

## HANDS-FREE ANSWERING ON INTERCOM

### 1A1, 1A2, 6A AND 6B KEY TELEPHONE SYSTEMS

#### 1. GENERAL

**1.01** This section provides information on the station adjuncts (Fig. 1) used in 1A1, 1A2, 6A and 6B KTSs to provide Hands-Free Answering on Intercom (HFAI).

**1.02** This section is reissued to:

- Add information on the 6B KTS
- Add additional information on the station adjuncts (paragraphs 2.04 and 3.03)
- Add Note to Table A
- Revise Table B
- Revise Fig. 3, 4, and 5
- Add Fig. 6.

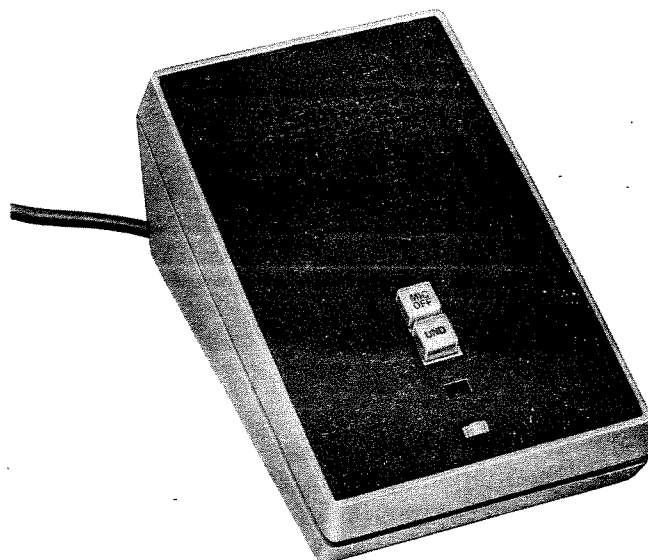
**1.03** The HFAI feature is an intercom feature and is not to be connected to CO/PBX lines. The adjuncts are activated by incoming calls only and cannot be used to originate outgoing calls.

#### 2. DESCRIPTION

**2.01** Addition of the HFAI feature requires the installation of an adjunct at the station location as follows:

- HFAI on manual intercom or one intercom path—2A transmitter-receiver
- HFAI on button-per-path intercom—2B transmitter-receiver.

If HFAI is installed at a 1- or 2-link 6A KTS station, a 276A adapter must be wired between the KTS equipment and the adjunct on a one-per-adjunct basis.



A. 2A TRANSMITTER-RECEIVER (SINGLE-PATH)



B. 2B TRANSMITTER-RECEIVER (THREE-PATH)

**Fig. 1—2-Type Transmitter-Receiver**

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"Bell" and the Bell symbol, with the exceptions as set  
forth in that Order. Pursuant thereto, any reference to  
"BELL" and/or the BELL symbol in this document is here-  
by deleted and "expunged".

**2.02** The 2A transmitter-receiver permits a calling station to tone-signal another intercom station through the loudspeaker in the adjunct. If the called station does not want to receive incoming calls, depressing the do-not-disturb (DND) button will block turn-on of the adjunct and will furnish a DND tone to both parties. If the DND button is not depressed, the called party can answer without going off-hook. Conversation from the called station can also be blocked by depressing the MIKE-OFF button without affecting the incoming speech. A light emitting diode (LED) is provided to indicate when the microphone is turned on. If desired, the called station may depress the button on the key telephone set associated with the intercom and go off-hook; conversation is then through the handsets.

**2.03** The 3-path adjunct (2B transmitter-receiver) operates in a similar manner but, in addition, is equipped with LEDs which indicate the intercom path the station is being called on. The called station can depress the associated pickup button on the key telephone set and go off-hook to use the handset. The path indicating LEDs will stay lit as long as the calling party is off-hook.

