3-TYPE SPEAKERPHONE

WIRE OR LEAD	COLOR	REMOVE FROM		CONNECT TO		INSULATE AND STORE
		NETWORK		NET.	TERM. BLK	
Line Switch	(S)	A		L2		
	(Y) [S-Y]	L2			3	
	(BR) [S-BR]	C		G		
Ringer	(BK)	G		L1		
Network	(BK) [S-BK]	A†	L2‡			•
Strap*						
D6AF Mtg. Cord (see Note)	(G)			L1		
	(R)			C		
	(W)				3	
	(BK)				4	
	(BL)			G		
	(Y)			L2		

\*Use M1W cord or equivalent.

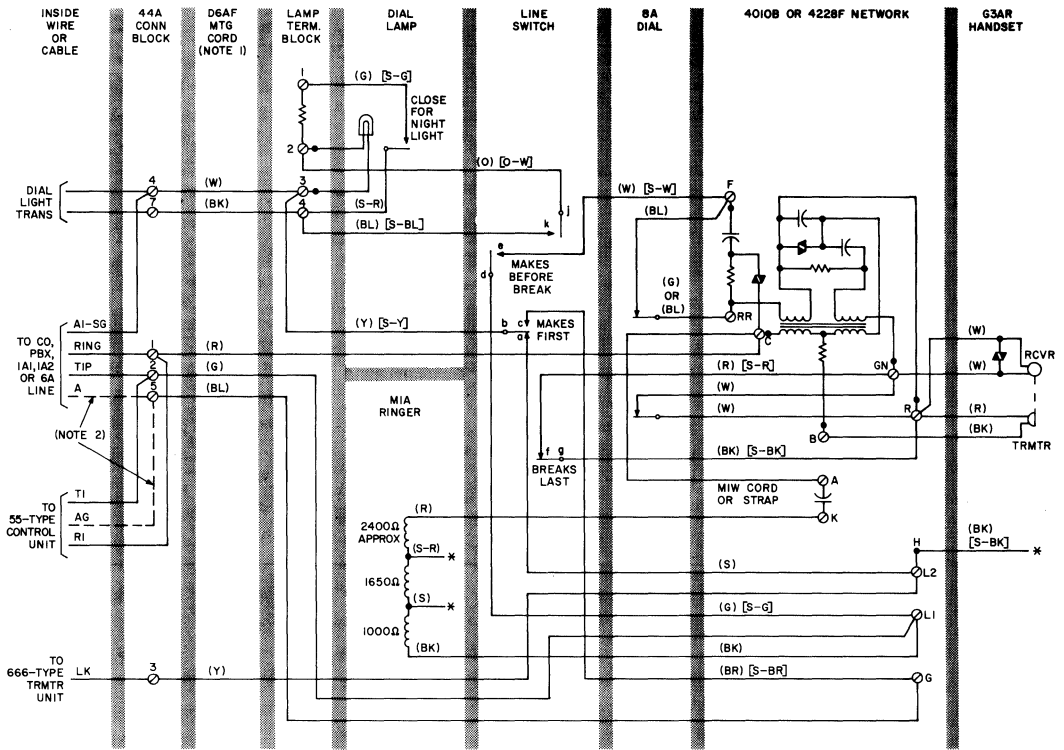
†702B telephone set

‡1702B telephone set

( ) Current color code.

[ ] MD color code.

Note: Replace D5AK mounting cord with D6AF mounting cord connected as shown.



NOTES:

1. TO MODIFY SET, REPLACE D5AK MOUNTING CORD WITH D6AF.
  2. WHEN USING WITH IA1 OR IA2 KEY TELEPHONE SYSTEM, CONNECT A LEAD FROM KTS AND AG LEAD FROM CONTROL UNIT TO TERMINAL 5 OF CONNECTOR BLOCK.
- ( ) INDICATES CURRENT COLOR CODE.  
 [ ] INDICATES MD COLOR CODE.  
 \* INDICATES INSULATE AND STORE.

Fig. 3—702B Telephone Set—Wired for 3-Type Speakerphone

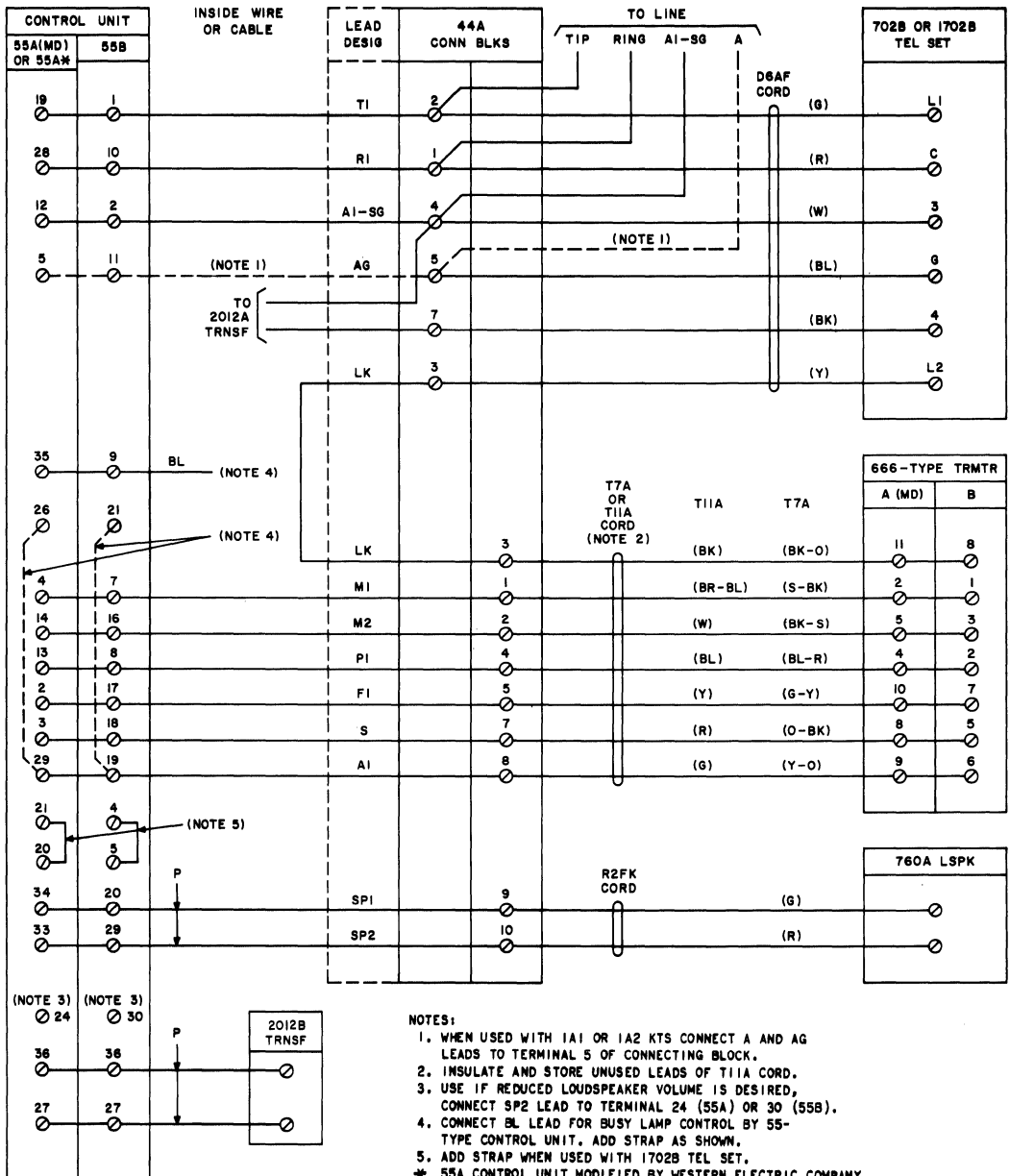
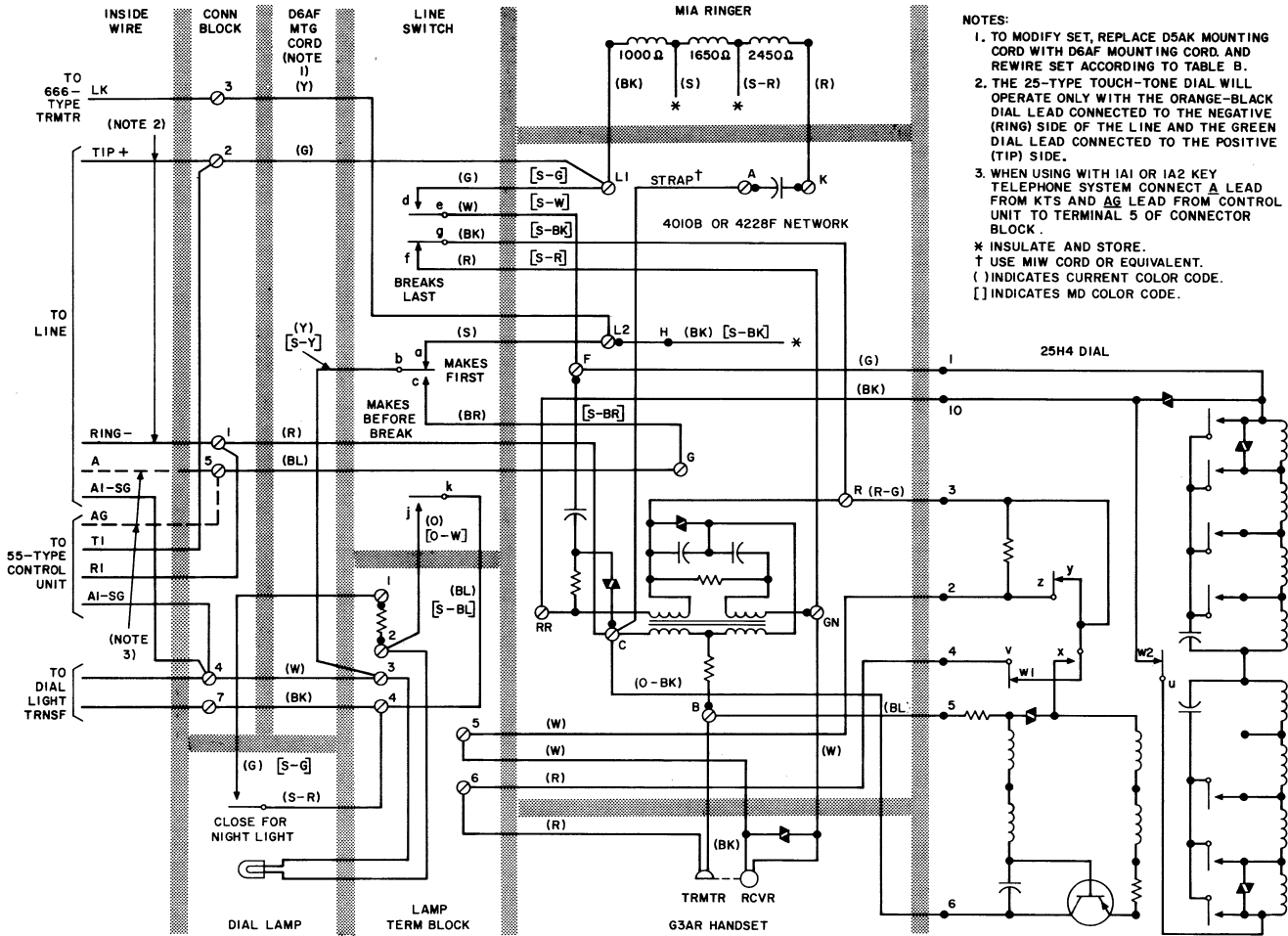


Fig. 4—702B and 1702B Telephone Sets—Speakerphone Connection



NOTES:  
 1. TO MODIFY SET, REPLACE D5AK MOUNTING CORD WITH D6AF MOUNTING CORD. AND REWIRE SET ACCORDING TO TABLE B.  
 2. THE 25-TYPE TOUCH-TONE DIAL WILL OPERATE ONLY WITH THE ORANGE-BLACK DIAL LEAD CONNECTED TO THE NEGATIVE (RING) SIDE OF THE LINE AND THE GREEN DIAL LEAD CONNECTED TO THE POSITIVE (TIP) SIDE.  
 3. WHEN USING WITH IA1 OR IA2 KEY TELEPHONE SYSTEM CONNECT A LEAD FROM KTS AND AG LEAD FROM CONTROL UNIT TO TERMINAL 5 OF CONNECTOR BLOCK.  
 \* INSULATE AND STORE.  
 † USE MIW CORD OR EQUIVALENT.  
 ( ) INDICATES CURRENT COLOR CODE.  
 [ ] INDICATES MD COLOR CODE.

Fig. 5—1702B Telephone Set (Early Production) Using 25H4 (MD) Dial—Wired for 3-Type Speakerphone

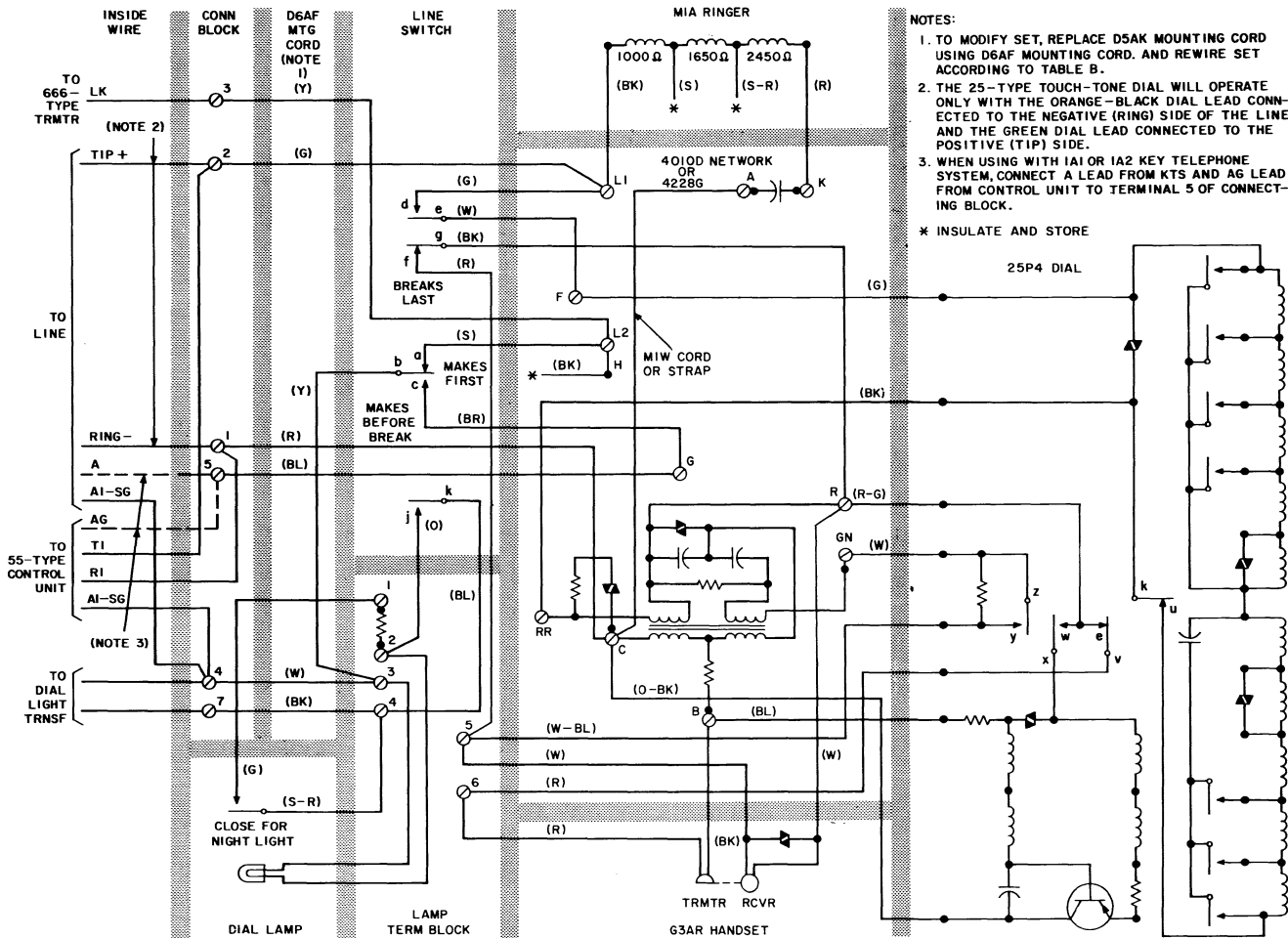


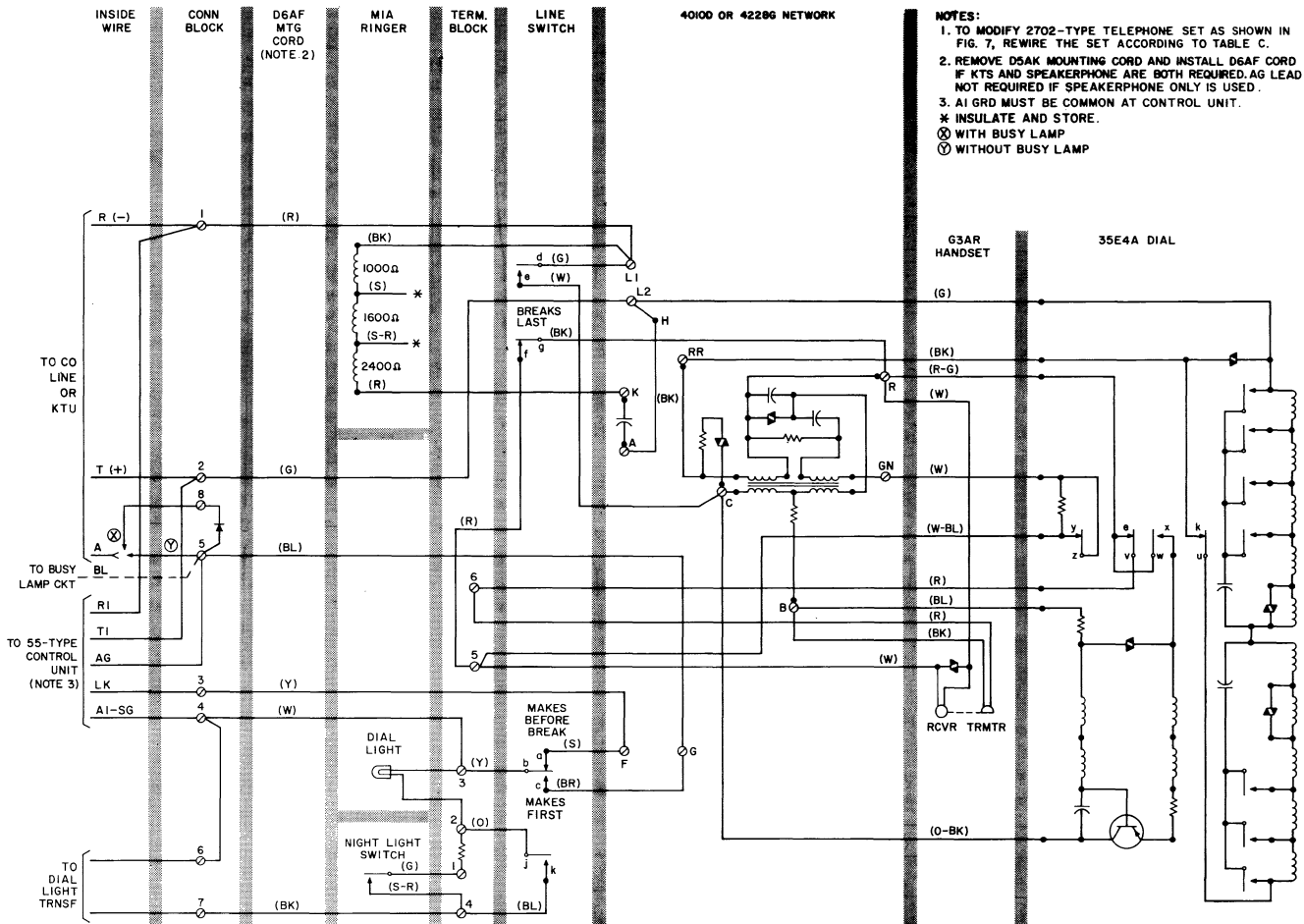
Fig. 6—1702B Telephone Set (Current Production) Using 25P4 Dial—Wired for 3-Type Speakerphone

TABLE C  
2702-TYPE TELEPHONE SET  
MODIFICATIONS FOR 3-TYPE SPEAKERPHONE

WIRE OR LEAD	COLOR	REMOVE FROM NETWORK	CONNECT TO	
			NET.	TERM. BLOCK
Line Switch	W	F	C	
	S	A	F	
	Y	L2		3
	BR	C	G	
Ringer	BK	G	L1	
Network Strap	BK	*	A	
D6AF Mtg Cord (Note)	R		L1	
	G		L2	
	BL		G	
	Y		F	
	W			3
	BK			4
Dial	G	F	L2	

\*Remove from stored location.

*Note:* Replace D5AK mounting cord with D6AF mounting cord when both KTS and speakerphone are required, otherwise retain D5AK cord with no connection to G terminal.



- NOTES:**
1. TO MODIFY 2702-TYPE TELEPHONE SET AS SHOWN IN FIG. 7, REWIRE THE SET ACCORDING TO TABLE C.
  2. REMOVE D5AK MOUNTING CORD AND INSTALL D6AF CORD IF KTS AND SPEAKERPHONE ARE BOTH REQUIRED. AG LEAD NOT REQUIRED IF SPEAKERPHONE ONLY IS USED.
  3. AI GRD MUST BE COMMON AT CONTROL UNIT.
- \* INSULATE AND STORE.  
⊗ WITH BUSY LAMP  
⊙ WITHOUT BUSY LAMP

**Fig. 7—2702-Type Telephone Set, Wired for 3-Type Speakerphone and KTS Use**



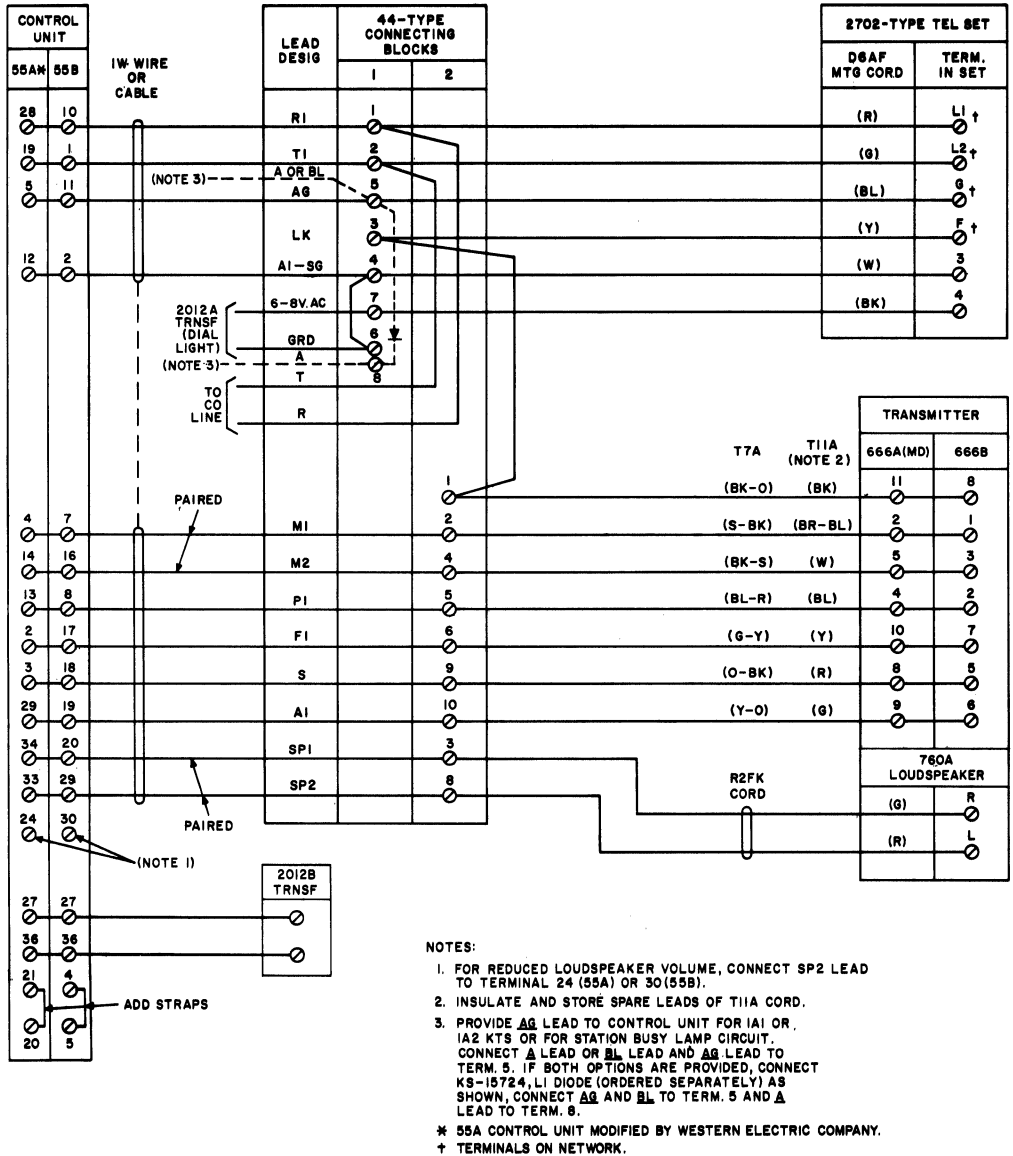


Fig. 8—2702-Type Telephone Set, Connections to 3-Type Speakerphone

## SPEAKERPHONE SYSTEM—3-TYPE

### 752-, 1752-, AND 2752-TYPE TELEPHONE SETS

### CONNECTIONS AND MAINTENANCE

#### 1. GENERAL

**1.01** This section contains connection information for 752-, 1752-, and 2752-type telephone sets when used with a 3-type speakerphone system.



*If 3-type speakerphone is to be provided in conjunction with 1A home interphone, refer to Sections 512-510-410, 512-510-430 or 512-510-450 for connections of the 752-, 1752-, or 2752-type telephone sets.*

**1.02** This section is reissued to include connection information for the 1752- and 2752-type telephone sets, formerly found in Sections 512-621-480 and 512-622-480, which are hereby canceled.

Since this reissue covers a general revision, arrows ordinarily used to indicate changes have been omitted.

**1.03** These sets are equipped with loudspeaker, transmitter, and speakerphone ON-OFF and volume controls. No conversion or wiring changes

are necessary for speakerphone operation. Refer to Sections 502-736-401, 502-737-401, or 502-738-401 for telephone set internal connections.

#### 2. CONNECTION INDEX

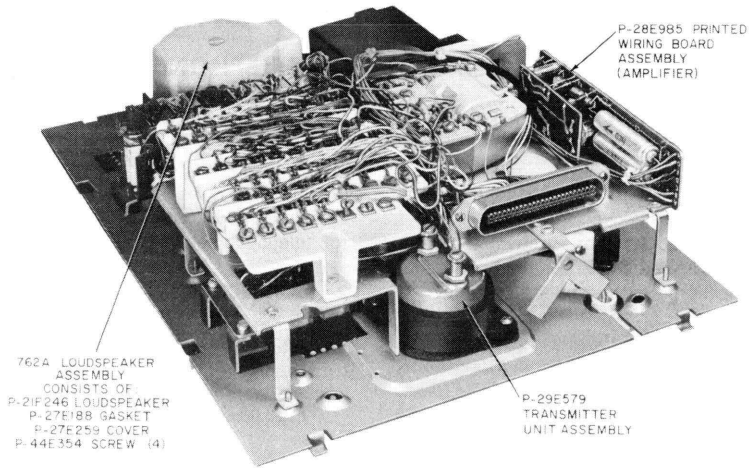
Fig. 2—752-Type Telephone Set, Connections to 3-Type Speakerphone System

Fig. 3—1752- or 2752-Type Telephone Set, Connections to 3-Type Speakerphone System

#### 3. MAINTENANCE

**3.01** Maintenance of the speakerphone components of these sets (Fig. 1) is limited to checking for loose or broken connections and replacement of defective units.

**3.02** Refer to Section 512-620-100 for additional information on 3-type speakerphone system requirements and maintenance.



**Fig. 1—Speakerphone Components**

NOTES:

1. CONNECT FOR BUSY LAMP CONTROLLED BY SPEAKERPHONE CONTROL UNIT ONLY; ADD STRAP TERMINAL 19 TO 21(55B) OR 26 TO 29(55A\*).
2. CONNECT SP2 LEAD TO TERMINAL 30(55B) OR 24(55A) CONTROL UNIT IF REDUCED LOUDSPEAKER VOLUME IS DESIRED.
3. MODIFIED UNITS ARE IDENTIFIED BY AN ASTERISK FOLLOWING THE CODE.
4. INTERCONNECTIONS MAY BE MADE USING AN A25B CONNECTOR CABLE WHEN THE 55-TYPE CONTROL UNIT IS LOCATED AT THE KEY EQUIPMENT.

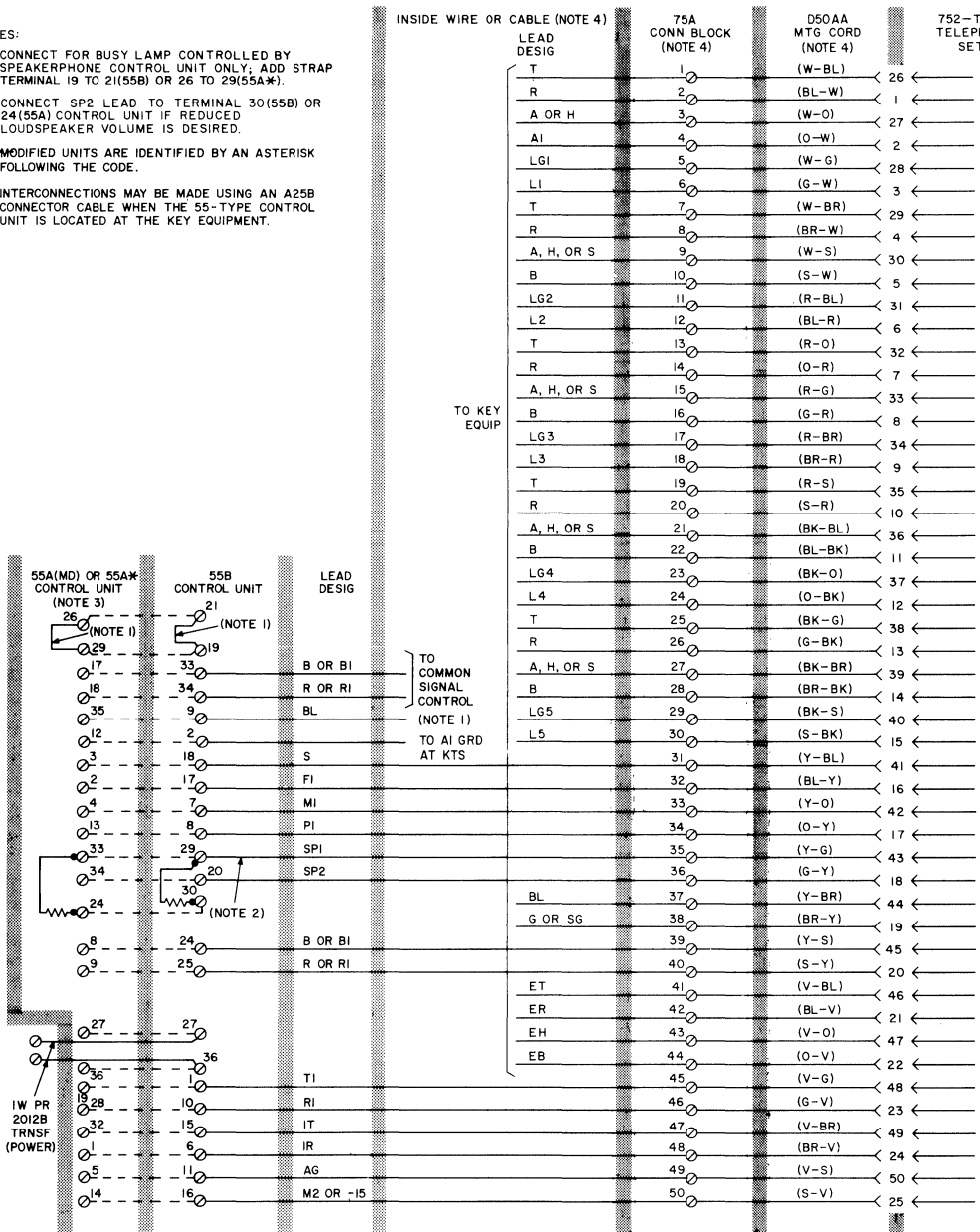
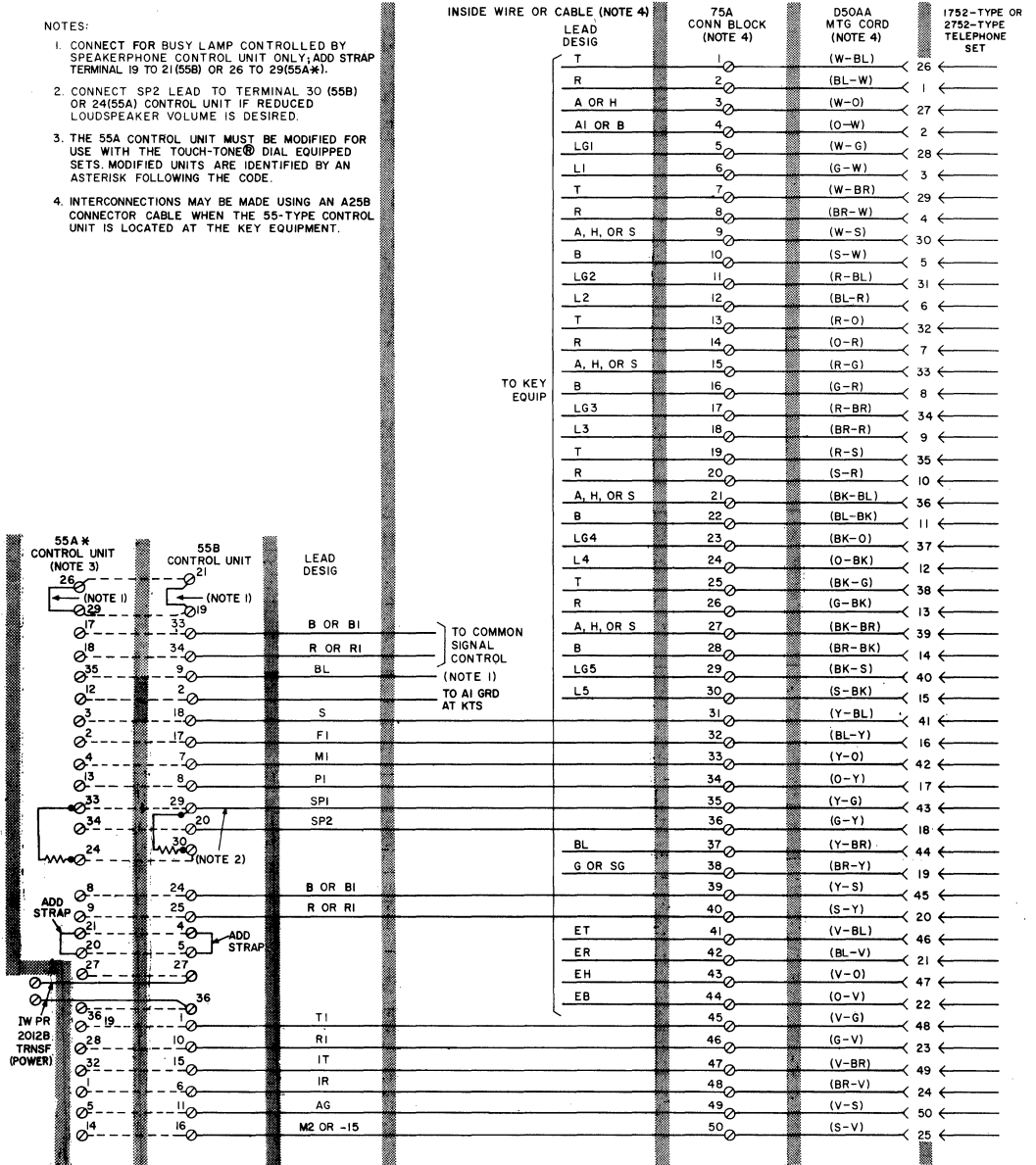


Fig. 2—752-Type Telephone Set, Connections to 3-Type Speakerphone

**SECTION 512-620-480**

**NOTES:**

1. CONNECT FOR BUSY LAMP CONTROLLED BY SPEAKERPHONE CONTROL UNIT ONLY; ADD STRAP TERMINAL 19 TO 21(55B) OR 26 TO 29(55A\*).
2. CONNECT SP2 LEAD TO TERMINAL 30 (55B) OR 24(55A) CONTROL UNIT IF REDUCED LOUDSPEAKER VOLUME IS DESIRED.
3. THE 55A CONTROL UNIT MUST BE MODIFIED FOR USE WITH THE TOUCH-TONE® DIAL EQUIPPED SETS. MODIFIED UNITS ARE IDENTIFIED BY AN ASTERISK FOLLOWING THE CODE.
4. INTERCONNECTIONS MAY BE MADE USING AN A25B CONNECTOR CABLE WHEN THE 55-TYPE CONTROL UNIT IS LOCATED AT THE KEY EQUIPMENT.



**Fig. 3—1752- or 2752-Type Telephone Set, Connections to 3-Type Speakerphone**

## SPEAKERPHONE SYSTEMS—3-TYPE

### 832-, 2832-, 833-, AND 2833-TYPE TELEPHONE SETS

### CONNECTIONS

#### 1. GENERAL

**1.01** This section shows connections between components of the 3-type speakerphone system and the 832-, 833-, 2832-, and 2833-type telephone sets.

**1.02** This section is reissued to:

- Show wiring changes which must be made when using speakerphone with BM and CM coded modular telephone sets.
- Revise Table A and Fig. 1 and 2.

**1.03** The 832- and 2832-type telephone sets are special 10-, 11-, and 13-button set initially designed to work with the 7A Communication System.

**1.04** The 833- and 2833-type telephone sets are special 20-button sets initially designed to work with the 14A Communication System.

#### 2. CONNECTIONS

**2.01** Due to lack of available conductors in the mounting cords, the 55B control unit must be installed at the same location as the telephone set. The speakerphone leads are connected to the telephone set using a D10R auxiliary cord (Fig. 1, 2, and Table A).

**2.02** Refer to Section 512-620-100 for maintenance and ordering information of speakerphone components used with these sets.

**2.03** In order to reduce the tone or voice level on incoming calls while using speakerphone, a wiring change must be made to amplifier. The change uses the (O-W) and (W-O) conductors in the D10R cord and is shown in Table A.

#### NOTICE

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

**TABLE A**  
**3B SPEAKERPHONE CONNECTIONS (USING AUXILIARY MOUNTING CORD)**

CONNECT LEADS FROM				LEAD DESIG	CORD COLORS			CONNECT LEADS TO 55B CONTROL UNIT TERM. ‡	
TEL SET TERM. ¶¶	TRMTR TERM.	SPEAKER TERM.	TRNSF TERM.		DIOR	T7A	R2FK		
24				P4*	W-S			13	
				IR†				6	
30				P3*	S-W			4	
				IT†				15	
25†				T1	W-BL			1	
RR§ *									
6				R1	BL-W			10	
29				LK	W-BR			35	
8				AG	BR-W			11	
10				A1	W-G			2	
19¶					O-W			32	
**					W-O			23	
	8			LK		BK-O		35	
	7			F1		G-Y		17	
	5			S		O-BK		18	
	6			A1		Y-O		19	
	3			M2		BK-S		16	
	2			P1		BL-R		8	
	1			M1		S-BK		7	
			††		SP2		G		20
			††		SP1		R		29§ §
				‡‡	TF1				27
			‡‡	TF2				36	

\* For rotary dial tel set.

† For TOUCH-TONE tel set.

‡ Strap terminals 4 and 5 on control unit when used with TOUCH-TONE tel sets.

§ Located on network.

¶ Also remove W-S lead from telephone set amplifier terminal 1 and connect it to terminal 19.  
 (If telephone set is equipped with D50AL-87 cord, use D-161488 connector instead of terminal 19.)

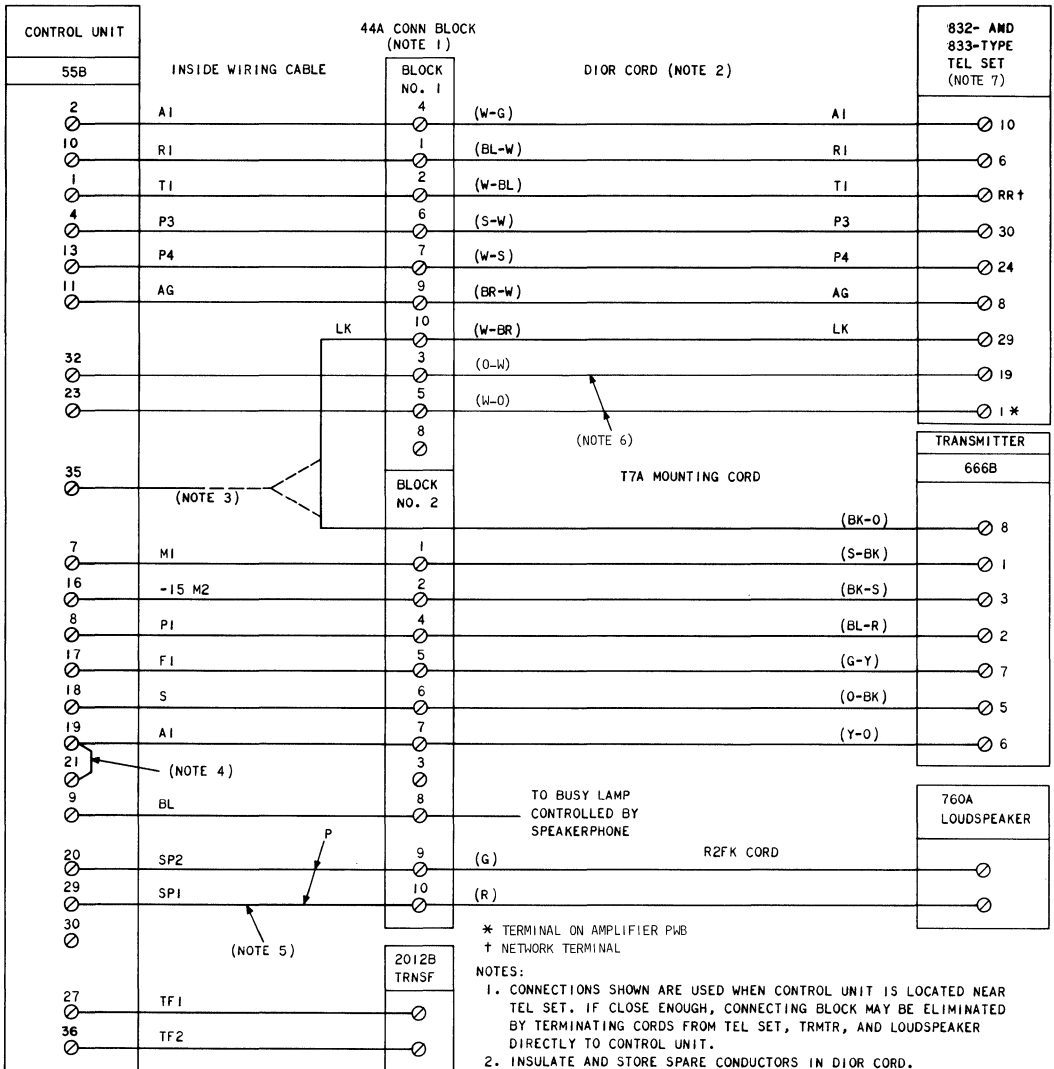
\*\* Connect W-O lead to terminal 1 on tel set amplifier.

†† Speaker terminals are not designated.

‡‡ Use inside wire.

§ § Connect lead to terminal 30 if a reduction in volume is desired.

¶¶ If modular set with new line switch is used, remove (o) lead from terminal 27 and connect to terminal 22.



6. REMOVE (W-S) LEAD FROM TERMINAL 1 OF AMPLIFIER PWB AND CONNECT WITH (O-W) LEAD OF DIOR CORD TO TERMINAL 19 OF TELEPHONE SET.
7. IF MODULAR SET WITH NEW LINE SWITCH IS USED, REMOVE (O) LEAD FROM TERMINAL 27 AND CONNECT TO TERMINAL 22.

NOTES:

1. CONNECTIONS SHOWN ARE USED WHEN CONTROL UNIT IS LOCATED NEAR TEL SET. IF CLOSE ENOUGH, CONNECTING BLOCK MAY BE ELIMINATED BY TERMINATING CORDS FROM TEL SET, TRMTR, AND LOUDSPEAKER DIRECTLY TO CONTROL UNIT.
2. INSULATE AND STORE SPARE CONDUCTORS IN DIOR CORD.
3. IF CONNECTING BLOCK IS NOT USED, TERMINATE BOTH LK LEADS ON TERM. 35 OF CONTROL UNIT.
4. PLACE STRAP WHEN BUSY LAMP IS CONTROLLED BY SPEAKERPHONE. USE DC LAMP OR BUSY LAMP CONTROL CIRCUIT PER SD-69403-01.
5. CONNECT SP1 LEAD TO TERMINAL 30 (ON 55B) WHEN REDUCED LOUDSPEAKER VOLUME IS DESIRED.

Fig. 1—832- and 833-Type Telephone Sets—3-Type Speakerphone Connections



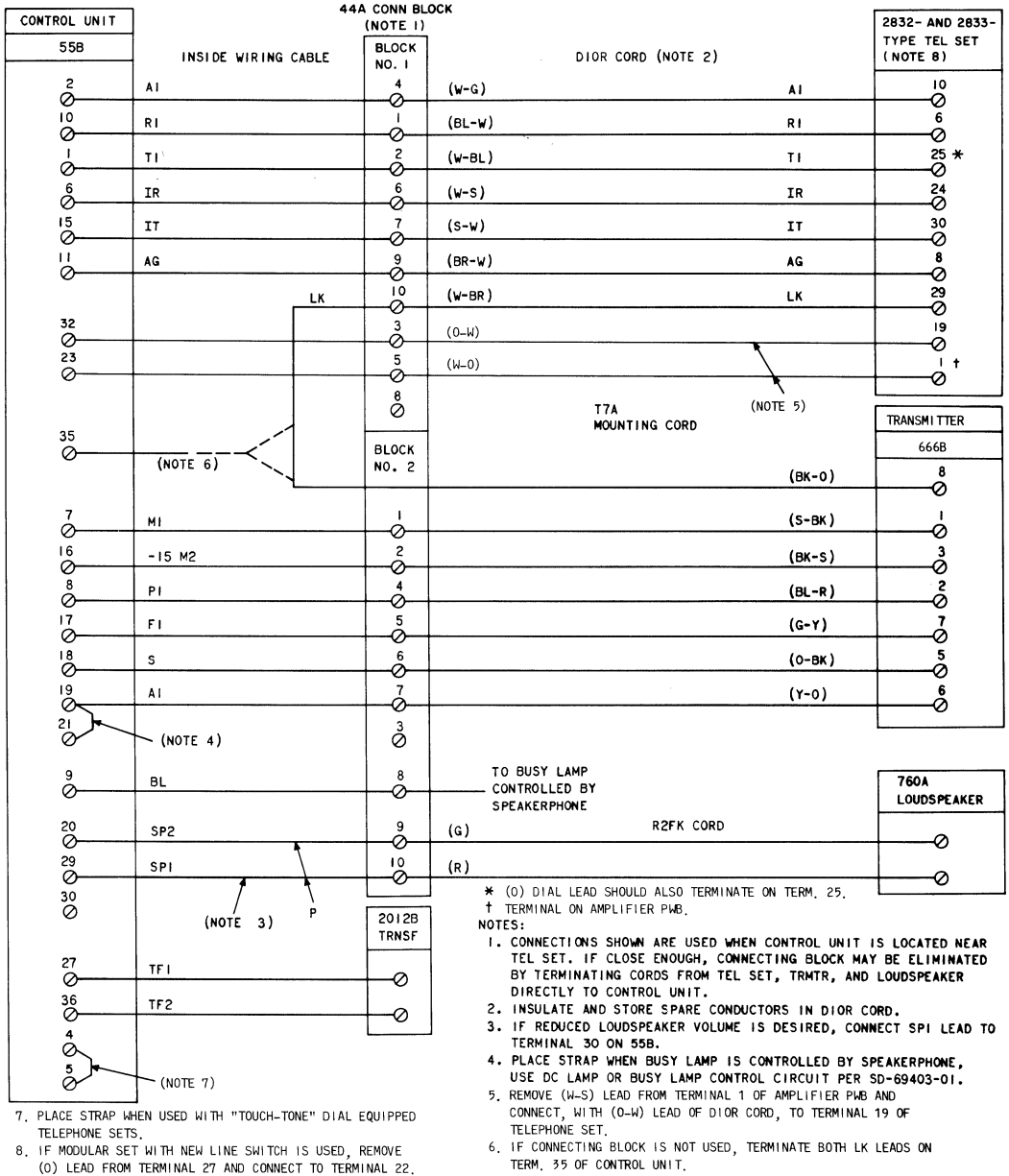


Fig. 2—2832- and 2833-Type Telephone Sets—3-Type Speakerphone Connections

**SPEAKERPHONE SYSTEM—3-TYPE**  
**851- AND 2851-TYPE TELEPHONE SETS**  
**CONNECTION AND MAINTENANCE**

**1. GENERAL**

**1.01** These sets are supplied factory-wired for use with 3-type speakerphone except that any 851-type telephone set that is equipped with an 8R dial, the dial must be replaced with an 8C dial to provide a second set of off-normal contacts (P8 and P4 leads). Refer to Section 503-601-101 for set wiring and ringer connections.

**1.02** This section is reissued to include connection information for the 2851-type telephone sets formerly found in Section 512-622-495, which is hereby canceled.

Since this reissue covers a general revision, arrows ordinarily used to indicate changes have been omitted.

**2. CONNECTION INDEX**

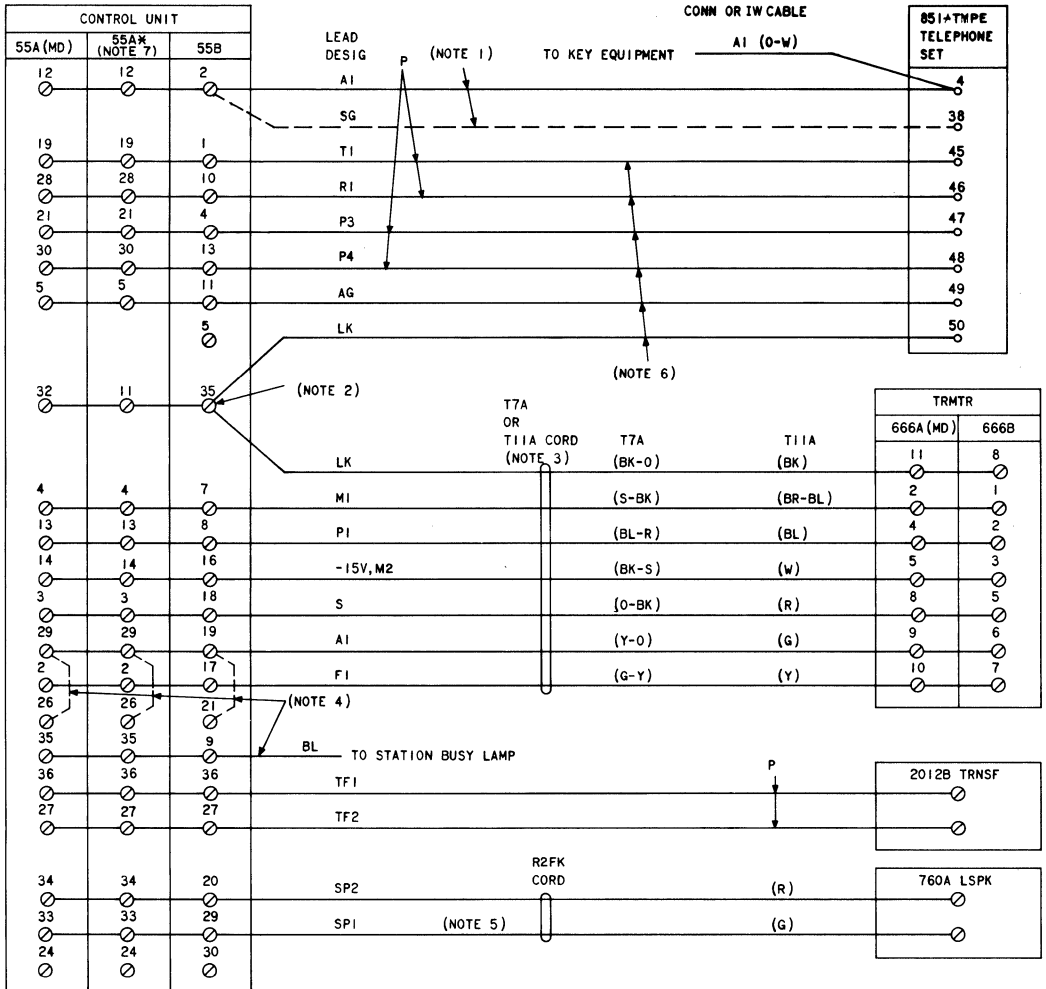
Fig. 1—851-Type Telephone Set, Connections to 3-Type Speakerphone System

Fig. 2—2851-Type Telephone Set, Connections to 3-Type Speakerphone System

Fig. 3—2851-Type Telephone Set, Connections to 3-Type Speakerphone System When Control Unit is Located at the KTS Equipment.

**3. MAINTENANCE**

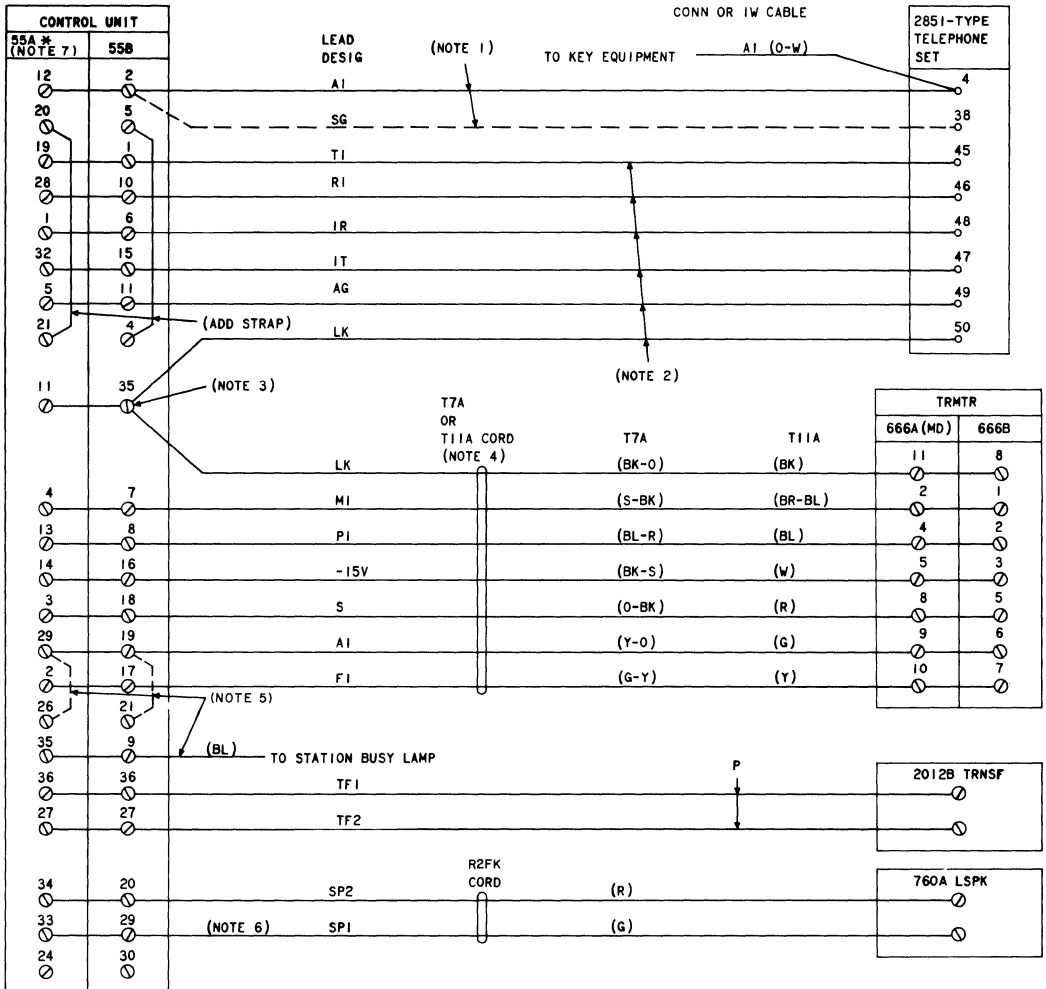
**3.01** For maintenance information refer to Section 503-601-101 for the 851- and 2851-type telephone sets and to Section 512-620-100 for the speakerphone components used with these sets.



NOTES:

1. FOR 1A1, 1A2 AND 6A KEY TELEPHONE SYSTEMS, CONNECT A1 LEAD TO TERMINAL 4 ON CLIP-TYPE CONNECTING BLOCK. FOR 1A KEY TELEPHONE SYSTEM CONNECT SG LEAD TO TERMINAL 38 ON CLIP-TYPE CONNECTING BLOCK AND MOVE (Y) LINE SWITCH LEAD FROM 4 TO 11 OF SCREW- TERMINAL FIELD.
2. TIE POINT FOR LK LEADS BETWEEN TELEPHONE SET AND TRANSMITTER WHEN CONTROL UNIT IS LOCATED NEAR TELEPHONE SET.
3. INSULATE AND STORE UNUSED LEADS OF T11A CORD.
4. STRAP AS INDICATED AND CONNECT BL LEAD WHEN STATION BUSY LAMP IS CONTROLLED BY SPEAKERPHONE.
5. TO REDUCE LOUDSPEAKER VOLUME, CONNECT SP1 LEAD TO TERMINAL 24 (55A) OR 30 (55B).
6. DO NOT CONNECT T1, R1, P3, P4, AG AND LK LEADS IN CABLE TO KEY EQUIPMENT.
7. 55A\* CONTROL UNIT MODIFIED BY WESTERN ELECTRIC CO. FOR USE WITH "TOUCH-TONE" ® TELEPHONE SETS.

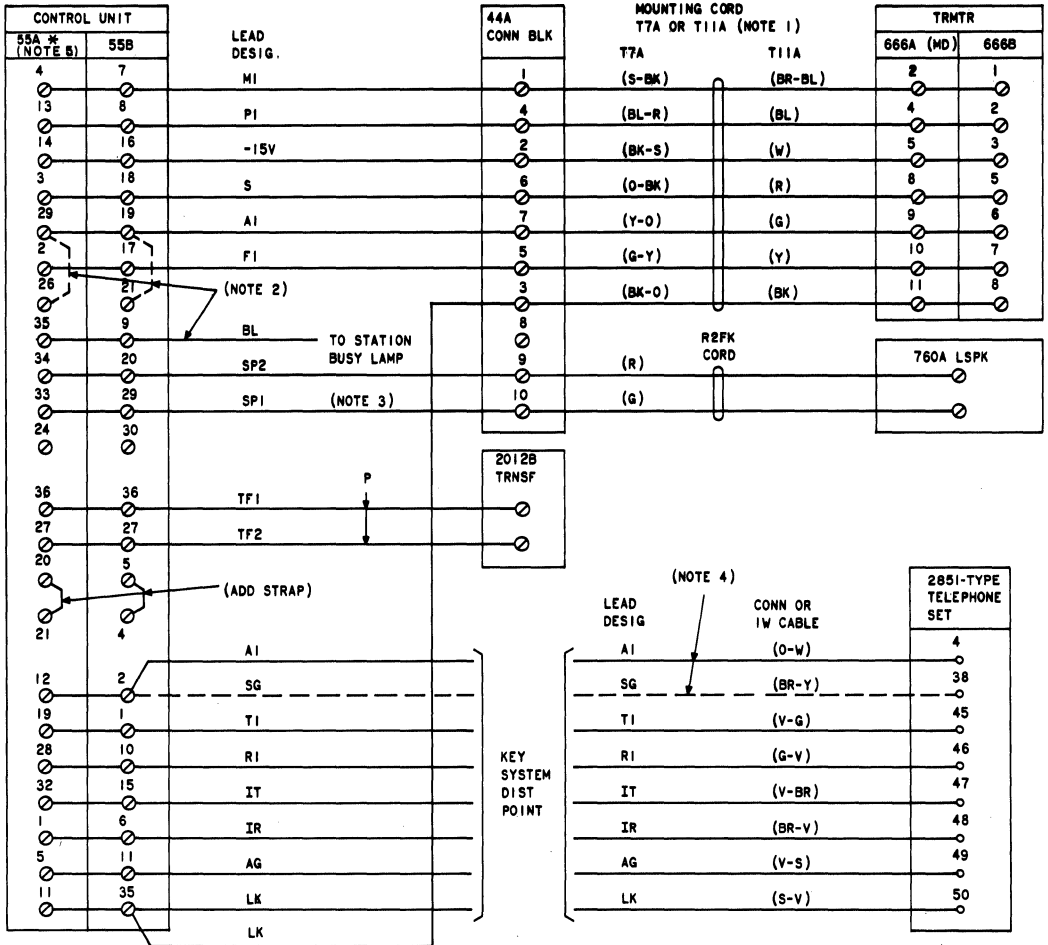
Fig. 1—851-Type Telephone Set, Connections to 3-Type Speakerphone System



NOTES:

1. FOR 1A1, 1A2 AND 6A KEY TELEPHONE SYSTEMS, CONNECT AI LEAD TO TERMINAL 4 ON CLIP-TYPE CONNECTING BLOCK, FOR 1A KEY TELEPHONE SYSTEM CONNECT SG LEAD TO TERMINAL 38 ON CLIP-TYPE CONNECTING BLOCK AND MOVE (Y) LINE SWITCH LEAD FROM 4 TO 11 OF SCREW TERMINAL FIELD.
2. DO NOT CONNECT TI, RI, IR, IT, AG AND LK LEADS IN CABLE TO KEY EQUIPMENT.
3. TIE POINT FOR LK LEADS BETWEEN TELEPHONE SET AND TRANSMITTER WHEN CONTROL UNIT IS LOCATED NEAR TELEPHONE SET.
4. INSULATE AND STORE UNUSED LEADS OF T11A CORD.
5. STRAP AS INDICATED AND CONNECT (BL) LEAD WHEN STATION BUSY LAMP IS CONTROLLED BY SPEAKERPHONE.
6. TO REDUCE LOUDSPEAKER VOLUME, CONNECT SPI LEAD TO TERMINAL 24 (55A) OR 30 (55B).
7. 55A\* CONTROL UNIT MODIFIED BY WESTERN ELECTRIC CO. FOR USE WITH "TOUCH-TONE"® TELEPHONE SETS.

Fig. 2—2851-Type Telephone Set, Connections to 3-Type Speakerphone System



NOTES:

1. INSULATE AND STORE UNUSED LEADS OF T11A CORD.
2. STRAP AS INDICATED AND CONNECT (BL) LEAD WHEN STATION BUSY LAMP IS CONTROLLED BY SPEAKERPHONE.
3. TO REDUCE LOUDSPEAKER VOLUME, CONNECT SPI LEAD TO TERMINAL 24 (55A) OR 30 (55B).
4. FOR 1A1, 1A2, AND 6A KEY TELEPHONE SYSTEMS CONNECT AI LEAD TO TERMINAL 4 ON CLIP-TYPE CONNECTING BLOCK, FOR 1A KEY TELEPHONE SYSTEM CONNECT SG LEAD TO TERMINAL 38 ON CLIP-TYPE CONNECTING BLOCK AND MOVE (Y) LINE SWITCH LEAD FROM 4 TO 11 OF SCREW TERMINAL FIELD
5. 55A\* CONTROL UNIT MODIFIED BY WESTERN ELECTRIC CO. FOR USE WITH "TOUCH-TONE" TELEPHONE SETS.

Fig. 3—2851-Type Telephone Set, Connections to 3-Type Speakerphone System When Control Unit is Located at KTS Equipment

## 50A1 CONFERENCE SET

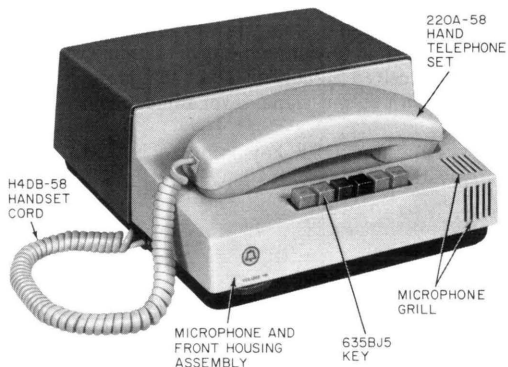
### 1. GENERAL

**1.01** This section covers the identification, installation, connections, operation, and maintenance of the 50A1 conference set.

**1.02** The 50A1 conference set permits hands-free 2-way audience participation in a call placed over the telephone network. This set provides additional features such as A-lead control, multiple microphone use, and 2/4 wire operation not provided with the 50A set. The 50A1 is sometimes referred to as the Portable Conference Telephone.

### 2. IDENTIFICATION

**2.01** The 50A1 conference set (Fig. 1) consists of a 73B control unit, a modified 220A-58 hand telephone set plus the other accessories listed in 2.03 under the Ordering Guide.



**Fig. 1—73B Control Unit, Front View**

### Ordering Guide

**2.02** The 50A1 conference set can be ordered as a complete unit as follows:

- Set, Conference, 50A1

**2.03** The following components of the 50A1 conference set are field replaceable and can be ordered separately:

- KS-20653L1 Carrying Case
- Unit, Control, 73B (includes modified 220A-58 hand telephone set)
- KS-20660L1 (Green) microphone with 20-foot cord and color-coded plug
- KS-20660L2 (Gold) microphone with 20-foot cord and color-coded plug
- Set, Hand Telephone, 220A-58 (5.03)
- Lamp, 51A
- Cord, Handset, H4DB-58
- KS-20660L3 Lavalier Assembly (2)
- KS-20689L1 Power Cord (10-foot length)
- Cord, Telephone Line, D4BU (25-foot length)
- Adapter, 225A
- Holder, 54A (microphone desk stand) (2)

**2.04** *Replaceable Common Components of 73B Control Unit:*

- 840695142 Microphone and Front Housing Assembly

**TABLE A**  
**POLARITY GUARD AND S3A CORD CONNECTIONS**  
**TO MODIFY 2500S TELEPHONE SET**

LEAD	COLOR	REMOVE FROM NET.	CONNECT TO		
			NET.	POLARITY GUARD	TERM. BOARD
Line Switch	W	C		S	
Dial	G-W BK	C RR		S T	
Polarity Guard	W G		C RR		
S3A Cord	W BL R	— — —	— L1 L2	—	1

- Key, 635BJ5
  - 840284152 Rear Housing Assembly
  - Ringer Assembly, P1B
  - One-way communication using the loudspeaker only
  - A-lead control for use with key telephone systems
- 2.05 Associated Optional Apparatus or Equipment**  
(Required for auxiliary dial):
- Set, Telephone, 2500S
  - Cord, S3A
  - Plug, 309
  - Guard Assembly, P-90D052
  - Means to provide audible TOUCH-TONE® signals for computer data input
  - Means to connect both transmitted and received signals to a public address system with output signal level adjustment
  - Lighted OFF key lamp to indicate when the set is in operation

#### Design Features

**2.06** The 50A1 conference set is equipped with a TRIMLINE® hand telephone set and provides the following:

- Hands-free conference communication using any combination of the three microphones and a loudspeaker with output signal level adjustment
- 2- or 4-wire operation
- Handset communication using a TRIMLINE hand telephone set
- Transferring between hands-free and handset during conversation

#### Application

**2.07** This set can be used on individual or bridged service on CO or PBX line circuits with 1A1, 1A2, or 6A key telephone systems where A-lead control is provided. It may also be used with 1A KTS where connection to tip and ring only are required.

### 3. INSTALLATION AND CONNECTIONS

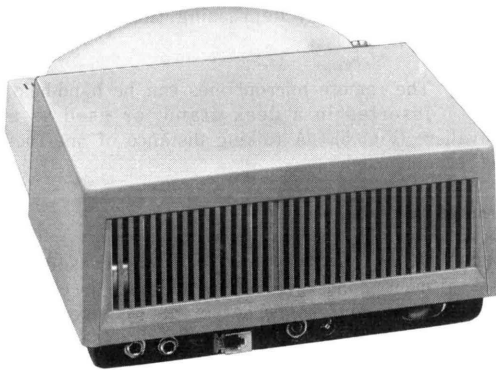
**3.01** Terminate incoming telephone line on a 549A jack or equivalent. Place control unit on a desk, table, etc. within 25 feet of the jack and within 10 feet of a grounded power outlet supplying 120 volts AC, 60 Hz.



**Ensure that the power cord is connected to an AC outlet not under control of a switch.**

**3.02** Arrange control unit so front is located at least six inches from table edge and with its loudspeaker facing the audience. For optimum performance, there should be no obstructions at the front, rear, or within one foot of the sides of the unit.

**3.03** Install telephone line cord, AC power cord, and, as required, microphones or auxiliary TOUCH-TONE dial telephone set to the appropriate jacks located on rear of control unit (Fig. 2).



**Fig. 2—73B Control Unit, Rear View**

**3.04** Provision is made for reproducing both transmitted and received signals over a customer-owned public address system. A public address adjustment (PA ADJ) (Fig. 2) control is located on the back of the set for adjusting the level of the transmitted signal at the PA terminals. Connections to the public address system are made to the screw terminals on the bottom of the unit (Fig. 3). Connections should be made using a shielded pair, grounded at the customers' equipment only. If desired, the conference set loudspeaker can be deactivated by opening the shorting link between adjacent screw terminals on the base of the control unit (Fig. 3). Connection to and adjustment of the PA system is the customer's responsibility. Typical signal levels are—45dbv at 600-ohm impedance (balanced).



A—REAR HOUSING ASSY CAPTIVE SCREW ACCESS HOLES  
B—MICROPHONE AND FRONT HOUSING ASSY SCREWS AND CAPTIVE SCREW ACCESS HOLE

**Fig. 3—73B Control Unit, Bottom View**

**3.05** When the conference set is not in use or is being moved to another location, store the components and control unit in the carrying case.

**3.06** When installed behind a 1A1, 1A2, or 6A KTS, the A and A1 leads from the KTS should be connected to the T1 and R1 leads, respectively, of the control unit to obtain A lead control. There are several ways to connect the 50A1 to a key system termination:

- (1) A special connector (F-Specification 59888) can be ordered separately with a modular plug at the 50A1 end and a 153-type adapter wired to pick up tip, ring, A and A1 leads at the key system end.
- (2) If the customer desires to continue using his present key set, use of a KS-19252L1 bridging adapter is recommended. A surface-mounted 549A jack can be connected to a 153C adapter, which is then plugged into the bridging adapter.
- (3) If a 66-type connecting block is available, the 549A jack can be wired directly to it. Refer to appropriate section in Division 461 for



connection information on 66-type connecting block and 153-type adapter.

**3.08** When 4-wire operation is required, remove the rear housing assembly and with a screwdriver rotate selector switch to the 4W position (Fig. 6). The transmit line should be connected to the T and R leads from the control unit and the receive line should be connected to the T1 and R1 leads.

#### **4. OPERATION**

##### **Rotary Dial Service—220A Hand Telephone Set**

**4.01** The hand telephone set is used to establish all outgoing calls. Incoming calls may be answered using the hand telephone set or by depressing the SET MIKE ON button. Dial lamp power is provided when the power is connected.

##### **TOUCH-TONE Service**

**4.02** A 2220B TOUCH-TONE handset can be substituted for the 220A handset for TOUCH-TONE dialing and signaling with no modifications other than the lamp change noted in 5.03.

##### **Hands-Free Operation**

**4.03** The conference is transferred from the handset to hands-free operation by depressing one of the five locking key buttons (SET MIKE ON, GOLD MIKE, GREEN MIKE, AUX DIAL, or MIKES OFF) and then returning the handset to its cradle.

**4.04** A call is transferred to the handset mode and the control unit is deactivated whenever the handset is lifted.

**4.05** Incoming calls are heard through the set loudspeaker. The output level is adjusted by means of the VOLUME control. Advance the VOLUME control only far enough for adequate listening level. However, when this control is set at 0, a lecturer speaking into the conference set will be heard more clearly at the remote location since the set will remain in the transmit mode.

##### **SET MIKE ON**

**4.06** When the SET MIKE ON key button is depressed, the control unit microphone is activated. The person talking should position himself in front of the unit, preferably at a distance of one or two feet for best transmission.

##### **GOLD MIKE, GREEN MIKE**

**4.07** To use remote microphones, plugs should be inserted into the labeled jacks located on the rear of the control unit. The microphones will be activated when the gold or green key button is depressed.

*Note:* Any combination of the three microphones can be used at one time by simultaneously depressing the appropriate buttons.

**4.08** The remote microphones can be hand-held, inserted in a desk stand, or used as a lavalier (Fig. 5). A talking distance of one foot is recommended.

##### **MIKES OFF**

**4.09** When this key button is depressed all microphones are disconnected from the circuit, leaving the conference set in the receive mode only.

##### **AUX DIAL**

**4.10** If TOUCH-TONE service is available, two means of signaling to a computer terminal are possible:

- (a) The customer can be provided with a 2220B TOUCH-TONE handset in place of the 220A handset (see 5.03 for lamp change). Tone signaling may be accomplished by using the handset dial. the AUX DIAL key button need not be depressed.

*Note:* The signals will not be heard on the conference set loudspeaker.

- (b) The customer may be provided with a 2500S telephone set modified in accordance with Table A and shown in Fig. 4. Tone signaling may be accomplished by inserting the 309 plug into the AUX DIAL jack on the rear of the control unit and depressing the AUX DIAL key

button. The dial of the modified telephone set may be used without lifting the handset. Signals will be transmitted to both the telephone line and the conference set loudspeaker. The VOLUME control on front of the control unit adjusts the listening level of the TOUCH-TONE signals.

(c) If TOUCH-TONE service is not available, the modified 2500S telephone set must be used as described in (b) to provide signaling to a computer terminal.

#### **OFF Button**

**4.11** When in the hands-free mode, depressing the nonlocking OFF-button deactivates the conference set, extinguishes the associated indicator lamp, and disconnects the call.

#### **2- or 4-Wire Operation**

**4.12** An internally mounted switch (Fig. 6) allows easy selection between 2- or 4-wire mode of operation. In the 4-wire mode, transmit and receive channels are each connected through separate pairs of the telephone line.

#### **Ringer**

**4.13** This control unit is equipped with a P1B ringer. The ringer volume control is located on the bottom of the unit.

### **5. MAINTENANCE**

**Caution:** *Disconnect AC power cord and the D4BU line cord before attempting any*

#### ***maintenance to the interior of the control unit.***

**5.01** Work done on customers' premises should be limited to replacement of those parts listed in the Ordering Guide. Repair of other components affects set performance and requires detailed testing.

**5.02** To remove the front and rear housing assemblies from the 73B control unit, disconnect the hand telephone set first, using a KS-16750 type releaser or equivalent. Release the three captive screws located in access holes at sides and rear of the unit base pan (Fig. 3) and remove the rear housing assembly first. Then remove two screws located on the sides of the base pan and captive screw at the front to release microphone and front housing assembly. The proper dress of wires in the vicinity of the ringer gong, line switch, and internal microphone terminal connections should be maintained to prevent interference with the front housing assembly when it is replaced after performing maintenance.

**5.03** Replace 220A hand telephone set by connecting plug of H4DB cord to hand telephone set jack, and to jack located on left side of control unit.

**Note:** Replace the 53B dial lamp furnished with the hand telephone set with a 53A lamp. Refer to appropriate section in Division 502 for replacement procedures.

