

## 4-WIRE PRIVATE LINE TERMINATING CIRCUIT

### SD-69449-01 IDENTIFICATION, INSTALLATION, AND CONNECTIONS

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**1. GENERAL**

**1.01** This section contains identification, installation and connections required to provide a means for talking and signaling on 4-wire local battery private lines terminating in 2- and 4-wire telephone sets. This arrangement can be used with existing dc or 20 Hz signaling, SS-1 selective signaling and 600/1500 Hz signaling. See Fig. 1.

**1.02** Sections 518-610-101 and 518-610-401 are hereby cancelled. The information formerly contained in those sections is now a part of this issue.

**2. IDENTIFICATION**

**2.01** Table A contains information necessary to identify the individual KTUs and associated equipment.

**2.02** A station group refers to those key telephone sets associated with the same local battery talking supply. A 4-wire private line may have up to six station groups with a maximum of 20 extensions per group.

**3. DESCRIPTION OF EQUIPMENT**

(a) *Telephone Sets*

- (1) Normal line functions such as pickup, lamps and signaling are furnished by the telephone sets used with this arrangement.
- (2) Two- or four-wire circuits may be picked up by the same key telephone set or separately mounted keys by the use of a FW (four-wire) relay.
- (3) Speakerphone option for use with either 2- or 4-wire circuits is available.
- (4) Telephone sets which are compatible with 4-wire lines are as follows:

500 AD Telephone Set

618 Type or 682 AA 18 button CALL DIRECTOR

608 Type or 683 AA 30 button CALL DIRECTOR

(b) *Key Telephone Units*

- (1) All or any one of the following KTU's might be required at a specific location depending on the type of installation. See notes on applicable figures 2 thru 9.
- (2) **220A KTU**—Incoming signaling circuit operates from either SS-1 or 600/1500 Hz selective signaling system or from the 4-wire private line circuit. This unit controls visual and audible time-out function, common audible, and where required, sends a busy line condition to other appearances of the line in certain switching systems.
- (3) **227B KTU**—Provides visual and audible signaling control and switching relay for 2- and 4-wire private line systems.
- (4) **229B KTU**—Used as line pickup or exclusion control to provide additional contacts for 4-wire station control. Line pickup

**TABLE A**  
**DESCRIPTION OF INDIVIDUAL KTUS AND ASSOCIATED EQUIPMENT**

KTU	CIRCUIT PURPOSE	QUANTITY	PANEL WIDTH	
			INCHES	7/16-INCH MODULES
201C	Fuse unit	as required	2-5/32	5
220A	Ring relay or power supply	1 per line	3-1/32	7
227B	Common audible control circuit	as required	3-1/32	7
229B	Auxiliary relay unit used as 4-wire pickup relay circuit	1 per station per line	3-1/32	7
	Auxiliary relay unit used as 4-wire exclusion control circuit	1 per line		
232B	Time-out and manual intercom circuit provides flashing, winking, ringing and busy-tone signal interruptions when equipped with KS-15900, List 1 interrupter	as required*	3-15/32	8
248B	4-wire private line station circuit	1 per station group	4-25/32	11
251A	Ringup relay for 20 Hz incoming signal	1 per line	2-5/32	5
J53041D, List 1	Speakerphone control	1 per line	6-3/32	14

\* Time-out and required interruptions may be furnished from an associated key telephone system.

relay is operated over the A lead of pickup key associated with 4-wire circuit.

(5) **232B KTU**—Provided when visual and audible signal circuit equipment is not available as part of an associated 1A1 KTS. Must be equipped with separately ordered KS-15900, List 1 interrupter.

(6) **248-type KTU**—This unit provides the basic common line functions for the 4-wire private line service. Operates under control of pickup relays for key telephone sets or the switchhook in single line sets. The 248A (MD) or 248B KTU may be used with key telephone sets. The 248B KTU is required for use with single line telephone sets. Dial

pulses when required, are repeated to the signaling system by this circuit.

(7) **251A KTU**—This unit is part of the 4-wire private line circuit. Responds to 20-Hz incoming ring and is used to control the incoming signaling circuit (220A KTU).

(8) **J53041D, L1 Speakerphone unit and 55B modified control unit**—These units are required when speakerphone is added to the 4-wire private line. The 2 units are housed in apparatus boxes approximately 8 inches square and 5 inches deep. The units are connected by a single cable which is supplied. Both control units must be provided on a per station basis.