**2.04** ♦The speech circuit of the transmitter-receiver adjunct contains a transmit channel (consisting of a microphone, an amplifier, and a voice-operated switch), a receive channel (consisting of a voice-operated switch, an amplifier, and a loudspeaker), and a control circuit which activates the transmit and receive voice-operated switches. The control circuit continuously compares the speech energy present in both the transmit and receive channels to determine which direction of transmission should be enabled in much the same manner as an ordinary speakerphone. That is, when the speech energy in the receive channel is greater than in the transmit channel, the control circuit activates the voice-operated switches to reduce the gain of the transmit channel and to increase the gain of the receive channel. When the speech energy in both channels is below the switching threshold, the voice-operated switches are automatically conditioned in the transmit mode (transmit channel at maximum gain and receive channel at maximum gain). For a more detailed description of the speech circuit, refer to drawings SD-69947-01 (2A transmitter-receiver) and SD-69948-01 (2B transmitter-receiver).♦

**2.05** No modification of the intercom system is required in the 1A1, 1A2, or selector-only

6A KTSs for the addition of the adjuncts. The potential on the R lead (VS lead) from the intercom selector can be  $\pm 10V$ ,  $-24V$ , or  $\pm 105V$ .

**2.06** If the adjuncts are added to a 1- or 2-link 6A KTS, a 276A adapter must be added for each adjunct (Fig. 5). ♦When the 2A transmitter-receiver is used with the DIALOG\* intercom system (6B KTS), wire as shown in Section 518-411-100.♦

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**2.07** The adjuncts are equipped with a volume control for adjusting the loudspeaker level.

**2.08** ♦The 2A transmitter-receiver is compatible with the following intercoms:

401A KTU—Manual Intercom (Section 518-215-402)

407, 424 KTUs—Selector Only (Section 518-215-402)

6B Dialog—Multilink Intercom (Section 518-411-100)

6A Key Telephone System† (Section 518-114-431).

† Requires a 276A adapter per adjunct.

**2.09** The 2B transmitter-receiver is compatible with the button-per-path intercom (Section 518-114-431) and multiple selectors when flashing lamps are provided.♦

#### ORDERING GUIDE

- Transmitter-Receiver, 2A‡—single-path HFAI
- Transmitter-Receiver, 2B‡—button-per-path HFAI
- Block, Connecting, 66E8-25 ♦or F76BA0089A♦  
—order one for each location where adjunct cord cannot be brought into telephone set (see **Note**)

**Note:** If station is already wired using 66E3-25, a 66E8-25 may not be required. ♦The 66E8-25 gives access to all 50 wires in a 25-pair cable while allowing further extension of the cable. See Section 461-604-103.♦

- Adapter, 276A—order one for each adjunct installed in a 1- or 2-link 6A KTS.

‡Refer to Table A for color information.

### 3. INSTALLATION

**3.01** An adjunct must be installed at each station to be furnished with the HFAI feature. The adjunct can be wired by any of the methods outlined in paragraphs 3.04, 3.05, or 3.06.

**3.02** The microphone in the 2A and 2B transmitter-receiver is located on the bottom of the base. To assure maximum pickup, the adjunct should not be placed on a surface that would obstruct the mike.

**3.03** ♦As previously stated in paragraph 2.04, the 2A and 2B transmitter-receivers contain voice-operated switches that are activated by a control circuit which compares the speech energy present in the transmit and receive channels, permitting only one-way speech transmission by selecting the channel with the highest speech energy. It is important, for this reason, to install the 2-type receivers in a location that is absent from noise interference sources such as typewriters, air conditioners, radios, etc. Sound energy from such sources will be picked up by the microphone and will increase the level of incoming speech that is required to activate the voice-operated switches and enable the receive channel. Symptoms of

excessive noise will vary from occasional clipping of words and syllables for lower levels of interference to complete loss of inward transmission for noisy locations. Locations with interfering noise sources at sound pressure levels comparable to average conversational speech levels (or higher) will seriously degrade the performance of the transmitter-receivers and should be avoided.♦

**3.04** In installations where all the leads are available on screw terminals such as in a 6-button key telephone set, the mounting cord from the adjunct can be terminated directly in the set (Fig. 3). The leads from the 2012B transformer, if used, can also be brought into the set using spare terminals or D-161488 connectors.

