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## 247A KEY TELEPHONE UNIT (TOUCH-TONE ADAPTER)

### 6A KEY TELEPHONE SYSTEM

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

##### 1. GENERAL

1.01 The 247A key telephone unit is used with the three 6A key telephone arrangements to permit the use of TOUCH-TONE telephone sets as well as rotary dial sets.

1.02 This section is reissued to:

- Correct connection information for the single-talking link arrangement using the 234A KTU
- Include additional relay operations to sequence charts
- Delete circuitry already covered in SD-69447-01

1.03 The 247A KTU will be rated Manufacture Discontinued (MD) and replaced by the 247B KTU.

##### 2. IDENTIFICATION

2.01 The 247A KTU (Fig. 1 and 2) converts multifrequency tones, generated by TOUCH-TONE telephone sets, into relay operations for signaling selected stations.

2.02 Since the frequencies generated by the TOUCH-TONE telephone sets fall within the voice range, a relay is provided to keep the circuit idle until called in by a TOUCH-TONE station. Rotary dial stations do not use this circuit.



*Dialing must be completed within a 5- to 10-second time limit or the circuit will time out. If the circuit times out, the customer must hang up and dial over*

*again. The timing interval may be varied by changing the size of resistor R55.*

2.03 To prevent false operation of relays due to handset fumbling, the digit 1 is never used as an initial digit. (See Table A.)

2.04 Internal modifications of the 6A key telephone system are not required. The circuit will work with minor strapping changes on the KTUs involved.

##### 3. INSTALLATION

3.01 The TOUCH-TONE adapter should be installed in accordance with the section entitled 1A and 1A1 Key Telephone Systems-Installation.

3.02 The TOUCH-TONE adapter will fit a 9-1/4 by 7-inch mounting space. (See Fig. 1 and 2.)



*To ensure proper operation of the transistor circuitry, the power supply used with this circuit must maintain a voltage between a minimum of -20 volts and a maximum of -26 volts.*

3.03 Handling of KTUs sometimes results in damage to wire spring relays. After mounting, visually inspect all wire spring relays for:

- Improper position of contact springs
- Broken cards
- Improper position of cards