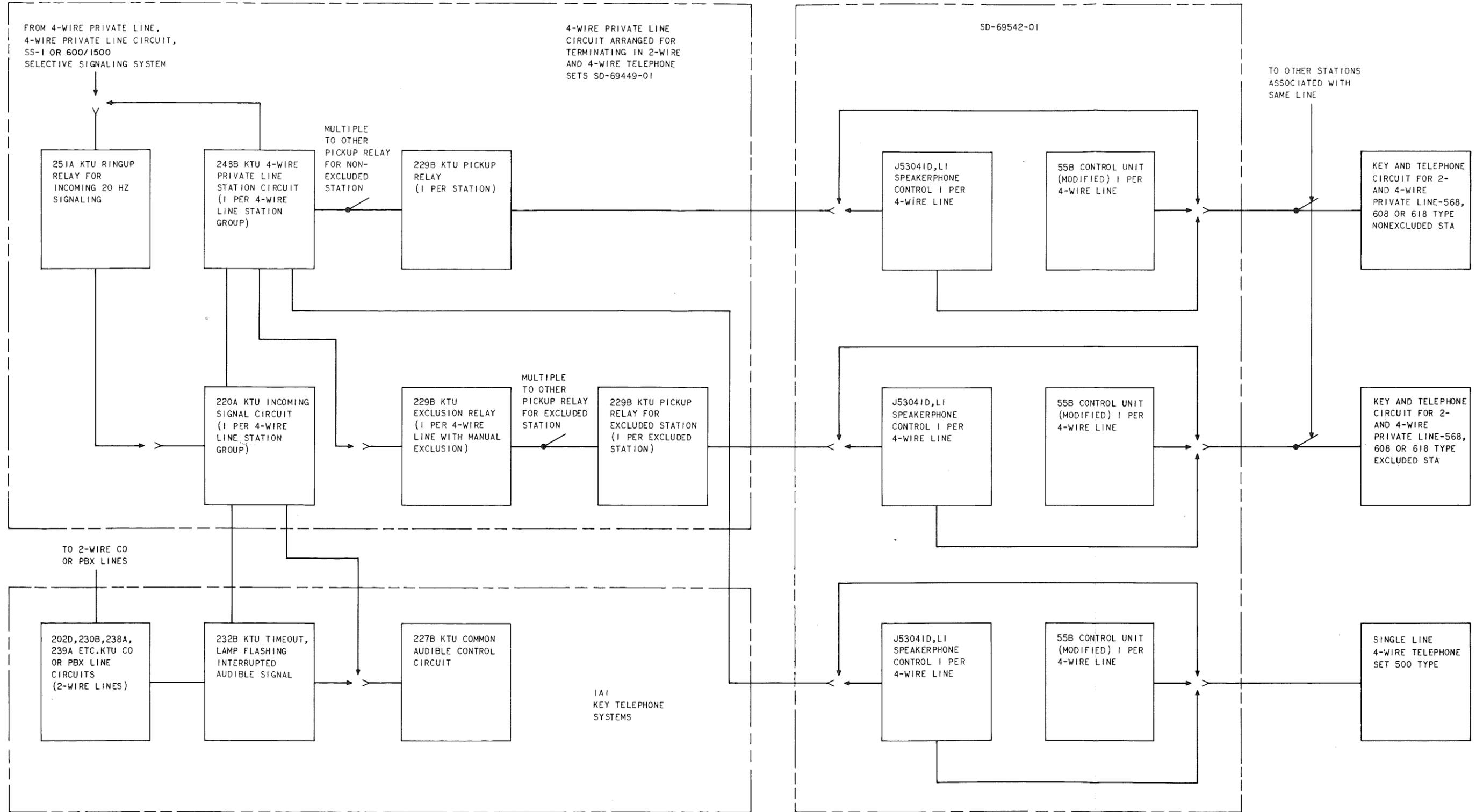


Fig. 1—Block Diagram for Stations Arranged for 2 & 4-Wire Private Line Service

**4. INSTALLATION**

**4.01** All units referred to in this section can be installed in existing cabinets used for key equipment or additional cabinets depending on space requirements. Table A can be used to determine the mounting space required.

**4.02** Table B shows fuse requirements. The KTUs can be mounted in sequence as per the appropriate figure 2 thru 7.

**5. CONNECTIONS**

**5.01** Connections are shown in Fig. 2 through 8. Fig. 9 shows the modification of a 55B control unit. Additional KTUs required to connect customer-provided equipment to 2- and 4-wire facilities are contained in 480-610-100 titled Key Telephone Systems Station Arrangement For 2- and 4-Wire No. 5 Crossbar Central Office Lines.

**5.02** The list of figures showing connections is as follows:

Fig. 1—Block diagram for stations arranged for 2- and 4-wire private line service.

Fig. 2—Connections for 4-wire service-single line telephone set

Fig. 3—Connections for control station or nonexcluded station using 248B KTU

Fig. 4—Connections for control station or nonexcluded station using 248A KTU(MD)

Fig. 5—Connections for excluded stations

Fig. 6—Incoming signal arrangement

Fig. 7—Connections to provide interchange of busy signals with other switching systems.

Fig. 8—Connections for 106B loudspeaker set

Fig. 9—Modification of 55B control unit.

