

## 6A KEY TELEPHONE SYSTEM IDENTIFICATION AND INSTALLATION

### 1. GENERAL

1.01 This section is reissued to include the following:

- 227B key telephone unit (KTU) replacing the 227A KTU which is rated MD.
- Show 229B KTU as an additional choice for single add-on transfer circuit.
- Installation information formerly covered in individual 6A arrangement connection sections.

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

### 2. IDENTIFICATION

#### PURPOSE

2.01 The 6A Key Telephone System, available in three arrangements (~~selector only, single talking link~~, and two-talking link), is a single and/or 2-digit dial selective intercommunicating system designed primarily for on-premise operation. However, with the use of a long line circuit, remote stations have access to the local 6A system facilities.

#### DESIGN AND OPERATING FEATURES

2.02 The 6A Key Telephone System offers a variety of service features to the customer depending on the type of basic arrangement (selector only, single-talking link, or two-talking link) installed. Some optional features can be obtained by strapping changes on key telephone units; other features require the addition of key telephone units.

2.03 The selector only arrangement (Fig. 1) provides for:

- (a) Access to a ~~common~~ talking path for a maximum of 36 station codes.

- (b) Rotary dial station selection.
- (c) TOUCH-TONE® dial station selection utilizing the 247A (MD) or B key telephone unit.
- (d) Line busy lamps.
- (e) Station signaling over a separate pair by means of a single-spurt audible signal.
- (f) **Preset Conferencing:** This optional feature enables a 6A station to simultaneously select and signal a group of preselected stations (maximum of six) by means of either a dialed code or the operation of a signal key. Several preset conference arrangements may be provided at an installation and a particular station can appear in one, all, or none of these. Assignment of a single or 2-digit dial code for each preset conference reduces the total number of 6A station codes in the system by that amount.

**Note:** For transmission reasons, preset conference-connected stations should not be bridged onto a central office or PBX line by means of the add-on conference circuit of the 6A Telephone System.

- (g) **Off-premise Stations** connected to the 6A system by means of a long line circuit will provide satisfactory transmission if the following conditions are met:

- (1) All off-premise stations must be equipped with 500-type telephone sets.
- (2) The maximum external loop between the off-premise station and the long lines circuit (225A KTU) shall not exceed 500 ohms when operated at a minimum battery potential of 20 volts.
- (3) Off-premise stations that may be connected to the add-on conference feature should not exceed a 1000-cps loss of 8 db from the station to the serving central office.

(4) When these conditions cannot be met, individual circuit requirements should be locally engineered.

(h) **Add-on Conferencing** is a feature that allows a central office or PBX line to be interconnected with any 6A station. Operation is as follows: An incoming call on a central office or PBX line is picked up under control of an associated key telephone system line unit. A hold is placed on the central office or PBX line while the 6A system line is selected, the desired intercommunicating station is signaled, and a talking path established. Then by operation of a separate nonlocking add-on conferencing key associated with the held CO or PBX line involved, the central office or PBX line and the intercommunicating stations are connected.

**Note:** To maintain a satisfactory transmission level, no more than two local stations should be connected on any 6A add-on conferenced call.