**3.05** Where it is not desired to terminate the cords in the set, or where the required leads are not accessible such as in 10- and 20-button sets or CALL DIRECTOR® sets, a 66E8-25 connecting block must be used. In 20-button and CALL DIRECTOR sets, all intercom circuits should appear on the same key so that all leads can be found in one plug of the mounting cord and connector cable. Figure 4 shows connections for the single-path adjuncts using a 66E8 connecting block; Table B, Fig. 5 and 6 show the 3-path adjunct connections. Install the 66E8-25 connecting block as follows:

- (a) Mount block in a location which provides access to the connection between the mounting cord and connector cable.

TABLE A  
COLOR SELECTION

TRANSMITTER-RECEIVER			FACEPLATE		
CODE	COLOR	SUFFIX	CODE	COLOR	SUFFIX
2A	Black	—03	73A	Charcoal	—70
	Moss Green	—51		Light Green	—71
	White	—58		Light Gray	—73
	Light Beige	—60		Muted Beige	—75
2B	Black	—03	73B	Charcoal	—70
	Moss Green	—51		Light Green	—71
	White	—58		Light Gray	—73
	Light Beige	—60		Muted Beige	—75

**Note:** The 2-type transmitter-receiver will be shipped with color-coordinated faceplates. Cords will be satin-silver (-87) only.

(b) Break the mounting cord-connector cable connection and plug the cord and cable into the proper legs on connecting block (Fig. 2B).

(c) Terminate adjunct mounting cord leads on connecting block using 161A adapters. Power leads are terminated on screw terminals AC1 and AC2.

(d) Terminate inside wire from transformer on AC1 and AC2.

**3.06** If the station is fed by inside wiring cable terminated in a 66E3-25 connecting block, the proper leads can be accessed on the connecting block using 161A adapters.

**3.07** Figure 3 and 4 assume the intercom circuit is on the last button of a 6-button set. If intercom appears on another button, the T, R, A, L and LG leads must be connected to the leads associated with the proper button. In a like manner, Table B assumes the intercom circuits are on the last three buttons of the set. If they appear elsewhere, the adjunct cord will have to be wired to the proper leads.

**3.08** The HFAI adjuncts are signaled over the R lead of the selector ♦or the buzzer lead of the manual intercom to the VS lead of the adjunct.♦ Signaling for the adjuncts must be separate from any other audible arrangements at the station. Buzzers or ringers cannot be connected on intercom at stations having an adjunct. This will require a separate lead to be used for intercom signaling if the station is also wired for common audible. The potential on the signaling lead from the selector can be  $\pm 10V$ ,  $-24V$ , or  $\pm 105V$ .

**3.09** At 1- and 2-link 6A KTS installations, a 276A adapter is required for each adjunct installed. Install the adapter at a location permitting access to the required station and KTS leads, and wire as shown in Fig. 5.

**3.10** Power for the adjuncts can be derived either from a 2012B transformer or from the  $-24V$  supply in the KTS. If a 2012B transformer is used, the wiring is brought into the set or connecting block. Power from the KTS requires a spare cable conductor which is connected to either the AC1 or AC2 lead.

**3.11** Do not power more than one adjunct from a 2012B transformer. If power is derived from the KTS, the drain should be figured on the basis of 90 milliamperes for each adjunct.

## 4. OPERATION

### A. 2A Transmitter-Receiver

**4.01** Operation of the single-path adjunct is as follows:

(a) The calling party dials the proper intercom code for the adjunct-equipped station.

(b) When dialing is complete, the microphone in the adjunct is turned on, as indicated by the MIKE-ON LED, and a single 1/2-second tone burst is heard by both parties.

**Note:** If the called party does not want to receive incoming calls on the intercom, the DND button must be depressed. With the DND depressed, both parties will hear a double tone burst when the station is called. To allow incoming calls, the DND button must be depressed again, releasing it.

(c) After hearing the single-tone burst, the calling station can voice-signal the called station. The called station may answer via the microphone in the adjunct.

(d) If the called party does not want local conversation or noise to be heard, the MIKE-OFF button must be depressed, at which time the LED will turn off. The called party may return to HFAI by releasing the MIKE-OFF button.