**5.04** If a light appears under the MIKES OFF button, it indicates dial light power is supplied on T1 and R1 leads. **Do not remove this lamp from the conference set.**

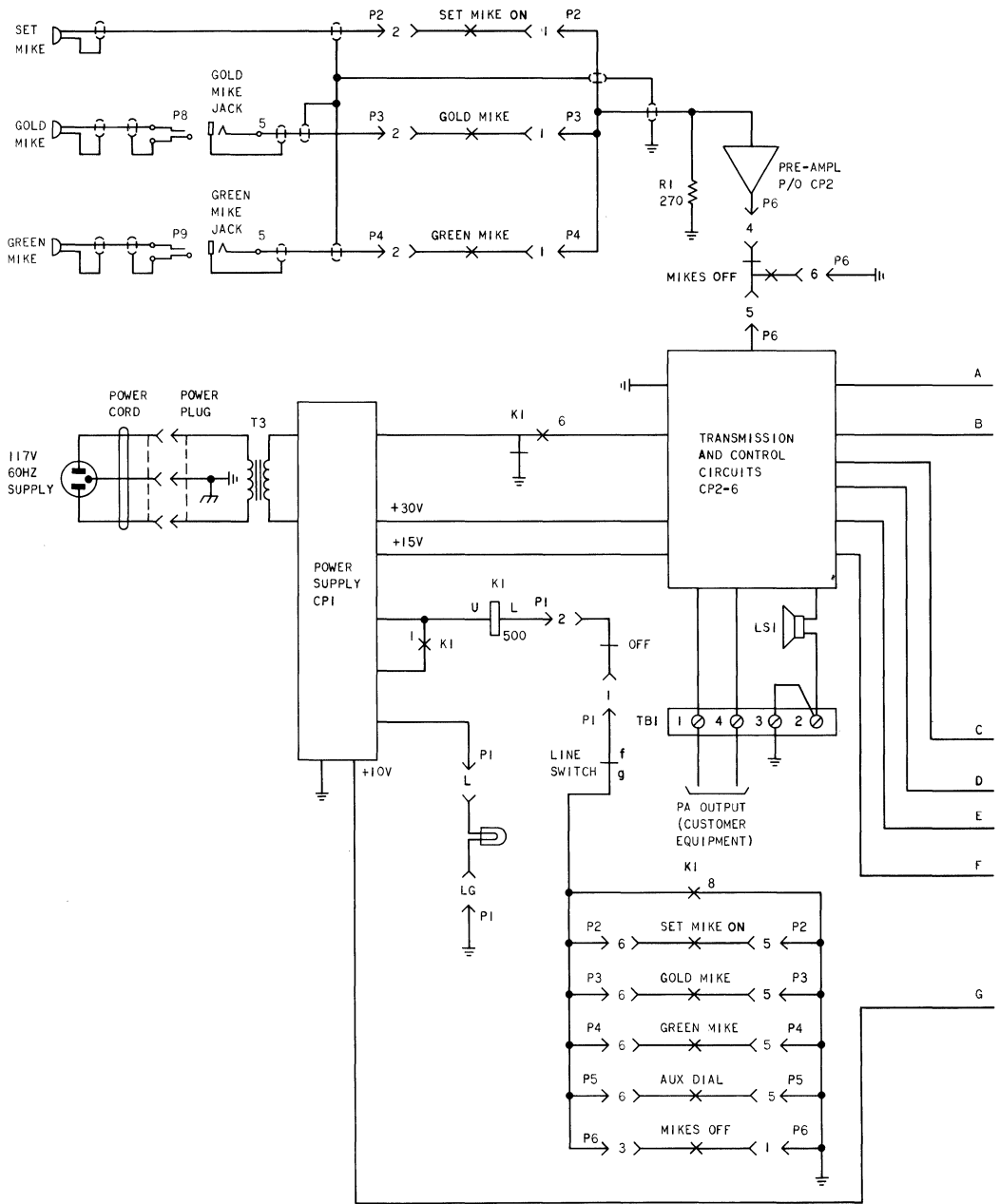
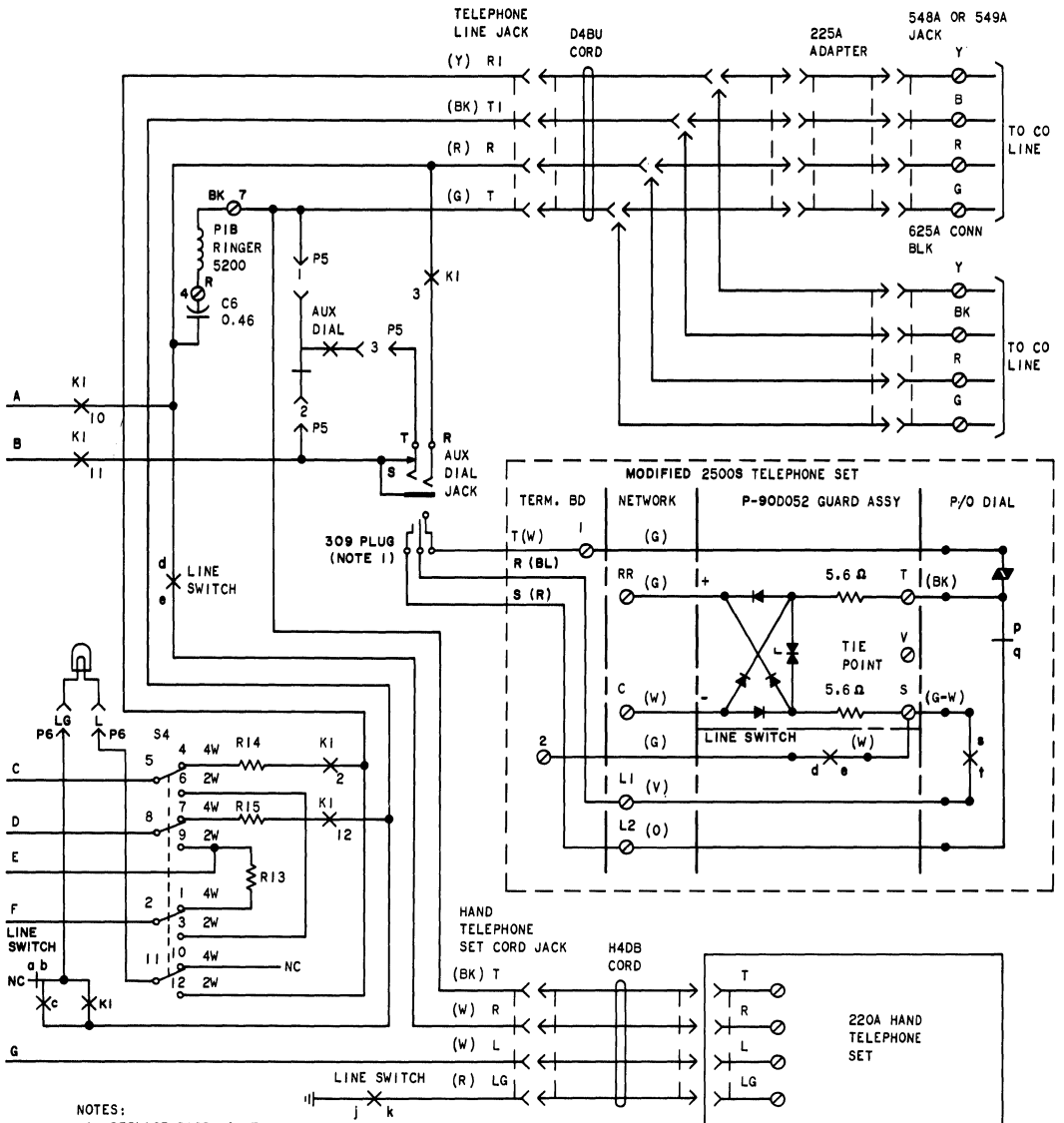
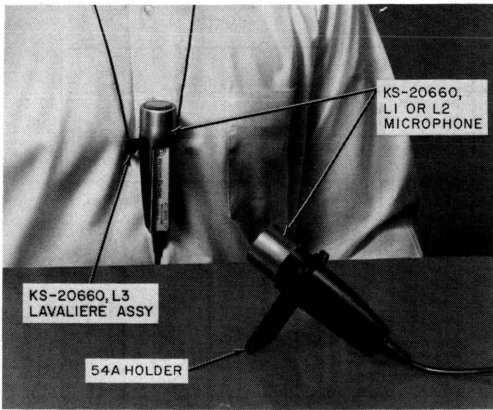


Fig. 4—50A1 Conference Set, Block Diagram (Sheet 1 of 2)

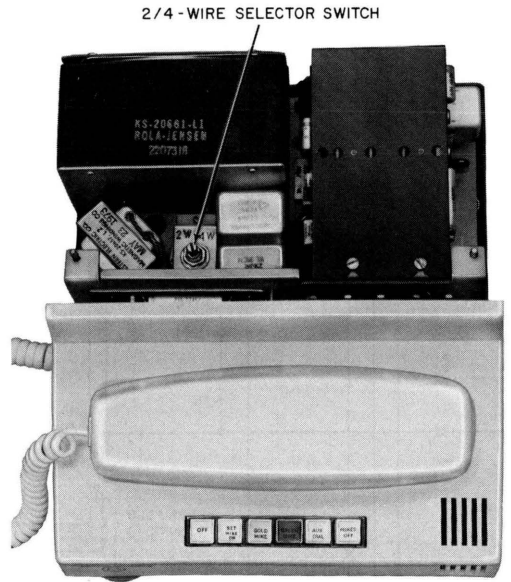


NOTES:  
 1. REPLACE DIOP MOUNTING CORD FURNISHED WITH 2500S TELEPHONE SET WITH A S3A (SWITCHBOARD) CORD EQUIPPED WITH A 309 PLUG OR EQUIVALENT (ORDERED SEPARATELY). SPECIFY LENGTH AND COLOR OF CORD. SEE TABLE A FOR CONNECTIONS.

Fig. 4—50A1 Conference Set, Block Diagram (Sheet 2 of 2)



**Fig. 5—Remote Microphones Using Lavalier and Holder**



**Fig. 6—73B Control Unit, Rear Housing Removed**

## 4A SPEAKERPHONE SYSTEM

### 1. GENERAL

**1.01** This section contains identification, installation, operation, and maintenance information for the 4A speakerphone system.

**1.02** This section is reissued to:

- Add safety information for installing or removing (841050818) retaining clamp
- Add 80A control unit, Fig. 2 and 7
- Add 108AA loudspeaker set
- Show 108A and 108AR loudspeaker set rated MD
- Add 680AD transmitter
- Show 680AR and 680AR14 transmitters rated MD
- Show 82A connecting block MD
- Add 223C adapter

### 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.

**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 muting 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, and 1A2 key telephone systems and all PBXs.
- 2.05** For additional schematic and circuit information refer to SD- and CD-69909-01, respectively.

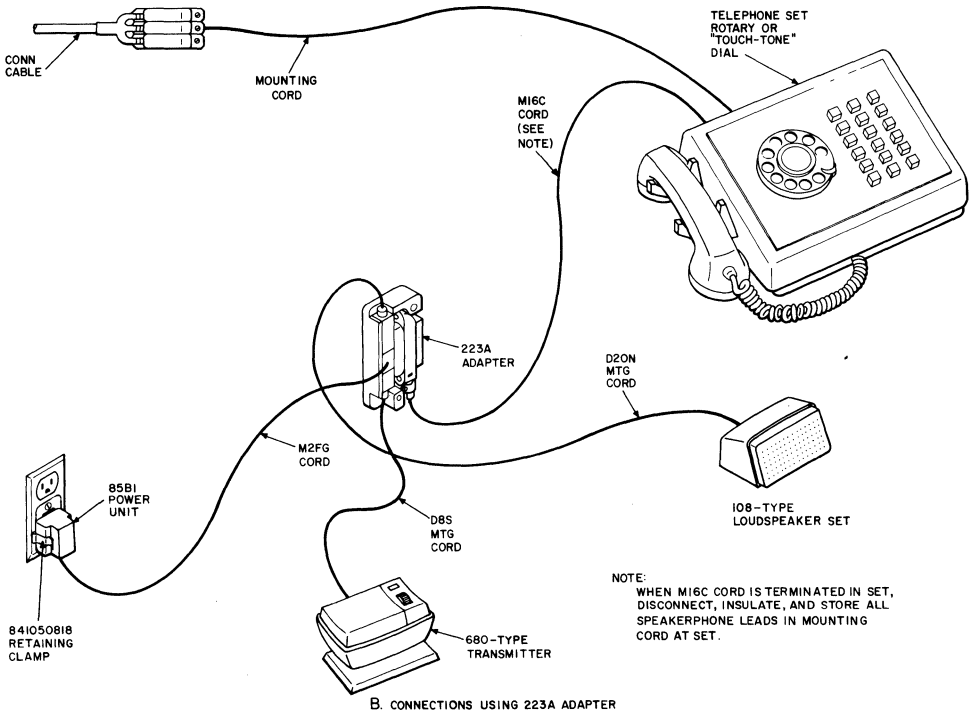
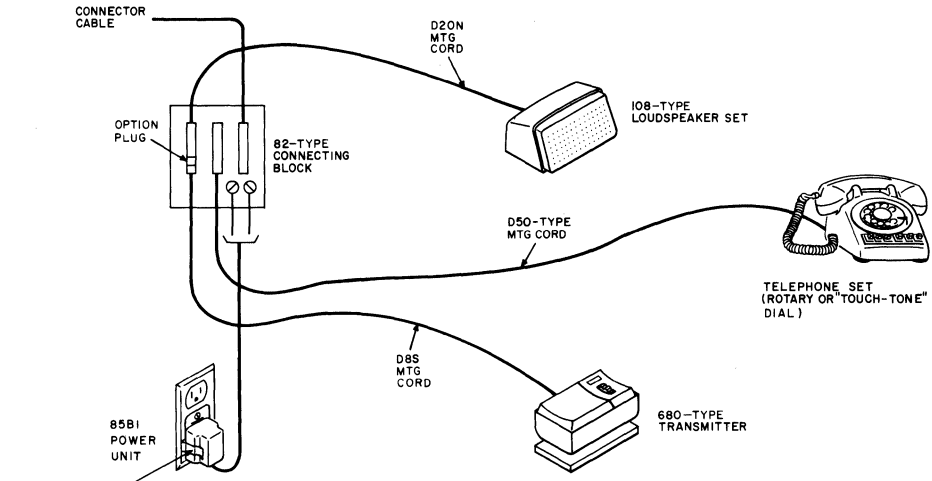
#### Ordering Guide

**2.06** Components which make up the 4A speakerphone systems are ordered separately as follows:

- Set, Loudspeaker, 108A-\* ♦(MD)♦ (includes 7-foot D20N mounting cord)
- Set, Loudspeaker, 108AR-\* ♦(MD)♦ (includes 7-foot D20N mounting cord) for use when radio frequency interference is a problem
- ♦Set, Loudspeaker, 108AA-\* (includes 7-foot D20N mounting cord) for use when radio frequency interference and/or static electricity is a problem♦
- Transmitter, 680A-\* (includes 7-foot, D8S mounting cord)
- Transmitter, 680A14-\* (includes 14-foot, D8S mounting cord)
- Transmitter, 680AR-\* ♦(MD)♦ (includes 7-foot, D8S mounting cord) for use when radio frequency interference is a problem
- Transmitter, 680AR14-\* ♦(MD)♦ (includes 14-foot D8S mounting cord) for use when radio frequency interference is a problem

#### NOTICE

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



◆ Fig. 1—Typical Arrangements of 4A Speakerphone System ◆

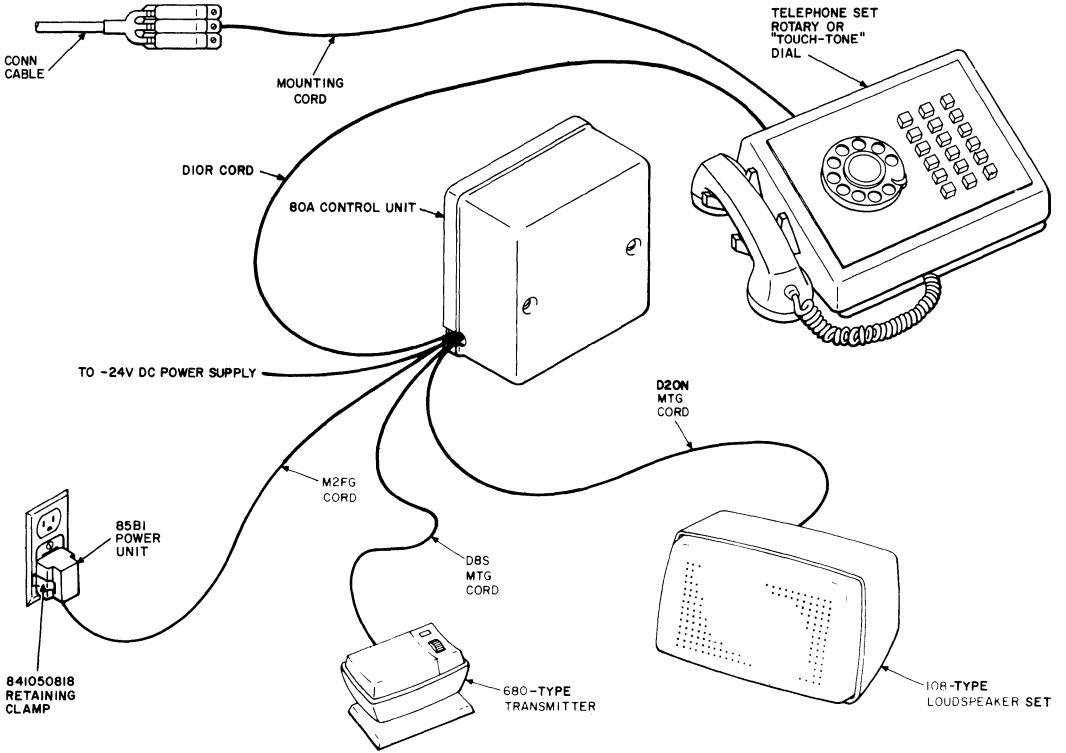


Fig. 2—Typical Arrangement of 4A Speakerphone System with 2- or 4-Wire Telephone Set



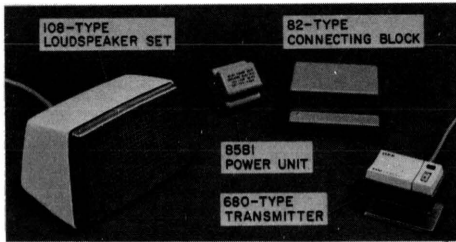


Fig. 3—Components of 4A Speakerphone System

- ♦Transmitter, 680AD-\* (includes 7-foot D8S mounting cord) for use when radio frequency interference and/or static electricity is a problem
- Transmitter, 680AD14-\* (includes 14-foot D8S mounting cord) for use when radio frequency interference and/or static electricity is a problem
- Unit, Control, 80A-49 (one required for each 2- or 4-wire station equipped with 4A speakerphone)♦
- Unit, Power, 85B1-49
- Only one required:
  - (a) Block, Connecting, 82B-49
  - (b) Adapter, 223A-49
  - (c) ♦Adapter, 223C-49♦

**Note:** ♦The 82B connecting block replaces the 82A (MD) connecting block. The 223A adapter includes 7-foot M16C-87 and 25-foot M2FG-87 cords. The 223C adapter includes 7-foot D16H-50 and 25-foot M2FG-87 cord.♦

\*Add color suffix, see 2.08.

**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, M16C-87, 14 feet (223A adapter)

Cord, D16H-50, 14 feet (223C adapter)

**2.08** The transmitter and loudspeaker set will be shipped in four promoted colors: Black (-03), 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 Circuitry:

- (1) The 4A speakerphone incorporates a voice-switching circuit, 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. 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.

(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 voice-guard circuit, automatically raises the required threshold level to prevent operation of the switching control circuit by the noise. Talkers will still switch satisfactorily because they increase their speaking levels under noisy conditions.

### 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 or 680AD14 transmitter and a 108AA loudspeaker set. These components are functionally the same 680AR or 680AR14 transmitter and a 108AR loudspeaker set, respectively, except that circuit components necessary for static discharge protection have been added.

### 680A, 680A14, 680AR, 680AR14, 680AD, or 680AD14 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. The indicator lamp lights when the system is on.

2.12 The 680AD or 680AD14 transmitter provides RFI and static discharge protection and replaces the 680AR and 680AR14 transmitter, respectively.

**Note:** Whenever the 680AD or 680AD14 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.

### 108A, 108AR, 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.

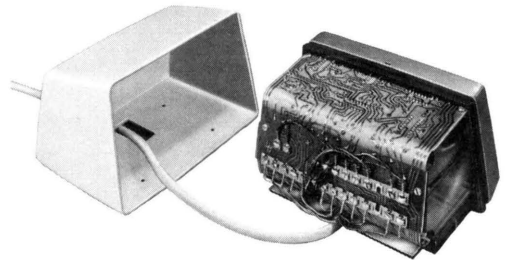


Fig. 4—Typical 108-Type Loudspeaker Set with Cover Removed

2.14 The 108AA loudspeaker replaces the 108AR loudspeaker 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 strapping.

**Note:** Whenever the 108A or 108AR loudspeaker set is used with the 680AD or 680AD14 transmitter it is necessary to install a 106A varistor (shipped with the 680AD or 680AD14 transmitter) between terminal 7 (TVL) and 5 (GRD) in the loudspeaker set to prevent damage to the loudspeaker set from discharge of static electricity.

### 82-Type 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 [82A (MD)] or eleven screw terminals (82B) for AC power connections and 1A1, 1A2, or 1A key system operation (Fig. 9 and 10).

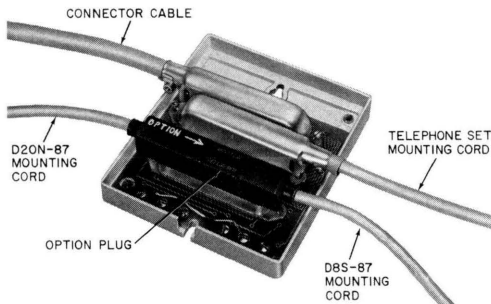


Fig. 5—82-Type Connecting Block with Cover Removed

2.16 The 82B is the same as the 82A connecting block with the exception that 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).

### 223A or 223C Adapter

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 which connects to the 85B1 power unit. The

cord from the adapter connects to the telephone set. Two codes of the 223-type adapter are described as follows:

- (a) **223A 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.

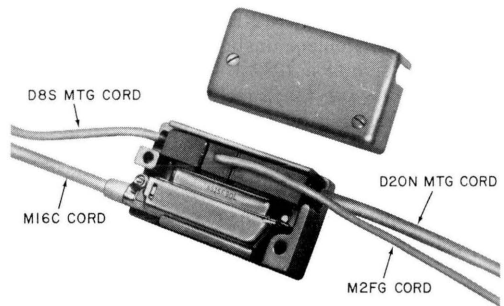


Fig. 6—223-Type Adapter

### 80A Control Unit

2.18 One 80A control unit is required for each 4-wire or combination 2-wire/4-wire station used with 4A speakerphone.

2.19 The 80A control unit (Fig. 2 and 7) provides for connecting the 4A speakerphone system to either a 2-wire or a 4-wire telephone transmission network. All standard operating features of the 4A speakerphone system are retained. Attached to the chassis of the 80A control unit is a connector (same as that used in the 223A adapter) to which the 108-type loudspeaker set, the 680-type transmitter and the 85B1 power unit are connected.

2.20 For additional schematic and circuit information, refer to SD- and CD-69923-01, respectively. For connection information, refer to Section 512-730-460.

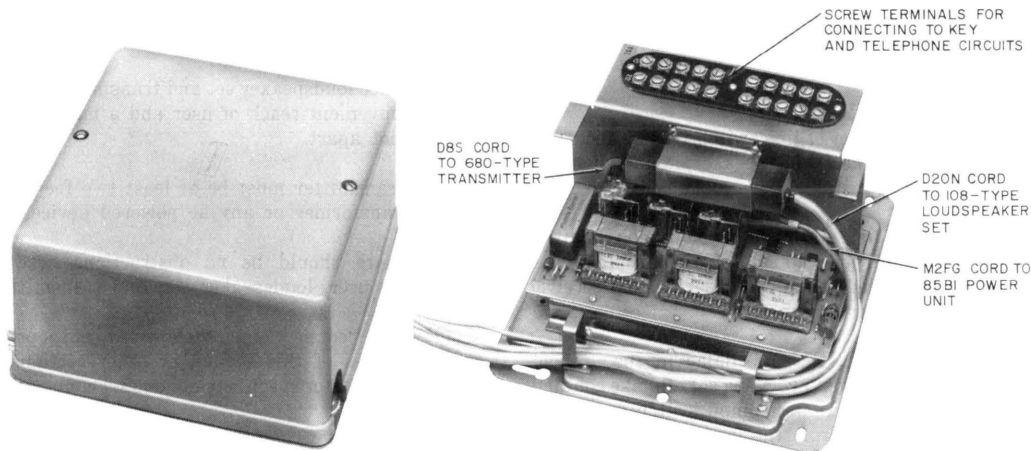


Fig. 7—80A Control Unit With Cover Removed

#### 85B1 Power Unit

2.21 The power unit transforms the local customer-provided 115-volt, 60 Hz power to the voltage level required to operate the 4A speakerphone system. An 85B1 power unit (UL approved) can be used to power only one speakerphone system. The 85B1 power unit should be located less than 125 feet from the 108-type loudspeaker set when using 24 gauge wire.

2.22 A retaining clamp (841050818) (Fig. 1 and 2) will be shipped with the 85B1 power unit and should be mounted to the AC receptacle to hold 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. When removing 85B1 power unit, always unplug the power unit 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 85B1 power unit when partially withdrawn from outlet. Do not use

an 841050818 or similar retaining clamp on outlets where the cover mounting screw holds the duplex outlet in the box.

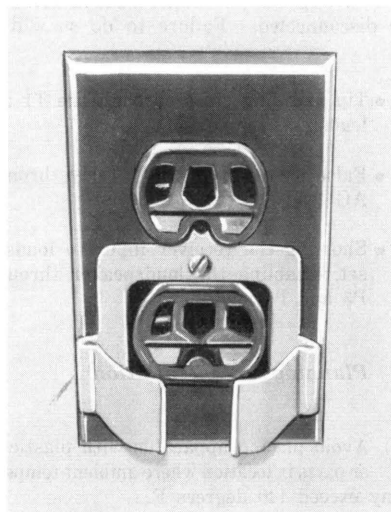


Fig. 8—841050818 Retaining Clamp Mounted on AC Outlet Box Using Outlet Cover Screw

3. INSTALLATION

3.01 The telephone set intended for use in 4A speakerphone system must meet the following requirements:

- (1) Provide a set of line switch transfer contacts to disconnect the speakerphone when the handset is lifted.
- (2) Rotary dial sets dialed in an on-hook condition must provide two sets of off-normal (make) contacts in the dial for loudspeaker and receiver muting during dialing.
- (3) TOUCH-TONE® sets dialed in the on-hook condition must provide a set of make contacts (s and t) in the dial common switch to connect line power (IR) from the loudspeaker set to the dial oscillator. If a polarity guard is provided these contacts (s and t) must be isolated from the oscillator by the polarity guard.
- (4) 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 will 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.

3.02 *Planning an installation:*

- (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 2.22.

- (3) The 85B1 power unit should be located less than 125 feet from 108-type loudspeaker set when using 24 gauge wire.
- (4) Place loudspeaker set and transmitter within convenient reach of user and a minimum of one foot apart.
- (5) Transmitter must be at least two feet from transformer or any ac powered device.
- (6) There should be no obstructions between the user, loudspeaker set, and transmitter.
- (7) Make connections as shown in appropriate figures of this section or other sections in Division 512 for specific telephone set connections.
- (8) 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).
- (9) For station busy lamp circuit with 4A speakerphone system, refer to the appropriate Service section in Division 502 for telephone set involved.

4. OPERATION

**Note:** 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. ON lamp will light indicating speakerphone is in the talking condition. Listen for dial tone transmitted through loudspeaker set. Telephone handset is not lifted during dialing (except where handset covers dial) [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 complete number is dialed, ringing tones, busy signals or called party answer will be heard from the loudspeaker set.
- (5) When called party answers, 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:

- (1) Telephone set ringer signals an incoming call.
- (2) Depress ON OR QUIET button on transmitter. Ringing is tripped and system is automatically connected to the line by the loudspeaker set.

**4.03** To disable 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, distant party can still be heard over the loudspeaker.

- (2) After private conversation is completed and it is desired to transmit to 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** Transferring from handset to speakerphone operation:

- (1) After dialing or during a conversation, 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** When transferring from speakerphone to handset operation, lift handset during speakerphone operation to automatically transfer to handset operation. When it is necessary to transfer back to speakerphone, refer to 4.05 to prevent disconnect.

## 5. MAINTENANCE



**Remove power from 108-type loudspeaker set before attempting any maintenance of speakerphone components. Observe procedures in 2.22.**

### Tests and Adjustments

**5.01** When system is installed or maintenance is performed on any component, make the following tests of speakerphone operation:

- (1) Place a speakerphone call to the testdesk.

**Note:** Excessively loud TOUCH-TONE signals will result at loudspeaker output during dialing if P3-IT and P4-IR leads are reversed. 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 choppiness 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.
- (5) Repeat this test at a high listening level by turning the volume control to maximum volume.

**5.02** If voice-switching caused by external telephone audible signaling devices is encountered:

- (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.

## SECTION 512-700-100

(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).

**5.03** If speakerphone fails to operate properly, refer to Table A for trouble analysis.

### Cleaning

**5.04** Clean plastic covers and housings with water dampened KS-2423 cloth or equivalent. Do not use scouring powders or cleaners.

### 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.***

**5.05** 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.

**5.06** 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 with fingers, 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 self inventory it is suggested that the kits listed in 2.08 be stocked instead of extra loudspeakers and transmitters.***

### Change of Loudspeaker Set Cord

**5.07** First remove housing as in 5.05. Next, loosen the screws that hold the spade tips, and remove the spade tips. Next remove the screw that fastens the stay band of the cord. Slide the spade tips and wafers out the hole in the bottom of the plastic chassis. To install the new cord, reverse the procedures.

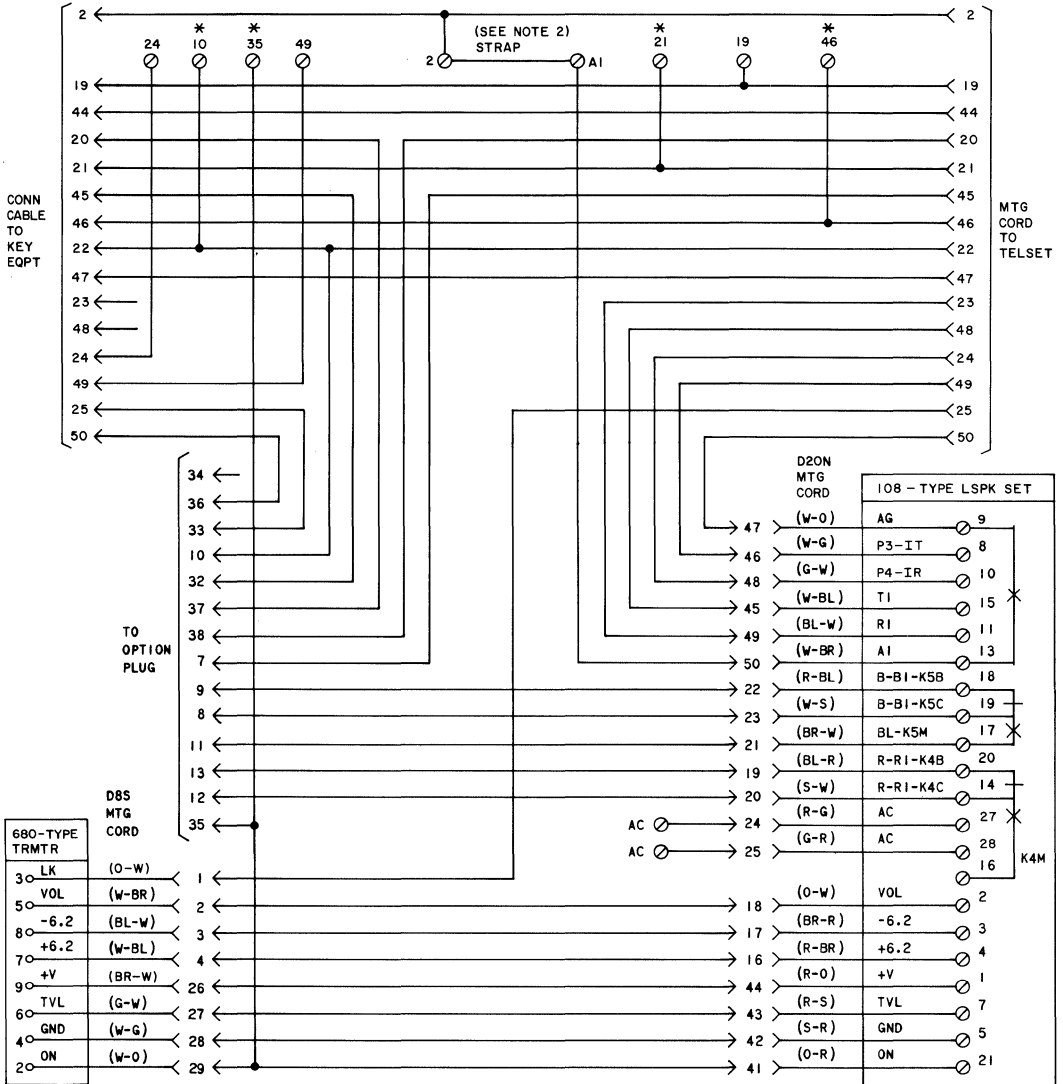
**Note:** Be careful not to damage the circuit board, particularly the flexible areas of the bends.

♦ 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 TI, RI, 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 or 680AD transmitter and 108AR or 108AA loudspeaker set

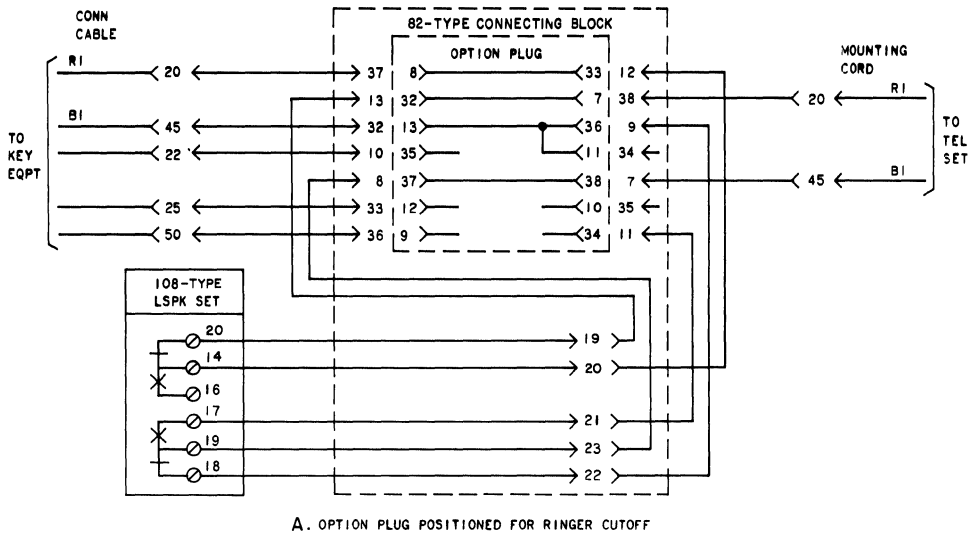




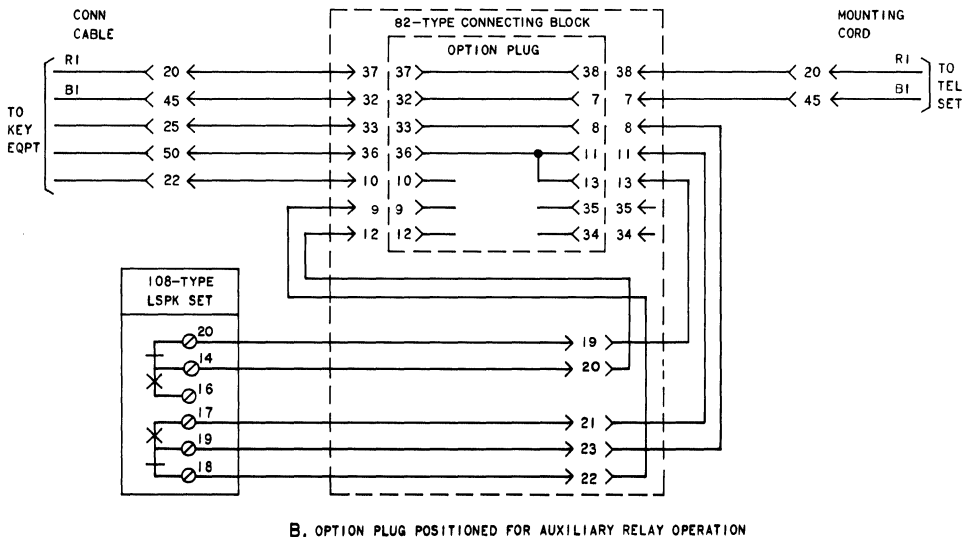
NOTES:

1. ONLY LEADS INVOLVED IN SPEAKERPHONE ARE SHOWN.
  2. METAL STRAP FACTORY WIRED FOR 1A1/1A2, (A1-2). MOVE TO TERMINAL 19 FOR 1A KTS, (A1-19), ONLY WHEN PROVIDING BUSY LAMP OPTION.
- \* THESE FOUR TERMINALS APPEAR ONLY ON THE 82B CONNECTING BLOCK.

Fig. 9—Speakerphone Connections Using 82-Type Connecting Block



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

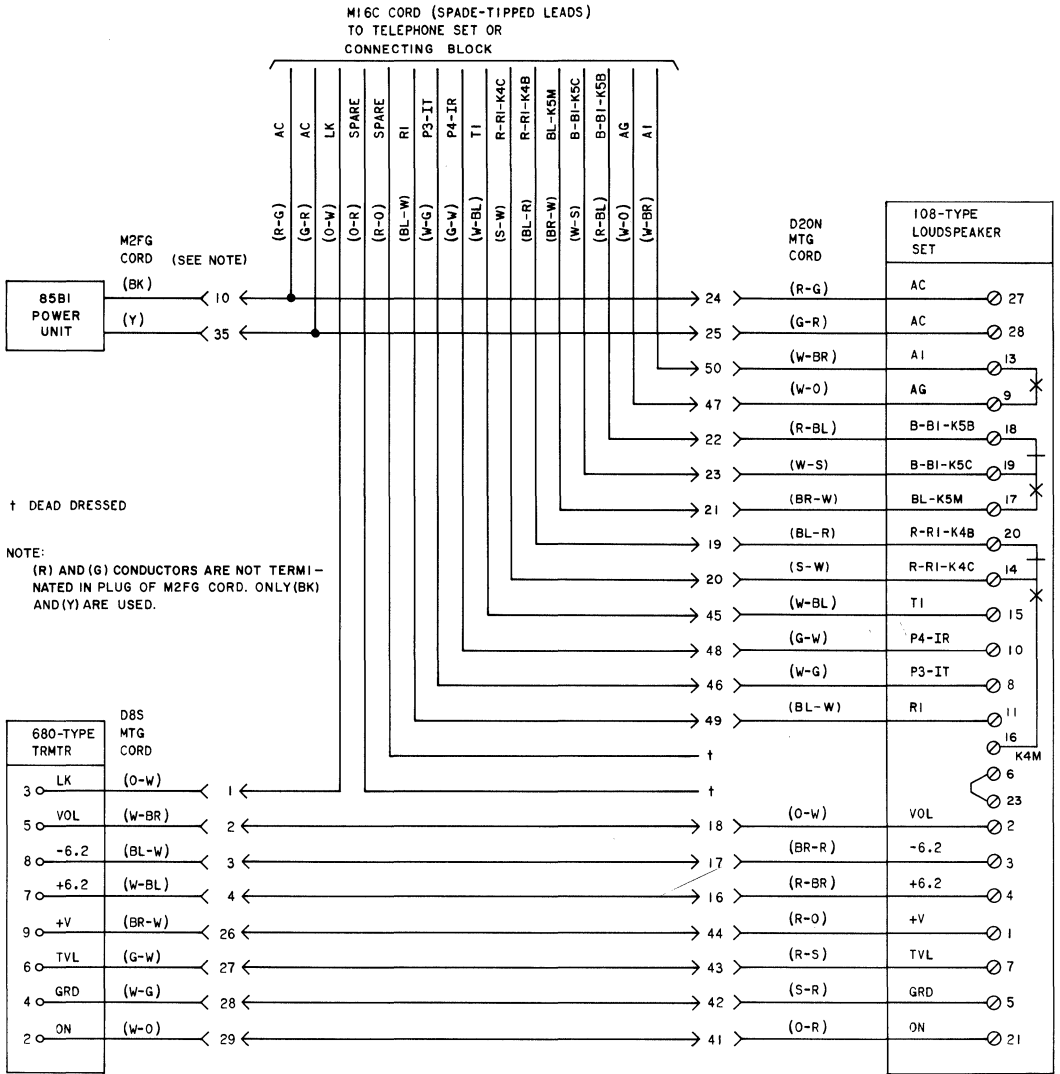


Fig. 11—Speakerphone Connections Using 223A Adapter

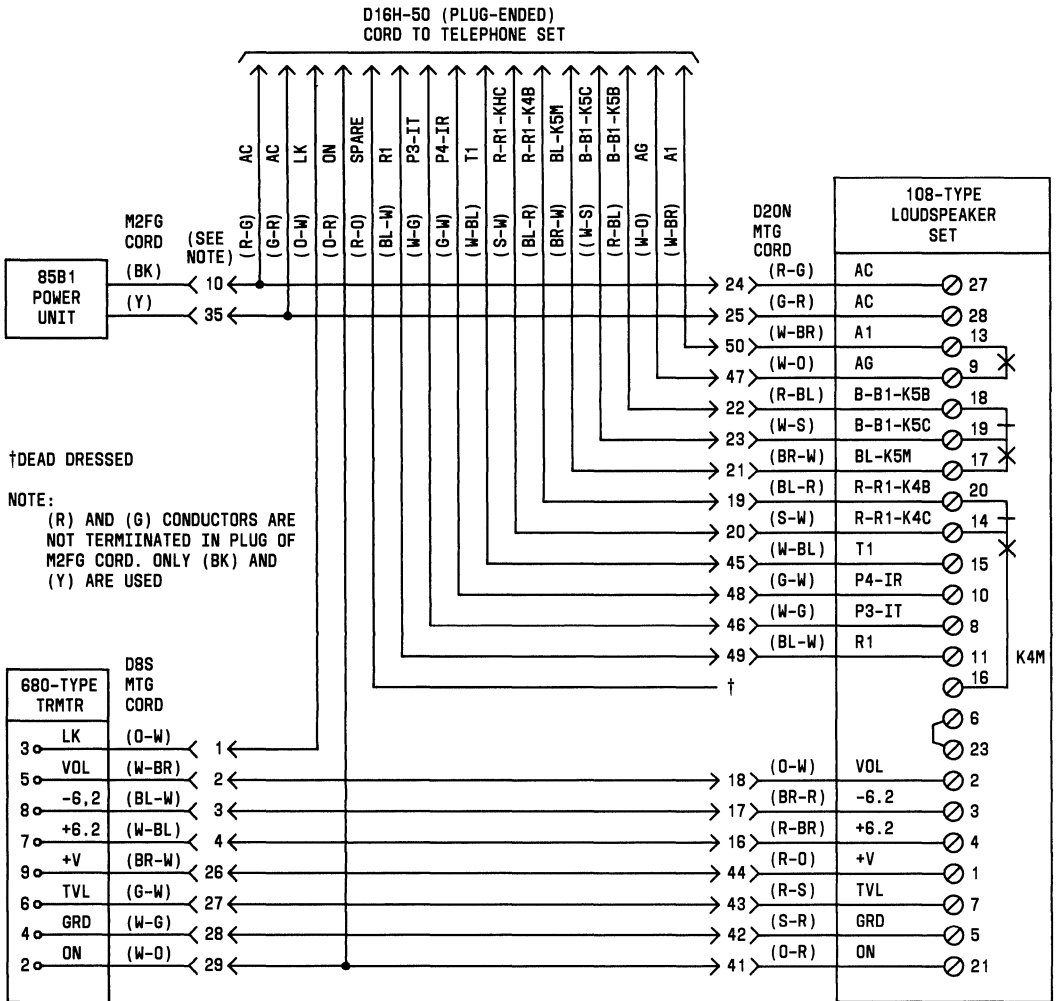


Fig. 12—Speakerphone Connections Using 223C Adapter

## SPEAKERPHONE SYSTEM—4A

### 211PR AND 2211P TELEPHONE SETS

### CONNECTIONS

#### 1. GENERAL

**1.01** Refer to Section 512-700-100 for detailed information on the components of the 4A speakerphone system.

**1.02** This section is reissued to include:

- 108AR loudspeaker set
- 680A14, 680AR, and 680AR14 transmitters.

**1.03** To provide 4A speakerphone feature at these telephone sets, refer to Fig. 1 for layout arrangement for the components required for the system and Fig. 2, 3, 4, 5, or 6 for individual lead connections.

**1.04** These hand telephone sets are factory-wired for use with 1A1 or 1A2 KTS. Refer to (Fig. 2 or 3) for 685A subscriber set modification necessary when used with 4A speakerphone system.

#### 2. CONNECTIONS

##### 223A Adapter

**2.01** The cords from the 108-type loudspeaker set, 680-type transmitter, and the 85B1 power unit are installed in the proper receptacle of the 223A adapter. The cover must be fastened securely to assure proper mating of connectors.

##### 108A or 108AR Loudspeaker Set

**2.02** The loudspeaker set and transmitter must be placed a minimum of one foot apart.

##### 680A, 680A14, 680AR, or 680AR14 Transmitter

**2.03** The transmitter must be at least two feet from transformer or any AC powered device.

##### 85B1 Power Unit

**2.04** Power can be supplied by connecting 85B1 power unit as shown in Fig. 1 or 6.

**2.05** Use an AC power outlet (not under control of a switch) located as close as possible to the system being installed. A 841050818 retaining clamp will be shipped with the 85B1 power unit and should be mounted to the AC receptacle to hold power unit securely.

**Caution:** *Do not Ground Power Unit.*

**2.06** The M2FG cord is furnished as part of the 223A adapter for connecting the 85B1 power unit.

**2.07** The 85B1 power unit should be located less than 125 feet from 108-type loudspeaker set when using 24 gauge wire. Refer to Section 512-700-100 for detailed information on power supply applications.

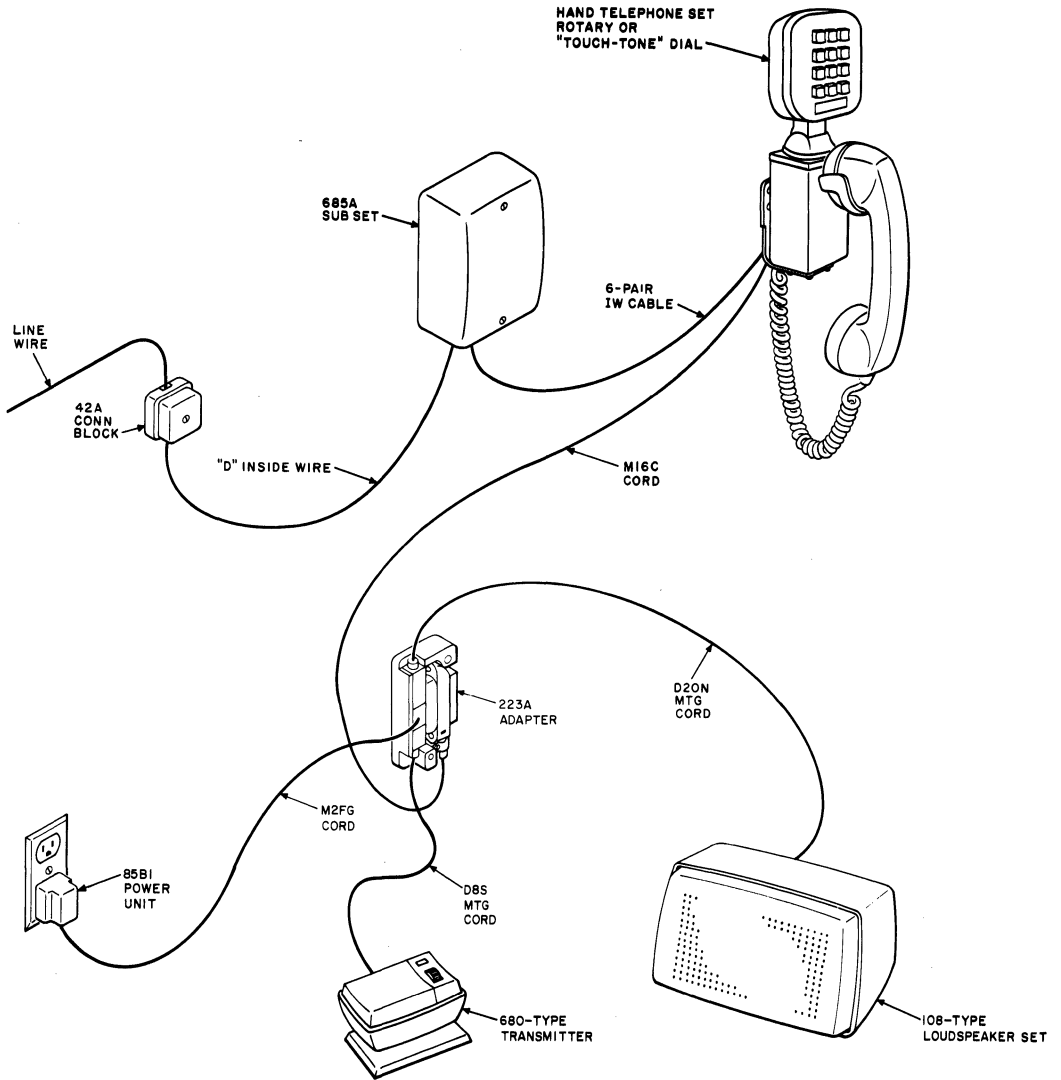


Fig. 1—Speakerphone Arrangement, 211PR and 2211P Hand Telephone Sets With 685A Subscriber Set

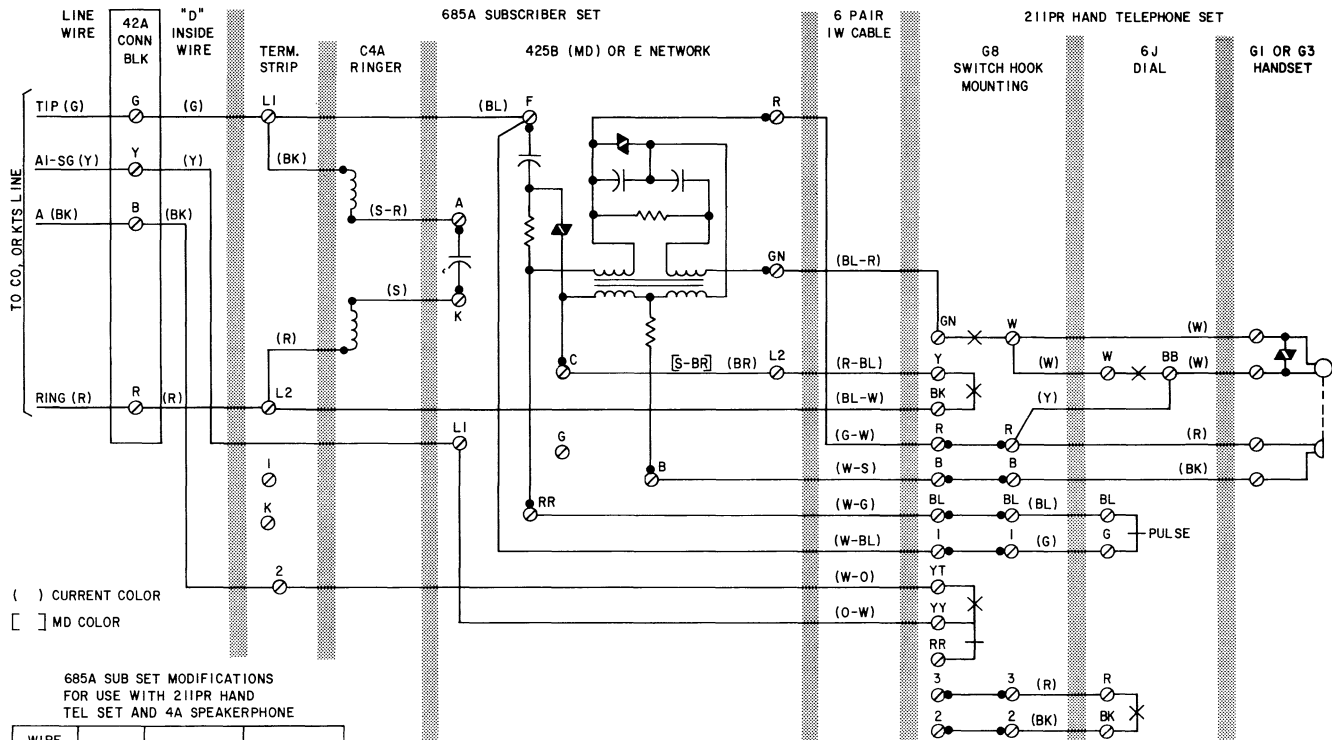
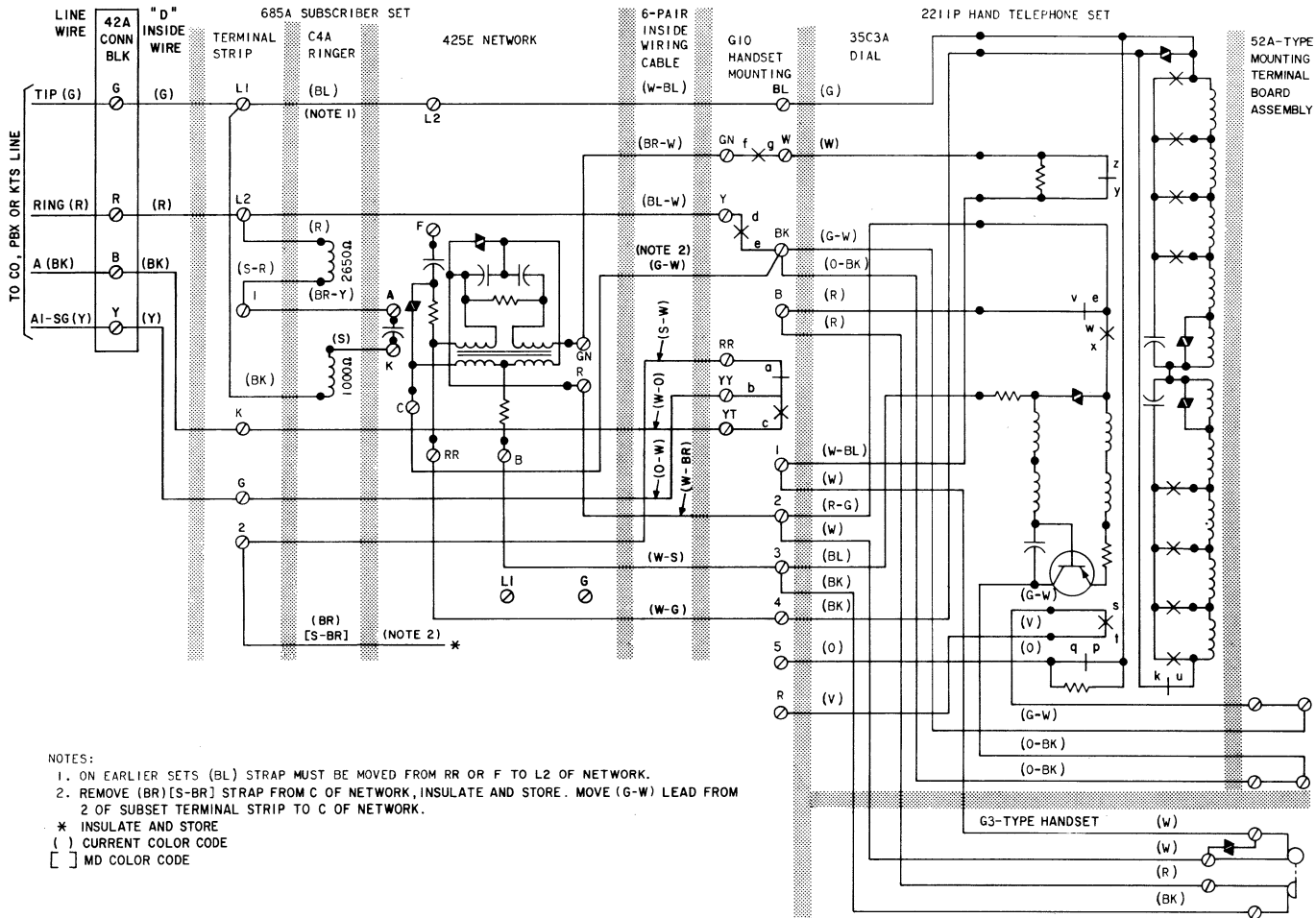


Fig. 2—211PR Hand Telephone Set and 658A Subscriber Set Wired for use with 4A Speakerphone



- NOTES:
1. ON EARLIER SETS (BL) STRAP MUST BE MOVED FROM RR OR F TO L2 OF NETWORK.
  2. REMOVE (BR)[S-BR] STRAP FROM C OF NETWORK, INSULATE AND STORE. MOVE (G-W) LEAD FROM 2 OF SUBSET TERMINAL STRIP TO C OF NETWORK.
- \* INSULATE AND STORE  
 ( ) CURRENT COLOR CODE  
 [ ] MD COLOR CODE

Fig. 3—2211P Hand Telephone Set and 685A Subscriber Set Wired for use with 4A Speakerphone



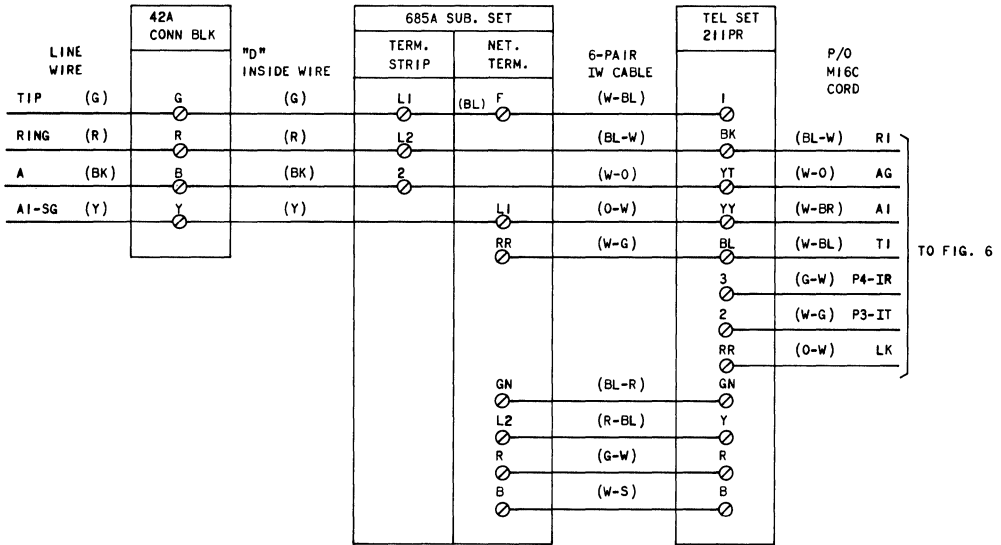


Fig. 4—211PR Hand Telephone Set with 685A Subscriber Set—Speakerphone Connections

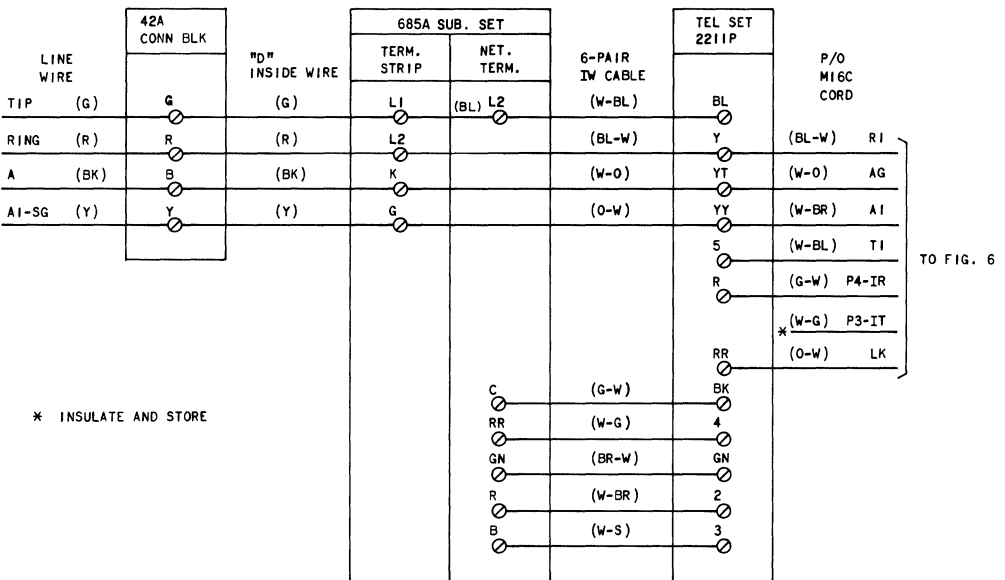
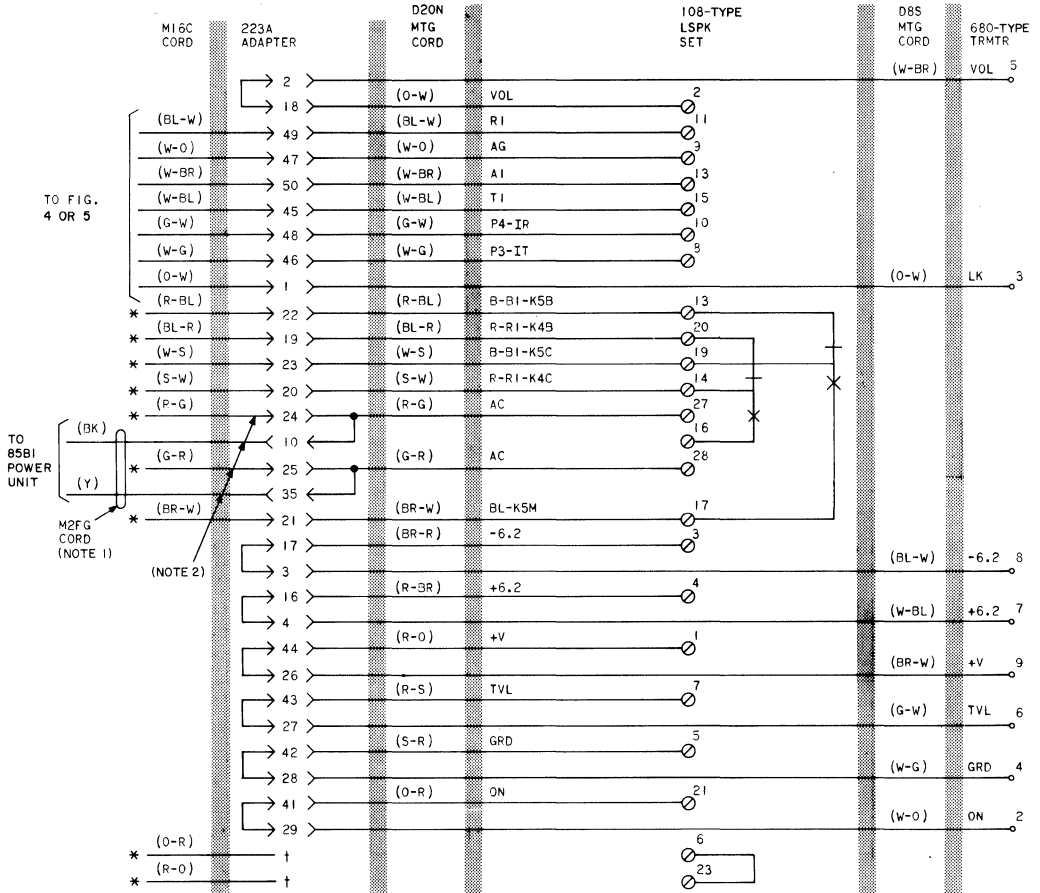


Fig. 5—2211P Hand Telephone Set with 685A Subscriber Set—Speakerphone Connections



\* INSULATED AND STORED  
 † DEAD DRESSED

NOTES:

1. (R) AND (G) CONDUCTORS ARE NOT TERMINATED IN PLUG OF M2FG CORD, ONLY (BK) AND (Y) ARE USED.

2. WHEN POWER IS PROVIDED THROUGH M2FG CORD, INSULATE AND STORE (R-G) AND (G-R) LEADS IN M16C CORD

Fig. 6—4A Speakerphone Connections Using 223A Adapter

## SPEAKERPHONE SYSTEM—4A

### 500S, 500SM, 2500S, AND 2500SM TELEPHONE SETS

### CONNECTIONS

#### 1. GENERAL

1.01 Refer to Section 512-700-100 for detailed information on the components of the 4A speakerphone system.

1.02 This section is reissued to add connections for 500SM and 2500SM (modular) telephone sets.

1.03 To provide 4A speakerphone feature at the 500- and 2500-type telephone sets, refer to Fig. 1 or 2 for layout arrangement of the components required for the system and Fig. 2 through 6 for individual lead connections.

#### 2. CONNECTIONS

##### 223A Adapter

2.01 The cords from the 108-type loudspeaker set, 680-type transmitter, and 85B1 power unit are installed in the proper receptacle of the 223A adapter. The cover must be fastened securely to assure proper mating of connectors.

##### 108-Type Loudspeaker Set

2.02 The loudspeaker set and transmitter must be placed a minimum of one foot apart.

##### 680-Type Transmitter

2.03 The transmitter must be at least two feet from transformer or any AC powered device.

##### 85B1 Power Unit

2.04 Power can be supplied by connecting 85B1 power unit as shown in Fig. 1 through 6.

2.05 Use an AC power outlet (not under control of a switch) located as close as possible to the system being installed. A 841050818 retaining clamp will be shipped with the 85B1 power unit and should be mounted to the AC receptacle to hold power unit securely.

**Caution: Do Not Ground Power Unit**

2.06 The M2FG cord is furnished as part of the 223A adapter for connecting the 85B1 power unit.

2.07 The 85B1 power unit should be located less than 125 feet from 108-type loudspeaker set when using 24 gauge wire. Refer to Section 512-700-100 for detailed information on power supply applications.

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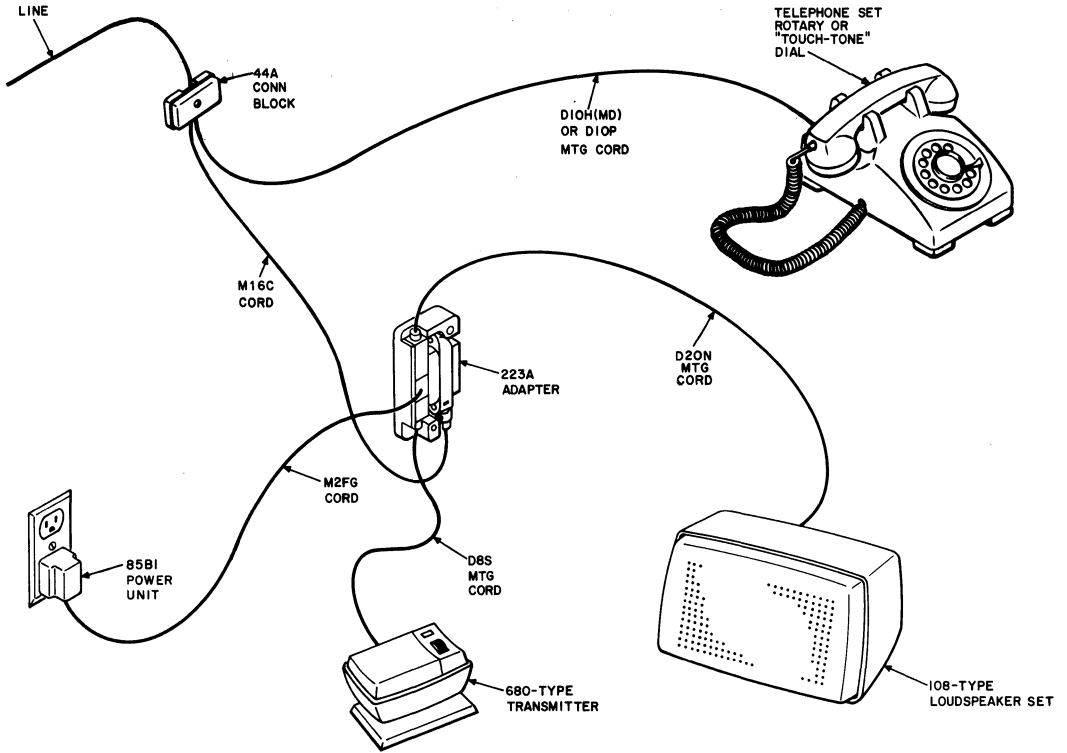


Fig. 1—Speakerphone Arrangement, 500S or 2500S Telephone Set

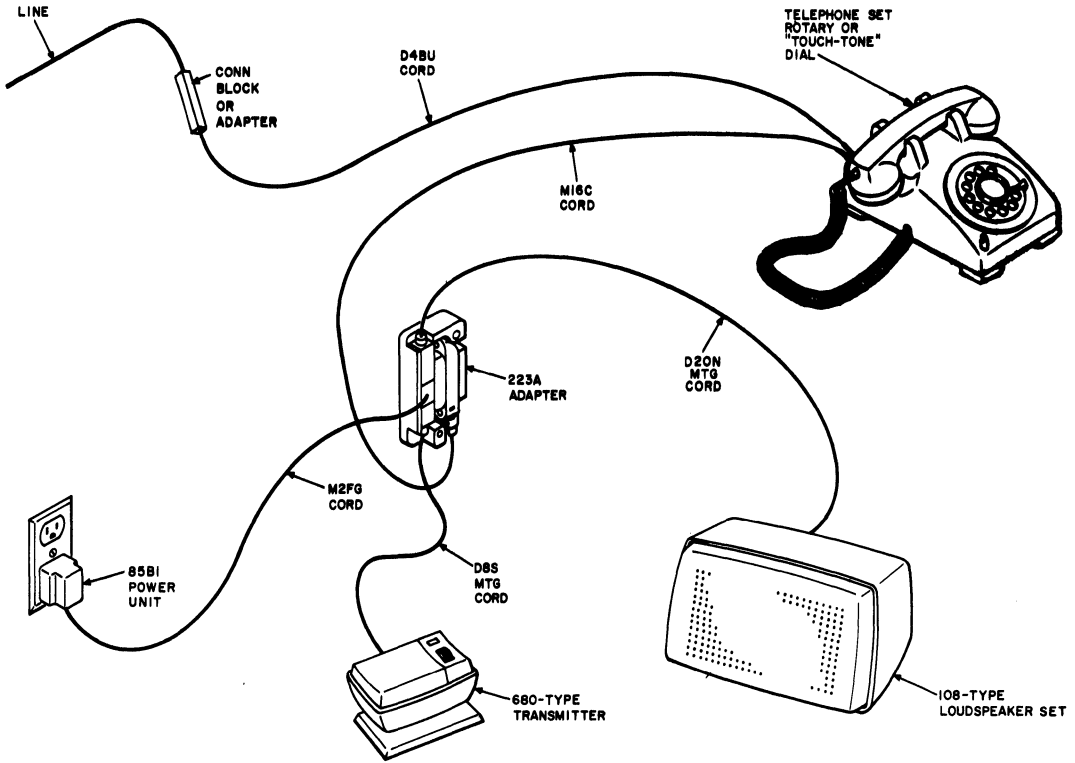


Fig. 2—Speakerphone Arrangement, 500SM or 2500SM Telephone Set

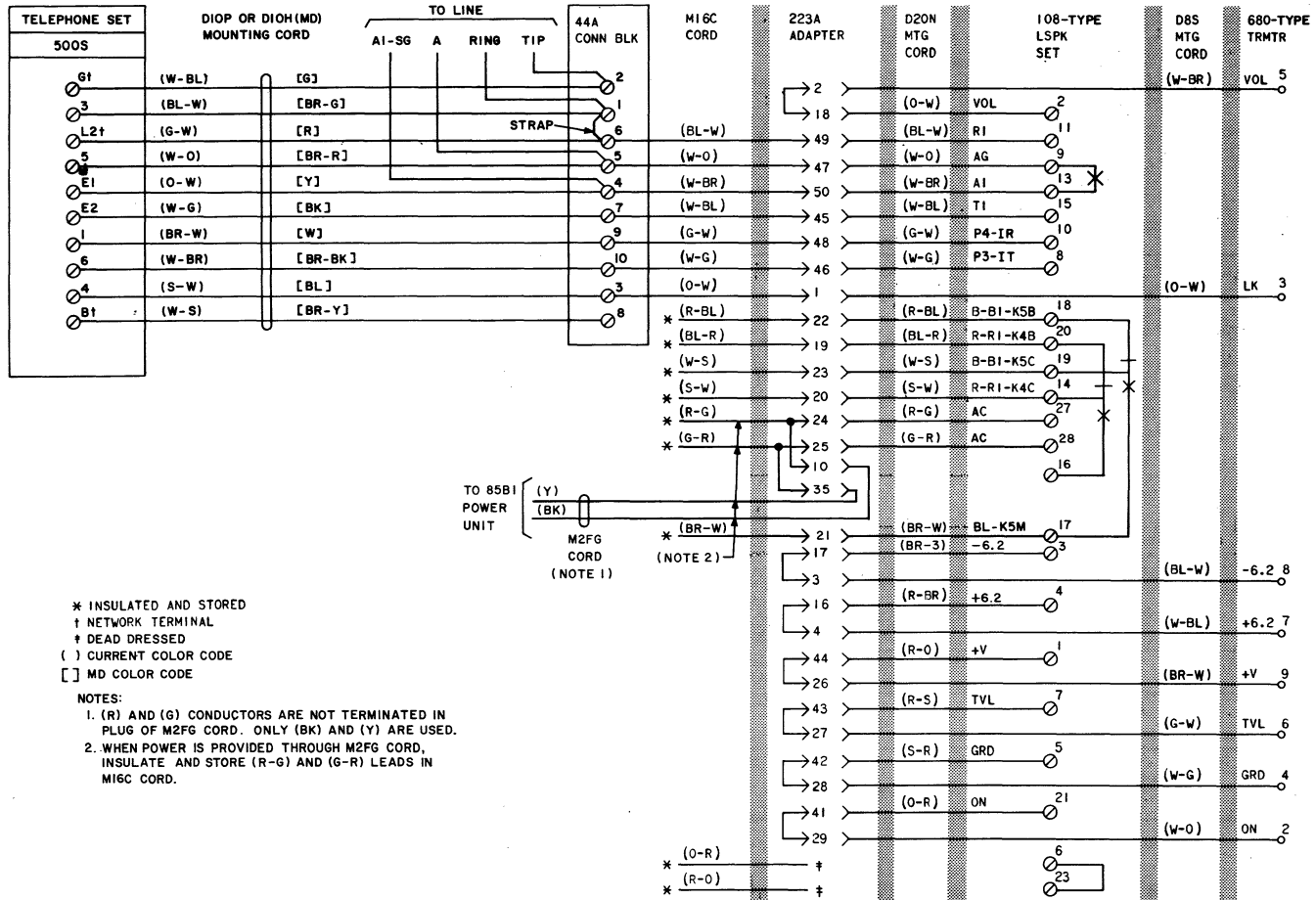


Fig. 3—500S Telephone Set, Connections to 4A Speakerphone

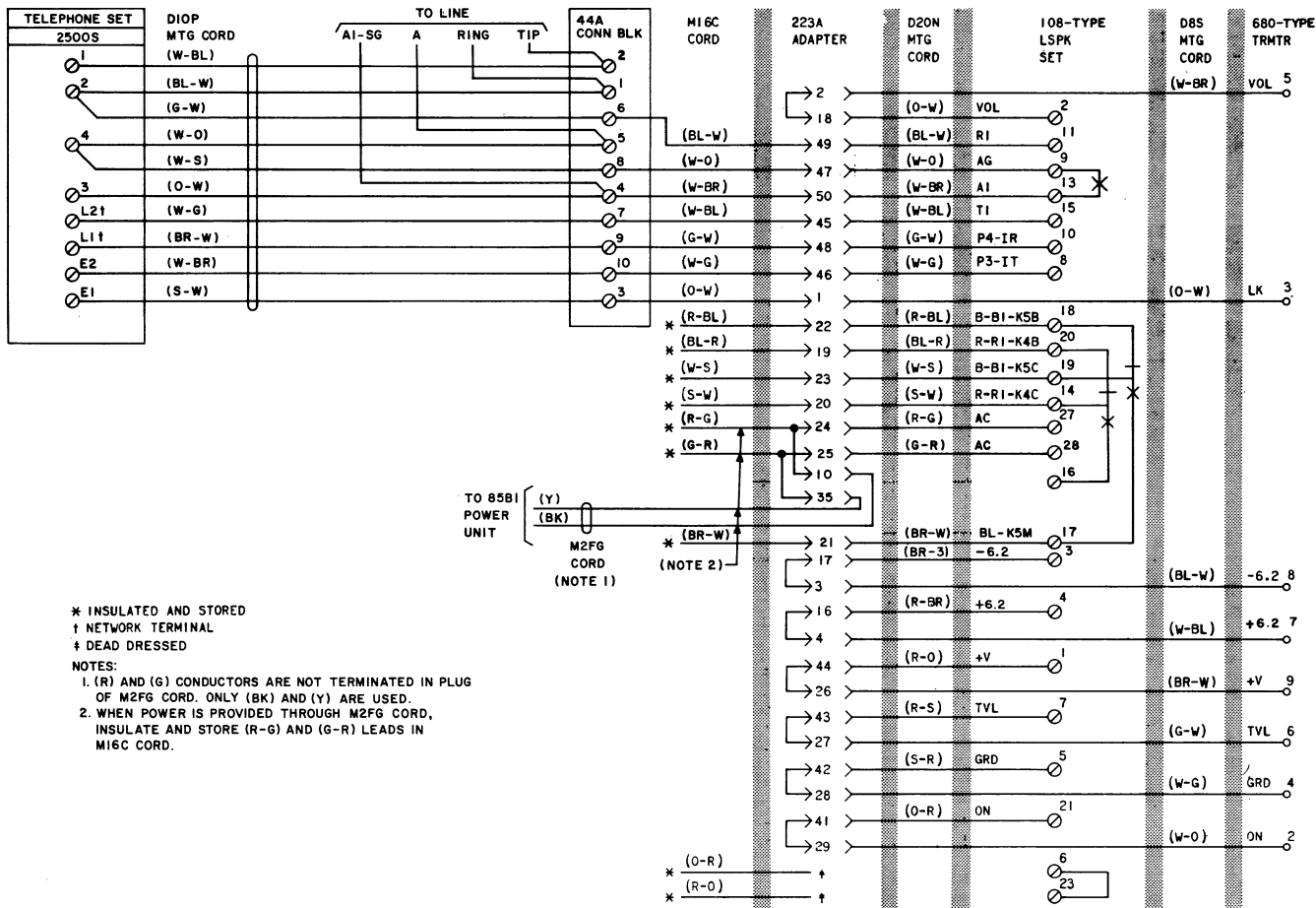


Fig. 4—2500S Telephone Set, Connections to 4A Speakerphone

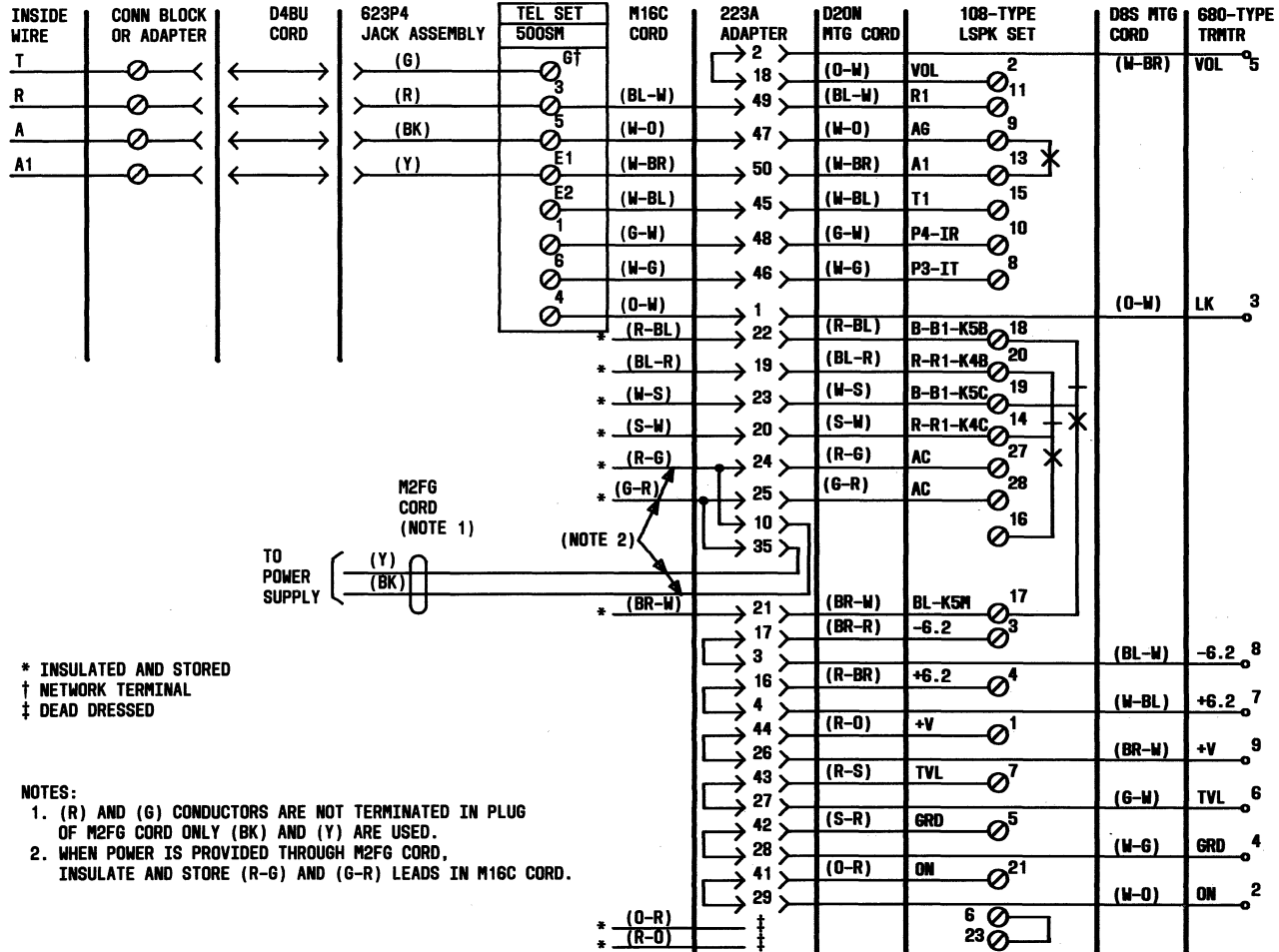


Fig. 5—500SM Telephone Set, Connections to 4A Speakerphone



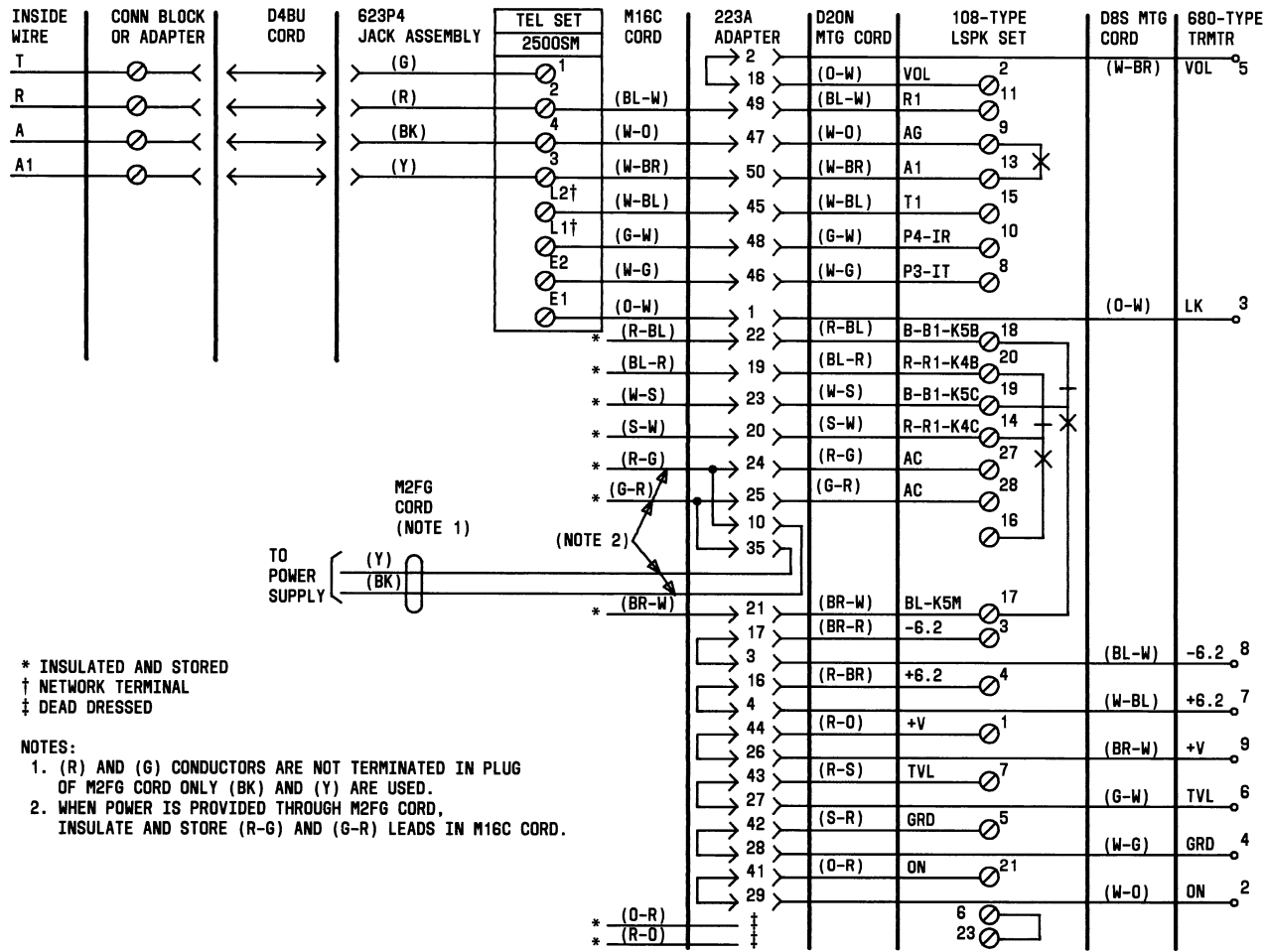


Fig. 6—2500SM Telephone Set Connections to 4A Speakerphone

## SPEAKERPHONE SYSTEM - 4A

### 511- AND 2511-TYPE TELEPHONE SETS

### CONNECTIONS

#### 1. GENERAL

1.01 Refer to Section 512-700-100 for detailed information on the components of the 4A speakerphone system.

1.02 This section is reissued to:

- Add 511HM and 2511HM (modular) telephone set information, Fig. 2 and 6
- Revise Fig. 1, 5, and 7
- Show 511D, H, 2511F, H telephone sets MD
- Add safety information for installing or removing the 85B1 power unit.

