

## KEY SERVICE UNITS

### 550- AND 551-TYPES

### CONNECTIONS AND MAINTENANCE

#### 1. GENERAL

**1.01** This section covers connections and maintenance information for the 550A and 551A key service units (KSU) used in the 1A2 key telephone system.

**1.02** This section is reissued to:

- Include information on new 400 series KTUs.
- Remove Fig. 7 of Issue 2.

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

**1.03** All wiring is factory placed except:

- Key cables to telephone sets.
- Power wiring when an external supply is used.
- $\pm 105$ -volt ringing supply (when required)

#### 2. CONNECTIONS

##### 66B5-37 CONNECTING BLOCK

**2.01** Connect incoming wire and cable on the 66B5-37 connecting block contained within the package. Use BW-24 type wire when strapping terminals on the block. This type wire is available in three colors. Use red for battery, black for ground, and green for miscellaneous purposes. Use the loop-through method when strapping more than one row of clips together. Refer to section covering 66-type connecting blocks.

**2.02** When the 550A KSU is powered from an external power supply, terminate the power leads on assigned connecting block clips used when self-contained power is furnished (Fig. 1).

**2.03** The  $\pm 105$ -volt ringing supply (if required) must be from an external source, such as a 107-type frequency generator (101G-type power plant) or central office generator pair. Fig. 1 shows the terminating point on the 66B5-37 connecting block where audible signal supply ( $\pm 105$ ,  $\pm 24$ , or  $\pm 18$  volt) is terminated.

**2.04** Ground the KSU with number 14 gauge wire or cable conductors equal in copper to 16 gauge wire (Fig. 1). Grounding should be in accordance with sections covering protector and signaling ground. *Do not bond or strap to third wire in power cord for this ground.*

**2.05** Terminate incoming line (*T* and *R* leads) and connect key and running cables (*T*, *R*, *A*, *A1*, *LG*, and *L* leads) on connecting block as shown in Fig. 2. Terminate the first cable on clip 1, the second cable on clip 2, and so on up to five cables. If more cables are required, use loop-through terminations or provide distribution facilities.

**2.06** Pushbutton and buzzer signaling circuits associated with manual intercom service are connected as required. Vacant connecting block terminals may be used for this purpose, supplemented as necessary with external connecting blocks.

**2.07** Additional features can be furnished to supplement the CO or PBX line circuits or manual intercom circuits of the 550- and 551-type KSUs as follows:

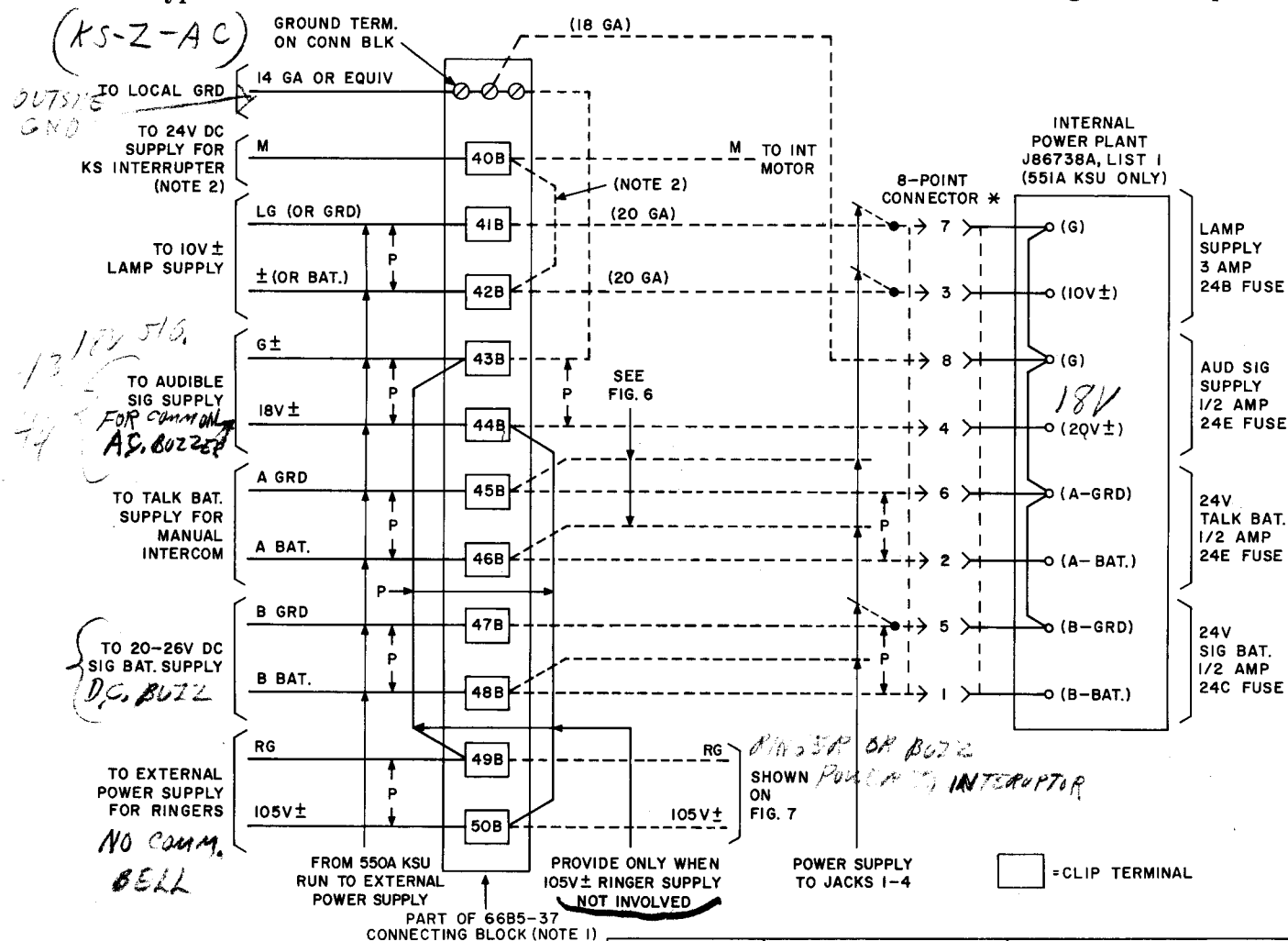
- Diode matrix for common audible ringing.
- Multiline exclusion.
- Supplementary hold.
- Dial intercom with flashing lamp option.

The equipment for these features cannot be contained in the 550- or 551-type KSU and requires supplemental apparatus cabinets or mountings for this type installation. For connections of the