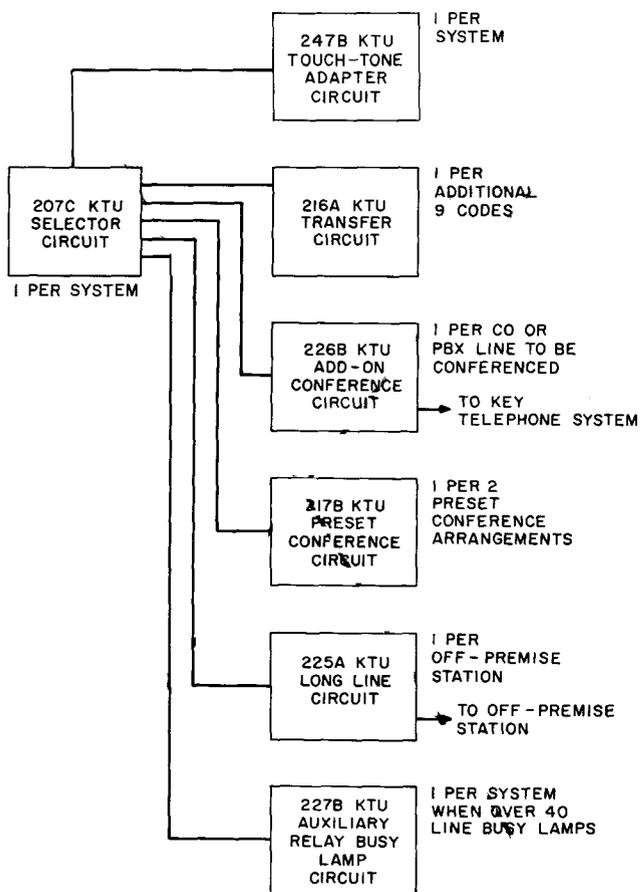


Fig. 1—Selector-Only Arrangement

**2.04** The single talking link arrangement (Fig. 2 or 3) provides for:

- (a) A selector and a primary talking link. The selector is used in the process of station selection and the primary link is used as the talking path between the called and calling station.
- (b) Maximum of 36 station codes.
- (c) Dial tone to a station originating a call.
- (d) Selective signaling by means of a signaling key on a one-per-called-station basis.
- (e) Combined line and busy lamps.
- (f) Rotary dial station selection.
- (g) TOUCH-TONE dial station selection utilizing the 247A (MD) or B KTU.
- (h) Audible signaling at a 6A station which can be provided in one of three ways:

- (1) Signaling over the *T* and *R* leads to a bridged ringer.
- (2) Signaling over a separate pair.
- (3) Operating a station common audible signal through a control circuit per SD-69294-01 and section entitled Audible and Visual Signaling—Using a 227A or B KTU.

**Note:** All three methods of signaling may be found on a 6A Key Telephone System.

(i) Single spurt or interrupted ringing.

- (1) Single-spurt signaling provides for the audible signal at the called station to be operated once for a nominal 1-1/2 second period.
- (2) Interrupted ringing provides for the audible signal at the called station to be interrupted at the rate of 1 second on and 3 seconds off, until such time as the called station answers or the call is abandoned.

**Note:** Ringing can be tripped only during the silent interval.

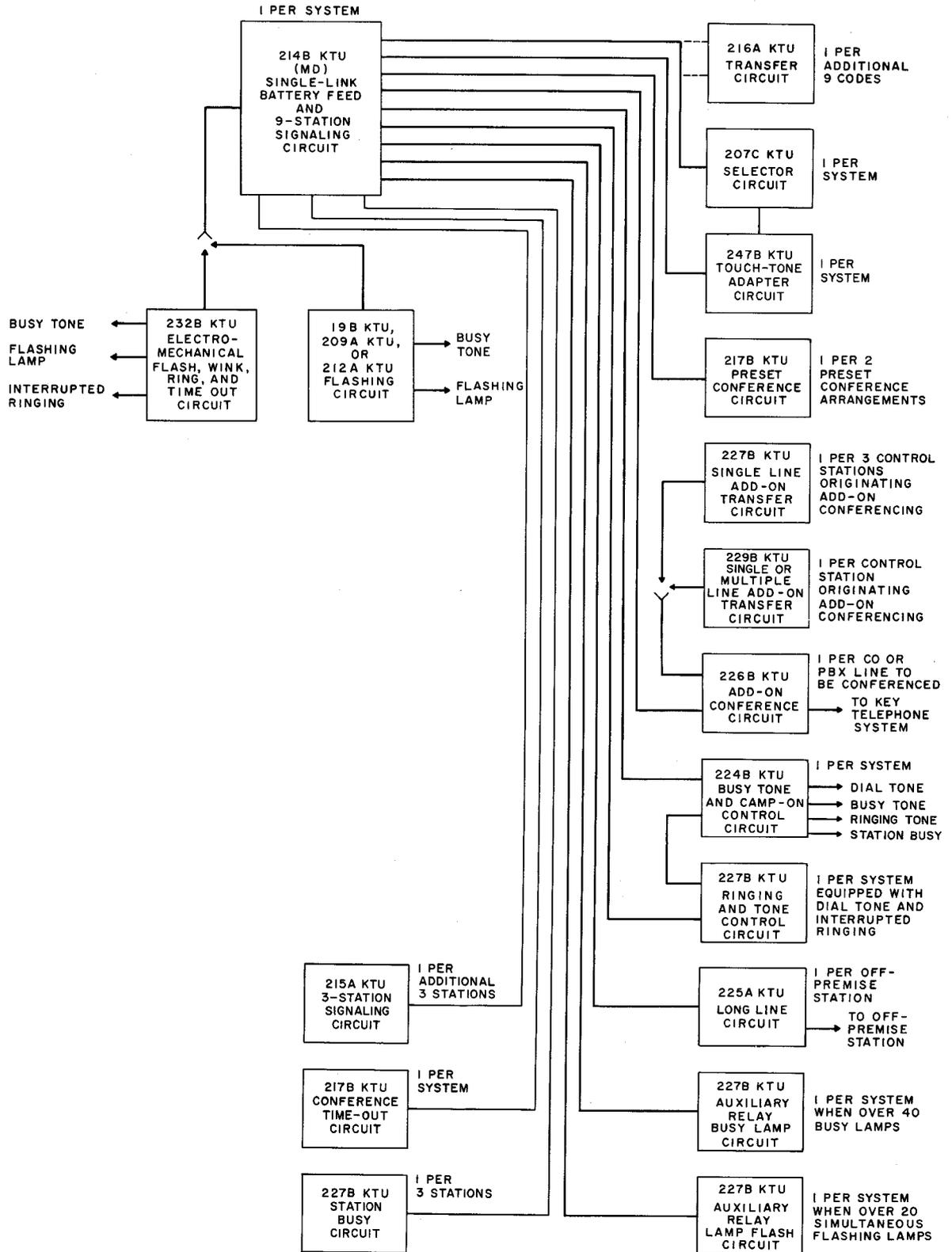


Fig. 2—Single-Link Arrangement Using 214B KTU (MD)

