

## 402A AND 404A

### KEY TELEPHONE UNITS

#### IDENTIFICATION, INSTALLATION, CONNECTIONS, AND MAINTENANCE

##### 1. GENERAL

1.01 The 402A and 404A key telephone units (KTUs) are diode matrixes which are designed for controlling station common audible signals in key telephone systems.

1.02 The 402A KTU (Fig. 1) is designed to utilize existing spare space in the 501- and 502-type key service units while the 404A KTU (Fig. 2) makes use of all 18-contacts of the connectors used in the 1A2 key telephone systems.

1.03 Each KTU has printed circuitry oriented into two electrical groupings. Line circuit leads connect to one group and the ringer leads connect to the other group.

1.04 A common ringer at a station can be energized from several lines by cross-connecting a 446F, or equivalent, diode between the station ringer lead and each desired line circuit lead. The diodes are not supplied with the KTUs and must be ordered separately.

##### 2. IDENTIFICATION

###### 402A Key Telephone Unit

2.01 The 402A key telephone unit is a phenolic terminal board equipped with horizontal and vertical rows of small clip-type mounting terminals arranged on a 4 by 6 matrix capable of controlling four lines and six audible signals or vice versa.

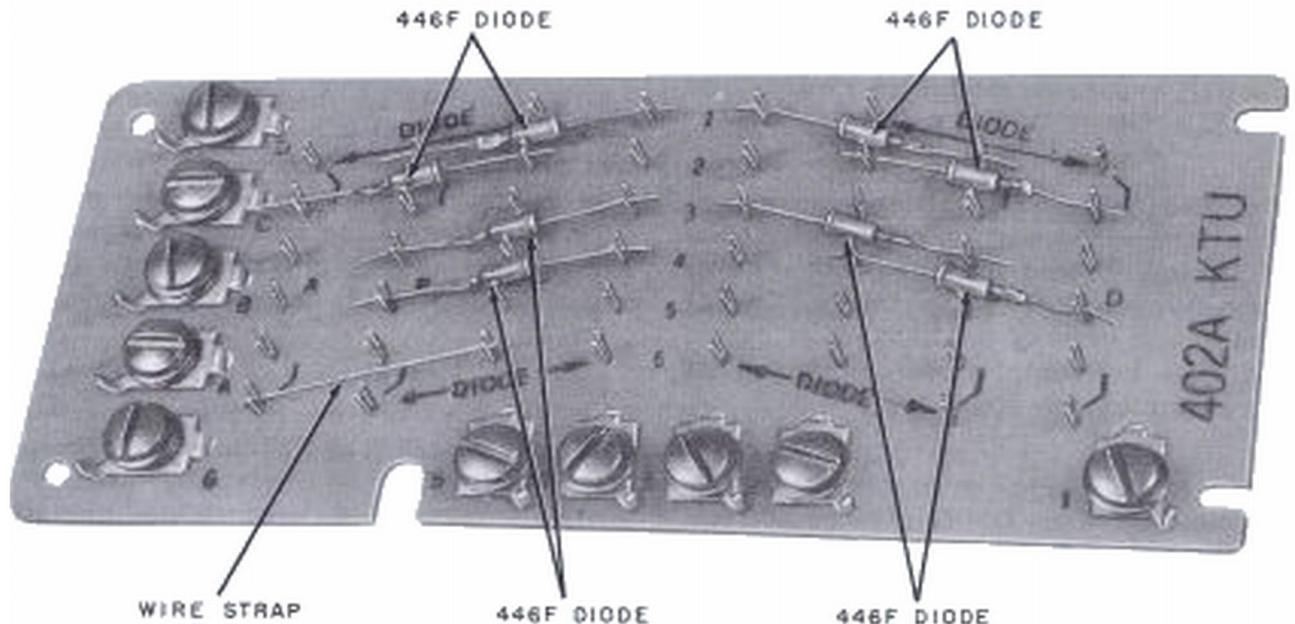


Fig. 1 — 402A KTU, With Diodes and Strap Installed

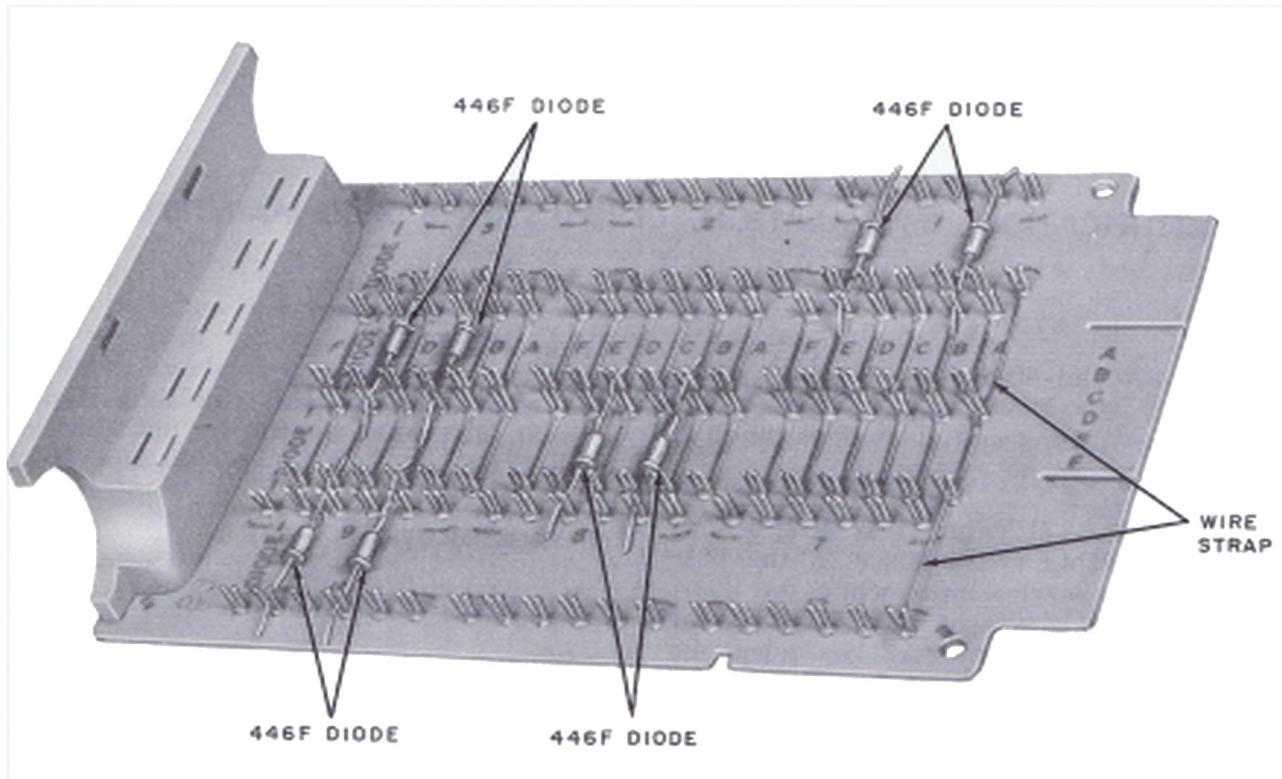


Fig. 2 — 404A KTU, With Diodes and Straps Installed