1.03 ♦To provide 4A speakerphone feature for these telephone sets, refer to Fig. 1 and 2 for layout arrangement of the components required, and Fig. 3 through 7 for individual connections.♦

1.04 ♦The 511D (MD) telephone set is factory-wired for non-KTS use (Fig. 3). The 511F (MD), 511H (MD), 511HM, 2511F (MD), 2511H (MD), and 2511HM telephone sets are factory-wired for use with 1A1 or 1A2 KTS (Fig. 4, 5, and 6).♦

#### 2. CONNECTIONS

##### 223A Adapter

2.01 The cords from the 108-type loudspeaker set, 680-type transmitter, and 85B1 power unit are installed in the proper receptacle of the 223A adapter. The cover must be fastened securely to assure proper mating of connectors.

##### 108-Type Loudspeaker Set

2.02 The loudspeaker set and transmitter must be placed a minimum of one foot apart.

##### 680-Type Transmitter

2.03 The transmitter must be at least two feet from transformer or any AC powered device.

##### 85B1 Power Unit

2.04 Power can be supplied by connecting 85B1 power unit as shown in Fig. 1, 2, and 7.

2.05 Use an AC power outlet (not under control of a switch) located as close as possible to the system being installed. A 841050818 retaining clamp will be shipped with the 85B1 power unit and should be mounted to the AC receptacle to hold power supply securely.

***Danger:*** ♦*For safety, securely attach retaining clamp to ac outlet using outlet cover screw BEFORE attempting to install a 85B1 power unit. The power unit should always be unplugged completely from the outlet BEFORE attempting to remove the retaining clamp.*♦

***Caution:*** *Do Not Ground Power Unit.*

2.06 The M2FG cord is furnished as part of the 223A adapter for connecting the 85B1 power unit.

2.07 The 85B1 power unit should be located less than 125 feet from 108-type loudspeaker set when using 24 gauge wire. Refer to Section 512-700-100 for detailed information on power supply application.

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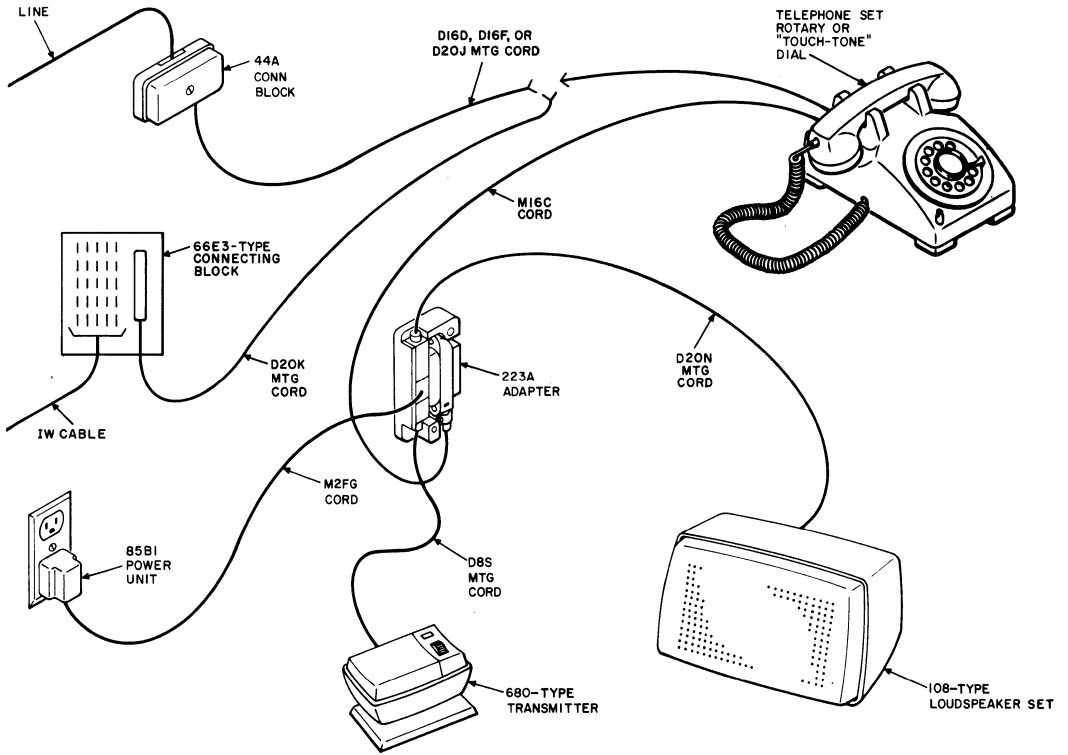


Fig. 1—Speakerphone Arrangement, 511- and 2511-Type (Nonmodular) Telephone Set

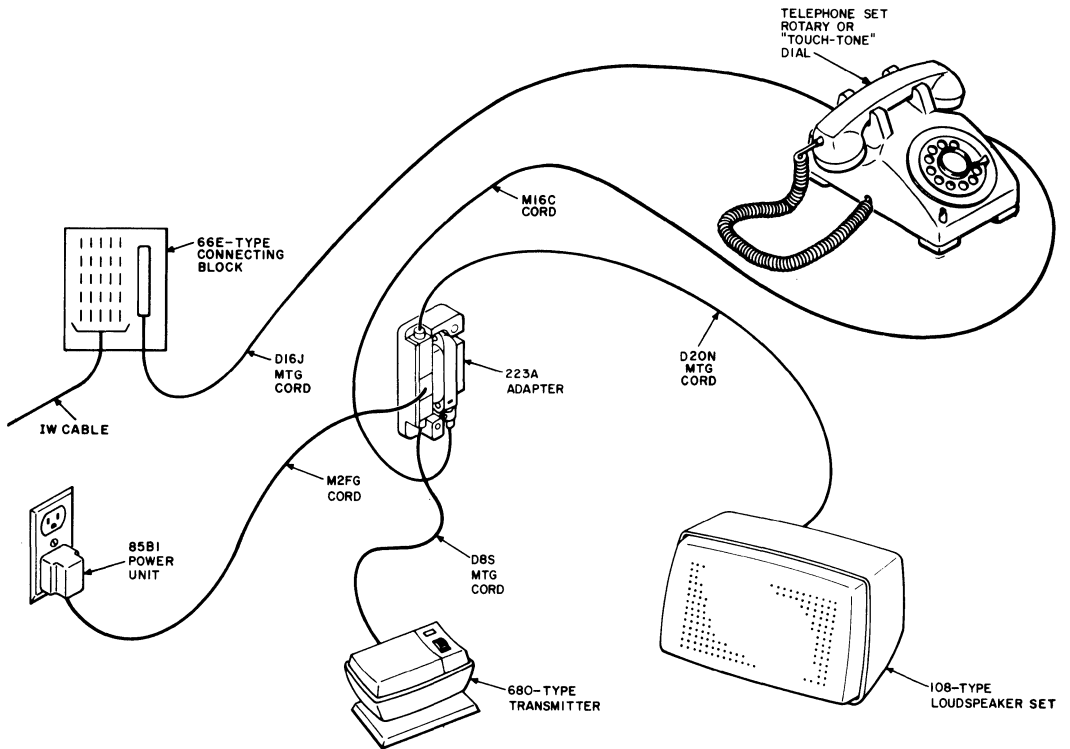


Fig. 2—Speakerphone Arrangement, 511HM and 2511HM Telephone Set

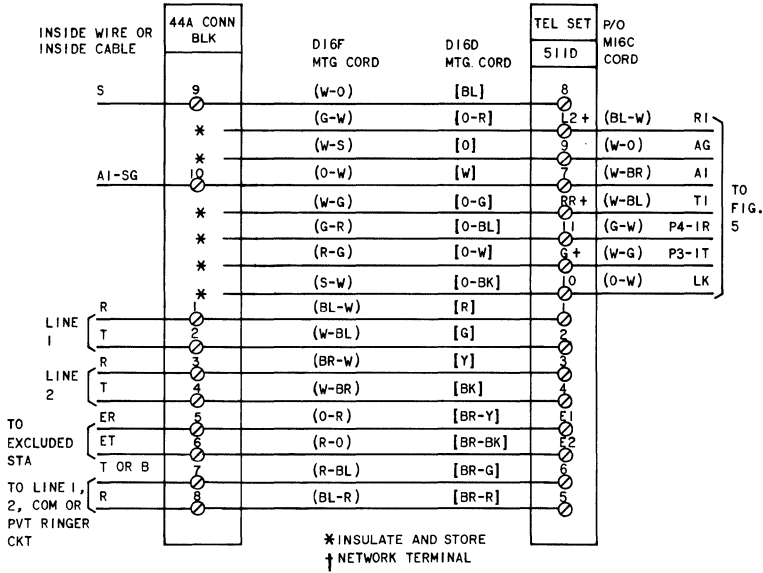


Fig. 3—511D Telephone Set Connections, 2-Line Pickup, Signaling, Exclusion, and 4A Speakerphone (Not to be Used With 1A1 or 1A2 KTS)

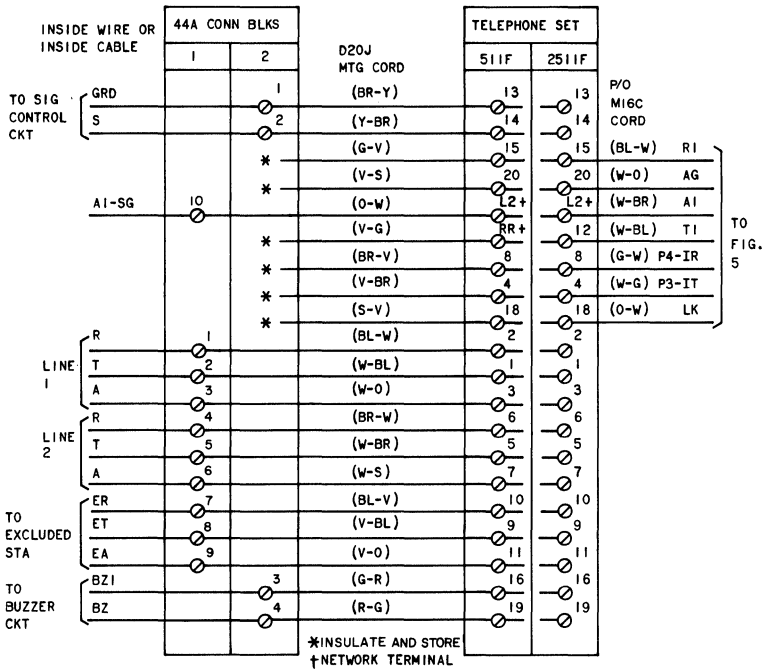


Fig. 4—511F and 2511F Telephone Set Connections, 2-Line Pickup With Exclusion of Line 1, Signaling, and 4A Speakerphone (Used With 1A1 or 1A2 KTS)

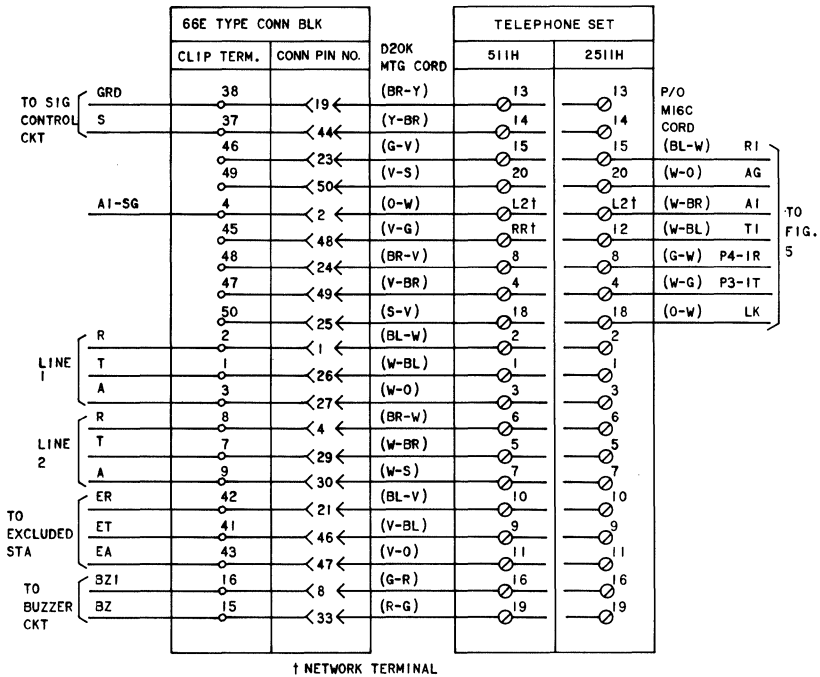
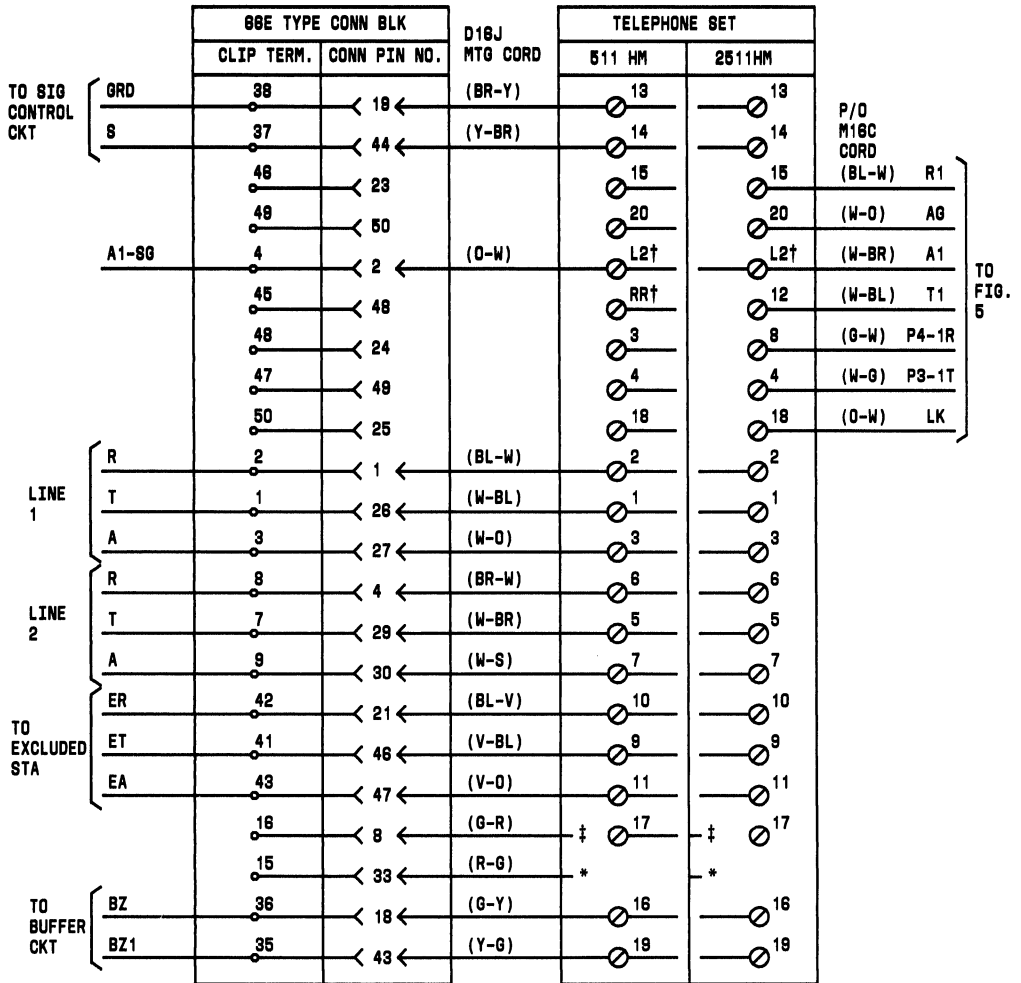


Fig. 5—511H and 2511H Telephone Set Connections, 2-Line Pickup With Exclusion on Line 1, Signaling, and 4A Speakerphone (Used With 1A1 or 1A2 KTS)



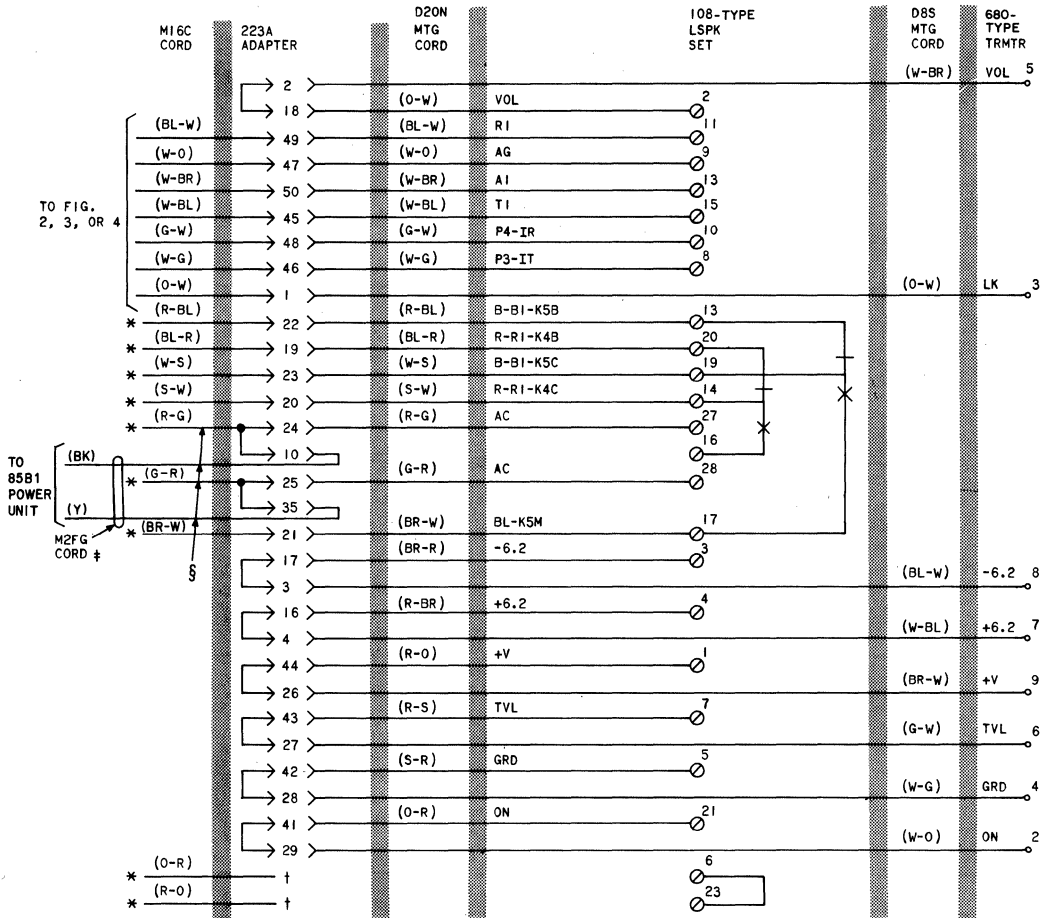
\* INSULATE AND STORE

† NETWORK TERMINAL

‡ INSULATED AND STORED IN SET. CONNECT TO TERMINAL 17 WHEN SET IS USED WITH 1A KTS.

Fig. 6—511HM and 2511HM Telephone Set Connections, 2-Line Pickup With Exclusion on Line 1, Signaling, and 4A Speakerphone (Used With 1A1 or 1A2 KTS)Ⓢ





\* INSULATED AND STORED  
 † DEAD DRESSED  
 ‡ (R) AND (G) CONDUCTORS ARE NOT TERMINATED IN PLUG OF M2FG CORD. ONLY (BK) AND (Y) CONDUCTORS ARE USED.  
 § WHEN POWER IS PROVIDED THROUGH M2FG CORD, INSULATE AND STORE (R-G) AND (G-R) LEADS IN M16C CORD.

Fig. 7—4A Speakerphone Connections Using 223A Adapter

## SPEAKERPHONE SYSTEM—4A

### 558D, 558F, 558FM, 2558D, AND 2558DM TELEPHONE SETS

### CONNECTIONS

#### 1. GENERAL

**1.01** Refer to Section 512-700-100 for detailed information on the components of the 4A speakerphone system.

**1.02** This section is reissued to:

- Add connections for 558FM and 2558DM (modular) telephone sets, (Fig. 4)
- Revise 223 Adapter connections (Fig. 2 and 3)

**1.03** To provide 4A speakerphone feature at the 558- and 2558-type telephone sets, refer to Fig. 1 for layout arrangement of the components required for the system and Fig. 2, 3, or 4 for individual lead connections.

#### 2. CONNECTIONS

##### 223A Adapter

**2.01** The cords from the 108-type loudspeaker set, 680-type transmitter, and 85B1 power unit are installed in the proper receptacle of the 223A adapter. The cover must be fastened securely to assure proper mating of connectors.

##### 108-Type Loudspeaker Set

**2.02** The loudspeaker set and transmitter must be placed a minimum of one foot apart.

##### 680-Type Transmitter

**2.03** The transmitter must be at least two feet from transformer or any AC powered device.

##### 85B1 Power Unit

**2.04** Power can be supplied by connecting 85B1 power unit as shown in Fig. 1, 2, 3, or 4.

**2.05** Use an AC power outlet (not under control of a switch) located as close as possible to the system being installed. A 841050818 retaining clamp will be shipped with the 85B1 power unit and should be mounted to the AC receptacle to hold power unit securely.

*Caution: Do Not Ground Power Unit.*

**2.06** The M2FG cord is furnished as part of the 223A adapter for connecting the 85B1 power unit.

**2.07** The 85B1 power unit should be located less than 125 feet from 108-type loudspeaker set when using 24 gauge wire. Refer to Section 512-700-100 for detailed information on power supply applications.

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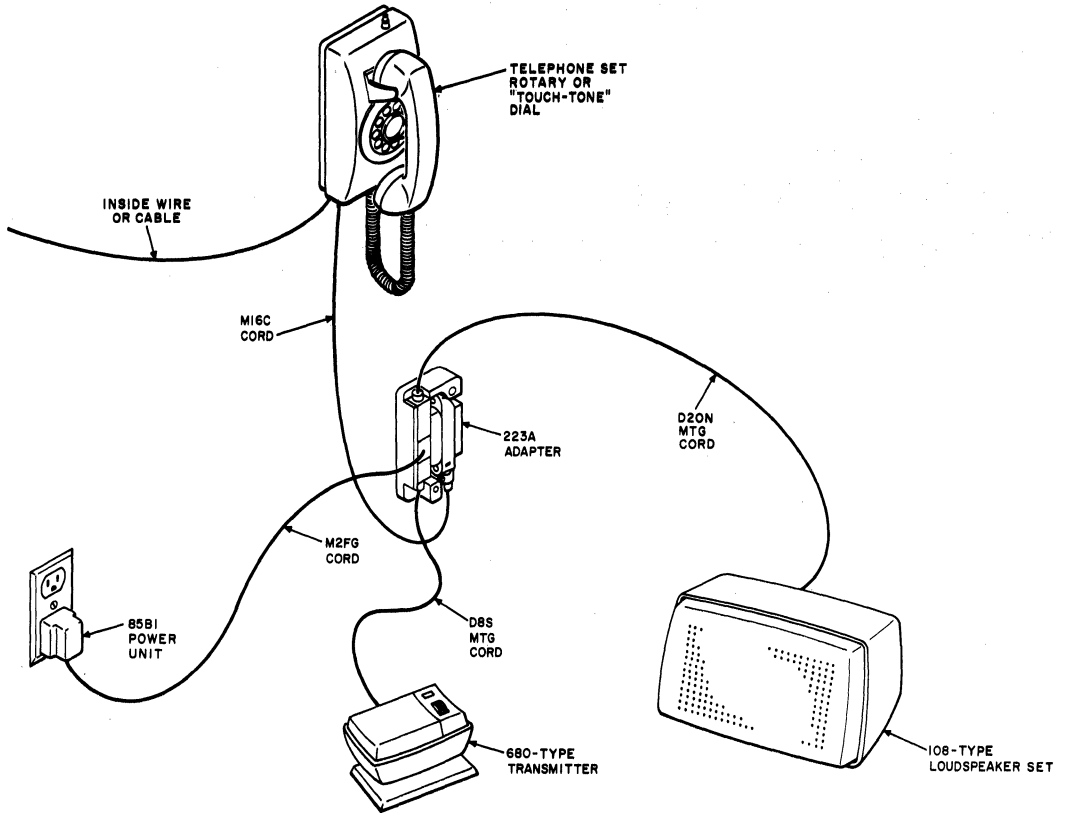


Fig. 1—Speakerphone Arrangement, 558- and 2558-Type Telephone Sets

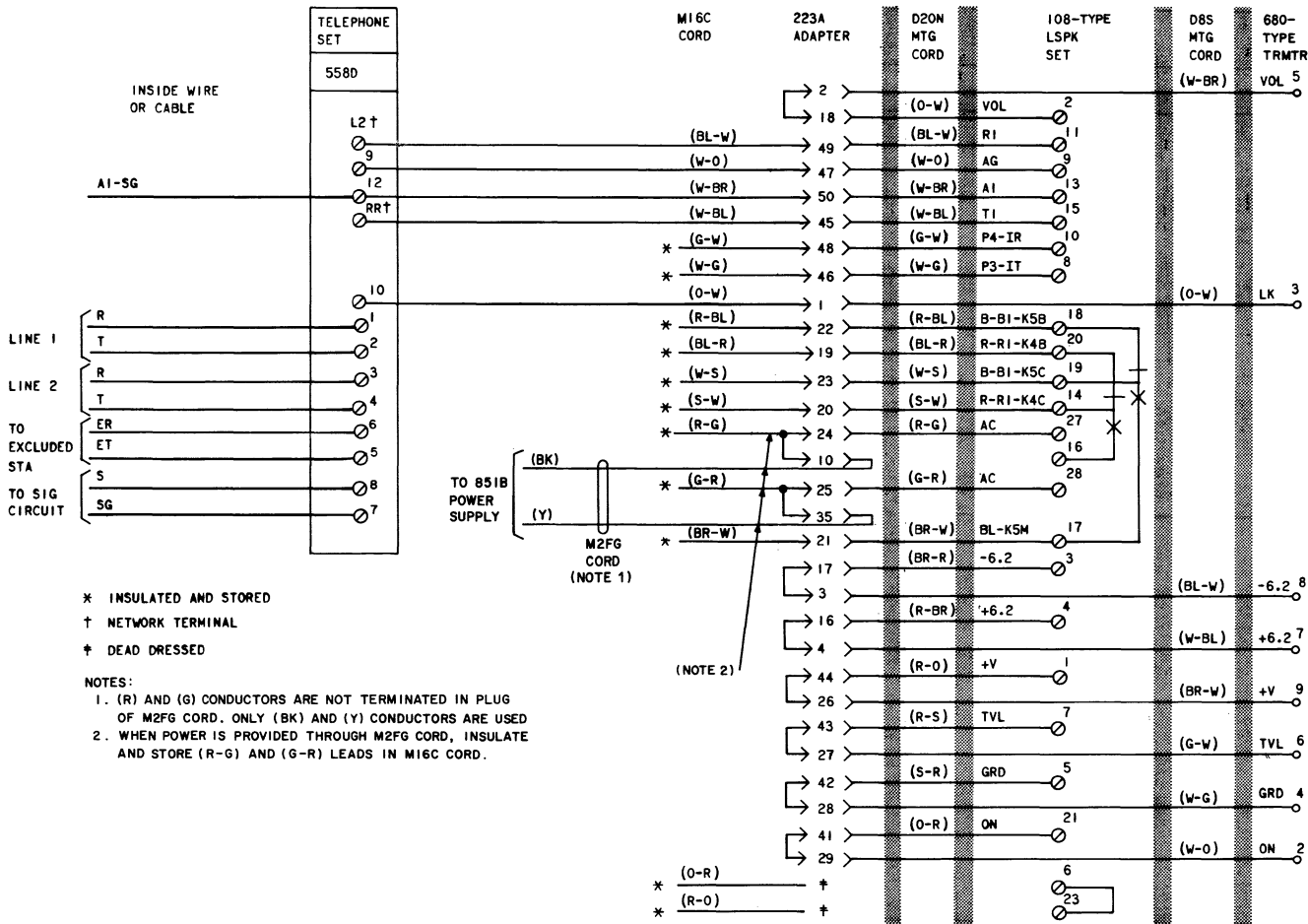


Fig. 2—558D Telephone Set, Connections to 4A Speakerphone

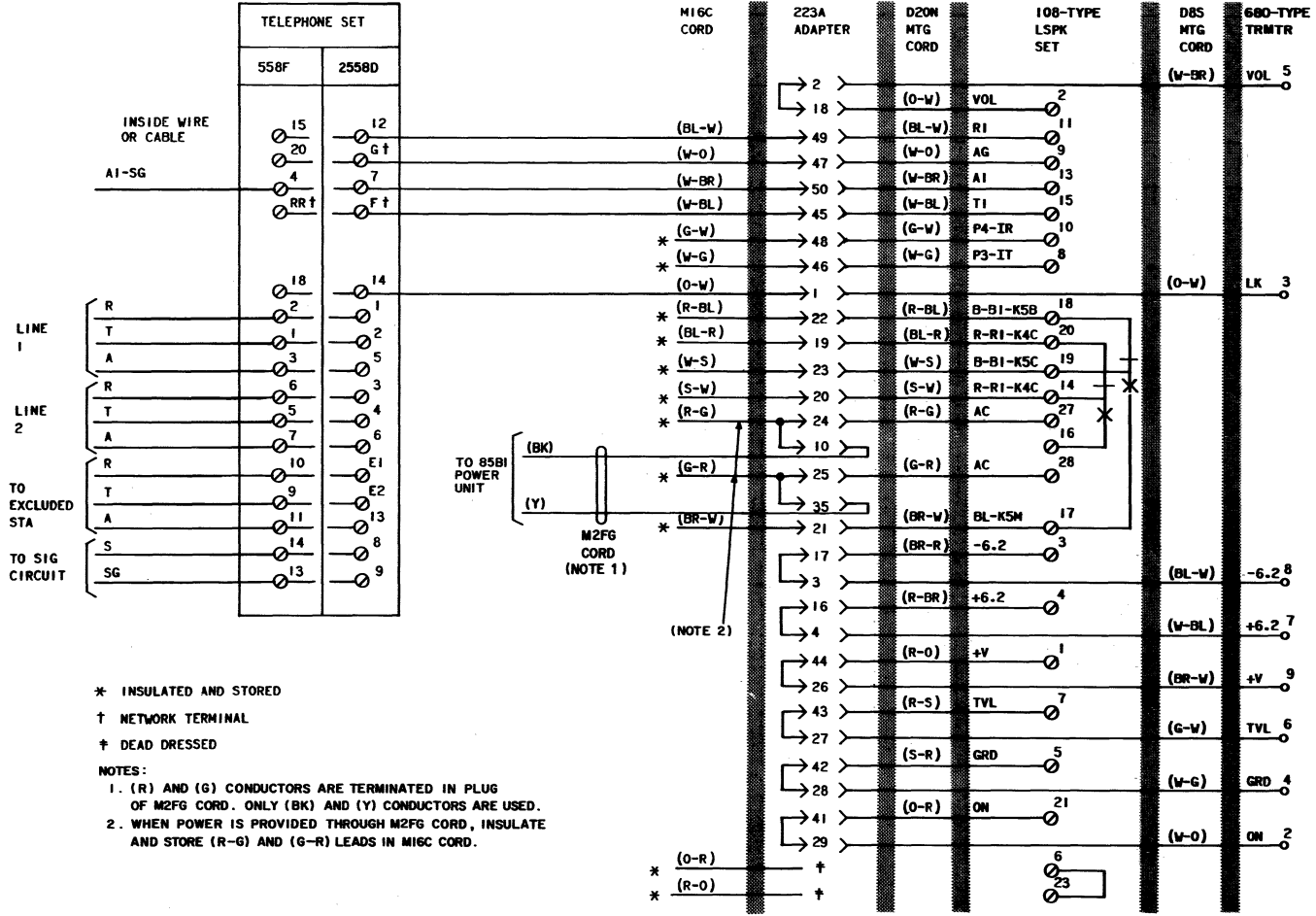
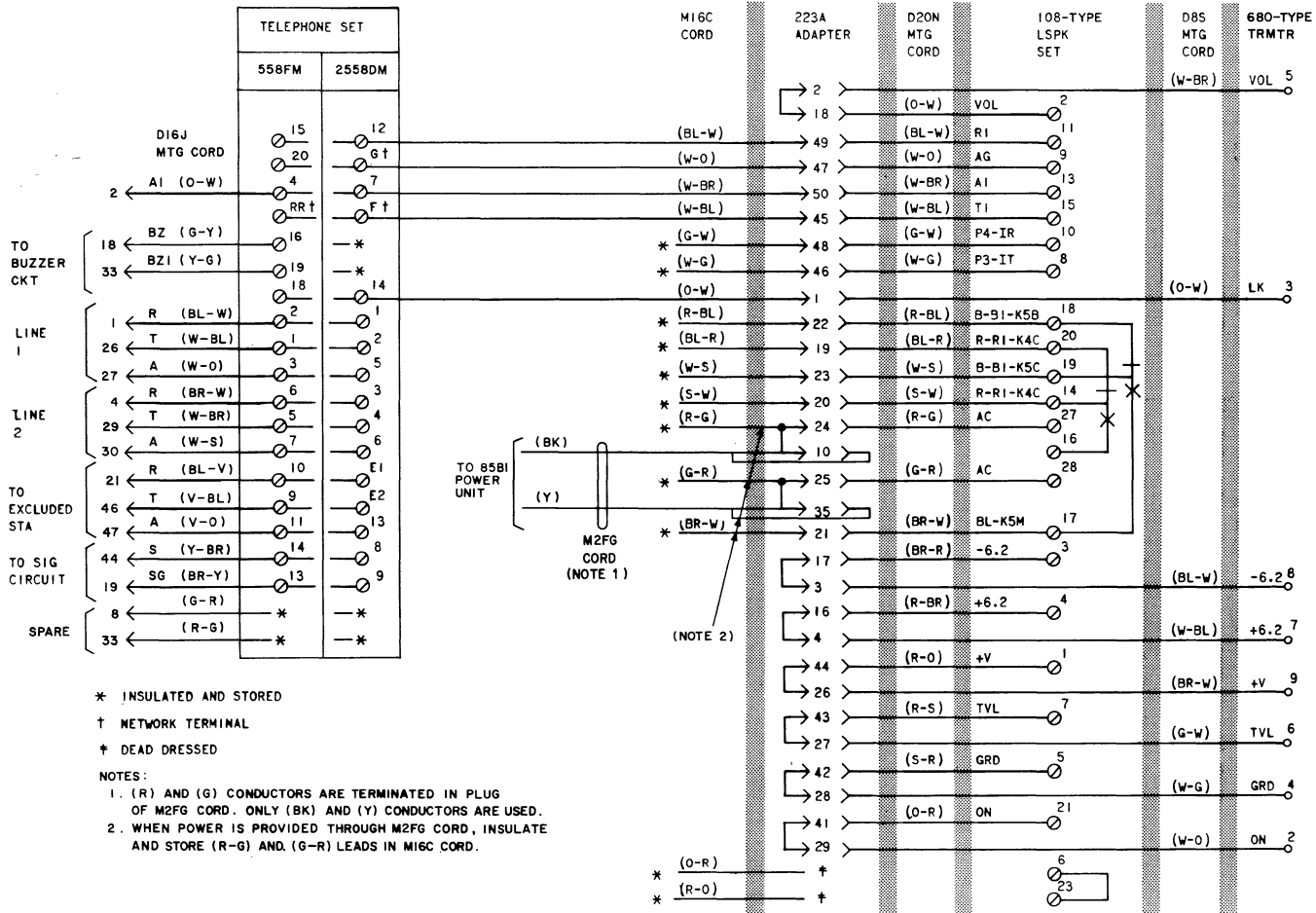


Fig. 3—558F and 2558D Telephone Set, Connections to 4A Speakerphone



\* INSULATED AND STORED

† NETWORK TERMINAL

‡ DEAD DRESSED

NOTES:

1. (R) AND (G) CONDUCTORS ARE TERMINATED IN PLUG OF M2FG CORD. ONLY (BK) AND (Y) CONDUCTORS ARE USED.
2. WHEN POWER IS PROVIDED THROUGH M2FG CORD, INSULATE AND STORE (R-G) AND (G-R) LEADS IN M16C CORD.

Fig. 4—558FM and 2558DM Telephone Set, Connections to 4A Speakerphone

## SPEAKERPHONE SYSTEM—4A

### 565- AND 2565-TYPE PLUG-ENDED TELEPHONE SETS

### CONNECTIONS

#### 1. GENERAL

**1.01** Refer to Section 512-700-100 for detailed information on the components of the 4A speakerphone system.

**1.02** This section is reissued to:

- Include 82B connecting block
- Include 108AR loudspeaker set
- Include 680A14, 680AR, and 680AR14 transmitters

**1.03** To provide speakerphone at stations supplied by connector cable, use an 82-type connecting block (Fig. 1A). Those stations supplied by inside wiring cable require a 66E3-25 or equivalent connecting block and 223A adapter (Fig. 1B).

#### 2. CONNECTIONS

##### **82A ~~or~~ 82B ~~or~~ Connecting Block**

**2.01** The connector cable and cords from the telephone set, 108-type loudspeaker set, and 680-type transmitter are installed in the proper receptacles of the connecting block (Fig. 1A and 2). Cover must be fastened securely to assure proper mating of connectors.

**2.02** The option plug furnished with 82-type connecting block (Fig. 3) must be positioned depending on services required. The arrow on the D20N plug should point to the option selected on the option plug. "RING CUTOFF" provides cut off of the telephone set ringer through the loudspeaker relay contacts while on speakerphone (Fig. 3A). "AUX RELAY" provides a contact closure for operation of an auxiliary relay key telephone unit when it is desired to cut off several signals. The signal circuits must be wired through the contacts of the auxiliary relay (Fig. 3B). The option plug should be in this position if no ringer

cut off is desired. In this case the auxiliary relay is not required.

***Caution: Do not use (S-V) and (V-S) pair for any other purpose as it is designated for auxiliary relay operation only.***

##### **223A Adapter**

**2.03** Cords from the loudspeaker set, transmitter, and power unit are plugged into the adapter (Fig. 1B). Cover must be fastened securely to assure proper mating of connectors. The telephone set mounting cord is plugged into the 66E3-25 connecting block (Fig. 1B). Access to speakerphone leads is obtained through the M16C cord, either in set (Fig. 4) or at the connecting block (Fig. 5). At the 66E3-25 connecting block, 161A adapters must be used to connect the spade tips of the M16C cord. Install the adapters as outlined in Section 461-604-100.

**2.04** The same options are available using the 223A adapter as with the 82-type connecting block. Unused speakerphone leads in the mounting cord, or IW cable shall be disconnected as near the telephone set as possible to prevent interference with working circuits. These leads shall never be multiplexed between telephone sets. Refer to Section 502-110-100 for more detailed information.

##### **108A ~~or~~ 108AR ~~or~~ Loudspeaker Set**

**2.05** Loudspeaker set and transmitter must be a minimum of one foot apart.

##### **680A, ~~or~~ 680A14, 680AR, or 680AR14 ~~or~~ Transmitter**

**2.06** Transmitter must be at least two feet from transformer or any AC powered device.

##### **85B1 Power Unit**

**2.07** Use an AC power outlet (not under control of a switch) located as close as possible to

**SECTION 512-720-405**

the system being installed. A 841050818 retaining clamp will be shipped with the 85B1 power unit and should be mounted to the AC receptacle to hold power unit securely.

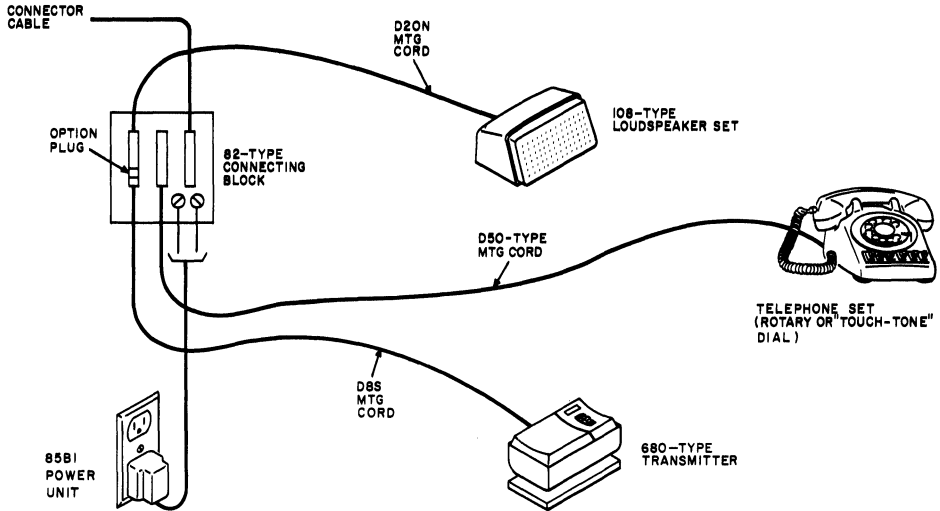
**Caution: Do Not Ground Power Unit.**

**2.08** Power can be supplied by making connections as shown in Fig. 1, 2, 4, or 5.

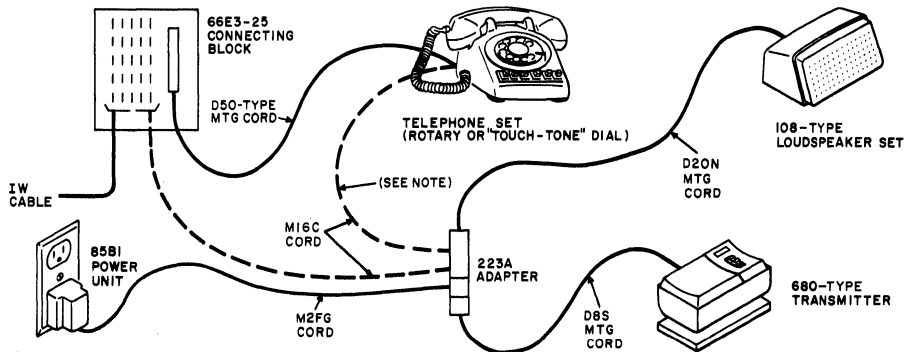
**2.09** The M2FG cord is furnished as part of the 223A adapter for connecting the 85B1 power unit.

**2.10** The 85B1 power unit should be located less than 125 feet from 108-type loudspeaker set when using 24 gauge wire. Refer to Section 512-700-100 for detailed information on power supply applications.





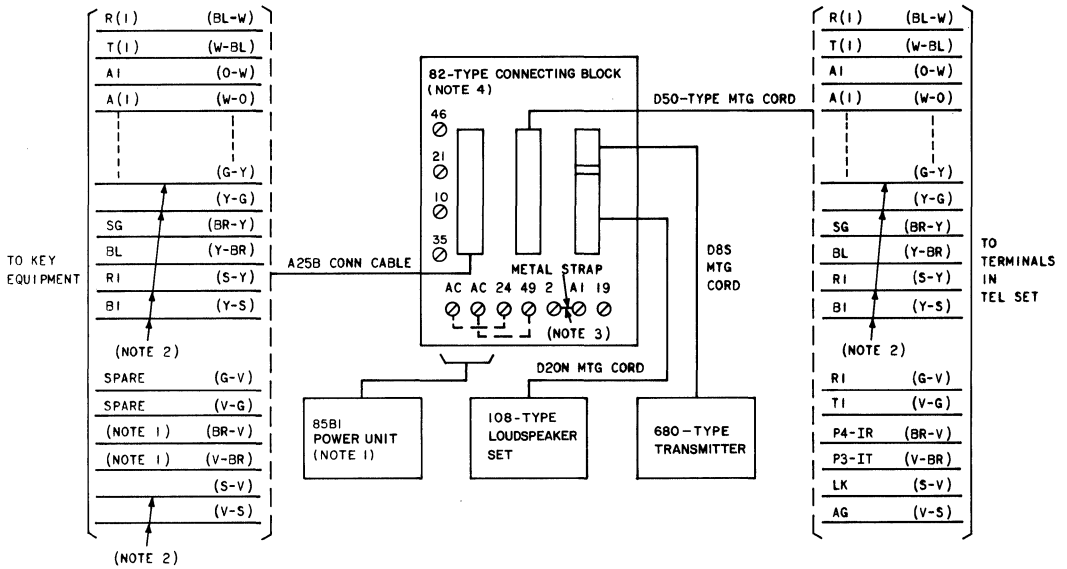
A. TELEPHONE SET SERVED BY CONNECTOR CABLE



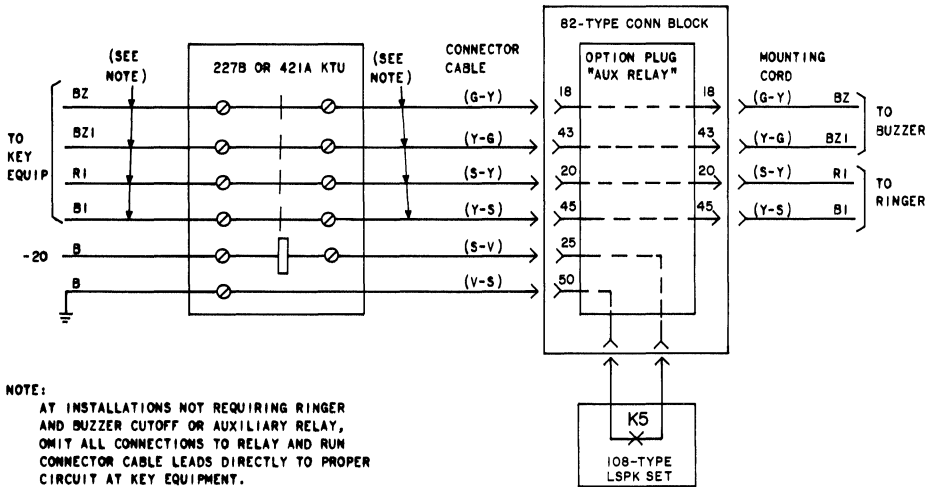
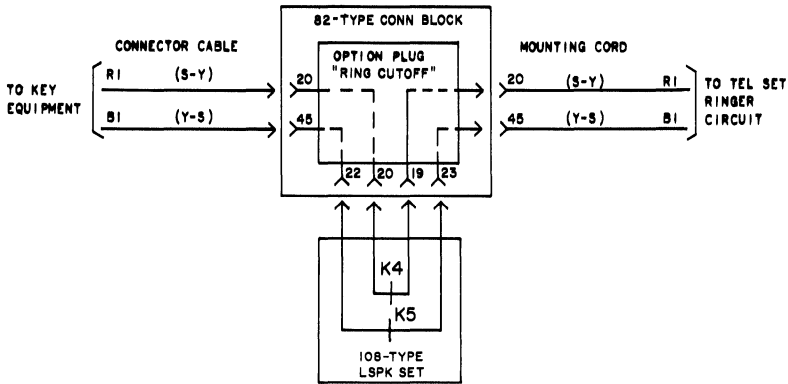
NOTE: WHEN M16C CORD IS TERMINATED IN SET, DISCONNECT, INSULATE, AND STORE ALL SPEAKERPHONE LEADS IN D50-TYPE MOUNTING CORD AT SET. WHEN M16C CORD IS TERMINATED AT 66E3-25 CONNECTING BLOCK, DISCONNECT, INSULATE, AND STORE ALL SPEAKERPHONE LEADS IN THE IW CABLE. CONNECT M16C CORD TO CONNECTING BLOCK USING 161A ADAPTERS.

B. TELEPHONE SET SERVED BY IW CABLE

◆ Fig. 1—Speakerphone Arrangements, 6-Button Key Telephone Set ◆

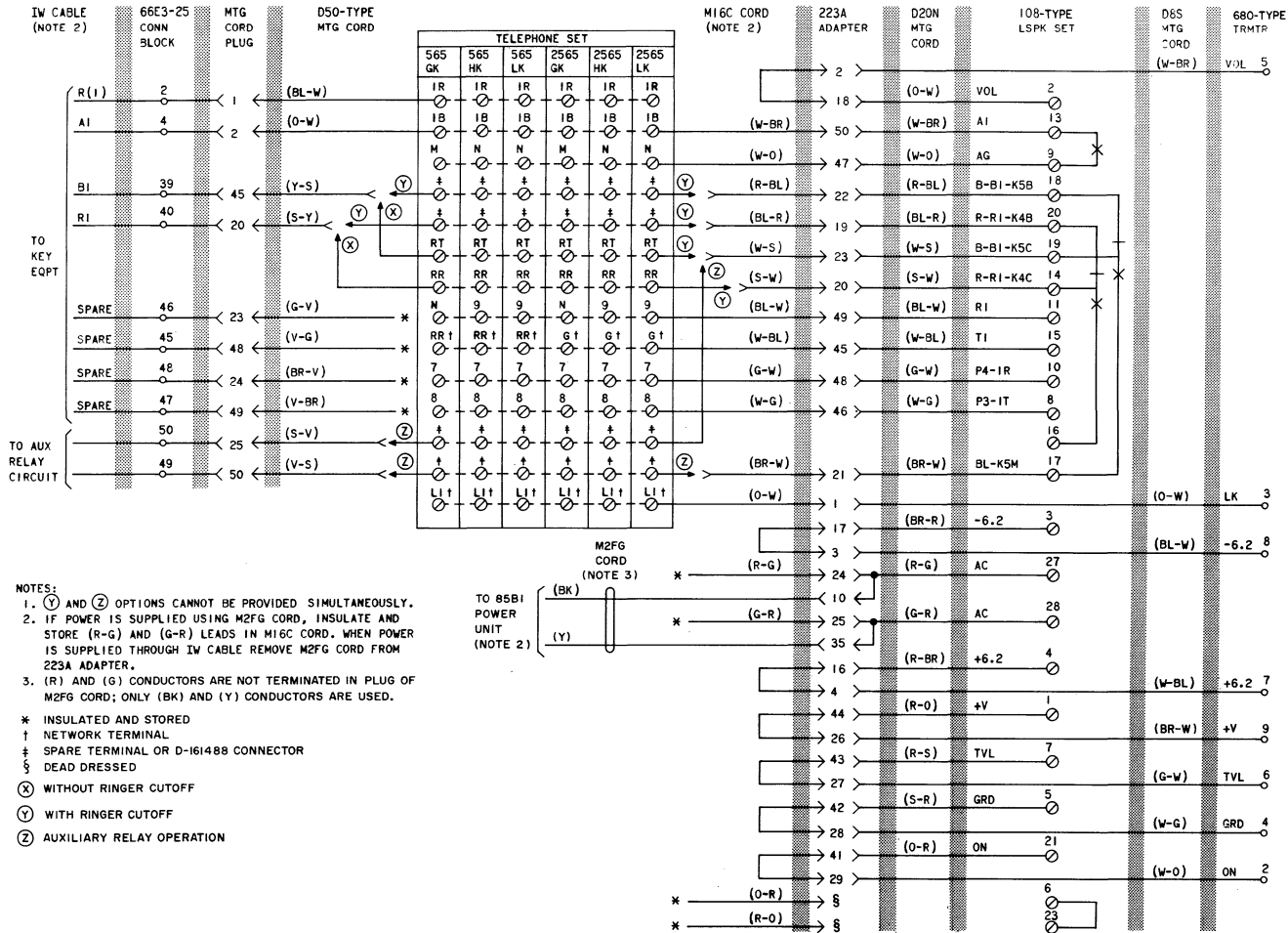


◆ Fig. 2—Speakerphone Connections Using 82A or 82B Connecting Block ◆



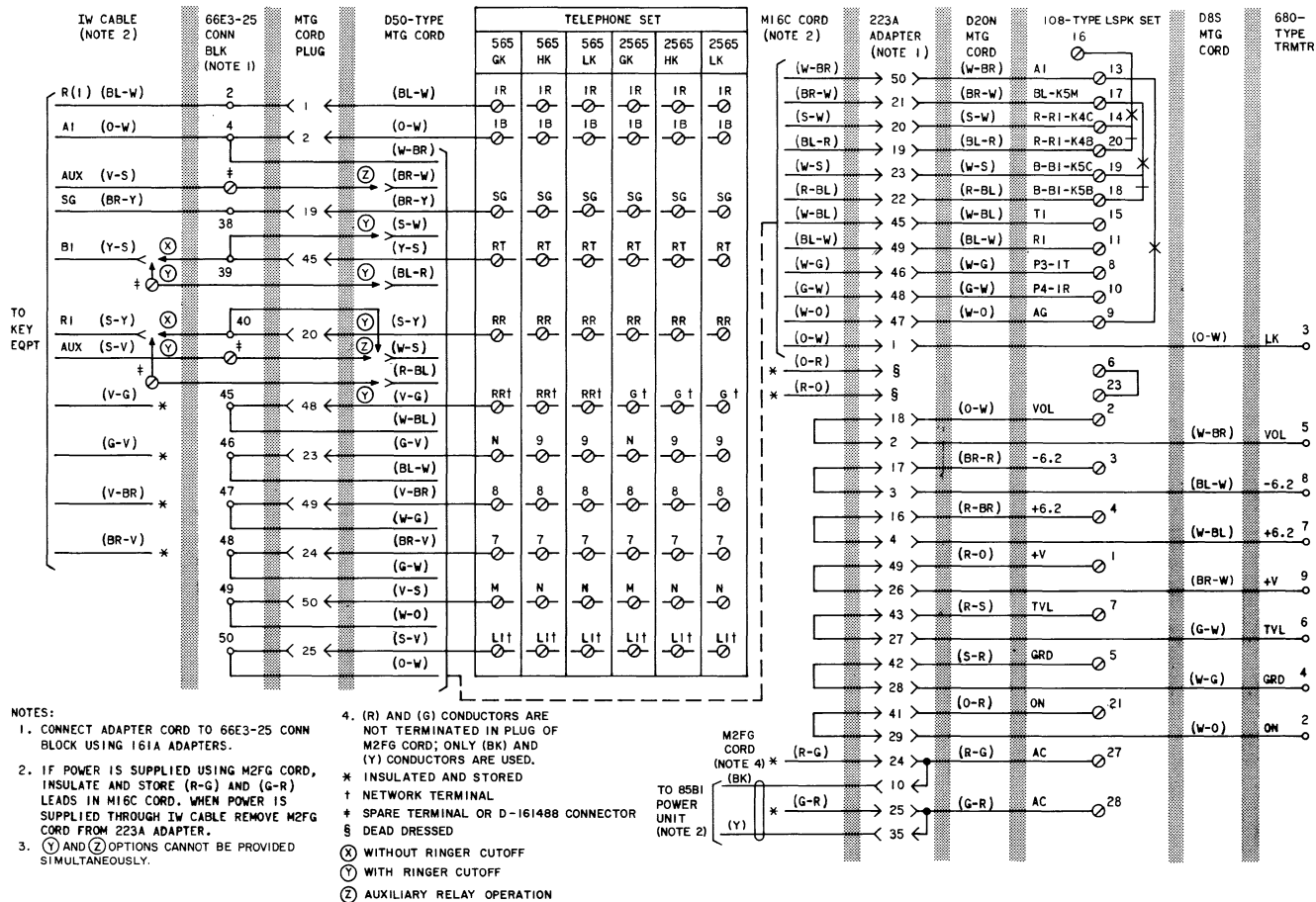
**NOTE:**  
 AT INSTALLATIONS NOT REQUIRING RINGER AND BUZZER CUTOFF OR AUXILIARY RELAY, OMIT ALL CONNECTIONS TO RELAY AND RUN CONNECTOR CABLE LEADS DIRECTLY TO PROPER CIRCUIT AT KEY EQUIPMENT.

◆ Fig. 3—Wiring Involved in Options at 82A or 82B Connecting Block ◆



- NOTES:
1. (Y) AND (Z) OPTIONS CANNOT BE PROVIDED SIMULTANEOUSLY.
  2. IF POWER IS SUPPLIED USING M2FG CORD, INSULATE AND STORE (R-G) AND (G-R) LEADS IN M16C CORD. WHEN POWER IS SUPPLIED THROUGH IW CABLE REMOVE M2FG CORD FROM 223A ADAPTER.
  3. (R) AND (G) CONDUCTORS ARE NOT TERMINATED IN PLUG OF M2FG CORD; ONLY (BK) AND (Y) CONDUCTORS ARE USED.
- \* INSULATED AND STORED  
 † NETWORK TERMINAL  
 ‡ SPARE TERMINAL OR D-161488 CONNECTOR  
 § DEAD DRESSED
- (X) WITHOUT RINGER CUTOFF  
 (Y) WITH RINGER CUTOFF  
 (Z) AUXILIARY RELAY OPERATION

◆ Fig. 4—Speakerphone Connections, Adapter Terminated in Set ◆



◆ Fig. 5—Speakerphone Connections Adapter Terminated at 66E3-25 Connecting Block ◆

## SPEAKERPHONE SYSTEM—4A

### 566MD TELEPHONE SET

### CONNECTIONS

#### 1. GENERAL

**1.01** This section contains information for maintenance and connection of the 566MD telephone set working with a 755A PBX to provide 4-type speakerphone service.

**1.02** When this section is reissued the reason for reissue will be stated in this paragraph.

**1.03** For detailed information on the components of the 4A speakerphone system, refer to Section 512-700-100.

**1.04** To provide a speakerphone at stations supplied by inside wiring cable, a 66E3-25 or equivalent connecting block and a 223A adapter (Fig. 1) is required.

#### 2. CONNECTIONS

##### 223A Adapter

**2.01** Cords from the loudspeaker set, transmitter and power unit are plugged into the adapter (Fig. 1). Adapter cover must be fastened securely to assure proper mating of connectors. The telephone set mounting cord is plugged into the 66E3-25 connecting block (Fig. 1). Access to the speakerphone leads is obtained through the M16C cord at the connecting block. At the 66E3-25 connecting block, 161A adapters must be used to connect the spade tips of the M16C cord. Install the adapter as outlined in Section 461-604-100.

##### 108-Type Loudspeaker Set

**2.02** Loudspeaker set and transmitter must be a minimum of one foot apart, to avoid feedback.

##### 680-Type transmitter

**2.03** Transmitter must be at least two feet from transformer or any AC power device to avoid AC noise in the transmitter.

##### 85B1 Power Unit

**2.05** Use an AC power outlet (not under control of a switch) located as close as possible to the system being installed. A 841050818 retaining clamp will be shipped with the 85B1 power unit and should be mounted to the AC receptacle to hold power unit securely.

*Caution: Do not ground power unit.*

**2.06** Power can be supplied by making connections as shown in Fig. 2.

**2.07** The M2FG cord is furnished as part of the 223A adapter for connecting the 85B1 power unit.

**2.08** The 85B1 power unit should be located less than 125 feet from 108-type loudspeaker set when using 24 gauge wire. Refer to Section 512-700-100 for details on power supply information.

##### 227A Key Telephone Unit (KTU)

**2.09** The 227A KTU provides lamp control to a station working with the 755A PBX. Connection for 227A may be found in Fig. 2.

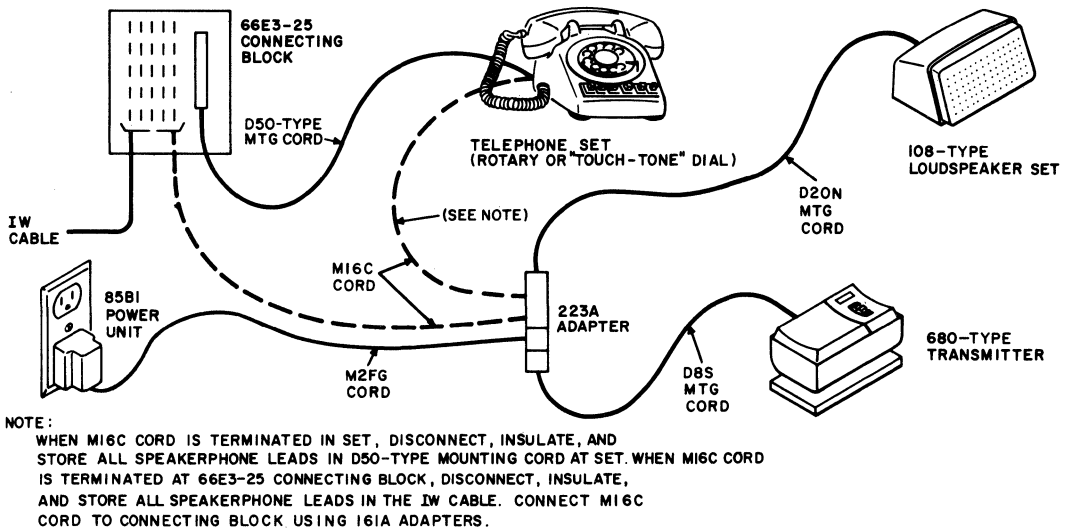


Fig. 1—Speakerphone Arrangement 566MD Key Telephone Set

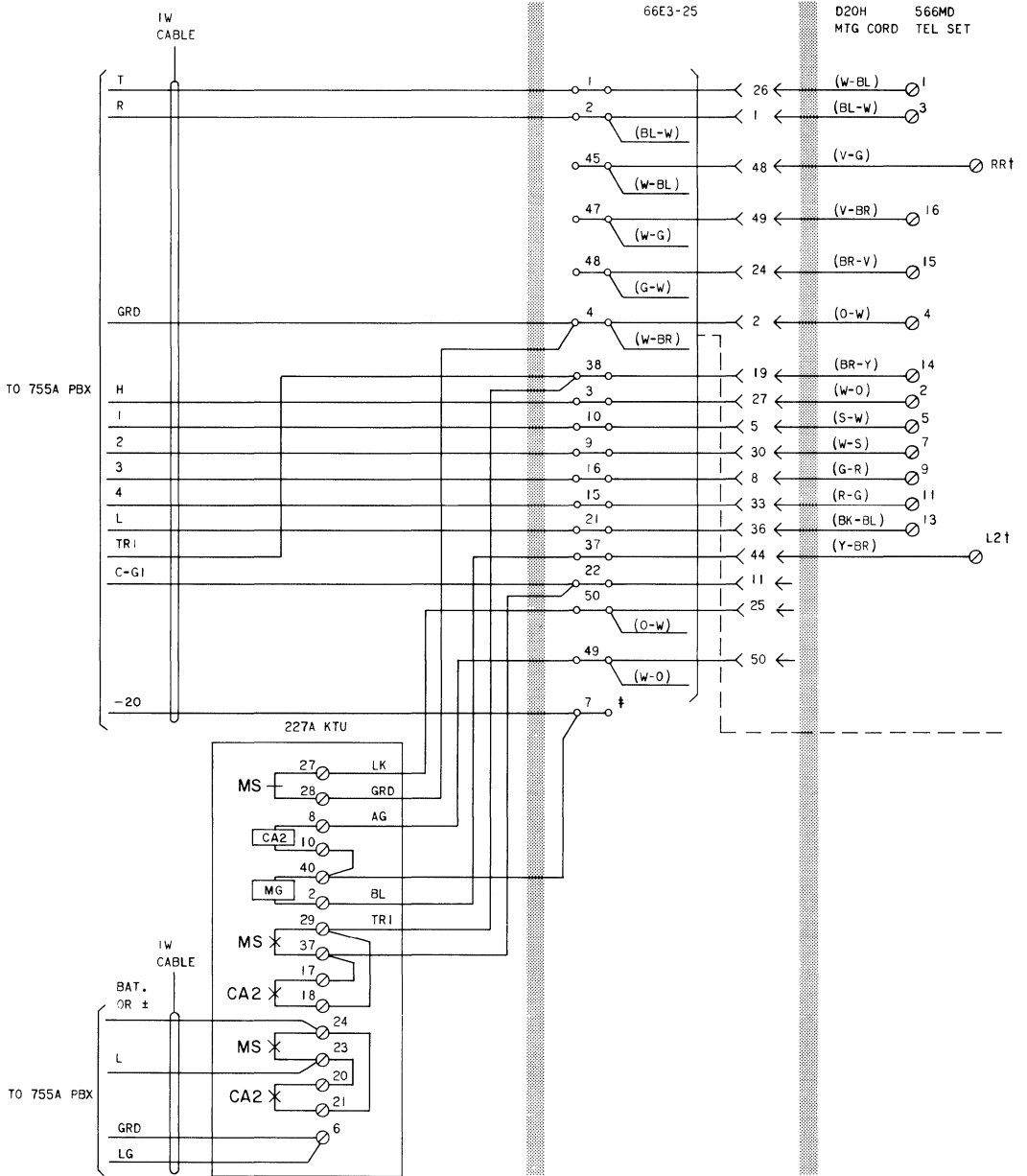


Fig. 2—Connection for 566MD Telephone Set With 4A Speakerphone and 755A PBX (Sheet 1 of 2)



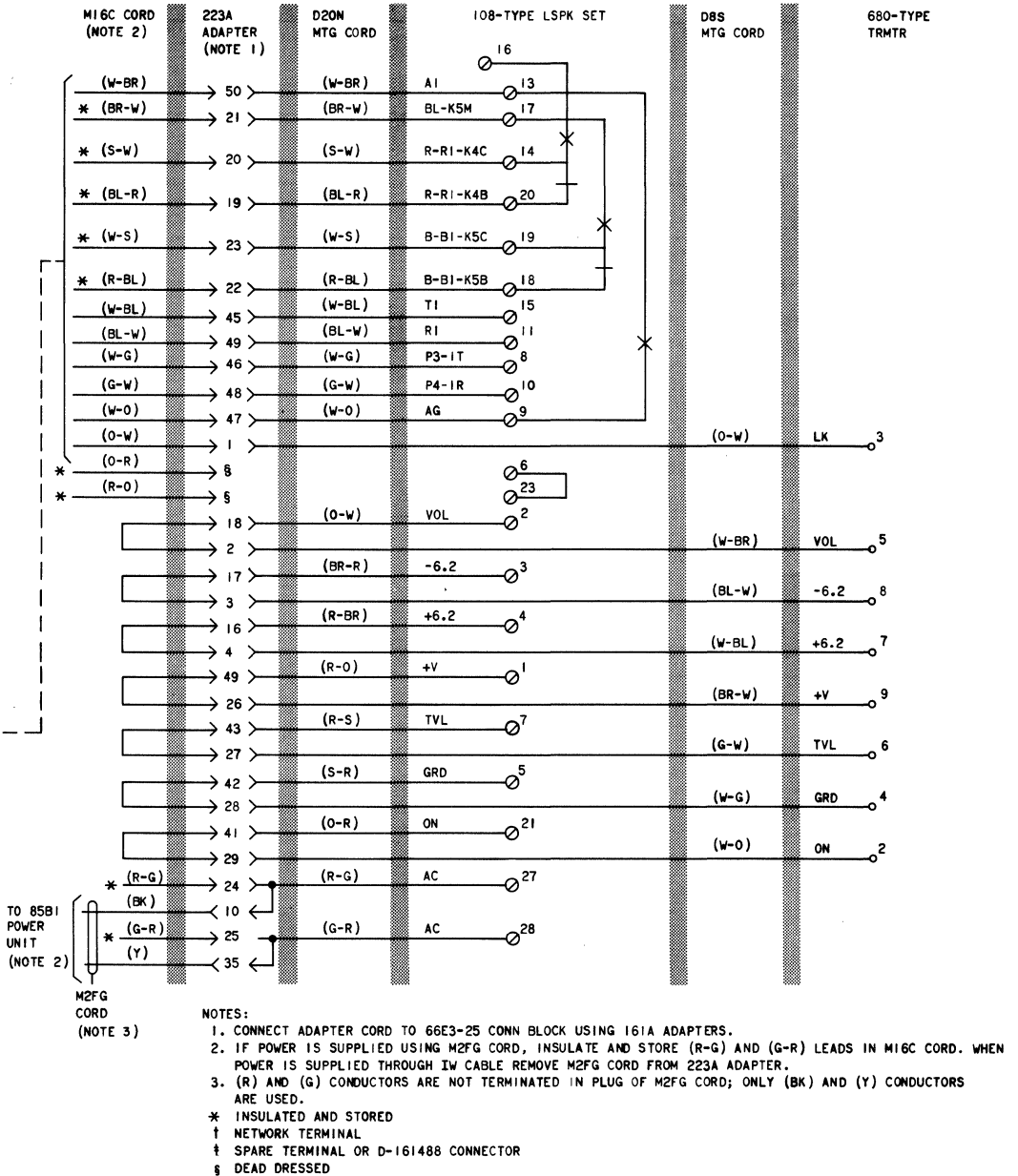


Fig. 2—Connection for 566MD Telephone Set With 4A Speakerphone and 755A PBX (Sheet 2 of 2)

## SPEAKERPHONE SYSTEM—4A

### 630-, 631-, 632-, 634-, 635-, 2630-, 2631-, 2632-, 2634-, AND 2635-TYPE TELEPHONE SET

#### 1. GENERAL

**1.01** This section contains connection information for using 630-, 631-, 632-, 634-, 635-, 2630-, 2631-, 2632-, 2634-, and 2635-type telephone sets with the 4A speakerphone system.

**1.02** This section is reissued to:

- Revise 223A connection information, Fig. 2, 3, 4, and 5
- Add 8C or 8CA dial information
- Add modular information for the DAM coded telephone sets, Fig. 3 and 5

**1.03** Refer to Section 512-700-100 for detailed information on the components of the 4A speakerphone system.

**1.04** To provide 4A speakerphone feature at these CALL DIRECTOR® stations, refer to Fig. 1 for connector cable and plug-ended mounting cord connection arrangements and Fig. 2, 3, 4, or 5 for individual lead connections of the components required for the system.

**1.05** ♦Rotary telephone sets equipped with an 8R dial must be equipped with 8C or 8CA dial when connected for 4A speakerphone. The second set of off-normal contacts on 8C or 8CA dial shall connect to the same terminals as P3 and P4 leads from the speakerphone.♦

#### 2. CONNECTIONS

##### 223A Adapter

**2.01** The cords from the 108-type loudspeaker set, 680-type transmitter, and 85B1 power unit are installed in the proper receptacle of the

223A adapter. The cover must be fastened securely to assure proper mating of connectors.

**2.02** These CALL DIRECTOR sets can be wired for "Ringer Cutoff" (Fig. 2, 3, 4, or 5). Ringer cutoff feature provides for cutting the telephone set ringer off through relay contacts located in the loudspeaker set while on speakerphone.

**2.03** "Auxiliary Relay" feature (Fig. 2, 3, or 4) provides a relay contact closure for operation of an auxiliary relay key telephone unit when it is desired to cut off several signals. The signal circuits must be wired through the contacts of the auxiliary relay. "Auxiliary Relay" feature cannot be provided in the 634-, 635-, 2634-, and 2635-type telephone sets due to insufficient mounting cord conductors.

**2.04** Unused speakerphone leads in the mounting cord or IW cable shall be disconnected so as to prevent interference with working circuits. These leads shall never be multiplied between telephone sets. Refer to Section 502-110-100 for more detailed information.

##### 108-Type Loudspeaker Set

**2.05** The loudspeaker set and transmitter must be a minimum of one foot apart.

##### 680-Type Transmitter

**2.06** The transmitter must be at least two feet from transformer or any AC powered device.

##### 85B1 Power Unit

**2.07** Power can be supplied by connecting 85B1 power unit as shown in Fig. 1, 2, 3, 4, or 5.

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**2.08** The M2FG cord is furnished as part of the 223A adapter for connecting the 85B1 power unit.

**2.09** Use an AC power outlet (not under control of a switch) located as close as possible to the system being installed. A 841050818 retaining clamp will be shipped with the 85B1 power unit and should be mounted to the AC receptacle to hold power unit securely.

**Caution: Do not Ground Power Unit.**

**2.10** The 85B1 power unit should be located less than 125 feet from 108-type loudspeaker set when using 24 gauge wire. Refer to Section 512-700-100 for detailed information on power supply applications.