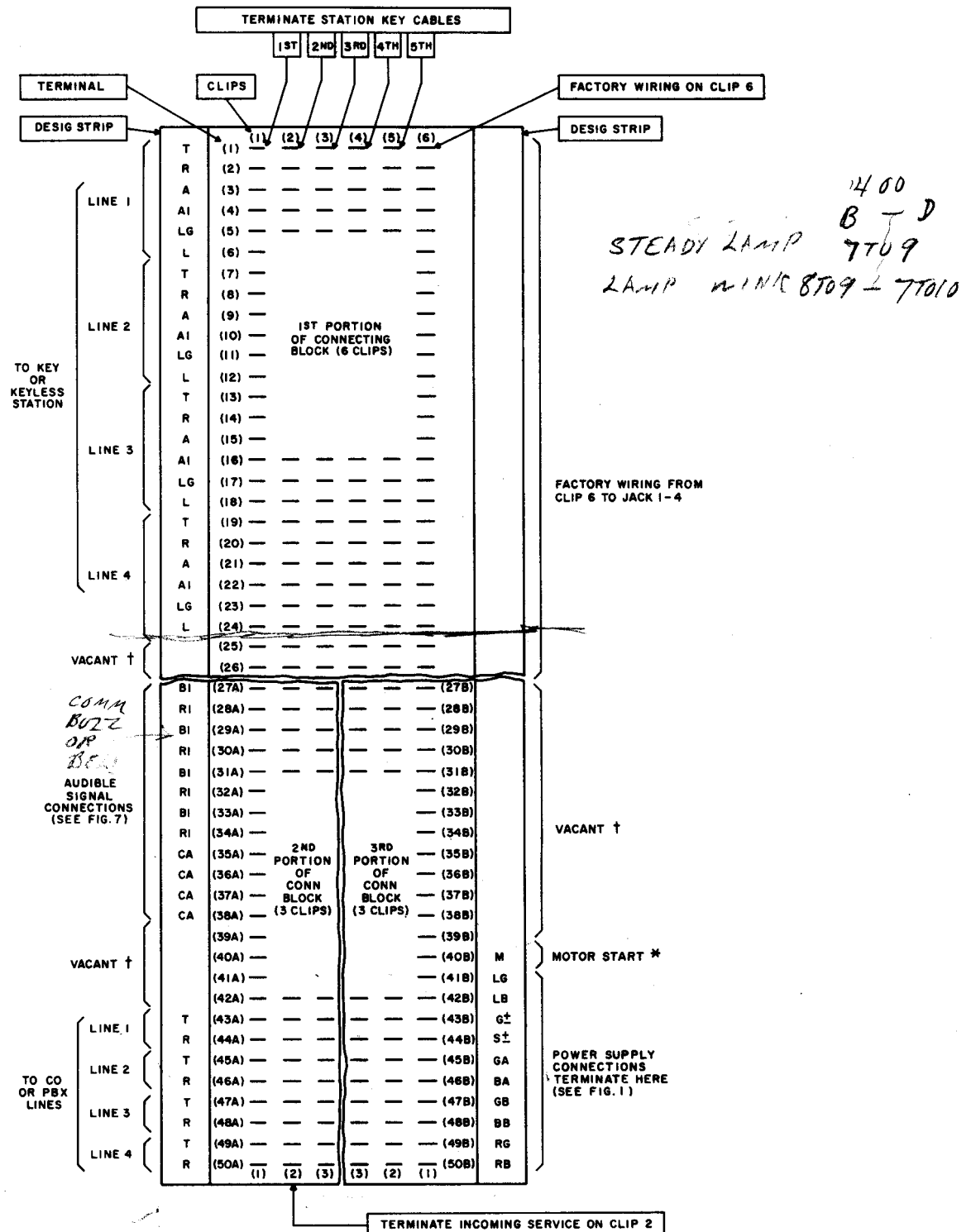
400 series KTUs furnishing the above features, refer to the section for the KTU involved.

**2.08** Fig. 3 and 4 show connections for optional audible signaling arrangements which are obtained by wire strapping connections on the 66B5-37 connecting block and/or the 400 type KTU involved.

**2.09** Fig. 5 is included to explain the abbreviations shown on the designation strip.



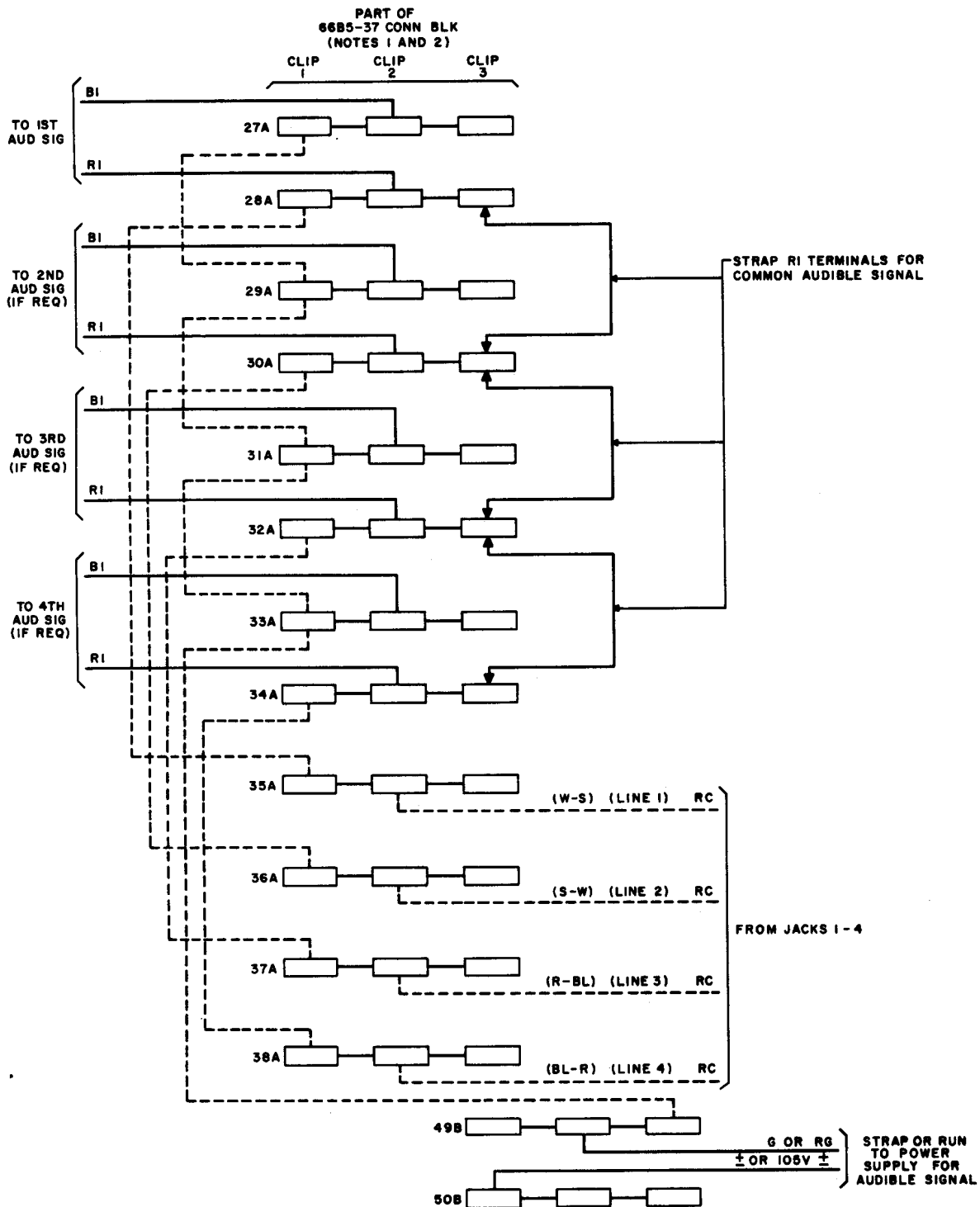
**Fig. 1 — Power Supply Connections**



\* FOR 24V DC OPERATED KS-19385, LI INTERRUPTER (SEE FIG. 1).

† VACANT TERMINALS MAY BE USED FOR BUTTON & BUZZER SIGNALING CIRCUITS ETC., AS REQUIRED.

**Fig. 2 — Connections to 66B5-37 Connecting Block for Incoming Lines and Station Key Cables**



NOTE 1: DOTTED LINES REPRESENT FACTORY WIRING. SOLID LINES REPRESENT WIRES TO BE RUN AS NEEDED.

NOTE 2: THIS ARRANGEMENT IS (T,W) OPTION ON FIG. 7, (T) OPTION REQUIRES A STRAPPING WIRE CHANGE ON 400 TYPE KTU).