**2.02** The terminal board is approximately 5.3 inches wide, 2.3 inches high, and 0.3 inch deep overall. The board is equipped with two holes and two slots for mounting into tapped holes of a 31B apparatus mounting, or 501- and 502-type KSUs.

**2.03** The grid layout of the board consists of four vertical rows of an electrically common 6-clip terminal, and six horizontal rows of an electrically common 4-clip terminal. The vertical rows are *lettered* to the right-center of each row. The horizontal rows are *numbered* down the center of the block.

**2.04** Six numbered screw terminals along the bottom-front edge and four lettered screw terminals along the left-front edge provide means for making wire connections to the KTU.

**2.05** Four reference lines appear on the face of the board as an aid to diode placement between terminals.

#### 404A Key Telephone Unit

**2.06** The 404A key telephone unit is a 6 by 12 matrix plug-in unit capable of controlling 6 lines and 12 audible signals or vice versa. It consists of a phenolic terminal board with rows of clip-type mounting terminals interconnected by printed circuitry on both sides of the board. The plug-end of the unit has two slots to orient for proper seating into the mounting receptacle of a 259-type KTU or equivalent adapter.

**2.07** The 12 *numbered* terminals in the grid layout are electrically connected to contacts 1 through 6, and 13 through 18, respectively, on the plug-end of the board. Each is an electrically common 6-clip terminal mounted horizontally on the board.