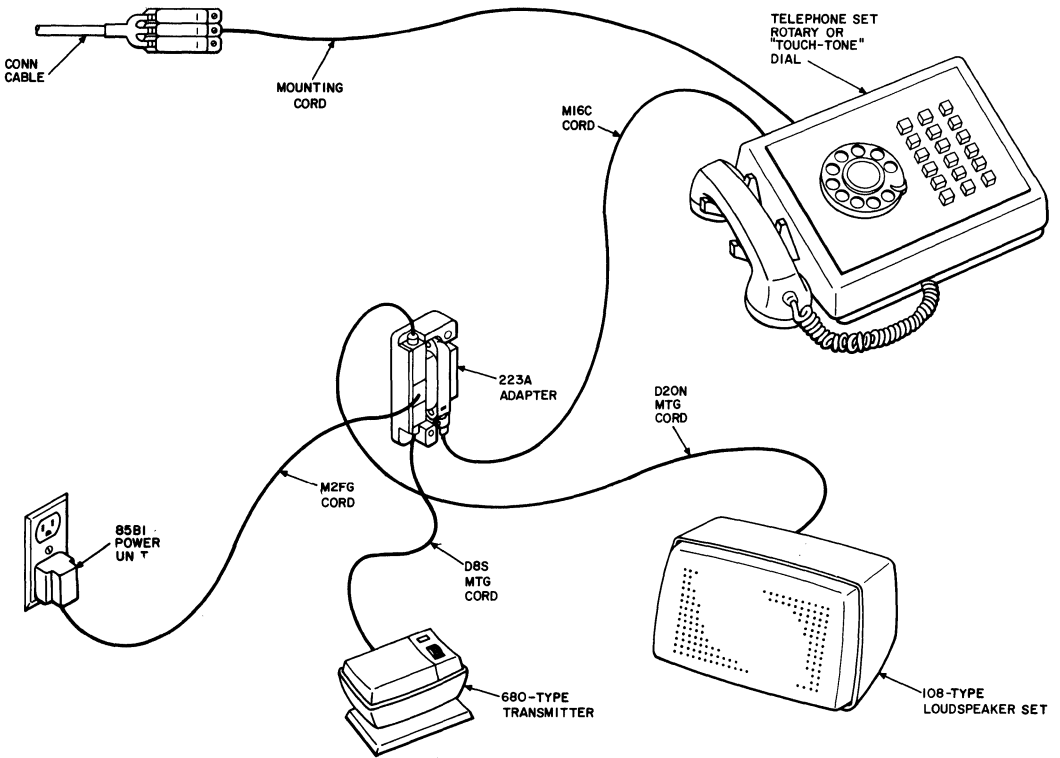
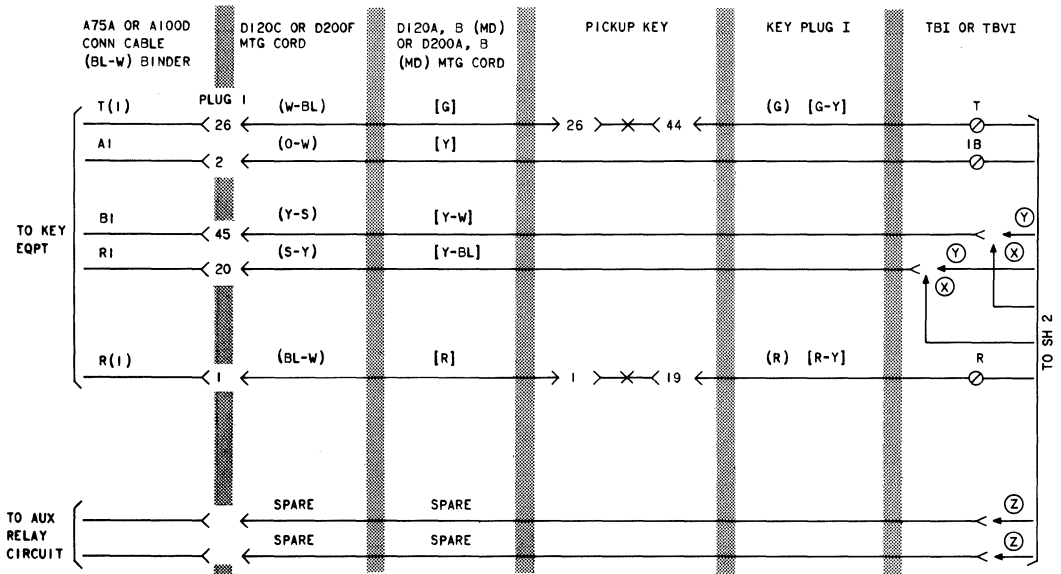


Fig. 1—Speakerphone Arrangement, CALL DIRECTOR Telephone Sets

SECTION 512-730-400



NOTES:

1. WHEN POWER IS PROVIDED THROUGH M2FG CORD, INSULATE AND STORE (R-G) AND (G-R) LEADS IN M16C CORD.
  2. WHEN POWER IS SUPPLIED VIA A SPARE PAIR IN CONNECTOR CABLE AND SET MOUNTING CORD, CONNECT THAT PAIR TO THE (R-G) AND (G-R) LEADS IN M16C CORD USING SPARE TERMINALS OR D-161488 CONNECTORS AND REMOVE M2FG PLUG FROM 223A ADAPTER.
  3. (Y) AND (Z) OPTIONS CANNOT BE PROVIDED SIMULTANEOUSLY.
  4. (R) AND (G) CONDUCTORS ARE NOT TERMINATED IN PLUG OF M2FG CORD; ONLY (BK) AND (Y) CONDUCTORS ARE USED.
  5. THE 223A ADAPTER CONSISTS OF A M16C CORD, M2FG CORD, AND A PLASTIC COVER AND BASE. THE PLUG OF THE M16C CORD INTERCONNECTS THE M2FG, D8S, AND D20N CORD CONNECTORS.
- \* INSULATED AND STORED  
 † NETWORK TERMINAL  
 ‡ SPARE TERMINAL OR D-161488 CONNECTOR  
 § DIAL TERMINAL  
 ¶ DEAD DRESSED

- (X) WITHOUT RINGER CUTOFF
- (Y) WITH RINGER CUTOFF
- (Z) AUXILIARY RELAY OPERATION

Fig. 2—Speakerphone Connections, Adapter Terminated in 630A, B, C, D, or 631A, B, C, D or 2630D or 2631D Telephone Set (Sheet 1 of 2)

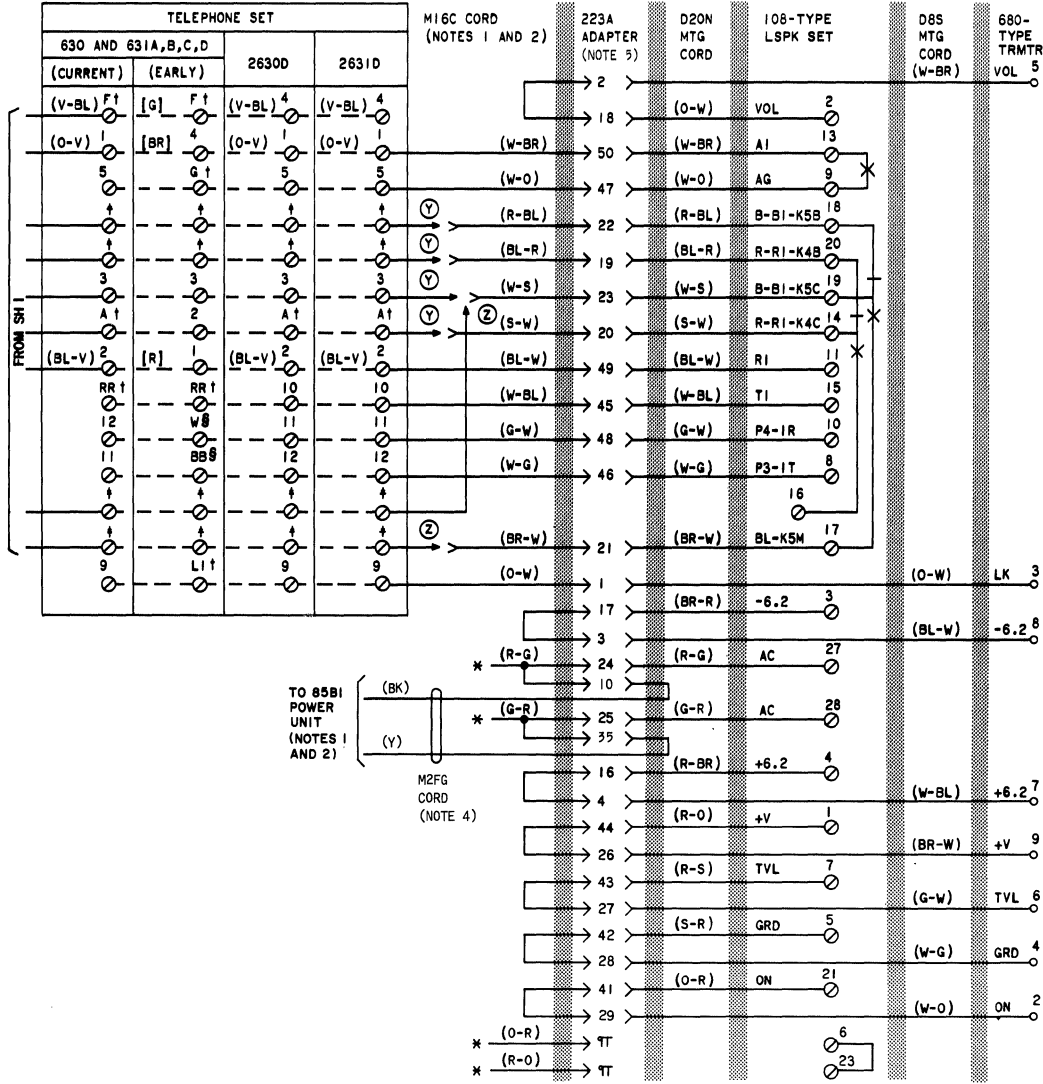
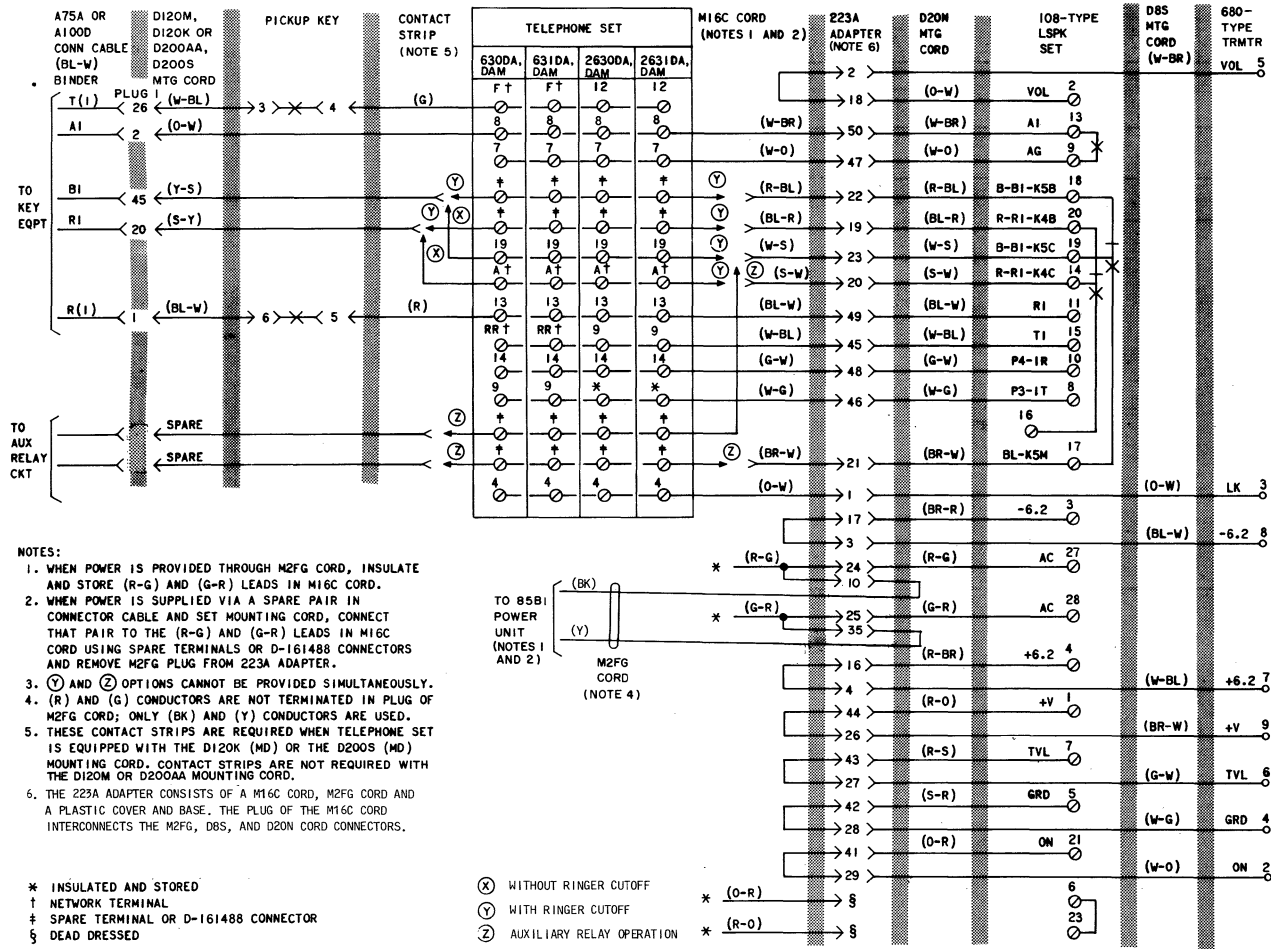


Fig. 2—Speakerphone Connections, Adapter Terminated in 630A, B, C, D, or 631A, B, C, D or 2630D or 2631D Telephone Set (Sheet 2 of 2)



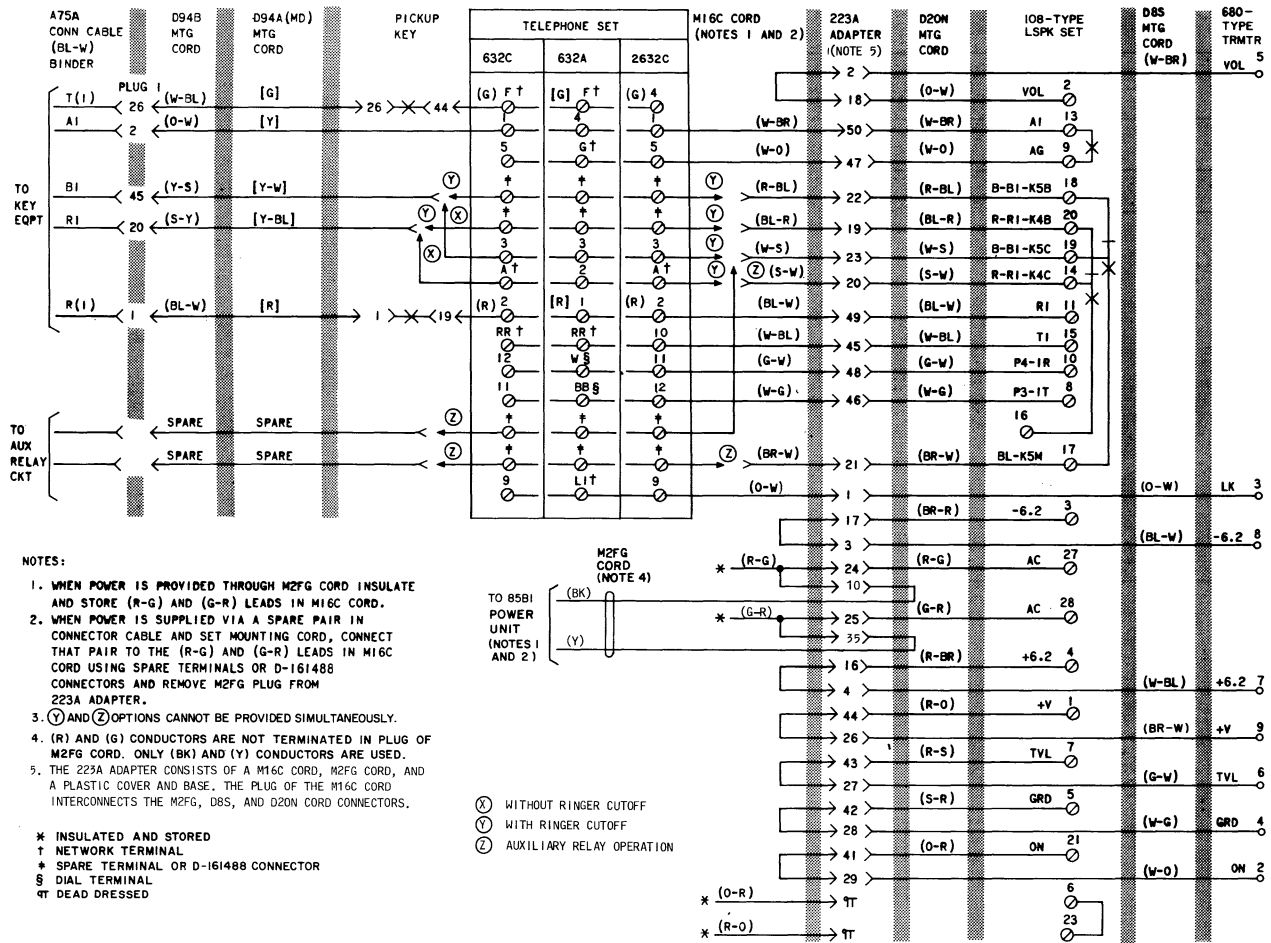
- NOTES:
1. WHEN POWER IS PROVIDED THROUGH M2FG CORD, INSULATE AND STORE (R-G) AND (G-R) LEADS IN M16C CORD.
  2. WHEN POWER IS SUPPLIED VIA A SPARE PAIR IN CONNECTOR CABLE AND SET MOUNTING CORD, CONNECT THAT PAIR TO THE (R-G) AND (G-R) LEADS IN M16C CORD USING SPARE TERMINALS OR D-161488 CONNECTORS AND REMOVE M2FG PLUG FROM 223A ADAPTER.
  3. (Y) AND (Z) OPTIONS CANNOT BE PROVIDED SIMULTANEOUSLY.
  4. (R) AND (G) CONDUCTORS ARE NOT TERMINATED IN PLUG OF M2FG CORD; ONLY (BK) AND (Y) CONDUCTORS ARE USED.
  5. THESE CONTACT STRIPS ARE REQUIRED WHEN TELEPHONE SET IS EQUIPPED WITH THE D120K (MD) OR THE D200S (MD) MOUNTING CORD. CONTACT STRIPS ARE NOT REQUIRED WITH THE D120M OR D200AA MOUNTING CORD.
  6. THE 223A ADAPTER CONSISTS OF A M16C CORD, M2FG CORD AND A PLASTIC COVER AND BASE. THE PLUG OF THE M16C CORD INTERCONNECTS THE M2FG, D8S, AND D20N CORD CONNECTORS.

\* INSULATED AND STORED  
 † NETWORK TERMINAL  
 ‡ SPARE TERMINAL OR D-161488 CONNECTOR  
 § DEAD DRESSED

(X) WITHOUT RINGER CUTOFF  
 (Y) WITH RINGER CUTOFF  
 (Z) AUXILIARY RELAY OPERATION

\* (O-R) → §  
 \* (R-O) → §

Fig. 3—Speakerphone Connections, Adapter Terminated in 630DA, DAM, 631DA, DAM, 2630DA, DAM, or 2631DA, DAM Telephone Set



**NOTES:**

1. WHEN POWER IS PROVIDED THROUGH M2FG CORD INSULATE AND STORE (R-G) AND (G-R) LEADS IN M16C CORD.
2. WHEN POWER IS SUPPLIED VIA A SPARE PAIR IN CONNECTOR CABLE AND SET MOUNTING CORD, CONNECT THAT PAIR TO THE (R-G) AND (G-R) LEADS IN M16C CORD USING SPARE TERMINALS OR D-161488 CONNECTORS AND REMOVE M2FG PLUG FROM 223A ADAPTER.
3. (Y) AND (Z) OPTIONS CANNOT BE PROVIDED SIMULTANEOUSLY.
4. (R) AND (G) CONDUCTORS ARE NOT TERMINATED IN PLUG OF M2FG CORD. ONLY (BK) AND (Y) CONDUCTORS ARE USED.
5. THE 223A ADAPTER CONSISTS OF A M16C CORD, AND A PLASTIC COVER AND BASE. THE PLUG OF THE M16C CORD INTERCONNECTS THE M2FG, DBS, AND D20N CORD CONNECTORS.

- \* INSULATED AND STORED
- † NETWORK TERMINAL
- \* SPARE TERMINAL OR D-161488 CONNECTOR
- § DIAL TERMINAL
- ‡ DEAD DRESSED

- (X) WITHOUT RINGER CUTOFF
- (Y) WITH RINGER CUTOFF
- (Z) AUXILIARY RELAY OPERATION

**Fig. 4—Speakerphone Connections, Adapter Terminated in 632A, 632C, or 2632C Telephone Set**



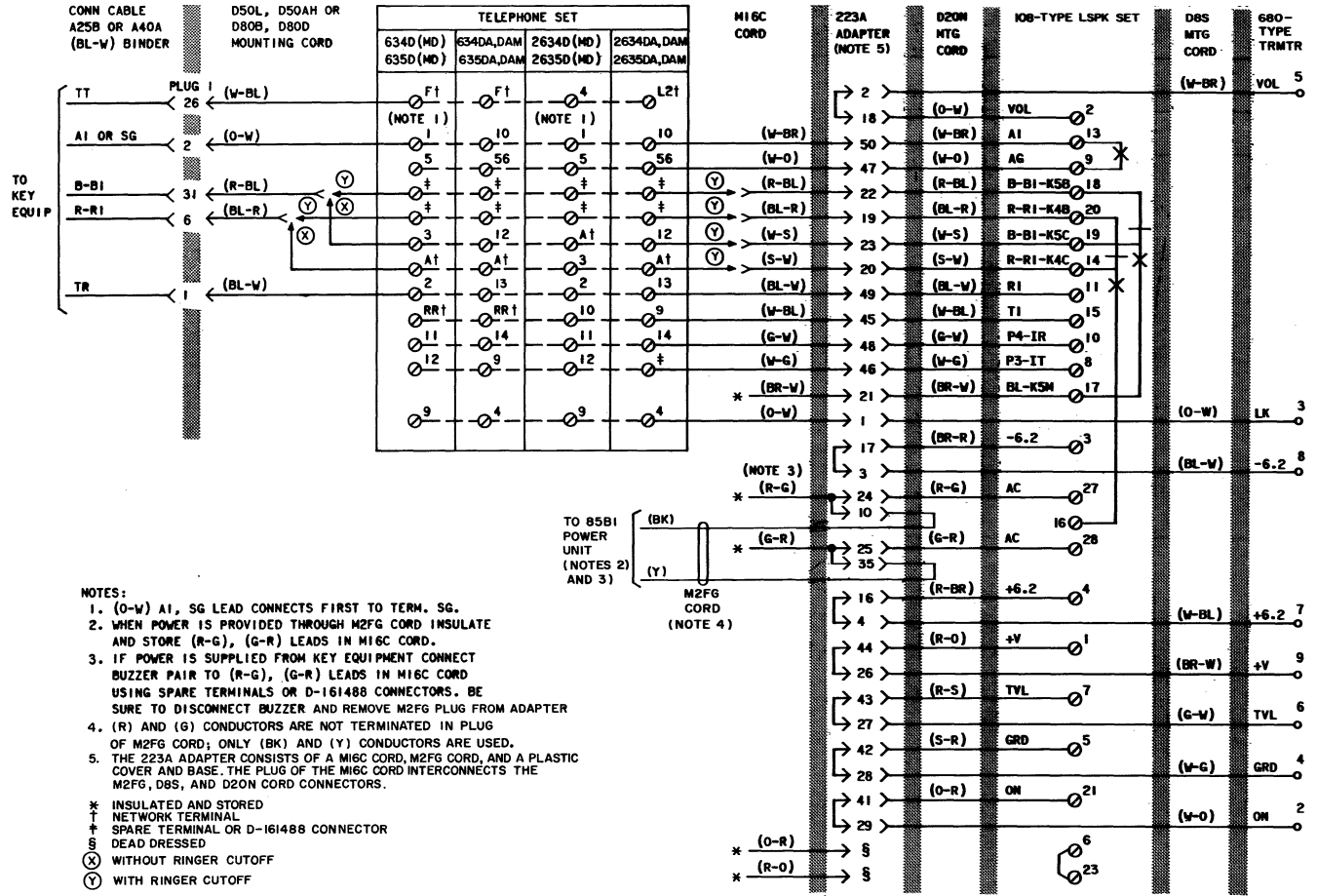


Fig. 5—Speakerphone Connections, Adapter Terminated in 634D, DA, DAM, 635D, DA, DAM, 2634D, DA, DAM, or 2635D, DA, DAM Telephone Set

## SPEAKERPHONE SYSTEM—4A

### 660A1, 660A1M, 2660A1, AND 2660A1M TELEPHONE SETS

### CONNECTIONS

#### 1. GENERAL

**1.01** Refer to Section 512-700-100 for detailed information on the components of the 4A speakerphone system.

**1.02** This section is reissued to add 660A1M and 2660A1M (modular) telephone sets.

**1.03** This section provides information necessary to modify and connect the 660A1, 660A1M, 2660A1, and 2660A1M telephone set to provide speakerphone service.

**1.04** Rotary dial telephone sets equipped with an 8R dial must be equipped with an 8C dial when connected for 4A speakerphone. Second set of off-normal contacts on 8C dial shall connect to same set terminals as P3 and P4 leads from speakerphone.

**1.05** The D4BT, D4BU, or D6AF mounting cord furnished with these sets along with the 623P4 jack assembly in the 660A1M or 2660A1M modular telephone sets must be replaced by a D10R mounting cord (ordered separately). In addition the telephone set must be modified per Tables A, B, or C and Fig. 2, 3, 5, or 6.

#### 2. CONNECTIONS

##### 223A Adapter

**2.01** The cords from the 108-type loudspeaker set, 680-type transmitter, and 85B1 power unit are installed in the proper receptacle of the 223A adapter. The cover must be fastened securely to assure proper mating of connectors.

##### 108A or 108AR Loudspeaker Set

**2.02** Loudspeaker set and transmitter must be a minimum of one foot apart.

##### 680A, 680A14, 680AR, or 680AR14 Transmitter

**2.03** Transmitter must be at least two feet from transformer or any AC powered device.

##### 85B1 Power Unit

**2.04** Power can be supplied by making connections as shown in Fig. 4 and 7.

**2.05** Use an AC power outlet (not under control of a switch) as close as possible to the system being installed. A retaining clamp (841050818) will be shipped with the 85B1 power unit and should be mounted to the AC receptacle to hold power unit securely and to prevent accidental loss of power.

**Caution:** *Do Not Ground Power Unit and never attempt to use the same power supply for the card dialer and the 4A speakerphone system.*

**2.06** The 85B1 power unit should be located less than 125 feet from 108-type loudspeaker set when using 24 gauge wire. Refer to Section 512-700-100 for detailed information on power supply application.

**2.07** The M2FG cord is furnished as part of the 223A adapter for connecting the 85B1 power unit.

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◆ TABLE A ◆

**660A1 OR 660A1M TELEPHONE SET EQUIPPED WITH C4B  
RINGER – MODIFICATION FOR 4A SPEAKERPHONE (Note 4)**

WIRE OR LEAD		1A1 OR 1A2 KEY TEL SYS (NOTE 3)	INDIVIDUAL OR BRIDGED (NOTE 3)	RING PARTY (NOTE 3)	TIP PARTY WITHOUT IDENT. (NOTE 3, 4)
Line Switch	(BR) [S-G] (Y) [S-W] (W) [S-BR]	TBI-1 TBI-P2 C	* TBI-P2 C	* TBI-P2 C	* TBI-P2 C
Ringer Straps†	(R)	L1	L1	L1	L1
8C Dial (Note 1)	(Y) (Y) (W) (W) (BL) (G) or (BL)	TBII <span style="font-size: 2em;">}</span> <span style="font-size: 2em;">1</span> <span style="font-size: 2em;">2</span> <span style="font-size: 2em;">3</span> <span style="font-size: 2em;">4</span> <span style="font-size: 2em;">5</span> <span style="font-size: 2em;">6</span>			
Add Straps	M1W cord or equivalent	TBII-1 to 41-type dial, terminal 1 TBII-2 to 41-type dial, terminal 2			
		K of Net. to F of Net.	K of Net. to F of Net.	K of Net. to P2 of TB1	K of Net. to P2 of TB1
Strap	(G)	L1 of Net. to L1 of TB1	L1 of Net. to L1 of TB1	L1 of Net. to L1 of TB1	L1 of Net. to F of Net.
D10R Mounting Cord (Note 2)	R (BL-W) T (W-BL) A1 (O-W)	TBI-L1 F TBI-P2			
	T1 (W-O) P4 (G-W) P3 (W-G)	41-type dial, terminal 6 41-type dial, terminal 1 41-type dial, terminal 2			
	A-AG (BR-W)	TBI-1	*	*	*
	LK (W-BR) P1 (S-W) P2 (W-S)	TBI-L2 41-type dial, terminal P1 41-type dial, terminal P2			

- Notes: 1. Replace 8R dial with 8C dial (order separately).  
 2. Replace D6AF or D4BU mounting cord and 623P4 jack assembly with D10R (order separately).  
 3. Terminals on network unless otherwise noted.  
 4. 4A speakerphone system is not designed for tip party identification service.

- \* Insulate and store  
 † (R) ringer lead in 660A1M telephone set  
 ( ) Current color code.  
 [ ] MD color code.

◆ TABLE B ◆

**660A1 OR 660A1M TELEPHONE SET EQUIPPED WITH C4A RINGER—MODIFICATION FOR 4A SPEAKERPHONE**  
(Note 4)

WIRE OR LEAD		1A1 OR 1A2 KEY TEL SYS (NOTE 3)	INDIVIDUAL OR BRIDGED (NOTE 3)	RING PARTY (NOTE 3)	TIP PARTY WITHOUT IDENT. (NOTE 3, 4)
Line Switch	(BR) [S-G] (Y) [S-W] (W) [S-BR]	TBI-1 TBI-P2 C	* TBI-P2 C	* TBI-P2 C	* TBI-P2 C
Ringer Straps	(R) (BK)	L1 F	L1 F	L1 TBI-P2	L1 TBI-P2
8C Dial (Note 1)	(Y) (Y) (W) (W) (BL) (G) or (BL)	TBII	$\left. \begin{array}{l} 1 \\ 2 \\ 3 \\ 4 \\ 5 \\ 6 \end{array} \right\}$		
Add Straps	M1W cord or equivalent	TBII-1 to 41-type dial, terminal 1 TBII-2 to 41-type dial, terminal 2			
D10R Mounting Cord (Note 2)	R (BL-W) T (W-BL) A1 (O-W)	TBI-L1 F TBI-P2			
	T1 (W-O) P4 (G-W) P3 (W-G)	41-type dial, terminal 6 41-type dial, terminal 1 41-type dial, terminal 2			
	A-AG (BR-W)	TBI-1	*	*	*
	LK (W-BR) P1 (S-W) P2 (W-S)	TBI-L2 41-type dial, terminal P1 41-type dial, terminal P2			

- Notes: 1. Replace 8R dial with 8C dial (order separately).  
 2. Replace D6AF or D4BU mounting cord and 623P4 jack assembly with D10R (order separately).  
 3. Terminals on network unless otherwise noted.  
 4. 4A speakerphone system is not designed for tip party identification service.

\* Insulate and store.  
 ( ) Current color code.  
 [ ] MD color code.

◆ TABLE C ◆

## 2660A1 OR 2660A1M TELEPHONE SET EQUIPPED WITH M1A OR M1B RINGER—MODIFICATION FOR 4A SPEAKERPHONE (Note 3)

WIRE OR LEAD		1A1 OR 1A2 KEY TEL SYS (NOTE 1)	INDIVIDUAL OR BRIDGED (NOTE 1)	RING PARTY (NOTE 1)	TIP PARTY WITHOUT IDENT. (NOTE 1, 4)
Line Switch	(BR) (Y)	F G	* G	* A	* G
	(S)	Connect to mounting cord (S-W) lead†			
	(G) (W)	L2 C	L2 C	L2 C	L2 C
Dial	(G)	A	A	G	A
Ringer Strap	(G)	TBI-7 to L2	TBI-7 to L2	TBI-7 to L2	TBI-7 to G
D10R Mounting Cord (Note 2, 3)	R (BL-W)	L2	L2	L2	L2
	T (W-BL)	A	A	G	A
	A1 (O-W)	G	G	A	G
	A-AG (W-O)	F	*	*	*
	T1 (W-G) IR (BR-W)	Connect to dial (O) lead† Connect to dial (V) lead†			
IT (W-BR)	*	*	*	*	
LK (S-W)	Connect to line switch (S) lead†				

\* Insulate and store.

† Use D-161488 connector.

Notes 1. Terminals on network unless otherwise noted.

2. Replace D4ET or D4BU mounting cord and 623P4 jack assembly with D10R (ordered separately).
3. Insulate and store (G-W) and (W-S) mounting cord leads.
4. 4A speakerphone system is not designed for tip party identification service.

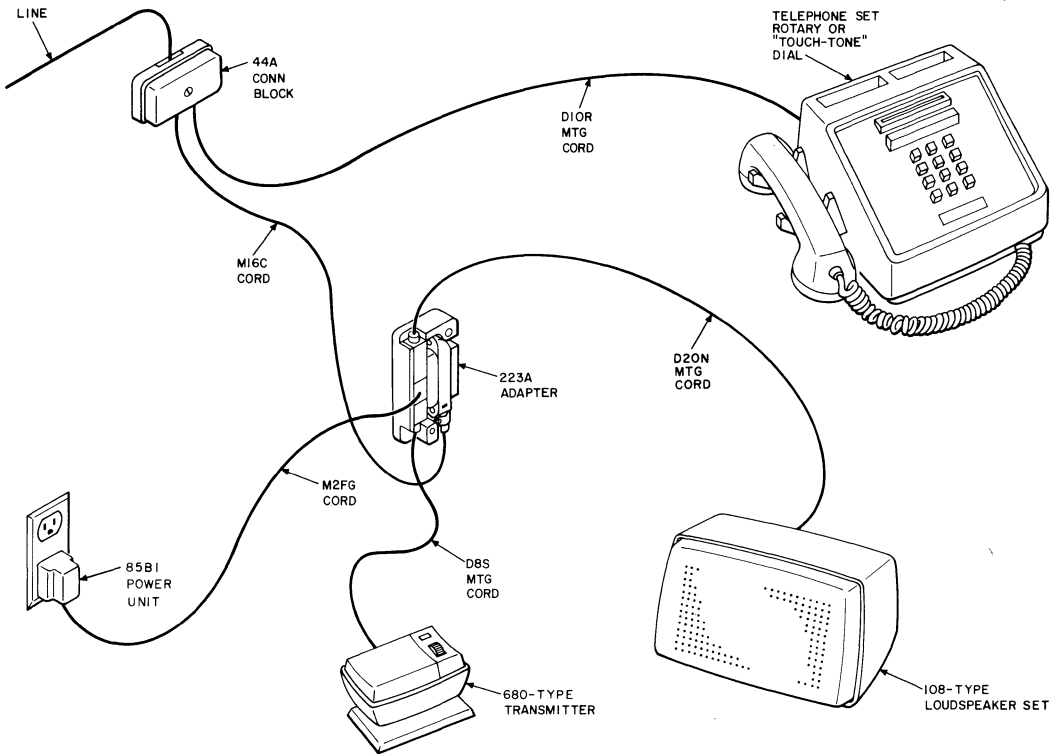


Fig. 1—Speakerphone Arrangement, Card Dialer Telephone Sets

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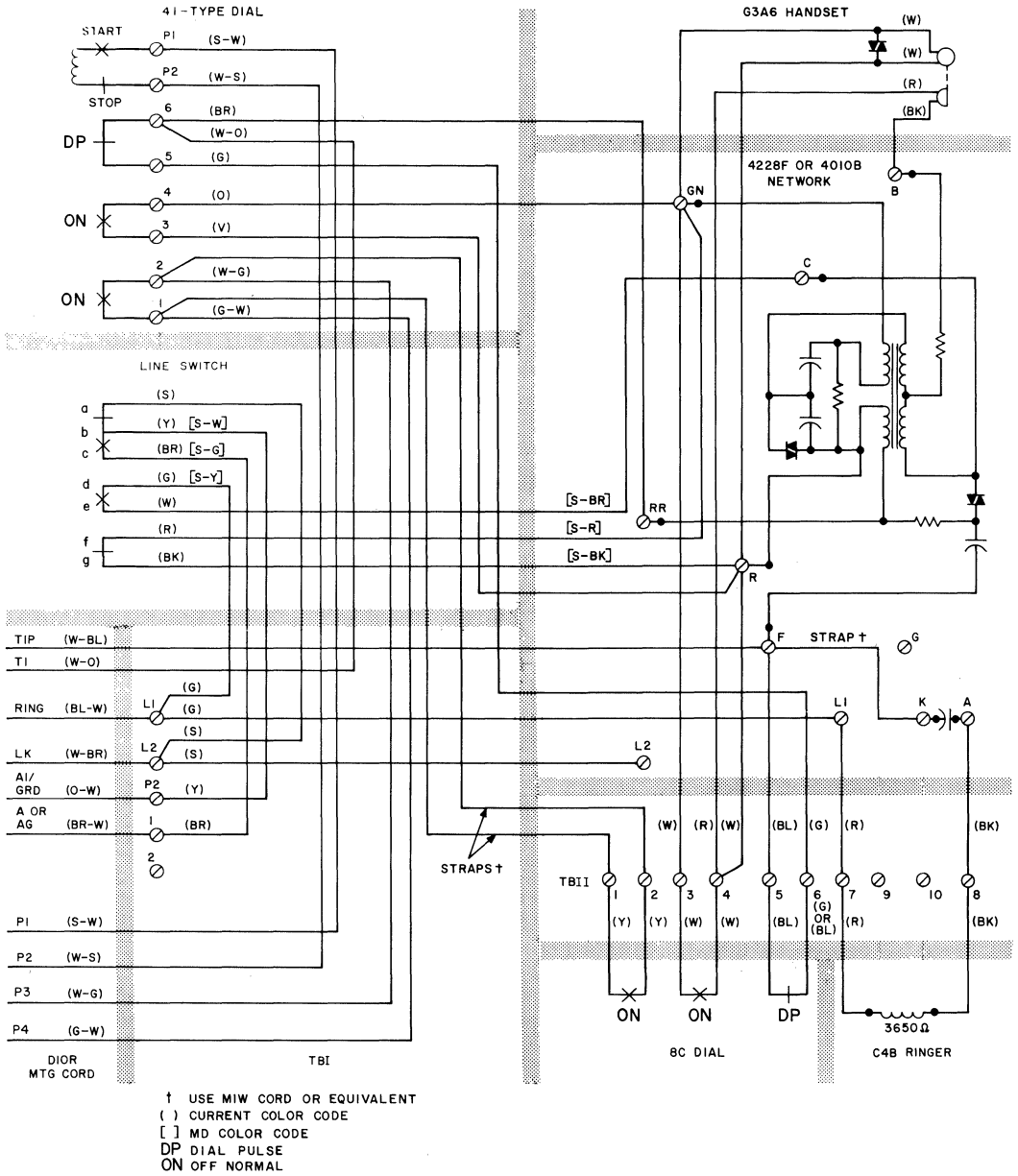


Fig. 2—660A1 Telephone Set Wired for 4A Speakerphone and 1A1 or 1A2 KTS

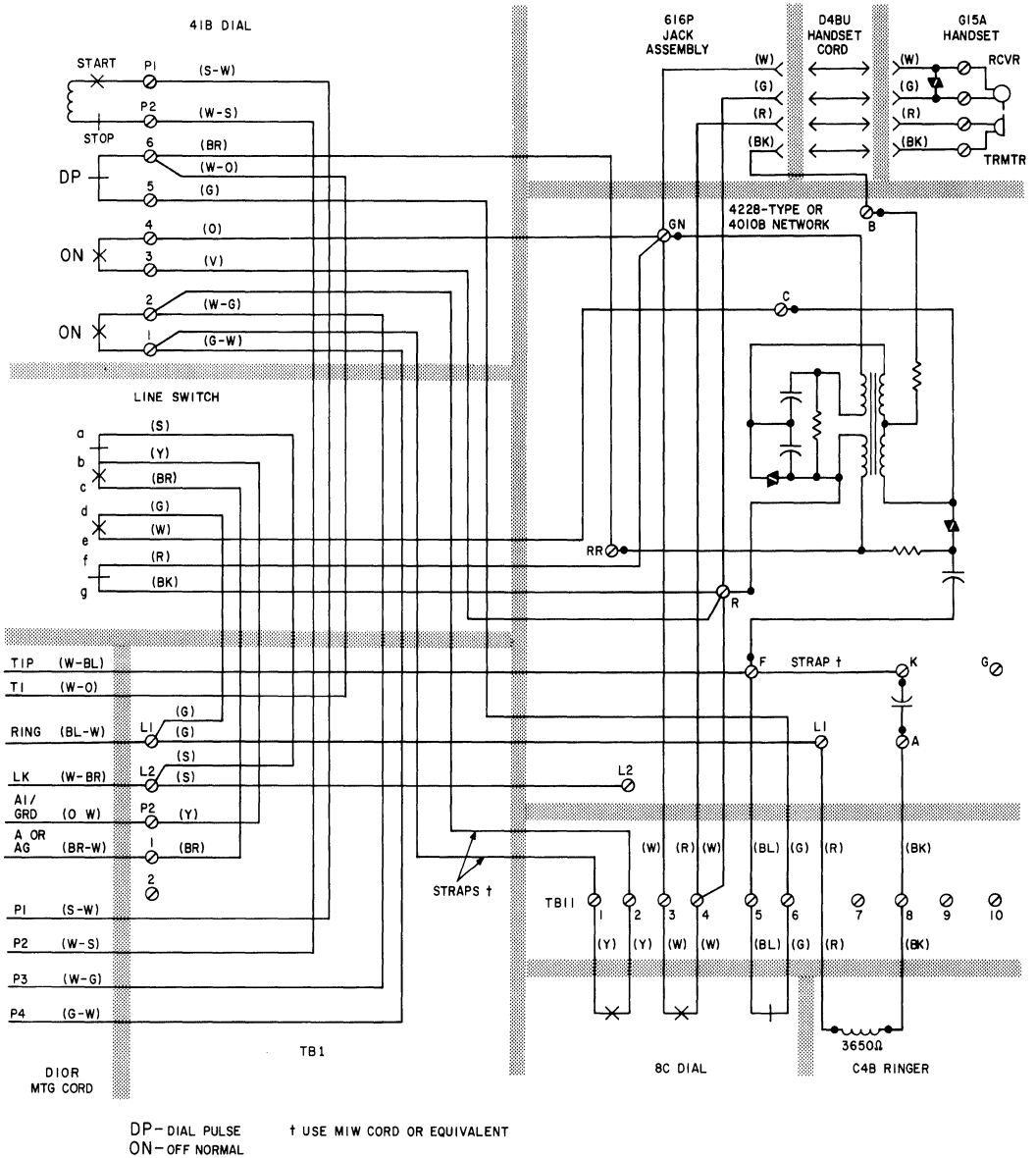


Fig. 3—660A1M Telephone Set Wired for 4A Speakerphone and 1A1 or 1A2 KTS



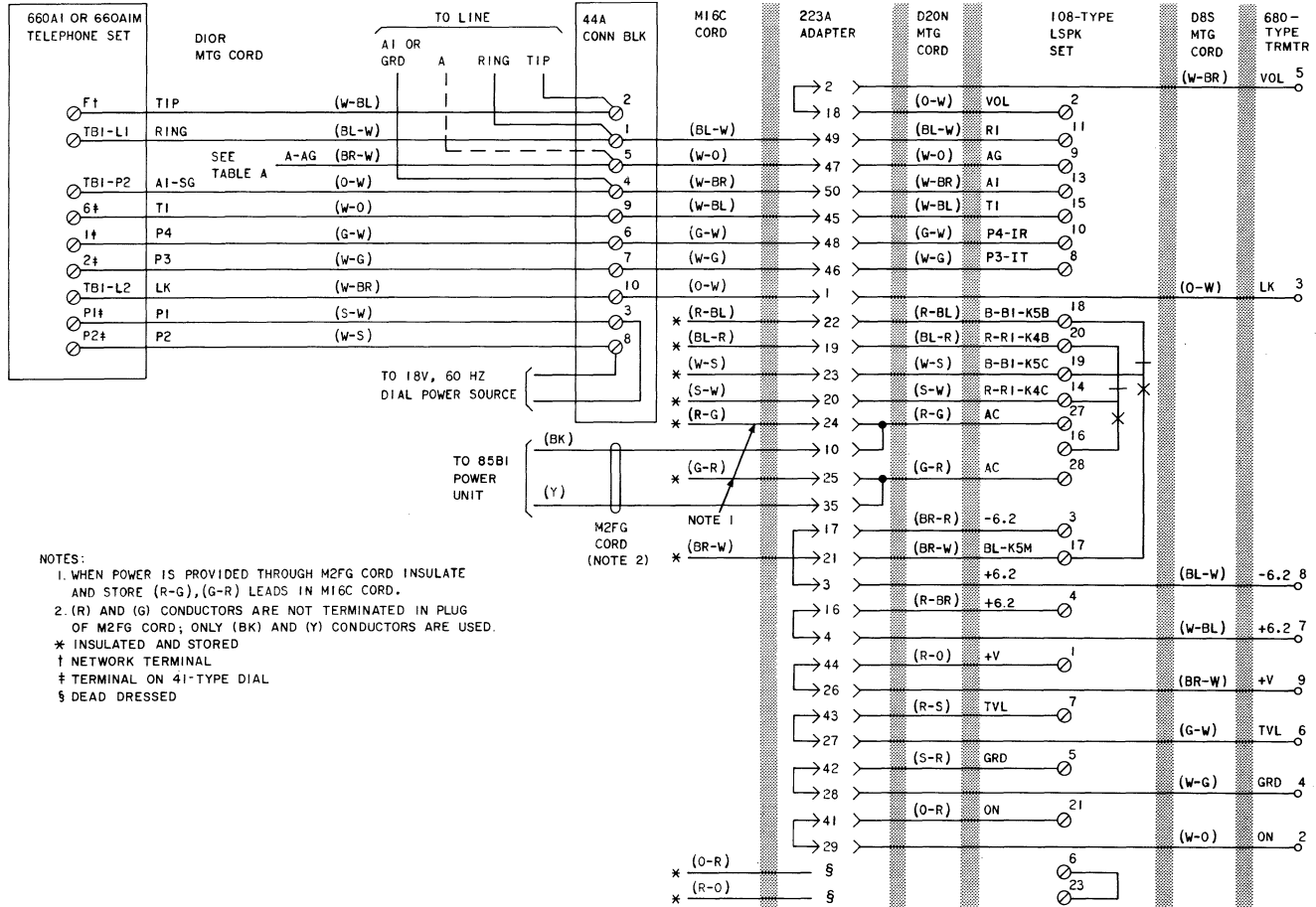


Fig. 4—660A1 or 660A1M Telephone Set, Connections to 4A Speakerphone

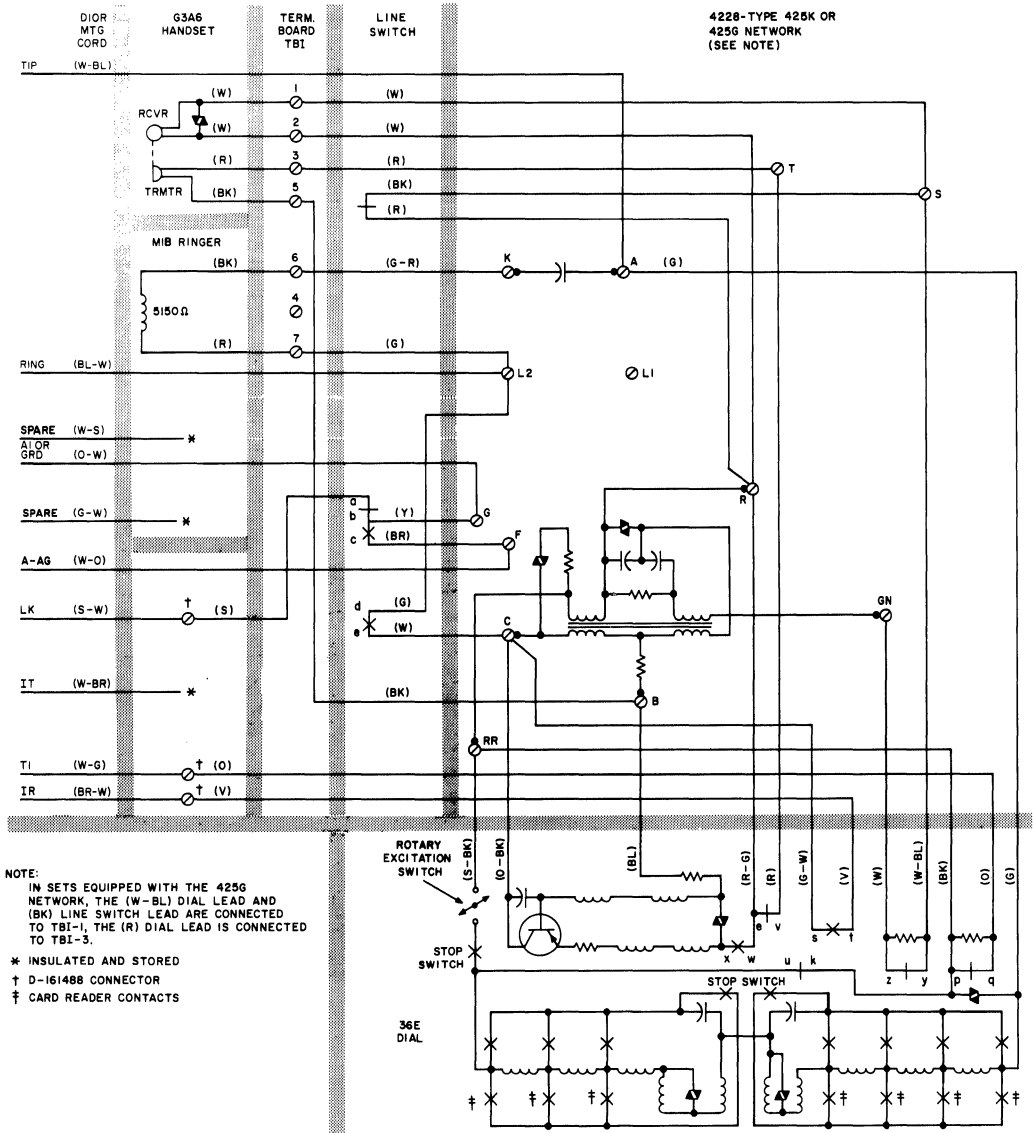


Fig. 5—2660A1 Telephone Set Wired for 4A Speakerphone and 1A1 or 1A2 KTS

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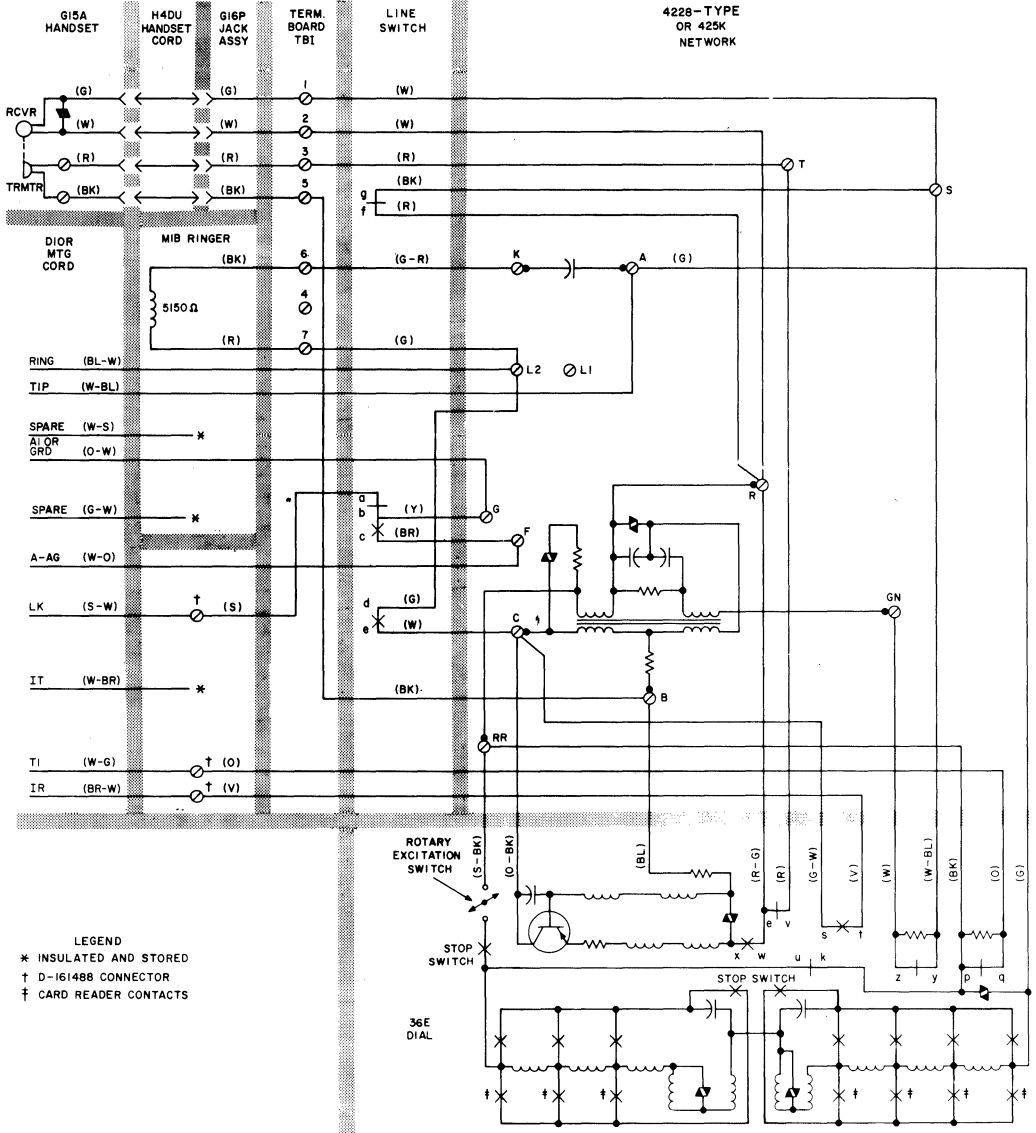
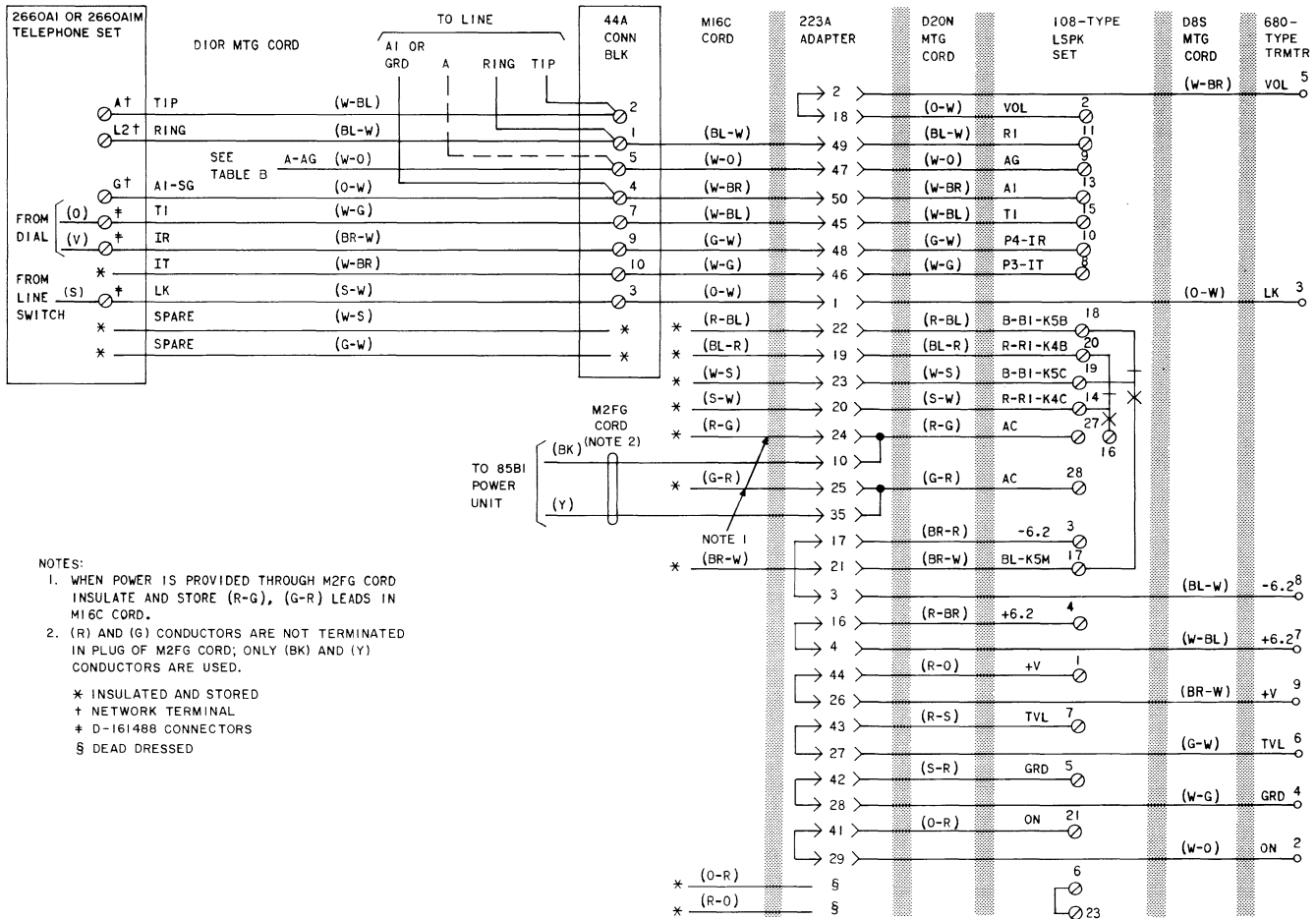


Fig. 6—2660A1M Telephone Set Wired for 4A Speakerphone and 1A1 or 1A2 KTS



NOTES:

1. WHEN POWER IS PROVIDED THROUGH M2FG CORD INSULATE AND STORE (R-G), (G-R) LEADS IN M16C CORD.
2. (R) AND (G) CONDUCTORS ARE NOT TERMINATED IN PLUG OF M2FG CORD; ONLY (BK) AND (Y) CONDUCTORS ARE USED.

\* INSULATED AND STORED  
 † NETWORK TERMINAL  
 ‡ D-161488 CONNECTORS  
 § DEAD DRESSED

Fig. 7—2660A1 or 2660A1M Telephone Set, Connections to 4A Speakerphone

## SPEAKERPHONE SYSTEM—4A

### 662- AND 2662-TYPE TELEPHONE SETS

### CONNECTIONS

#### 1. GENERAL

**1.01** This section contains connection and modification information for using 662- and 2662-type telephone sets with the 4A speakerphone system. Refer to Section 512-700-100 for detailed information on the 4A speakerphone.

**1.02** This section is reissued to:

- Include 82B connecting block
- Include 108AR loudspeaker set
- Include 680A14, 680AR, and 680AR14 transmitters

**1.03** Rotary telephone sets equipped with an 8R dial must be equipped with an 8C dial when connected for 4A speakerphone.

#### 2. CONNECTIONS

**2.01** Mounting cord leads must be connected as shown in Table A, except when M16C cord is terminated inside telephone set (Fig. 1B).

**2.02** To provide speakerphone at stations supplied by A25B connector cable use an 82-type connecting block (Fig. 1A). Those stations supplied by inside wiring cable require a 223A adapter and 66E3-25 or equivalent connecting block (Fig. 1B).

#### 82A ~~or~~ 82B ~~or~~ Connecting Block

**2.03** The connector cable and cords from the telephone set, 108-type loudspeaker set, and 680-type transmitter are installed in the proper receptacles of the connecting block (Fig. 1A and 2).

**2.04** The option plug, furnished as part of the 82-type connecting block (Fig. 1 and 3) must be positioned depending on services required. The arrow on the plug of the D20N cord points to the

option selected on the option plug. "RING CUTOFF" provides cut off of the telephone set ringer through the loudspeaker relay contacts while on speakerphone (Fig. 3A). "AUX RELAY" provides a contact closure for operation of an auxiliary relay key telephone unit when it is desired to cut off several signals. The signal circuits, must be wired through the contacts of the auxiliary relay (Fig. 3B). The option block should be in this position also if no ringer cut off is desired. In this case the auxiliary relay is not required.

**Caution:** *Do not use the (S-V), (V-S) pair for any other purpose as it is designated for auxiliary relay operation.*

**2.05** The cover must be fastened securely to assure proper mating of connectors.

#### 223A Adapter

**2.06** Cords from the loudspeaker set, transmitter and power unit are plugged into the adapter in same relative positions as on the 82-type connecting block. The cover must be fastened securely to assure proper mating of connectors. The telephone set mounting cord is plugged into the 66E3-25 connecting block (Fig. 1B). Access to speakerphone leads is obtained through the M16C cord, either in the set (Fig. 4) or at the connecting block (Fig. 5). At the 66E3-25 connecting block, 161A adapters must be used to connect the spade tips of the M16C cord. Install the adapters as outlined in Section 461-604-100.

**2.07** The same options are available using the 223A adapter as with the 82-type connecting block. Unused speakerphone leads in the mounting cord, or IW cable shall be disconnected as near the telephone set as possible to prevent interference with working circuits (refer to Table A). These leads shall never be multipled between telephone sets. Refer to Section 502-110-100 for more detailed information.

**108A or 108AR Loudspeaker Set**

**2.08** Loudspeaker set and transmitter must be a minimum of one foot apart.

**680A, 680A14, 680AR, or 680AR14 Transmitter**

**2.09** Transmitter must be at least two feet from transformer or any AC powered device.

**85B1 Power Unit**

**2.10** Use an AC power outlet (not under control of a switch) as close as possible to the system being installed. A retaining clamp (841050818) will be shipped with the 85B1 power unit and should be mounted to the AC receptacle to hold power unit securely and to prevent accidental loss of power.

**Caution: Do Not Ground Power Unit and never attempt to use the same power supply for the card dialer and 4A speakerphone system.**

**2.11** Power can be supplied by making connections as shown in Fig. 1, 2, 4, or 5.

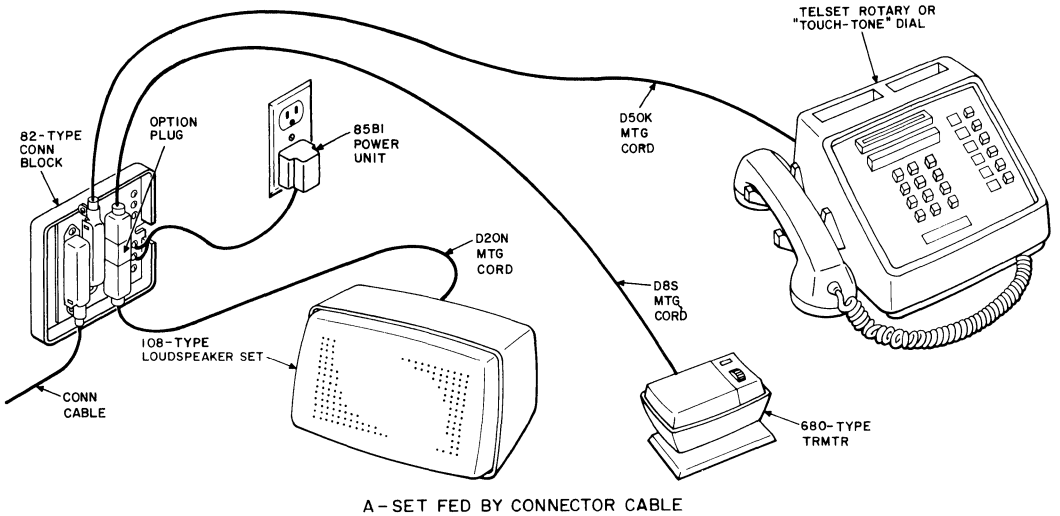
**2.12** The M2FG cord is furnished as part of the 223A adapter for connecting the 85B1 power unit.

**2.13** The 85B1 power unit should be located less than 125 feet from 108-type loudspeaker set when using 24 gauge wire. Refer to Section 512-700-100 for detailed information on power supply applications.

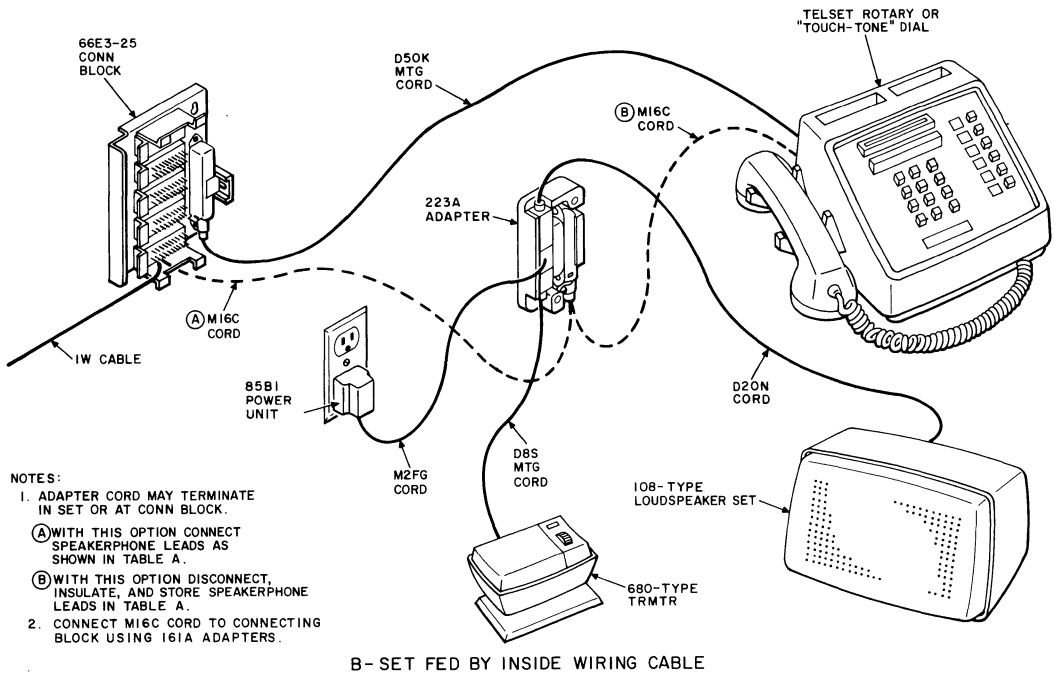
**TABLE A  
TELEPHONE SET MODIFICATIONS FOR 4A SPEAKERPHONE**

LEAD DESIG	LEAD COLOR¶	FROM	TO (662A1 TELSET)	TO (2662A1 TELSET)
R1	G-V	*	R-TBII	
T1	V-G		2-TBI	9-TBII
P4-IR	BR-V		2-41 Dial†	10-TBII§
P3-IT	V-BR		1-41 Dial‡	*
LK	S-V		LK-TBII	
AG	V-S		A-TBII	

- \* — Insulated and stored.
- † — Place strap between terminal 2 of 41-type dial and 4 of TBI.
- ‡ — Place strap between terminal 1 of 41-type dial and 3 of TBI.
- § — Move (V) dial lead from insulated and stored to terminal 10 of TBII.
- ¶ — These leads shall never be multiplied between telephone sets. For more detailed information see Section 502-110-100.



A-SET FED BY CONNECTOR CABLE

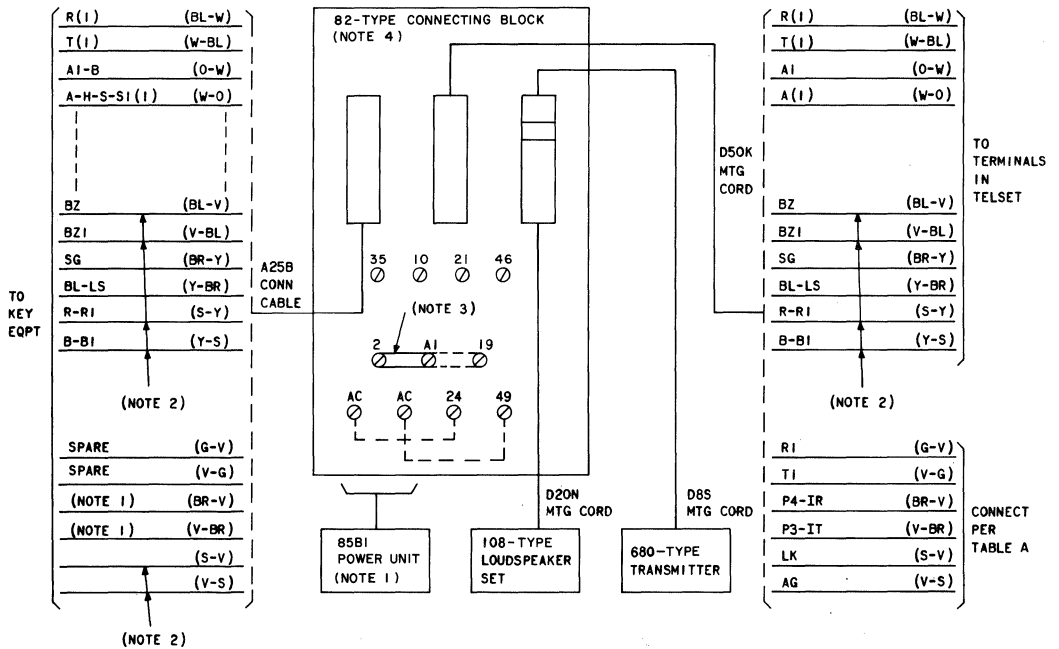


B-SET FED BY INSIDE WIRING CABLE

NOTES:

1. ADAPTER CORD MAY TERMINATE IN SET OR AT CONN BLOCK.
- (A) WITH THIS OPTION CONNECT SPEAKERPHONE LEADS AS SHOWN IN TABLE A.
- (B) WITH THIS OPTION DISCONNECT, INSULATE, AND STORE SPEAKERPHONE LEADS IN TABLE A.
2. CONNECT M16C CORD TO CONNECTING BLOCK USING 161A ADAPTERS.

Fig. 1—Speakerphone Arrangement, 6-Button Card Dialer Telephone Set

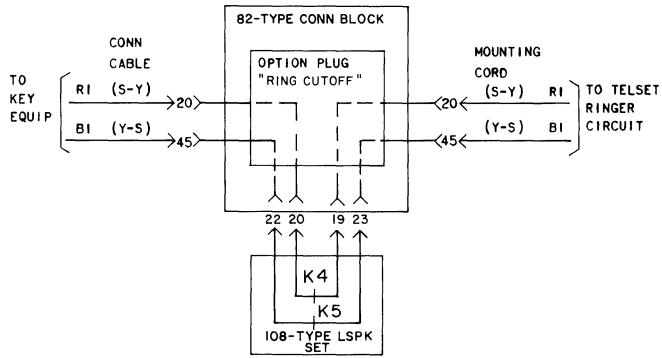


NOTES:

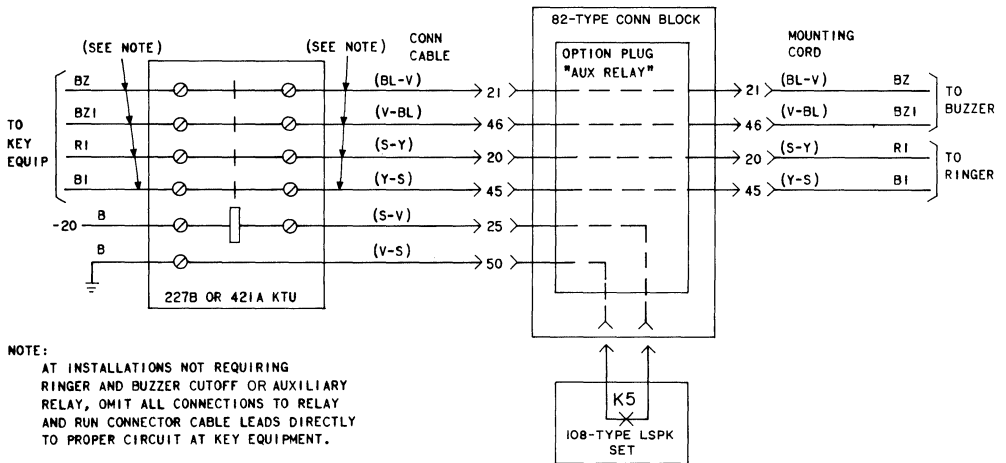
1. LEADS FROM 85BI POWER UNIT MAY BE CONNECTED DIRECTLY TO 82-TYPE CONNECTING BLOCK OR FED THROUGH CONNECTOR CABLE USING (BR-V) AND (V-BR) LEADS. IF CONNECTOR CABLE IS USED STRAP TERMINAL 24 TO ONE AC TERMINAL AND 49 TO OTHER AC TERMINAL AT 82-TYPE CONNECTING BLOCK.
2. LEADS INVOLVED IN OPTIONS. SEE FIG. 3.
3. METAL STRAP FACTORY WIRED FOR 1A1/1A2 KTS, (A1-2). MOVE TO TERMINAL 19 FOR 1A KTS, (A1-19), ONLY WHEN BUSY LAMP OPTION IS PROVIDED.
4. TERMINALS 10, 21, 35, AND 46 ON 82B CONNECTING BLOCK ONLY.

Fig. 2—Speakerphone Connections Using 82A or 82B Connecting Block





A RINGER CUTOFF OPTION



NOTE:  
 AT INSTALLATIONS NOT REQUIRING RINGER AND BUZZER CUTOFF OR AUXILIARY RELAY, OMIT ALL CONNECTIONS TO RELAY AND RUN CONNECTOR CABLE LEADS DIRECTLY TO PROPER CIRCUIT AT KEY EQUIPMENT.

B AUXILIARY RELAY OPTION

Fig. 3—Wiring Involved in Options at 82A or 82B Connecting Block

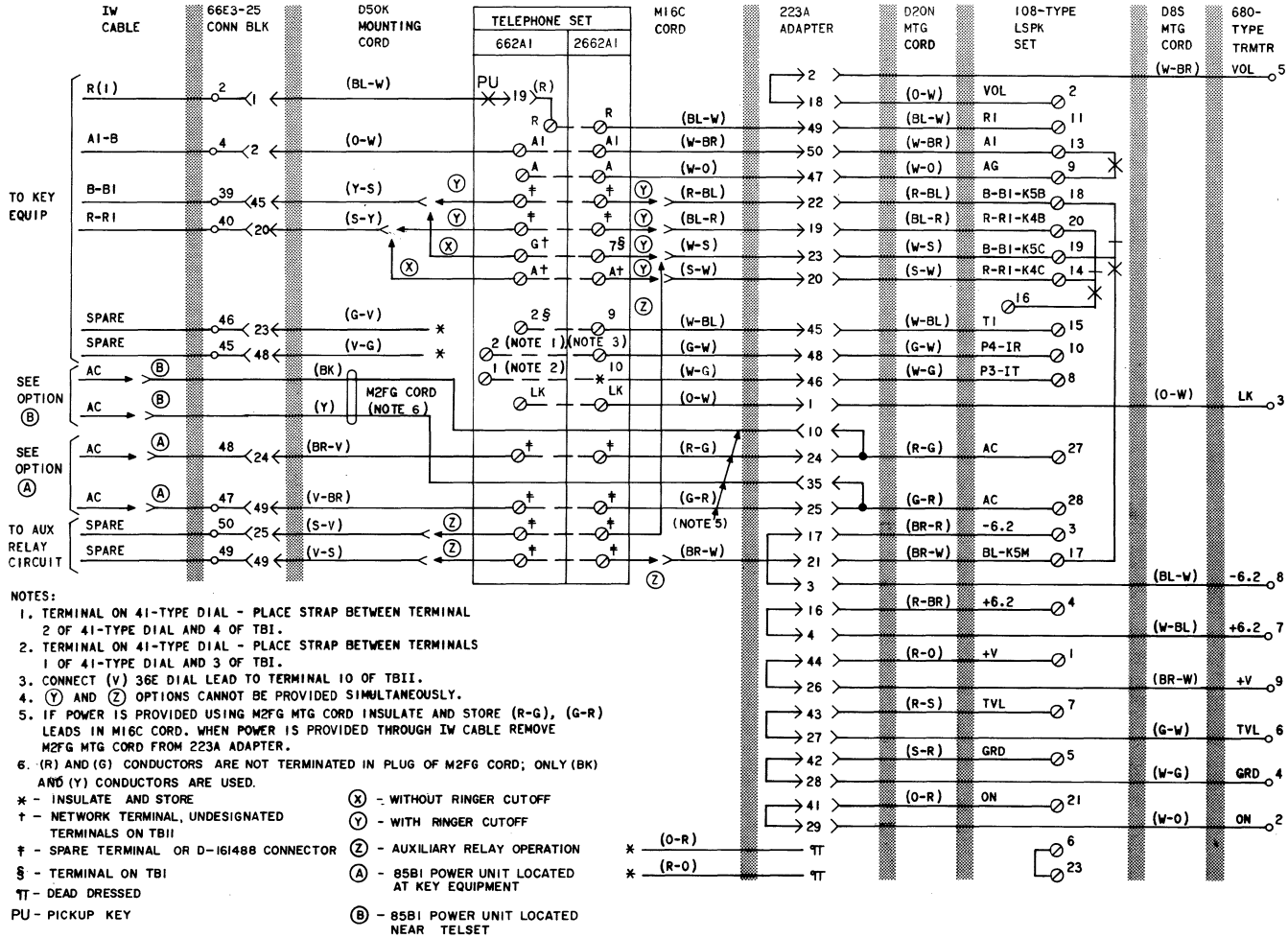


Fig. 4—Speakerphone Connections, Adapter Terminated in Set

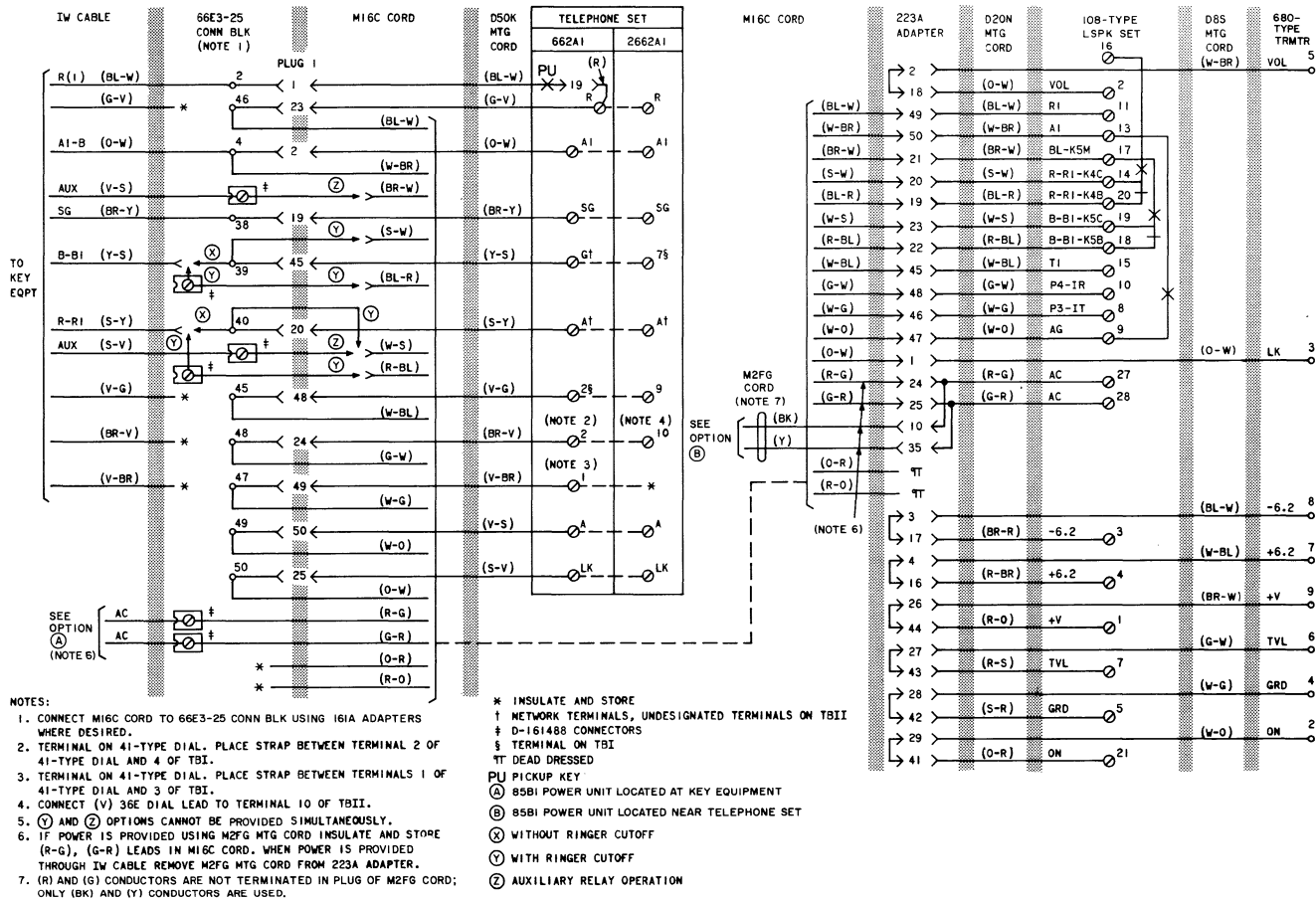


Fig. 5—Speakerphone Connections, Adapter Terminated at 66E3-25 Connecting Block

**SPEAKERPHONE SYSTEM—4A**  
**682AA, 682AAM, 683AA, 683AAM, 2682AA, 2682AAM,**  
**2683AA, AND 2683AAM TELEPHONE SETS**

**1. GENERAL**

**1.01** This section contains connection information for using these CALL DIRECTOR® telephone sets with the 4A speakerphone system. Refer to Section 512-700-100 for detailed information on the components of the 4A speakerphone system.