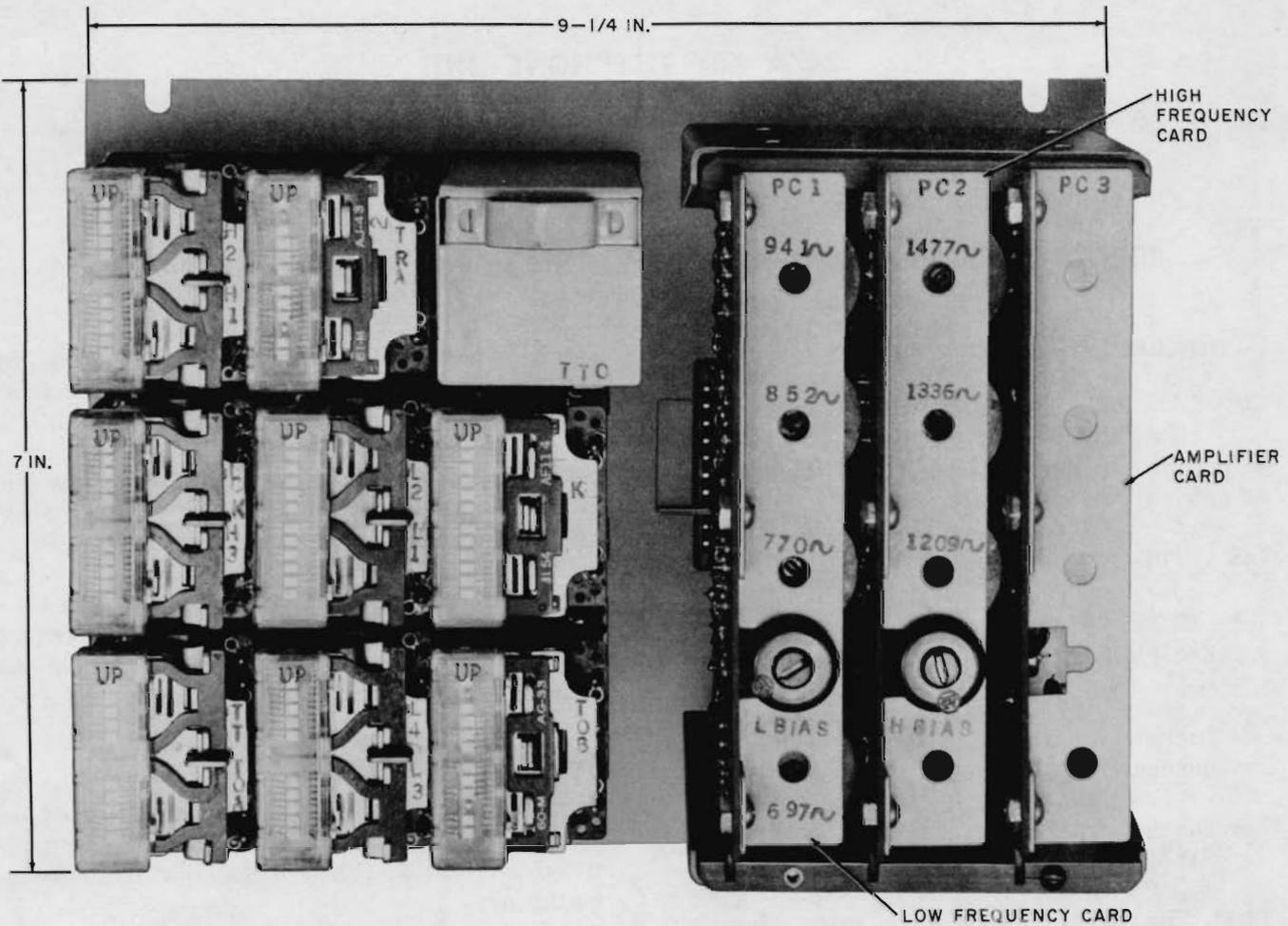


Fig. 1 — 247A KTU, TOUCH-TONE Adapter, Front View

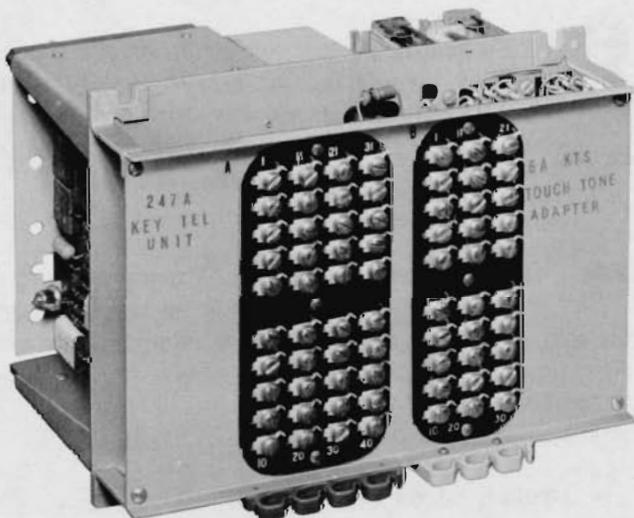


Fig. 2—247A KTU, TOUCH-TONE Adapter, Rear View

**SELECTOR-ONLY AND SINGLE-LINK INSTALLATIONS**

- 3.04 Install the 247A KTU as shown in Fig. 3 and 4.
- 3.05 If a 234A KTU is employed, connect as shown in Fig. 5.
- 3.06 The 247A KTU comes arranged for two digit codes, if single digit codes are used, modify the circuit as shown in Table A.
- 3.07 For selector-only arrangement all TOUCH-TONE stations are connected directly to the 247A KTU.
- 3.08 For single-link installations all TOUCH-TONE stations must be grouped on separate 215A KTUs. Rotary dial stations must not

**TABLE A**  
**SINGLE-DIGIT MODIFICATION**

DIGIT USED	CODE RELAYS OPERATED	CONNECT TERM.	TO TERM.
1	H1-L1	NOT USED	
2	H2-L1	28A	24A
3	H3-L1	30A	24A
4	H1-L2	22B	24A
5	H2-L2	35A	24A
6	H3-L2	37A	24A
7	H1-L3	3B	24A
8	H2-L3	5B	24A
9	H3-L3	7B	24A
0	H2-L4	33A	24A

*Note:* Strapping changes are on 247A KTU.

be installed on a 215A KTU used by a TOUCH-TONE station. This is necessary to insure that the adapter circuit will only be activated on calls originated by TOUCH-TONE stations.