**2.08** The remainder of the grid layout consists of three groups of six *lettered* terminals. Each is an electrically common 4-clip terminal mounted almost vertically on the board. Each

lettered terminal is electrically connected to its corresponding terminal in the other two groups, and to corresponding contacts 7 through 12 on the plug-end of the board.

**2.09** Four reference lines appear on the face of the board as an aid in diode placement between the numbered and lettered terminals.

**2.10** The KTU is equipped with a finger-grip handle to assist in its insertion or removal.

### 3. INSTALLATION

**3.01** Install the 446F diodes, or equivalents, on the KTUs between the station ringer terminals and the line circuit terminals as required. Point the diode arrow toward the ringer terminal and press the leads into the clips using a pair of long-nose pliers. See Fig. 1 and 2 for typical diode installations.

**THINK** *All diodes on the KTU must be polarized in the same direction.*

**3.02** A diode is not required when only one common ringer will be signaled from a line circuit. Install a 24-gauge bare wire strap between the terminals (see Fig. 1 and 2). If it becomes necessary to connect additional ringers to this line, replace the strap with a diode.

**THINK** *All line circuits connected to a matrix must be supplied from the same ringing supply and interrupter contact.*

#### 402A Key Telephone Unit

**3.03** Install the 402A KTU on the apparatus mounting of a 501- and 502-type key service unit to the left of the KS-interrupter utilizing the four tapped holes on the mounting and the four No. 4 1/4 RHM screws (P-210800) furnished with the KTU.

**3.04** The 402A KTU can be installed in other systems only when special mounting facilities have been provided locally. The mounting centers for the unit are 5 inches horizontally and 1-27/32 inches vertically. Install the KTU as close to the key system as possible.

#### 404A Key Telephone Unit

**3.05** An 18-contact receptacle must be made available for the installation of the 404A KTU. The 259-type KTU adapter provides two receptacles which are suitable for receiving the unit.

**3.06** The 259-type KTU can be installed on the apparatus mounting of a 501- or 502-type key service unit. When systems do not provide adequate mounting space, the 259-type KTU should be located as close to the key service unit or panel as possible.