**1.02** Whenever this section is reissued, the reason for reissue will be listed in this paragraph.

**1.03** An 80A control unit is required when 4A speakerphone is added to telephone sets equipped for 4-wire private line service.

**2. CONNECTIONS**

**80A Control Unit**

**2.01** The cords from the 108-type loudspeaker set, 680-type transmitter and 85B1 power unit are installed in the proper receptacle of the 80A control unit. The retainer must be fastened securely to assure proper mating of connectors.

**2.02** Unused speakerphone leads in the mounting cord or IW cable shall be disconnected so as to prevent interference with working circuits. These leads shall never be multipled between telephone sets. Refer to Section 502-110-100 for more detailed information.

**108-Type Loudspeaker Set**

**2.03** The loudspeaker set and transmitter must be a minimum of one foot apart.

**680-Type Transmitter**

**2.04** The transmitter must be at least two feet from transformer or any AC powered device.

**85B1 Power Unit**

**2.05** Power can be supplied by connecting 85B1 power unit as shown in Fig. 1, 2, and 3.

**2.06** The M2FG cord is furnished as part of the 80A control unit for connecting the 85B1 power unit.

**2.07** Use an AC power outlet (not under control of a switch) located as close as possible to the system being installed. A 841050818 retaining clamp will be shipped with the 85B1 power unit and should be mounted to the AC receptacle to hold power unit securely.

**Caution: Do not Ground Power Unit.**

**2.08** The 85B1 power unit should be located less than 125 feet from 108-type loudspeaker set when using 24 gauge wire. Refer to Section 512-700-100 for detailed information on power supply applications.

**2.09** Supply voltage for the 80A control unit is provided from a -24 volt DC external supply, (from associated key telephone system). Connect supply voltage to the proper terminals as shown in Fig. 2 and 3.

**NOTICE**

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

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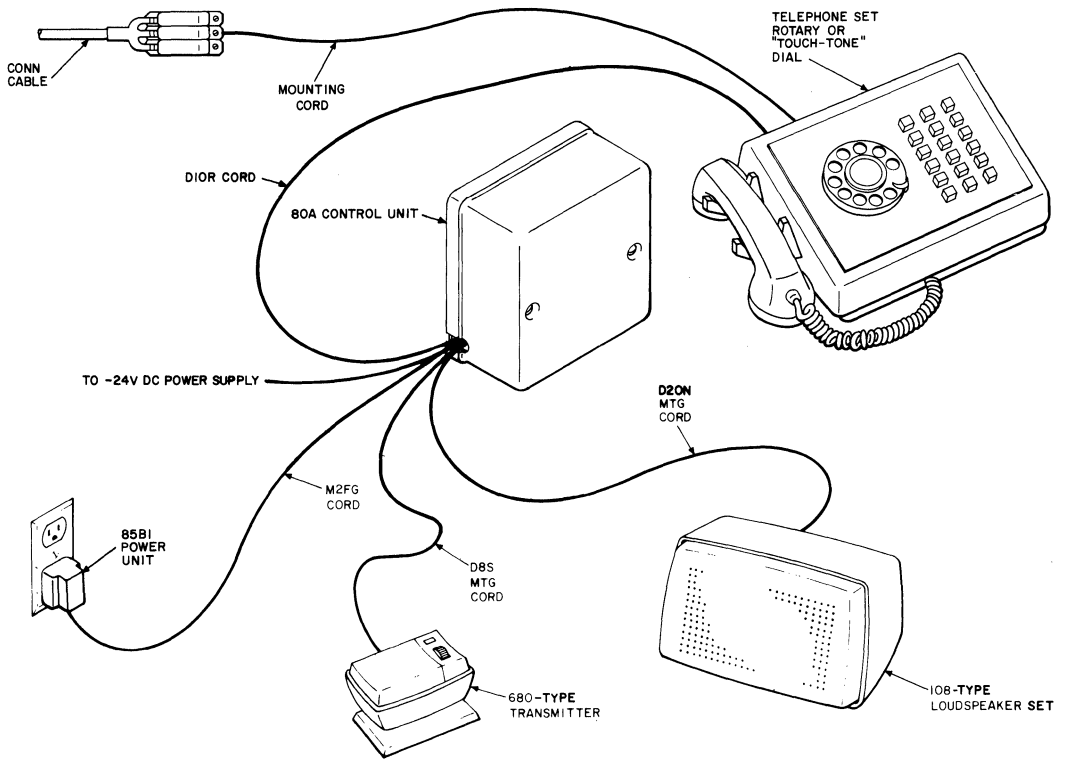


Fig. 1—Speakerphone Arrangement, CALL DIRECTOR (2-Wire or 4-Wire) Telephone Sets

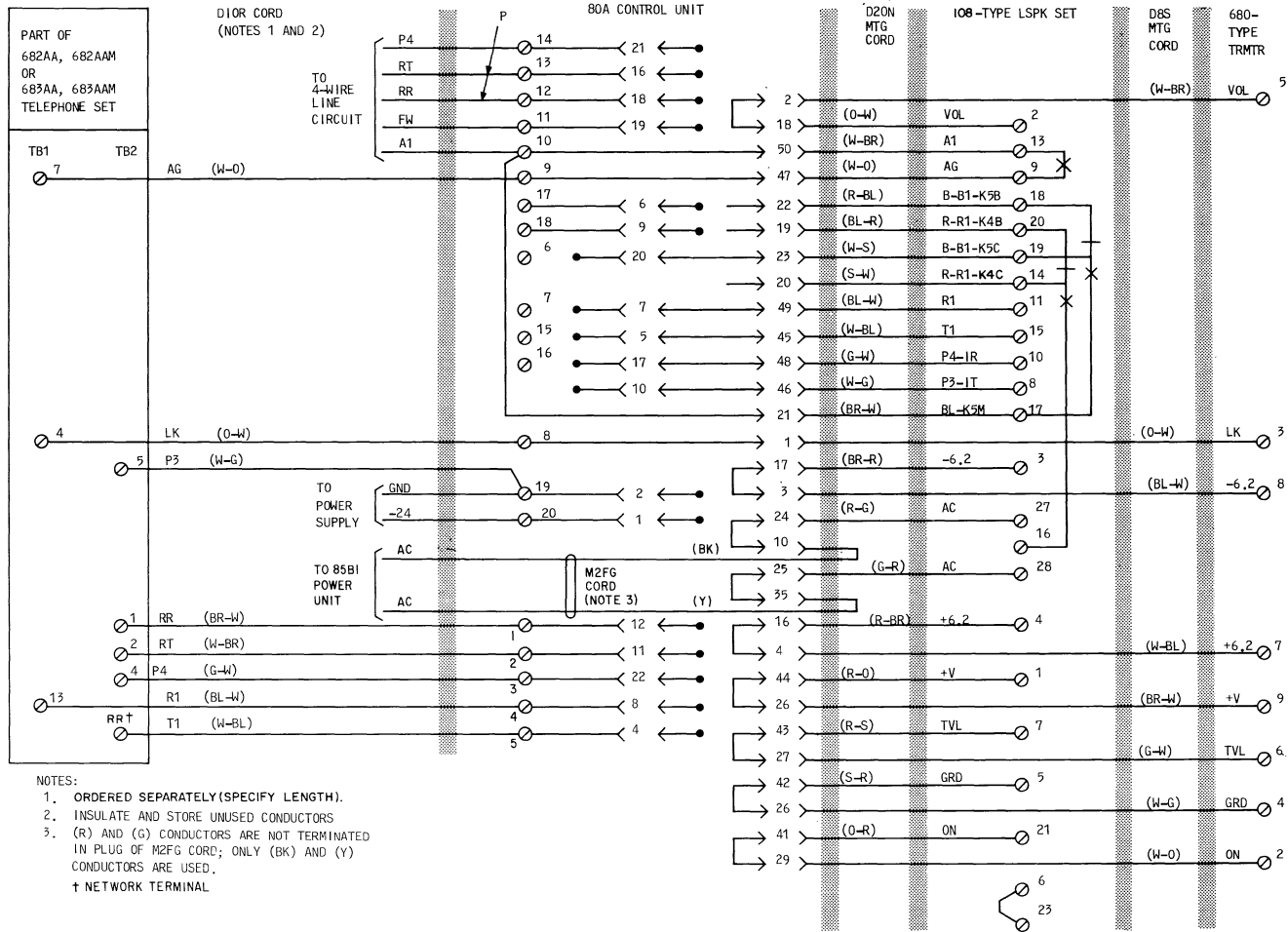
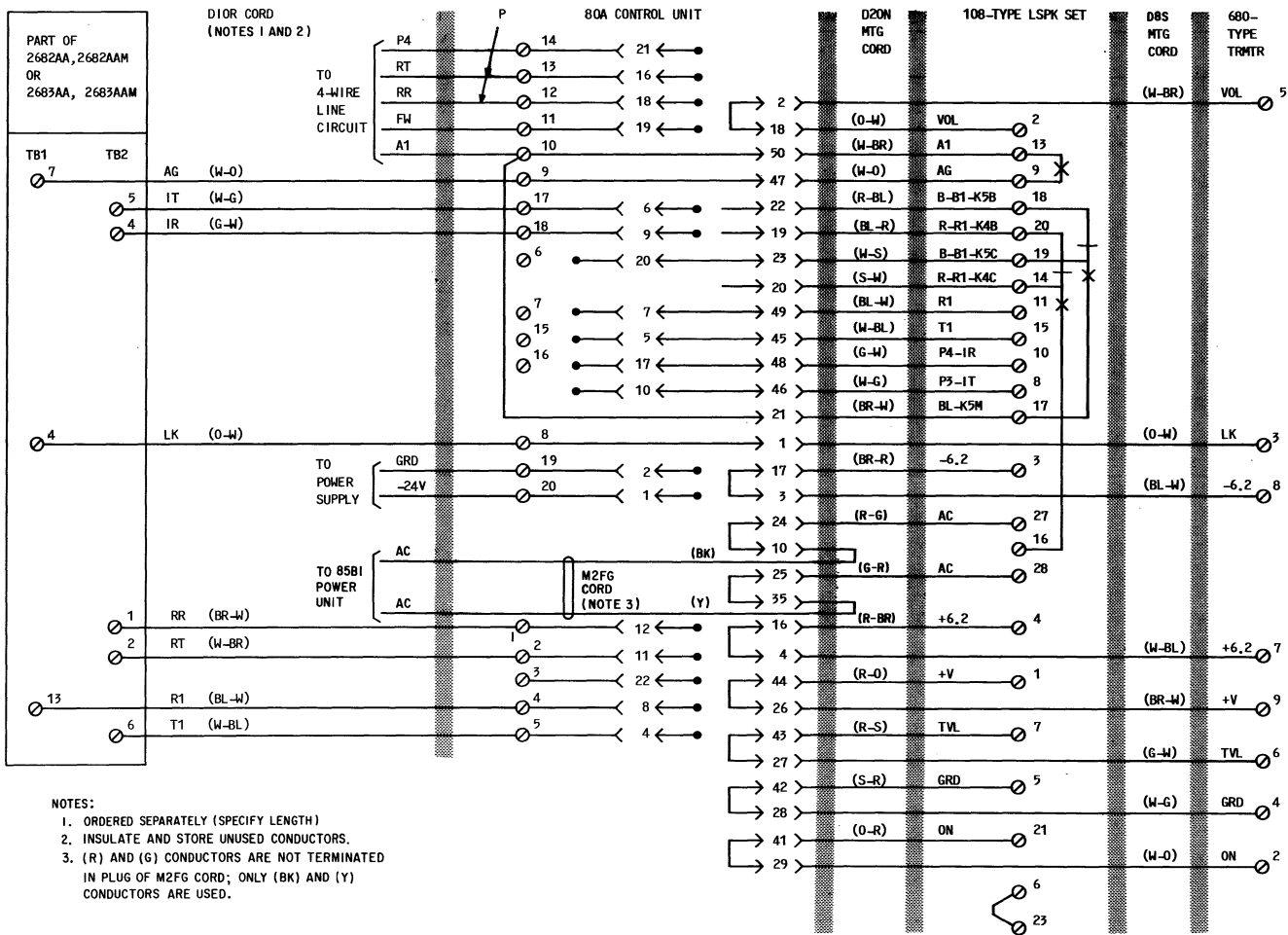


Fig. 2—4A Speakerphone Connections, Telephone Set Equipped With a Rotary Dial



- NOTES:**
1. ORDERED SEPARATELY (SPECIFY LENGTH)
  2. INSULATE AND STORE UNUSED CONDUCTORS.
  3. (R) AND (G) CONDUCTORS ARE NOT TERMINATED IN PLUG OF M2FG CORD; ONLY (BK) AND (Y) CONDUCTORS ARE USED.

Fig. 3—4A Speakerphone Connections, Telephone Set Equipped With a TOUCH-TONE Dial

## SPEAKERPHONE SYSTEM—4A

### 702B AND 2702B TELEPHONE SETS

### CONNECTIONS

#### 1. GENERAL

**1.01** Refer to Section 512-700-100 for detailed information on the components of the 4A speakerphone system.

**1.02** This section is reissued to add:

- 108AR loudspeaker set
- 680A14, 680AR, and 680AR14 transmitters

**1.03** To provide 4A speakerphone feature at these telephone sets, refer to (Fig. 1) for layout arrangement of the components required for the system and (Fig. 2, 3, or 4) for individual lead connections.

**1.04** These sets are factory-wired for non-KTS use. If used with speakerphone and KTS, refer to Table A and (Fig. 2) for modification and connections of the 702B set and Table B and (Fig. 3) for the 2702B set.

#### 2. CONNECTIONS

##### 223A Adapter

**2.01** The cords from the 108-type loudspeaker set, 680-type transmitter, and 85B1 power unit are installed in the proper receptacle of the 223A adapter. The cover must be fastened securely to assure proper mating of connectors.

##### 108A or 108AR Loudspeaker Set

**2.02** The loudspeaker set and transmitter must be placed a minimum of one foot apart.

##### 680A, 680A14, 680AR, or 680AR14 Transmitter

**2.03** The transmitter must be at least two feet from transformer or any AC power device.

##### 85B1 Power Unit

**2.04** Power can be supplied by connecting 85B1 power unit as shown in Fig. 1 or 4.

**2.05** Use an AC power outlet (not under control of a switch) located as close as possible to the system being installed. A 841050818 retaining clamp will be shipped with the 85B1 power unit and should be mounted to the AC receptacle to hold power unit securely.

**Caution:** *Do Not Ground Power Unit.*

**2.06** The M2FG cord is furnished as part of the 223A adapter for connecting the 85B1 power unit.

**2.07** The 85B1 power unit should be located less than 125 feet from 108-type loudspeaker set when using 24 gauge wire. Refer to Section 512-700-100 for detailed information on power supply applications.



**TABLE A**  
**702B TELEPHONE SET**  
**MODIFICATIONS FOR 4A SPEAKERPHONE**

WIRE OR LEAD	COLOR	REMOVE FROM NET.	CONNECT TO	
			NET.	TERM. BLOCK
Line Switch	(S)	A	L2	
	(Y) [S-Y]	L2		3
	(BR) [S-BR]	C	G	
Ringer	(BK)	G	L1	
Network	(BK) [S-BK]	A	‡	
Strap*			A ↔ C	
D5AK or D6AF Mounting Cord (See Note)	(R)		C	
	(BL) †		G	
	(Y)		L2	
	(G)		L1	
	(W)			3
	(BK)			4

\* M1W cord or equivalent.

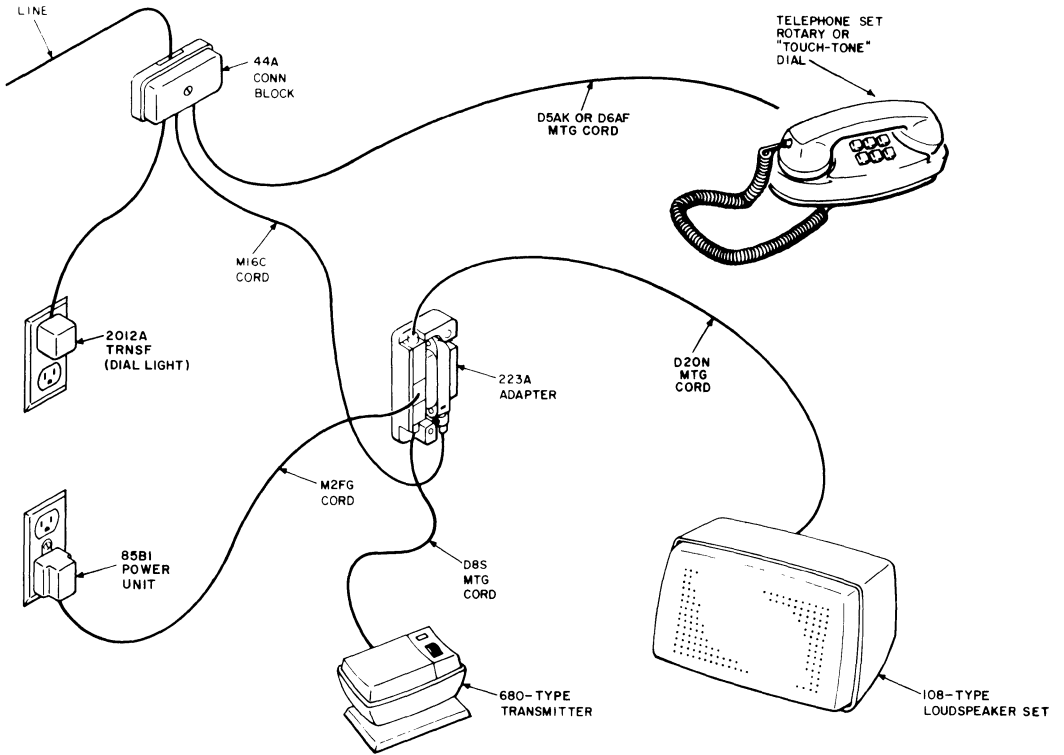
† D6AF mounting cord only.

‡ Insulate and store.

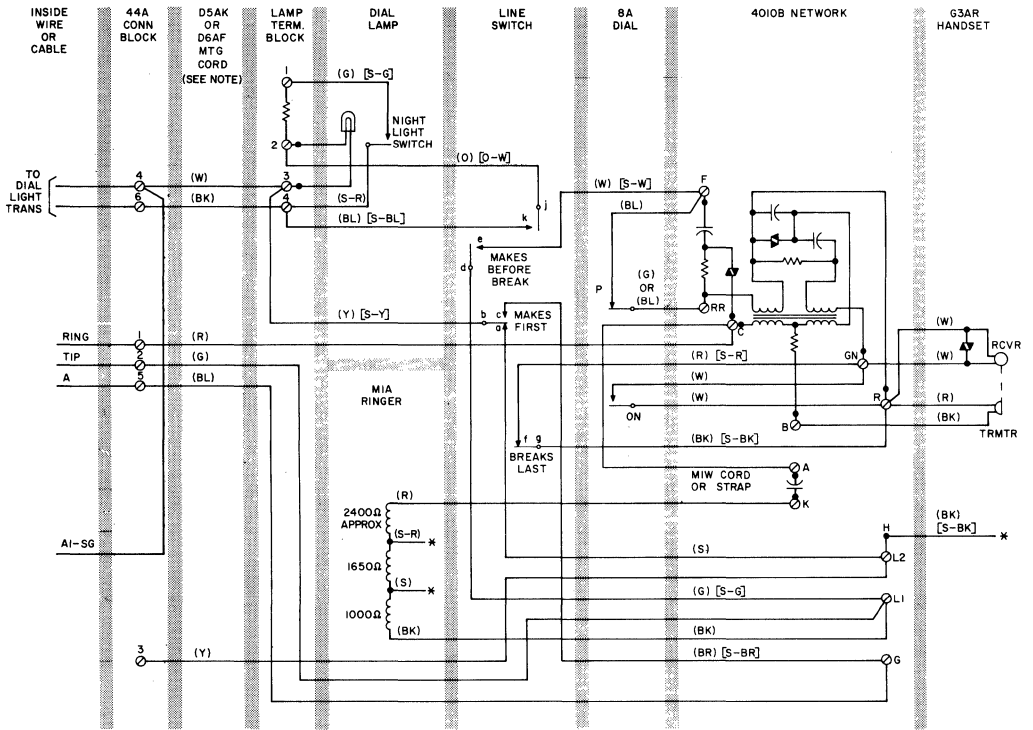
( ) Current color.

[ ] MD color.

**Note:** Replace D5AK mounting cord with D6AF mounting cord when both KTS and speakerphone are required.



◆ Fig. 1—Speakerphone Arrangement, 702B and 2702B Telephone Set ◆

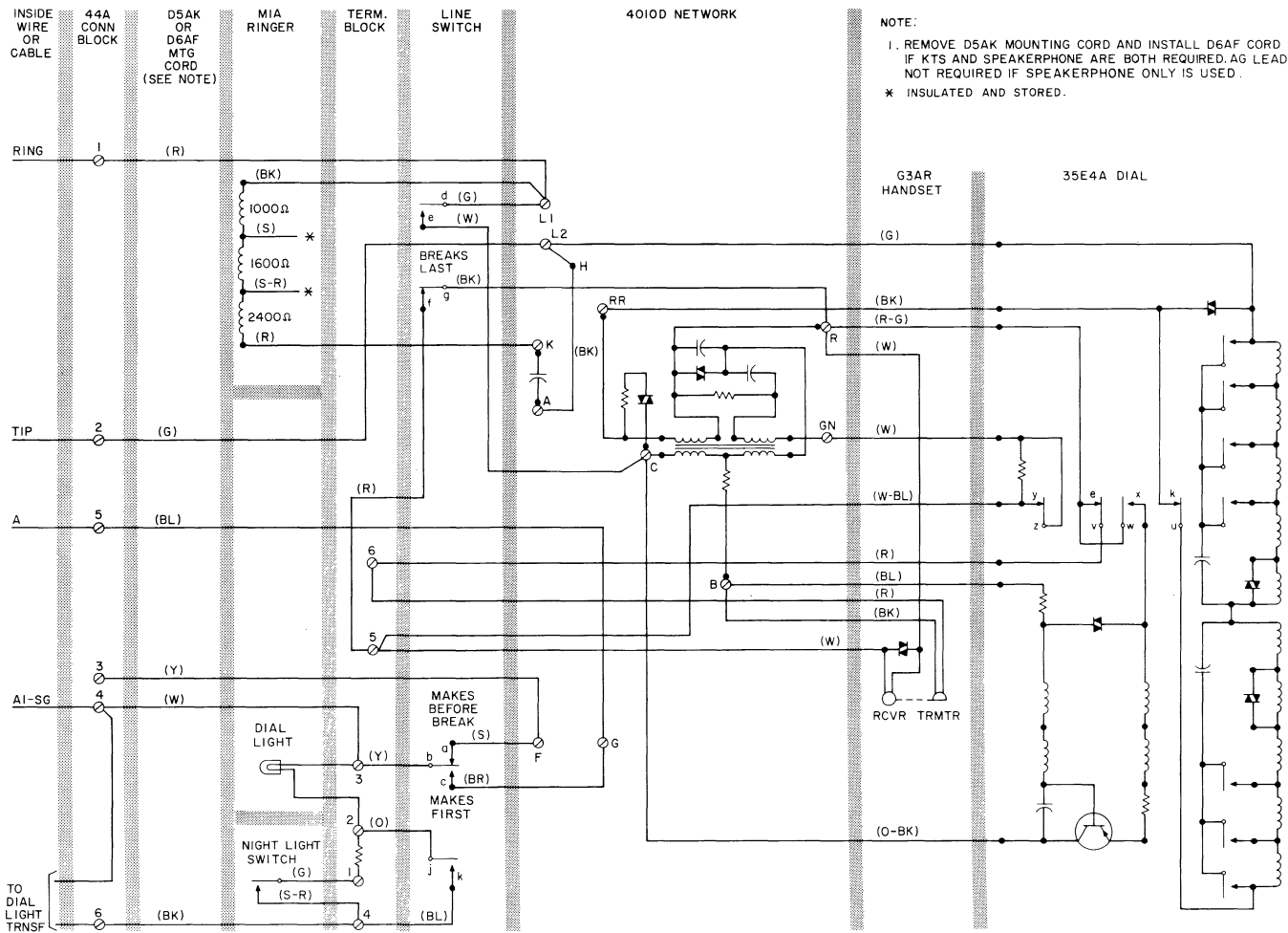


NOTE:  
 REMOVE D5AK MOUNTING CORD AND INSTALL D6AF CORD IF KTS AND SPEAKERPHONE ARE BOTH REQUIRED. AG LEAD NOT REQUIRED IF SPEAKERPHONE ONLY IS USED.

P - DIAL PULSE  
 ON - DIAL OFF-NORMAL

( ) CURRENT COLOR CODE.  
 □ MD COLOR CODE.  
 \* INSULATED AND STORED.

Fig. 2—702B Telephone Set, Wired for 4A Speakerphone and KTS Use



NOTE:  
 1. REMOVE D5AK MOUNTING CORD AND INSTALL D6AF CORD IF KTS AND SPEAKERPHONE ARE BOTH REQUIRED. AG LEAD NOT REQUIRED IF SPEAKERPHONE ONLY IS USED.  
 \* INSULATED AND STORED.

Fig. 3—2702B Telephone Set, Wired for 4A Speakerphone and KTS Use

**TABLE B**  
**2702B TELEPHONE SET**  
**MODIFICATIONS FOR 4A SPEAKERPHONE**

WIRE OR LEAD	COLOR	REMOVE FROM NET.	CONNECT TO	
			NET.	TERM. BLOCK
Line Switch	W	F	C	
	S	A	F	
	Y	L2		3
	BR	C	G	
Ringer	BK	G	L1	
Network Strap	BK	*	A	
D5AK or D6AF Mtg Cord (See Note)	R		L1	
	G		L2	
	BL†		G	
	Y		F	
	W			3
	BK			4
Dial	G	F	L2	

\* Remove from stored location.

† D6AF mounting cord only.

**Note:** Replace D5AK mounting cord with D6AF mounting cord when both KTS and speakerphone are required.

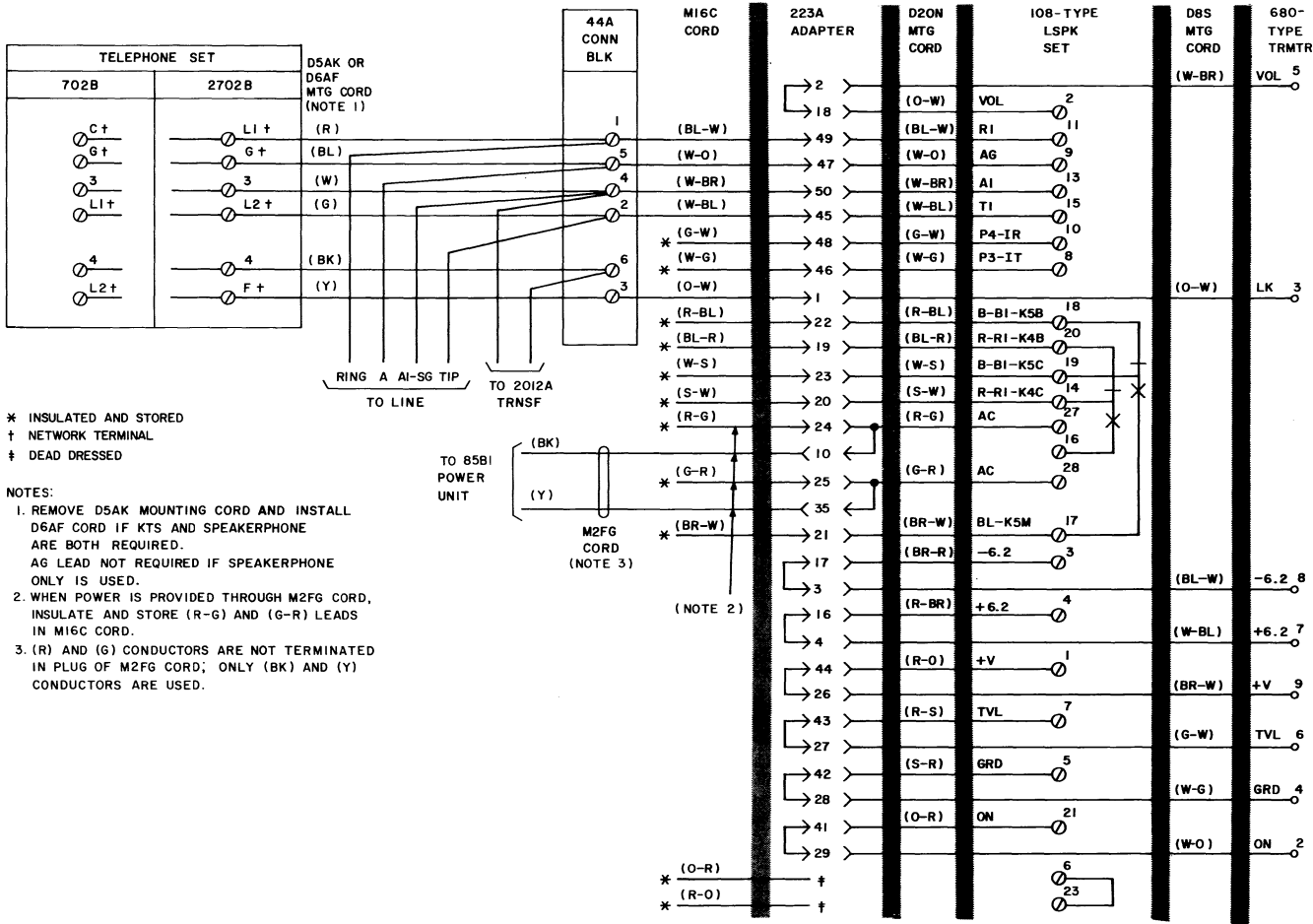


Fig. 4—4A Speakerphone Connections Using 223A Adapter

## SPEAKERPHONE SYSTEM—4A

### 711B, 712B, 712BM, 2712B, AND 2712BM TELEPHONE SETS

### CONNECTIONS

#### 1. GENERAL

1.01 Refer to Section 512-700-100 for detailed information on the components of the 4A speakerphone system.

1.02 This section is reissued to add:

- Information on the 712BM and 2712BM telephone sets Fig. 2 and 7
- Safety information for installing or removing the 85B1 power unit.

1.03 To provide 4A speakerphone feature at these telephone sets, refer to (Fig. 1 and 2) for layout arrangement of the components required for the system and (Fig. 3, 4, 5, 6, or 7) for individual lead connections.

1.04 ♦The 711B (MD) telephone set is factory-wired for non-KTS use (Fig. 3). The 712B, 712BM, 2712B, or 2712BM telephone sets can be used with or without 1A1 or 1A2 KTS (Fig. 4, 5, or 7). Refer to appropriate modification table shown in Fig. 4 or 5 when connecting 712B or 2712B telephone set.♦

#### 2. CONNECTIONS

##### 223A Adapter

2.01 The cords from the 108-type loudspeaker set, 680-type transmitter, and 85B1 power unit are installed in the proper receptacle of the 223A adapter. The cover must be fastened securely to assure proper mating of connectors.

##### 108-Type Loudspeaker Set

2.02 The loudspeaker set and transmitter must be placed a minimum of one foot apart.

##### 680-Type Transmitter

2.03 The transmitter must be at least two feet from transformer or any AC powered device.

##### 85B1 Power Unit

2.04 Power can be supplied by connecting 85B1 power unit as shown in Fig. 1, 2, 6, or 7.

2.05 Use an AC power outlet (not under control of a switch) located as close as possible to the system being installed. A 841050818 retaining clamp will be shipped with the 85B1 power unit and should be mounted to the AC receptacle to hold power unit securely.

***Danger: ♦For safety, securely attach retaining clamp to ac outlet using outlet cover screw BEFORE attempting to install 85B1 power unit. The power unit should always be unplugged completely from the outlet BEFORE attempting to remove the retaining clamp.♦***

***Caution: Do Not Ground Power Unit.***

2.06 The M2FG cord is furnished as part of the 223A adapter for connecting the 85B1 power unit.

2.07 The 85B1 power unit should be located less than 125 feet from 108-type loudspeaker set when using 24 gauge wire. Refer to Section 512-700-100 for detailed information on power supply application.

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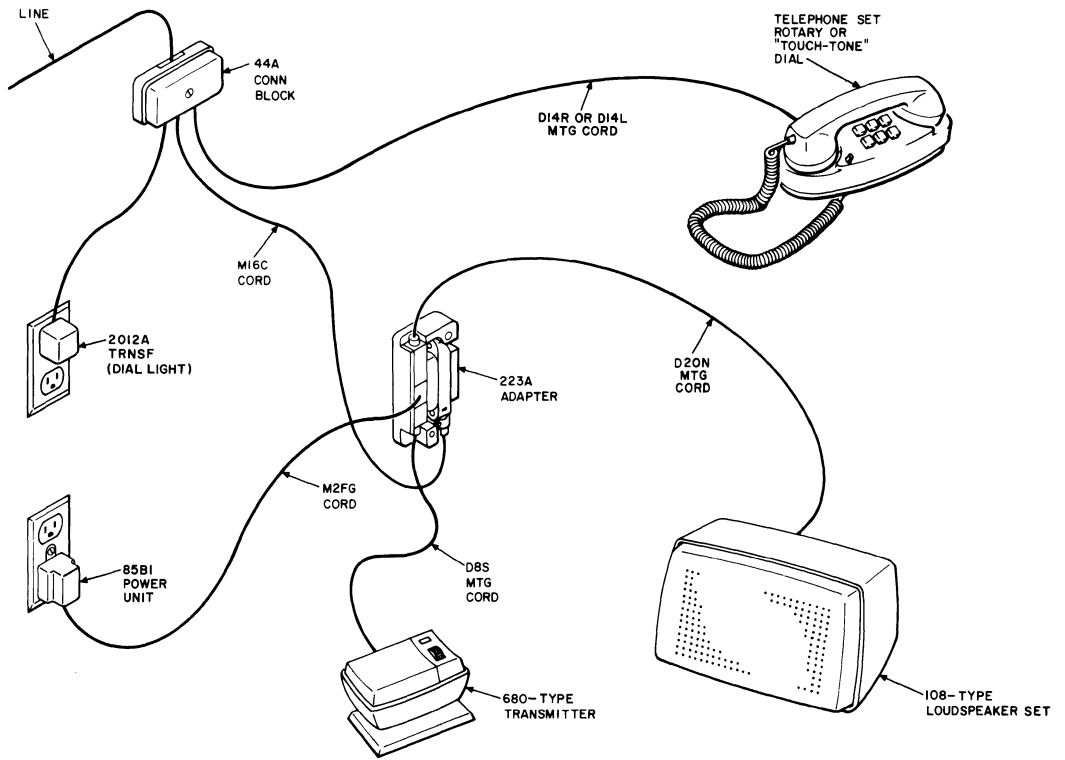
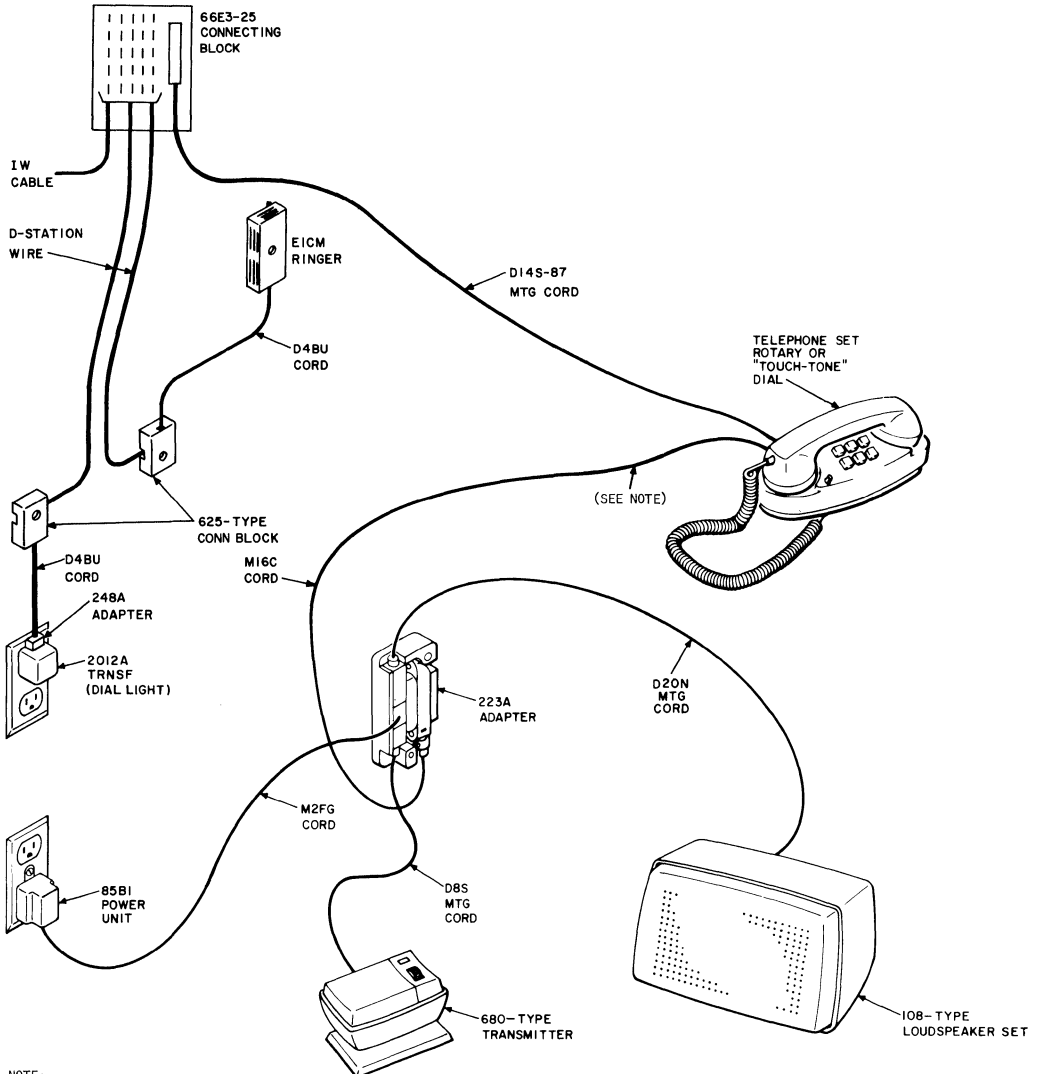


Fig. 1—Speakerphone Arrangement, 711B (MD), 712B, or 2712B Telephone Set





NOTE:  
 PLACE CORD THROUGH NOTCH IN BASE AND SECURE  
 CORD STAYHOOK UNDER SHOULDER SCREW  
 WHICH HOLDS THE KEY TO THE DIAL BRACKET.

Fig. 2—Speakerphone Arrangement, 712BM or 2712BM Telephone Set

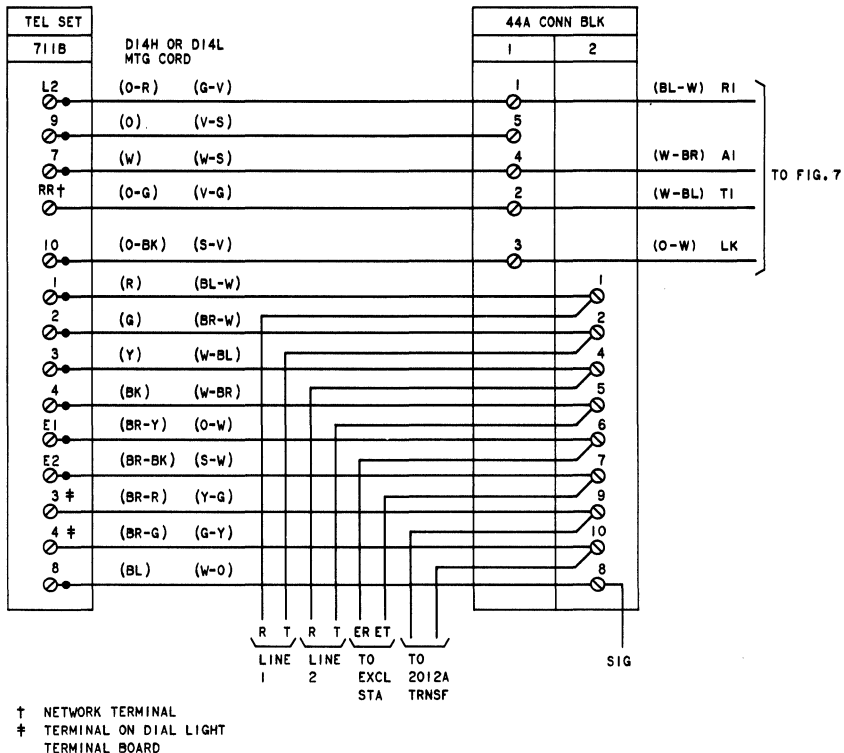
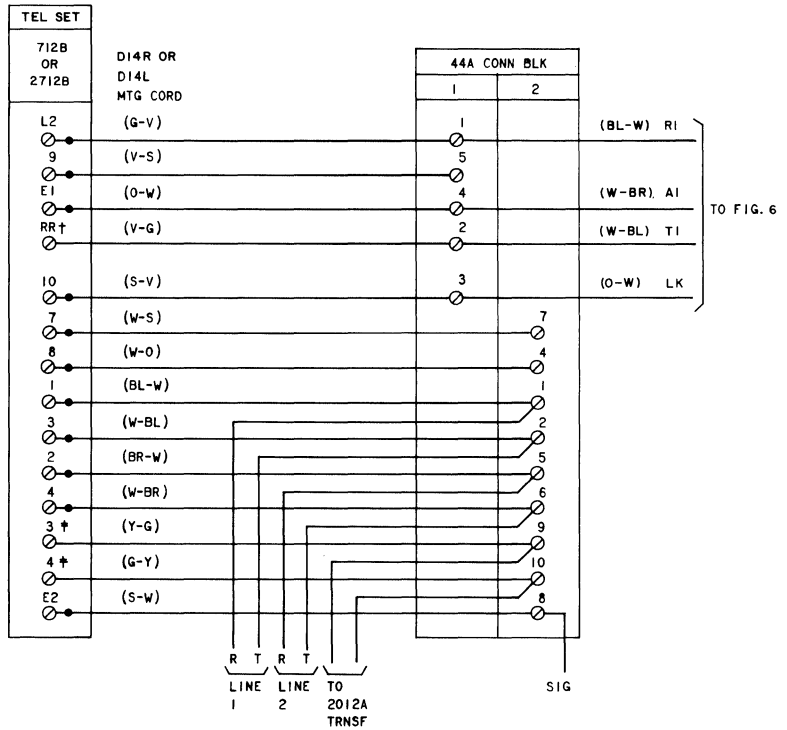


Fig. 3—711B (MD) Telephone Set, Wired for 2-Line Pickup, Exclusion on Line 1, Signaling and 4A Speakerphone (Not to be used with 1A1 or 1A2 KTS)

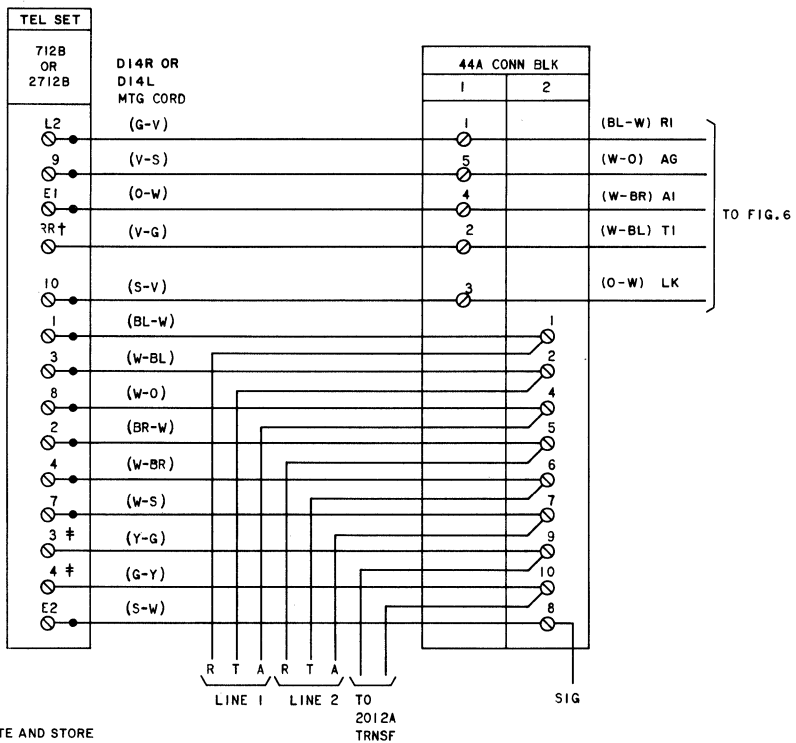


† NETWORK TERMINAL  
 ‡ TERMINAL ON DIAL LIGHT  
 TERMINAL BOARD

712B OR 2712B TELEPHONE SET  
 MODIFICATION FOR 4A SPEAKERPHONE  
 (NOT TO BE USED WITH KTS)

WIRE OR LEAD	COLOR	REMOVE FROM		CONNECT TO
		TERM. STRIP	NET.	
638B LINE KEY	(W)	7		E1
LINE SWITCH	(BR)	E1		9
	(S)		LI	10

Fig. 4—712B or 2712B Telephone Set, Wired for 2-Line Pickup, Hold on Line 1, Signaling and 4A Speakerphone (Not to be used with 1A1 or 1A2 KTS)



- \* INSULATE AND STORE
- † NETWORK TERMINAL
- ‡ TERMINAL ON DIAL LIGHT TERMINAL BOARD

712B OR 2712B TELEPHONE SET  
 MODIFICATION FOR 4A SPEAKERPHONE  
 (USED WITH 1A1 OR 1A2 KTS)

WIRE OR LEAD	COLOR	REMOVE FROM		CONNECT TO
		NET	TERM. STRIP	TERM. STRIP
LINE SWITCH	(BR)		E1	9
	(S)	LI		10
638B LINE KEY	(W-O)	G		9
	(O-BK)		10	8
	(O)		9	7
	(S)		8	*
	(W)		7	E1
EXCLUSION SWITCH	(BR)		1	*
	(W)		3	*
	(BK)		3	*

Fig. 5—712B or 2712B Telephone Set, Wired for 2-Line Pickup, Hold on Line 1, Signaling, and 4A Speakerphone (Used with 1A1 or 1A2 KTS)

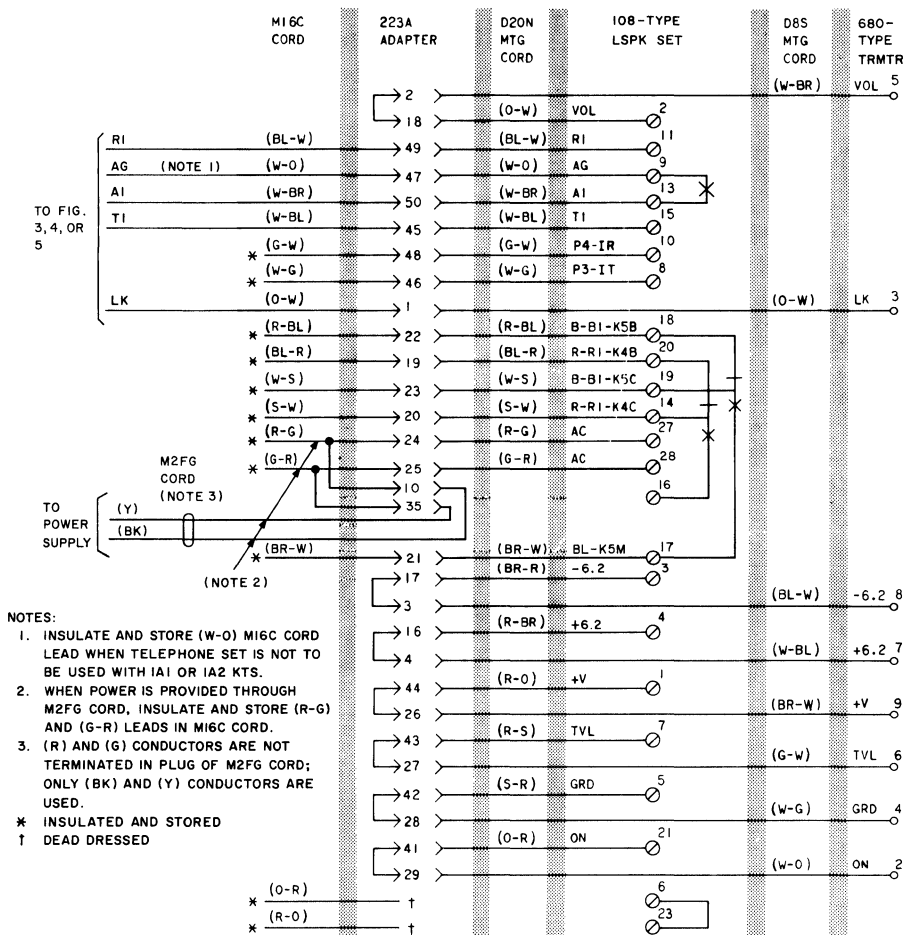


Fig. 6—4A Speakerphone Connections Using 223A Adapter for Sets Shown in Fig. 3, 4, and 5

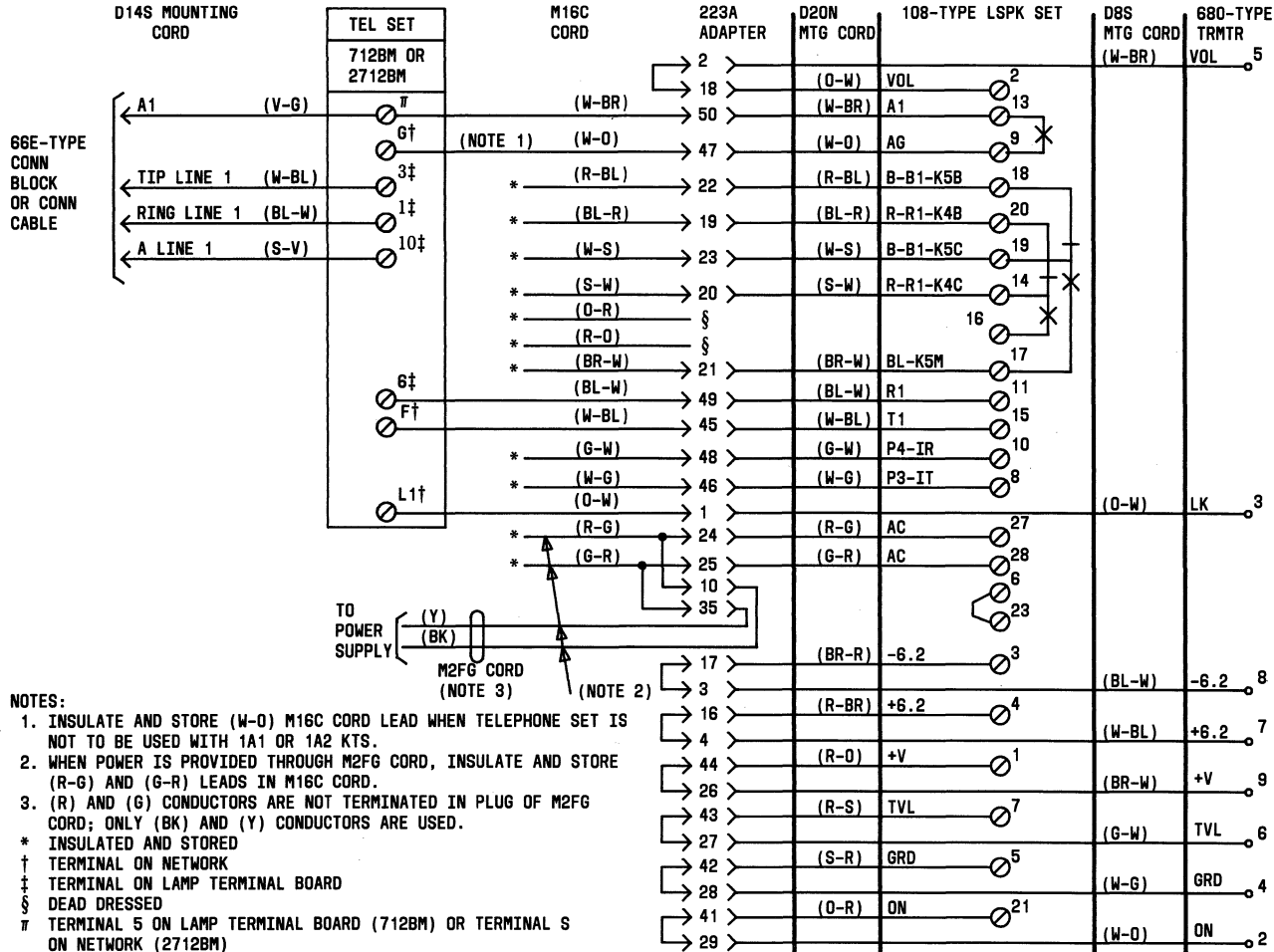


Fig. 7—4A Speakerphone Connections Using 223A Adapter, With 712BM or 2712BM Telephone Set, Wired for 2-Line Pickup, Exclusion on Line 1, and Signaling (Used with 1A1 or 1A2 KTS) ¶

## SPEAKERPHONE SYSTEM—4A

### 830-, 831-, 2830-, AND 2831-TYPE TELEPHONE SETS

### CONNECTIONS

#### 1. GENERAL

**1.01** This section provides information necessary to connect the 830-, 831-, 2830-, or 2831-type telephone set to provide speakerphone service. Refer to Section 512-700-100 for detailed information on components of the 4A speakerphone system.

**1.02** This section is reissued to show wiring changes which must be made when using speakerphone with CM or DM modular coded sets, equipped with new line switch, Fig. 2 and Table A.

**1.03** Rotary telephone sets equipped with an 8RA dial must be equipped with an 8CA dial when connected for 4A speakerphone. The second set of off-normal contacts on 8CA dial shall connect to the same terminals as P3 and P4 leads from the speakerphone.

#### 2. CONNECTIONS

##### 223A Adapter

**2.01** The cords from the 108-type loudspeaker set, 680-type transmitter, and 85B1 power unit are installed in the proper receptacles of the 223A adapter. The cover must be fastened securely to assure proper mating of connectors.

**2.02** "Ringer Cutoff" can be provided by connecting ringer leads as shown in Fig. 2. Ringer cutoff provides cut off of the telephone set ringer through the loudspeaker set relay contacts while on speakerphone.

**2.03** Due to insufficient mounting cord conductors in the other sets, the auxiliary relay feature can only be used in the 831DM, and 2831DM

(modular) telephone sets. The auxiliary feature provides a contact closure for the operation of an auxiliary relay key telephone unit when it is desired to cut off several signals.

##### 108-Type Loudspeaker Set

**2.04** Loudspeaker set and transmitter must be a minimum of one foot apart.

##### 680-Type Transmitter

**2.05** Transmitter must be at least two feet from transformer or any AC powered device.

##### 85B1 Power Unit

**2.06** Use an AC power outlet (not under control of a switch) as close as possible to the system being installed. A retaining clamp (841050818) will be shipped with the 85B1 power unit and should be mounted to the AC receptacle to hold power unit securely, and to prevent accidental loss of power.

**Caution: Do Not Ground Power Unit.**

**2.07** Power can be provided by making connections as shown in Fig. 1 and 2.

**2.08** The M2FG cord is furnished as part of the 223A adapter for connecting the 85B1 power unit.

**2.09** The 85B1 power unit should be located less than 125 feet from 108-type loudspeaker set when using 24 gauge wire. Refer to Section 512-700-100 for detailed power supply information.

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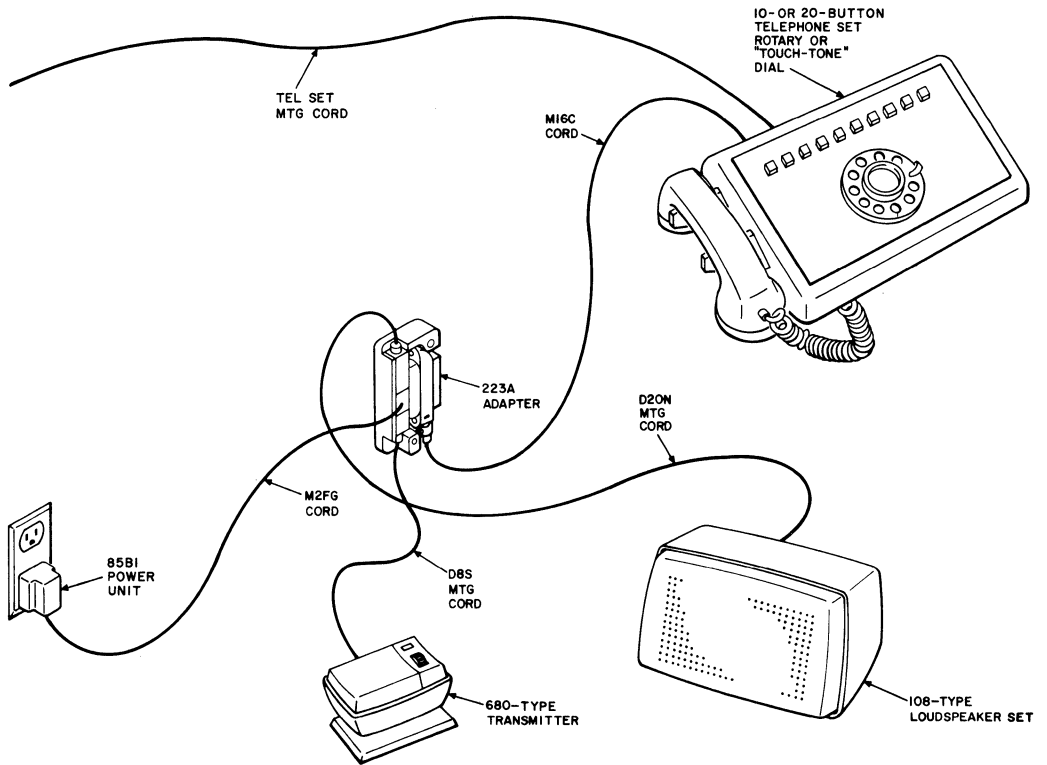


Fig. 1—Speakerphone Arrangement, 10- or 20-Button Telephone Set



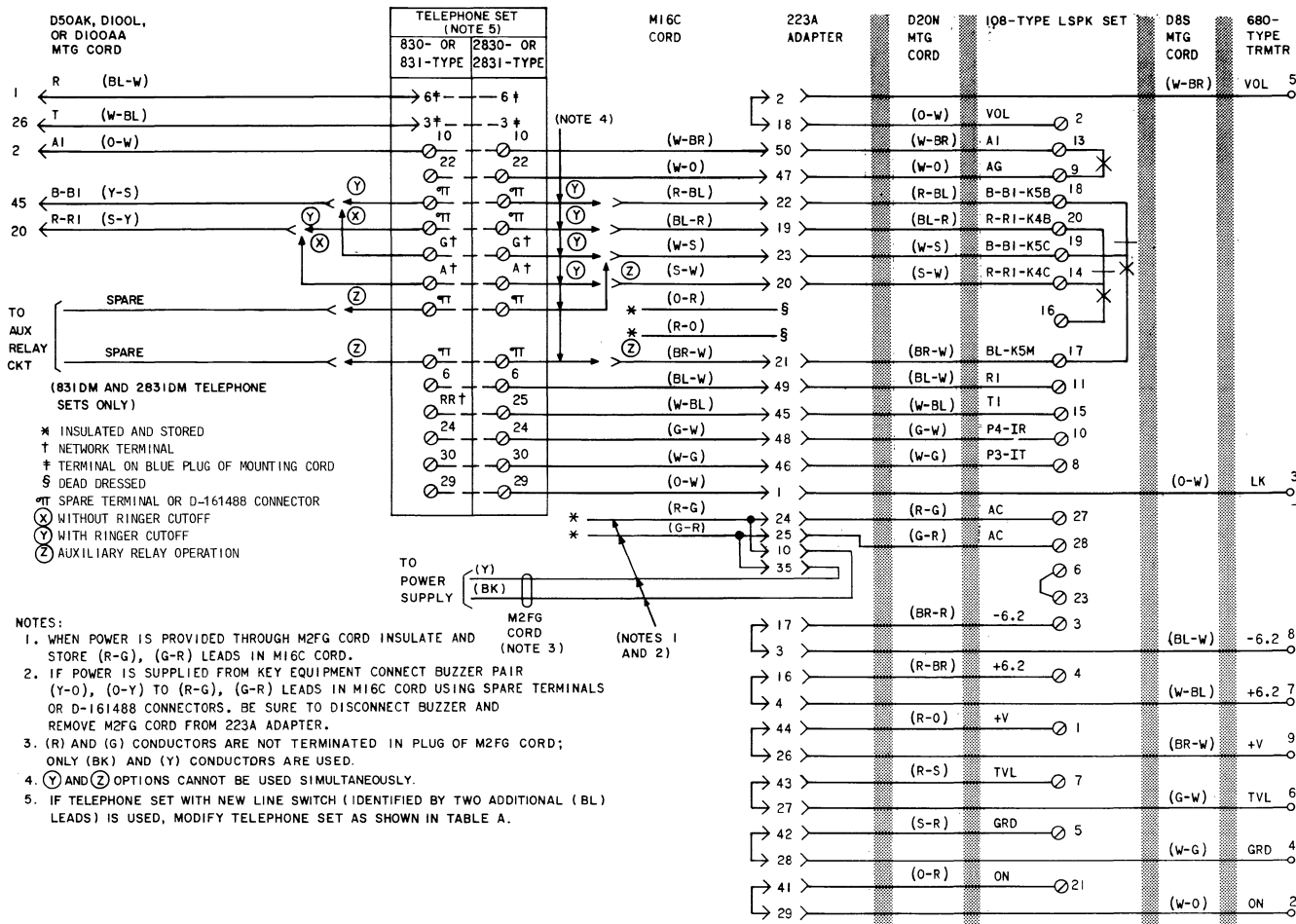


Fig. 2—Speakerphone Connections, Adapter Terminated in Set

♦TABLE A♦

**SPEAKERPHONE MODIFICATION FOR TELEPHONE SETS  
EQUIPPED WITH NEW LINE SWITCH (NOTE)**

TELEPHONE SET	LEAD COLOR	REMOVE FROM TERM.	CONNECT TO TERM.
830DM, 831DM, 2830DM, 2831DM, or 830CM, 831CM, 2830CM and 2831CM MFR after 1-77	G	16	8
830CM MFR Before 2-77	G	16	F
831CM MFR Before 2-77	G	16	F
	G		
2830CM or 2831CM 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 old line switch [no (BL) leads].

## SPEAKERPHONE SYSTEM 4A

### 832-, 833-, 2832-, AND 2833-TYPE TELEPHONE SETS

#### 1. GENERAL

**1.01** This section provides information necessary to connect the 832-, 833-, 2832-, or 2833-type telephone sets to provide 4A speakerphone service.

**1.02** This section is reissued to:

- Show wiring changes which must be made when using speakerphone with BM or CM coded modular sets, Fig. 2
- Revise Table A

**1.03** Refer to Section 512-700-100 for detailed information on components of the 4A speakerphone system.

**1.04** The 832- and 2832-type telephone sets are special 10-, 11-, or 13-button sets initially designed to work with the 7A Communication System.

**1.05** The 833- and 2833-type telephone sets are special 20-button sets initially designed to work with the 14A Communication System.

#### 2. CONNECTIONS

##### 223A Adapter

**2.01** Telephone sets are connected to the speakerphone system by means of a 223A adapter which consists of the following:

- (a) Receptacles for terminating mounting cords from 108-type loudspeaker set and 680-type transmitter.

(b) M16C cord for connecting to telephone set.

(c) M2FG cord for connecting the power supply.

**2.02** After cords are installed in the proper receptacles of the adapter, the cover must be fastened securely to assure proper mating of connectors.

##### 108A/R or 108AR Loudspeaker Set

**2.03** The loudspeaker set and transmitter must be a minimum of one foot apart and not directly facing each other.

##### 680A, 680A14, 680AR, or 680AR14 Transmitter

**2.04** The transmitter must be at least two feet from transformer or any AC powered device.

##### Power Supply

**2.05** Power is supplied by connecting an 85B1 power unit using M2FG cord as shown in Fig. 1 and 2.

**2.06** Use an AC power outlet (not under control of a switch) located as close as possible to the system being installed. A retaining clamp (841050818) will be shipped with the 85B1 power unit and should be mounted to the AC receptacle to hold power unit securely, and to prevent accidental loss of power.

**Caution:** *Do Not Ground Power Supply.*

**2.07** The power supply should be located less than 125 feet from 108-type loudspeaker set when using 24 gauge wire. Refer to Section

#### NOTICE

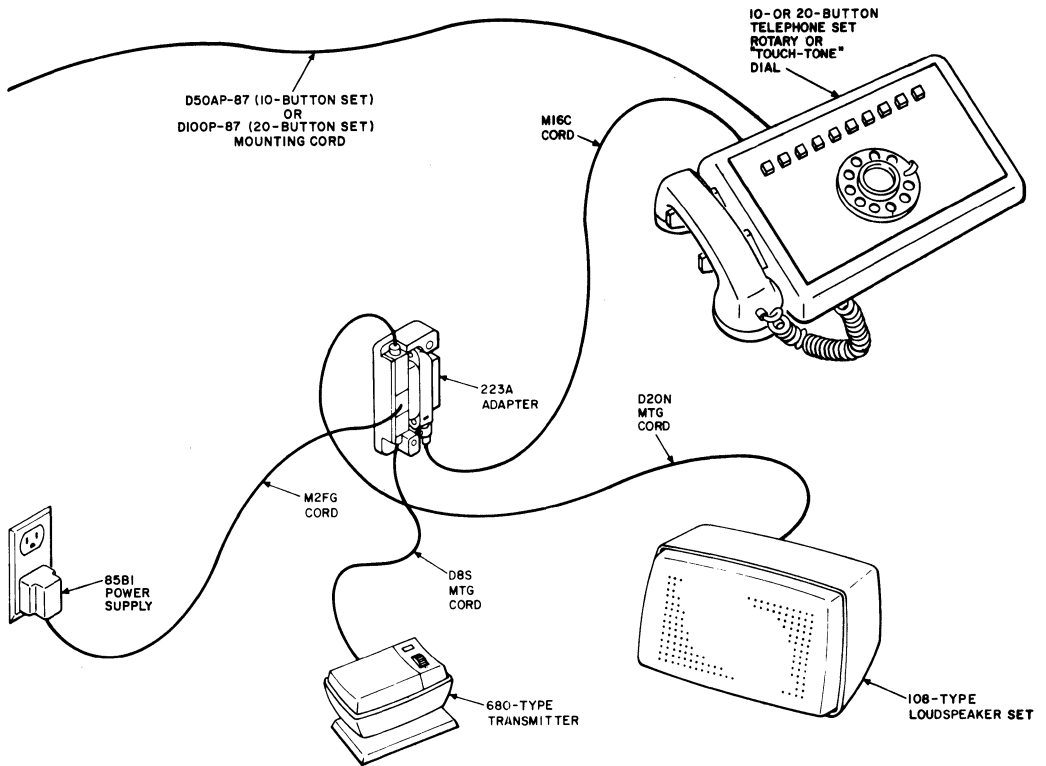
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**SECTION 512-740-471**

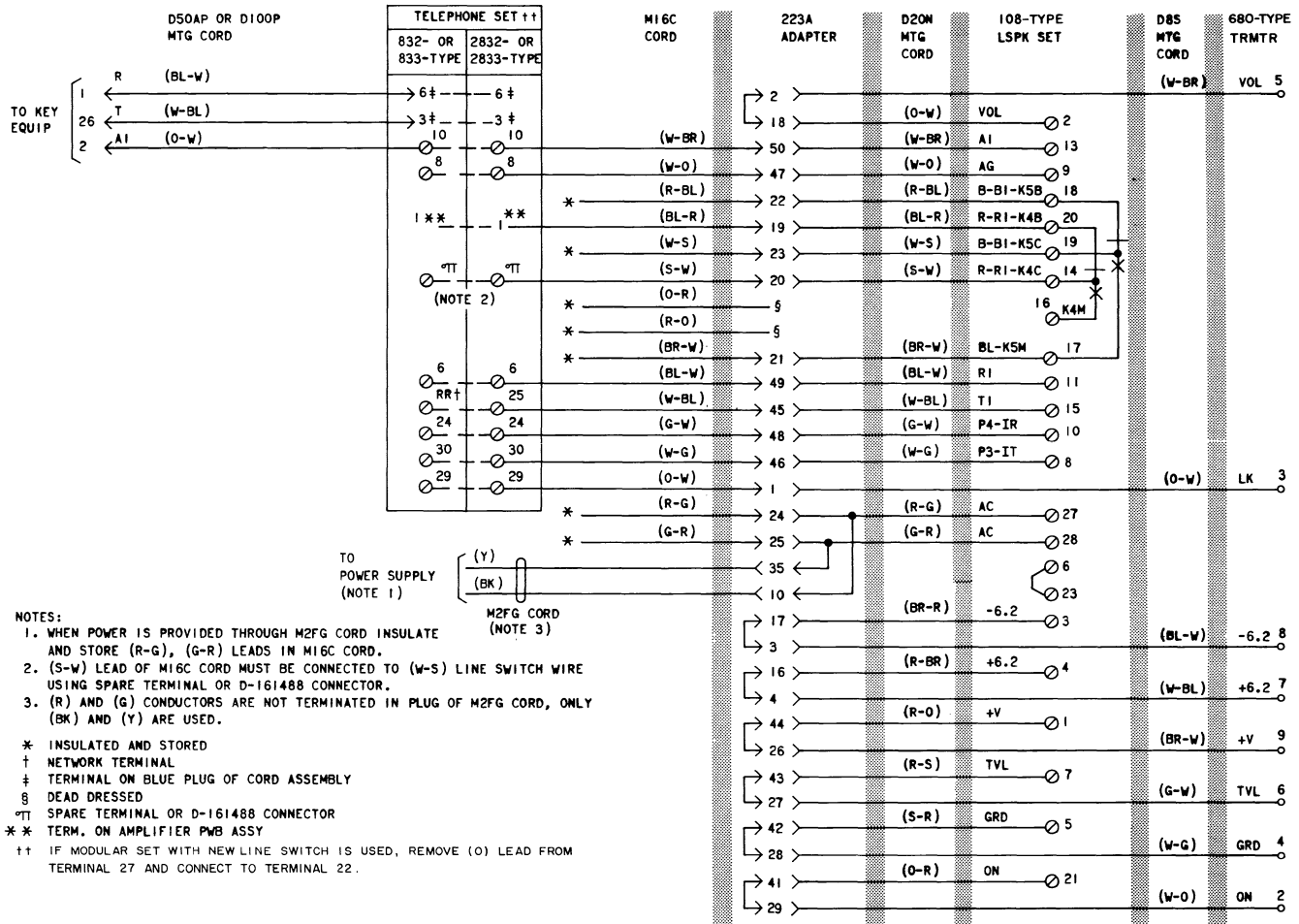
512-700-100 for detailed information on power supply applications.

**2.08** These sets are not provided with "ringer cutoff" or "auxiliary relay" optional features

associated with most CALL DIRECTOR® sets when using 4A speakerphone. The wiring changes shown in the top portion of Table A serve to reduce the tone or voice level on incoming calls while in speakerphone mode.



**Fig. 1—4A Speakerphone Arrangement, 10- or 20-Button Telephone Sets**



**NOTES:**

1. WHEN POWER IS PROVIDED THROUGH M2FG CORD INSULATE AND STORE (R-G), (G-R) LEADS IN M16C CORD.
  2. (S-W) LEAD OF M16C CORD MUST BE CONNECTED TO (W-S) LINE SWITCH WIRE USING SPARE TERMINAL OR D-161488 CONNECTOR.
  3. (R) AND (G) CONDUCTORS ARE NOT TERMINATED IN PLUG OF M2FG CORD, ONLY (BK) AND (Y) ARE USED.
- \* INSULATED AND STORED
  - † NETWORK TERMINAL
  - ‡ TERMINAL ON BLUE PLUG OF CORD ASSEMBLY
  - § DEAD DRESSED
  - ¶ SPARE TERMINAL OR D-161488 CONNECTOR
  - \*\* TERM. ON AMPLIFIER PWB ASSY
  - †† IF MODULAR SET WITH NEW LINE SWITCH IS USED, REMOVE (O) LEAD FROM TERMINAL 27 AND CONNECT TO TERMINAL 22.

**Fig. 2—Speakerphone Connections, Adapter Terminated in Set**

TABLE A  
SPEAKERPHONE CONNECTIONS

WIRE OR LEAD	LEAD DESIG	COLOR	REMOVE	CONNECT TO TEL SET TERM.	
SWHK Lead		W-S	Term. 1 of Amplifier PWB Assy	Connect these leads together using spare terminal in set or D-161488 connector	
		S-W			
Leads in M16C MTG Cord*		BL-R		Term. 1 of amplifier PWB Assy	
	T1	W-BL		§	
	R1	BL-W		6	
	AG	W-O		8	
	LK	O-W		29	
	P3†	IT‡	W-G		30
	P4†	IR‡	G-W		24
	A1	W-BR			10
(See Note)		O	27	22	

\* Insulate and store spare leads.

† Rotary dial telephone set.

‡ TOUCH-TONE® telephone set.

§ Terminal RR of network for rotary dial sets terminal 25 for TOUCH-TONE dial sets.

Note: This change is necessary on modular type sets. On early production sets, (O) lead is on terminal 22.

## SPEAKERPHONE SYSTEM—4A

### 851- AND 2851-TYPE TELEPHONE SETS

### CONNECTIONS

#### 1. GENERAL

**1.01** Refer to Section 512-700-100 for detailed information on components of the 4A speakerphone system.

**1.02** This section is reissued to include:

- 108AR loudspeaker set
- 680A14, 680AR, and 680AR14 transmitter

**1.03** This section provides information necessary to connect the 851- and 2851-type telephone sets to provide speakerphone service.

**1.04** Rotary telephone sets equipped with an 8R dial must be equipped with an 8C dial when connected for 4A speakerphone.

#### 2. CONNECTIONS

##### 223A Adapter

**2.01** The cords from the 108-type loudspeaker set, 680-type transmitter, and 85B1 power unit are installed in the proper receptacles of the 223A adapter. The cover must be fastened securely to assure proper mating of connectors.

**2.02** "Ringer Cutoff" can be provided by connecting ringer leads as shown in Fig. 2. Ringer cutoff provides cut off of the telephone set ringer through the loudspeaker set relay contacts while on speakerphone.

**2.03** "Auxiliary Relay" feature provides a contact closure for operation of an auxiliary relay key telephone unit when it is desired to cut off several signals (Fig. 2).