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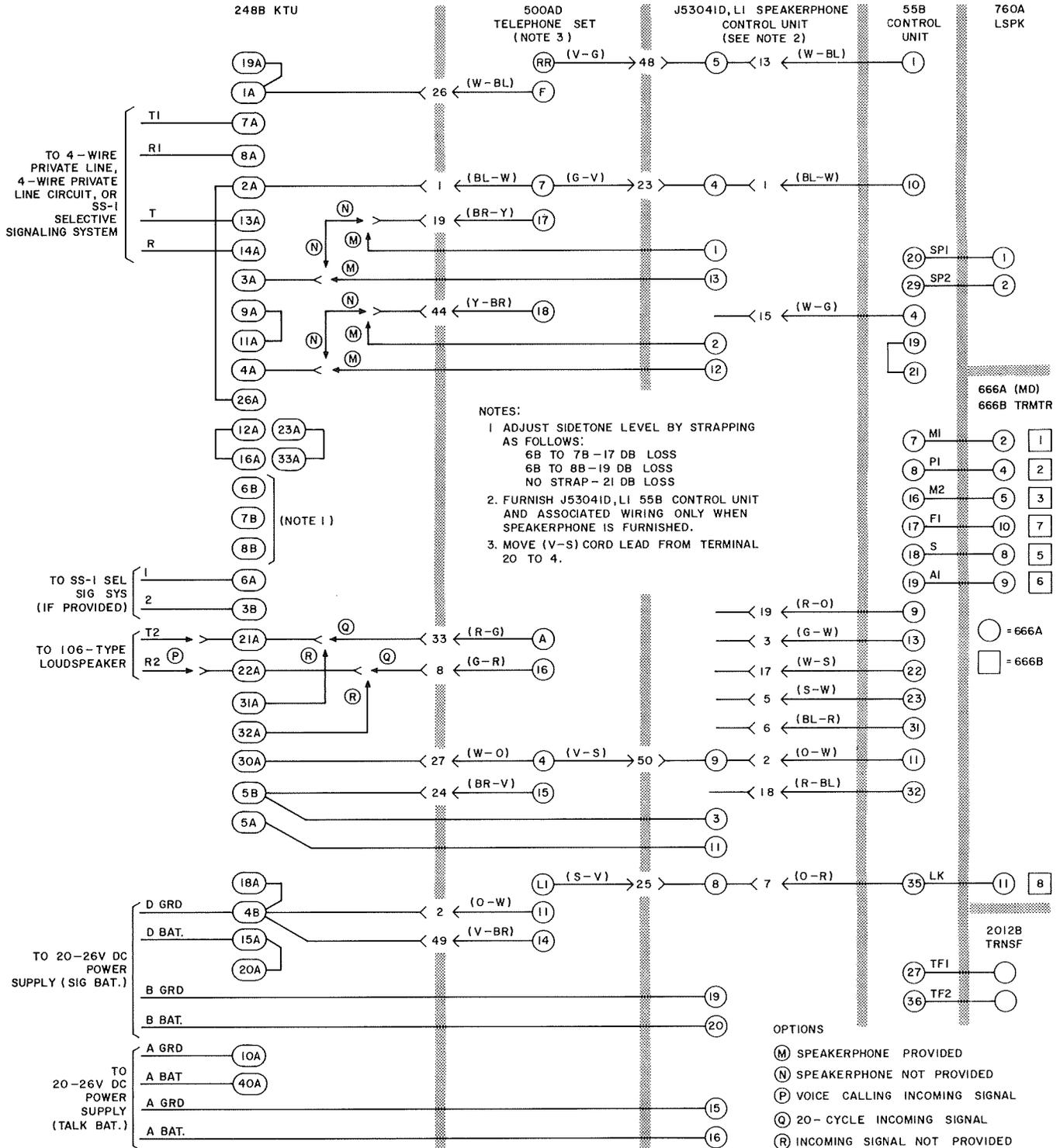
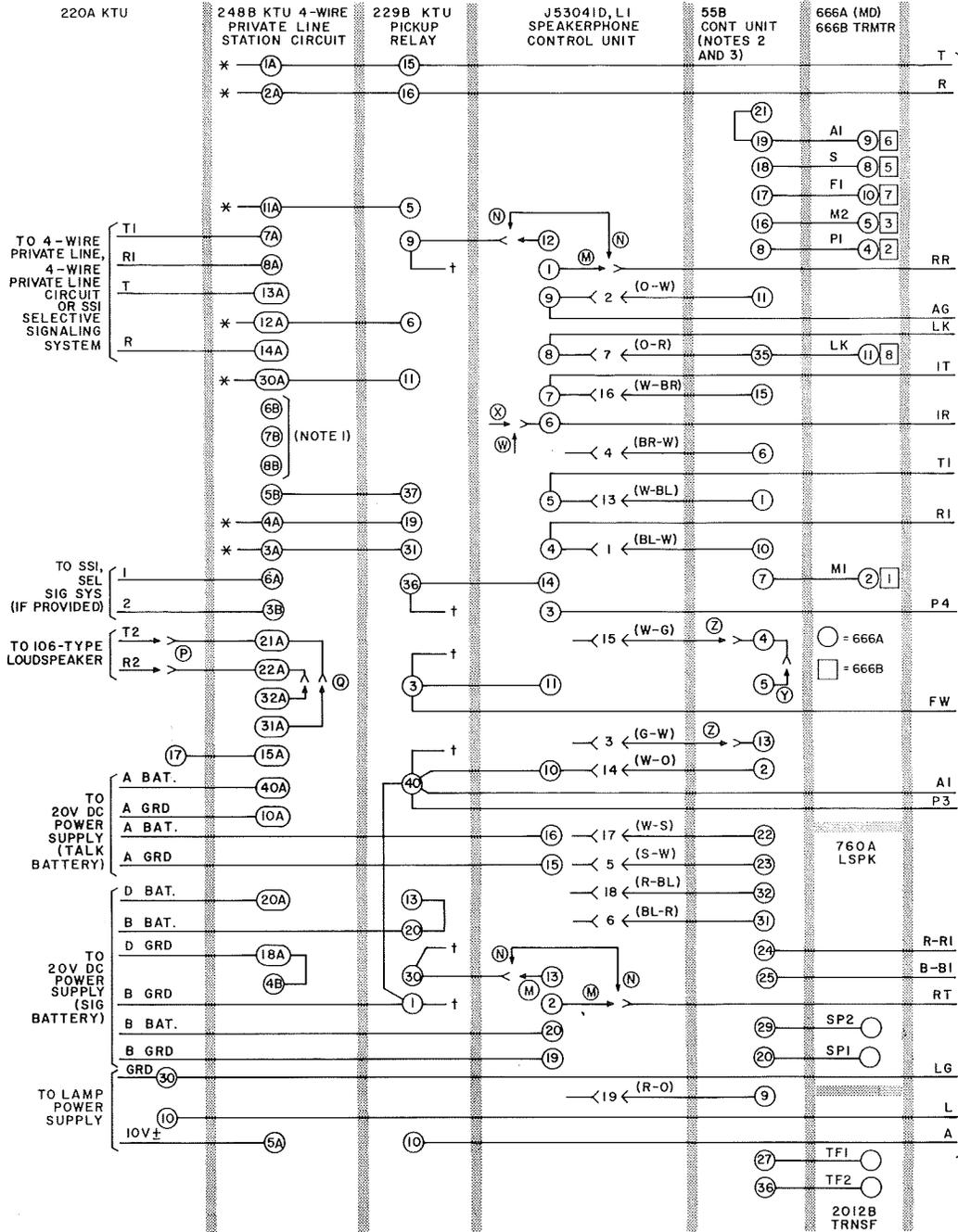