**3.07** Install the 404A KTU into the receptacle and ensure that it is fully seated in its proper position.

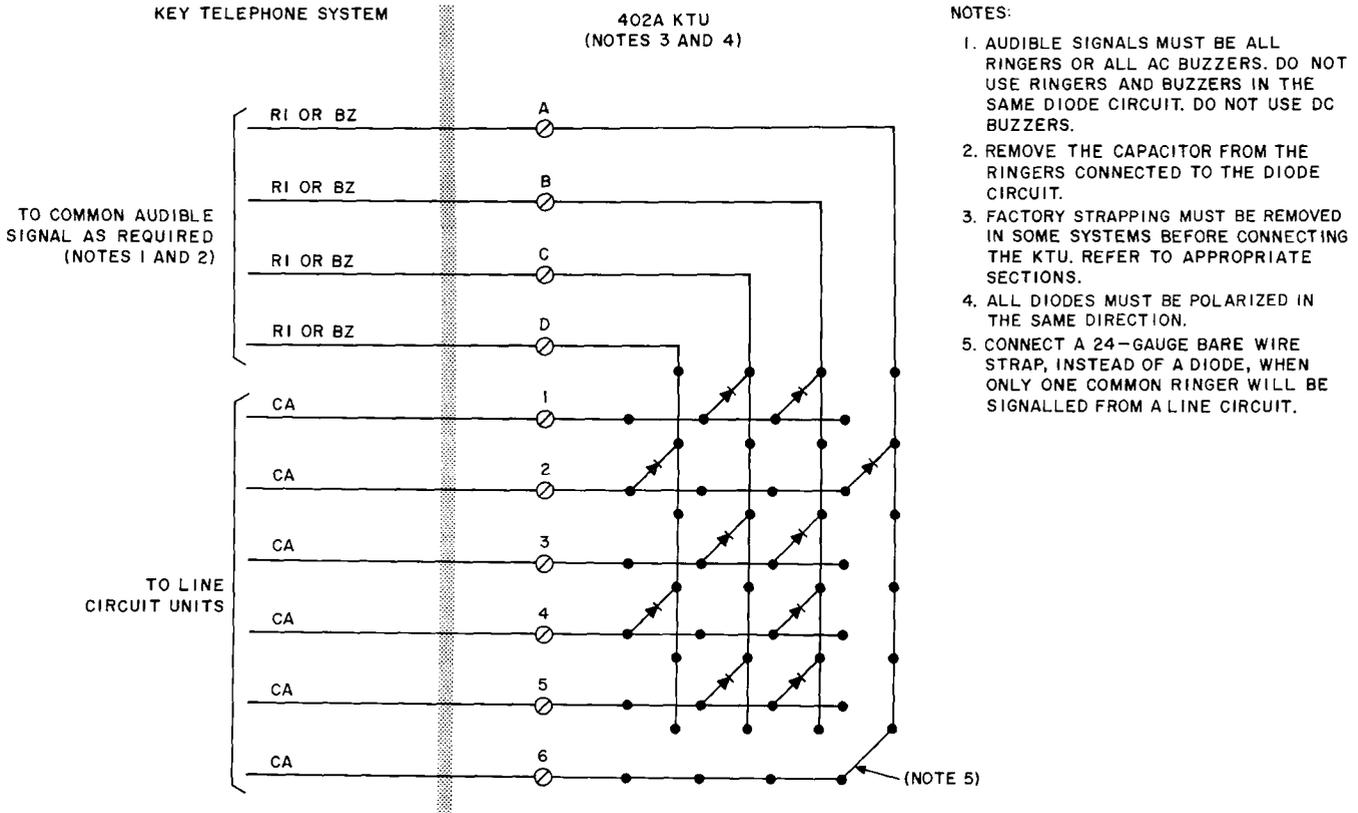
### 4. CONNECTIONS

**4.01** These KTUs limit the system to only one type of common audible signal, ie, all ringers or all ac buzzers. DC buzzers cause severe transients that will damage the diodes. When station ringers are used, disconnect the ringing capacitor from the circuit and connect the red ringer lead to the diode matrix.

**4.02** Connect the common ringer leads and the line circuit control leads to the KTUs as required (see Fig. 3 and 4).

**Note:** Do not connect the KTU directly to the tip or ring as this will place a permanent signal on the line.

**4.03** It may be preferable to wire all line circuit and ringer leads to the KTUs whether or not they need to be connected through them. The audible signaling connections used in the system would then be evident by an examination of the units.



- NOTES:
1. AUDIBLE SIGNALS MUST BE ALL RINGERS OR ALL AC BUZZERS. DO NOT USE RINGERS AND BUZZERS IN THE SAME DIODE CIRCUIT. DO NOT USE DC BUZZERS.
  2. REMOVE THE CAPACITOR FROM THE RINGERS CONNECTED TO THE DIODE CIRCUIT.
  3. FACTORY STRAPPING MUST BE REMOVED IN SOME SYSTEMS BEFORE CONNECTING THE KTU. REFER TO APPROPRIATE SECTIONS.
  4. ALL DIODES MUST BE POLARIZED IN THE SAME DIRECTION.
  5. CONNECT A 24-GAUGE BARE WIRE STRAP, INSTEAD OF A DIODE, WHEN ONLY ONE COMMON RINGER WILL BE SIGNALLED FROM A LINE CIRCUIT.