Fig. 3 — Connections to Provide Individual or Common Audible Signal

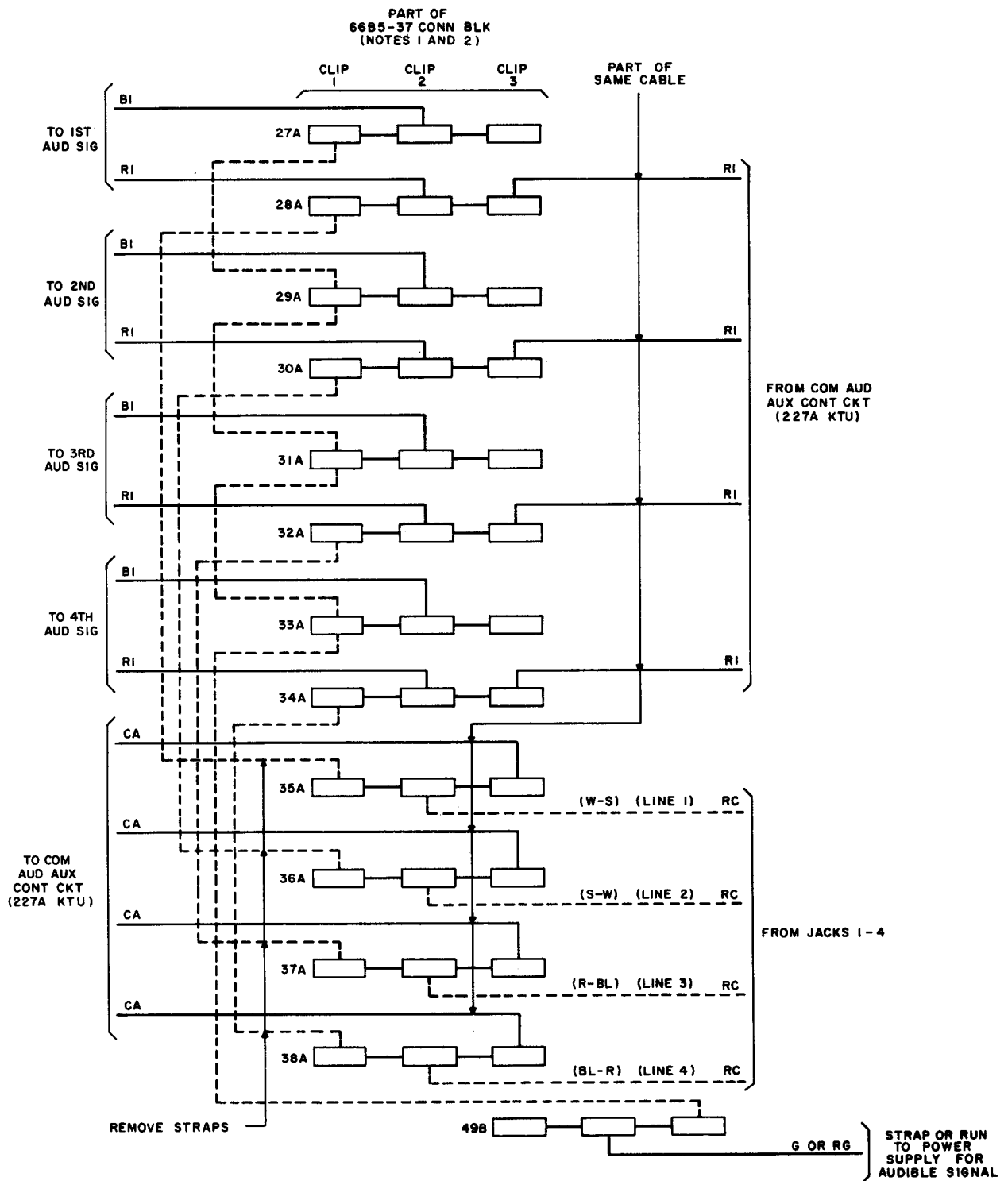


Fig. 4 — Connections To Provide Audible Signal Auxiliary Control

A		DESIGNATION STRIP "A"		B		DESIGNATION STRIP "B"	
T	TIP	}	LINE 1				
R	RING						
A	"A" LEAD						
AI	"AI" LEAD						
LG	LAMP GRD						
L	LAMP LEAD						
T	TIP	}	LINE 2				
R	RING						
A	"A" LEAD						
AI	"AI" LEAD						
LG	LAMP GRD						
L	LAMP LEAD						
T	TIP	}	LINE 3				
R	RING						
A	"A" LEAD						
AI	"AI" LEAD						
LG	LAMP GRD						
L	LAMP LEAD						
T	TIP	}	LINE 4				
R	RING						
A	"A" LEAD						
AI	"AI" LEAD						
LG	LAMP GRD						
L	LAMP LEAD						
BI	BI OR BZI LEAD	}	BELL OR BUZZER LEADS				
RI	RI OR BZ LEAD				FOR LINE 1		
BI	BI OR BZI LEAD	}	FOR LINE 2				
RI	RI OR BZ LEAD						
BI	BI OR BZI LEAD	}	FOR LINE 3				
RI	RI OR BZ LEAD						
BI	BI OR BZI LEAD	}	FOR LINE 4				
RI	RI OR BZ LEAD						
CA	COMMON AUDIBLE CONTROL FOR LINE 1						
CA	COMMON AUDIBLE CONTROL FOR LINE 2						
CA	COMMON AUDIBLE CONTROL FOR LINE 3						
CA	COMMON AUDIBLE CONTROL FOR LINE 4						
T	TIP	}	INCOMING CO OR PBX				
R	RING				LINE 1		
T	TIP	}	LINE 2				
R	RING						
T	TIP	}	LINE 3				
R	RING						
T	TIP	}	LINE 4				
R	RING						
M	MOTOR START						
LG	LAMP GRD						
LB	LAMP BAT.						
G±	GRD						
S±	AUD SIG SUPPLY						
GA	"A" GRD						
BA	"A" BAT.						
GB	B GRD						
BB	B BAT.						
RG	RING GRD						
RB	RING BAT.						

Fig. 5 — Lead Designation Key Sheet for 66B5-37 Connecting Block

**2.10** Factory wired leads for manual intercom line service are terminated at one end on line jacks 1, 2, 3, and 4. If manual intercom service is to be provided in any line jack other than 4, disconnect BR-W pair from terminals 45B and 46B and connect as shown in Fig. 6.

**2.11** Wiring options are made on the 400-type CO or PBX line circuit KTU as shown in Table A. Other wire formed option block terminals should be equipped with phosphor bronze "C" clamps (P48F768) after option straps have been placed or changed. Use only 24-gauge bare wire for option block strapped connections. Place them in option block terminals with long-nose pliers. Fig. 7 shows schematically how the application of wiring options affects audible signaling on incoming calls.



*The 1A2 system 400-type KTU requires 20 volts minimum dc power for reliable relay operation. If external power source is unmodified 101G-type power plant, do not feed other equipment from it if, this minimum voltage limit cannot be met. No more than 20 line lamps should be fed through one 400-type KTU, no more than 50 lamps total should be supplied from one interrupter contact.*

### 3. MAINTENANCE

**3.01** Maintenance activity involving these units should be limited to the following:

- Tracing wiring troubles.
- Fuse replacement as necessary on the 551A KSU.
- Removal and replacement of defective or improperly operating 400-type KTUs.

*Note:* Exercise care when inserting or removing plug-in type key telephone units to avoid damage to the printed wiring and other circuit components.

#### FALSE RINGUP ON 400B KTU

**3.02** False ringup is mainly due to induced 60-cycle potentials from power lines. When the voltage measured on an idle line at the KSU from tip to ground and ring to ground (longitudinal) or tip to ring (transverse) is 12 volts rms or above, false ringup may occur. This condition can be corrected by replacing the 400B KTU with a 400C or D KTU on all lines affected in the system.

*Note:* Measurement readings are subject to variance over a period of time, depending on shifting power line loads, temperature conditions, and climatic (seasonal) changes.

**TABLE A**  
**WIRING OPTIONS**

FEATURE	OPTION	APP OR WRG	STRAP ON 400 A, B, AND C KTU	STRAP ON 400D KTU	PROVIDED BY FACTORY†	LOCATION OF WIRING OPTION
Time-Out Control	Long time delay	*	None	None	No	On each 400-type KTU
	Short time delay	Z	1 to 2	1 to 2	Yes	
Visual Hold Signal	Lamp wink	Y	8 to 9	7 to 10	Yes	
	Lamp steady	X	7 to 9	7 to 9	No	On each 400-type KTU and on 66B5-37 conn block
Audible Signaling	Interrupted ring	W	5 to 6	5 to 8	Yes	
	Com aud control	V	3 to 6	4 to 8	No	
	Steady ring	T	4 to 6	6 to 8	No	

\* Long time delay is effective only when the Z option strap is removed.

† When changing options remove factory or existing option.