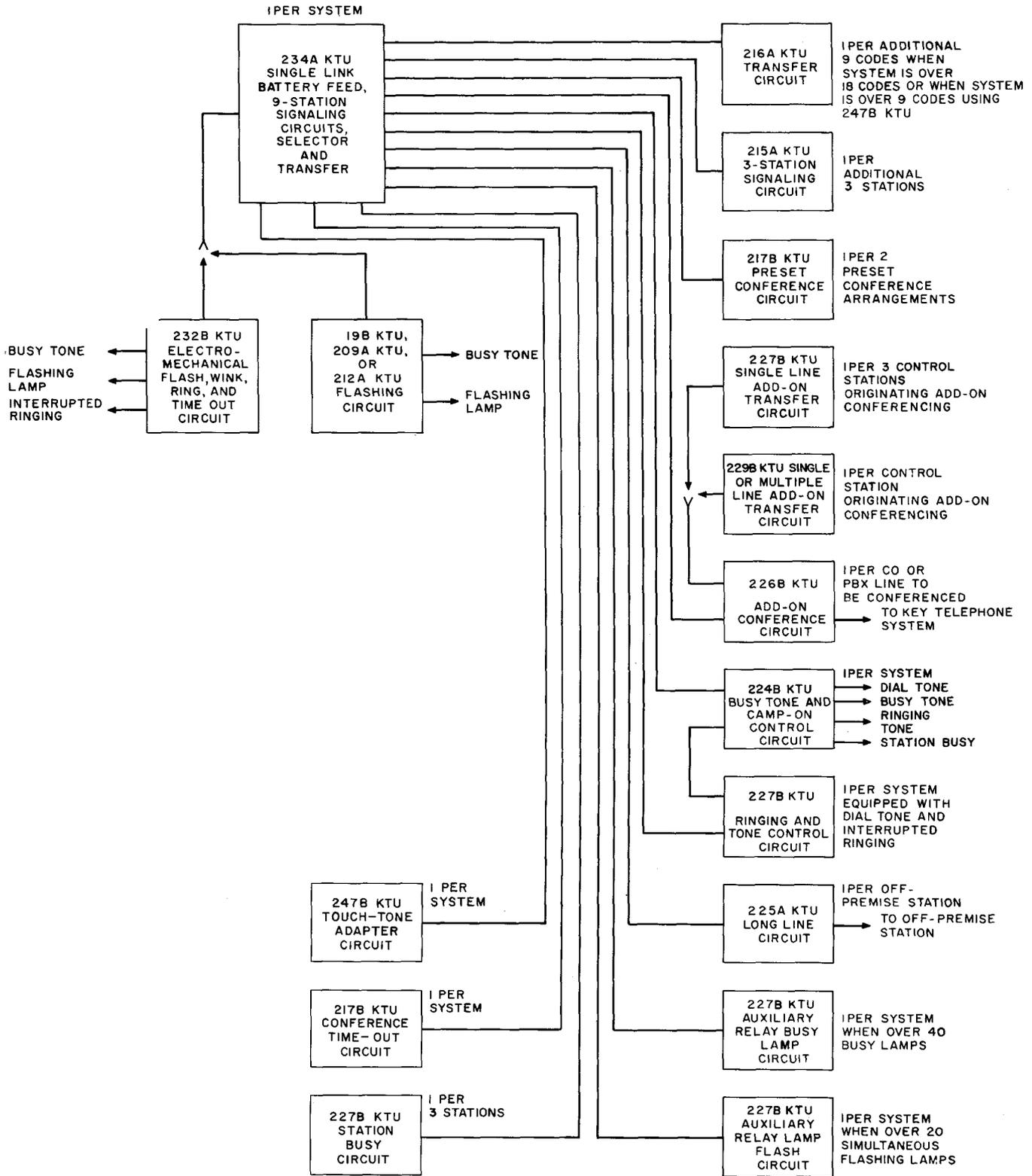


Fig. 3—Single-Link Arrangement Using 234A KTU

(j) Automatic cutoff of all, some, or none of the associated stations. Stations that are wired for automatic cutoff are prevented, on pickup, from being transferred onto an existing talking connection on the link.

(k) Ringing tone to the calling station when interrupted ringing is provided.