Fig. 3 — Typical Connections For 402A KTU

5. MAINTENANCE

5.01 When trouble is encountered with the ringing circuit:

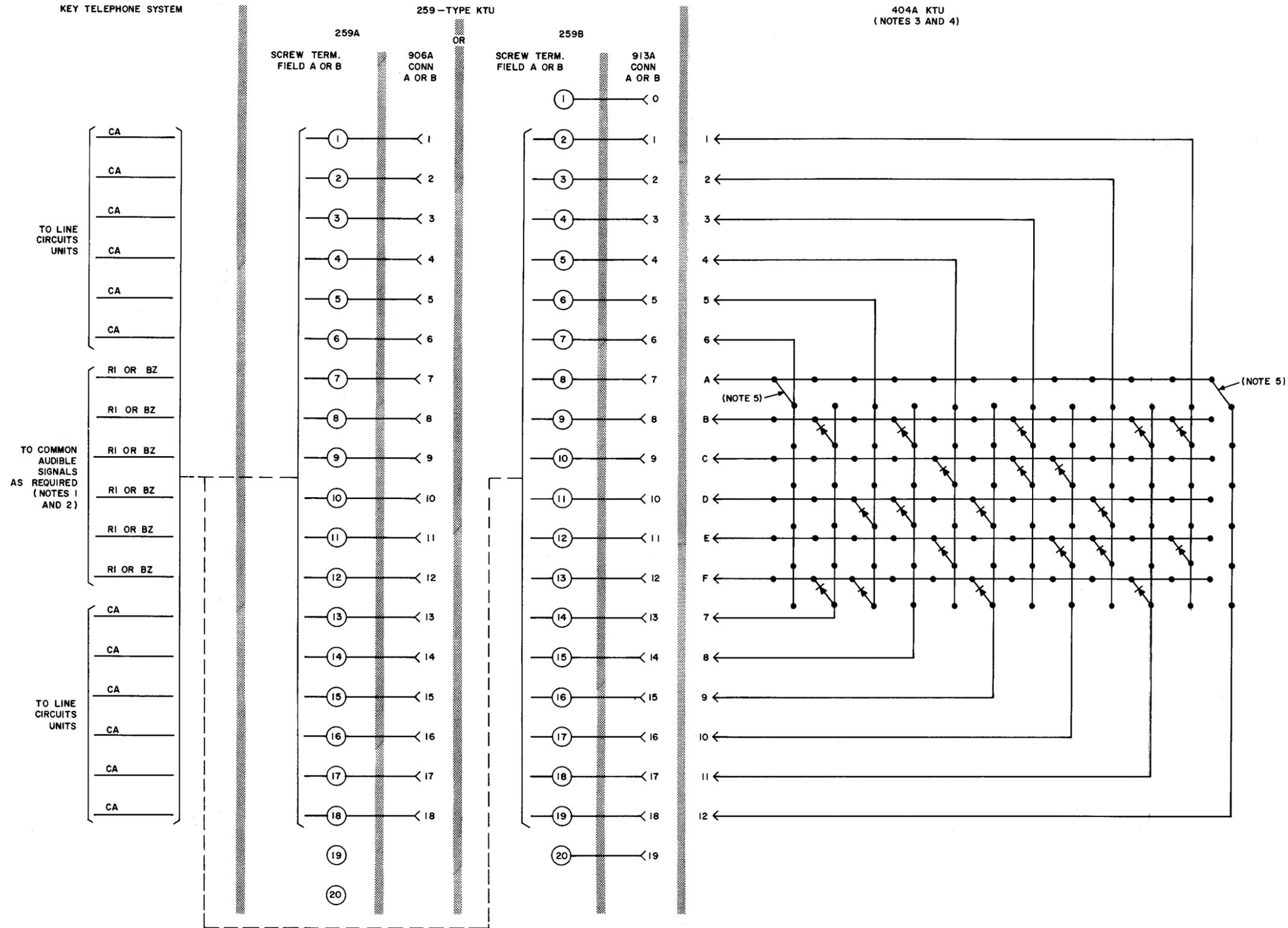
- (1) Examine the connections to the screw terminals on the 402A KTU, or on the 259-type adapter associated with the 404A KTU.
- (2) Check that the diodes and straps are properly seated in the clip terminals.
- (3) Check that the 404A KTU is properly seated in its mounting receptacle.

(4) Check to ensure proper function of audible signal devices and associated line circuit units.

5.02 When the printed wiring on the boards becomes defective or damaged, replace the KTUs. Remove the diodes from the defective board and install them on the new units.



*Exercise care when removing or installing a diode so as not to damage the clip terminals.*



- NOTES:
1. AUDIBLE SIGNALS MUST BE ALL RINGERS OR ALL AC BUZZERS, DO NOT USE RINGERS AND BUZZERS IN THE SAME DIODE CIRCUIT. DO NOT USE DC BUZZERS.
  2. REMOVE THE CAPACITOR FROM THE RINGERS CONNECTED TO THE DIODE CIRCUIT.
  3. FACTORY WIRING MUST BE REMOVED IN SOME SYSTEMS BEFORE CONNECTING THE KTU. REFER TO APPROPRIATE SECTIONS.
  4. ALL DIODES MUST BE POLARIZED IN THE SAME DIRECTION.
  5. CONNECT A 24-GAUGE BARE WIRE STRAP, INSTEAD OF A DIODE, WHEN ONLY ONE COMMON RINGER WILL BE SIGNALLED FROM A LINE CIRCUIT.

Fig. 4 — Typical Connections for 404A KTU Using a 259-Type KTU