**FAILURE TO HOLD****3.03** Failure to hold can be caused by:

- (a) Foreign potentials in the order of 65 to 80 volts 60-cycle ac in the circuit.
- (b) High-resistance power plant ground.
- (c) Key system power plant ground and associated PBX power plant ground not commonly bonded.
- (d) PBX power supply not properly poled.  
Grounding the negative terminal can cause failure to hold.
- (e) If dc voltage measured at 400B or C KTU equipped KSU with tip and ring leads shorted is less than 6 volts dc.

(f) Too many ringers bridged on line. (Limit is one ringing bridge ahead of the 400-type KTU and two behind.)

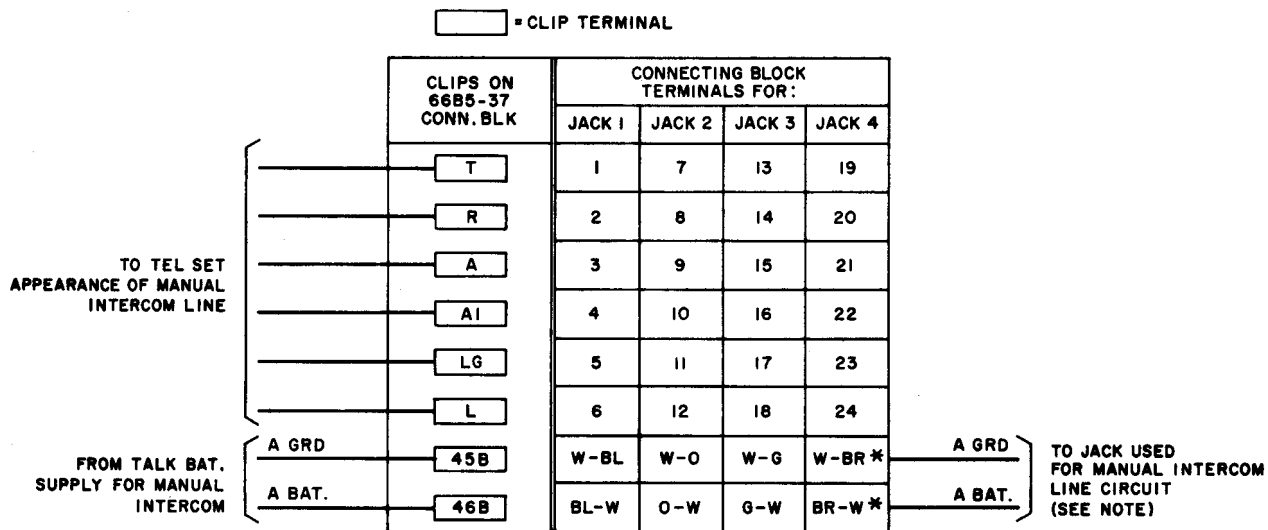
(g) Overloading of power plant, causing dc supply to fall below 20 volts.

(h) No central office or PBX line current.

**ABSORBED, ABBREVIATED, OR MISSING SWITCH HOOK FLASH (400B AND 400C KTU)**

**3.04** Switch hook flash failure (cannot flash operator) is usually caused by the following:

- (a) Station set user holds switch hook plunger down too long, causing switch train to disconnect completely.
- (b) Station set user does not depress the button fully before releasing.



\* FACTORY TERMINATED

**NOTE:**

IF OTHER THAN JACK 4 IS USED TO PROVIDE 401A KTU MANUAL INTERCOM SERVICE, DISCONNECT W-BR, BR-W, PAIR FROM CLIP TERMINALS 45B AND 46B AND RECONNECT APPROPRIATE PAIR (FACTORY DEAD DRESSED IN LOCAL CABLE FORM) FROM JACK 1, 2 OR 3 AS DESIRED.

**Fig. 6 — Connections for Manual Intercom Circuits**

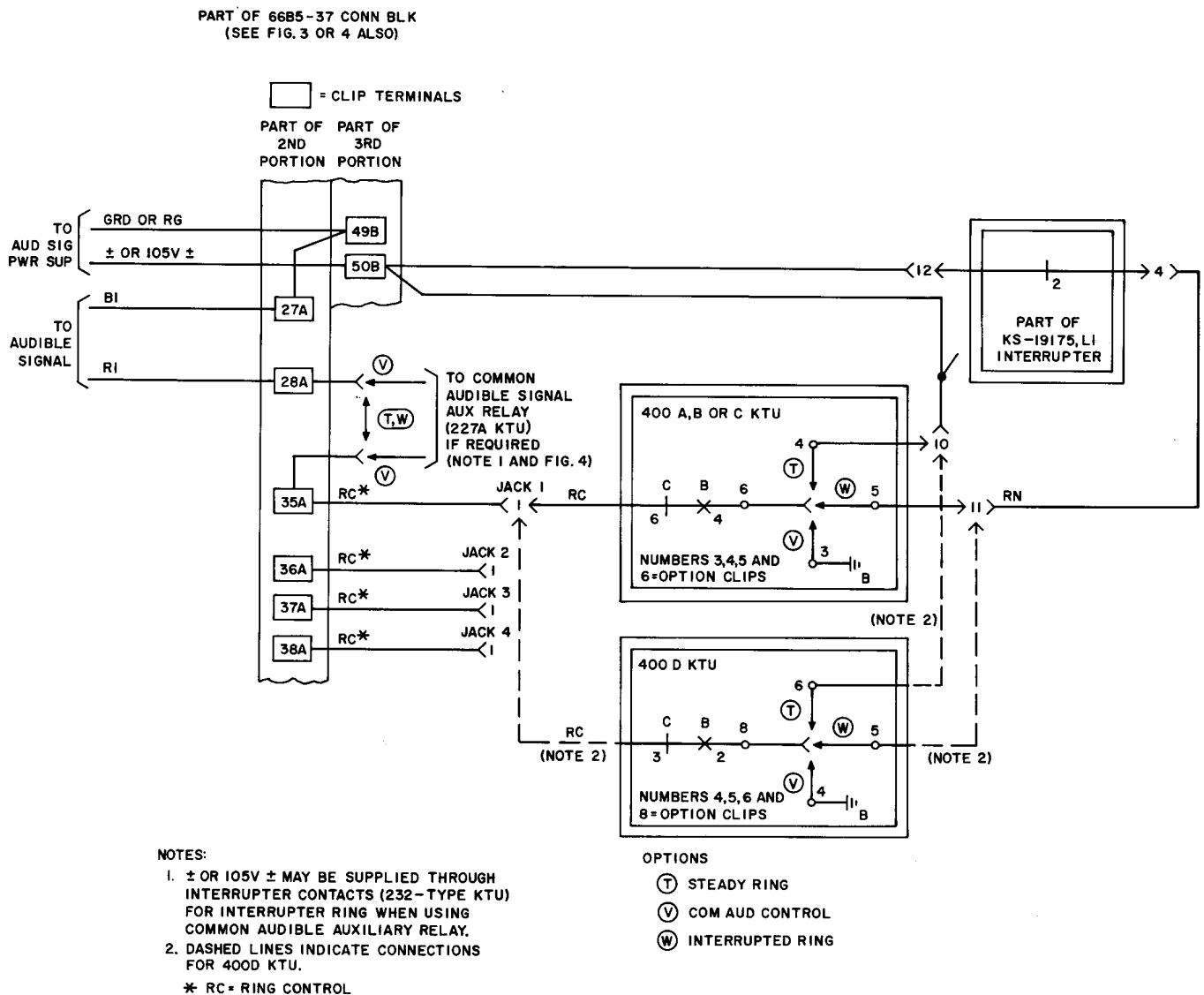


**Note:** In most cases satisfactory performance can be obtained by instructing the customer to: "FIRMLY DEPRESS SWITCH HOOK PLUNGER, THEN RELEASE."

**3.05** On repeat complaint cases replace 400B and/or C KTUs with 400D KTUs as locally directed.

### WIRE-WRAP CONNECTIONS

**3.06** The KS-16492, List 2 unwrapping tool should be used when removing solderless wrapped connections on line jack contacts, if required, for circuit testing. The 635A tool may be used to reterminate a wire on a wrapping terminal but such a connection must be soldered on reconnection for circuit reliability.