Fig. 2—Connections for 4-Wire Service Single Line Telephone Set

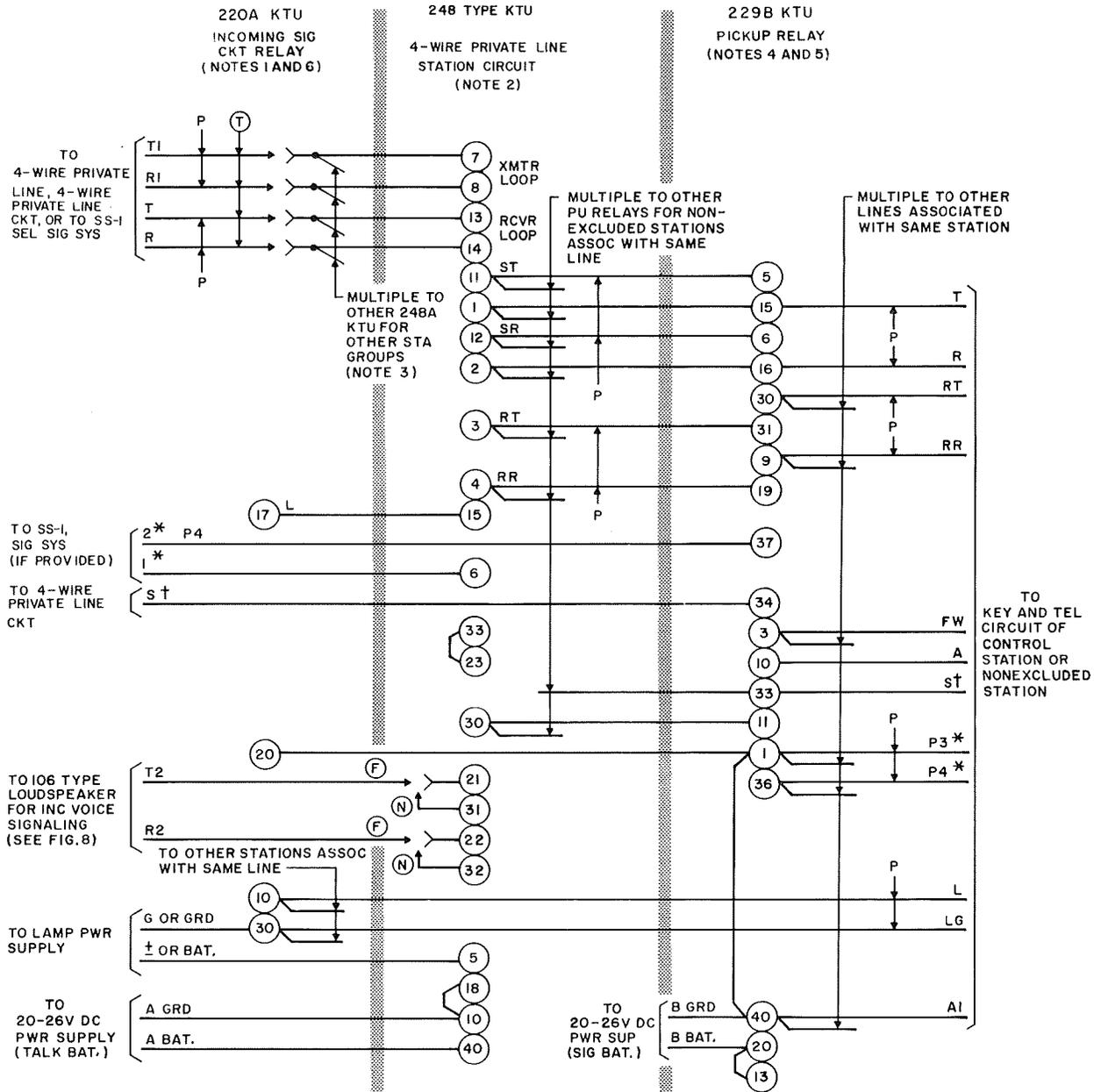


- NOTES:
- ADJUST SIDETONE LEVEL BY STRAPPING AS FOLLOWS:  
 6B TO 7B-17DB LOSS  
 6B TO 8B-19DB LOSS  
 NO STRAP-21DB LOSS
  - FURNISH J53041D, LI 55B CONTROL UNIT AND ASSOCIATED WIRING ONLY WHEN SPEAKERPHONE OPTION IS FURNISHED.
  - MODIFY 55B CONTROL UNIT AS SHOWN IN FIG. 9.
- (Y) TOUCH-TONE DIAL  
 (Z) ROTARY DIAL  
 (M) SPEAKERPHONE PROVIDED  
 (N) SPEAKERPHONE NOT PROVIDED  
 (P) VOICE CALLING INCOMING SIGNAL  
 (Q) VOICE CALLING NOT PROVIDED  
 (X) 4 OF TD RELAY (317A)  
 (W) 6 OF TD RELAY (327C)
- \* MULTIPLE TO OTHER PICKUP RELAYS FOR NONEXCLUDED STATIONS ASSOCIATED WITH SAME LINE.