(l) Off-premise stations as described in 2.03.

(m) Preset conferencing is an optional feature that enables a 6A station to select a group of stations (maximum of six) by means of a dialed code or the operation of a signal key. Several preset conference arrangements may be provided at an installation, and a particular station can appear in one, all, or none of these. Use of a dial code for selecting a preset conference would reduce the number of 6A stations on the system. The visual signal is used to indicate the progress of a conference call. When a conference call is originated, the calling station has a steady busy lamp, and the called stations have the flashing line lamp. As soon as the first called station answers, the calling station lamp begins to flash and continues to do so until all stations have answered. All lamps then go steady indicating that the conference is now completed. The preset conference unit (217B KTU) provides a timed release of unanswered stations. It eliminates continued ringing of an unanswered station bell, approximately 30 seconds after the calling party goes off-hook. It also stops the flashing lamps of all conferees, silences the busy tone if one of the called parties is busy on the system, and allows camp-on to be used.

**Note:** For transmission reasons, preset conference-connected stations should not be bridged onto a central office or PBX line by means of the 6A add-on conference circuit.

(n) Selective conferencing is available where pushbutton signaling has been provided. The conference is called by operating a number of pushbuttons (maximum of six) simultaneously. The visual signal is used to indicate the progress of a selected conference call, as described in preset conferencing.

(o) Camp-on is a feature that allows a 6A station, wired for automatic cutoff, to go in over the busy lamp, indicating the system is busy, and dial a station code. The dialed code is stored in the selector. The calling station receives a busy tone indicating to him, as well as to any other station which subsequently picks up, that the system is now camped on. When the system becomes free, the previously selected station is automatically signaled without further operation by the calling station. Stations not wired for automatic cutoff cannot originate the camp-on feature, as they would immediately be transferred onto the primary link on pickup.

**Note:** When the 6A system is equipped with station busy circuits, a camped-on call will not cut through until all station busy circuits are normal.

(p) A station busy circuit causes a station, so equipped, to appear busy to the 6A system whenever that station is off-hook and connected to any line other than the 6A line. This circuit provides for busy tone to be returned to the calling station. To provide this service the 6A system must be equipped with the busy signal and camp-on control unit (224A KTU).

**Note:** When the 6A system is equipped with the camp-on feature, a camped-on call will not cut through until all station busy circuits are normal.

(q) Add-on conferencing as described in 2.03.

**2.05** The two-talking link arrangement (Fig. 4) provides for:

(a) A selector and a primary talking link as described in 2.04 plus the addition of a secondary talking link. This enables one system to carry on two simultaneous and independent conversations. Whenever the secondary link is free, a call on the primary link is automatically transferred to it, thereby freeing the primary link for another call. A slight click is heard during this transfer operation.