**Fig. 7 — Audible Signal Options Showing Possible Arrangements**

## KEY SERVICE UNITS

### 550- AND 551-TYPES

### CONNECTIONS AND MAINTENANCE

#### 1. GENERAL

1.01 This section is reissued to:

- Add information on 550B and 551B key service units.
- Show 550A and 551A key service units MD.

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

#### 2. CONNECTIONS

##### 66B5-37 CONNECTING BLOCK

- 2.01 Refer to Section 461-604-100 for methods of strapping and terminating wire and cable.
- 2.02 Power leads are terminated to same terminals for internally or externally powered KSUs (Fig. 1 or 2).
- 2.03 The  $\pm 105$ -volt ringing supply (if required) must be from an external source, such as 107-type frequency generator (101G-type power plant) or central office generator pair. Fig. 1 or 2 shows the terminating point on the 66B5-27 connecting block where audible signal supply ( $\pm 105$ ,  $\pm 18$  volt or 24 volts dc) is terminated.



*The 1A2 system 400-type KTUs require 20 volts dc power (minimum) signal battery source. If external power source is unmodified 101G-type power plant, do not supply other equipment from it because the voltage will drop below the minimum required for reliable relay operation. No more than 20 line lamps should be supplied through one 400-type KTU; no more than 50 lamps total should be supplied from one interrupter contact.*

2.04 Ground the KSU with a single number 14 gauge wire, or cable conductors equivalent to 14 gauge copper wire. (Fig. 1 or 2). Grounding should be in accordance with the appropriate section in the 460 Plant Series Division. **Do not bond or strap to third wire in power cord for this ground.**

2.05 Terminate incoming line (*T* and *R* leads) and connect key and running cables (*T*, *R*, *A*, *A1*, *LG*, and *L* leads) on connecting block as shown in Fig 3). Terminate the first cable on terminal A, the second cable on terminal B, and so on up to five cables. If more cables are required, use loop-through terminations or provide distribution facilities.

2.06 Pushbutton and buzzer signaling circuits associated with manual intercom service should be connected as required.

2.07 Fig. 4 and 5 show connections for optional audible signaling arrangements which are obtained by strapping terminals on the connecting block.

2.08 Factory wired leads for manual intercom line service are terminated at one end of line jacks 1, 2, 3, and 4 (Fig. 6).

2.09 Fig. 7 is included to explain the abbreviations shown on the designation strip.

#### 3. MAINTENANCE

3.01 Maintenance activity involving these units should be limited to the following:

- Clearing wiring troubles.
- Fuse replacement as necessary on the 551A (MD) or 551B KSU.
- Removal and replacement of defective or improperly operating 400-type KTUs.

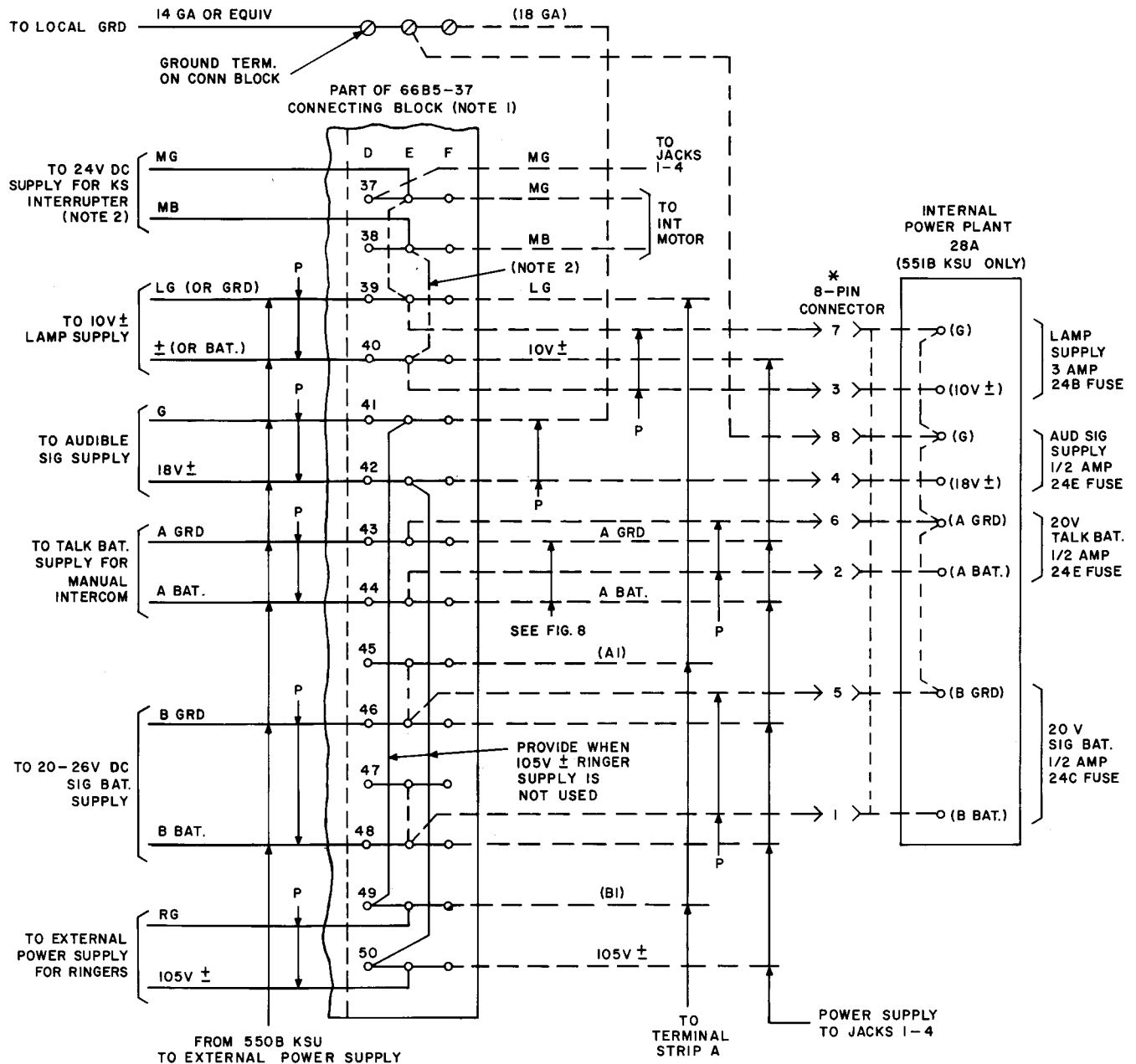
## **SECTION 518-255-401**

**Note:** Exercise care when inserting or removing plug-in type KTUs to avoid damage to the printed wiring and other circuit components. Blister packs should be used when returning KTUs.

connections on line jack contacts, if required, for circuit testing. The 635B tool may be used to reterminate a wire on a wrapping terminal but must be soldered when reconnected to ensure circuit reliability.

### **WIRE-WRAP CONNECTIONS**

- 3.02** The KS-16492, List 2 unwrapping tool should be used when removing solderless wrapped