(e) If desired, the called station may also depress the pickup button associated with the intercom and go off-hook for 2-way conversation using the handset. Once the called station goes off-hook, the HFAI feature is canceled for that call.

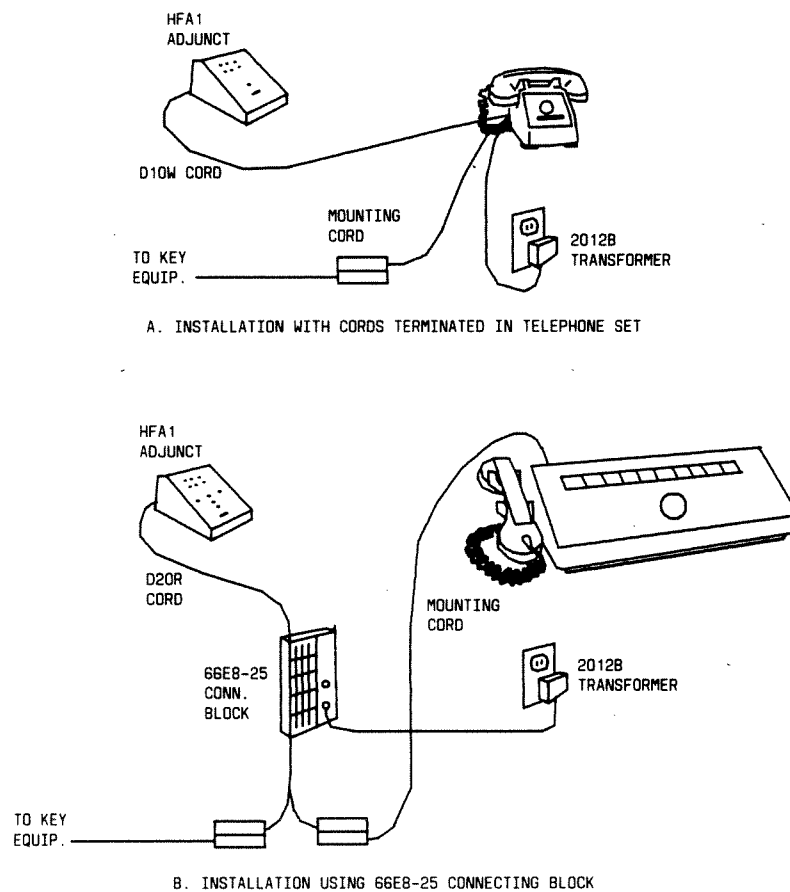
**4.02** ♦For operation of the 2A transmitter-receiver with the 6B KTS, refer to Section 518-411-100.♦

**B. 2B Transmitter-Receiver****4.03** Operation of the 3-path adjunct is as follows:

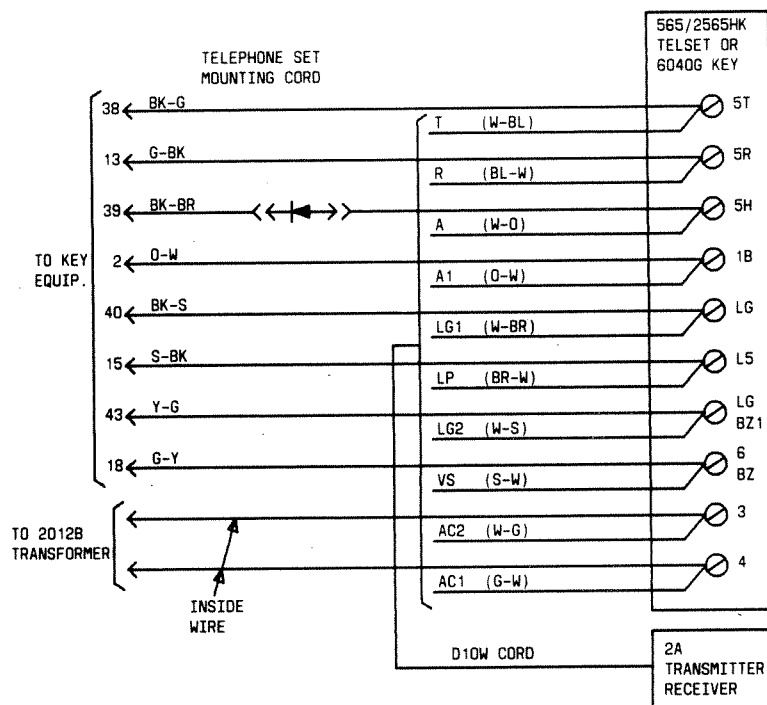
- (a) Calling and DND are the same as for single path.
- (b) Upon completion of dialing, the MIKE-ON LED and the LED associated with the