**2.04** Unused speakerphone leads in the IW cable shall be disconnected as near telephone set as possible to prevent interference with working circuits. These leads shall never be multiplied between telephone sets. Refer to Section 502-110-100 for detailed information.

##### 108A ~~or~~ 108AR ~~or~~ Loudspeaker Set

**2.05** Loudspeaker set and transmitter must be a minimum of one foot apart.

##### 680A, ~~or~~ 680A14, 680AR, or 680AR14 ~~or~~ Transmitter

**2.06** Transmitter must be at least two feet from transformer or any AC powered device.

##### 85B1 Power Unit

**2.07** Use an AC power outlet (not under control of a switch) as close as possible to the system being installed. A retaining clamp (841050818) will be shipped with the 85B1 power unit and should be mounted to the AC receptacle to hold power unit securely and to prevent accidental loss of power.

**Caution:** *Do Not Ground Power Unit.*

**2.08** Power can be provided by making connections as shown in Fig. 1 and 2.

**2.09** The M2FG cord is furnished as part of the 223A adapter for connecting the 85B1 power unit.

**2.10** The 85B1 power unit should be located less than 125 feet from 108-type loudspeaker set when using 24 gauge wire. Refer to Section 512-700-100 for detailed information on power supply applications.

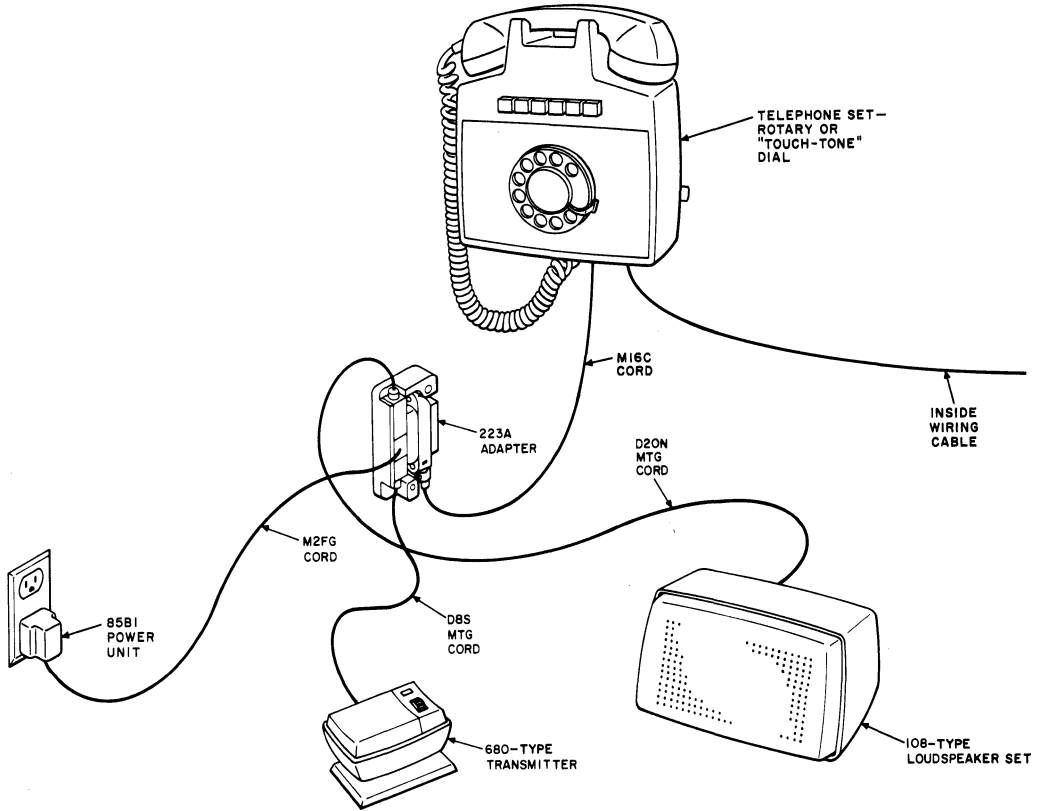


Fig. 1—Speakerphone Arrangement, 6-Button Wall Telephone Sets



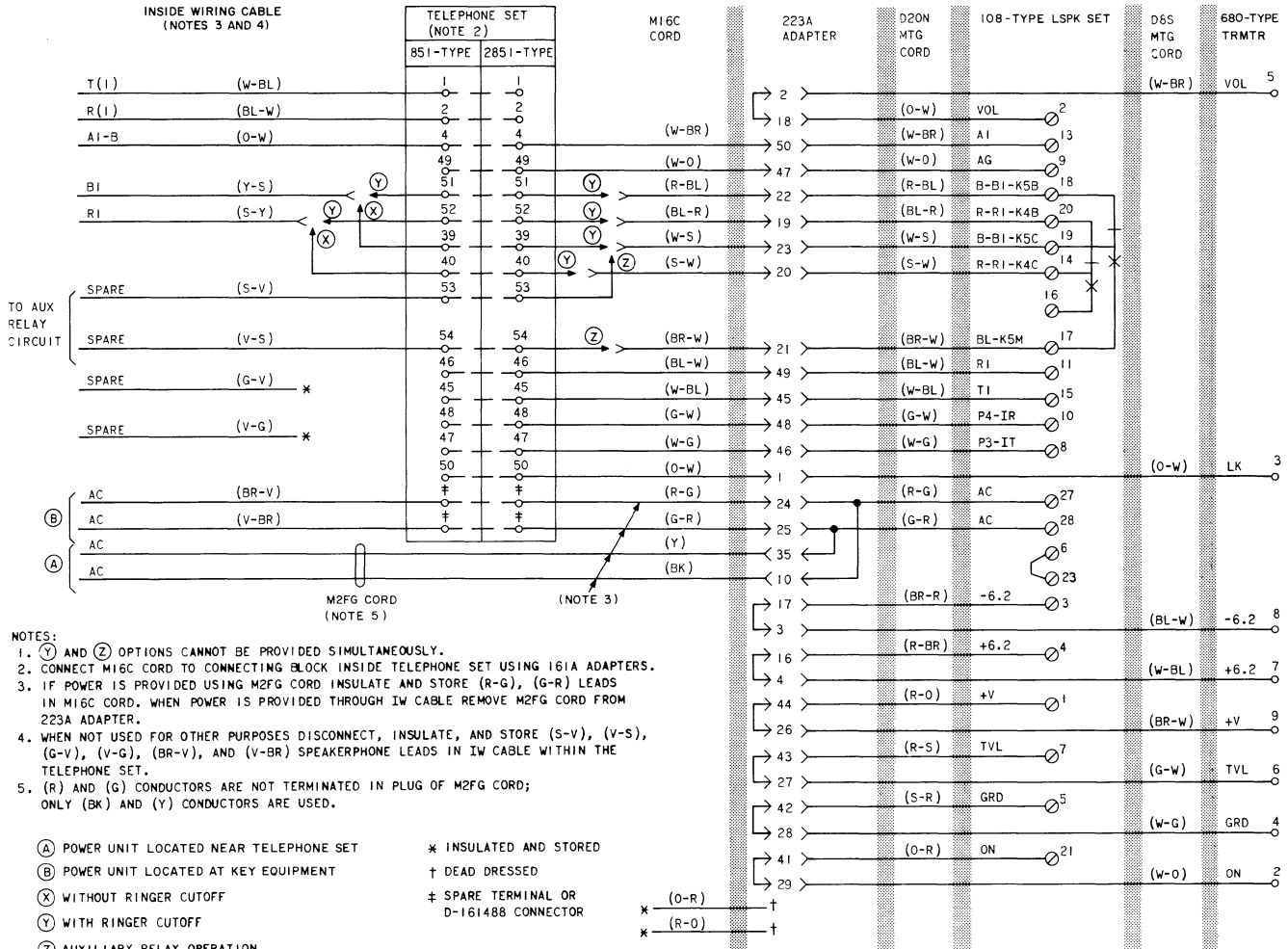


Fig. 2—Speakerphone Connection, Adapter Terminated in Set

## KS-19245, LIST 1 TELEPHONE ANSWERING SET INSTALLATION AND CONNECTIONS

### 1. GENERAL

1.01 This section contains installation and connection information for the KS-19245, List 1 telephone answering set (Fig. 1).

1.02 This section is reissued to:

- Show KS-19241, List 4 amplifier is not to be adjusted in the field
- Rearrange information in text for clarity

### 2. POWER

2.01 The KS-19245, List 1 telephone answering set is designed to operate on 110/125-volt AC 60 Hz power supply.



*In no case should the answering set be connected to DIRECT CURRENT. This would result in serious damage to answering set.*

2.02 If direct current is the only available power supply, a KS-15662, List 1 inverter must be used. Installation of this inverter is described in

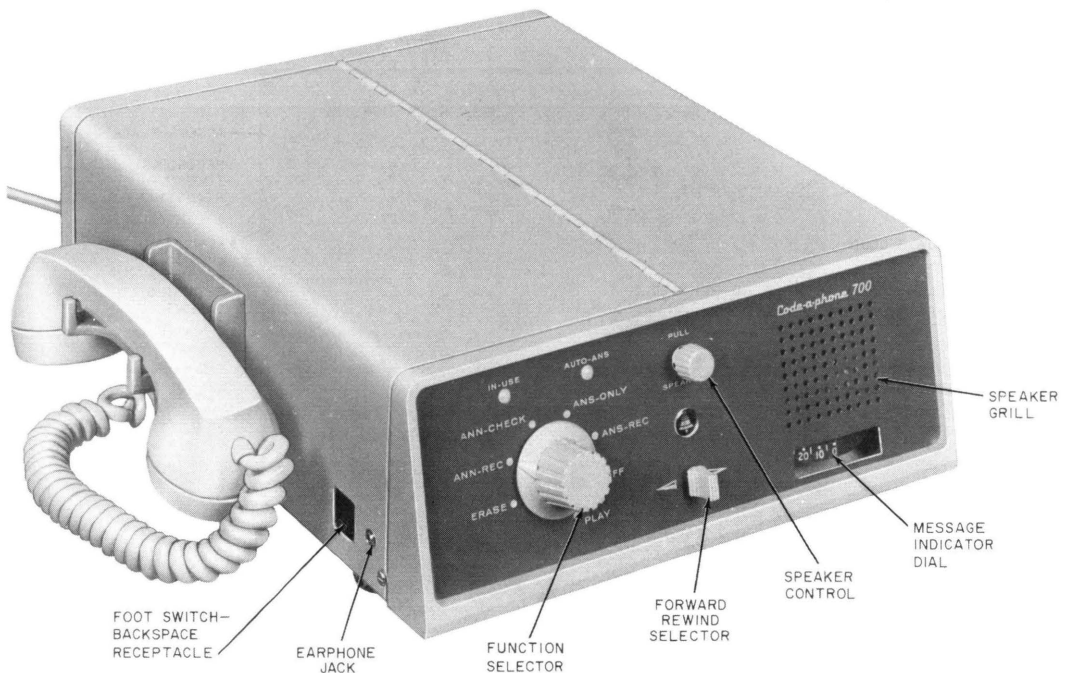


Fig. 1—KS-19245, List 1 Telephone Answering Set

section entitled KS-15662, DC-AC Inverter for Use With Telephone Answering Sets, in Division 514.

**2.03** A 1-ampere (3AG1) fuse is provided in this answering set for protection (Fig. 2).

**2.04** Customer must provide and maintain a standard AC outlet for operation of the KS-19245, List 1 telephone answering set. Outlet should not be controlled by a switch.

**3. LOCATION**

**3.01** Locate telephone answering set where it will be convenient for customer.

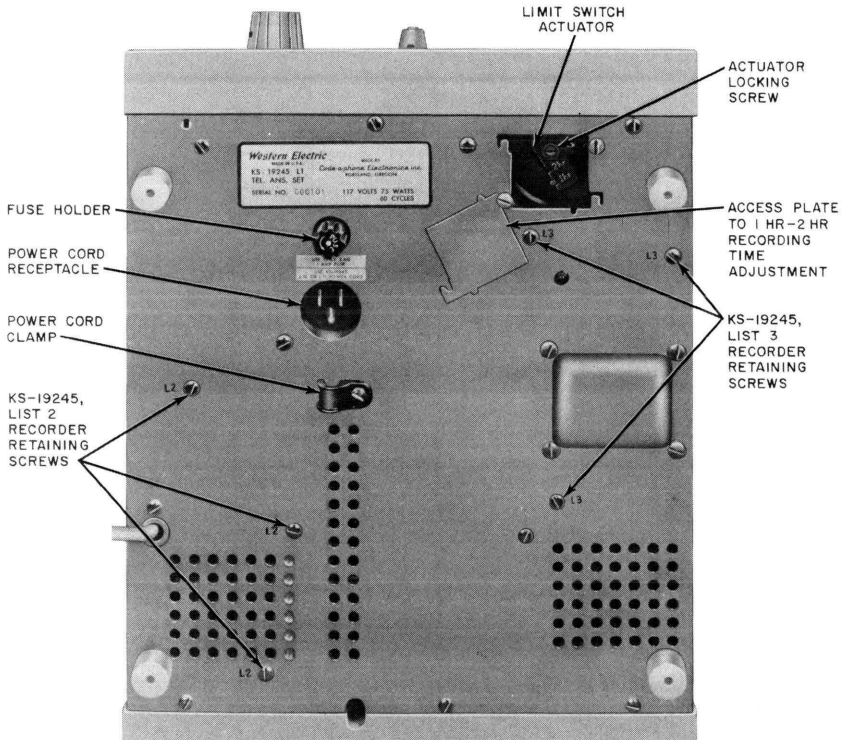
**3.02** Do not place set where it will be exposed to weather or extreme heat. The supporting surface should be able to support 30 pounds.

**4. INSTALLATION AND CONNECTIONS**

*Caution: Damage to the message tape and its mechanism will result if the message tape end is not properly secured in the snap retainer of the take-up reel before operating set.*

**4.01** Insert power cord into receptacle provided on the bottom of set (Fig. 2). Secure cord with captive cable clamp.

*Note:* When List 10 power cord is furnished with set, insert plug of cord into AC outlet,



**Fig. 2—KS-19245, List 1 Telephone Answering Set—Bottom View**

set function selector to PLAY, pull out speaker control knob, and check speaker for hum. Reverse plug of cord in AC outlet if hum is present.

#### 4.02 Adjust message recording capacity (Fig. 2).

The set is shipped with message recording capacity adjusted for one hour. To adjust to maximum recording capacity of 2 hours, proceed as follows:

- (1) Insert plug of power cord into AC outlet.
- (2) Run the set in rewind to obtain an elapsed message indicator dial reading of 0 (set will stop automatically).

**Caution: Before proceeding with any further adjustments or connections, remove power cord from AC outlet.**

- (3) Remove access cover.
  - (a) Loosen two access cover mounting screws.
  - (b) Lift plate.
- (4) Adjust limit switch actuator:
  - (a) Loosen actuator locking screw (Fig. 2).
  - (b) Slide actuator to 2-HR cutover.
  - (c) Tighten actuator to locking screw.
- (5) Replace access cover.

#### 4.03 Adjust announcement recording capacity

(Fig. 3). The set is shipped with an announcement setting of 30 seconds. Announcement time may be increased in increments of 15 seconds, from 15 seconds to 90 seconds, and in 30 second increments, from 90 seconds to 180 seconds. To change setting proceed as follows:

- (1) Remove top cover.
  - (a) Remove 4 cover retaining screws.
  - (b) Lift cover.
- (2) Remove KS-19245, List 4 amplifiers:
  - (a) Loosen amplifier card retainers.

(b) Lift amplifier card.

- (3) Release timer cap by carefully depressing timer arm (Fig. 3).

**Caution: Do not rotate recorder motor or tape reels by hand.**

- (4) Adjust recording capacity by carefully lifting tab of timer arm from slot and rotate to position of desired interval (Fig. 3).

**Caution: Do not lift tab over raised portion to timer cap. To increase interval, rotate tab clockwise. To reduce interval rotate tab counterclockwise.**

- (5) Replace KS-19245, List 4 amplifier.
- (6) Replace top cover.



**Handle set components with care at all times to avoid damage.**

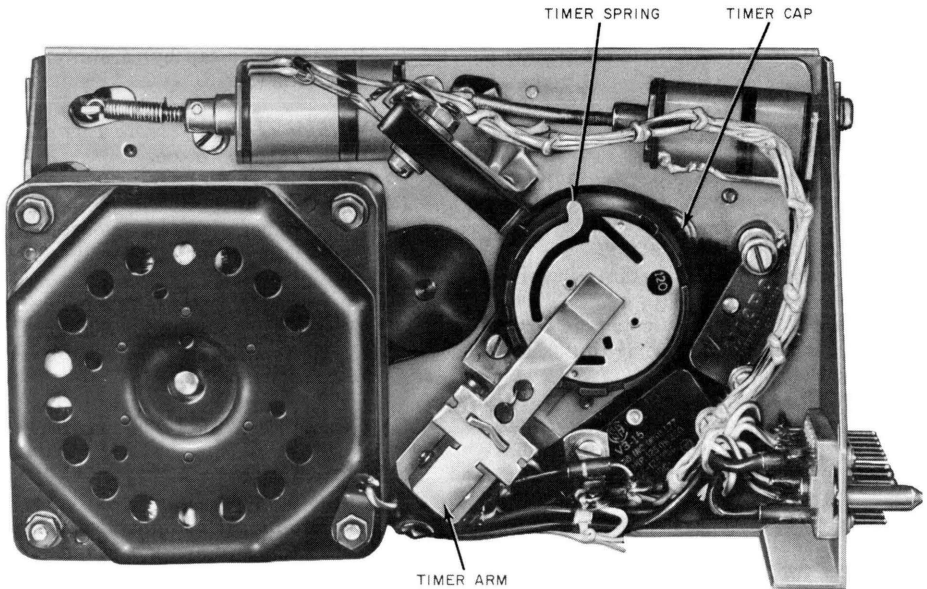
- 4.04 Remove access plate of terminal board located at the rear of the answering set (Fig. 4).

- 4.05 Insert suitable mounting cord through hole provided in answering set and anchor. Make connections for type of service required as shown in Fig. 6 and Table A.

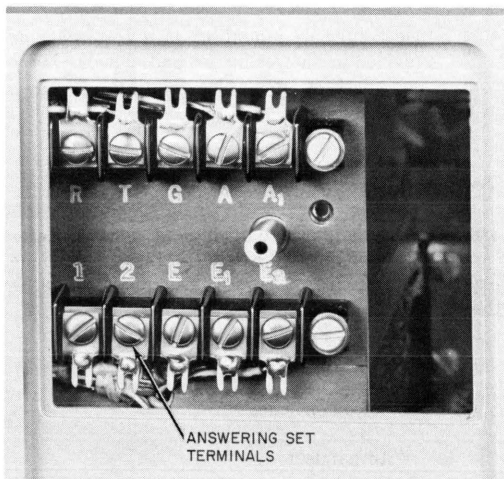
#### Tests and Time of Installation

- 4.06 Insert the power cord into AC outlet. Refer to section entitled KS-19245, List 1 Telephone Answering Set, Operation, in Division 514 and check the following:

- (1) Announcement recording and erasure.
- (2) Announcement check:
  - (a) With handset.
  - (b) With speaker.
- (3) Automatic answer - ANS and REC:
  - (a) Automatic answer ready lamp.



**Fig. 3—KS-19245, List 2 Recorder**



**Fig. 4—KS-19245, List 1 Telephone Answering Set—Rear View**

- (b) Ring-up.
  - (c) In-use lamp.
  - (d) Announcement monitoring in speaker.
  - (e) Transfer beep tone.
  - (f) Message monitoring in speaker.
  - (g) Talk-down tone.
  - (h) Voice control—timeout.
  - (i) Disconnect beep tone.
- (4) Automatic answer - answer only:
- (a) Ring-up.
  - (b) Announcement monitoring in speaker.
  - (c) Disconnect at end of announcement.

- (5) Message playback:
- (a) With handset.
  - (b) With speaker.
  - (c) With earphone (optional accessory).
- (6) Fast forward and rewind of message tape.
- (7) Erase message.
- (8) Foot switch (optional accessory).
- (9) Backspace unit (optional accessory).

**Note:** The output level for the KS-19245, List 4 amplifier is set and sealed at the factory. No field adjustments is recommended. Should the output level be too high replace the amplifier.

**4.07** The set should not be ready for operation. Instruct the subscriber of proper operation of set and accessories.

**4.08** Refer to CD- and SD-99306-01 for additional information on the KS-19245, List 1 telephone answering set.

**4.09** Accessories:

- (1) KS-19245, List 8 foot switch. Plug of foot switch is inserted into foot switch receptacle of answering set. If backspace unit is used, it is inserted into receptacle of backspace unit.
- (2) KS-19245, List 9 earphone. Plug of earphone is inserted into earphone jack on answering set. If backspace unit is used it is inserted into earphone jack of backspace unit.
- (3) KS-19245, List 12 backspace unit. Insert backspace unit into foot switch - backspace receptacle and earphone jack of answering set.

## 5. OPTIONS

**5.01** Voice control disable (Fig. 5)—Solder a strap between the terminals on the KS-19245, List 5 amplifier identified with blue dots.



***It is important to note that this option may be employed only when other means are available for disconnecting the set at the end of a call.***

- (1) When DC calling party control accompanies calling party disconnect.
- (2) When provisions are made for turning the function selector switch to the off position at the end of the recording.

**5.02** Disable calling party control (Fig. 5)—Solder strap between terminals on the KS-19245, List 5 amplifier identified by red dots and between those identified by green dots.



***Calling party control is provided on this set to disconnect when momentary interruption of central office battery on the telephone line occurs. Installations where no battery is provided require disabling the action of the calling party control circuit.***

**5.03** Talk-down tone (Fig. 5) may be disabled by removing the strap between the terminals on the KS-19245, List 5 amplifier identified by yellow dots. Removal of this strap does not affect the one second start and disconnect beep tones. The set is normally furnished with this option wired in place.

**5.04** Do not use options listed above without proper authorization.

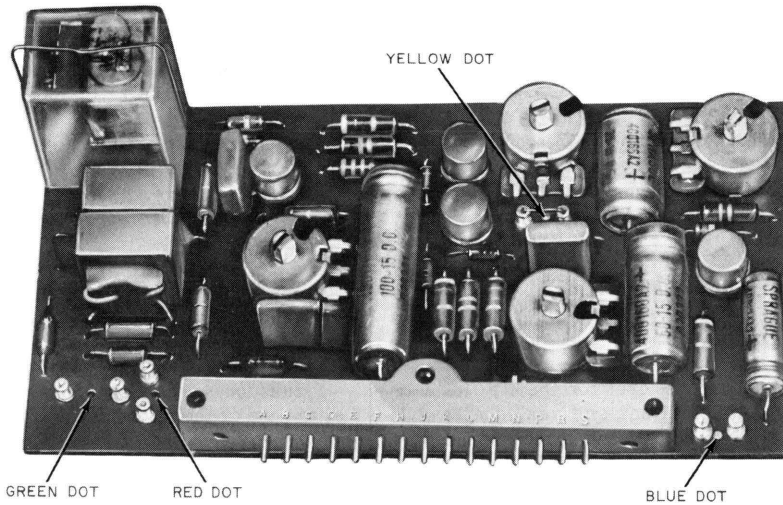


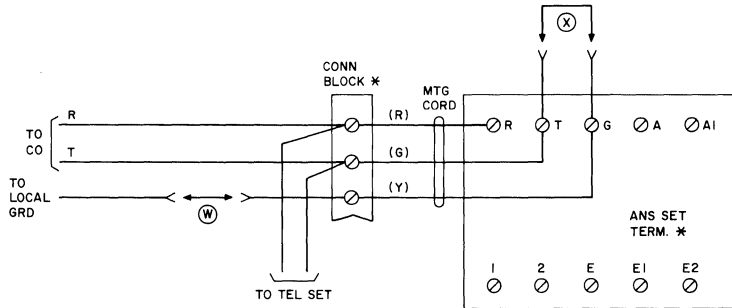
Fig. 5—KS-19245, List 5 Amplifier

TABLE A  
MOUNTING CORD CONNECTIONS

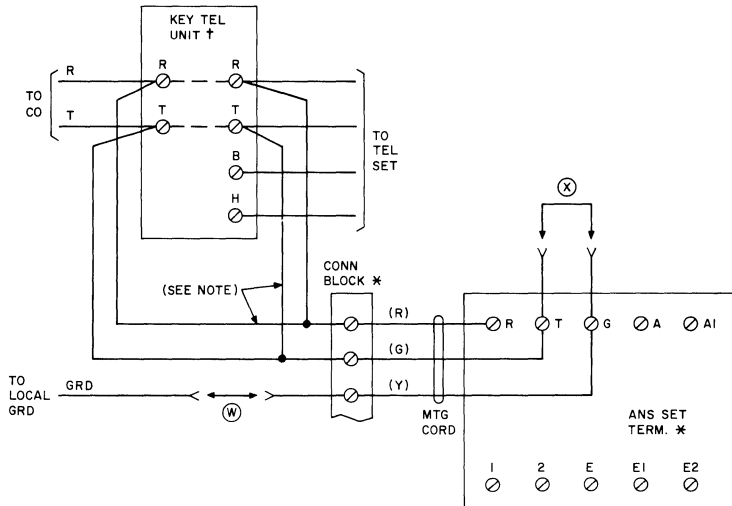
CORD CONDUCTOR COLOR	AT CONNECTING BLOCK ON TEL ANS SET	SIDE OF LINE WIRE TO WHICH CORD CONDUCTOR IS TERMINATED		
		INDIVIDUAL, PBX, OR BRIDGED SERVICE†	2-PARTY SELECTIVE OR MESSAGE RATE SERVICE*	
			RING PARTY	TIP PARTY
Red	R	Ring	Ring	Tip
Green	T	Tip	Tip	Ring
Yellow	G	Tip	Ground	Ground

\* Remove strap between T and G on telephone answering set connecting block and place local ground on G.

† Remove local ground and strap T and G punchings on telephone answering set connecting block.



WITH TELEPHONE SET ONLY



WITH IA KEY TELEPHONE SYSTEM

Fig. 6—KS-19245, List 1 Telephone Set Connections (Sheet 1 of 3)



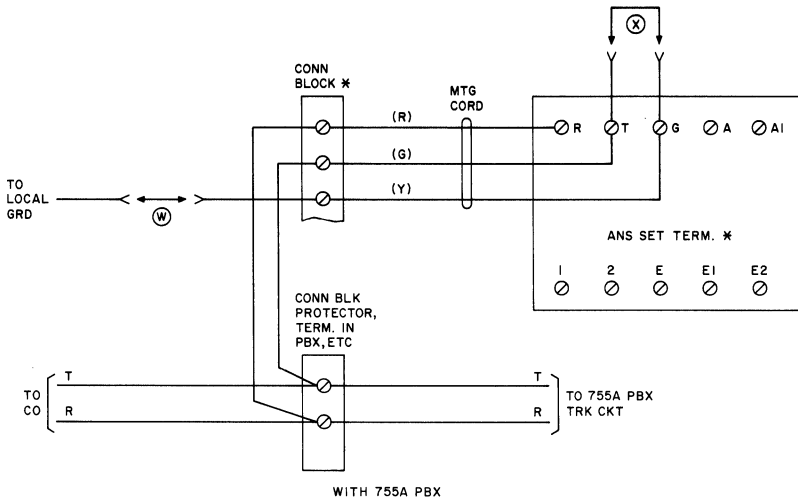
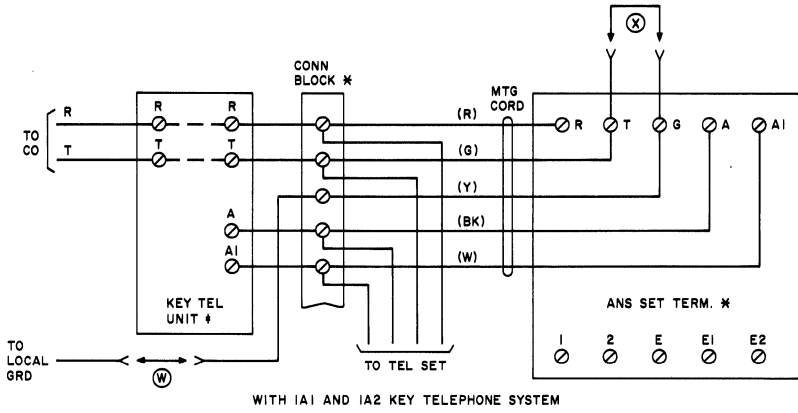
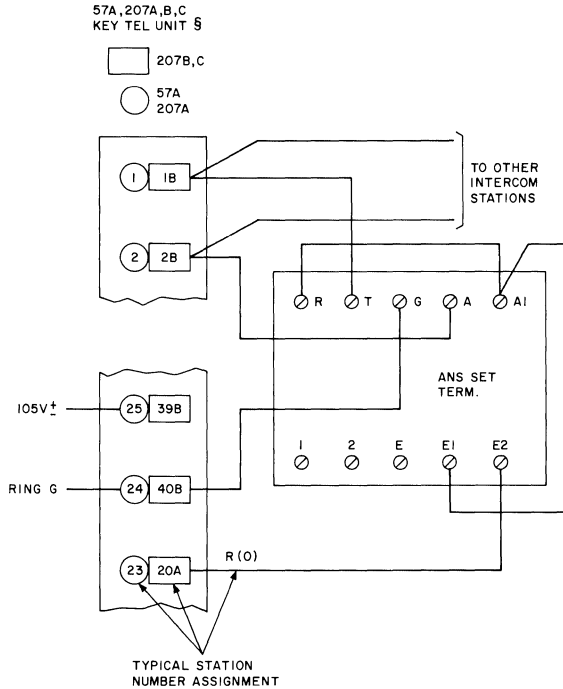


Fig. 6—KS-19245, List 1 Telephone Set Connections (Sheet 2 of 3)



WITH DIAL SELECTIVE INTERCOMMUNICATING CIRCUIT, IA, IA1, OR IA2 KEY TELEPHONE SYSTEMS

NOTE:  
ANSWER SET MAY BE CONNECTED ON EITHER SIDE OF KTU.

LEGEND:

- \* SEE TABLE A FOR MOUNTING CORD CONNECTIONS.
- † FOR TERMINAL NUMBERS, SEE SECTION ON IA KEY TELEPHONE SYSTEMS.
- ‡ FOR TERMINAL NUMBERS, SEE SECTION ON IA1 AND IA2 KEY TELEPHONE SYSTEMS.
- § MAY BE ADAPTED TO KEY TELEPHONE SYSTEM 6A WHEN RINGING POWER SUPPLY IS PROVIDED.

OPTIONS:

- (X) METALLIC RINGING
- (W) GROUNDED RINGING

Fig. 6—KS-19245, List 1 Telephone Set Connections (Sheet 3 of 3)

**KS-19245, LIST 1**  
**TELEPHONE ANSWERING SET**  
**MECHANICAL ADJUSTMENT AND MAINTENANCE**

**1. GENERAL**

**1.001** This addendum supplements Section 514-155-300, Issue 3.

**1.002** This addendum is issued to:

- Revise 2.03
- Add 2.04
- Revise 3.02

**2. REPLACEMENT OF LAMPS**

The following changes apply to Part 2 of this section:

- (a) 2.03 Revised
- (b) 2.04 Added

**2.03 IN-USE Lamp E2 (All Sets):**

- (1) Remove top cover (2.01).
- (2) Remove List 5 amplifier (3.03).
- (3) Pull out and hold spring clip, if present, on side of lamp socket and remove lamp E2 (Fig. 4).
- (4) Replace lamp E2, List 5 amplifier, and top cover.

**2.04 AUTO-ANS Lamp E3 (All Sets):**

- (1) Remove top cover (2.01).
- (2) Remove ENA relay (3.04).
- (3) Pull out and hold spring clip, if present, on side of lamp socket and remove lamp E3 (Fig. 4).

- (4) Replace lamp E3, ENA relay and top cover.

**3. REPLACEMENT OF PLUG-IN UNITS**

The following changes apply to Part 3 of this section:

- (a) 3.02 Revised

**3.02 KS-19245, List 3 Recorder:**

- (1) Remove top cover (2.01).
- (2) Remove List 6 cartridge (6.01).
- (3) Remove four screws and remove side cover (Fig. 7).
- (4) Remove three retaining screws (Fig. 2) located on the bottom of the set.



*Do not lift or pry on the trim plates (Fig. 3).*

- (5) Firmly grasp chassis of List 3 recorder and carefully withdraw until plug-in receptacle is disengaged (Fig. 4).
- (6) Carefully move recorder toward rear of set to clear plastic MESSAGE INDICATOR DIAL (Fig. 9) and remove recorder from set.
- (7) Plug new recorder into the plug-in receptacle (Fig. 4).
- (8) Replace and tighten the three retaining screws.
- (9) Replace List 6 cartridge (6.02).
- (10) Replace side and top covers.

# KS-19245, LIST 1

## TELEPHONE ANSWERING SET

### MECHANICAL ADJUSTMENT AND MAINTENANCE

#### 1. GENERAL

- 1.01 This section is reissued to add information on lamp replacement.
- 1.02 The KS-19245, List 1 telephone answering set (Fig. 1) has been designed to facilitate maintenance by the use of plug-in assemblies. In general it is not recommended that replacement of component parts of these plug-in assemblies be attempted, since readjustments requiring special equipment and procedures will usually be required.

- 1.03 It is intended that CD- and SD-99306-01 be used with this section.

**Caution:** Before performing any maintenance on this set, disconnect power cord from the ac outlet.

- 1.04 Refer to Chart A for probable cause and corrective action of a trouble report. Table A lists replacement parts.
- 1.05 The stenciling on the front panel of KS-19245, List 1 telephone answering set may be

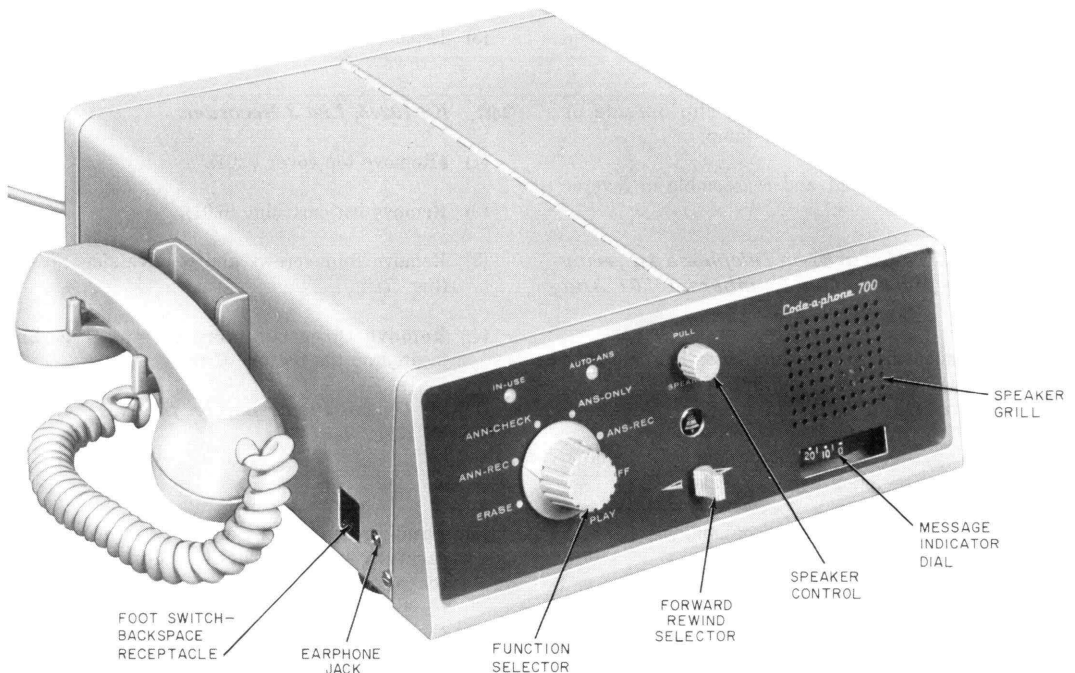


Fig. 1—KS-19245, List 1 Telephone Answering Set

## SECTION 514-155-300

protected from excessive wear by applying a coat of 639A flat clear lacquer or its equivalent.

### 2. REPLACEMENT OF LAMPS

#### 2.01 *ON-OFF Lamp E1 on Telephone Answering Sets With Serial Numbers 100 Through 15200:*

- (1) Remove top cover.
  - (a) Remove four retaining screws.
  - (b) Lift cover from set.
- (2) Remove List 3 recorder (3.02).

**Note:** ON-OFF lamp E1 is mounted on a bracket with a slotted screw hole and is located directly beneath the speaker control switch.

- (3) Loosen the retaining screw (Fig. 10) in the slotted screw hole until bracket is free. Pivot the bracket about the screw to expose lamp and lamp socket.
- (4) Pull out and hold spring clip on side of lamp socket and remove lamp.
- (5) Replace lamp E1 and reassemble in reverse order.

#### 2.02 *ON-OFF Lamp E1 on Telephone Answering Sets With Serial Numbers 15201 And Higher:*

- (1) Remove the Bell System Medallion from the front panel by grasping it from the front and extracting it.
- (2) Using a 553A switchboard lamp extractor, remove the lamp from its socket.
- (3) Replace lamp E1 and medallion.

#### 2.03 *IN-USE Lamp E2 (All Sets):*

- (1) Remove top cover (2.01).
- (2) Remove ENA relay (3.04).
- (3) Pull out and hold spring clip on side of lamp socket and remove lamp E3 (Fig. 4).

- (4) Replace lamp E3, ENA relay and top cover.♦

### 3. REPLACEMENT OF PLUG-IN UNITS

#### 3.01 *KS-19245, List 2 Recorder:*

- (1) Remove top cover (2.01).
- (2) Remove List 2 recorder (Fig. 3):
  - (a) Remove three retaining screws located on bottom of set (Fig. 2).
  - (b) Grasp List 2 recorder by its motor and chassis and carefully remove it from its plug-in receptacle.
- (3) Plug new recorder into the plug-in receptacle (Fig. 4).
- (4) Replace and tighten the three retaining screws.
- (5) Replace outer cover and tighten four retaining screws.

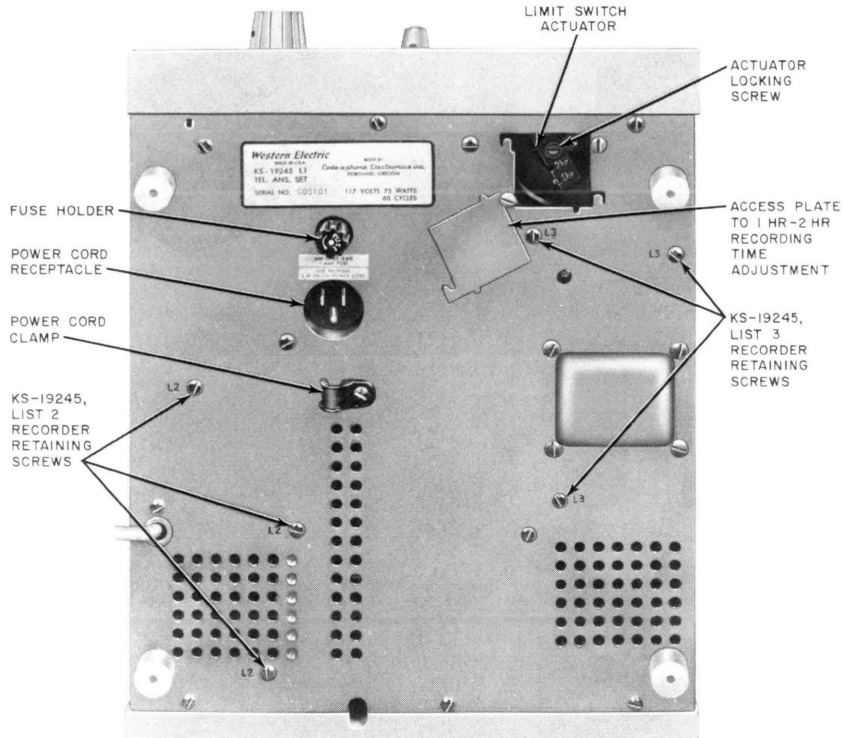
#### 3.02 *KS-19245, List 3 Recorder:*

- (1) ♦Remove top cover (2.01).
- (2) Remove list cartridge (6.01).
- (3) Remove four screws and remove side cover (Fig. 7).
- (4) Remove three retaining screws (Fig. 2) located on the bottom of the set.



***Do not lift or pry on the trim plates (Fig. 3).***

- (5) Firmly grasp chassis of List 3 recorder and carefully withdraw until plug-in receptacle is disengaged (Fig. 4).
- (6) Carefully move recorder toward rear of set to clear plastic MESSAGE INDICATOR DIAL (Fig. 9) and remove recorder from set.♦
- (7) Plug new recorder into the plug-in receptacle (Fig. 4).

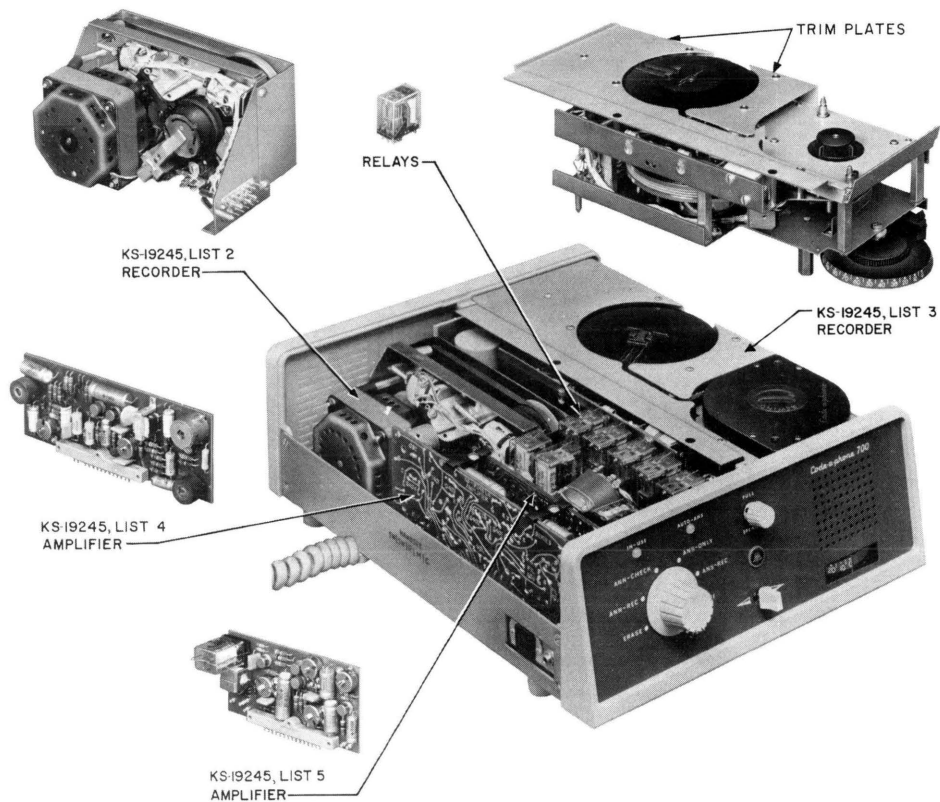


**Fig. 2—KS-19245, List 1 Telephone Answering Set, Bottom View**

- (5) Firmly grasp chassis of List 3 recorder and carefully withdraw until plug-in receptacle is disengaged (Fig. 4).
- (6) Carefully move recorder toward rear of set to clear plastic MESSAGE INDICATOR DIAL (Fig. 9) and remove recorder from set.
- (7) Plug new recorder into the plug-in receptacle (Fig. 4).
- (8) Replace and tighten the three retaining screws.
- (9) Replace List 6 cartridge (6.02).
- (10) Replace side and top covers.

### 3.03 *KS-19245, Lists 4 and 5 Amplifiers:*

- (1) Remove top cover of answering set (2.01).
- (2) Loosen retaining screws of the circuit board retainers.
- (3) Remove amplifier from its plug-in receptacle.
- (4) Plug new amplifier into plug-in receptacle (Fig. 4) and tighten screw of circuit board retainers.
- (5) Replace top cover.



**Fig. 3—KS-19245, List 1 Telephone Answering Set, Top Cover Removed**

### 3.04 Replacement of AD, BD, DLY, ENA, ED, LS, or ADR relays (Fig. 4):

- (1) Remove top cover of answering set (2.01).
- (2) Slide wire spring retainer from relay.
- (3) Remove relay from its plug-in socket (Fig. 3).
- (4) Plug new relay into the plug-in socket (Fig. 4).
- (5) Engage wire spring retainer.
- (6) Replace top cover.

### 4. REPLACEMENT OF MOTOR

#### 4.01 KS-19245, List 2 Recorder (Fig. 5):

- (1) Unsolder motor leads.
- (2) Remove four nuts and lock washers.
- (3) Remove drive belt from motor pulley. Remove motor.
- (4) Install new motor. Replace drive belt on motor pulley.
- (5) Replace and tighten lockwashers and nuts.

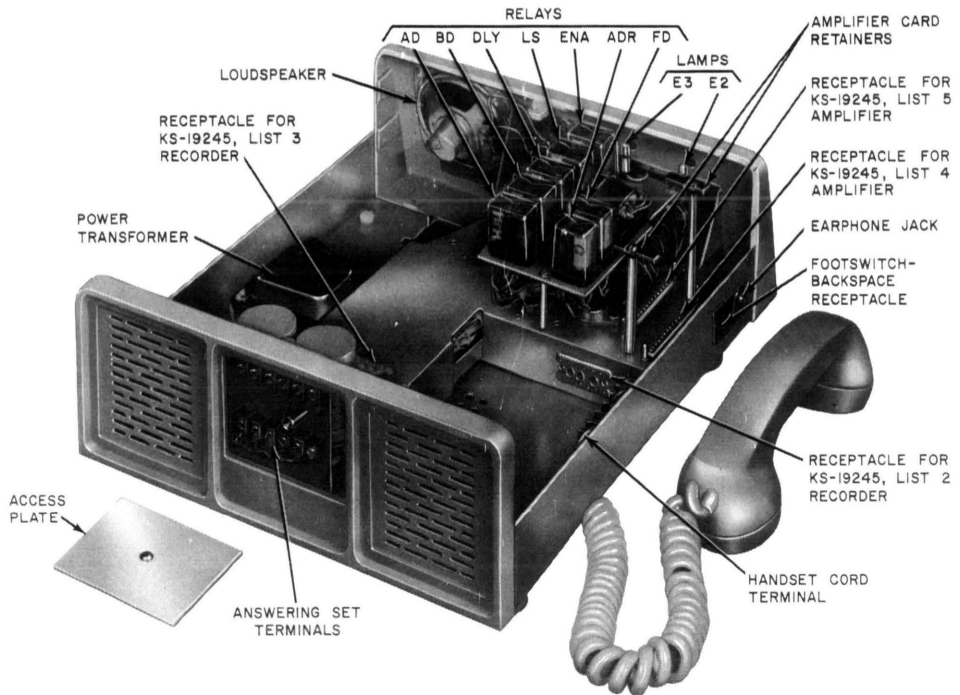


Fig. 4—KS-19245, List 1 Telephone Answering Set, Cover and Plug-In Components Removed

- (6) Solder motor leads.

#### 4.02 KS-19245, List 3 Recorder (Fig. 6):

- (1) Unsolder motor leads.
- (2) Remove four nuts and lockwashers.
- (3) Remove the three drive belts from the motor pulley. Remove motor.
- (4) Install new motor. Replace the three drive belts on the motor pulley.
- (5) Replace and tighten lockwashers and nuts.
- (6) Solder motor leads.

#### 5. REPLACEMENT OF BELT ON KS-19245, LIST 2 RECORDER (Fig. 5)

##### 5.01 Capstan Flywheel Belt:

- (1) Remove motor (4.01).
- (2) Remove drive belt.
- (3) Remove faulty capstan flywheel belt and install new belt.
- (4) Install drive belt. Replace motor.

##### 5.02 Rewind Belt:

- (1) Remove motor (4.01).
- (2) Remove faulty drive belt.
- (3) Install new belt. Replace motor.



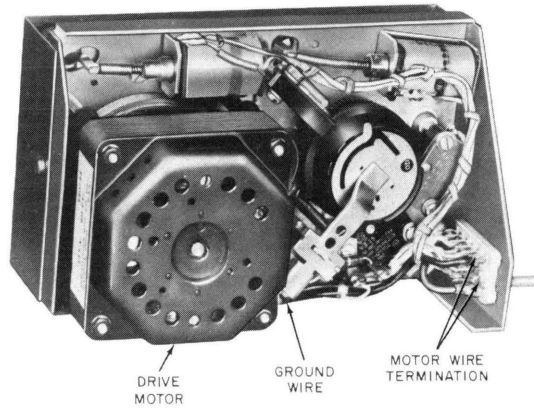


Fig. 5—KS-19245, List 2 Recorder, Motor Side

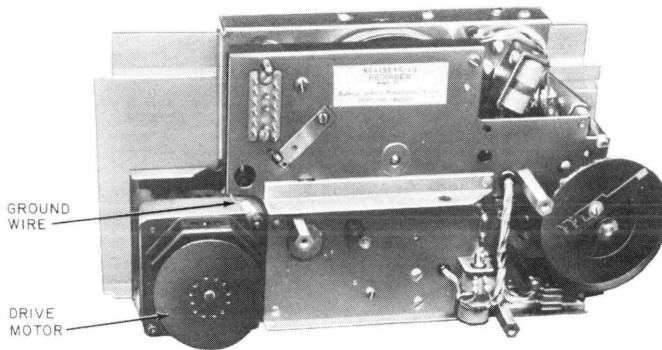


Fig. 6—KS-19245, List 3 Recorder, Motor Side

## 6. REPLACEMENT OF KS-19245, LIST 6 CARTRIDGE

### 6.01 Cartridge Removal:

- (1) Rewind tape into cartridge (0 setting on message indicator dial).
- (2) Set function selector to off.
- (3) Remove tape end from take-up reel by depressing and backing out of slot.

- (4) Turn cartridge hub clockwise by hand to rewind remaining tape into cartridge.

- (5) Grasp cartridge and lift up.

### 6.02 Cartridge Installation (Fig. 7):

- (1) Place cartridge over cartridge lock pins and hub, snap down into place.
- (2) Slide tape end through tape slot into slot of take-up reel and snap into place.



**Fig. 7—Resetting “0” Registration on Message Indicator Dial**

## **7. REPLACEMENT OF SPEAKER**

**7.01** To replace speaker:

- (1) Remove top cover (2.01).
- (2) Remove KS-19245, List 3 recorder (3.02).
- (3) Unsolder speaker leads.
- (4) Remove four nuts and withdraw speaker (Fig. 4).
- (5) Install new speaker and tighten nuts.
- (6) Solder speaker leads.
- (7) Replace List 3 recorder.
- (8) Replace top cover.

## **8. RESETTING 0 REGISTRATION ON MESSAGE INDICATOR DIAL**

**8.01** Remove tape cartridge (6.01).

**8.02** Set dial to 0:

- (1) Rotate cartridge hub (Fig. 7) by hand in either direction to set dial at 0.

or

For more rapid resetting, run set in rewind as follows (Fig. 7):

- (a) Insert folded paper in take-up reel slot.
- (b) Rotate take-up reel by hand to allow folded paper to operate limit switch.

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- (c) Plug in power cord.
- (d) Set selector to PLAY.
- (e) Restrain take-up reel and depress cartridge interlock switch.
- (f) Operate REWIND lever until 0 setting is obtained.

### 9. BROKEN OR ENTANGLED MESSAGE TAPE

**9.01** Broken or entangled message tape should be replaced with a new KS-19245, List 6 cartridge. If necessary reset message indicator dial to 0. (Refer to Part 8.)



*To recover recorded messages on broken tape, splice broken tape ends using splicing tape and tools obtained locally. After splicing tape, message indicator dial should be reset to 0. After messages are recovered tape cartridge should be replaced.*

### 10. ADJUSTMENTS

#### 10.01 *Message Recording:*

- (1) Insert plug of power cord into ac outlet.
- (2) Run the set in rewind to obtain a message indicator dial reading of 0 (set will stop automatically).

**Caution:** *Before proceeding with adjustment, remove power cord from ac outlet.*

- (3) Remove access cover (Fig. 2).
- (4) Adjust limit switch actuator (Fig. 2):
  - (a) Loosen actuator locking screw.
  - (b) Slide actuator to desired setting (1 HR or 2 HR).
  - (c) Tighten actuator locking screw.
- (5) Replace access cover.

#### 10.02 *Announcement Recording:*

- (1) Remove top cover (2.01).

- (2) Remove KS-19245, List 4 amplifier (3.03).
- (3) Release timer cap by carefully depressing timer arm.

**Caution:** *Do not rotate recorder motor by hand.*

- (4) Adjust recording capacity by carefully lifting tab of timer spring from slot and rotating to position of desired interval (Fig. 8).

**Caution:** *Do not lift tab over raised portion of timer cap. To increase interval, rotate tab clockwise. To reduce interval, rotate tab counterclockwise.*

- (5) Replace KS-19245, List 4 amplifier.
- (6) Replace top cover.

### 11. LUBRICATION

**11.01** No lubrication should be done in the field on KS-19245, List 1 telephone answering sets.

### 12. CLEANING

**12.01** Clean recording and erase heads by wiping with a clean KS-2423 cloth, moistened slightly with trichloroethane or approved equivalent. Remove all excess cleaner with a dry KS-2423 cloth.

**12.02** Drive belts, capstans, and drive surfaces of pulleys shall be free of oil, dirt, or other foreign matter. To clean, use a KS-2423 cloth moistened with (type cleaner) 1, 1, 1, trichloroethane or approved equivalent.

**12.03** Clean pinch rollers only if excessive build-up of foreign particles is present. Use KS-2423 cloth moistened slightly with (type cleaner) 1, 1, 1, trichloroethane. Wipe off any excess cleaner immediately with dry KS-2423 cloth and allow time for rubber surface to dry before running set.

### 13. ACCESSORIES

**13.01** Limit maintenance on foot switch, head set, or backspace unit to correcting loose connections. Replace and return accessories to

Western Electric Company for repairs of any other troubles.

#### 14. CHECK POINTS



*Upon completion of any maintenance work the following steps should be taken to insure answering set is in proper operating condition.*

- (1) Insert power cord into ac outlet. Refer to Division 514 section entitled: KS-19245, List 1 Telephone Answering Set, Operation, and check the following:
  - (a) Announcement recording and erasure
  - (b) Announcement check:
    - With handset
    - With speaker
  - (c) Automatic answer—answer and record:
    - Automatic answer ready lamp
    - Ring-up
    - In-use lamp
    - Announcement monitoring in speaker
    - Transfer beep tone
    - Message monitoring in speaker
    - Talk-down tone
    - Voice control—time-out
    - Disconnect beep tone
  - (d) Automatic answer—answer only:
    - Ring-up
    - Announcement monitoring in speaker
    - Disconnect at end of announcement
  - (e) Message playback:
    - With handset
    - With speaker
    - With earphone (optional accessory)
  - (f) Fast forward and rewind of message tape
  - (g) Erase messages
  - (h) Foot switch (optional accessory)
  - (i) Back space unit (optional accessory)

#### 15. CHART A



*Before proceeding with operational procedure make the following visual inspection.*

#### VISUAL INSPECTION

- 15.01 Check connections for type of service.
- 15.02 Check that plug-in assemblies are properly installed, with plugs firmly in place:
  - List 2 Recorder
  - List 3 Recorder
  - List 4 Amplifier
  - List 5 Amplifier
  - Relays
  - List 6 Cartridge
- 15.03 ON-OFF (medallion) lamp lighted. Check following if otherwise:
  - Function selector—Any position other than OFF
  - Power cord properly installed
  - Fuse not blown
  - List 6 cartridge properly installed
  - Lamp bulb
- 15.04 Functions (Preliminary Check)

TABLE A

PART	ORDERING INFORMATION*	REMARKS
Recorder	KS-19245, List 2	Announcement recording mechanism
Motor M 201	B-559822	Component of KS-19245, List 2 Recorder
Belt (Drive belt)	B-559817-1	Component of KS-19245, List 2 Recorder
Belt (Capstan flywheel)	B-559817-2	Component of KS-19245, List 2 Recorder
Shock Mount, Motor	B-559821	Component of KS-19245, List 2 Recorder
Recorder	KS-19245, List 3	Incoming message mechanism
Motor M 301	B-650602	Component of KS-19245, List 3 Recorder
Motor Fan	B-558996	Component of KS-19245, List 3 Recorder
Shock Mount, Motor	B-559821	Component of KS-19245, List 3 Recorder
Dial Assembly	B-559988	Component of KS-19245, List 3 Recorder
Hub Cartridge Drive	B-559923	Component of KS-19245, List 3 Recorder
Take-up Spool Assembly	B-563465	Component of KS-19245, List 3 Recorder
Deck	B-559921	Component of KS-19245, List 3 Recorder
Island, Trim Deck	B-559922	Component of KS-19245, List 3 Recorder
Amplifier	KS-19245, List 4	Printed wiring card for recording and reproducing
Amplifier	KS-19245, List 5	Printed wiring card containing voice operated and calling party control circuits
Relay VC	Allied Control Co. or equiv. TS 154-C-C 8.5 MADC- 1000 ohms	Component of KS-19245, List 5 Amplifier
Relay CPC	B-560101	Component of KS-19245, List 5 Amplifier
Control Knob Assembly	B-560078	Function selector
Control Knob Assembly	B-560081	Speaker control
Knob Control	B-560070	Forward — rewind selector

\* Parts identified by B-numbers, order as: "B — Part of KS-19245, List 1 Telephone Answering Set."

TABLE A (Cont)

PART	ORDERING INFORMATION*	REMARKS
Power Cord	KS-19245, List 10	For use with a 2-wire 110-volt ac outlet
Power Cord	KS-19245, List 11	For use with a 3-wire parallel-blade, 110-volt ac outlet
Cartridge	KS-19245, List 6	Contains recording tape for incoming messages
Retainer, Circuit Board	B-560824	Secures KS-19245, List 4 and List 5 amplifiers
Hand Set (Furnished with Cord)	G-5KR-61	Used to record and monitor
Cord	H6E-61	Used with G-5KR-61 handset
Hanger, Handset	B-560066	Handset cradle
Speaker	Quam 3.2 ohms 3 inch diam, 30A05 or 09149	Monitors announcement and message tapes
Relay RU	Allied Control Co., Inc. SWX-63-13, 800 ohms	Component of chassis assembly
Relays AD,BD,DLY, ENA,FD, or LS	Allied Control Co., Inc. TF154-CC-CC 24 VDC-700 ohms	Component of chassis assembly
Relay ADR	Allied Control Co., Inc. TF154-C-C 24 VDC-700 ohms	Component of chassis assembly
Plate, Rectangular	B-560085	Access to mounting cord terminal board
Cover Access	B-560083	Access to 1 hr, 2 hr limit switch actuator of List 3 recorder
Operating Instruction Label	B-559781	Contains operating instructions of answering set, adheres to cover
Fuse Holder	Bussman Fuse Holder 342004; obtain locally	Located on bottom of set. Houses 1 lamp fuse
Fuse	3AG1 amp; obtain locally	Provides electrical protection
Lamp Miniature	No. 334-LSV† (Chicago Miniature Lamp Co.), GE #388†, or equivalent	IN-USE, AUTO-ANS and ON-OFF lamp bulbs
Foot	B-550086	Located on bottom of set

\* Parts identified by B-numbers, order as: "B — Part of KS-19245, List 1 Telephone Answering Set."  
† 25,000 Hour Life

**A. Announcement Record and Announcement Check**

Following conditions should exist:

- Function Selector—ANN-REC or ANN-CHECK position
- ON-OFF (medallion) lamp lighted
- Forward limit switch on List 3 recorder not operated

(Message indicator dial reading less than 100 for 1-hour message recording adjustment and less than 200 for 2-hour message recording adjustment)

**B. Automatic Answer—Answer Only**

Following conditions should exist:

- Function Selector—ANS-ONLY position
- ON-OFF (medallion) lamp lighted
- AUTO-ANS lamp lighted
- Minute end of tape warning switch not operated

(Message indicator dial reading less than 90 for 1-hour message recording adjustment and less than 190 for 2-hour message recording adjustment)

**C. Automatic Answer—Answer and Record**

Following conditions should exist:

- Function Selector—ANS-REC position
- ON-OFF (medallion) lamp lighted
- AUTO-ANS lamp lighted
- 3-minute end of tape warning switch not operated

(Message indicator dial reading less than 90 for 1-hour message recording and less than 190 for 2-hour adjustment)

**D. Message Playback**

Following conditions should exist:

- Function Selector—PLAY position
- ON-OFF (medallion) lamp lighted
- Forward limit switch on List 3 recorder not operated

(Message indicator dial reading less than 100 for 1-hour message recording adjustment and less than 200 for 2-hour message recording adjustment)

**E. Fast Forward—Rewind**

Following conditions should exist:

- Function Selector—PLAY position or ERASE position
- ON-OFF (medallion) lamp lighted
- Fast forward—forward limit switch on List 3 recorder not operated

(Message indicator dial reading less than 100 for 1-hour message recording adjustment and less than 200 for 2-hour message recording adjustment)

**15.05 Lamp Bulbs (IN-USE, AUTO-ANS, and ON-OFF):**

General Electric No. 334 Lamp (rated 1000 hours) should be replaced by General Electric No. 388 or Chicago Miniature No. 334-LSV Lamp (both rated 25,000 hours).

**15.06 Drive Belt Slippage:** Silicone oil from the drive motors creeps along the shafts and eventually over the pulleys until it reaches the belts. This causes the belts to stretch somewhat and also reduces the friction between the belts and the pulleys, both of which causes warble. Stretched belts work satisfactorily if they and the pulley surfaces are cleaned per 12.02.

## 16. OPERATIONAL PROCEDURE



*The following tests require operation of the set with outer cover removed and 24 vdc on exposed terminals. Do not operate solenoids, tape reels or other mechanism parts by hand.*

- 16.01 If securing of loose connections or replacement of fuse, lamp bulbs, List 2 recorder, List

3 recorder, List 4 amplifier, List 5 amplifier, List 6 cartridge, List 10 or 11 power cords, or plug-in relays does not correct trouble, return set to Distributing House.

- 16.02 Refer to Fig. 8 and 9 for reference with operational procedure.

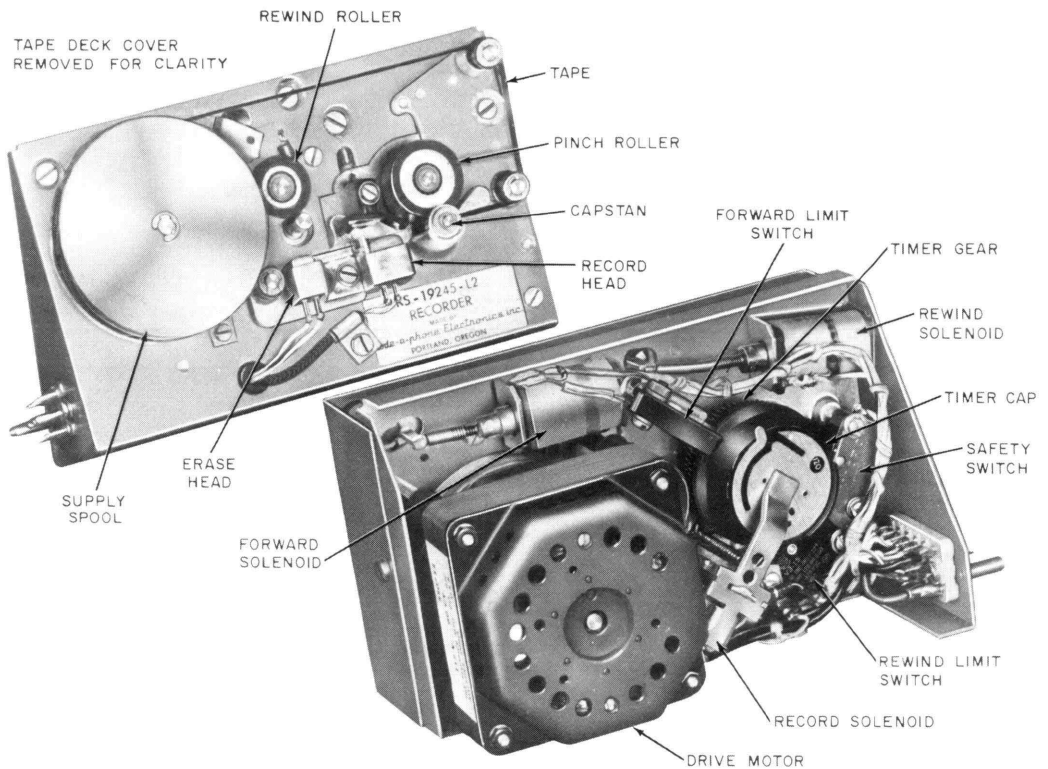


Fig. 8—KS-19245, List 2 Recorder Front and Rear Views



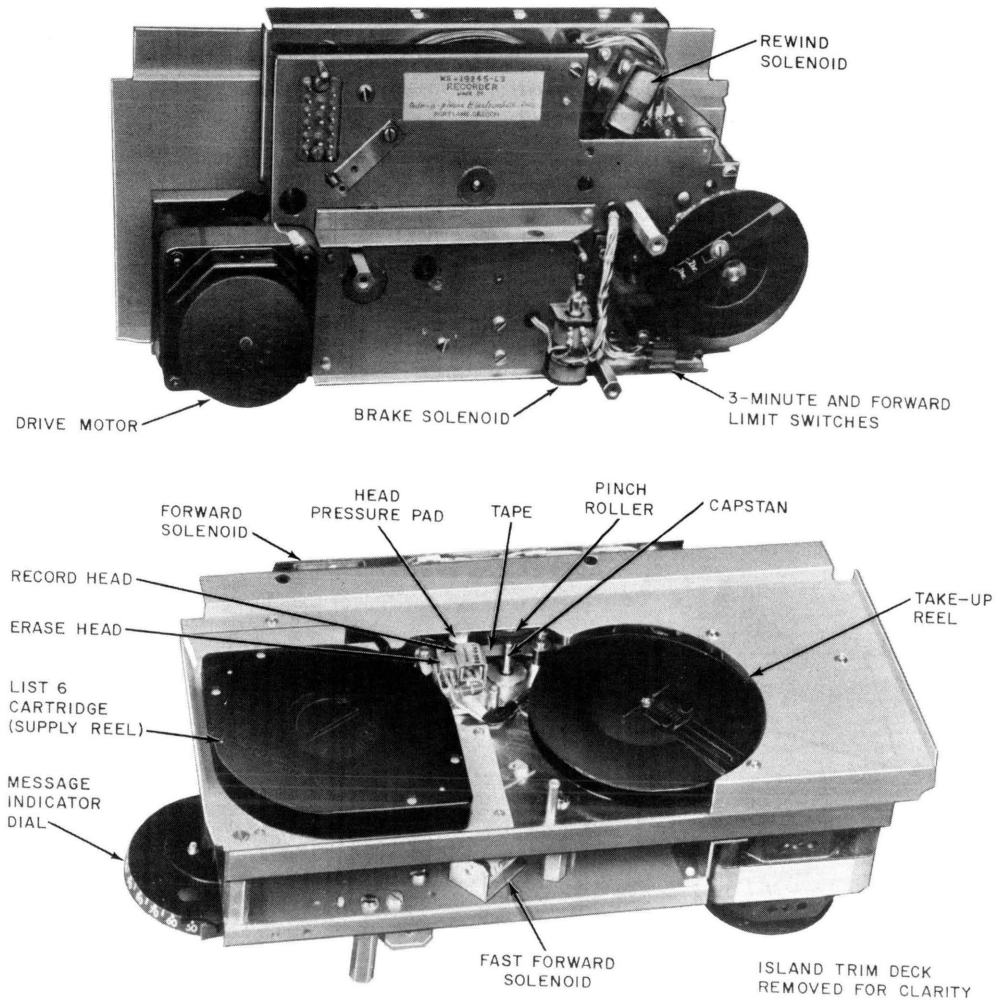


Fig. 9—KS-19245, List 3 Recorder Front and Rear Views

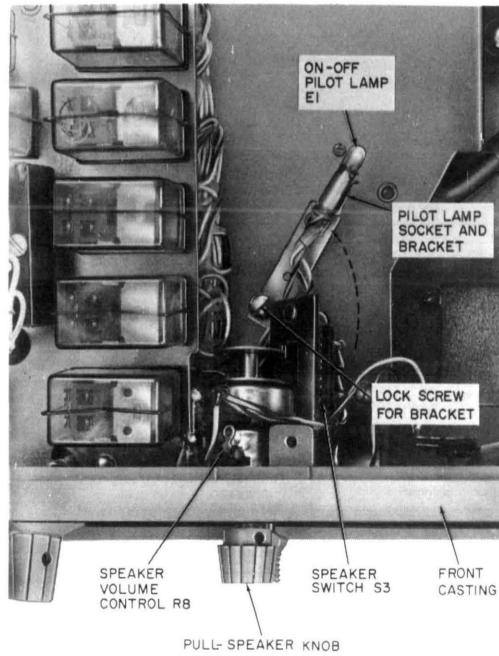


Fig. 10—ON-OFF Lamp E1 on Pivoted Position

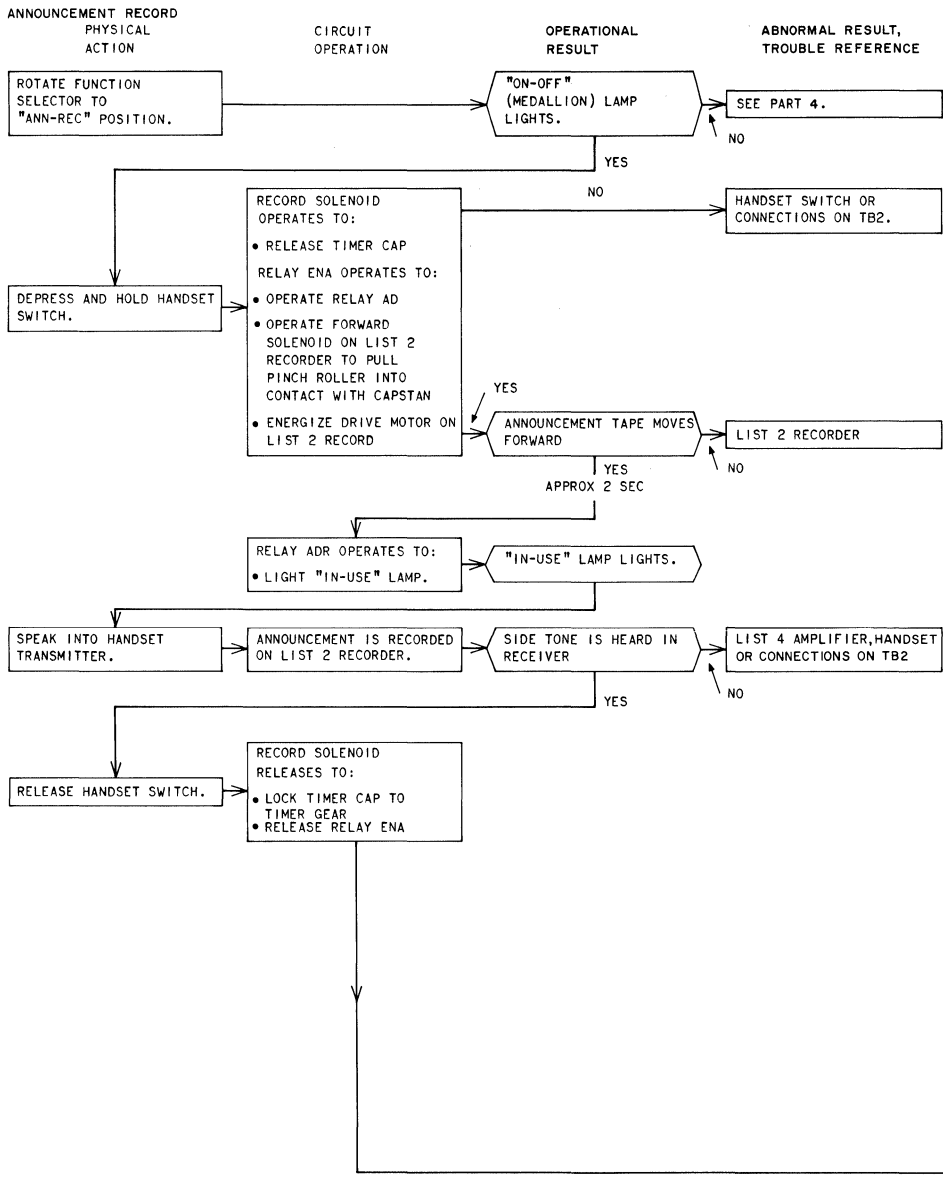


Fig. 11—Chart A (Sheet 1)

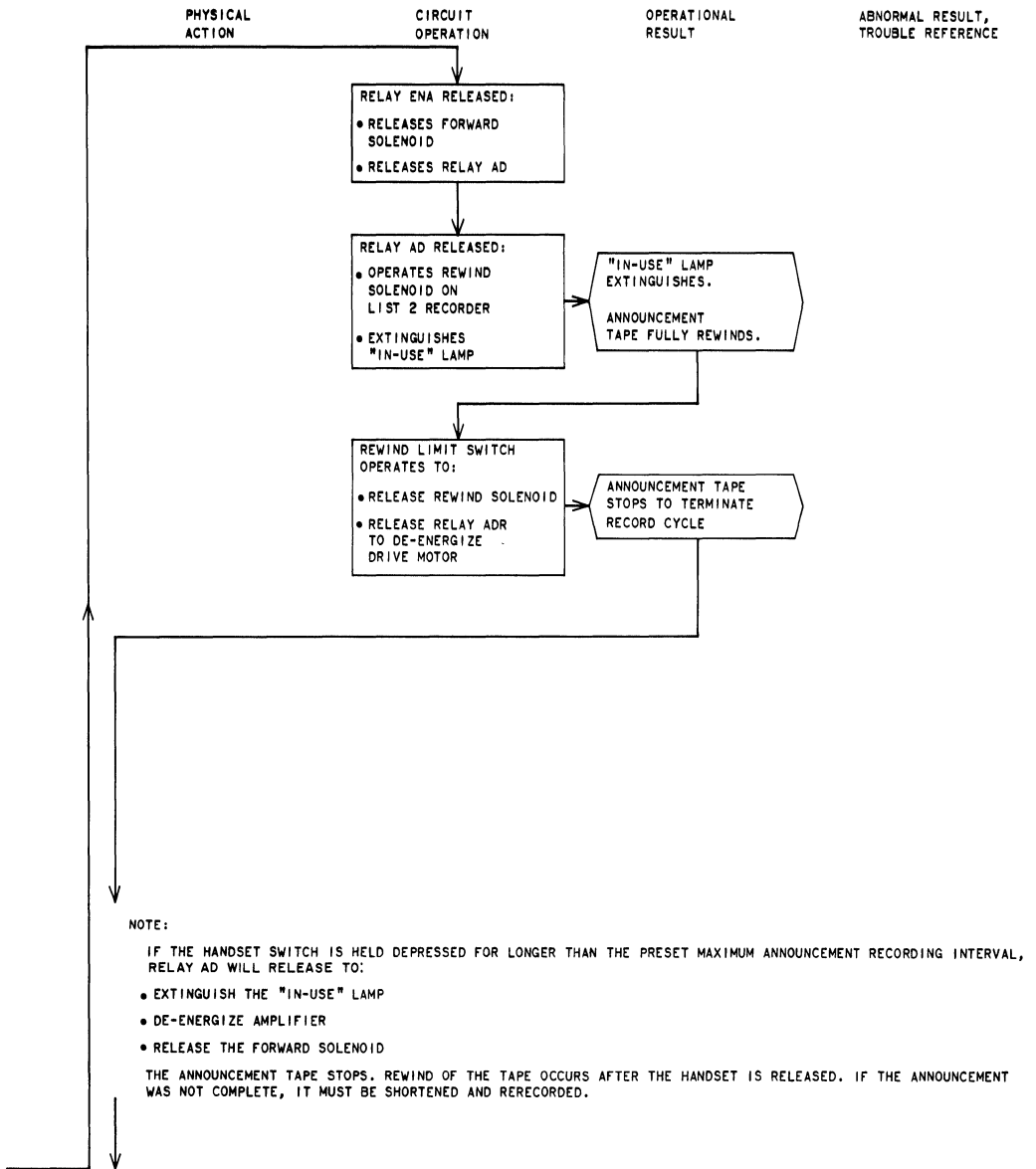


Fig. 11—Chart A (Sheet 2)

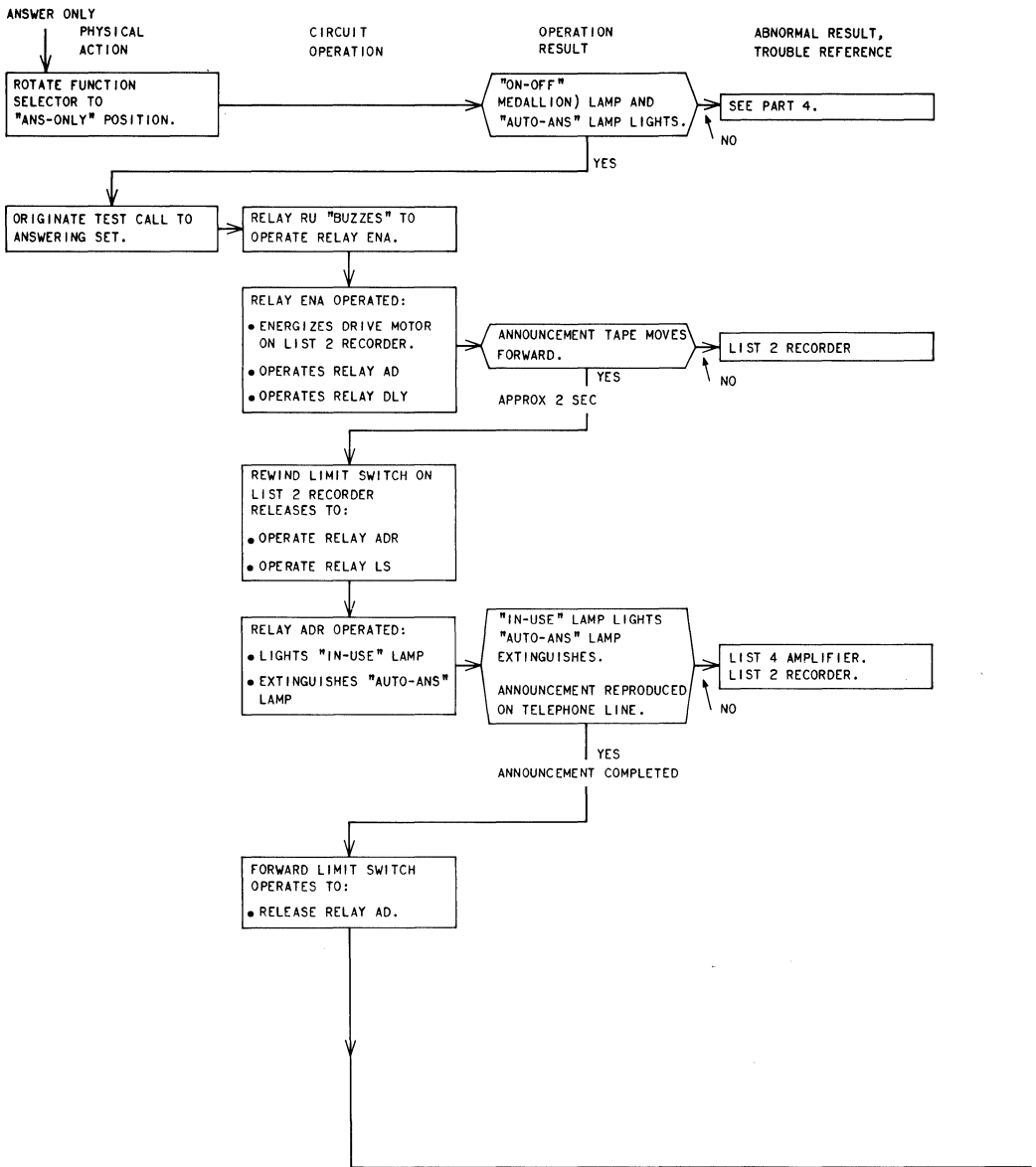


Fig. 11—Chart A (Sheet 3)