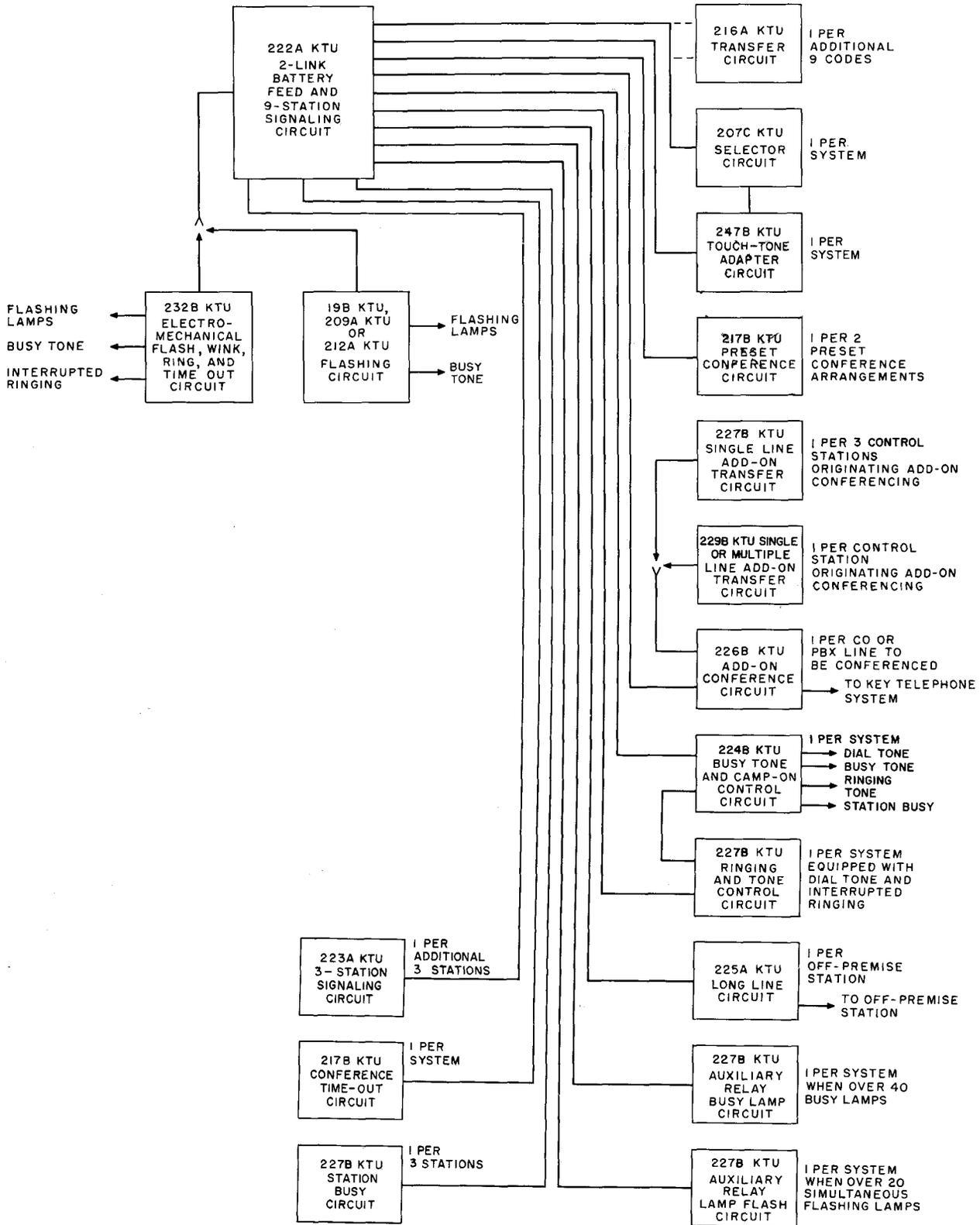


Fig. 4—Two-Link Arrangement

- (b) Dial tone to a station originating a call.
- (c) TOUCH-TONE dialing
- (d) Selective signaling
- (e) Combined line and busy lamps
- (f) Audible signaling
- (g) Single spurt or interrupted ringing
- (h) Automatic cutoff
- (i) Ringing tone
- (j) Selective conferencing
- (k) Station busy feature
- (l) Off-premise stations
- (m) Add- on conferencing
- (n) Busy tone to a calling station when the called station is busy on the secondary link.
- (o) Preset conferencing as described in 2.04 with the added feature of the calling station receiving a busy signal when a station that is part of the preset conference arrangement called is busy on the secondary link. Busy tone would be heard until the first called station answers.
- (p) Camp-on when associated with a two-link system and using the 224A KTU (MD) has two phases of operation.
  - (1) Camping on a busy system (both links in use) as described in 2.04 with the camp-on control circuit locking operated under control of the secondary link. The release of the secondary link and the transfer operation freeing the primary link would allow the called station to be signaled automatically. Had the primary link released first, the camped-on condition would have persisted until the secondary link had released, even though a link is available.
  - (2) The second phase of operation allows a calling station to camp on when a station that is busy on the secondary link is called. Under this condition the calling station receives

per 2.04

per 2.03

the busy tone and then reserves the intercom system until the secondary link releases.

- (q) Camp-on when associated with a two-link system and using the 224B KTU permits the camp-on circuit to cut through when either the primary or the secondary link becomes available and the called station is idle.

**Note:** When the 6A system is equipped with station busy circuits, a camped-on call will not cut through until all station busy circuits are normal.

**APPLICATION**

**2.06** Used in conjunction with CO or PBX line circuits normally connected to 1A, 1A1, or 1A2 Key Telephone Systems or 100A, 101A, or B, or 102A Key Equipment.

**ORDERING GUIDE**

**2.07** Unit, Telephone, Key \_\_\_\_.

**Note:** Order required units per Table A.

**2.08** A two-talking link 6A Key Telephone System is available in packaged form. For information see Section 518-210-402.

**ASSOCIATED APPARATUS**

**2.09 Power Supply**

(a) The 6A Key Telephone System is designed to operate from a 20- to 26-volt dc source. Since associated installations of other key equipment or key systems may operate at a somewhat lower value, 14 to 26 volts, it may be necessary to replace the existing power supply or use an independent supply for the 6A system equipment.

(b) The J86731A, List 4 (101G) power plant may be used as an independent power supply for any size and arrangement of the 6A Key Telephone System with the following limitations:

- No load other than the 6A is placed on the power plant.
- 20-volt talk terminals are used only for battery designated A.

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- 20-volt signal terminals are used only for battery designated B.
- 18-volt ac terminals, audible and/or visual signals, do not exceed 1.4 amperes.
- 10-volt ac terminals operate a maximum of seventy-two 51A lamps, current drain not to exceed 2.8 amperes.