**3.09** To adjust the adapter circuit attach a TOUCH-TONE telephone set directly to the 247A KTU in selector-only installations, or to the 215A KTU associated with the TOUCH-TONE sets in single-link installations. After blocking the TOA relay in the adapter operated to prevent time-out, remove the handset of the TOUCH-TONE set and depress two keys simultaneously to cause each L relay to be operated singly in succession. Adjust the potentiometer labeled L BIAS until one or more of the L relays fails to operate when the keys corresponding to its frequency are depressed; then readjust it until all L relays operate properly. Next, adjust the potentiometer labeled H BIAS while depressing the keys which cause the H relays to operate until one (or more) fails to operate; then readjust it until all operate properly.

**3.10** Now, operate each key on the TOUCH-TONE set individually, observing that the proper H and L relay combination is operated. (See Table B.) If necessary, readjust the bias potentiometers for proper operation.

**TABLE B**  
**DIGIT SEQUENCE**

DIGIT	FREQUENCIES TRANSMITTED	RELAYS OPERATED
1	1209 & 697	H1, L1
2	1336 & 697	H2, L1
3	1477 & 697	H3, L1
4	1209 & 770	H1, L2
5	1336 & 770	H2, L2
6	1477 & 770	H3, L2
7	1209 & 852	H1, L3
8	1336 & 852	H2, L3
9	1477 & 852	H3, L3
0	1336 & 941	H2, L4

*Note:* All high frequencies  $\pm 2$  cps; all low frequencies  $\pm 1$  cps.

**3.11** Replace the telephone handset and remove the block from the TOA relay. Remove the handset and determine that an interrupted tone is heard within 5 to 10 seconds. Replace the handset, then initiate several test calls to make sure that signaling occurs at the selected station. Initiate test calls from all TOUCH-TONE stations to check for proper operation.

#### **TWO-LINK INSTALLATIONS**

**3.12** Install the 247A KTU TOUCH-TONE adapter as shown in Fig. 6.

**3.13** All TOUCH-TONE stations must be grouped on separate 223A KTUs.

**3.14** To adjust the adapter circuit originate a call from one rotary dial station to another rotary dial station, answer at the called station, and leave both handsets off-hook to keep the secondary link busy. Install a TOUCH-TONE telephone set on the 223A KTU. Block the TOA relay in the 247A KTU operated to prevent time-out. Follow the same procedure outlined under Selector-Only and Single-Link Installations and adjust the H and L BIAS potentiometers for proper operation of the H and L relays.

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**3.15** Remove the block from the TOA relay and check the time-out and tone circuits for proper operation. Initiate test calls from all TOUCH-TONE stations to ascertain proper operation.

### 4. CONNECTION INDEX

Fig. 3 — 6A KTS — Selector Only

Fig. 4 — 6A KTS — Single-Talking Link

Fig. 5 — 6A KTS — Single-Talking Link Using 234A KTU

Fig. 6 — 6A KTS — Two-Talking Link

### 5. MAINTENANCE

**5.01** After the cards have been individually aligned and tested, the assembled 247A KTU shall be tested to determine that the time-out interval is between 5 and 10 seconds.

**5.02** The time-out interval may be measured by observing the time that the TOA relay remains operated after line seizure.

**5.03** The interrupted warning tone frequency may be measured by any convenient method. A steady tone may be made to appear on terminal 11B by blocking the TOB relay operated.



*To eliminate time-out warning tone (early manufactured 247A KTUs) on rotary dial calls for the selector-only arrangement, remove lead from 8 make contact of TOB relay and place it on 8 armature of TOB relay.*

**5.04** Maintenance of the TOUCH-TONE adapter should be limited to the following:

- Checking the relay portion of unit.