incoming intercom path are turned on and the single tone burst is heard at both stations.

- (c) The balance of operation is the same as for single-path HFAI, except if called station wishes to converse over telephone, the intercom pickup button associated with lit LED must be depressed and the station go off-hook.



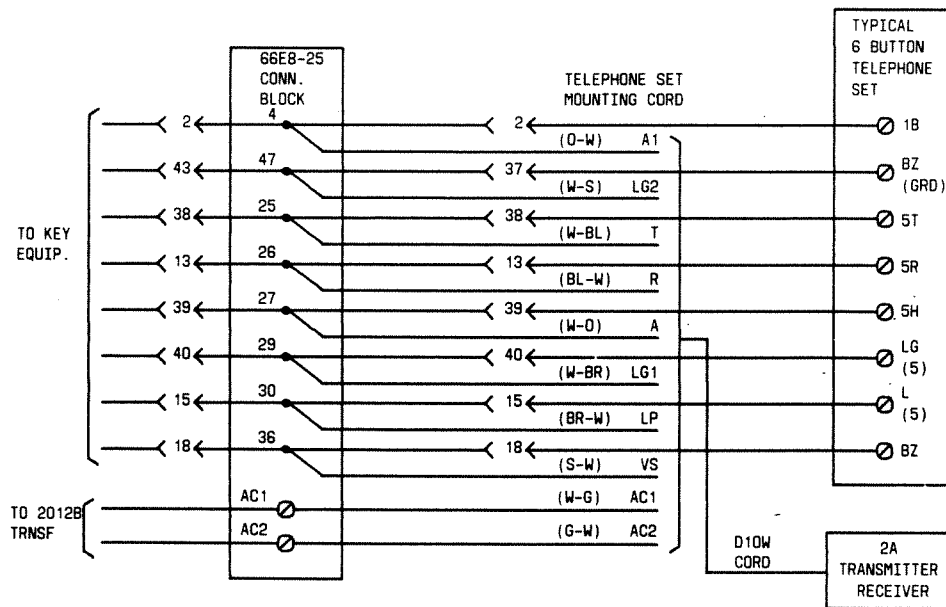
**Fig. 2—Typical Installations—HFAI Adjuncts**



## NOTES:

1. CONNECTIONS SHOWN ARE FOR INTERCOM ON THE 5TH PICKUP BUTTON. IF INTERCOM APPEARS ON ANOTHER BUTTON, THE T, R, A, LG1 AND LP LEADS MUST BE CONNECTED TO PROPER TERMINALS.
2. AUDIBLE SIGNAL IN SET CANNOT BE CONNECTED ON INTERCOM AT STATION HAVING VS-HFA1 ADJUNCT. CONNECTION SHOWN USE BUZZER LEAD AS VS LEAD. DISCONNECT BUZZER LEADS IN SET.
3. 2012B TRANSFORMER IS SHOWN CONNECTED TO SPARE TERMINALS 3 AND 4. IF THESE TERMINALS ARE IN USE, USE ANY SPARE TERMINALS OR D-161488 CONNECTORS.
4. IF POWER IS OBTAINED FROM KEY SYSTEM (-24B) USE ONE SPARE LEAD FROM KTS AND CONNECT TO EITHER AC1 OR AC2.
5. A DIODE IS NEEDED IN SERIES WITH THE A LEAD WHEN THE ADJUNCT IS USED WITH MANUAL INTERCOMS. CONNECTIONS FOR DIODE (456F-OR EQUIVALENT) MAY BE MADE BY INSERTING DIODE IN SERIES WITH THE A LEAD BY USING A SPARE TERMINAL IN TEL SET. (E.G. - CONNECT DIODE FROM 5H TO TERMINAL 2. MOVE BK-BR WIRE FROM 5H TO TERMINAL 2.