**When 10- and 18-volt ac taps are used on the power plant, the maximum total current drain shall not exceed 1.4 amperes.**

- 105-volt  $\pm$  terminals operate simultaneously one to eight high-impedance ringers without capacitors or one or two high-impedance ringers with capacitors (one to three if 70 to 110 volts or one to five if 60 to 110 volts is permitted).
  - If circuit failure occurs due to low line voltage, move the primary tap to 111 volts.
- (c) The following power plants have a capacity large enough to be used as a common power plant for combined station systems:

- J86471B, List 1 (101J)
- 19- or 20-type
- 29- or 30-type

(d) When ringers are used as audible signals, a separate power source supplying 105 volts 20 cycles must be provided when using the 101J power plant. The 20- and 30-type power plants include a 30-cycle ringing supply.

**Note:** When using the 30-cycle supply, off-premise stations must not be equipped with intermediate transmission or toll ringing repeating facilities.

(e) For power supply arrangements, refer to Section 167-400-180.

(f) When central office, building, or local battery is supplied, fuse as follows:

- One 2-amp fuse for talking battery designated A.
- One 2-amp fuse for signaling battery designated B.
- One 2-amp fuse per maximum of 36 signal lamps.
- One 2-amp fuse for dc audible signal supply.

**Note:** When the same dc source is used for talking and audible signal operation a noise suppression capacitor, such as the 23A KTU, should be installed across the battery supply.

**2.10** Apparatus mountings, cabinets, and relay racks for mounting key telephone units of a 6A system are as follows:

(a) Apparatus Mountings

- 16-type
- 26-type

(b) Cabinets

- 11 and 18 plate
- 26 plate
- 45 plate
- Floor-supported

(c) Relay Racks

- Wall
- Floor-supported

**TABLE A**  
**KEY TELEPHONE UNITS**

KTU CODE	CIRCUITS	QUANTITY REQUIRED	USE			PANEL WIDTH		FIG. NO.
			SEL-ONLY ARR	SINGLE-LINK ARR	TWO-LINK ARR	INCHES	7/16-INCH MODULES	
207C	Selector	1 per system	●	*	●	5-7/32	12	5
215A	3-station signaling	1 per 3 additional stations		●		3-29/32	9	6
216A	Transfer	1 per additional 9 codes	●	*	●	3-1/32	7	7
217B	Preset conference control	1 per 2 conference arr	●	●	●	3-15/32	8	8
	Conference time-out	1 per system		●	●			
222A	Battery feed and 9-station signaling	1 per system			●	23	49	9
223A	3-station signaling	1 per 3 additional stations			●	5-2/32	13	10
224B	Busy signal and camp-on control	1 per system		●†	●	3-15/32	8	11
225A	Long line	1 per off-premise station	●	●	●	2-5/32	5	12
226B	Add-on conference control	1 per CO or PBX line to be conferenced	●	●	●	3-15/32	8	13
227B ‡	Ringing and tone control	1 per system equipped with dial tone and interrupted ringing		●	●	3-1/32	7	14
	Single line add-on transfer	1 per 3 control stations each originating 1 add-on conference line		●	●			
	Auxiliary relay busy lamp	1 per system when over 40 line busy lamps	●	●	●			
	Auxiliary relay lamp flash	1 per system when over 20 simultaneous flashing lamps		●	●			
	Station busy	1 per 3 stations		●	●			
228A	Blank apparatus panel assembly	As required for bridging purposes	●	●	●	3-15/32	8	
229B	Single or Multiple line add-on transfer	1 per control station originating 1 to 7 add-on conference lines		●	●	3-1/16	7	15
232§ type	Electromechanical flash, wink, ring, and time-out, when equipped with KS 15900, List 1 interrupter	1 per system for flashing lamps, busy tone, and interrupted ringing		●	●	3-15/32	8	16
234A	Battery feed, 9-station signaling, selector, and transfer	1 per system		●		23	49	17
247B	TOUCH-TONE adapter	1 per system	●	●	●	7-15/32	17	18
19B§	Flashing	1 per system for flashing lamps and busy tone		●	●	Mounting detail per local engineering		

\* Equivalent of one of these units is included as part of the 234A KTU

† Supply only when camp-on, dial tone, ringing tone, or station busy circuit is furnished

‡ Unit consists of three identical relays. Some features listed require one or two relays. Remaining relay(s) may be utilized for other features.