*Note:* When checking relay portion of unit, all 3 boards **must be removed** from unit to prevent possible damage to transistors.

- Replacing of defective printed wiring board.

**5.05** Sequence charts are furnished in Fig. 7, 8, 9, and 10. For more detailed information refer to CD- and SD-69447-01.

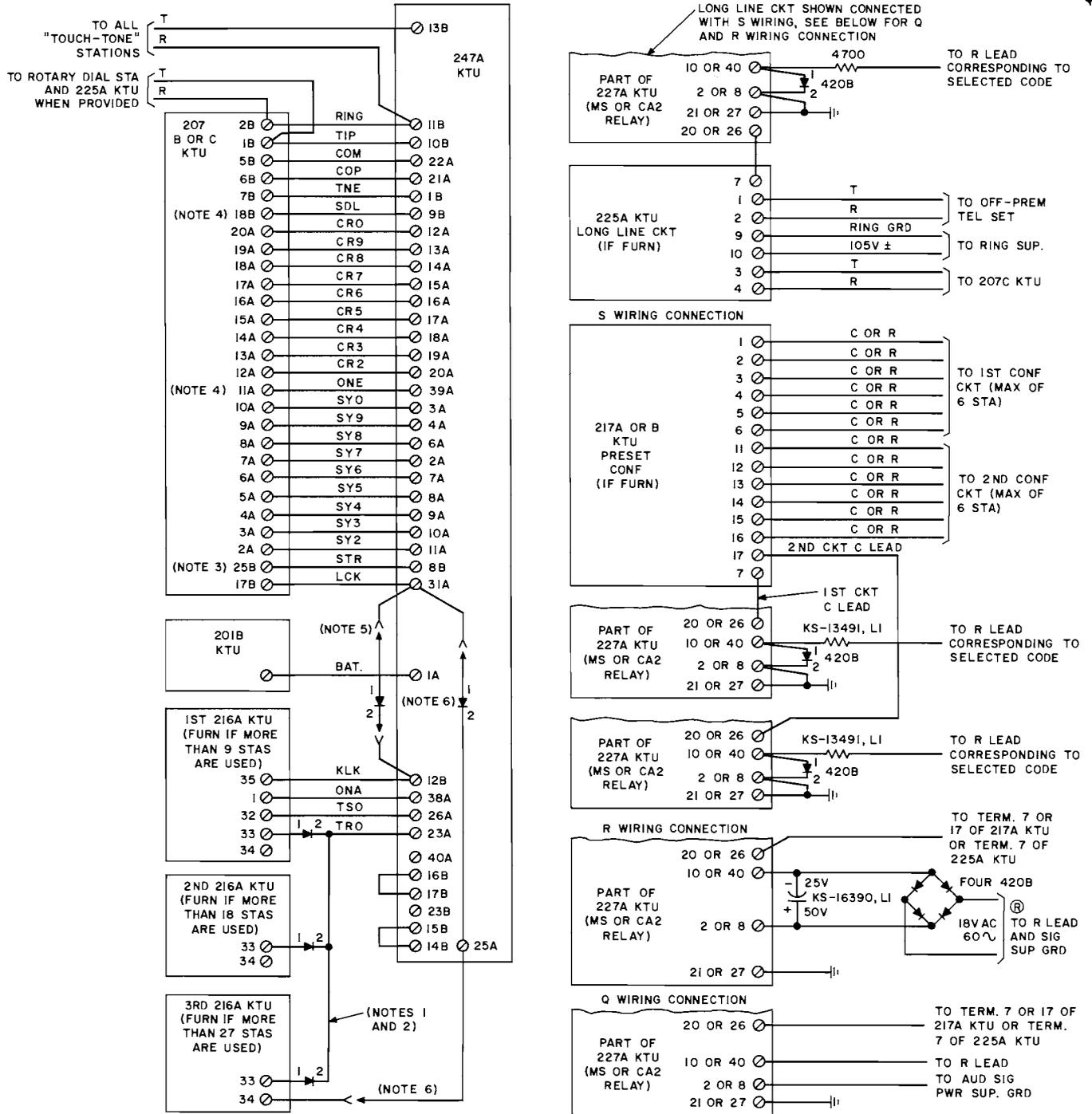
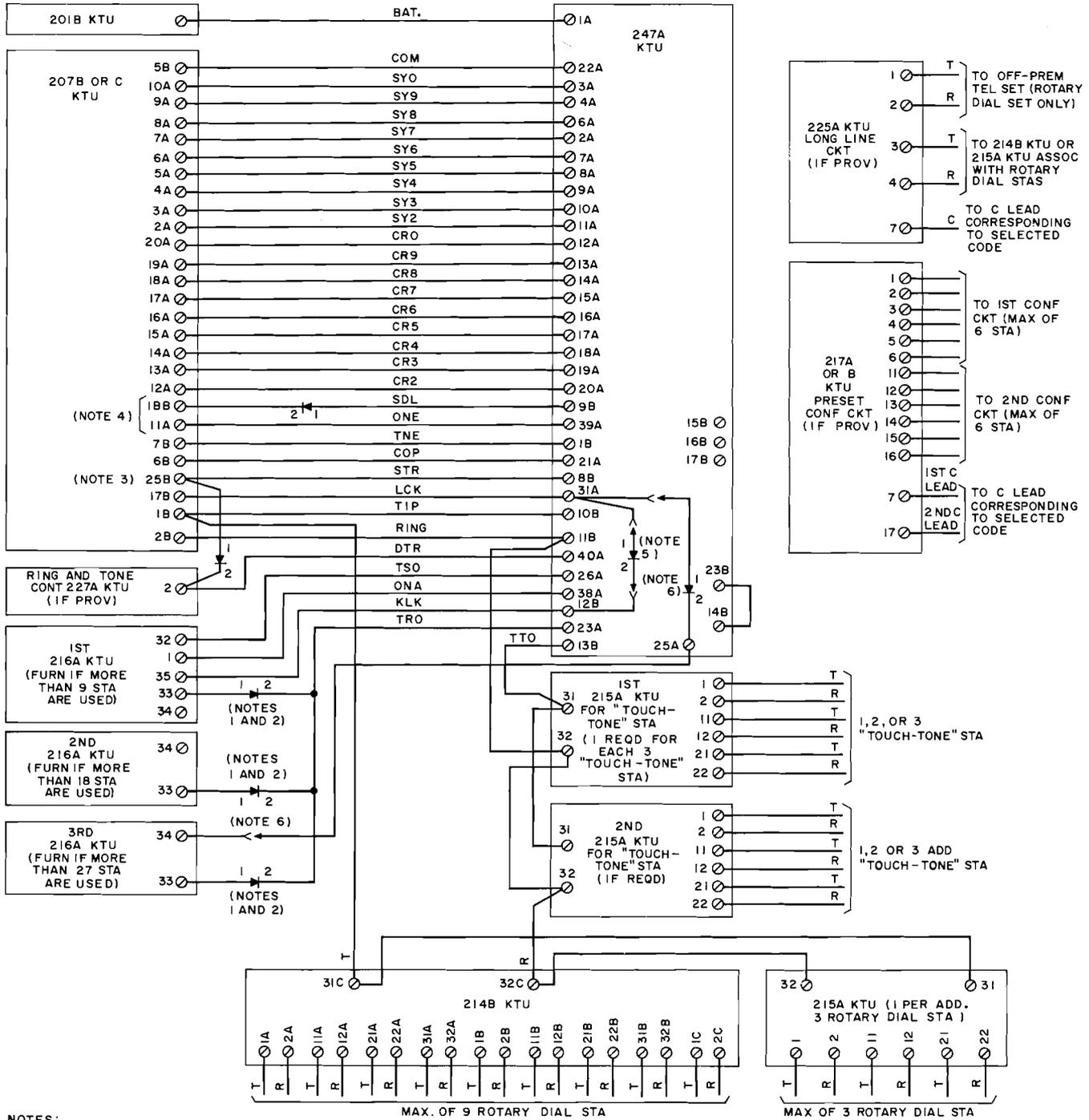


Fig. 3 — 6A KTS — Selector Only



NOTES:

1. WHEN ONE OR MORE 216A KTU IS USED, THE TRO LEADS CONNECTING TO THE ADAPTER MUST HAVE DIODES AS SHOWN.
2. UNLESS OTHERWISE SPECIFIED, ALL DIODES ARE 400J OR EQUIVALENT.
3. WHEN USING 207B KTU, THE STR LEAD WILL NOT ATTACH TO TERMINAL 25B, IT MUST HAVE A DIODE PLACED IN SERIES AND ATTACHED TO TERMINAL 8B OF 207B.
4. REMOVE THE EXISTING LEAD FROM TERMINAL 18B OF THE 207C KTU TO TERMINAL 35 OF THE 216A KTU, AND THE EXISTING LEAD FROM TERMINAL 11A OF THE 207C KTU TO TERMINAL 1 OF THE FIRST 216A KTU.
5. PLACE DIODE WHEN 216A IS NOT USED.
6. PLACE LEAD ON LAST 216A USED. PUNCHING 25A OF 247A IS SPARE TERMINAL AND MAY BE UTILIZED FOR DIODE TERMINATION.

Fig. 4 — 6A KTS — Single-Talking Link

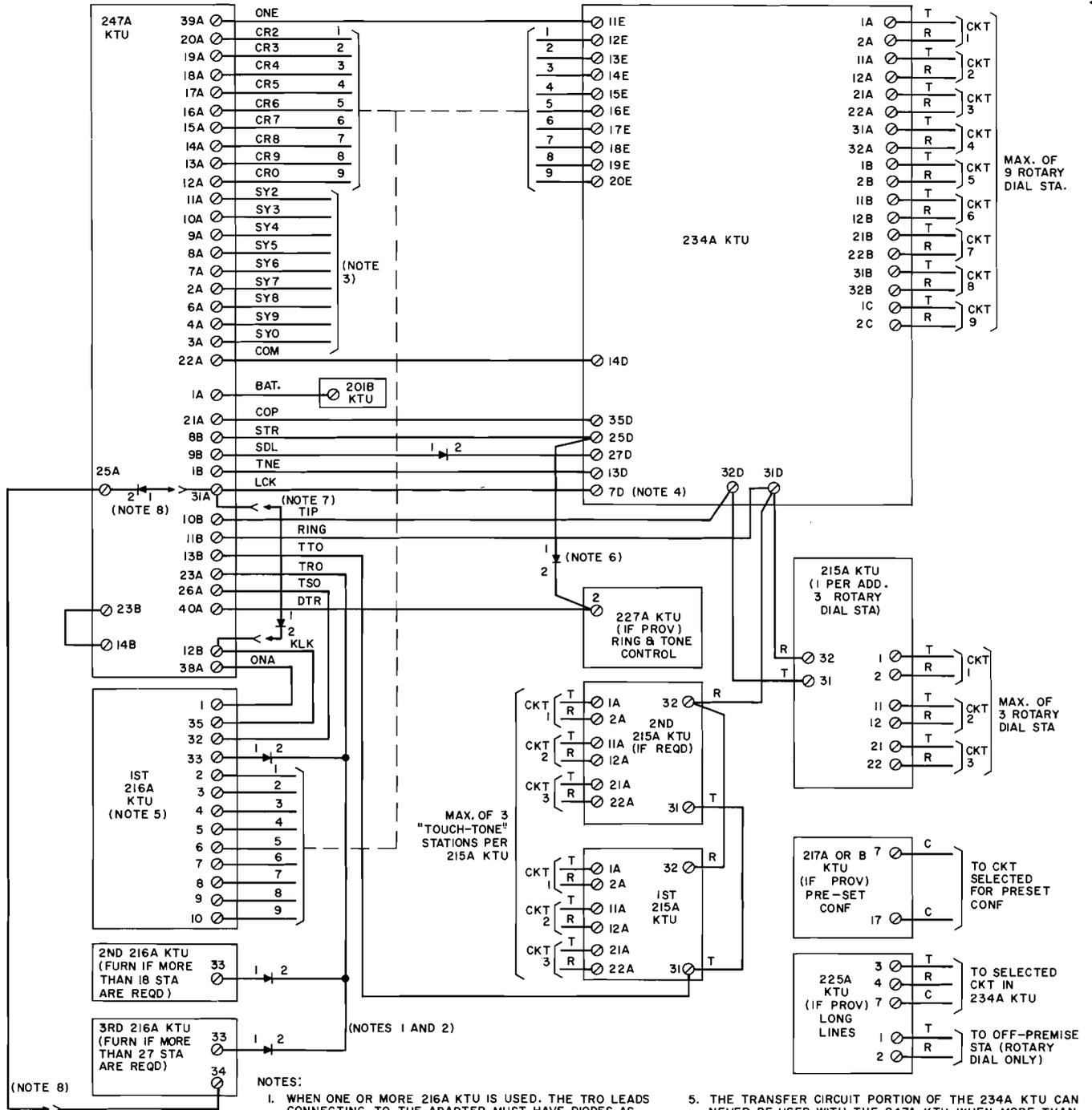


Fig. 5 — 6A KTS — Single-Talking Link Using 234A KTU

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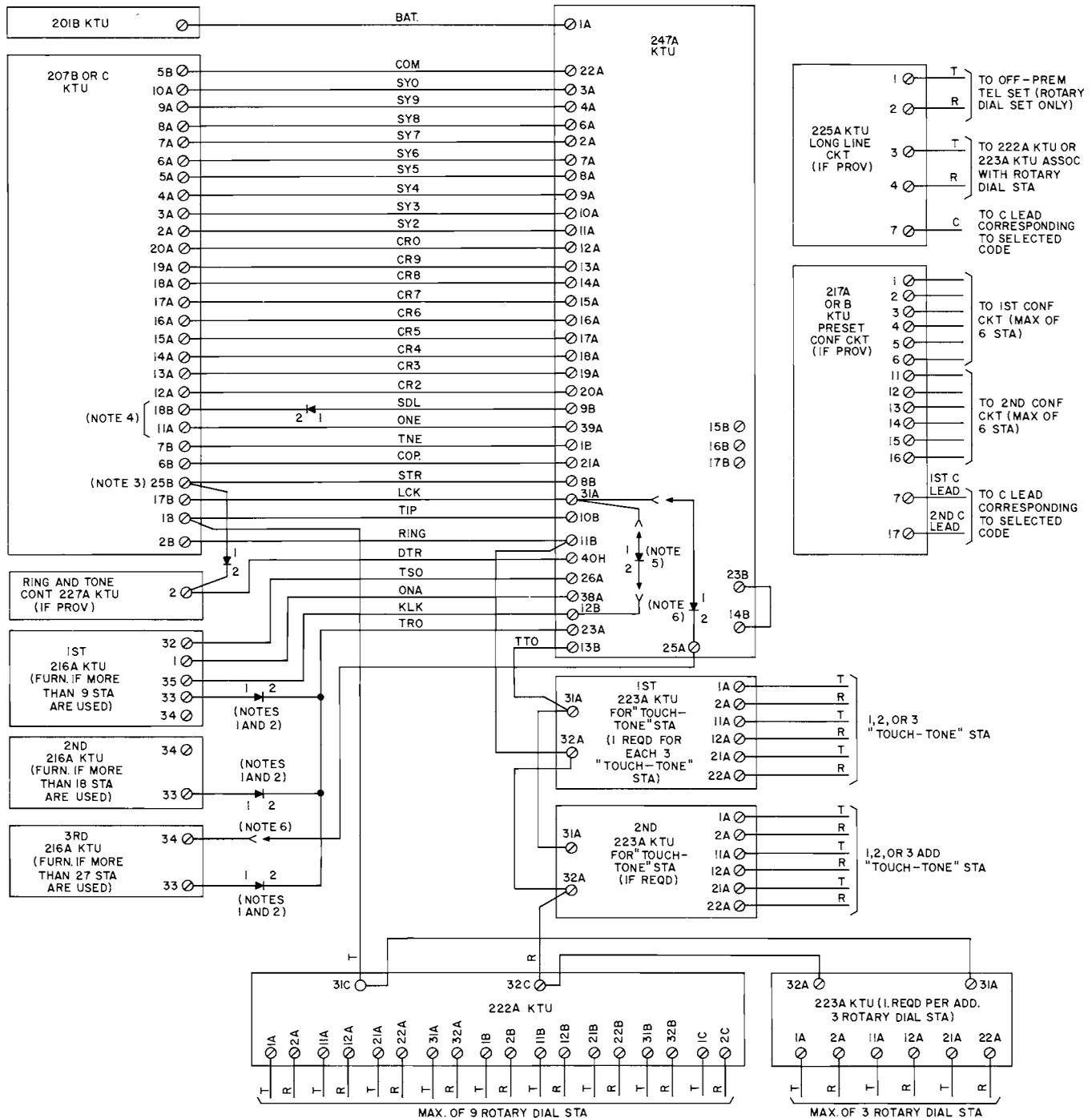