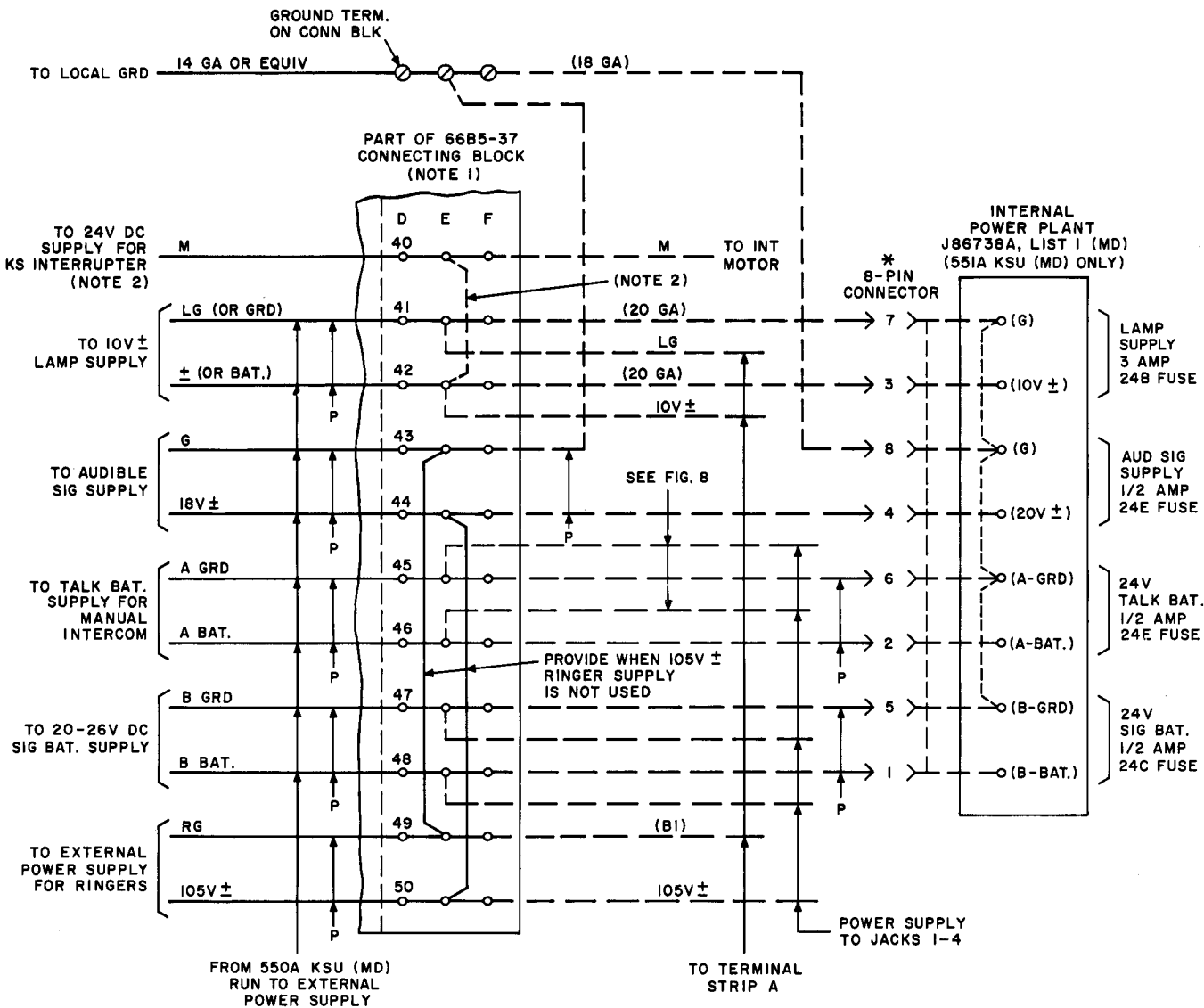
MOTOR SUPPLY	KS-19175, L1	KS-19385, L1 (MD)	KS-19385, L2
10V±	38E (STRAPPED TO 40E)	—	—
GRD	37E (STRAPPED TO 39E)	—	—
24V DC	—	38E (STRAPPED TO 45D)	38E (STRAPPED TO 47F)
GRD	—	37E (STRAPPED TO 47F)	37E (STRAPPED TO 39E)

## NOTES:

- DASHED LINES REPRESENT FACTORY WIRING. SOLID LINES REPRESENT WIRES TO BE RUN AS REQUIRED.
- REMOVE FACTORY STRAPS BETWEEN 37B AND 39B AND 38E AND 40E FOR 24V DC KS INTERRUPTER OPERATION. THE POWER SUPPLY CONNECTIONS FOR EITHER INTERRUPTER MOTOR ARE SHOWN AT LEFT.

\* 8-PIN CONNECTOR AND WIRING TO CONNECTING BLOCK FURNISHED IN BOTH 550B AND 551B KSU.

Fig. 1—Power Supply Connections for 550B and 551B KSU



- NOTES:
1. DASHED LINES REPRESENT FACTORY WIRING. SOLID LINES REPRESENT WIRES TO BE RUN AS REQUIRED.
  2. REMOVE FACTORY STRAP BETWEEN 40F AND 42F FOR 24V DC KS INTERRUPTER OPERATION. THE POWER SUPPLY CONNECTIONS FOR EITHER INTERRUPTER MOTOR ARE SHOWN AT RIGHT.

\* 8-PIN CONNECTOR AND WIRING TO CONNECTING BLOCK FURNISHED IN BOTH 550A (MD) AND 551A KSU (MD).

MOTOR SUPPLY	KS-19175, L1	KS-19385, L1 (MD)	KS-19385, L2
10V±	42F (STRAPPED TO 40F)	—	—
GRD	41E	—	—
24V DC	—	47F (STRAPPED TO 40F)	48F (STRAPPED TO 40F)
GRD	—	41E	41E

Fig. 2—Power Supply Connections for 550A(MD) and 551A (MD) KSU

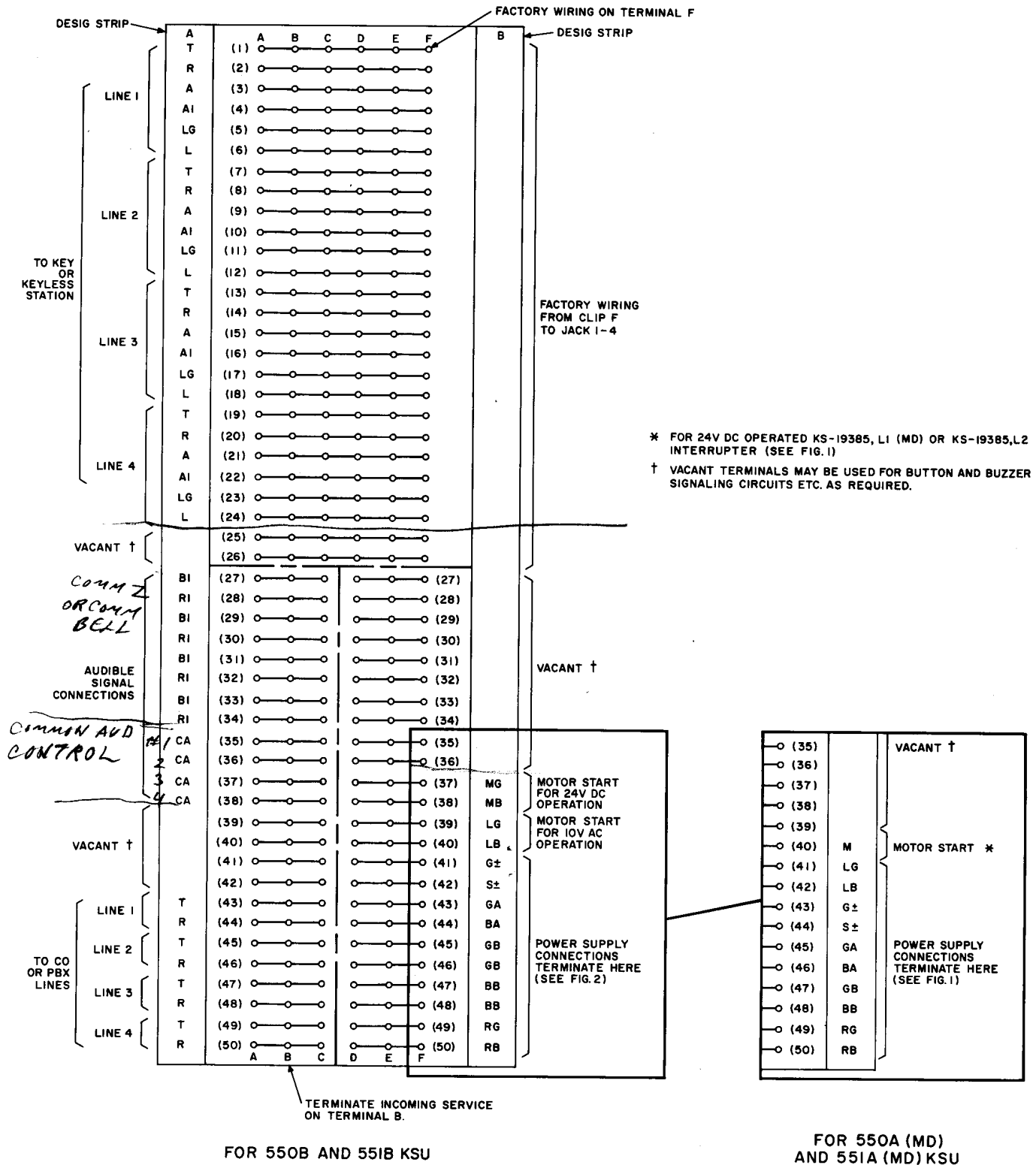


Fig. 3—Connections to 66B5-37 Connecting Block for Incoming Lines and Station Key Cables