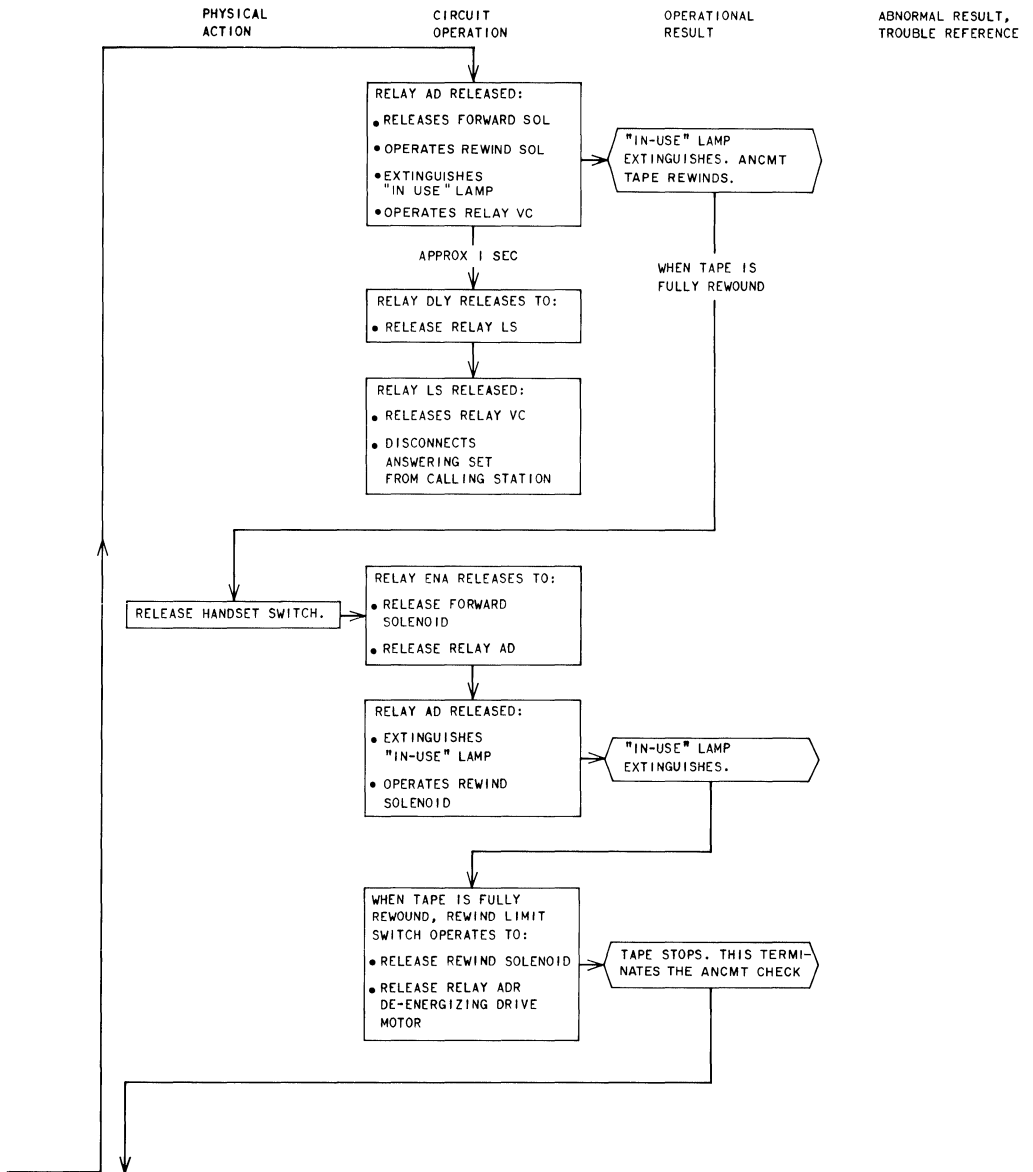


Fig. 11—Chart A (Sheet 4)

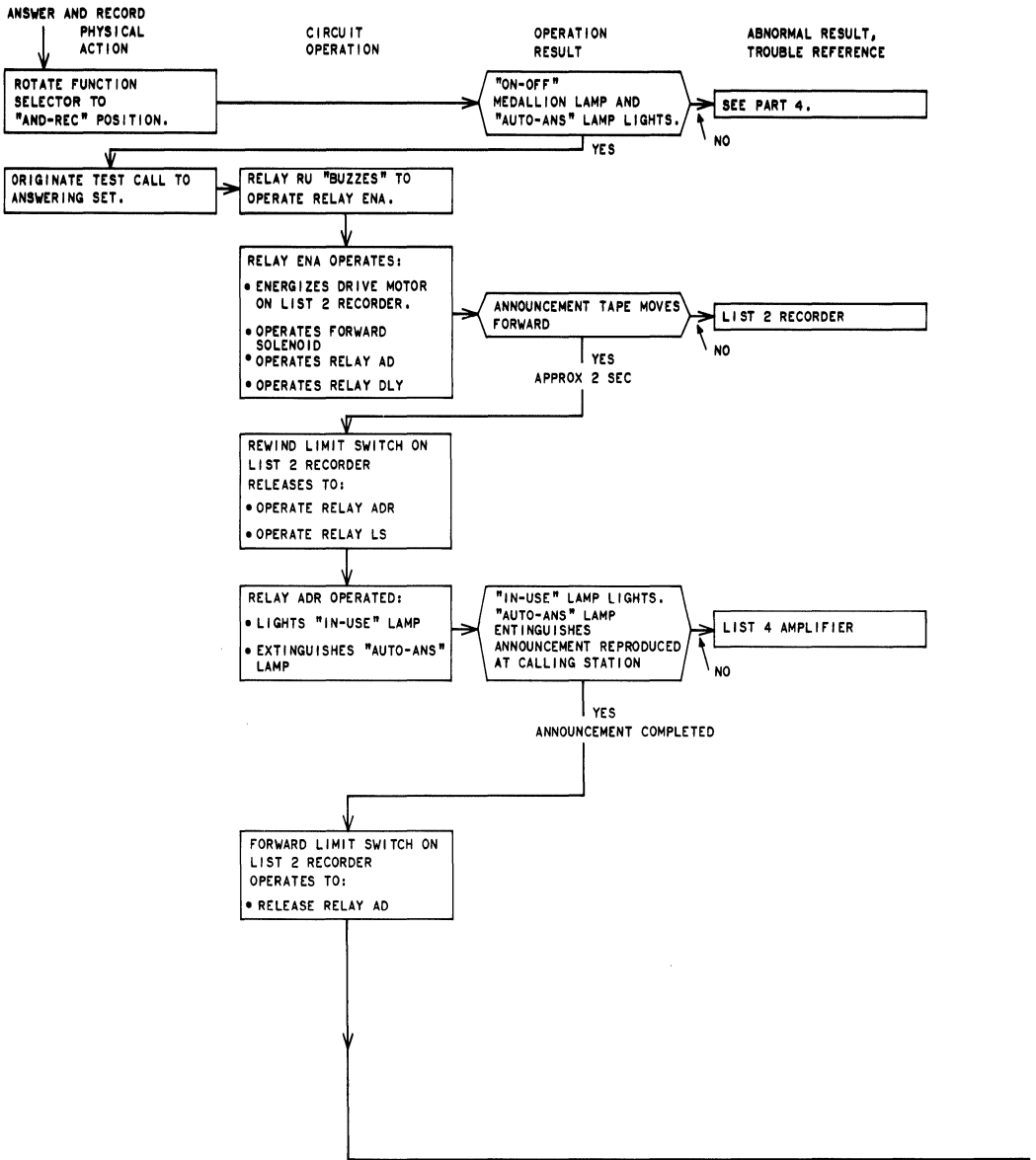


Fig. 11—Chart A (Sheet 5)

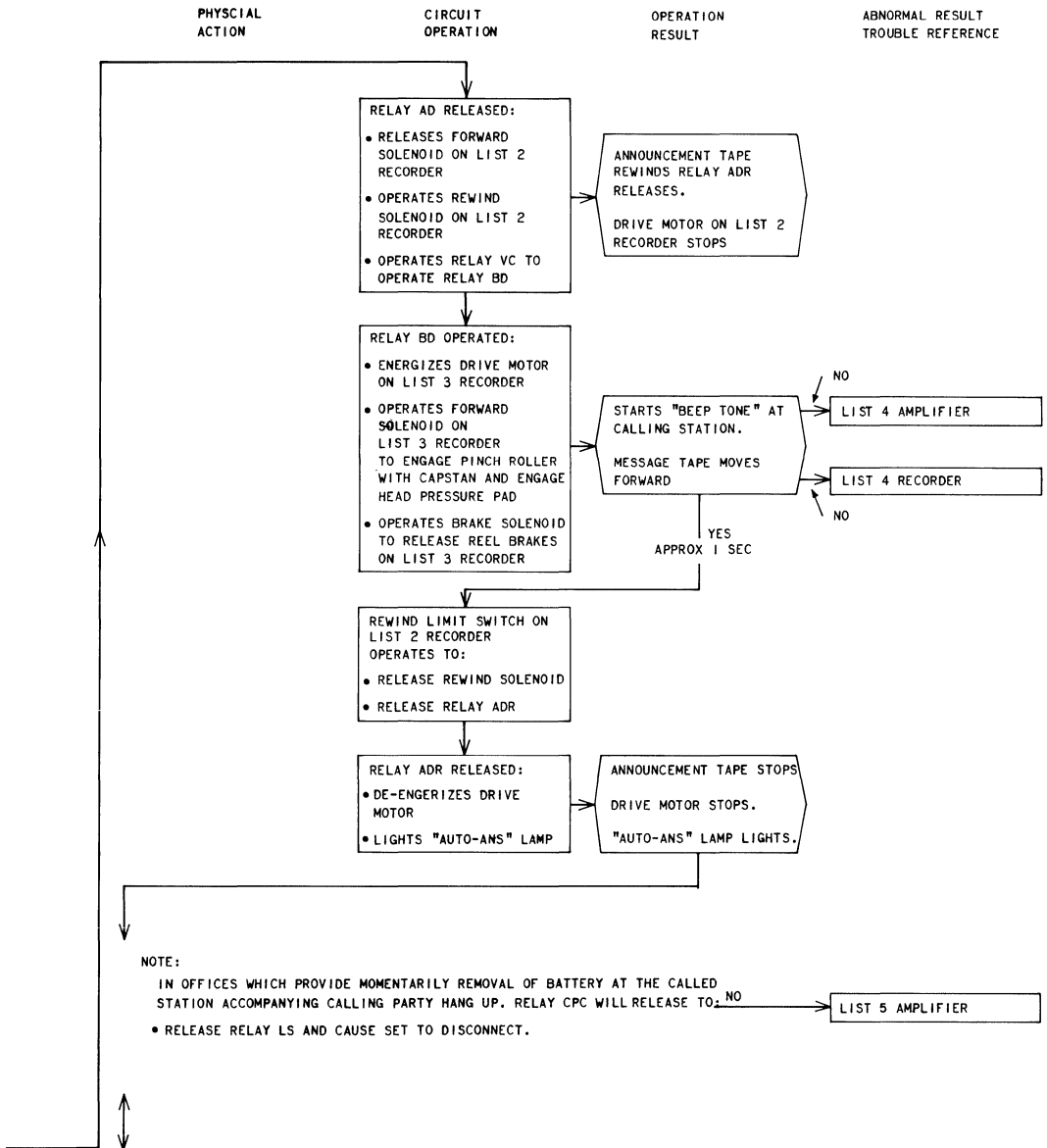


Fig. 11—Chart A (Sheet 6)◄



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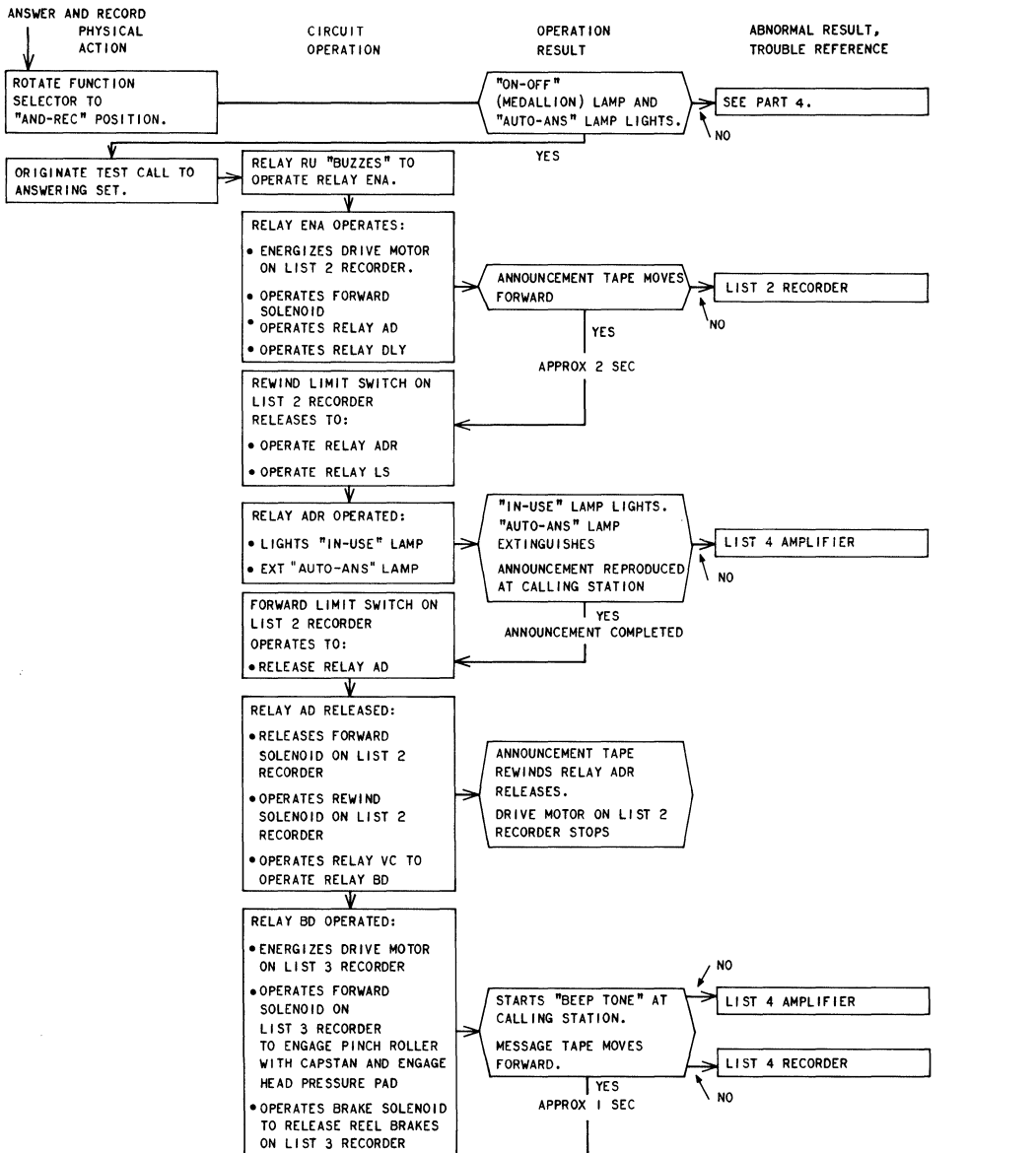


Fig. 11—Chart A (Sheet 7)

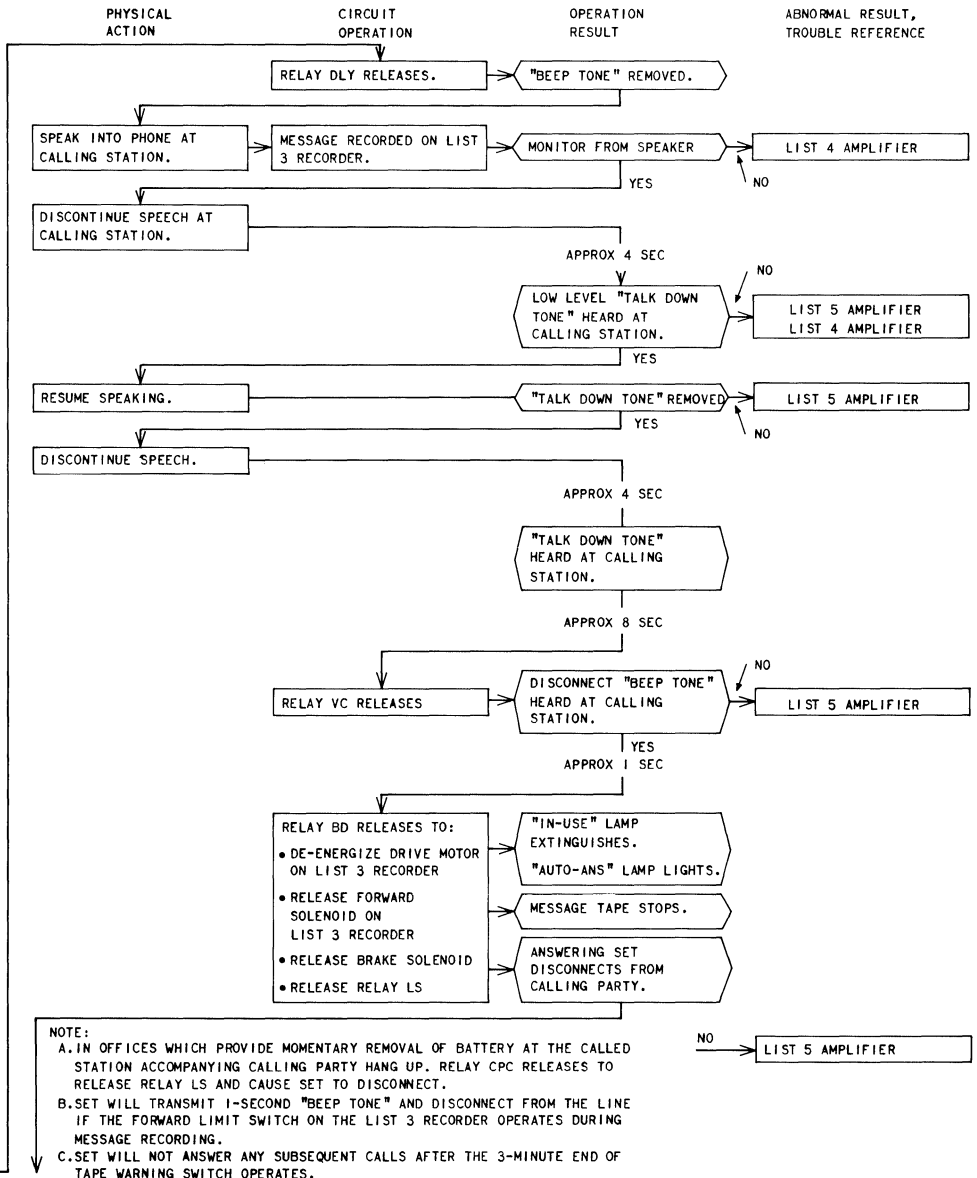


Fig. 11—Chart A (Sheet 8)

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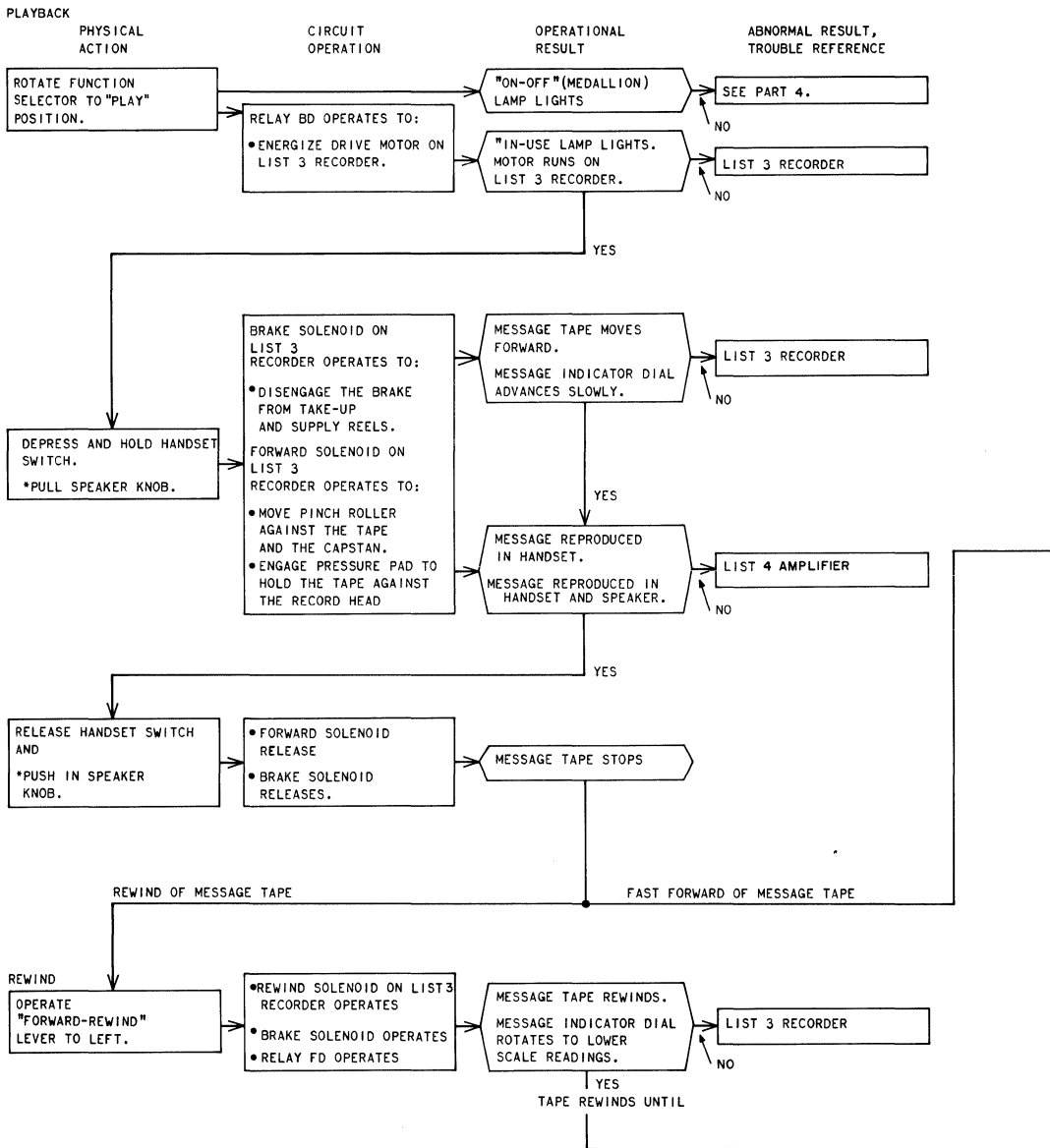


Fig. 11—Chart A (Sheet 9)

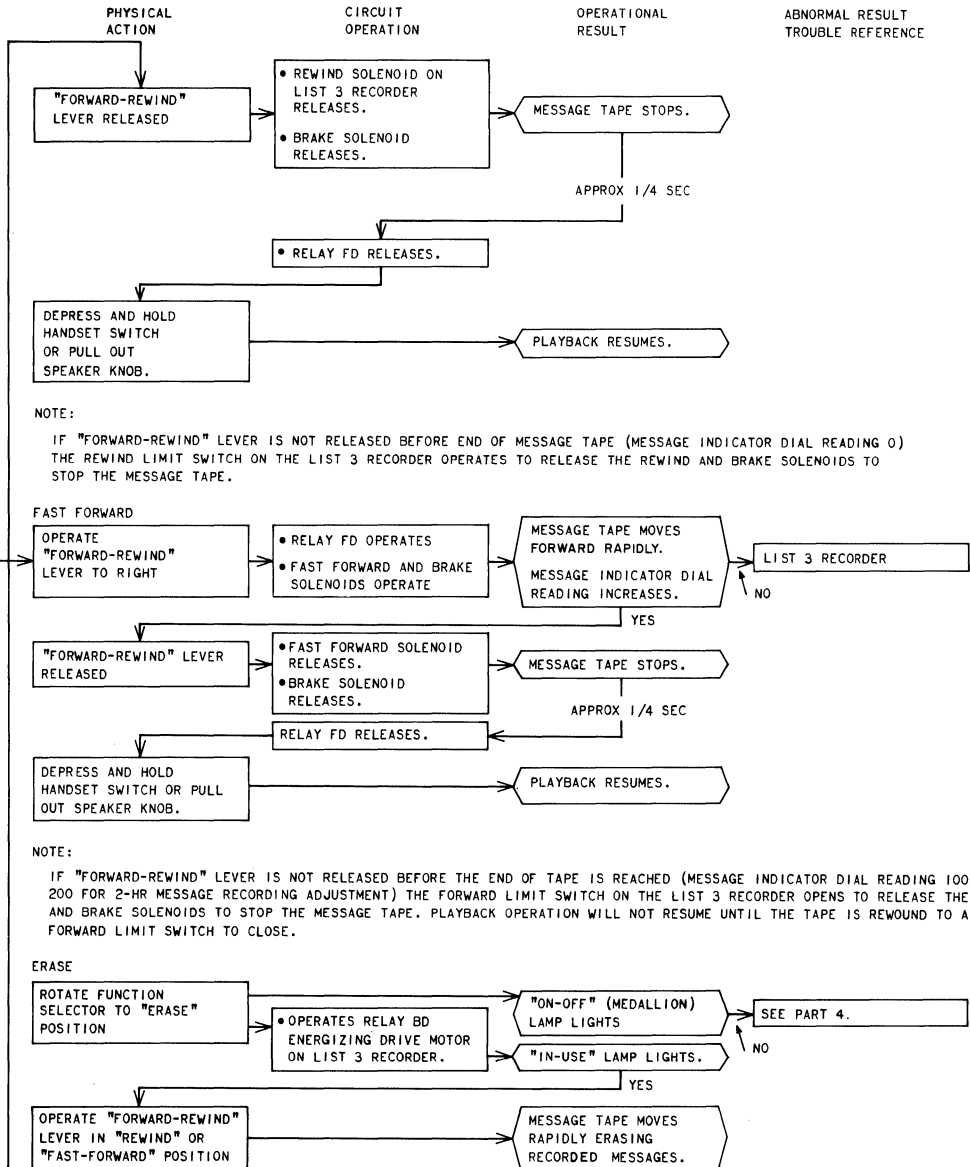


Fig. 11—Chart A (Sheet 10)†

## KS-16765, LISTS 1 AND 2 ANNOUNCEMENT SETS IDENTIFICATION AND MAINTENANCE

### 1. GENERAL

**1.01** Refer to CD- and SD-95286-01 for List 1 and CD- and SD-95283-01 for List 2 announcement sets.

**1.02** This section is reissued to emphasize the importance of regular lubrication and to add new lubrication requirements.

### 2. IDENTIFICATION

**2.01** The KS-16765, Lists 1 and 2 announcement sets (Fig. 1) feature:

- (a) Recording and reproducing of announcements on a magnetic recording band.
- (b) Announcement recording capacity of 2 minutes with provision for increasing to 3 minutes on most sets.



*Recording capacity of 3 minutes is provided on announcement sets with List 3 recorders. Announcement sets equipped with B-650412 drive assemblies, may be identified by a black star located at the upper right corner of the announcement set nameplate or identified by checking the serial number of the announcement set. All Lists 1 and 2 announcement sets having serial numbers higher than 22737 and 19395, respectively, can be arranged for 3-minute recording capacity by installing the B-650417 drive pulley. Sets without the black star and with serial numbers lower than 22737 and 19395, respectively, are limited to a 2-minute recording capacity.*

- (c) Adjustment for limiting announcement recording interval to less than maximum capacity.

- (d) Variable cycle that automatically adjusts reproduce cycle to length of recorded announcement.

**2.02** List 1 announcement set is designed and intended for:

- (a) Loop start operation.
- (b) Installation on a customers premises.
- (c) Remote control, up to several hundred feet, by either the pushbutton of a key telephone set or a 6040H or 6041H key with a 500-type telephone.

**2.03** List 2 announcement set is designed and intended for:

- (a) Ground start operation.
- (b) Central office installation or when used with a 2A, 2B, or 3A ACD installation on a customers premises
- (c) Local control using the dictate-check key on the announcement set with an operator telephone set plugged into the telephone jacks (Fig. 4).
- (d) Use with the KS-16765, List 7 mounting bracket and KS-16765, List 8 connecting cord if the set is to be mounted in a 23-inch relay rack.

**2.04** Lists 1 and 2 sets may be wall mounted or placed on a desk, table, or shelf.

**2.05** Each set weighs approximately 40 pounds and is housed in a metal cabinet that has a removable front and back (Fig. 2, 3, 4, and 5). The cover has a blue gray enamel finish and the chassis has a light olive gray finish. Dimensions are shown in Fig. 1.

### NOTICE

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

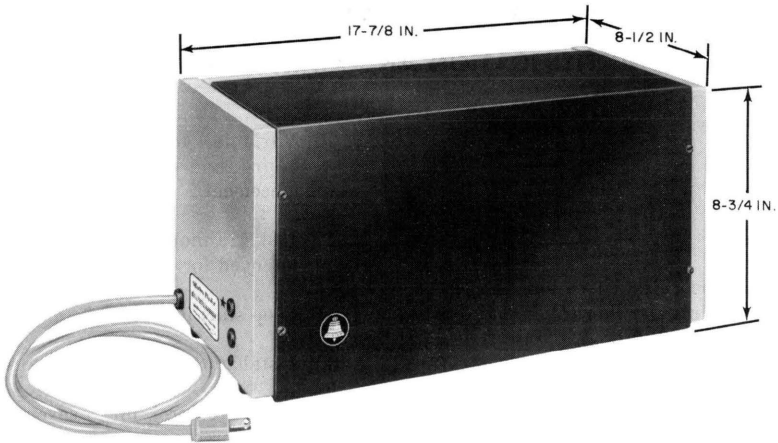


Fig. 1—KS-16765, Lists 1 and 2 Announcement Set Dimensions

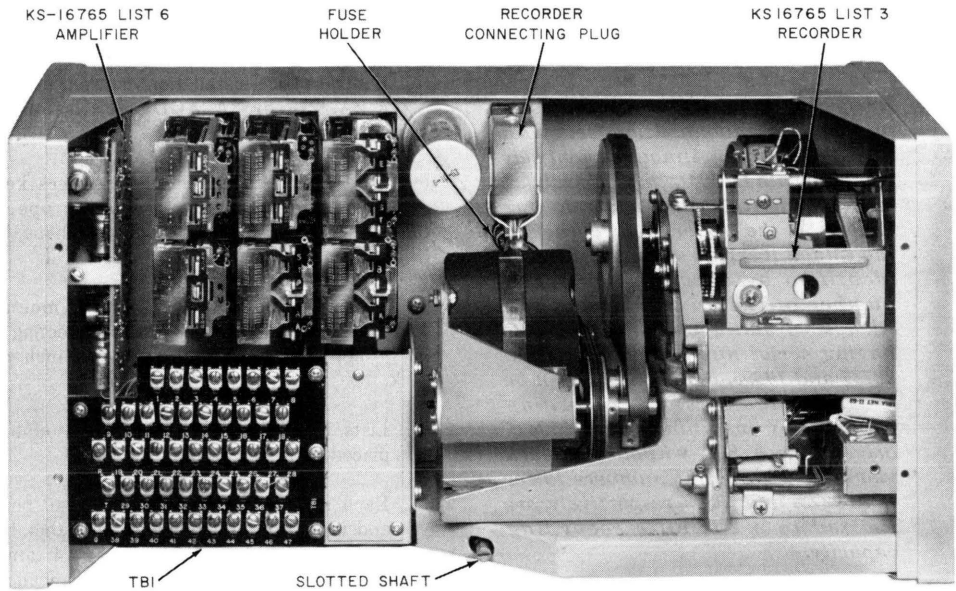


Fig. 2—KS-16765, List 1 Announcement Set, Front Cover Removed

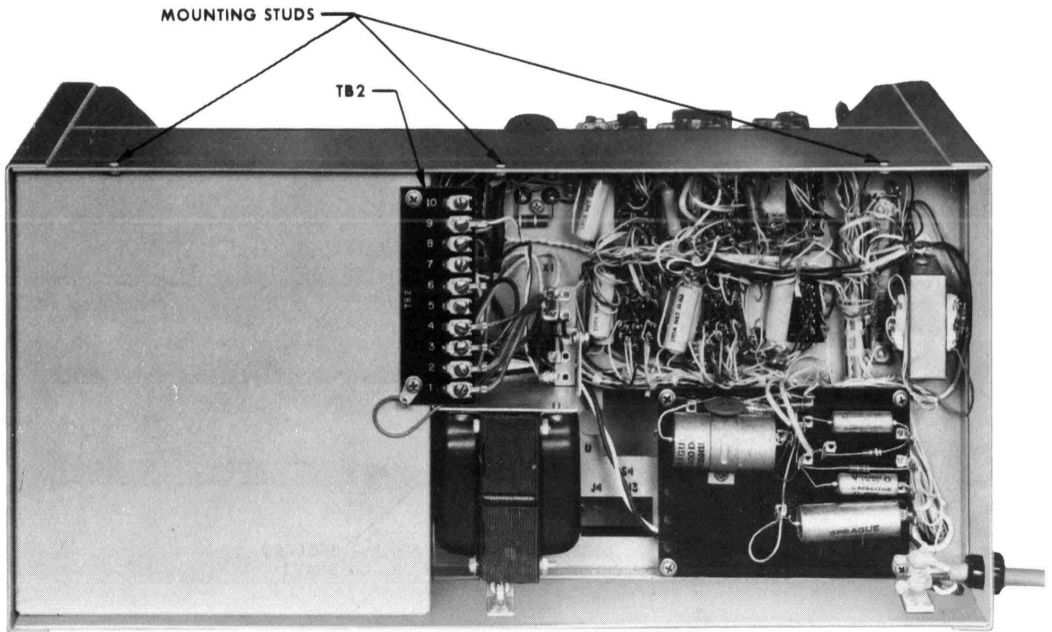


Fig. 3—KS-16765, List 1 Announcement Set, Rear Cover Removed

**2.06** A power source of 110/125-volt, 60 cycle ac is required for these sets. Outlet and power are provided by the customer.

**2.07** A 1/2-amp fuse is provided in these sets for electrical protection (Fig. 2 and 4).

**2.08** The KS-16765, Lists 1 and 2 announcement sets (Fig. 2, 3, 4, and 5) incorporate the following:

- KS-16765, List 3 Recorder
- KS-16765, List 6 Amplifier
- Chassis

**2.09** The KS-16765, List 3 recorder (Fig. 6 and 7) is the announcement recording mechanism. It consists of a magnetic record-reproduce head, an apparatus for tracking and switching, and a magnetic recording band on a drum. The drum is revolved by the B-650412 drive assembly (Fig. 10)

which is fitted with one of the two interchangeable pulleys that control the maximum recording duration.

**2.10** The B-650417 3-minute pulley (Fig. 8) is used to increase the maximum announcement recording capacity from 2 to 3 minutes. The 3-minute pulley reduces the angular speed of the recording drum, thereby increasing the announcement capacity.



*Earlier announcement sets without a black star beside the nameplate cannot be fitted with the 3-minute pulley and are limited to a recording duration of 2 minutes.*

**2.11** As shown in Fig. 8 the 3-minute pulley differs from the 2-minute in that the smaller diameter extension is not provided and hence, the flat drive belt is driven directly from the shaft.

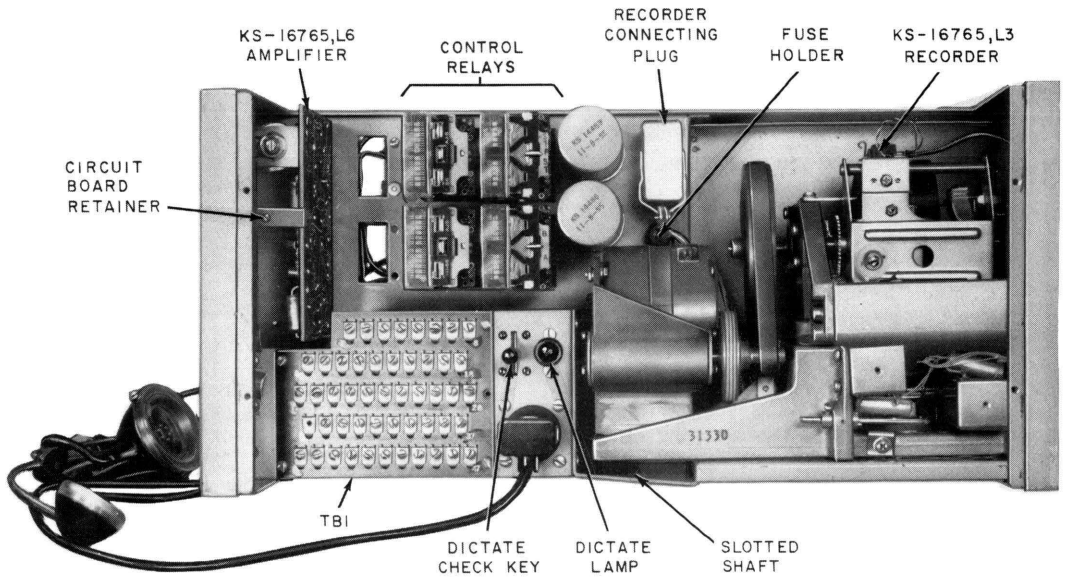


Fig. 4—KS-16765, List 2 Announcement Set, Front Cover Removed

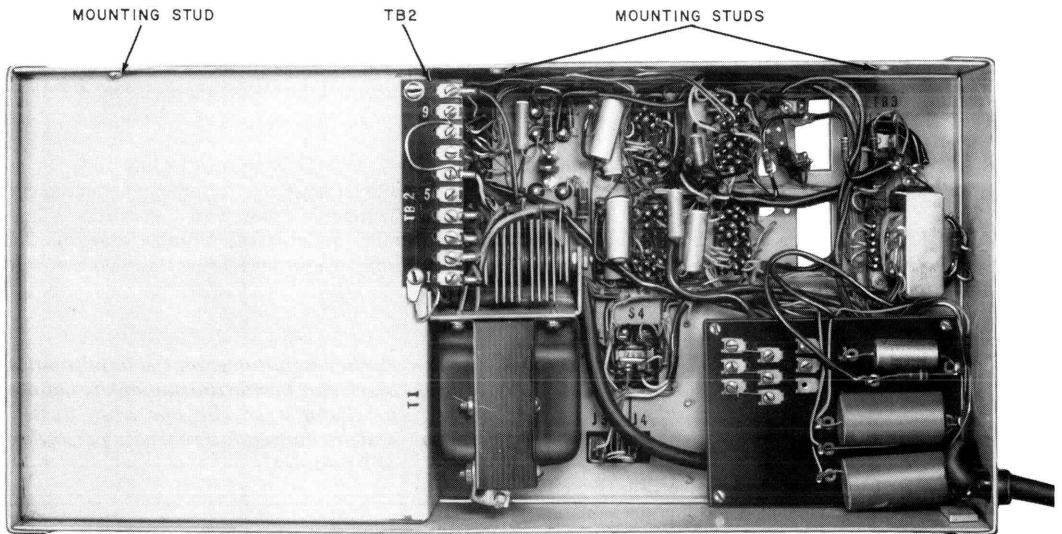


Fig. 5—KS-16765, List 2 Announcement Set, Rear Cover Removed



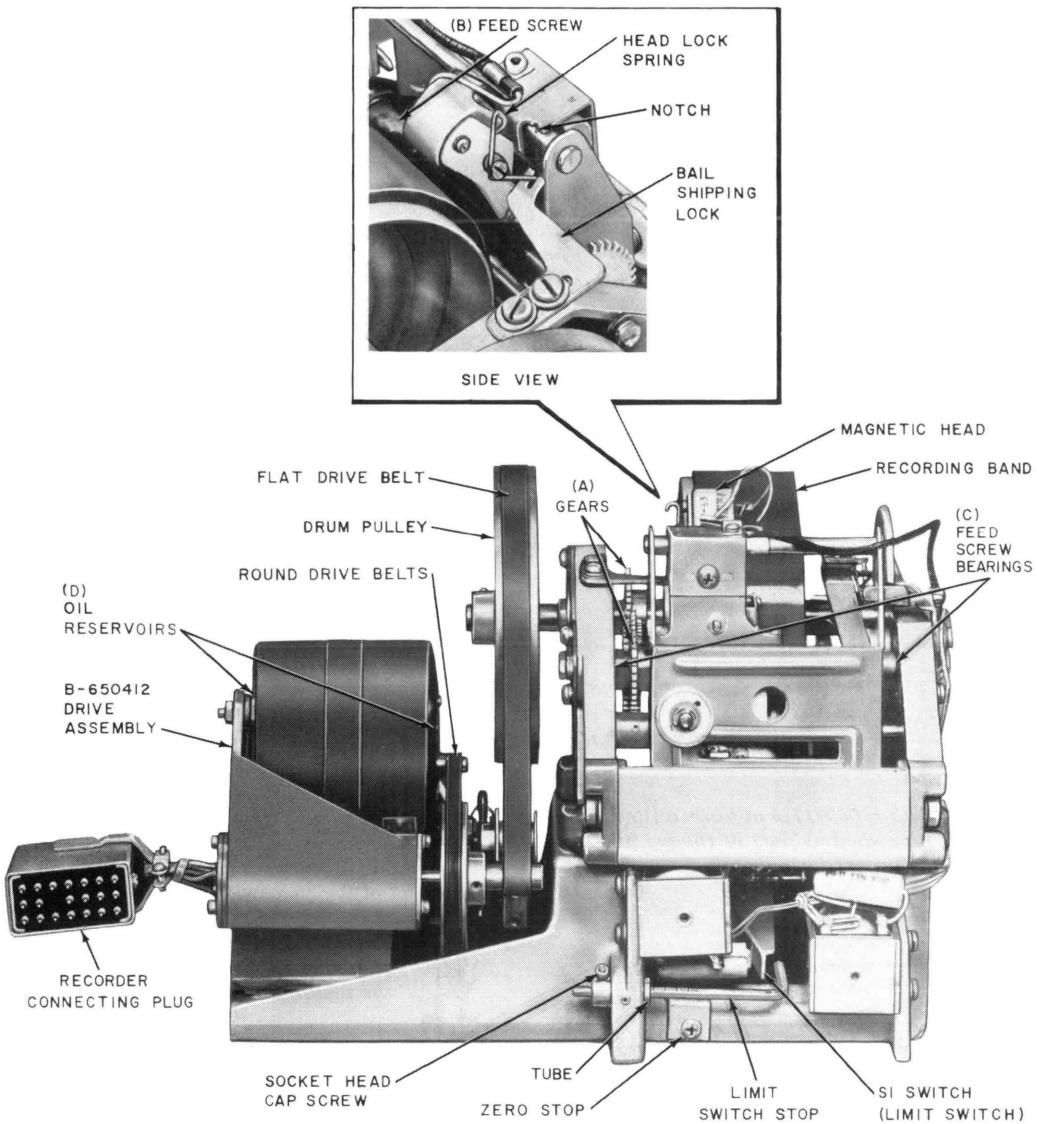


Fig. 6—KS-16765, List 3 Recorder, Front View

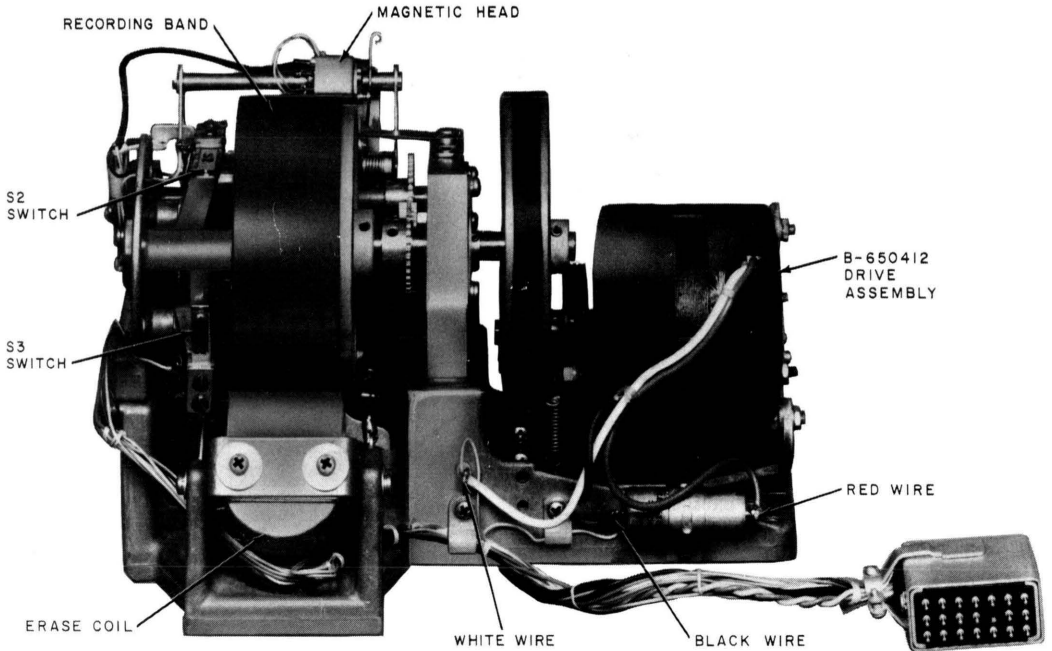


Fig. 7—KS-16765, List 3 Recorder, Rear View



*The B-650417 3-minute pulley is not furnished as part of the set and must be ordered separately.*

2.12 Facilities are provided for limiting the maximum recording interval to any portion of the total capacity. This is accomplished by adjustment of the limit switch stop (Fig. 6).



*The seven marks on the limit switch stop may be used as guides for setting the maximum recording interval.*

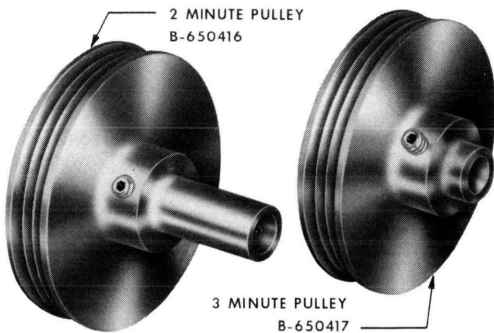


Fig. 8—Drive Pulleys

MARK	2-MINUTE CAPACITY TIME IN SEC.	3-MINUTE CAPACITY TIME IN SEC.
	(B-650416 PULLEY)	(B-650417 PULLEY)
1	0	0
2	15	22-1/2
3	30	45
4	45	67-1/2
5	60	90
6	90	135
7	120	180

**2.13** For intervals other than those shown, it will be necessary to estimate the setting between the two appropriate marks. The mark nearest the bent end of the stop (No. 1) represents 0 second.

**2.14** The KS-16765, List 6 amplifier (Fig. 9) is of printed wiring board construction and provides amplification for both recording and reproducing, an automatic volume control feature for minimizing variation in level of recorded speech, and a high frequency oscillator to provide the bias current required for magnetic recording. List 6 amplifier supersedes List 4 amplifier and may be used as a replacement in all Lists 1 and 2 announcement sets.



*Earlier type KS-16765, Lists 1 and 2 announcement sets are equipped with List 4 amplifiers. List 4 amplifier should not be used in List 1 sets with serial numbers above 8135 or in List 2 sets with serial numbers above 5558.*

**2.15** Earlier type KS-16765, Lists 1 and 2 announcement sets that have a 60 Hz hum in the output of the set, can be upgraded in the field with a kit of parts to reduce the hum level. This kit is to be ordered directly from the manufacturer. The kit of parts consists of a 10 ohm, 3 watt resistor and 750 ufd capacitor. Sets manufactured after the first quarter of 1971 are equipped with this modification. Installation information for this kit of parts is contained in the kit of parts package.

Ordering information for the modification kit is as follows:

(Qty) KS-16765 Filter Assembly Kit

Order directly from: Wilcox Electric, 14th and Chestnut Street, Kansas City, Missouri, 64127

Cost and shipping charges billed by manufacturer.

- Verification and analysis of trouble
- Adjustments, lubrication, and cleaning as described in this section
- Replacement and repair of major components

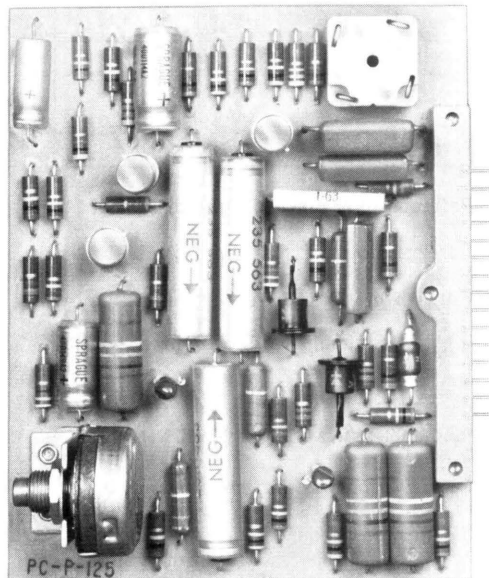
**3.02** Requirements that are gauged by eye should be checked with gauges if there is any doubt.

**3.03** Refer to Table A for piece part information.

**3.04** Clean recording band and head on every maintenance visit.



*Before performing any maintenance on the set, disconnect power cord from the ac outlet.*



**Fig. 9—KS-16765, List 6 Amplifier**

### 3. MAINTENANCE

**3.01** Work performed in customers' premises should be limited to:

TABLE A

PART	ORDERING INFORMATION	REMARKS	FIG.
Recorder	KS-16765, List 3	Announcement Mechanism	Fig. 4
Drive Assembly	B-650412	Component of KS-16765 List 3 Recorder	Fig. 6
Motor	B-650418	Component of B-650412 Drive Assembly	Fig. 6, 10
Drive Belt*	B-651981	Component of B-650412 Drive Assembly	Fig. 6, 10
Belt†‡	B-651703-1	Component of KS-16765, List 3 Recorder	Fig. 6
Belt	B-651703-2	Used on List 1 announcement sets equipped with KS-15914, List 1 or List 2 motors	
Pulley, 2-minute	B-650416	Component of B-650412 Drive Assembly	Fig. 8
Pulley, 3-minute	B-650417	Used to convert announcement set to 3-minute announcement interval	Fig. 8
Pulley Assembly	B-190932	"Idler Pulley Assembly"—Component of List 3 Recorder	Fig. 10
Spring	B-190920	"Idler Tension Spring"—Component of List 3 Recorder	Fig. 10
Stop	B-190915	Announcement Length Adjustment	Fig. 6
Amplifier	KS-16765, List 6	Printed Wiring Card for Recording and Reproducing	Fig. 9
Cover Assembly	B-190892	Front Cover of Announcement Set	Fig. 1
Cover, Rear	B-190890	Rear Cover of Announcement Set	
Fuse	AGC 1/2 amp; obtain locally	Provides Electrical Protection	Fig. 2, 4
Screw	B-190900	Captive screws of Front Cover Assembly	Fig. 1

\* Referred to in text as round drive belt.

† Referred to in text as flat drive belt.

‡ Furnished with B-650412 drive assembly.

**Note:** Parts identified by B-Number, Order As "B-....., part of KS-16765, List 1, 2 Announcement Sets."

#### REPLACEMENT OF MAJOR COMPONENTS

##### 3.05 KS-16765, List 3 recorder (Fig. 6 and 7):

(1) Remove announcement set front cover.

- Loosen four captive screws on front cover (Fig. 1).
- Remove cover by sliding forward.

(2) Remove recorder connecting plug from plug-in receptacle.

(3) Remove List 3 recorder.

- Remove three retaining screws located on bottom of announcement set.
- Grasp recorder by its motor and chassis and carefully withdraw it from the cabinet.

(4) Insert new recorder into cabinet.

- Tighten three retaining screws.

(5) Release bail shipping lock.

- Loosen mounting screws.

- Move bail shipping lock to extreme position away from bail.
  - Position bail shipping lock to maintain adequate clearance between end of lock and head mounting bracket.
  - Tighten mounting screws.
- (6) Disengage head lock spring.
- Disengage head lock-spring from screw head located on the record-reproduce head.
  - Place head lock spring in notch on carriage bracket. Do not permit spring to rest on slide rod.
- (7) Adjust announcement record capacity as described in 3.22.
- (8) Insert recorder connecting plug into plug-in receptacle.
- (9) Replace announcement set cover and tighten four captive screws.

**3.06 KS-16765, List 6 amplifier (Fig. 2, 4, and 9):**

**Caution:** Do not remove or plug in List 4 or 6 amplifier while power is on. Failure to observe this precaution may cause failure of or damage to electron tube filaments.

- (1) Remove announcement set cover (3.05).
- (2) Remove List 6 amplifier.
- Loosen retaining screw of circuit board retainer.
  - Carefully remove amplifier from its plug-in receptacle.
- (3) Insert new amplifier into plug-in receptacle, tighten screw of circuit board retainer.
- (4) Replace announcement set cover.
- Tighten four captive screws.



**Earlier type KS-16765, Lists 1 and 2 announcement sets are equipped with List 4 amplifiers. Faulty List 4 amplifiers may be replaced in these sets with either List 4 or List 6 amplifier. List 6 amplifier can be used in all KS-16765, Lists 1 and 2 announcement sets. List 4 amplifier can only be used in List 1 sets with serial number 8135 or lower and in List 2 sets with serial number 5558 or lower.**

**3.07 Power Supply—Modification to Reduce 60 Hz Hum Level:**

**Caution:** Remove power cord before performing any work on the power supply to prevent shock and damage to equipment.

- (a) Complete installation procedure is included with the kit of parts for both List 1 and List 2 announcement sets. A complete schematic of the power supply will be found in SD-95286-01 and SD-95283-01 for the KS-16765, Lists 1 and 2 sets, respectively.

**3.08 Relays and Fuses (Fig. 2 and 4):** Relays in these announcement sets shall be maintained and adjusted in accordance with Division 040 of the Plant Series covering wire spring relays.

**3.09** Circuit requirement table for these relays is included in SD-95286-01 and SD-95283-01.

**3.10** Faulty relays will necessitate replacement of the announcement set.

**3.11** The line fuse provided for this set is mounted just below the recorder connector plug (Fig. 2 and 4). The set is equipped with a 1/2-amp AGC fuse. Sets equipped with 1 ampere AGC fuse will be changed to the 1/2 ampere AGC fuse. For fuse inspection or replacement, remove recorder connector plug from receptacle, turn fuse holder counterclockwise and withdraw.

**3.12 B-650412 Drive Assembly (Fig. 10):**

- (1) Remove announcement set cover (3.05).
- (2) Remove List 3 recorder (3.05).
- (3) Remove flat drive belt.

- (4) Remove drive assembly.
  - Unsolder motor leads.
  - Remove four Phillips head screws located on bottom of casting.
  - Lift out drive assembly.
- (5) Remove idler pulley assembly, tension spring and associated nut, washers and details. Install these items on the new B-650412 drive assembly (Fig. 10).
- (6) Install new drive assembly.
  - Tighten four Phillips head screws.

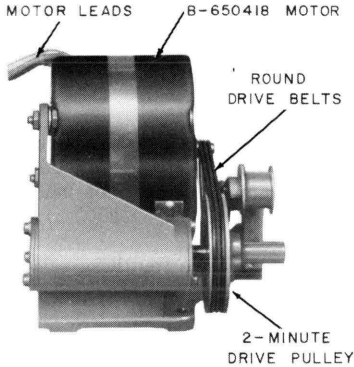
- Solder motor leads (Fig. 7).

- (7) Install flat drive belt (3.17).

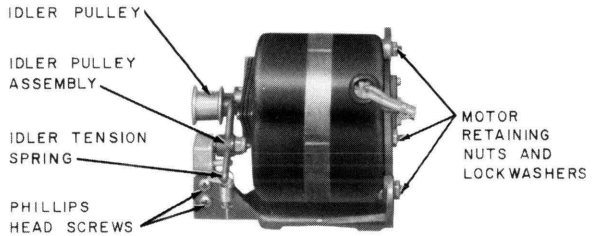


***Before securing List 3 recorder to cabinet, energize recorder and run to observe that flat drive belt runs squarely on drum pulley and does not slip or bind.***

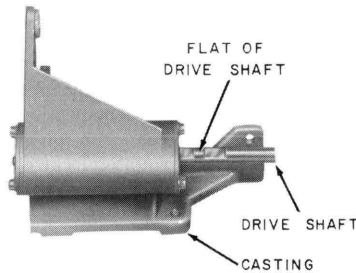
- (a) If belt runs to either side of pulley, correct by loosening mounting screws and pivoting idler pulley assembly. Tighten mounting screws after adjusting.
- (b) If belt slips or binds, correct by moving idler tension spring to another hole on idler pulley arm.



FRONT VIEW



REAR VIEW



MOTOR REMOVED

**Fig. 10—B-650412 Drive Assembly**

- (8) Insert List 3 recorder into cabinet.
  - Tighten three retaining screws.
- (9) Insert recorder connecting plug into plug-in receptacle.
- (10) Replace announcement set cover.
  - Tighten four captive screws.

### 3.13 *Motor Replacement (Fig. 10):*

- (1) Remove List 3 recorder (3.05).
- (2) Remove flat drive belt.
- (3) Remove drive assembly.
  - Unsolder motor leads.
  - Remove four Phillips head screws located on bottom of casting.
  - Lift out drive assembly.
- (4) Remove three round drive belts from motor shaft and drive pulley.
- (5) Disengage idler tension spring.
- (6) Remove idler pulley assembly.
  - Remove two Phillips head screws located on mounting bracket.
- (7) Remove 2-minute drive pulley (Fig. 8).
  - Loosen set screw located on collar of pulley.
  - Slide pulley off drive shaft.
- (8) Remove motor.
  - Remove three nuts and lock washers.
  - Lift off motor.
- (9) Install new motor.
  - Tighten three nuts and lock washers.
- (10) Replace 2-minute drive pulley (Fig. 8).

- Insert pulley on shaft.
- Align pulley with motor shaft.
- Tighten set screw.

**Note:** Tighten set screw against the flat of the drive shaft.

- (11) Install three round drive belts (3.18).
- (12) Replace idler pulley assembly.
  - Tighten two Phillips head screws.
- (13) Engage idler tension spring.
- (14) Install drive assembly.
  - Tighten four Phillips head screws.
  - Solder motor leads (Fig. 7).
- (15) Install flat drive belt, and observe the **Read** (3.17).
  - (a) If belt runs to either side of pulley, correct by loosening mounting screws and pivoting idler pulley assembly. Tighten mounting screws after adjusting.
  - (b) If belt slips or binds correct by moving idler tension spring to another hole on idler pulley arm.
- (16) Insert List 3 recorder in cabinet.
  - Tighten three retaining screws.
- (17) Insert recorder connecting plug into plug-in receptacle.



**Earlier type announcement sets are equipped with KS-15914, List 1 or 2 motor. Faulty List 1 or 2 motor may be replaced with B-650412 drive assembly:**

### 3.14 *To install B-650412 drive assembly:*

- (1) Remove List 3 recorder (3.05).
- (2) Remove flat drive belt and discard.

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- (3) Remove motor assembly.
  - Unsolder motor leads (Fig. 7).
  - Remove four Phillips head screws located on bottom of casting.
  - Lift out motor.
- (4) Remove idler pulley assembly, tension spring and associated nut, washers and details. Install these items on the B-650412 drive assembly.
- (5) Install B-650412 drive assembly.
  - Tighten four Phillips head screws.
  - Solder motor leads (Fig. 7).
- (6) Install B-651703-1 flat drive belt, and observe the **Read** (3.17).
  - (a) If belt runs to either side of pulley, correct by loosening mounting screws and pivoting idler pulley assembly. Tighten mounting screws after adjusting.
  - (b) If belt slips or binds, correct by moving idler tension spring to another hole on idler pulley arm.
- (7) Insert List 3 recorder into cabinet.
  - Tighten three retaining screws.
- (8) Insert recorder connecting plug into plug-in receptacle.

### 3.15 B-650417, 3-Minute Pulley (Fig. 8):



*KS-16765, Lists 1 and 2 announcement sets equipped with B-650412 drive assemblies may be converted from 2-minute announcement recording capacity to 3-minute by installing the B-650417, 3-minute pulley.*

### 3.16 Procedure for converting:

- (1) Remove List 2 recorder (3.05).
- (2) Remove flat drive belt.

- (3) Remove three round drive belts.
- (4) Remove drive assembly.
  - Remove four Phillips head screws located on bottom of casting.
  - Lift out drive assembly.
- (5) Disengage idler tension spring.
- (6) Remove 2-minute drive pulley.
  - Loosen set screw located on collar of pulley.
  - Slide pulley off shaft.
- (7) Install 3-minute pulley:
  - Insert pulley on drive shaft.
  - Align pulley with motor shaft.
  - Tighten set screw against the flat of the drive shaft.
- (8) Install drive assembly.
  - Tighten four Phillips head screws.
- (9) Install flat drive belt, and observe the **Read** (3.17).
- (10) Insert List 3 recorder into cabinet.
  - Tighten three retaining screws.
- (11) Insert recorder connecting plug into plug-in receptacle.

### Belt Replacement



*Replace belts if they are broken, cracked, nicked, stretched, or have oil or grease on their surfaces.*

### 3.17 Flat Drive Belt:

- (1) Remove faulty flat drive belt from drum pulley and drive pulley shaft.
- (2) Install new flat drive belt with unground (shiny) side in contact with the drum pulley,



on center of drum pulley, and so that edges of belt will not ride up on the flanges of the idler pulley (Table A).



**Before securing List 3 recorder to cabinet, energize recorder and run to observe that flat drive belt runs squarely on drum pulley and does not slip or bind.**

**Note:** Flat rubber drive belts B-651703-1 for use with B-650412 drive assembly (Part of List 3 recorder) are larger in diameter than belts B-651703-2 used with KS-15914 (MD), List 1 or 2 motor (Part of List 3 recorder).

### 3.18 Round Drive Belt:

- (1) Remove flat drive belt from drum pulley and drive pulley shaft.
- (2) Remove faulty round drive belt.
- (3) Install new round drive belt.
  - Verify that drive belts are parallel with each other between the motor shaft and drive pulley.
- (4) Install flat drive belt, and observe **Read** (3.17).

### MECHANICAL ADJUSTMENTS (Fig. 6 and 7)

#### 3.19 Zero Position of Carriage Assembly:

Position where the side of the carriage nearest the motor is in contact with the adjacent side of the bail assembly with the bail assembly in the unoperated position.

**3.20 Zero Position of the Limit Switch:** Position where the limit switch lever is in contact with the zero stop with the carriage assembly in the zero position.

#### 3.21 Magnetic Head in the Electrically Operated

**Position:** Position where the magnetic head is in contact with the surface of the recording band and the half nut and feed screw of the carriage assembly are engaged.

**Note:** To engage magnetic head in the electrically operated position, carefully rotate drum pulley by hand to position where switch

3 is operated. Supply 48 volts dc to pins 7 (-) and 14 (+) of connecting plug of List 3 recorder.

#### 3.22 Announcement Length Adjustment (Fig. 6):

The announcement set is shipped with the announcement length adjusted for 30 seconds, however this adjustment may be set for an interval up to the maximum capacity by adjustment of the limit switch stop. The seven marks on the limit switch stop may be used as guides for setting the maximum announcement recording interval. For intervals other than those shown, it will be necessary to estimate the setting between the two appropriate marks. The mark nearest the bent end of the stop (No. 1) represents 0 seconds. To change announcement record interval, proceed as follows:

- (1) Loosen socket head cap screw.
- (2) Position the limit-switch stop to desired setting, desired setting should be flush with left side of tube.
- (3) Tighten socket head cap screw.

#### 3.23 Switch Springs (S1, S2, and S3) (Fig. 6 and 7):

##### (a) Contact separation and follow:

- (1) In the unoperated position, S1 switch contacts shall have a separation between contacts of:

Min. 0.008 inch

Max. 0.015 inch

Gauge by eye

- (2) In the unoperated position, S2 and S3 switch contacts shall have a separation between contacts of:

Min. 0.006 inch

Max. 0.015 inch

Gauge by eye.

- (3) When S2 and S3 switches are operated by the insulated pin of the drum, the contact follow shall be:

Min. 0.010 inch

Max. 0.020 inch

Gauge by eye.

- (4) Contact separation and follow of these springs are interdependent. Care should be taken when adjusting to meet one requirement that the other is also met. Adjustments should be made using the No. 534E spring adjuster on the stationary springs, and the No. 524A or No. 524B spring adjuster on the operating springs. To adjust, place the adjuster on the spring and slide it back to where the spring leaves the insulator. Adjust the spring up or down as required.

(b) **Contact alignment (Fig. 11):**

- (1) The contacts shall line up so that the width on the contact surface of each contact bar falls wholly within the length of its mating bar.

Gauge by eye.

- (2) If any switch fails to meet the contact alignment requirement, replace List 3 recorder.

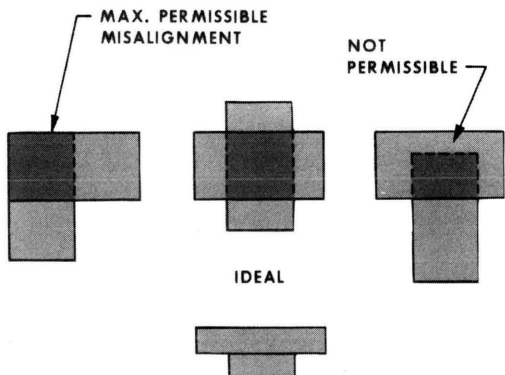


Fig. 11—Contact Alignment

- 3.24 Erase Coil (Fig. 12):** The erase coil assembly shall be so positioned that the central plane of the pole piece gap is radial with respect to the recording band. Gauge by eye.

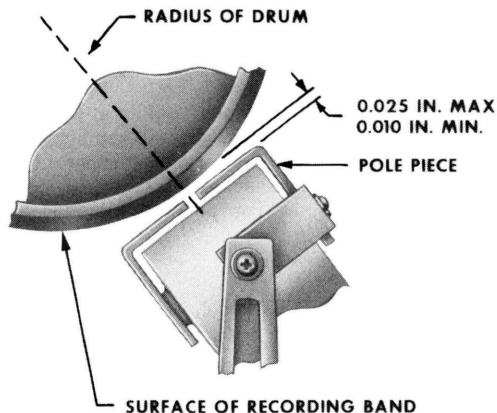


Fig. 12—Erase Coil Clearance

(a) **To adjust pole piece:**

- (1) Loosen the 3 screws that fasten the pole piece bracket to the base.
- (2) Adjust erase coil forward or backward to correct position.
- (3) Tighten screws.

There shall be a clearance between the recording band and the surface of the erase coil pole pieces throughout one complete revolution of the drum of:

Min. 0.010 inch

Max. 0.025 inch

Gauge by eye.

(b) **To adjust separation:**

- (1) Loosen the two screws that fasten erase coil to bracket.

- (2) Move erase coil either toward or away from drum to correct position.
- (3) Keep same separation over the width of the drum.
- (4) Tighten screws after making adjustment.

### 3.25 *Magnetic Head Lifter Tab Position (Fig. 13):*

With magnetic head in electrically operated position, the clearance between the magnetic head bracket and the tab shall be a minimum of 1/32-inch. Gauge by eye. (Fig. 13A). With magnetic head in electrically operated position, the clearance between the magnetic head and the tab shall be a minimum of 1/32 inch. Gauge by eye, (Fig. 13B). With the magnetic head unoperated, the clearance between the magnetic head and the recording band shall be a minimum of 1/32 inch. Gauge by eye. Head lifter tab may be bent to meet these requirements. Use No. 325 adjuster. **Do not damage wiring.**

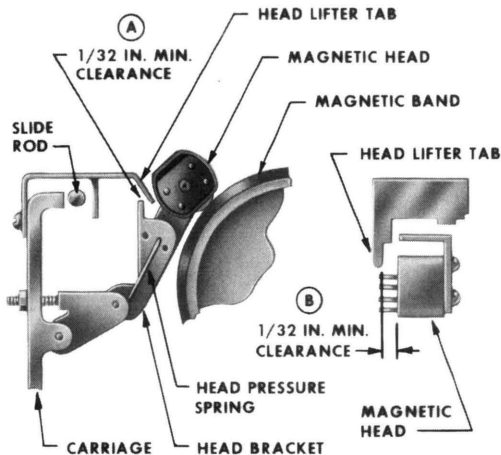


Fig. 13—Head Lifter Tab Clearance

**3.26 Carriage:** The carriage assembly shall return freely and without hesitation to its starting position.

**Note:** Check this requirement in several positions, one of which is close to the zero position of the carriage.

Head retainer shipping lock spring shall be in the notch provided on the carriage and should not bear on the slide rod.

### 3.27 *Limit Switch:*

- (a) Replace recorder if:
  - Limit switch does not return freely to its zero position when limit switch arm is released by operation of L2 solenoid.
  - Message is clipped on reproduce.

### 3.28 *Magnetic Head Pressure (Fig. 14):*

With the magnetic head in the electrically operated position, the pressure of the magnetic head on the recording band shall be a minimum of 28 grams, a maximum of 43 grams. Use No. 68B gauge to measure this quantity by placing tip of gauge under recording head bracket between the two mounting screws and measuring the pressure on a line passing through the drum center and between the two screws. The end of the head pressure spring shall be placed in the hole which provides the maximum pressure within the permissible range.

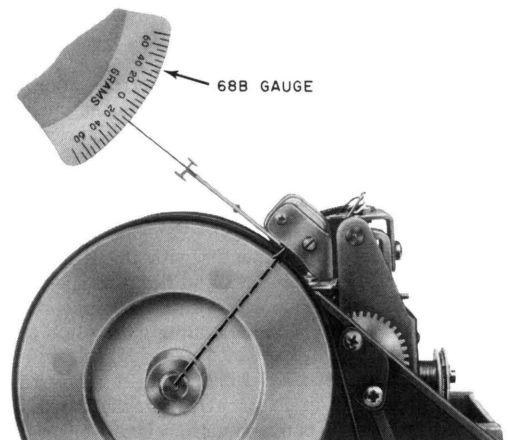


Fig. 14—Magnetic Head Pressure

**3.29 Bail Stop Position (Fig. 15):** With the magnetic head in the electrically operated position, the clearance between the side of the slot in the bail assembly and the side of the bail stop

farthest from the drum shall be 1/32-inch minimum throughout the entire carriage travel. If the clearance between the bail stop and bail assembly in the operated position is not satisfactory, adjust the bail stop as required by using the No. 325B adjuster to bend the bail stop. Check clearance with the 92K feeler gauge. This requirement should be checked everytime the recorder is lubricated.◆

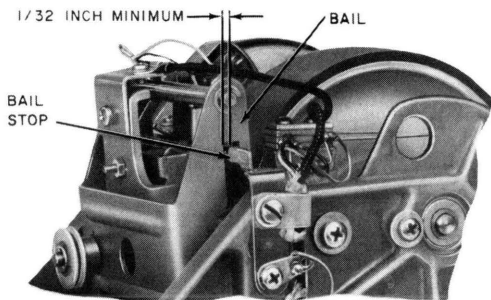


Fig. 15—Bail Stop Adjustment

## LUBRICATION

**3.30** ◆The life and continued proper operation of the announcement set is dependent upon a well administered and properly executed lubrication program. Therefore, it is critically important that before being placed in operation, the announcement set shall have been lubricated as specified and that after being placed in service, the set must be lubricated every three months with the KS-16326, List 1 oil and KS-19139, List 4 lubricant as specified in 3.37. Experience may prove that sets receiving severe service may need lubricating more often.◆

**3.31** One drop of KS-16326, List 1 oil is the amount of oil discharged from the nozzle of the No. 486A oil can when the sides of the oil can are depressed once and held depressed until the drop is released from the nozzle.

**3.32** A film of KS-19139, List 4 lubricant is the amount of lubricant deposited on the surface of a part after being brushed with the KS-14164 brush which has been dipped into the lubricant to

a depth of 3/8-inch and brushed lightly against the side of the container as the brush is removed.

### 3.33 Lubricate as follows:

**Caution:** ◆Do not allow any KS-16326, List 1 oil or KS-19139, List 4 lubricant to get on the recording band, drive belt, pulley surfaces, or motor shaft.◆

- (a) Apply a thin film of KS-19139, List 4 lubricant to surfaces of all gear teeth, Fig. 6(A), threads of feed screw, Fig. 6(B), and half nut which is mounted on bracket assembly.◆ Stir lubricant container thoroughly before using.
- (b) Apply two drops of KS-16326, List 1 oil to the bearings at each end of the feed screw, Fig. 6(C). Apply where feed screw enters bearing.

**Caution:** Do not remove feed screw bearing plate or bail stop.

- (c) Motors:

- (1) Sets equipped with KS-15914, List 1 motor require two drops of KS-16326, List 1 oil to each of the two motor shaft bearing oil holes and two drops to the oil hole of the rear bearing of motor. Keep oil off motor shaft, belt, and band.

- (2) Sets equipped with KS-15914, List 2 motor, no lubrication of motor required.

- (3) Sets equipped with B-650412 drive assembly containing a B-650418 motor requires two drops of KS-16326, List 1 oil to each of the two oil reservoirs [one at the shaft and one at the rear of the motor, Fig. 6(D)], as applicable. Earlier models of the motor require no lubrication.

- (d) ◆Record of Lubrication: The telephone company should maintain a record showing the dates lubricants were applied to the recording band (3.34), the gear teeth, feed screw, and half nut [3.33(a)], and the feed screw bearings and motor [3.33 (b) and (c)].◆

**CLEANING**

*Note:* Always clean recording band and head on same visit. The recording band shall be cleaned and lubricant every three months.

**3.34 To clean recording band:**

- (1) Moisten a clean KS-2423 twill jean or other approved lint-free cloth slightly with KS-16328, List 2 cleaner-lubricant.
- (2) Wipe recording band thoroughly.
- (3) Wipe dry with another clean, dry, lint-free cloth.
- (4) Repeat if necessary. The band should have a dry polished surface with no trace of dirt remaining.
- (5) After cleaning, lubricate the band, by applying a thin film of G.E. SF-1147 200 Cs silicone oil to the recording band using a KS-2423 cloth.

**3.35 To clean recording head pole piece.**

- (1) Pivot head away from recording band and lock against carriage with head locking spring.
- (2) Place a clean, dry KS-2423 cloth over band and adjacent parts to prevent damage by cleaner.

(3) Moisten another clean KS-2423 cloth with KS-16328, List 2 cleaner and rub surface of pole piece clean.

(4) Dry recording head surface and any surfaces contacted by the cleaner with a clean KS-2423 cloth.

**3.36** For more detailed information on the maintenance and lubrication of the KS-16765, List 3, refer to Sections 034-354-701 and 034-354-801.

**3.37 Ordering Information for Lubricants:**

KS-19139, List 4  
(Lubricant)

American Oil and  
Supply Company  
238 Wilson Avenue  
Newark, New Jersey  
07105

G. E. SF-1147  
(Silicone Oil)

Wilcox Electric  
Company  
14th and Chestnut  
Street  
Kansas City, Missouri  
64127  
Part # 264847-1

KS-16328, List 2  
(Cleaner-Lubricant)

WECO Supply Center  
650 Liberty Avenue  
Union, New Jersey  
07083

KS-16326, List 1  
(Oil)

## KS-16765, LIST 1, 2 ANNOUNCEMENT SETS INSTALLATION, CONNECTIONS, AND OPERATION

### 1. GENERAL

**1.01** The List 1 announcement set is designed for loop-start operation on a customer's premises and the List 2 for ground start operation from the local equipment in the central office. The List 2 may also be located on a customer's premises when used with a 2A, 2B, or 3A ACD.

**1.02** This section is reissued to:

- Add information on kit of parts to remove 60 Hz hum in power supply
- Change line current fuse rating
- Add lubrication information at time of installation
- Add ACD information to Table A.

**1.03** These announcement sets (Fig. 1) contain fragile apparatus. To prevent damage, handle the sets carefully at all times.

**1.04** Refer to CD- and SD-95286-01 for List 1 and CD- and SD-95283-01 for List 2 announcement sets.

### 2. INSTALLATION

**2.01** The KS-16765, List 1 and 2 announcement sets are designed to operate on 110/125-volt ac power supply.



**Do not connect these announcement sets to direct current; this will seriously damage sets.**

**2.02** If direct current is the only available power supply, a KS-15662, List 1 vibrator-inverter must be used. Installation of this inverter is covered in Section 514-112-100.

**2.03** ♦A 1/2-amp fuse is provided in both sets for electrical protection. **Sets equipped**

**with 1-amp AGC fuse will be changed to 1/2-amp AGC fuse.♦**

**2.04** The customer must provide and maintain a standard ac outlet for operation of the announcement set. The outlet must not be controlled by a switch.

**2.05** Announcement sets with B-650412 drive assemblies, equipped for 3-minute announcement recording capacity should **not** be installed for group alerting or in 8A announcement system without proper authorization. (Use of a set equipped with a 3-minute capacity will excessively increase the time between announcements for continuous operations in these systems.)