- † MULTIPLE TO OTHER LINES ASSOCIATED WITH SAME STATION.
- REF:  
 SD-69449-01  
 SD-69542-01  
 SD-69403-01  
 SD-69593-01

TO 2- OR 4-WIRE KEY AND TELEPHONE CIRCUIT OF CONTROL STATION OR NONEXCLUDED STATION

Fig. 3—Connections for Control Station or Nonexcluded Station Using 248B KTU

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\* PROVIDE THESE LEADS WHEN LINE CONNECTS TO SS-I SEL SIG SYSTEM.

† PROVIDE THESE LEADS WHEN MANUAL SIGNALING IS REQUIRED. NO LEADS IN THE TELEPHONE SET NEED TO BE CHANGED AS SIGNALING KEY UTILIZES AI GROUND.

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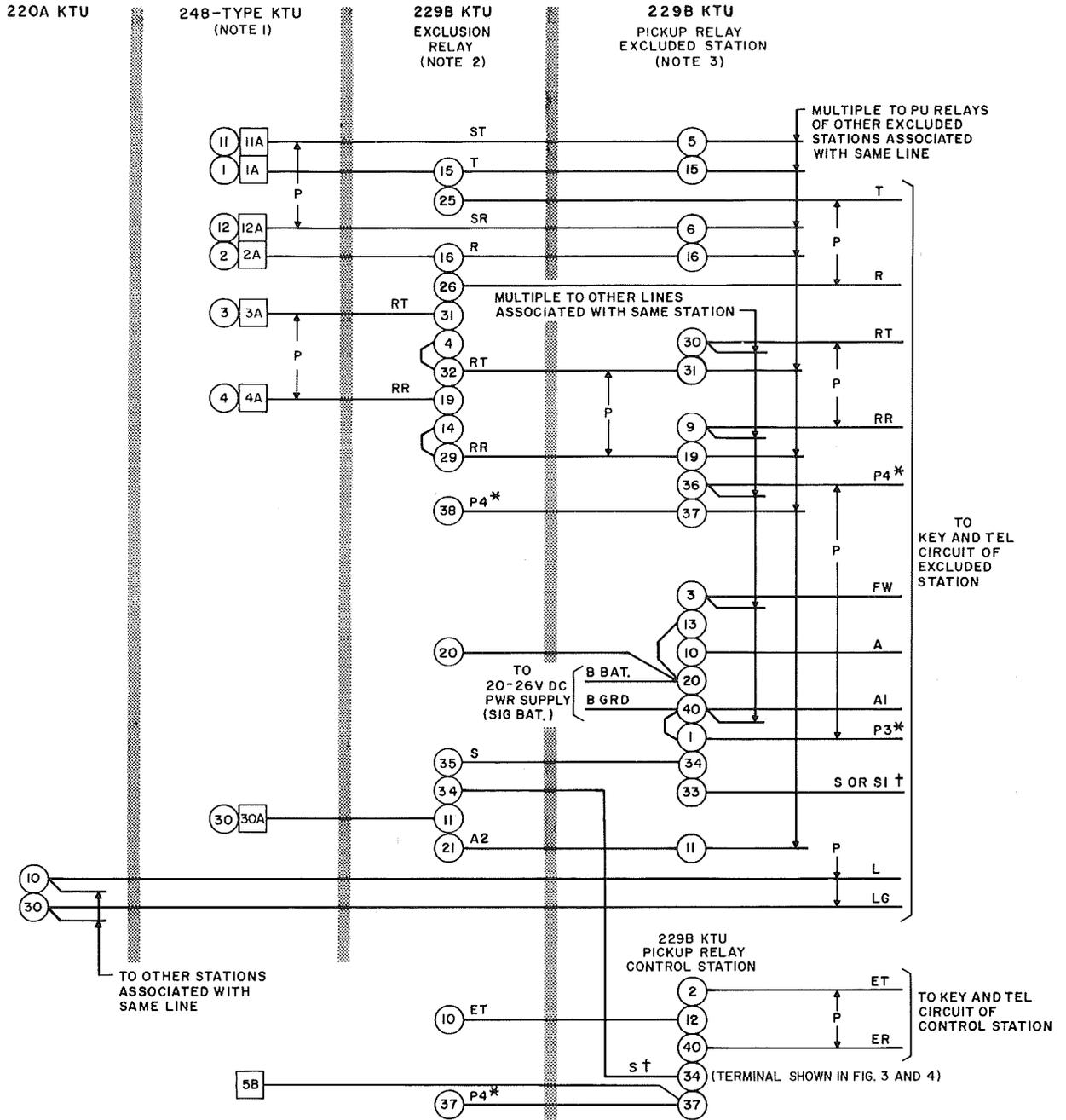
OPTIONS:

- (T) 4-WIRE PRIVATE LINE USED WITHOUT LINE TRANSFER CIRCUIT.
- (F) VOICE CALLING PROVIDED.
- (N) VOICE CALLING NOT PROVIDED.

NOTES:

1. PROVIDE ONE 220A KTU PER LINE.
2. PROVIDE ONE 248A KTU PER STATION GROUP.
3. PROVIDE INDIVIDUAL LEADS FOR EACH STATION GROUP WHEN SSI SEL SIG SYSTEM PRIVACY OR ON-PREMISES DIALING IS REQUIRED. WHEN CONNECTING DIRECTLY TO A 4-WIRE PRIVATE LINE. ONLY ONE STATION GROUP IS PERMITTED.
4. PROVIDE ONE PICKUP RELAY (229B KTU) PER STATION.
5. ADDITIONAL CONNECTIONS SHOWN ON FIG. 5 WHEN THIS FIGURE IS USED AS A CONTROL STATION TO EXCLUDE OTHER STATIONS.
6. REFER TO FIG. 6 FOR INCOMING SIGNAL ARRANGEMENTS.

Fig. 4—Connections for Control Station or Nonexcluded Station Using 248A KTU (MD)



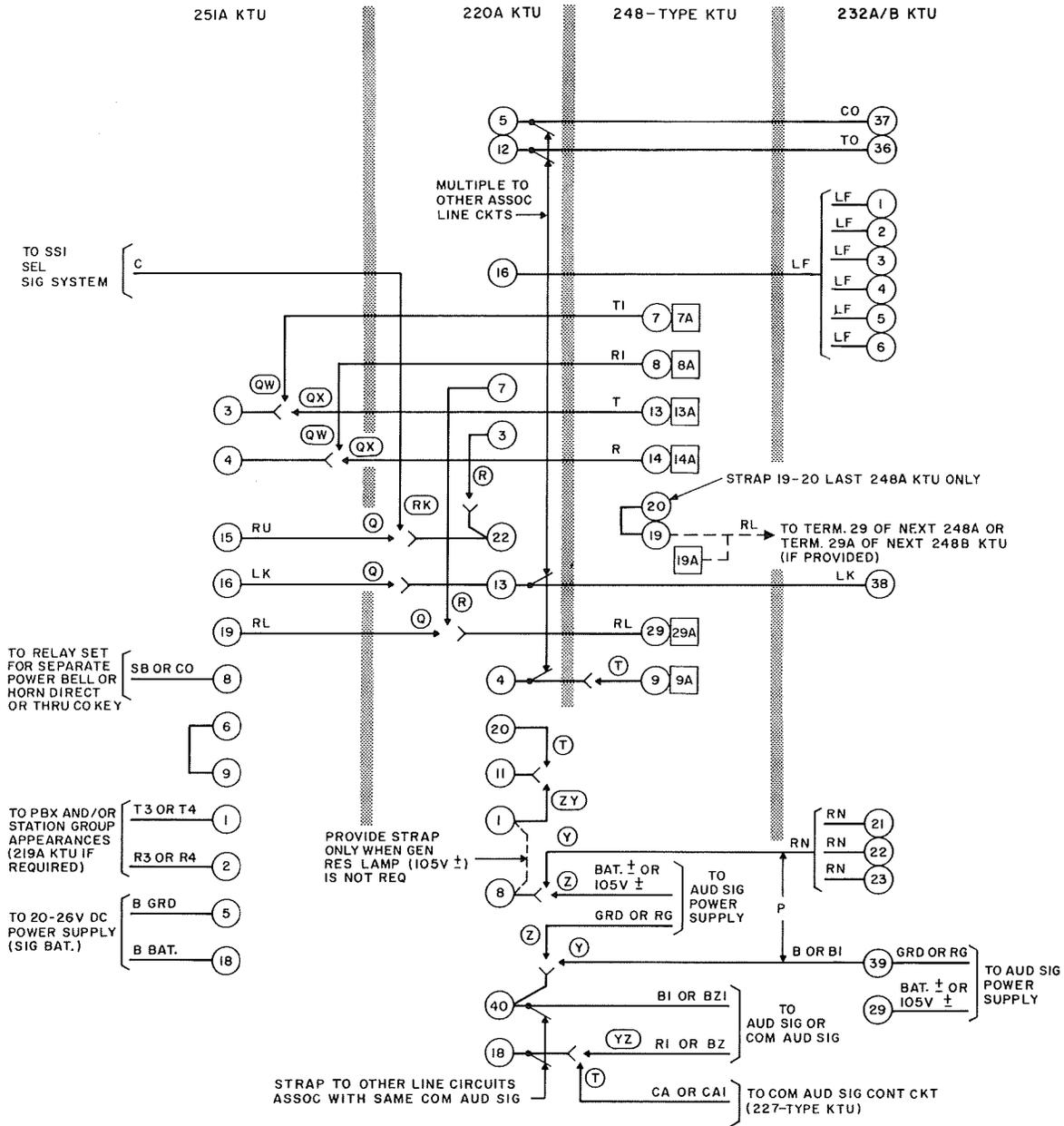
○ 248A KTU (MD)  
 □ 248B KTU

\* PROVIDE THESE LEADS WHEN LINE CONNECTS TO SS-1  