Fig. 3—Connections for 2A Transmitter-Receiver in Manual or Single Path Intercoms, With Cord Terminated in Telephone Set



## NOTES:

1. CONNECTIONS SHOWN ARE FOR INTERCOM ON 5TH PICKUP BUTTON. IF INTERCOM APPEARS ON ANOTHER BUTTON, T, R, A, LG1 AND LP LEADS MUST BE CONNECTED TO PROPER TERMINALS.
2. USE 161A ADAPTERS TO TERMINATE D10W CORD IN 66E8-25 CONNECTING BLOCK
3. AUDIBLE SIGNAL IN SET CANNOT BE CONNECTED ON INTERCOM AT STATION HAVING VS-HFA1 ADJUNCT. CONNECTIONS SHOWN USE BUZZER LEAD AS VS LEAD. DISCONNECT BUZZER LEADS IN SET.
4. 2012B TRANSFORMER IS SHOWN CONNECTED TO SPARE TERMINALS 3 AND 4. IF THESE TERMINALS ARE IN USE, USE ANY SPARE TERMINALS OR D-161488 CONNECTORS.
5. IF POWER IS OBTAINED FROM KEY SYSTEM (-24B), USE ONE SPARE LEAD FROM KTS AND CONNECT TO EITHER AC1 OR AC2.

**Fig. 4—Connections for 2A Transmitter-Receiver in Manual or Single Path Intercoms, Using 66E8-25 Connecting Block**

**TABLE B**  
**CONNECTIONS FOR 2B TRANSMITTER-RECEIVER**

TYPICAL TEL SET DESIGNATIONS	D20R CORD TERMINAL ON 66E8 CONN BLOCK (NOTE 3)				
	LEAD DESIG	COLOR	830/2830 TEL SET	831/2831 TEL SET	"CALL DIRECTOR®" TEL SET (NOTE 1)
TIP (1st intercom line)	T1	R-O	37	37	19
RING (1st intercom line)	R1	O-R	38	38	20
A LEAD (1st intercom line)	AH1	R-G	22	22	21
LAMP (1st intercom line)	LP1	BR-R	42	42	24
TIP (2nd intercom line)	T2	R-S	43	43	25
RING (2nd intercom line)	R2	S-R	44	44	26
A LEAD (2nd intercom line)	AH2	R-BL	16	16	27
LAMP (2nd intercom line)	LP2	W-O	48	48	30
TIP (3rd intercom line)	T3	W-BL	49	49	31
RING (3rd intercom line)	R3	BL-W	50	50	32
A LEAD (3rd intercom line)	AH3	W-BR	10	10	33
LAMP (3rd intercom line)	LP3	S-W	46	46	36
LAMP GRD (Note 2)	LG	W-S	41	41	17
A1 GRD (Note 4)	A1	O-W	4	5	5
BUZZER (BZ)	VS	G-R	34	34	34
	AC1	G-W	AC1	AC1	AC1
	AC2	W-G	AC2	AC2	AC2
	SPARE	R-BR	*	*	*
	SPARE	BL-R	*	*	*
	SPARE	BR-W	*	*	*

**Note 1:** Adjuncts cannot be used with concentrator-type CALL DIRECTORS. Connections shown are for intercom on the last three buttons of the key.

**Note 2:** LAMP GRD can be connected to any LG associated with intercom. Connections shown have LG associated with 1st intercom line.

**Note 3:** Intercom appearance for the 830/2830 is on the last three buttons. For the 831/2831, the intercom appears on the last three buttons of the first binder (Blue).

**Note 4:** If A1 GRD is not available in the binder the intercom appears in, the A1 lead of the adjunct may be tied to a second LG lead associated with the intercom.

\*Insulate and store.