**2.06** ♦Earlier type KS-16765, List 1 and 2 announcement sets that have a 60 Hz hum in the output of the set, can be upgraded in the field with a kit of parts to reduce the hum level. This kit is to be ordered directly from the manufacturer. The kit of parts consists of a 10 ohm, 3 watt resistor and 750  $\mu$ fd capacitor. Sets manufactured after the first quarter of 1971 are equipped with this modification.

Ordering information for the modification kit is as follows:

(Qty) KS-16765 Filter Assembly Kit

Order directly from: Wilcox Electric Company,  
14th and Chestnut Street, Kansas City,  
Missouri, 64127

Cost and shipping charges billed by manufacturer.

**2.07** Complete installation procedure is included with the kit of parts for both List 1 and 2 announcement sets. A complete schematic of the power supply will be found in SD-95286-01 and SD-95283-01 for the KS-16765, List and 2 sets, respectively.

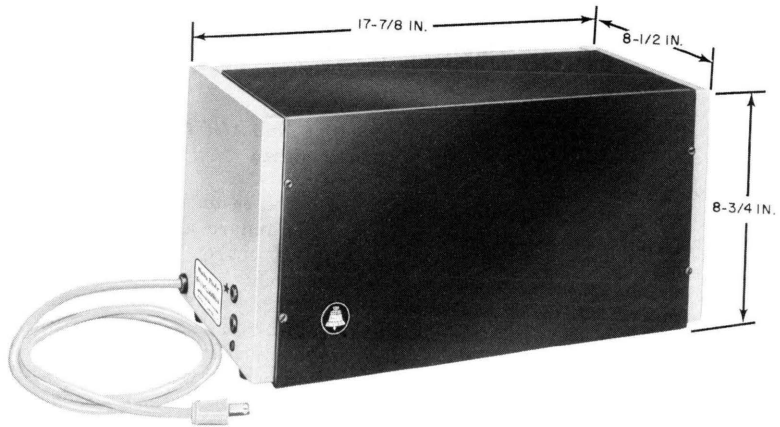


Fig. 1—KS-16765, Lists 1 and 2 Announcement Sets, Dimensions

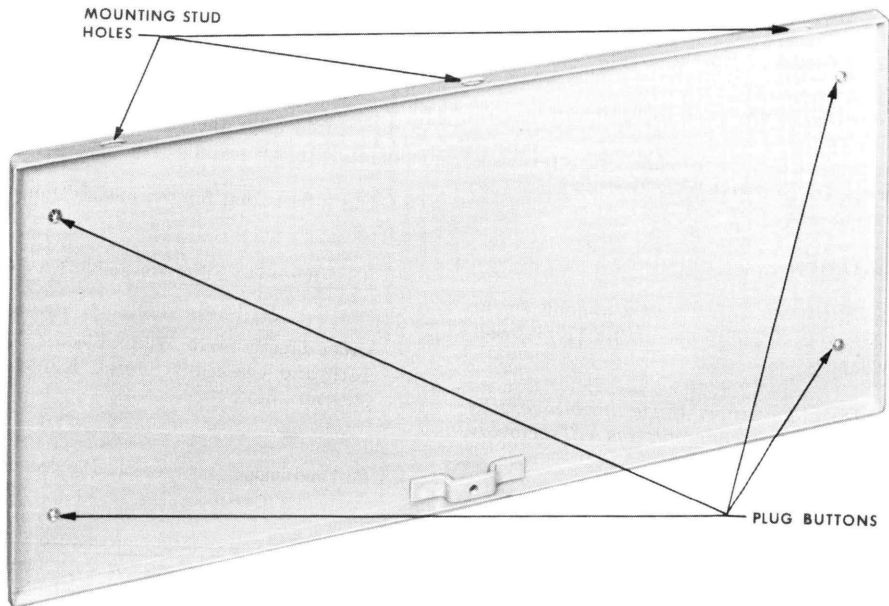


Fig. 2—KS-16765, Lists 1 and 2, Rear Cover

**Warning:** Remove power cord before performing any work on the power supply to prevent shock and damage to equipment.



*Before being placed in operation, the announcement set shall have been lubricated as specified. After being placed in service, the set should be lubricated every six months. Experience may prove that sets receiving severe use may need lubricating more often. Refer to Sections 514-210-100 and 034-354-701.*

## LOCATIONS

**2.08** The announcement set may be placed on a desk, table, or shelf or fastened to a wall. Since the List 1 set is remotely controlled, it need not be located adjacent to the telephone set which controls it.

**2.09** When wall installation is required, be sure wall is substantial enough to support 40 pounds, the weight of the announcement set. The 81-type backboard may be used when required.



*Allow enough clearance under set to permit removing the three recorder mounting screws from the bottom of the set should it be necessary to replace the recorder. Leave enough slack in the wiring cable so that set may be dismantled without being disconnected.*

**2.10** Locate the set in accordance with customer wishes after considering the following:

- Set must be located within 6 feet of a customer-provided, 110/125-volt, 60-cycle ac outlet.
- Set must be installed in a reasonably level position.
- Avoid locations that are exposed to weather or extreme heat conditions.

## INSTALLING



*Do not connect announcement set to power supply until all installation work is completed.*

**2.11** Refer to the appropriate sections to install the telephone set, cable, drop wire, connecting block, and inside wiring used with a List 1 set (Fig. 3 and 4) and to install the inside wiring used with a List 2 set (Fig. 5 and 6).

**2.12** When List 1 announcement set and its associated key telephone set (or key unit) are located together, the mounting cord of the telephone set (or key unit) may be connected directly to the announcement set. To do this, remove and discard the large rubber grommet from the center entrance hole. Feed the mounting cord through the entrance hole and fasten cable stay hook with cable clamp screw. Discard the cable clamp.

## MOUNTING

**2.13** To mount either announcement set:

- (1) Remove front cover
  - Loosen four captive screws in front of cover (Fig. 1). Slide cover forward.
- (2) Remove rear cover
  - Turn slotted shaft counterclockwise with a screwdriver. This forces rear cover off.



*Before proceeding, make changes on TB2 if required. TB2 is located in rear of set and is not accessible after set is mounted.*

- (3) Remove the four plug buttons from announcement set rear cover (Fig. 2).
  - (4) Mount rear cover to wall surface using four No. 14 screws or equivalent.
  - (5) Hold set with top tipped slightly back. Insert the three mounting studs (Fig. 3 and 4) located on the underside of the top of the set into the three mounting stud holes in the top edge of the rear cover.
- THINK** *Be sure mounting studs are securely seated before releasing set.*
- (6) Tighten slotted shaft by turning clockwise with a screwdriver. This locks set to rear cover.



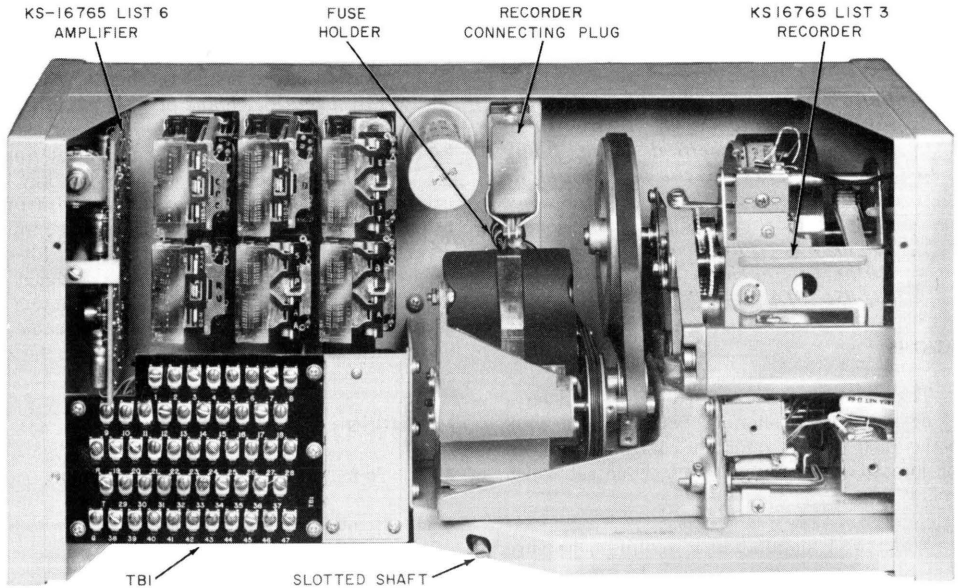


Fig. 3—KS-16765, List 1 Announcement Set, Front Cover Removed

**SERVICING**

2.14 To release bail shipping lock (Fig. 7):

- (1) Loosen the two mounting screws.
- (2) Move bail shipping lock to extreme position away from bail.
- (3) Tighten mounting screws.



*After tightening mounting screws, check to see that there is adequate clearance between the tab end of the bail shipping lock and the recording head mounting.*

2.15 To remove head lock spring (Fig. 7):

- (1) Remove head lock spring from screw head on magnetic head and place in notch of carriage bracket.



*Be sure head lock spring is securely in notch and does not rest on slide rod.*

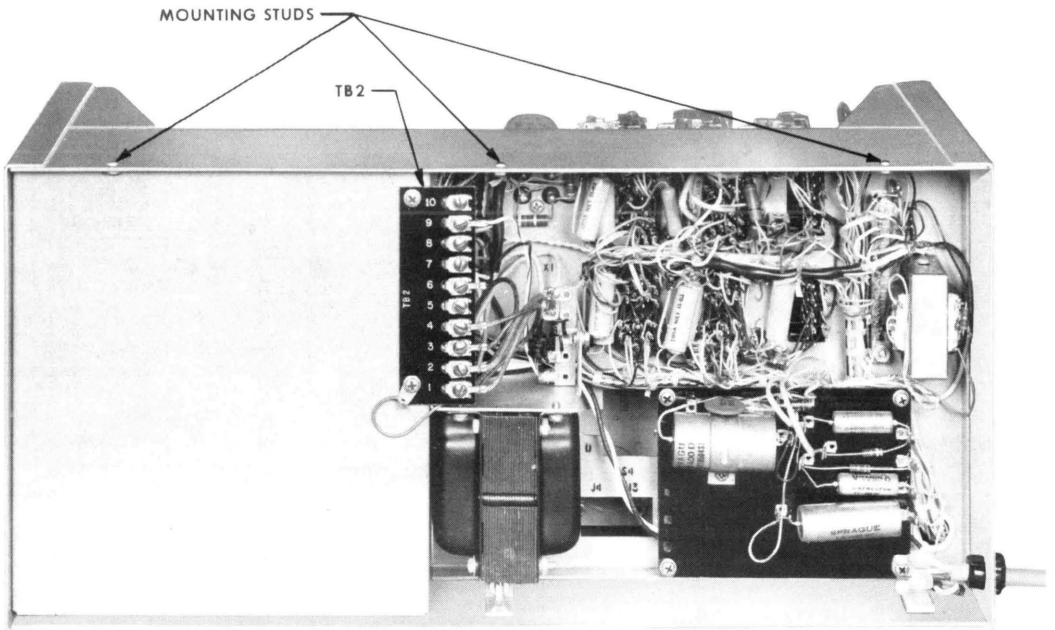


Fig. 4—KS-16765, List 1 Announcement Set, Rear Cover Removed

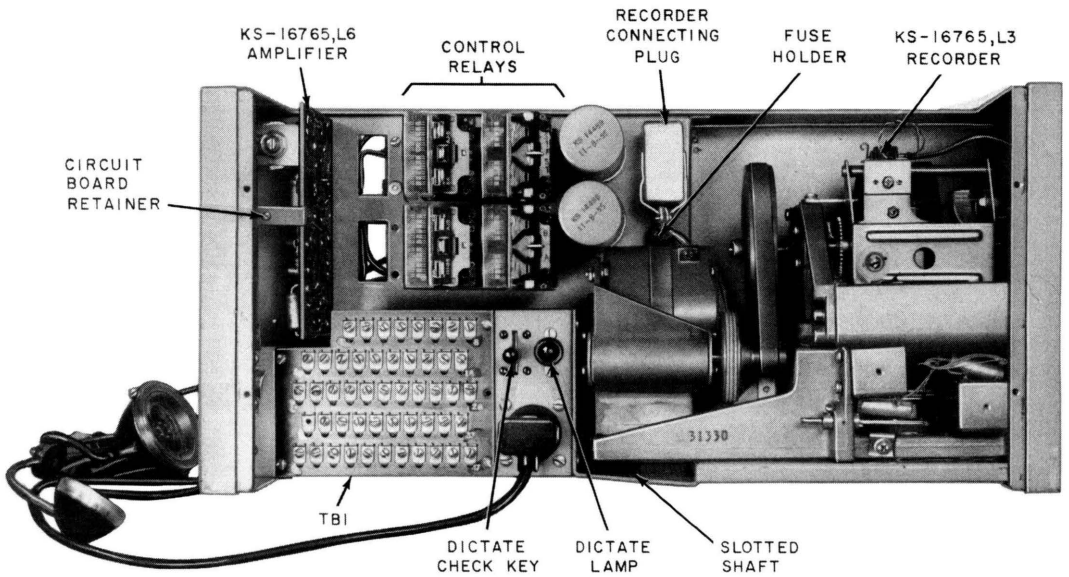


Fig. 5—KS-16765, List 2 Announcement Set, Front Cover Removed

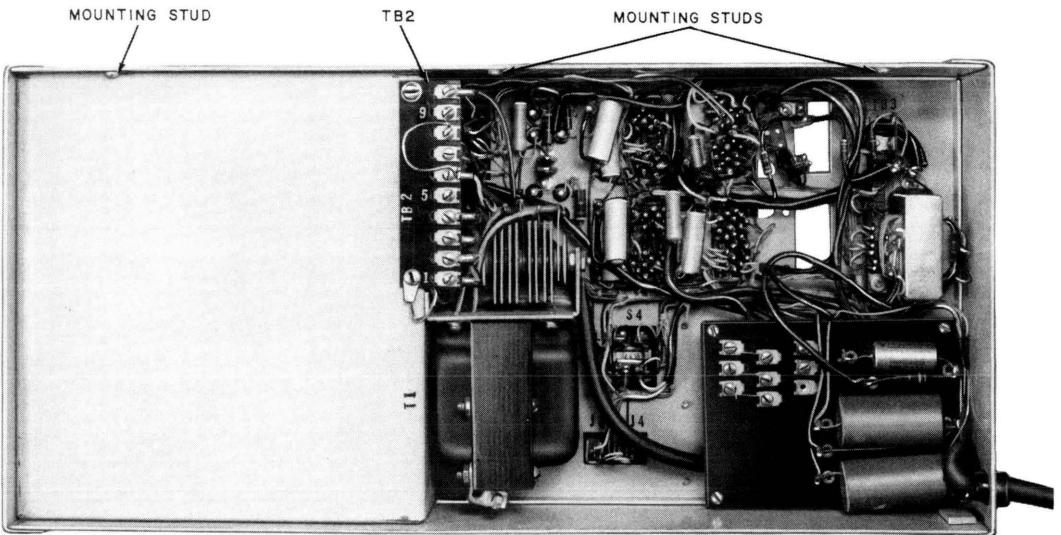


Fig. 6—KS-16765, List 2 Announcement Set, Rear Cover Removed

**2.16 Announcement length adjustment:** The announcement set is shipped with the announcement length adjusted for 30 seconds, however this adjustment may be set for any interval up to the maximum capacity by adjustment of the limit switch stop (Fig. 7). The seven marks on the limit switch stop may be used as guides for setting the maximum announcement recording interval.

MARK	2-MINUTE CAPACITY TIME IN SEC.	3-MINUTE CAPACITY TIME IN SEC.
	(B-650416 PULLEY)	(B-650417 PULLEY)
1	0	0
2	15	22-1/2
3	30	45
4	34	67-1/2
5	60	90
6	90	135
7	120	180

For intervals other than those shown, it will be necessary to estimate the setting between the two appropriate marks. The mark nearest the bent end of the stop (No. 1) represents 0 seconds. To change announcement record interval, proceed as follows:

- (1) Loosen socket head cap screw (Fig. 7).
- (2) Position limit-switch stop to desired setting; flush with left side of tube.
- (3) Tighten socket head cap screw.

**3. CONNECTIONS**

**3.01** Connections for the announcement set will vary with the system in which it is being used. Select the appropriate section from the following:

- (a) 100A Telephone Answering System (Section 473-675-201)

- (b) Group Alerting System (Section 480-310-400)
- (c) 8A Announcement System Using KS-16765, List 1 Announcement Set (Section 514-615-200)
- (d) 7A Announcement System Using KS-16765, List 2 Announcement Set (Section 951-116-100)
- (e) 2A Automatic Call Distributor (ACD) (Section 476-216-210)
- (f) 2B Automatic Call Distributor (ACD) (Section 476-270-203)
- (g) 3A Automatic Call Distributor (ACD) (Section 981-236-100)

**3.02** After completing connections for type of service required, insert power cord into ac outlet. Refer to appropriate section listed in 3.01 and test operation of announcement set.

**3.03** The set is now ready for operation. Replace announcement set cover and instruct the customer in the proper operation of set.

**4. OPERATION**

**4.01** The operation of the announcement sets will vary with the system in which they are used.

**4.02** Refer to SD-, CD-95286-01 and SD-, CD-95283-01 for Lists 1 and 2, respectively, for detailed operational information in a particular system. Sequence charts and functional sketches are included.

**4.03** Operating instructions for the particular system which either announcement set is used are covered in the SDs and CDs listed in Table A.

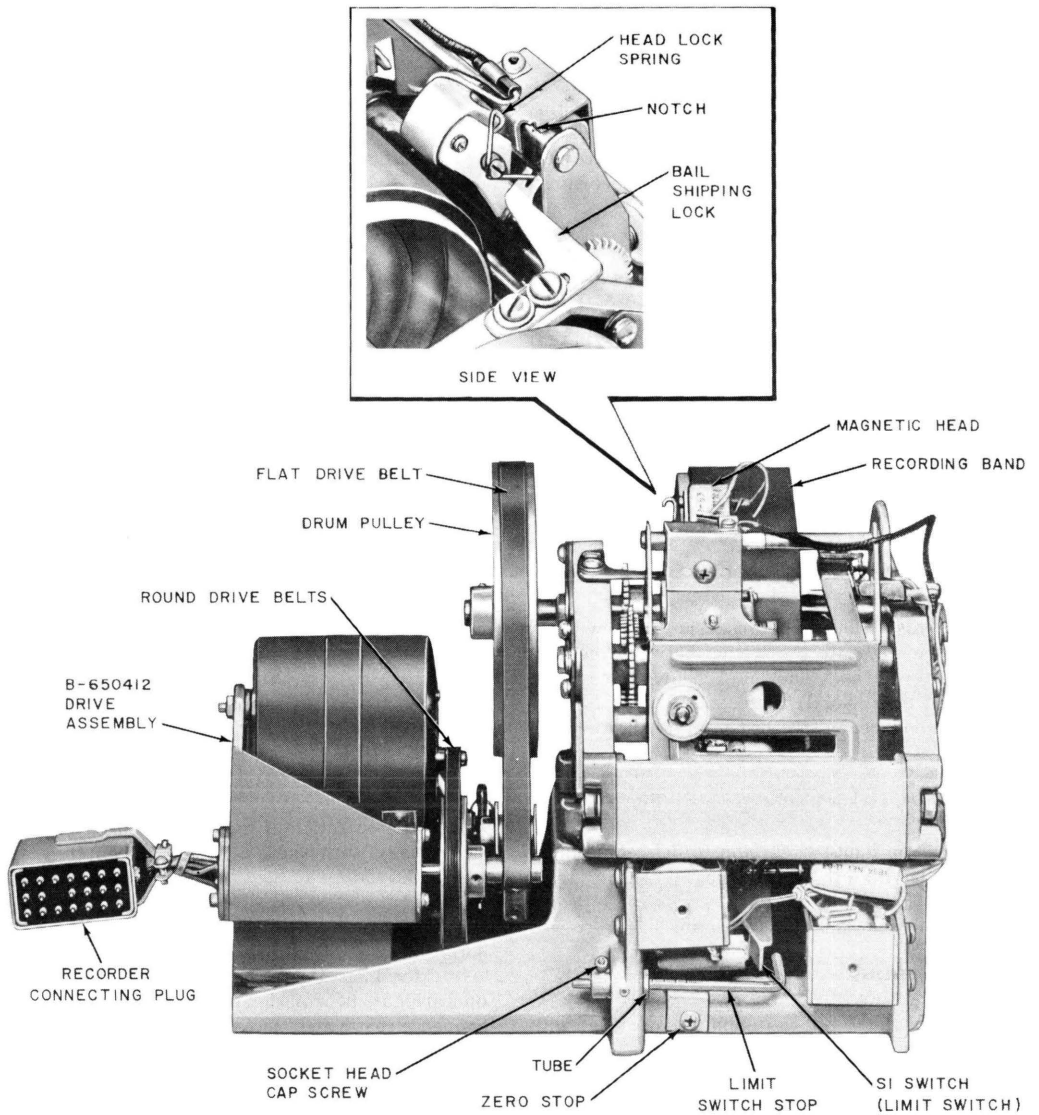


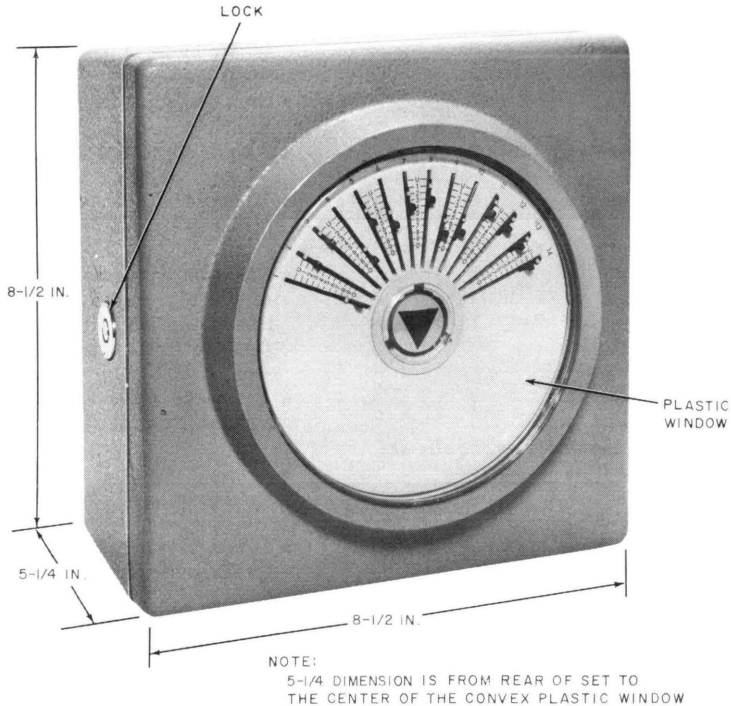
Fig. 7—KS-16765, List 3 Recorder

◆ TABLE A ◆

PLANT	TYPE OF OPERATION	APPLICABLE SD & CD
100A Telephone Answering System	Automatic Answer	SD & CD-95286-01
8A Announcement System Using KS-16765, List 1 Announcement Set or 2-Type Telephone Answer Set	Automatic Answer	SD & CD-95286-01 and SD & CD-95293-01
Group Alerting System	Automatic Announce	SD & CD-95286-01 and SD & CD-69385-01
7A Announcement System Using KS-16765, List 2 Announcement Set.	Automatic Answer	SD & CD-95283-01
2A Automatic Call Distributor (ACD)	Automatic Answer	SD & CD-95283-01
2B Automatic Call Distributor (ACD)	Automatic Answer	SD & CD-1E088-01
3A Automatic Call Distributor (ACD)	Automatic Answer	SD & CD-65979

## 1A TELEPHONE REPORTING SET

### IDENTIFICATION, INSTALLATION/CONNECTIONS, TEST, AND MAINTENANCE



**Fig. 1—1A Telephone Reporting Set**

#### 1. GENERAL

**1.01** The 1A telephone reporting set (Fig. 1) is an instrument which is activated by a customer-provided contact closure and is programmed to dial a designated telephone number and report alarm conditions from a prerecorded magnetic tape.

**1.02** The 1A telephone reporting set is not intended for use with key equipment, key telephone systems, or semipublic coin lines.

Since this reissue covers a general revision, arrows ordinarily used to indicate changes have been omitted.

**1.03** This section is reissued to:

- Add instructions for initial charging of KS-19784L1 battery.
- Add protection and grounding information.
- Add ordering guide information.

## 2. IDENTIFICATION

### Ordering Guide

Set, Telephone, Reporting, 1A (includes battery, two keys, mounting template, and subscriber instruction booklet)

#### 2.01 *Replaceable Components:*

- Battery, KS-19784L1
- P-29E965 Battery Assembly Bracket
- P-29E923 Lens Gasket
- Lamp, 51A
- P-29E922 Lens
- P-29E967 Magnetic Tape
- Key, RM-692836

#### 2.02 *Optional Components (order as required):*

- Heater, Battery, D-180053
- Transformer, 2012B
- Transformer, KS-16886L2
- Set, Hand, J1A-\*
- Unit, Control, 62A-\*

#### 2.03 *Associated Telephone Sets (commonly used):*

- Set, Telephone, 502B-\*
- Set, Telephone, 511F/H-\*
- Set, Telephone, 558D-\*
- Set, Telephone, 558F-\*

\* Add color suffix.

**Note:** Any telephone set equipped per 2.11 may be used for a control point telephone set.

**2.04** A subscriber instruction booklet (SIB-2487) is shipped loose with the 1A telephone reporting set and should be left with the customer.

### Design Features

- Approximate dimensions are 8-1/2 inches square by 5-1/4 inches deep.
- Gray aluminum housing
- Weighs approximately 9 pounds
- Equipped with lock (prevents tampering with predesignated numbers)
- Equipped with (tamper resistant) retaining screw, Fig. 2 (discourages customer from tampering with terminal behind control panel)
- Activated from remote contact closure (customer provided)
- Automatically dials a predesignated telephone number (capacity for 14 digit number)
- Sliders provided for customer to select and predesignate control point telephone number.
- Equipped with magnetic tape for recording messages.
- Playback volume control
- Transmits prerecorded message and disconnects and resets when properly signaled by control station
- Equipped with microphone for customer to record messages. Prior messages are erased when a new message is recorded.
- Equipped with lamp indicator to indicate when to record
- May be tested from control point telephone set.
- Operates from self-contained rechargeable nickle-cadmium battery. Battery has capacity for 30 to 40 call attempts in a 24 hour period.



- Operates satisfactorily within temperature range of  $-10^{\circ}\text{F}$  to  $+140^{\circ}\text{F}$  (operates below  $0^{\circ}\text{F}$  when equipped with a battery heater).
- Can be used with an associated telephone set (optional).

### 2.05 *Requirements for customer-provided equipment*

- (a) Customer-provided detecting device must provide a "dry" contact closure from a pair of normally-open contacts.
- (b) The contacts and customer-provided wiring between the detecting device and the Telephone Company-provided connecting block must be capable of carrying .015 amperes at 15VDC.
- (c) Maximum loop resistance from the 1A Telephone Reporting Set through the customer-provided contact closure shall be no more than 1000 ohms. With contacts open, loop resistance should exceed a megohm.
- (d) Customer-provided loop shall be free of any grounds, crosses, or external voltages.

### Operating Features

**2.06 *Dial Plate:*** Position sliders (Fig. 2), beginning with No. 1, to successive digits of predesignated telephone number. Unused sliders shall be placed in "U" position. To allow time for a second dial tone, if needed, two or three sliders after the access code should be positioned to "U". Example 9, U, U, U, 555-2368.

**2.07 *RECORD/PLAY Switch (Fig. 2):*** In "RECORD" position previous message is erased and a new message (up to 11.8 seconds long) may be recorded by speaking into the "RECORDING MICROPHONE" during the time the "RECORD LAMP" is on. In "PLAY" position recorded message is transmitted to the telephone line when the 1A Telephone Reporting Set is activated.

**2.08 *VOLUME Control (Fig. 2):*** Adjusts the level of playback to manually compensate for local loop conditions.

**2.09 *INPUT Button (Fig. 2):*** For locally testing operation of 1A Telephone Reporting Set. Depressing the button while set is idle will activate unit. Depressing the button while set is transmitting recorded message will cause unit to reset.

**2.10** The 1A telephone reporting set responds only to bridged ringing.

**2.11** The control point telephone set (station at predesignated telephone number) must be equipped with a J1A handset or associated with an externally mounted 62A control unit (Fig. 6).

**Note:** The J1A handset and the 62A control unit contain an oscillator producing a 1475 Hz tone. This tone is used to control the 1A Telephone Reporting Set from the control point telephone.

**2.12** For a detailed description of the 1A Telephone Reporting Set refer to Division 812.

## 3. INSTALLATION/CONNECTIONS

### *Planning*

**3.01** The telephone reporting set should not be installed in a location directly exposed to sun and rain. The location chosen should allow visual inspection of the settings of the dial sliders and sufficient side clearance on both sides for opening the hinged cover and the hinged number coding assembly.

**3.02** The KS-19784L1 battery shipped with the telephone reporting set is not charged before shipment. It must be charged at a rate of 10 milliamperes for 24 hours using a KS-19921L1 rectifier, or a suitable equivalent. Use of the KS-19921L1 rectifier will insure the proper charge current and polarity. Fully charged battery should have a no-load measurement of 16-18 volts DC.

**Caution:** *Nickel-cadmium batteries can explode if subjected to a severe overcharge, a reverse charge, or a short circuit.*

**3.03** It is intended that the battery charge is maintained by charging over the telephone

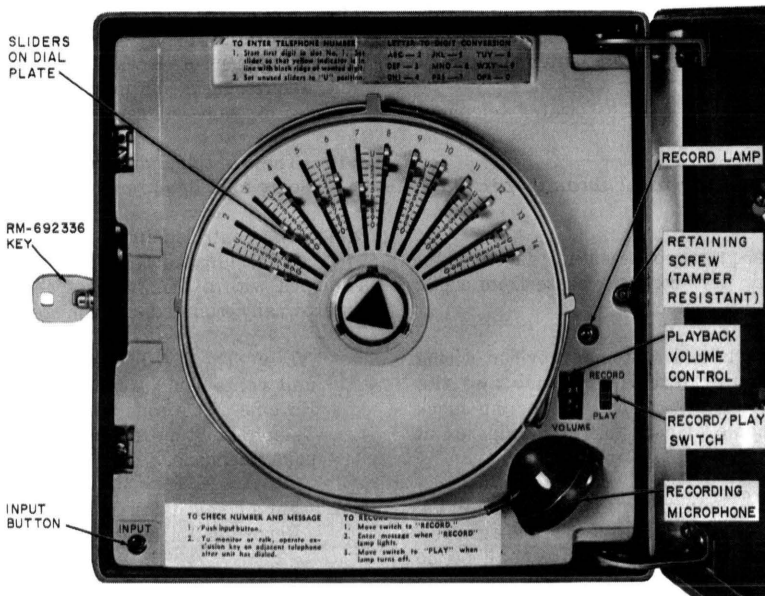


Fig. 2—1A Telephone Reporting Set, Controls

line. However to do so, the following requirements must be met:

- (1) Loop resistance must be less than 1500 ohms.
- (2) Charging current plus line leakage must not cause CO or PBX line relays to operate falsely or keep the line relays operated after a call has been completed by the telephone reporting set or associated telephone set.

**Note:** When the line terminates in a dial CO, it should be assigned to a Class "A" line termination, to prevent line load control relay operation from denying originating service to the 1A Telephone Reporting Set.

- (3) CO or PBX battery, if used, must be 48 volts. (PBX battery must not be turned off at night.)
- (4) Associated telephone, if provided, must not be off-hook for more than 2 hours in any 24-hour period.

(5) Set must be operated in temperatures below 140°F and above 0°F.

(6) A notation of the total charging current in the circuit should be made on the line card for each installation.

If any requirement (1-4) cannot be met, install a 2012B transformer on the customer's premise for charging the battery. If requirement (5) cannot be met, a KS-16886L2 transformer and a D-180053 battery heater, Fig. 4 (replaces the regular battery holder) must be installed on the customer's premise. The KS-16886L2 transformer supplies power for maintaining the battery charge and operating the heater (Fig. 7).

**3.04** When using a transformer for battery charging, the leads terminated on screw terminals 45 and 46 (battery charging leads) must be protected with a 123A1A protector if any of the following conditions exist:

- (a) Location of power ground is unknown.

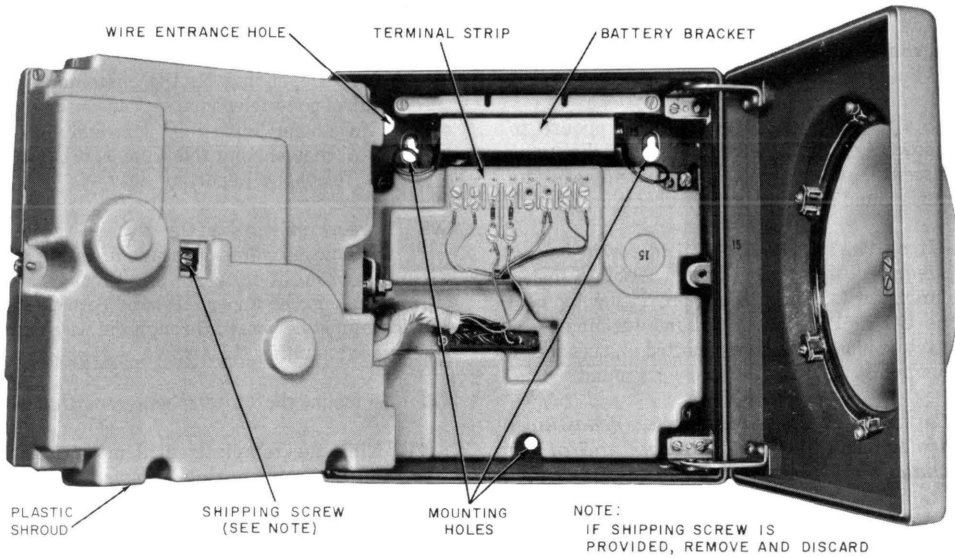


Fig. 3—Interior View of 1A Telephone Reporting Set

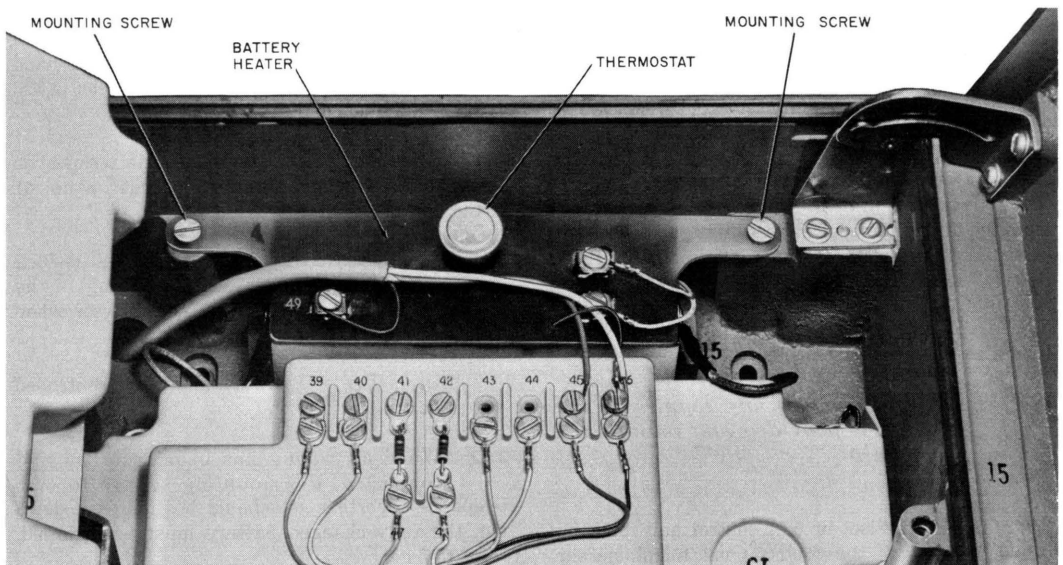


Fig. 4—D-180053 Heater, Installation

(b) The protector for CO or PBX line and control line are not grounded to power ground or the ground connection is further than 10 feet from the protector.

(c) Station location is such that exposure to power storms is encountered and lightning transients are regularly dissipated into the power ground (such as power substations).

**3.05** If a 123A1A protector called for in 3.04 is required, it must be located within 6 inches of the protector for the customer-provided equipment and the CO or PBX line. Ground terminals for all protectors should be interconnected and connected to a common ground with the power ground.

**Caution:** *If proper protection procedures are not followed false alarms and/or set damage may occur.*

**3.06** A station protector must be installed between the CO or PBX line and the telephone reporting set. In addition, protection must be placed between the telephone reporting set and the customer detecting device. A 128A1A-2 protector would serve to protect both circuits.

**Note:** 2B1A (MD) or 2B2A protector units of the 128A1A-2 protector that are associated with the customer detecting device must be replaced with 6B1A protector units. Do not replace protector units associated with the CO or PBX line.

**3.07** Leads associated with the customer-provided detecting (alarm) device should be wired from the telephone reporting set through a 128A1A-2 protector and terminated on a 42-type connecting block (Fig. 5). The connecting block provides a termination for the wiring from the detecting device and marks the division of customer and telephone company responsibility.



**Do not attempt any repairs to the customer provided and maintained equipment.**

**3.08** A J1A handset or 62A control unit must be installed at the control point telephone set location. Use Fig. 6 for connections. Refer to the section entitled Handset—J1A in Division 501 and section entitled 62A Control Unit in Division

514 for a complete description of the handset or control unit.

**Note:** Depending on the customer's needs, a control point telephone set can control several 1A Telephone Reporting Sets, and conversely, several control point telephone sets can control a 1A Telephone Reporting Set.

**3.09** Three breakouts in the web on the rear of the housing allows passage of inside wiring. Wiring is brought into the set through a wire entrance hole in the upper left-hand corner (Fig. 3). All wiring must be passed through the wire entrance hole before mounting the set.

**3.10** To mount the 1A telephone reporting set:

- (1) Using the template, drill mounting holes and insert mounting screws. Use a 83A backboard if the mounting surface is uneven.
- (2) Unlock set, loosen dial plate retaining screw (Fig. 2), using a KS-19192L1 tool, KS-8187 tool, or an appropriate wrench from the C Key Kit, and swing the assembly aside. Mounting holes are then accessible (Fig. 3).
- (3) Mount the set, but do not tighten the mounting screws since all wiring must be brought in through the entrance hole in the upper left-hand corner (Fig. 3) or through breakout webs in the rear of the housing.
- (4) A terminal strip is provided for the termination of all wiring on the inside rear panel of the unit (Fig. 3).

**3.11** If required install the 2012B or KS-16886L2 transformer and extend the wiring to the telephone reporting set. Install a protector when required (Fig. 7).

**Note:** Use AC power supply not controlled by a wall switch.

**3.12** When all wiring has been installed and connected, the mounting screws for the telephone reporting set should be tightened down and the fully charged battery must be installed; refer to 5.06.

**3.13** If the shipping screw (Fig. 3) is provided, remove and discard. The telephone reporting

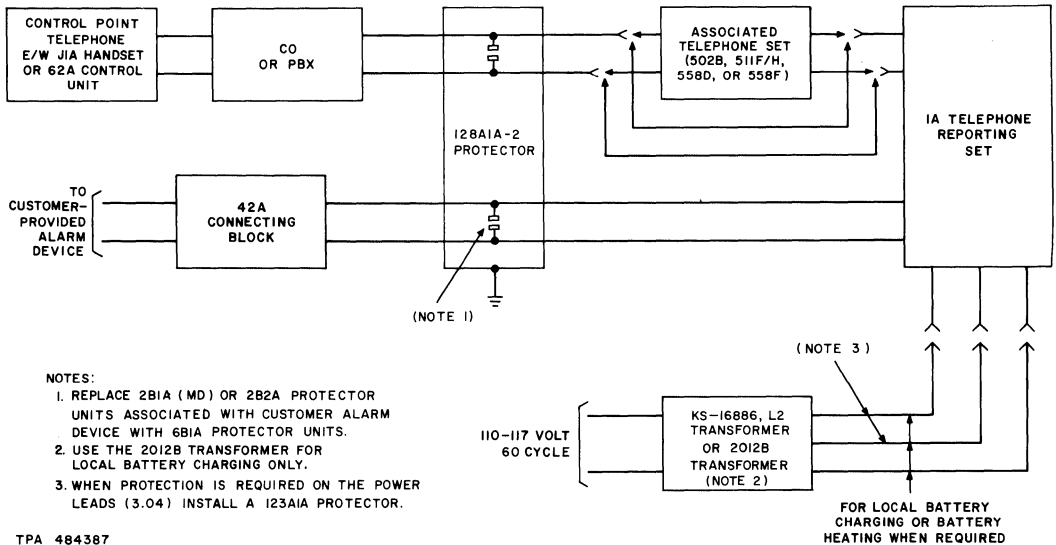


Fig. 5—Block Diagram of Typical Installation

set will not function with the shipping screw in place and tightened down.

**3.14** To assure that all internal switches are in their proper operative positions, perform the following (Fig. 2):

- (1) Operate RECORD-PLAY switch to RECORD position.
- (2) After the RECORD lamp goes off, depress the INPUT button and hold for 2 seconds.
- (3) Return the RECORD-PLAY switch to the PLAY position.
- (4) After approximately 1 minute all internal switches should be in their home positions.

#### 4. TEST

##### 4.01 Perform Initial Setup as follows:

- (a) Set up the number of the control point telephone on the dial plate. Position the sliders on the dial plate (beginning with slider No. 1) to the successive digits of the telephone

number. Set only as many sliders as are needed for the number to be dialed. Place the remaining sliders in the "U" (for unused) position.

**Note:** Extra sliders may be positioned to "U" to allow more time between digits, for example, set 9, U, U, U, 555-2368 to allow for a second dial tone, if needed for PBX access code.

- (b) Put the RECORD-PLAY switch in the RECORD position and wait for the RECORD lamp to light. Talk at a normal conversational level into the recording transmitter, holding the transmitter about 3 inches from the lips. The recorded message may be up to 11.8 seconds long. After the RECORD lamp goes out, **return the RECORD-PLAY switch to the PLAY position** and wait approximately 1.5 minutes. The 1A Telephone Reporting Set is now ready for test.

##### 4.02 The 1A Telephone Reporting Set has two operating modes:

- (a) Alarm, in which the 1A Telephone Reporting Set calls the control point telephone.

- (b) Inquiry, in which the control point telephone calls the 1A Telephone Reporting Set.

**4.03 To test the alarm mode:**

- (1) Connect a hand test set across the CO or PBX with switch in **MONITOR** position to check the process of alarm test.
- (2) Short the pair from customer's detecting device at terminals 41 and 42. Maintain this short throughout test.
- (3) The 1A Telephone Reporting Set seizes telephone line and dials the number of the control point telephone. The triangular indicator in the center of the dial plate rotates during the dialing interval.
- (4) A few seconds after the last digit is dialed, the 1A Telephone Reporting Set will transmit the control point telephone a portion of the prerecorded message with superimposed, **interrupted** tone. This identifying tone serves to indicate that the customer's detecting circuit is closed. The triangular indicator continues to rotate during this period.
- (5) After dialing interval is completed, the indicator ceases to rotate and an identifying continuous tone will be transmitted for 30 seconds.
- (6) Following the 30-second interval, the entire message will be transmitted twice with interrupted tone superimposed on the message. The indicator rotates.
- (7) At the control point telephone:
  - (a) Pick up when ringing is heard.
  - (b) Listen for continuous identifying tone, followed by two playings of the entire message with superimposed, interrupted tone. (If the voice message is not loud enough, adjust the volume control at the 1A Telephone Reporting Set.) The 1A Telephone Reporting Set will hang up.
  - (c) **Hang up the control point telephone.**
- (8) After 30 seconds 1A Telephone Reporting Set will seize telephone line, and dial the control point telephone again.

- (9) At the control point telephone:

- (a) Pick up when ringing is heard.
- (b) Signal the 1A Telephone Reporting Set by depressing the button in the 62A control unit or J1A handset. Depress button for at least one second.

- Signaling during the identifying continuous tone period will advance the 1A Telephone Reporting Set to the voice message period.
- Signaling during any voice message period will cause the 1A Telephone Reporting Set to hang up and reset.

**Note:** Failure to signal from the 62A control unit or J1A handset at the control point telephone during a voice message period will cause the 1A Telephone Reporting Set to make nine successive call attempts before resetting itself.

- (10) **Remove the short previously placed across the pair from the customer's detecting device.**

**4.04 To test the inquiry mode:**

- (1) Dial the telephone number of the 1A Telephone Reporting Set from the control point telephone.
- (2) After approximately eight or nine rings the 1A Telephone Reporting Set terminates ringing by seizing telephone line, and transmits identifying continuous tone for ten seconds.
- (3) Signal the 1A Telephone Reporting Set from the control point telephone by depressing switch in the 62A control unit or the J1A handset during the **ten second tone period**. This will shift the operating sequence to the alarm mode. The prerecorded message will be transmitted twice followed by hang-up by the 1A Telephone Reporting Set. If the 1A Telephone Reporting Set is signaled during the **message transmission** period, the 1A Telephone Reporting Set will drop the connection and reset. If the set is not signaled it will wait 30 seconds and initiate a call.

**Note:** If the 1A Telephone Reporting Set does not receive a signal from the control point telephone during the inquiry mode, the 1A Telephone Reporting Set will drop the connection and reset.

**4.05** Repeat the test of 4.03. Instead of shorting the pair from the customer's detecting device, have the customer actuate the detecting device to simulate an alarm condition.

**4.06** Test the unit from the associated telephone set (502B-, 511F/H-, 558D-, or 558F-type), if provided. Sequence is as follows:

- (a) Lift handset of associated telephone set, if telephone set is a 2-line pickup type, position turnbutton to line 1.
- (b) Dial the local central office number for a quiet termination.
- (c) Raise the exclusion key of the associated telephone and momentarily operate the INPUT button located in the lower left hand corner of the unit (Fig. 2). Unit will dial the number of the control point telephone but the dial pulses will not be effective because of the off-hook condition of the associated telephone set.

**Note:** The customer should be instructed *not* to operate the exclusion key, when originating or answering a call, on the line assigned to the 1A Telephone Reporting Set. However, when using line 2 (the line not assigned to the 1A Telephone Reporting Set) of a 2-line pickup telephone set, the exclusion key *should* be operated. Operation of the exclusion key, in this case, reconnects the 1A Telephone Reporting Set to line 1. On hangup the exclusion key is restored to normal and the 1A Telephone Reporting Set is now connected to line 1 through a line switch contact. (See Fig. 9 or 10.)

- (d) After the dialing sequence is completed, the unit will transmit the identifying continuous tone followed by the recorded message. This can be verified from the receiver of the associated telephone. Reset the unit by depressing the INPUT button for 2 to 3 seconds *during the message transmission period*. Failure to operate the INPUT button during this period, will cause

the unit to make 8 more successive calls to the control point telephone before resetting.

## 5. CONNECTIONS

**5.01** Refer to Fig. 6 when connecting control unit to station sets equipped with 425- or 4010-type networks.

**5.02** Connections to other station equipment will be included in the attendant position or telephone circuit in appropriate SDs.

## 6. MAINTENANCE

**6.01** *Field maintenance of the 1A Telephone Reporting Set is limited to:*

- Cleaning or replacing the magnetic tape.
- Cleaning the record/reproduce head.
- Replacement of battery, battery heater if used, KS-16886L2 transformer, or 2012B transformer.
- Replacement of 51A lamp.
- Replacement of lens and gasket.
- Replacement of the complete unit.

**6.02** Refer to Table D for possible trouble and corrective action to be taken.

**6.03** *To clean magnetic tape:*

- (a) Open the unit and remove plastic shroud covering the mechanism. (See Fig. 3.)
- (b) Hold a dry, clean "Q-Tip" lightly against the tape as shown in Fig. 11. Momentarily move the RECORD-PLAY switch to the RECORD position, then back to the PLAY position. Move the "Q-Tip" back and forth across the dull face of the tape.

**Caution:** *Avoid using excessive pressure on the tape.*

**6.04** *To clean the record/reproduce head:*

- (a) Remove tape tension spring per Fig. 12.

- (b) Hold pressure pad (Fig. 12) away from head. Care should be taken not to bend spring.
- (c) Remove tape from tape guide (Fig. 12). Exercise caution not to tear tape on the square corner of the guide.
- (d) Remove tape from sprocket wheel and idler rollers.
- (e) Clean the face of the record/reproduce head and outside roller surfaces, using Trichloroethane on a clean, lint-free cloth.

**Caution:** *Do not saturate the pressure pads. Use the Trichloroethane sparingly and in well ventilated area. Do not replace the tape until all the Trichloroethane has evaporated. Trichloroethane will remove the magnetic particles from the tape and render it useless.*

#### 6.05 To reinstall a tape or install a new tape:

- (a) Clean head per 5.04.
- (b) Place the tape around the idler rollers as shown in Fig. 12.
- (c) The dull side of the tape must be placed against face of the record/reproduce head.
- (d) Position the splice of the tape approximately at the center of capacitor C-81 or between arrows above the word SPLICE (Fig. 12).
- (e) Engage the sprocket in the holes in the tape.
- (f) When placing the tape over the face of the record/reproduce head, be careful not to scratch or tear the tape on the square corner of the tape guide (Fig. 12).
- (g) Replace tape tension spring (Fig. 12).

- (h) Avoid touching the dull side of the tape.

**Note:** Replacement recording tape can be ordered as P-29E967.

#### 6.06 To replace battery:

- (a) Loosen two captive screws holding battery bracket or battery heater (Fig. 4).
- (b) Unsnap connector from each end of the battery.

**Caution:** *Do not short circuit battery (3.02).*

- (c) Roll battery out of battery bracket or slide battery out of heater.
- (d) Roll new battery into bracket or slide into heater.
- (e) Snap connectors onto terminals of battery; red lead to red end and black lead to black end of battery.
- (f) Place bracket or heater in housing.
- (g) Tighten two captive screws.

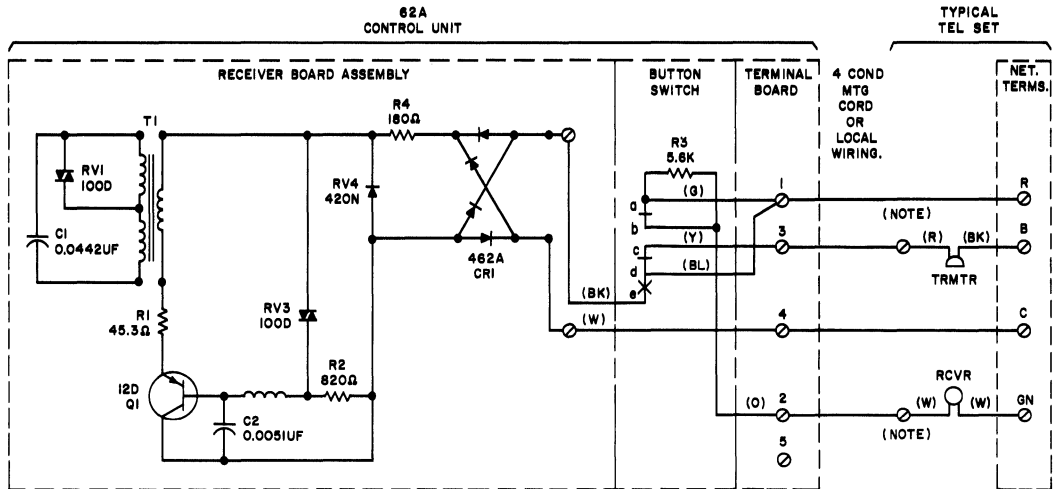
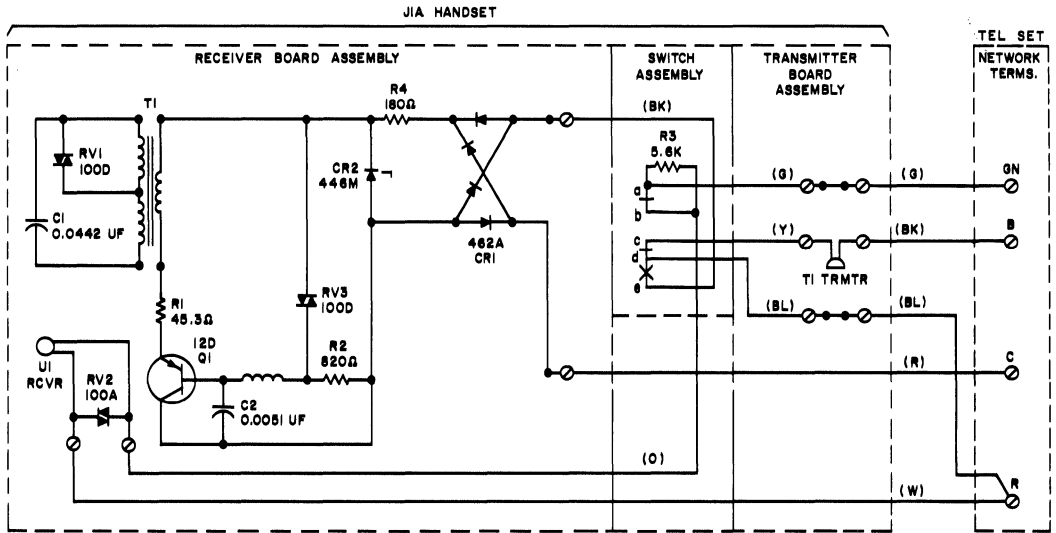
**6.07** To replace the lens (plastic window, Fig. 1), remove the six screws and washers from the inside of the upper housing.



**Exercise caution when installing the new lens to ensure that the gasket is properly seated to give a watertight seal.**

**6.08** To replace RECORD lamp use a 553A tool to extract the defective lamp and replace the new 51A lamp. Align the lamp contacts with the lamp socket contacts.





NOTE:  
 BEFORE CONNECTING THE 62A CONTROL UNIT, REMOVE RED TRANSMITTER LEAD AND WHITE RECEIVER LEAD FROM TERMINAL R OF NETWORK AND CONNECT TO VACANT TIE POINTS. A D-161488 CONNECTOR MAY BE USED IF VACANT TIE POINTS ARE NOT AVAILABLE.

Fig. 6—J1A Handset and 62A Control Unit, Connections

TABLE A

## MODIFICATION OF 502B TELEPHONE SET

WIRE OR LEAD		FROM	TO
Line Switch	(W) [S-BR]	C	GN
	(G) [S-Y]	L2	3
	(R) [S-R]	GN	1
	(BK) [S-BK]	R	E1
	(BR) [S-W]	5	1
	(Y) [S-G]	6	C
Handset	(W)	GN	3
Exclusion Key	(W)	E2	1
	(BK) [G-Y]	L1	4
	(Y) [R-Y]	L2	5
Mounting Cord	(BK)	E2	2

( ) Current color code

[ ] MD color code

TABLE B

## MODIFICATION OF 558D TELEPHONE SET

WIRE OR LEAD		FROM	TO
Line Switch	(W) [S-BR]	C	GN
	(G) [S-Y]	L2	E1
	(R) [S-R]	GN	1
	(BK) [S-BK]	R	5
	(Y) [S-W]	12	C
	(BR) [S-G]	9	L2
Handset	(W)	GN	E1
Exclusion Key	(BK) [G-Y]	6	*
	(Y) [R-Y]	5	*
Add Strap		1	6

( ) Current color code

[ ] MD color code

\* Insulate and store

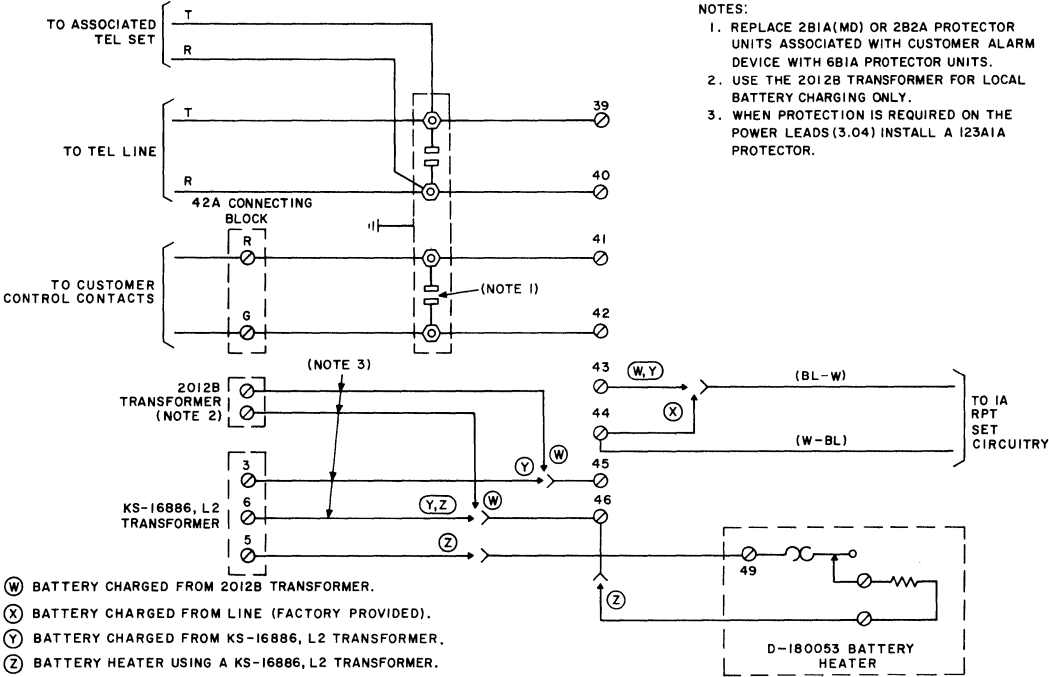
TABLE C

## MODIFICATION OF 511F/H OR 558F TELEPHONE SET FOR USE WITH 1A TELEPHONE REPORTING SET

WIRE OR LEAD		FROM	TO
Line Switch	(BK)	R	10
	(R)	GN	2
	(BR)	20	15
	(Y)	4* L2†	C
	(W)	C	GN
	(G)	15	G
Exclusion Key	(BK)	1	19
	(Y)	2	16
	(BL)	10	16
Turn Key	(V)	2	17
Handset	(W)	GN	G
Mounting Cord 511F/H Set Only	(S-V)	18	16
Add Strap		2	9

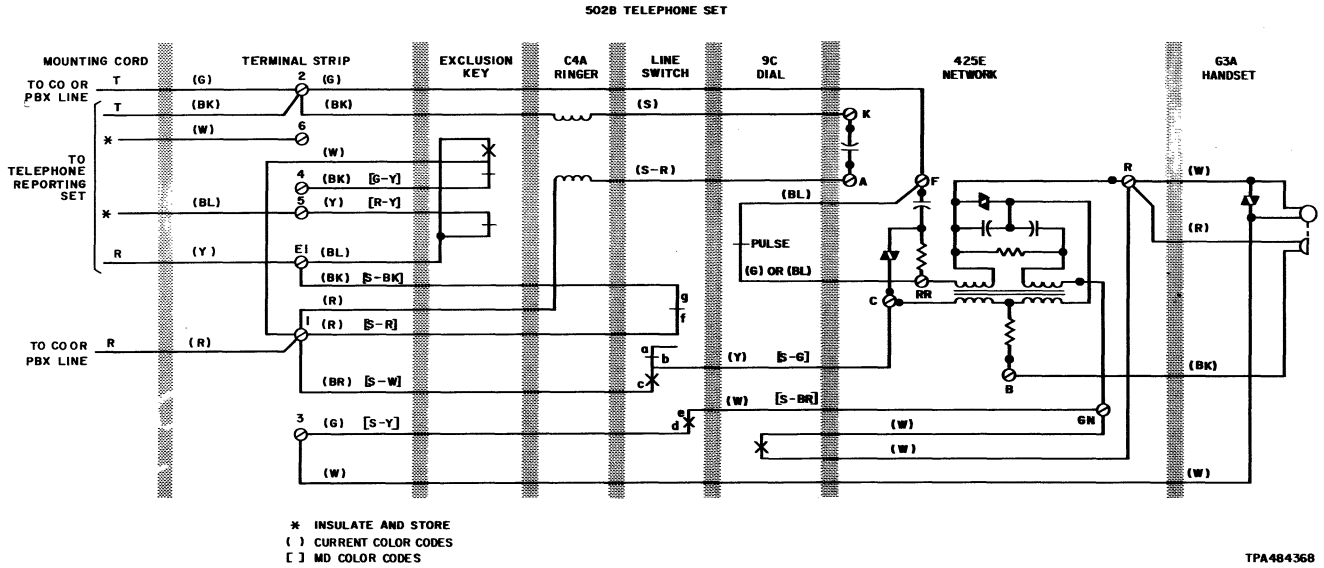
\* 558F Telephone Set

† 511F/H Telephone Set



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Fig. 7—1A Telephone Reporting Set, Connections



**Fig. 8—502B Telephone Set, Connection Modification**

558D TELEPHONE SET

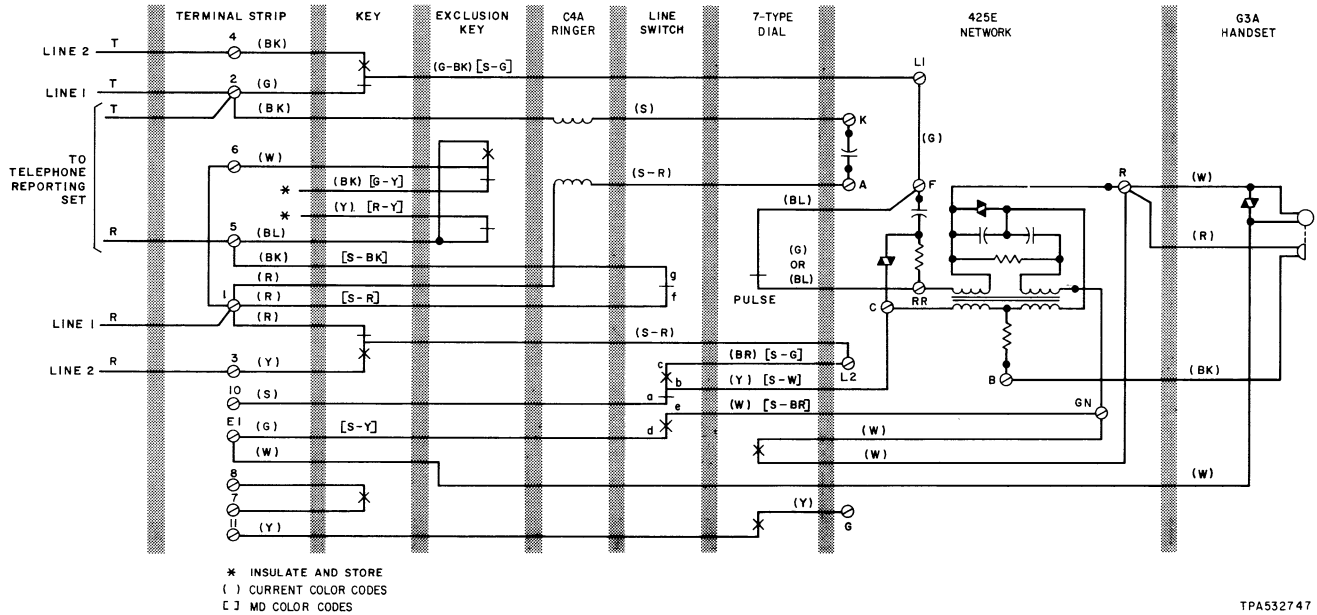
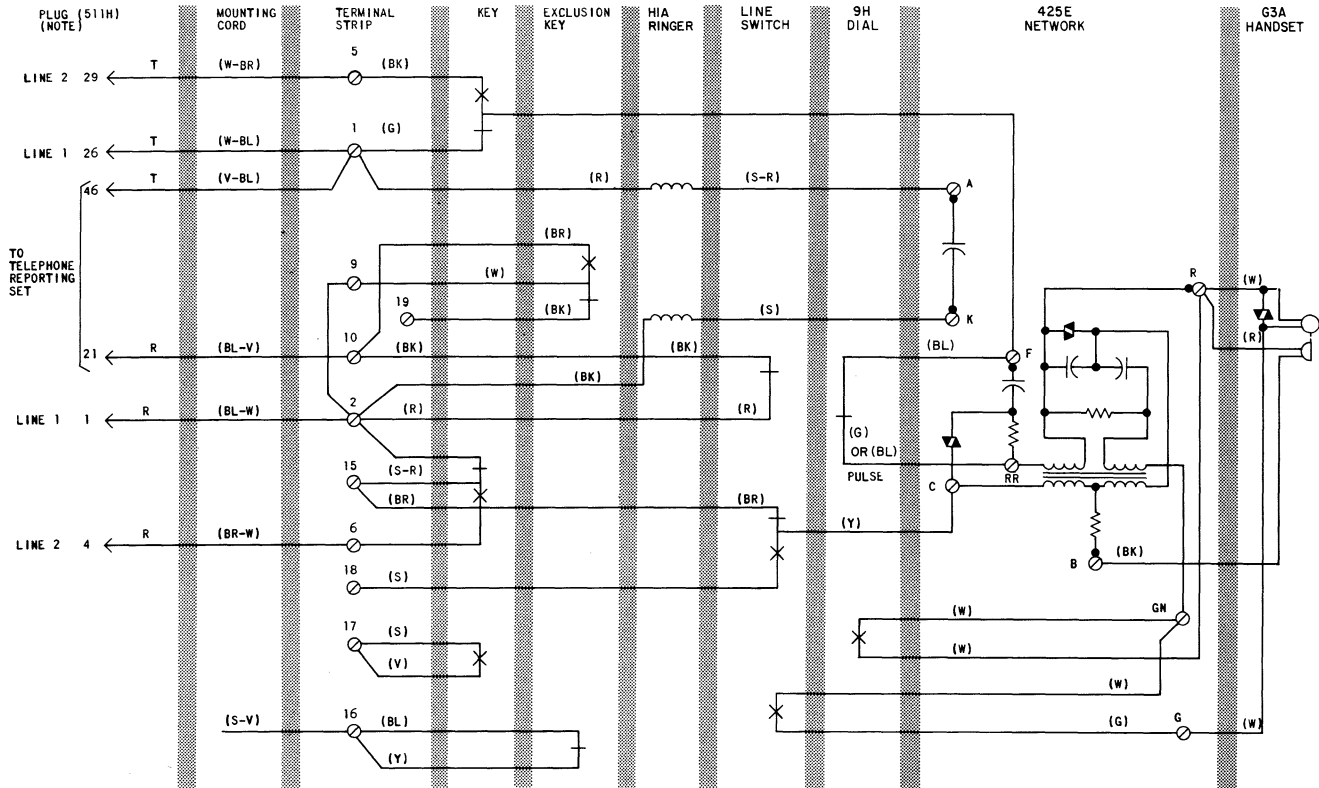


Fig. 9—558D Telephone Set, Connection Modification



NOTE:  
 511F TELEPHONE SET IS IDENTICAL TO THE 511H TELEPHONE SET EXCEPT  
 EQUIPPED WITH SPADE-TIPPED MOUNTING CORD. CONNECTIONS TO 558F  
 TELEPHONE SET ARE MADE DIRECTLY TO THE TERMINAL STRIP.

TPA 532450

Fig. 10—511F/H or 558F Telephone Set, Connection Modification

TABLE D

POSSIBLE TROUBLE	CORRECTIVE ACTION
Unit does not run from closure of customer's contacts (triangular indicator does not rotate)	<ol style="list-style-type: none"> <li>1. Check loop resistance of customer's circuit to detecting device [2.05(e)].</li> <li>2. Check condition of battery (3.02).</li> </ol>
Unit runs continuously	<ol style="list-style-type: none"> <li>1. Check RECORD-PLAY switch. Should be in PLAY position.</li> </ol>
Noisy voice message	<ol style="list-style-type: none"> <li>1. Clean tape and/or record head.</li> <li>2. Replace tape if scratched or torn.</li> </ol>
No or weak voice message level	<ol style="list-style-type: none"> <li>1. Turn up volume control.</li> <li>2. Voice message recorded at too low a level — re-record voice message.</li> <li>3. Check for broken tape.</li> <li>4. Check.</li> </ol>

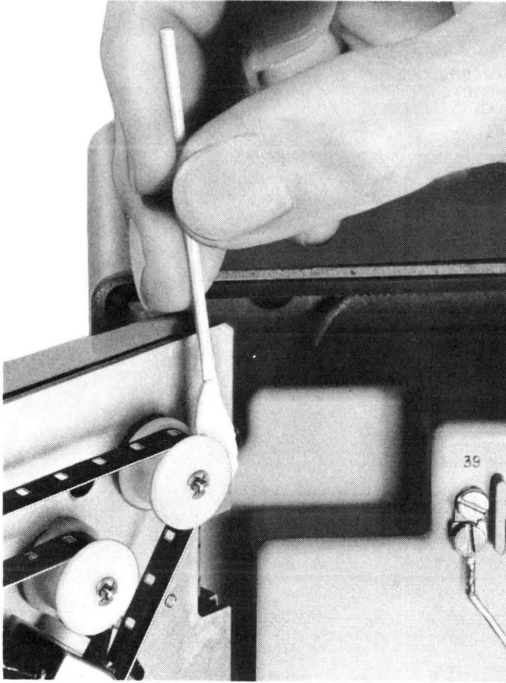


Fig. 11—Details of Cleaning Tape

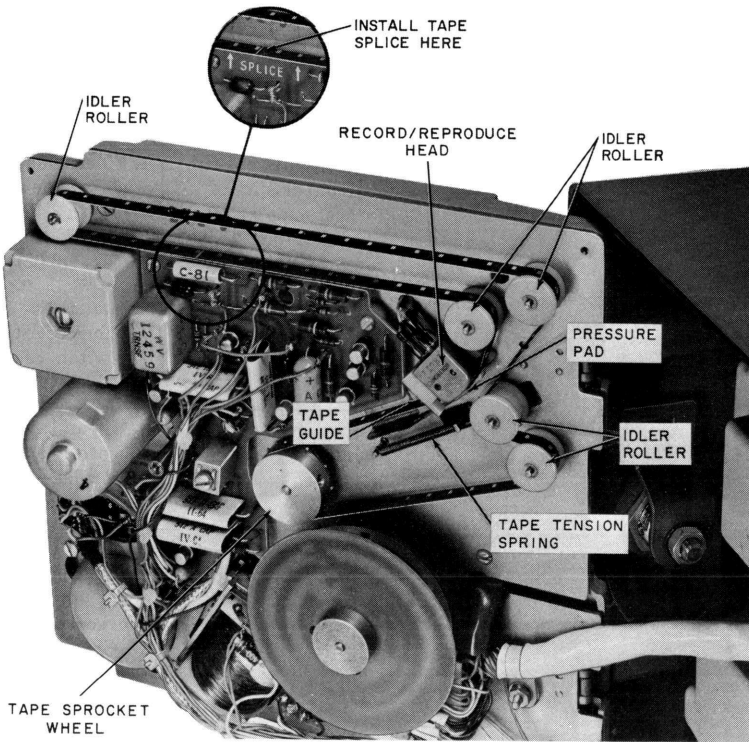


Fig. 12—Details of Tape Installation



## 62A CONTROL UNIT

### IDENTIFICATION, INSTALLATION, AND CONNECTIONS

#### 1. GENERAL

**1.01** The 62A control unit (Fig. 1) is a transistorized, 1475 Hz oscillator intended for use with the control telephone, console, or switchboard which receives calls from a 1A telephone reporting set.



Fig. 1—62A Control Unit

**1.02** This section is reissued to revise Fig. 3.

#### 2. IDENTIFICATION

**2.01** The control unit consists of an oscillator, polarity guard, and pushbutton switch mounted on a circuit board. The circuit board mounts on a steel base approximately 3-1/2 inches long by 2 inches wide. The assembly is covered by a plastic housing which has a stick-on instruction label.

**2.02** A screw-type terminal board inside the unit is arranged to terminate inside wiring or a

4-conductor mounting cord. The mounting cord must be ordered separately.

**2.03** When the control unit is connected to a telephone set, operation of the pushbutton switch:

- Connects a resistance of 5600 ohms in series with the receiver to limit the output signal to a comfortable listening level at the receiver.
- Opens the transmitter circuit and couples the oscillator output to the line.
- Closes dc power to the oscillator from the line.

**2.04** The control unit will be produced in one color, light gray (-61). Other colors may be obtained by ordering a P-21F564 label and an appropriate colored housing, and changing the housing in the field. The housings are available in the following standard colors:

- P-84H503-Black
- P-84H551-Green
- P-84H556-Yellow
- P-84H558-White
- P-84H559-Pink
- P-84H560-Light Beige
- P-84H561-Light Gray
- P-84H562-Aqua Blue
- P-84H564-Turquoise

**3. INSTALLATION**

**3.01** The control unit may be desk or wall mounted. Two mounting screw slots are provided in the base of the unit. To obtain access to the slots:

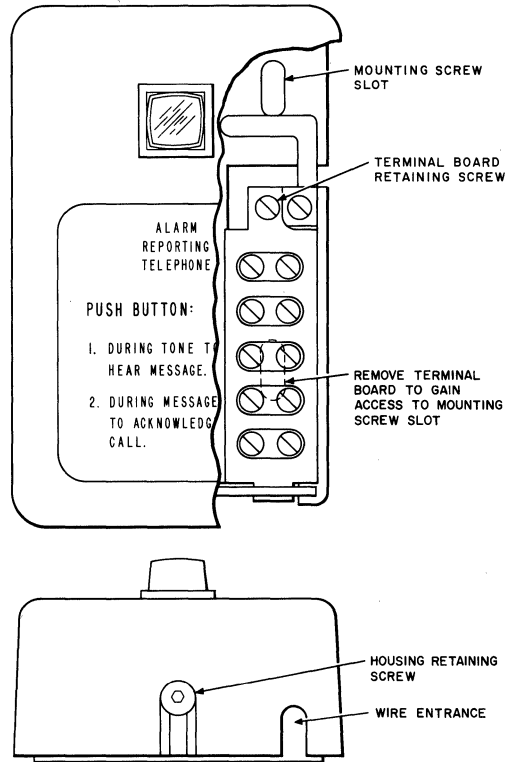
- (1) Loosen two housing retaining screws (Fig. 2), using appropriate wrench from C Key Kit, and remove housing.
- (2) Remove the one terminal board retaining screw (Fig. 2) and remove terminal board.

**3.02** Route mounting cord or inside wiring through entrance hole provided at one end of the unit.

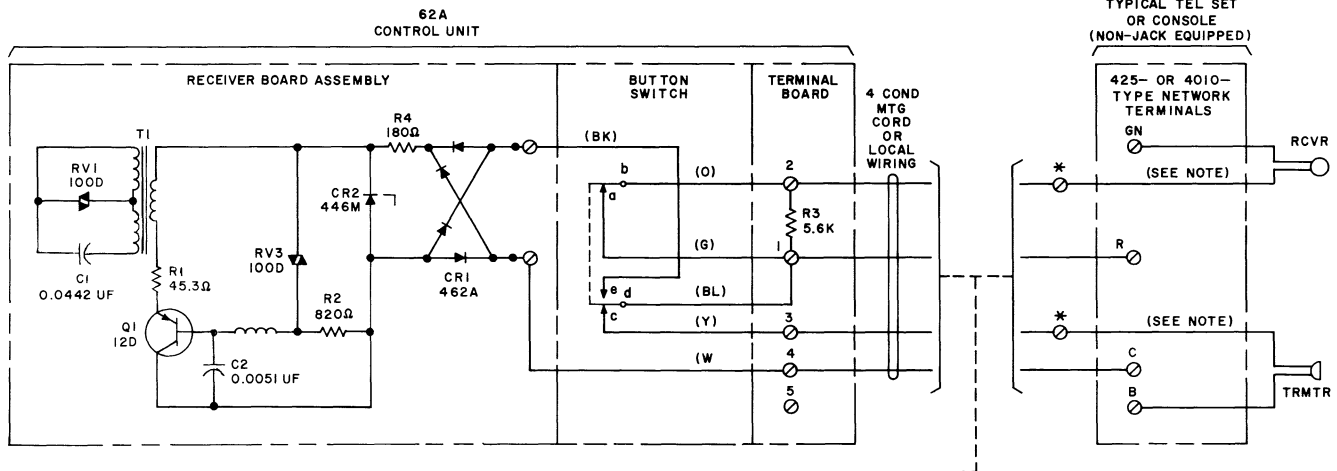
**4. CONNECTIONS**

**4.01** Refer to Fig. 3 when connecting control unit to station sets equipped with 425- or 4010-type networks.

**4.02** Connections to other station equipment will be included in the attendant's position or telephone circuit in appropriate SDs.



**Fig. 2—Mounting Details**



**NOTE:**

BEFORE CONNECTING THE 62A CONTROL UNIT, REMOVE TRANSMITTER AND RECEIVER LEADS FROM TERMINAL R OF NETWORK AND CONNECT TO SPARE TERMINAL ON NETWORK OR AMPLIFIER OR USE D-161488 CONNECTORS.

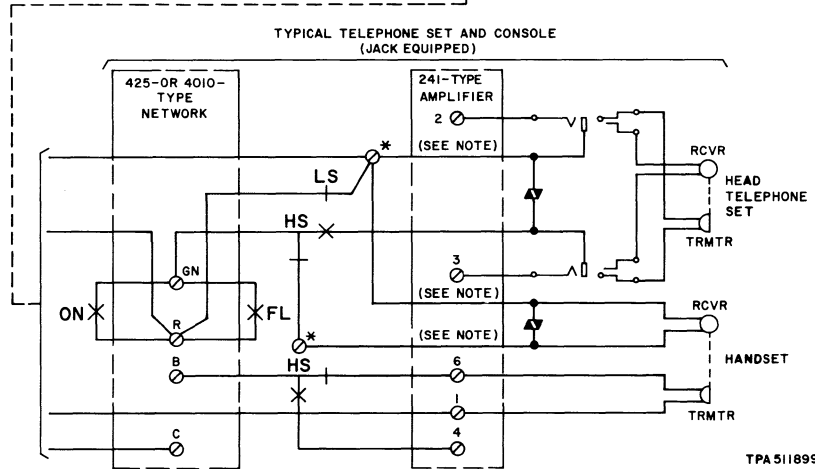
\* - SPARE TERMINAL ON NETWORK OR AMPLIFIER OR D-161488 CONNECTOR

ON - DIAL OFF NORMAL CONTACTS

LS - LINE SWITCH

HS - HEADSET KEY

FL - FLASH KEY



TPA 511899

◆ Fig. 3—62A Control Unit, Connections ◆