 † PROVIDE THESE LEADS WHEN MANUAL SIGNALING IS REQUIRED. NO LEADS IN TELEPHONE SET NEED TO BE CHANGED AS SIGNALING KEY UTILIZES THE AI GROUND.

NOTES:  
 1. THESE CONNECTIONS ARE IN ADDITION TO THOSE SHOWN IN FIG. 3 AND 4.  
 2. PROVIDE ONE EXCLUSION RELAY (229B KTU) PER LINE.  
 3. PROVIDE ONE PICKUP RELAY (229B KTU) LINE PER STATION.

REF:  
 SD-69449-01

Fig. 5—Connections for Excluded Stations



OPTIONS:

- (K) JOINT OPERATION WITH PBX NOT PROVIDED.
- (Q) INCOMING SIGNAL PROVIDED BY 251A KTU (20 CYCLE SIG).
- (R) INCOMING SIGNAL PROVIDED BY SS-I SEL SIGNALING SYSTEM.
- (T) INTERRUPTED COM AUD SIG USING RELAY CONTROL CIRCUIT (227B KTU).
- (W) INCOMING SIG VIA TRMT LOOP.
- (X) INCOMING SIG VIA RCV LOOP.
- (Y) INTERRUPTED AUD SIG USING ELECTROMECHANICAL-INTERRUPTER 232A/B KTU.
- (Z) STEADY AUD SIG.

NOTE:

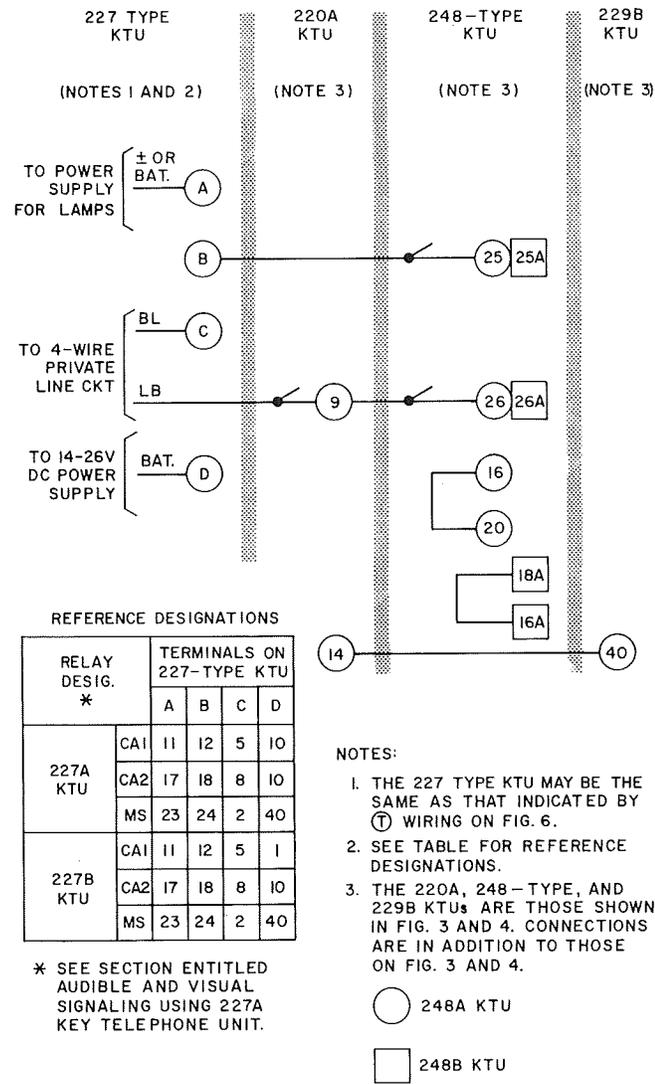
THESE CONNECTIONS ARE IN ADDITION TO THOSE SHOWN IN FIG. 3 AND FIG. 4.