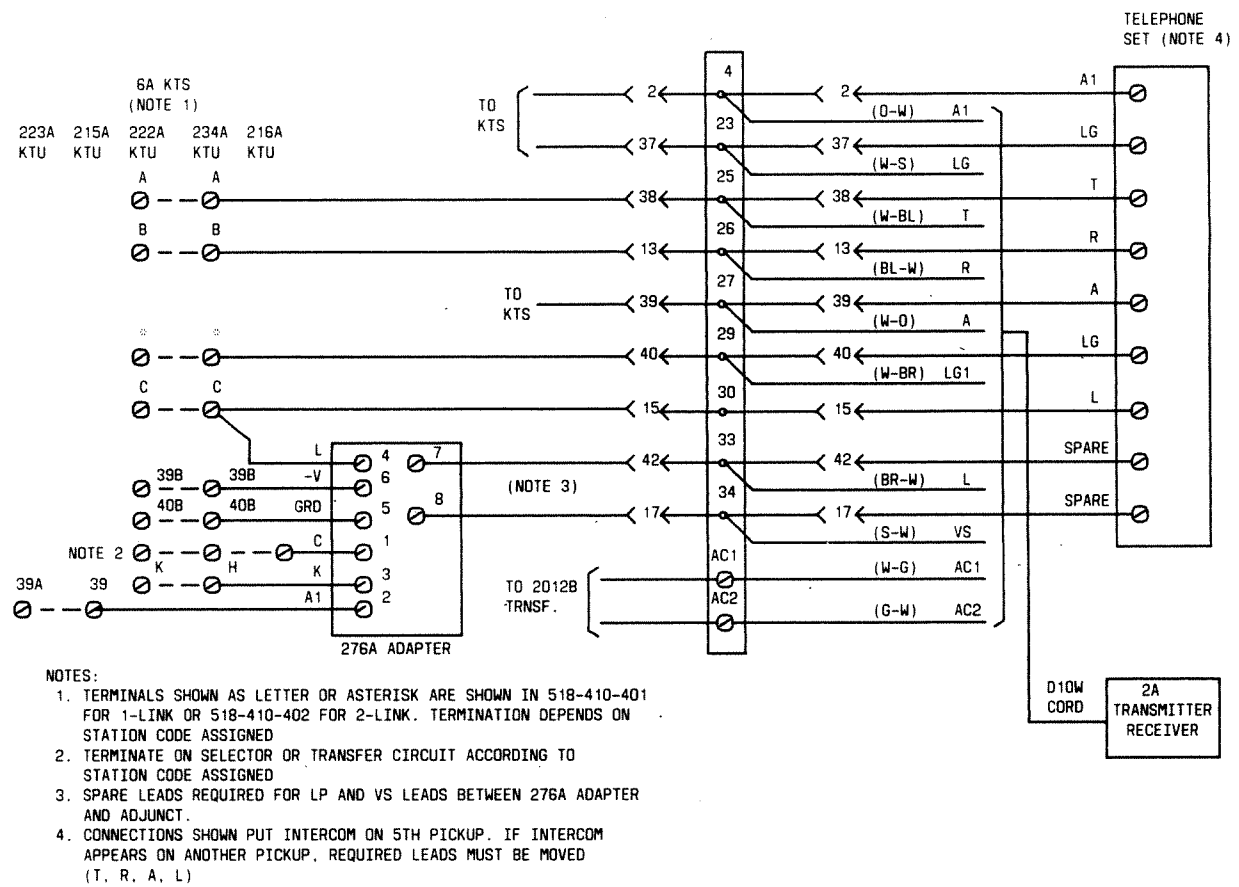
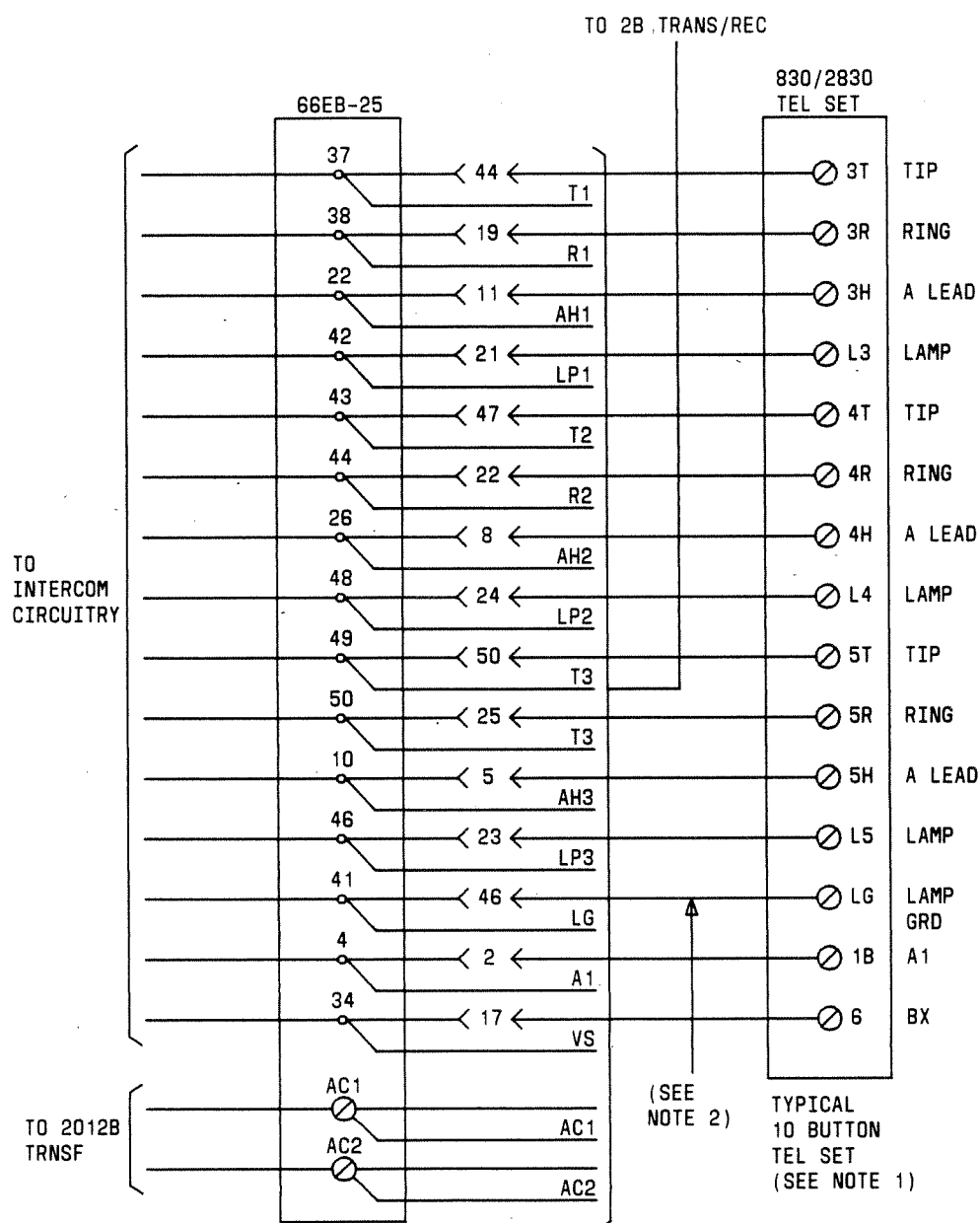


Fig. 5—Adjunct Connections in 6A Key Telephone System



## NOTES:

1. CONNECTIONS SHOWN ARE FOR INTERCOM APPEARANCE ON THE LAST 3 BUTTONS.
2. LG LEAD CAN BE CONNECTED TO ANY LG ASSOCIATED WITH THE INTERCOM. CONNECTIONS SHOWN HAVE THE LG LEAD OF THE ADJUNCT CONNECTED TO THE FIRST INTERCOM PATH LG LEAD.

Fig. 6—Connections for 2B Transmitter-Receiver in Button-per-Path Intercom, With Cord Terminated in 66E8-25 Connecting Block