PART OF 66B5-37 CONNECTOR BLOCK

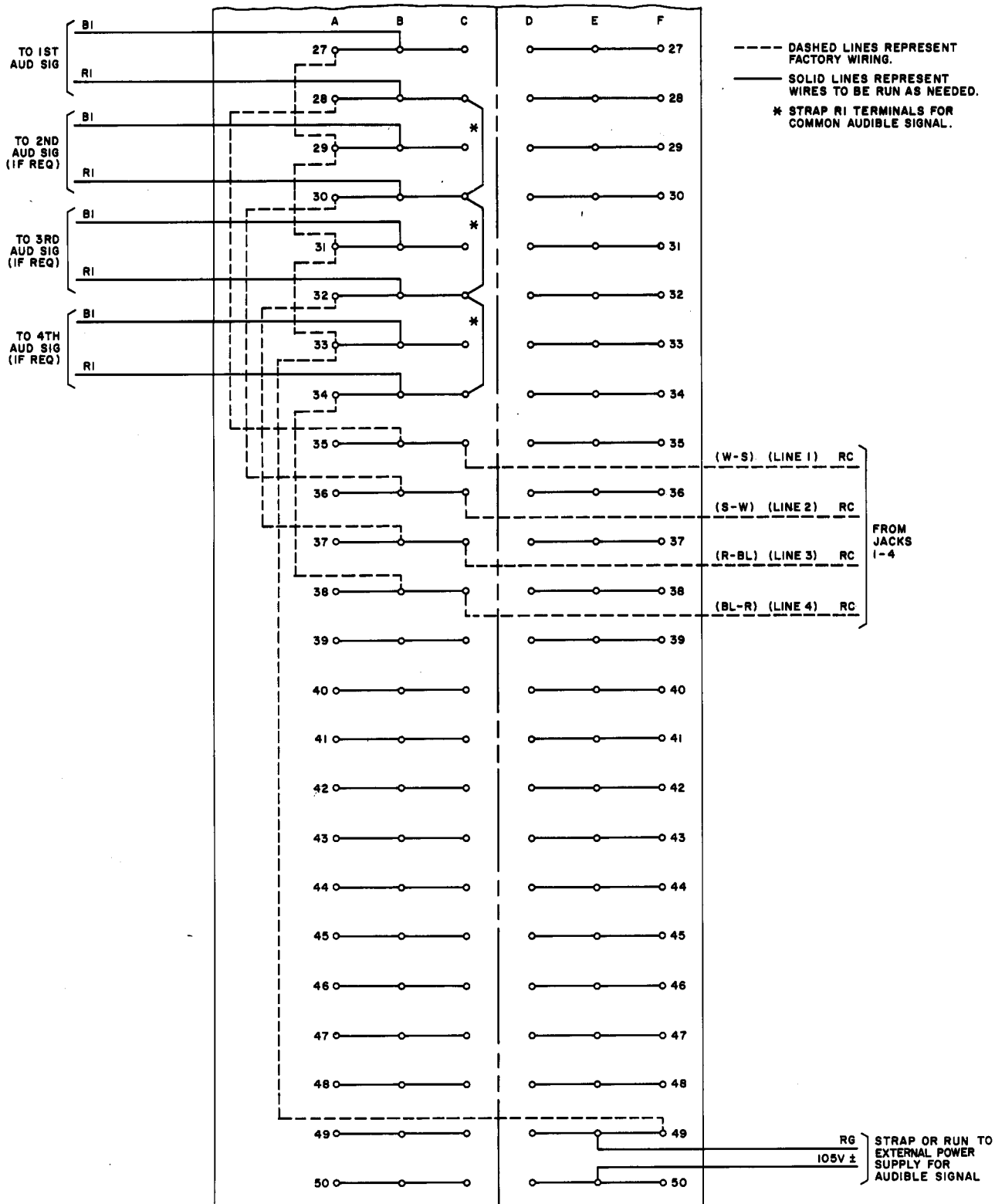


Fig. 4—Connections to Provide Individual or Common Audible Control

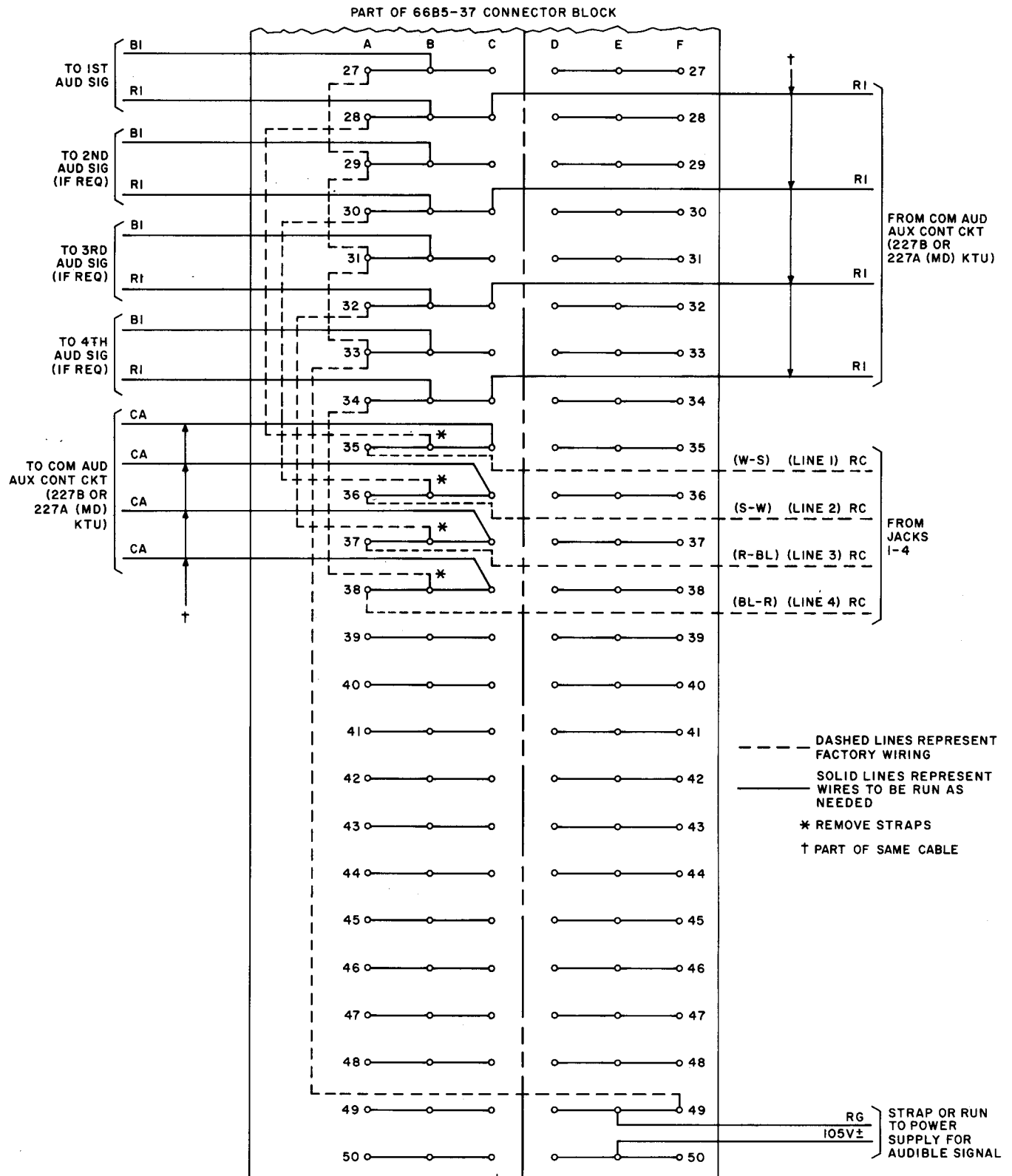
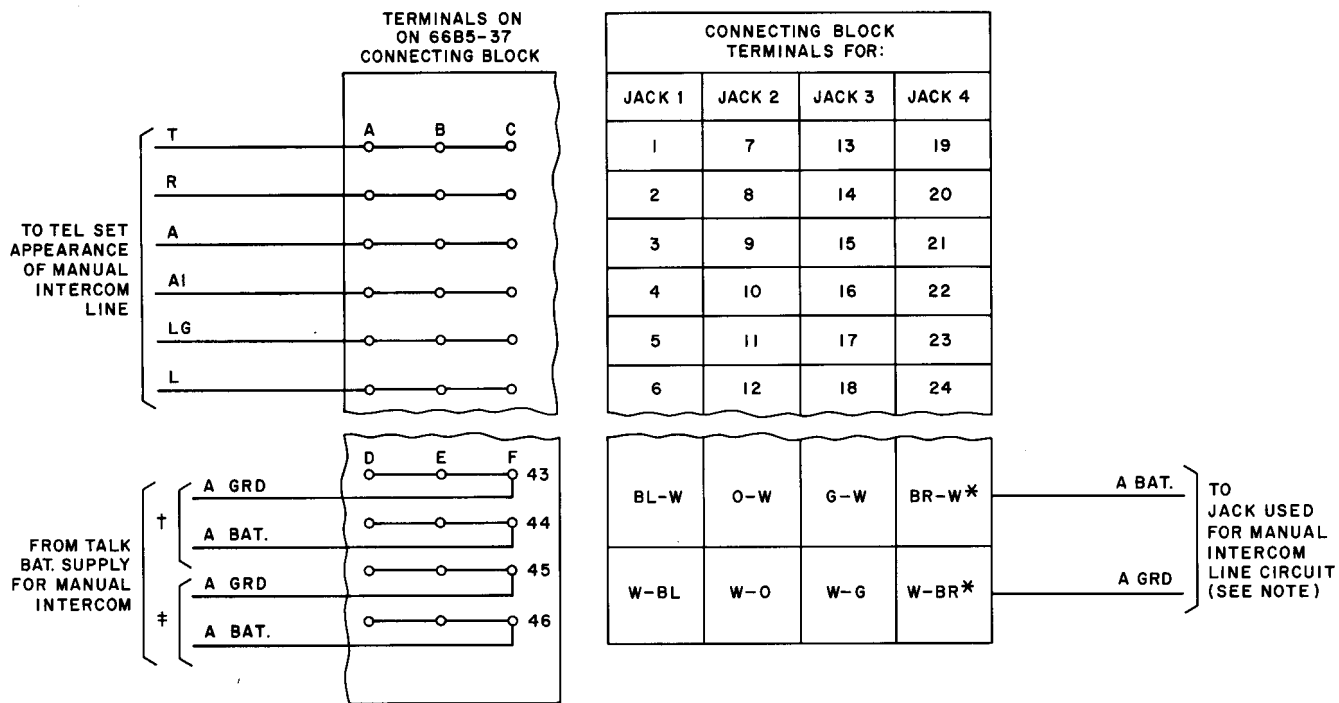


Fig. 5—Connections to Provide Audible Signal Auxiliary Control



**NOTE:**

IF OTHER THAN JACK 4 IS USED TO PROVIDE 401A KTU MANUAL INTERCOM