- 248A KTU
- 248B KTU

REF:

- SD-69410-01
- SD-69449-01

Fig. 6—Incoming Signal Arrangements



**Fig. 7—Connections to Provide Interchange of Busy Signals With Other Switching Systems**

**TABLE B**  
**FUSE REQUIREMENTS\***

FUSE AMP	POTENTIAL	ONE PER
2	-24V Talk	Station line circuit (248-type)
2	-24V Signal	All pickup relay (229B KTU) and exclusion relay (229B) associated with same station.
2	-24V Signal	CA, CA1, or MS relay (227-type KTU)

\* Fuse holder may be a 201-type KTU or equivalent.

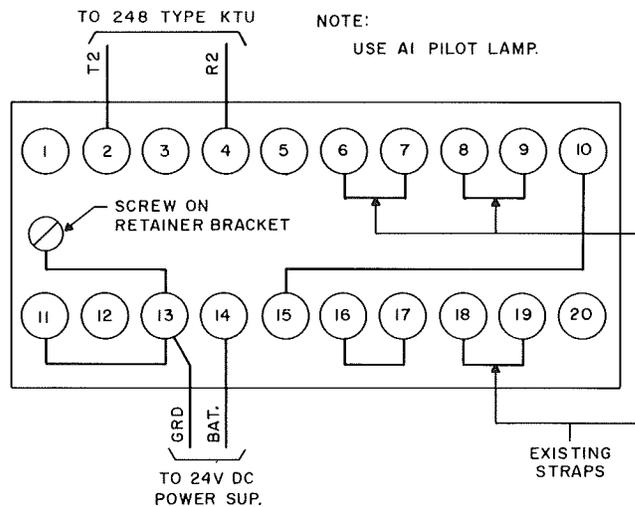
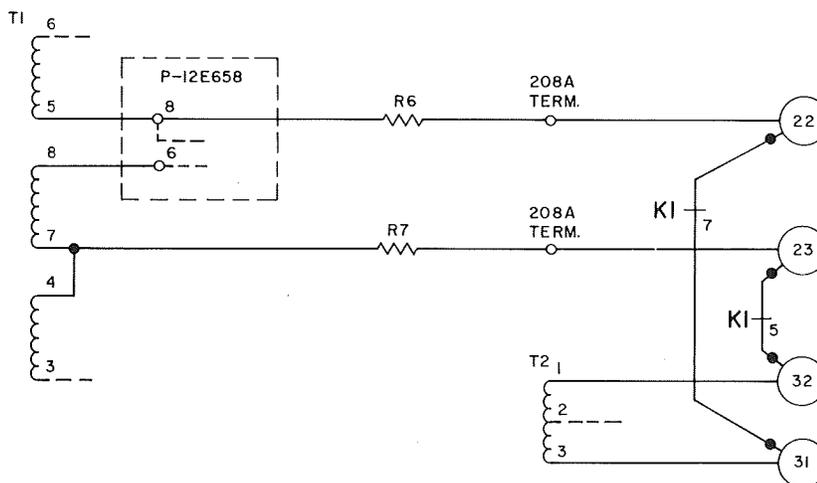


Fig. 8—Connections for 106B Loudspeaker Set



NOTES:

- I. MODIFY CONTROL UNIT AS FOLLOWS:
  1. UNSOLDER R6 FROM TERMINAL 3 OF T2 TRANSFORMER.
  2. UNSOLDER R7 FROM TERMINAL 1 OF T2 TRANSFORMER.
  3. INSTALL TWO 208A TERMINALS OR EQUIVALENT UNDER THE MOUNTING NUT OF TRANSFORMERS T1 AND T2. TERMINALS SHOULD NOT INTERFERE WITH ADJACENT EQUIPMENT.
  4. SOLDER FREE END OF R6 TO ONE 208A TERMINAL AND FREE END OF R7 TO OTHER 208A TERMINAL.
  5. REMOVE FOUR SCREWS HOLDING TERMINAL BOARD TO EXPOSE CONNECTIONS ON REAR OF TERMINAL BOARD.
  6. PLACE AND SOLDER FOUR STRAPS FROM TERMINAL BOARD AS FOLLOWS:
    - (A) TERMINAL 22 TO 208A TERMINAL ASSOCIATED WITH R6.
    - (B) TERMINAL 23 TO 208A TERMINAL ASSOCIATED WITH R7.
    - (C) TERMINAL 31 TO TERMINAL 3 OF T2 TRANSFORMER.
    - (D) TERMINAL 32 TO TERMINAL 1 OF T2 TRANSFORMER.
  7. REPLACE TERMINAL BOARD AND SCREWS.
  8. STENCIL COVER "MODIFIED PER SD-69542-01".
2. CONNECT TO J53041D, LI SPEAKERPHONE CONTROL UNIT WITH CABLE SUPPLIED WITH J-SPEC. MOUNT UNITS AS CLOSE TOGETHER AS POSSIBLE, NOT EXCEEDING 4 FT., WITH 55B CONTROL UNIT TO RIGHT OF J53041D, LI UNIT.

Fig. 9—Modification of 55B Control Unit