Fig. 6 — 6A KTS — Two-Talking Link

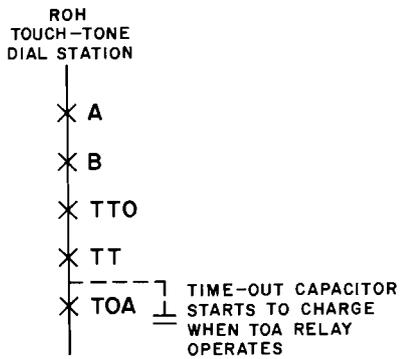


Fig. 7 — 6A KTS, Line Seizure

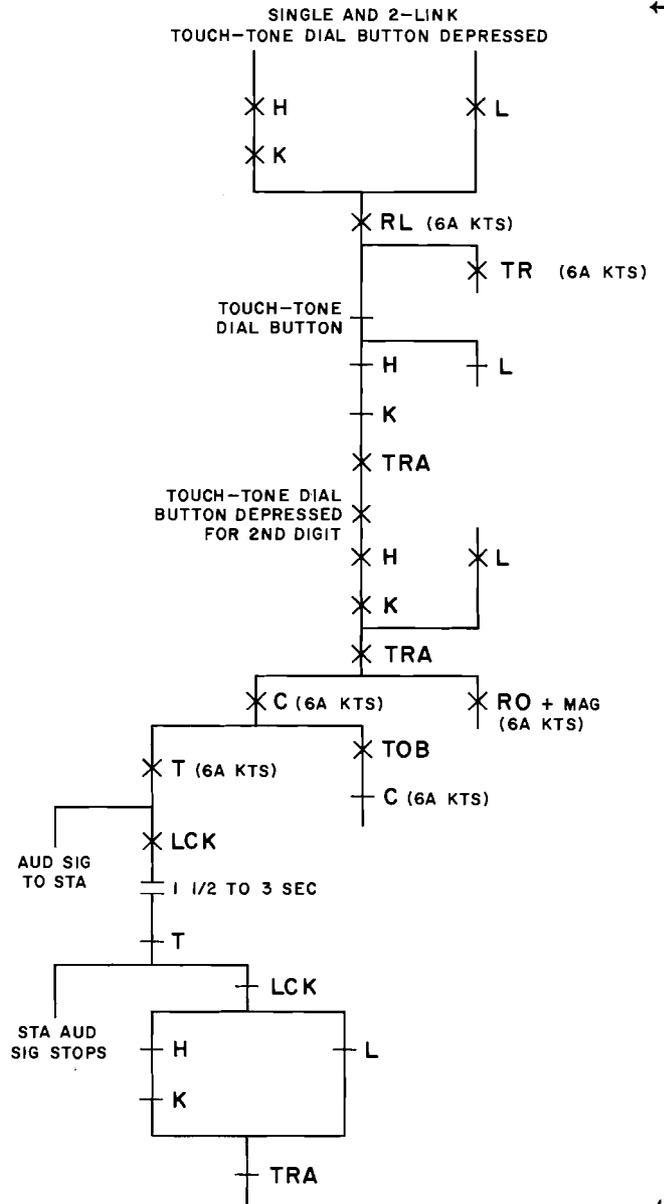


Fig. 8 — 6A KTS — Dialing 2-Digit Code