SERVICE, DISCONNECT W-BR, BR-W, PAIR FROM TERMINALS AND RECONNECT APPROPRIATE PAIR (FACTORY DEAD DRESSED IN LOCAL CABLE FORM) FROM JACK 1, 2, OR 3 AS DESIRED.

\* FACTORY TERMINATED

† FOR 551B KSU

‡ FOR 551A KSU (MD)

**Fig. 6—Connections for Manual Intercom Circuits**

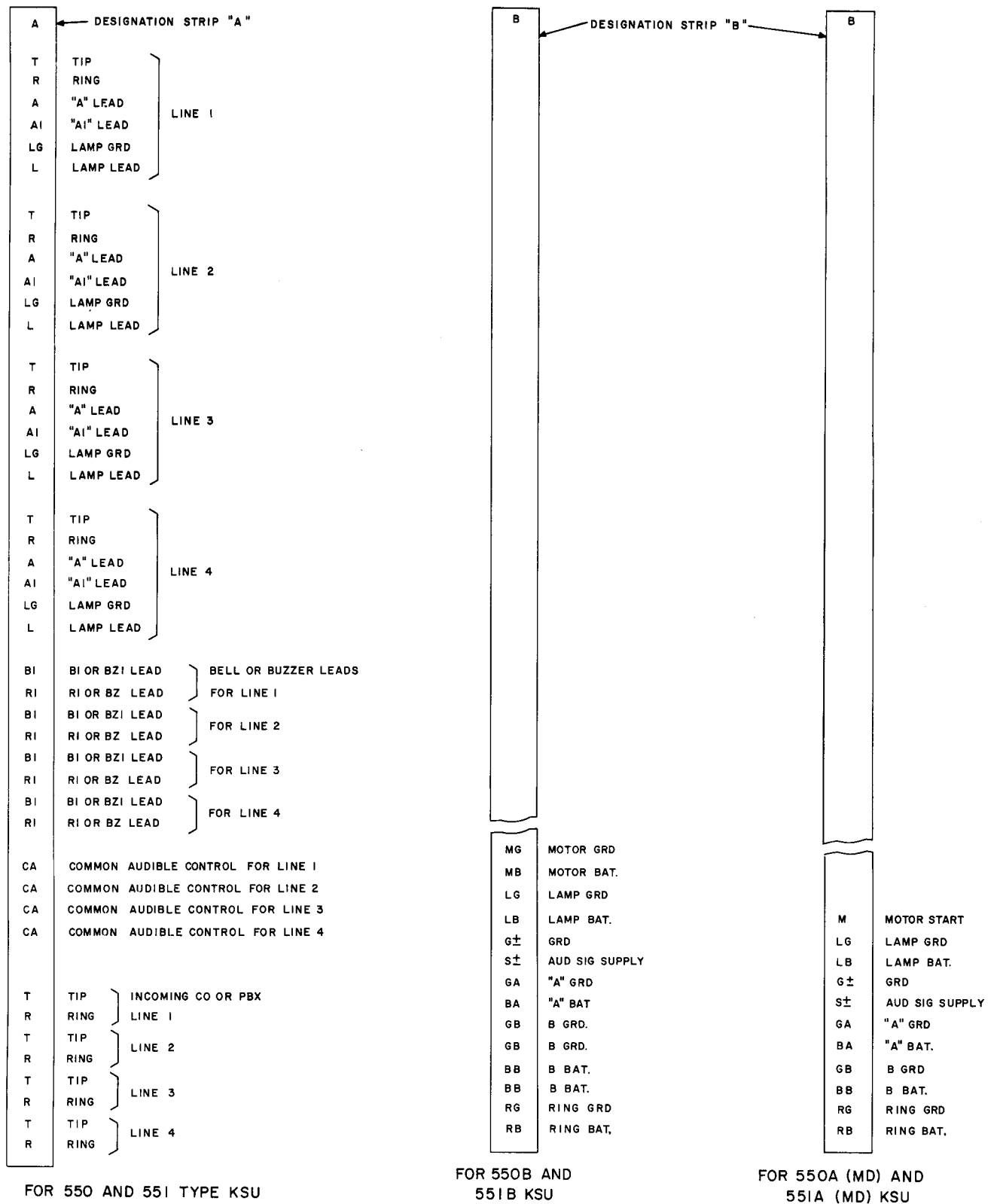


Fig. 7—Lead Designation Key Sheet for 66B5-37 Connecting Block