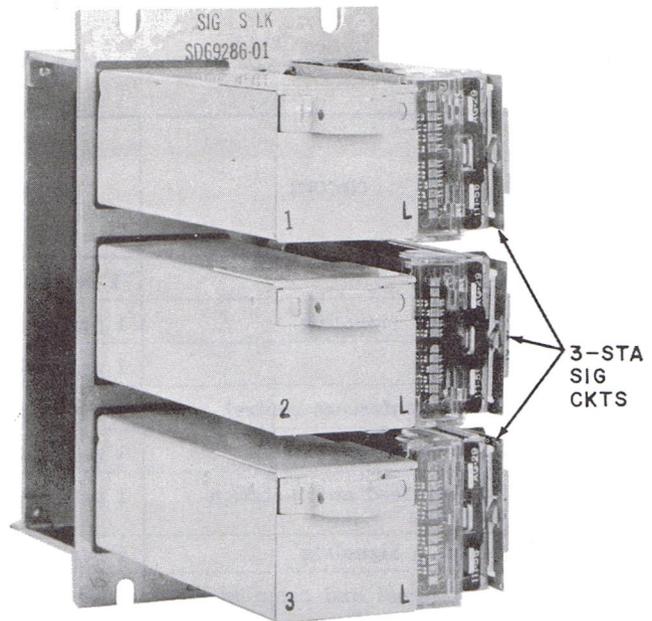
§ The required interruptions may be furnished by an associated key telephone system.

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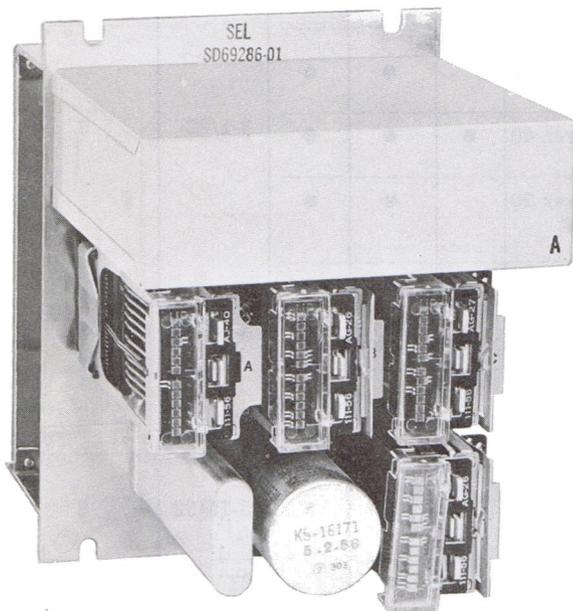
(d) To determine the size of the mounting facility, the following should be taken into consideration:

- Type 6A arrangement
- Number and size of key telephone units required
- Future requirements
- Mounting of power supply
- Whether 6A system to be mounted separately or combined in same facility with associated key system.

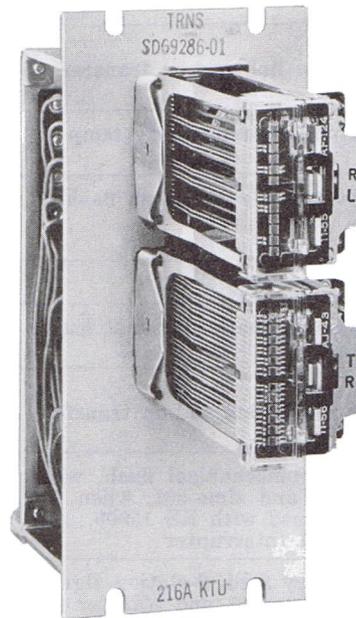
(e) Refer to Section 463-140-100 for identification of the mounting facilities.



**Fig. 6—215A KTU, Signaling Circuit, Single-Talking Link**



**Fig. 5—207C KTU, Selector Circuit**



**Fig. 7—216A KTU, Transfer Circuit**

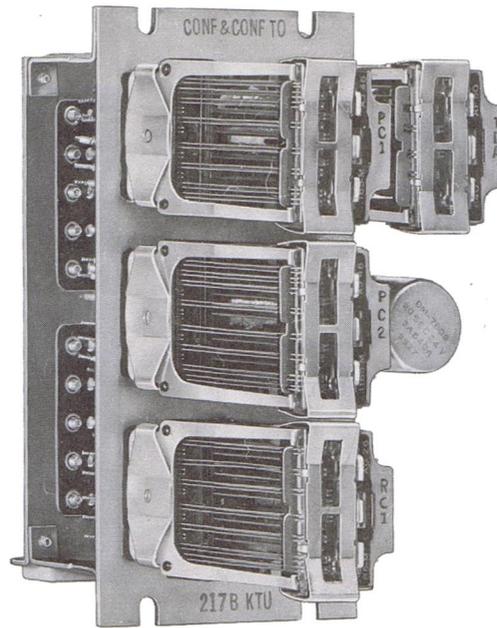


Fig. 8—217B KTU, Preset Conference Control Circuit

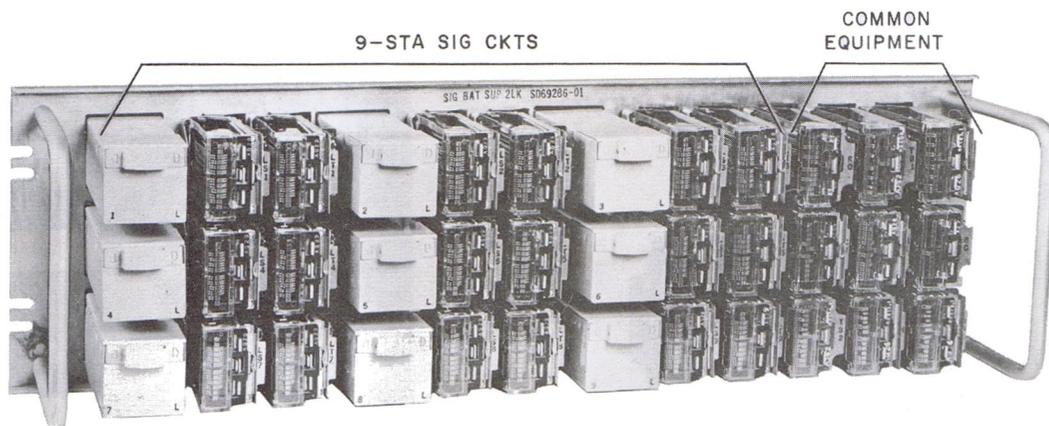


Fig. 9—222A KTU, Battery Supply and Signaling Circuit, Two-Talking Link

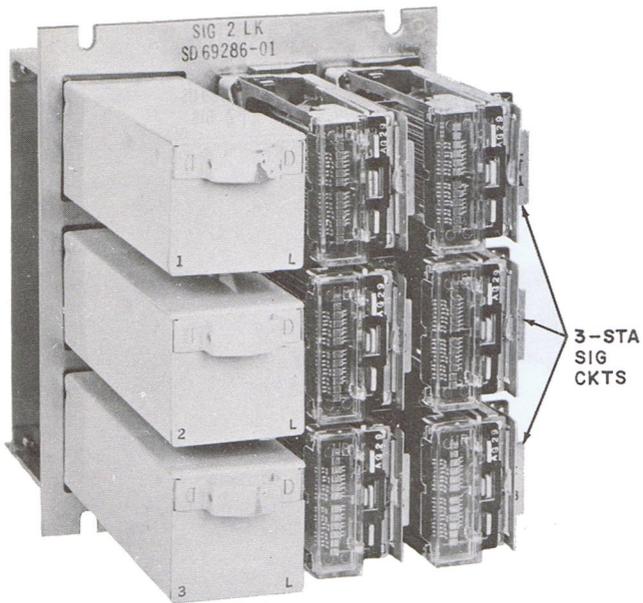


Fig. 10—223A KTU, Station Signaling Circuit, Two-Talking Link

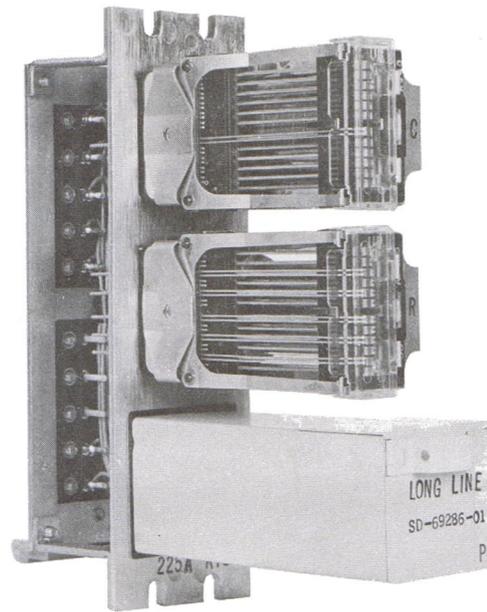


Fig. 12—225A KTU, Long Line Circuit

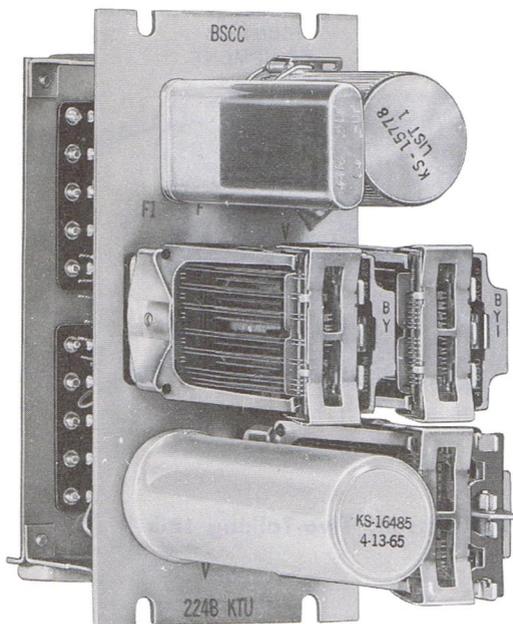


Fig. 11—224B KTU, Busy Signal Camp-On Control Circuit

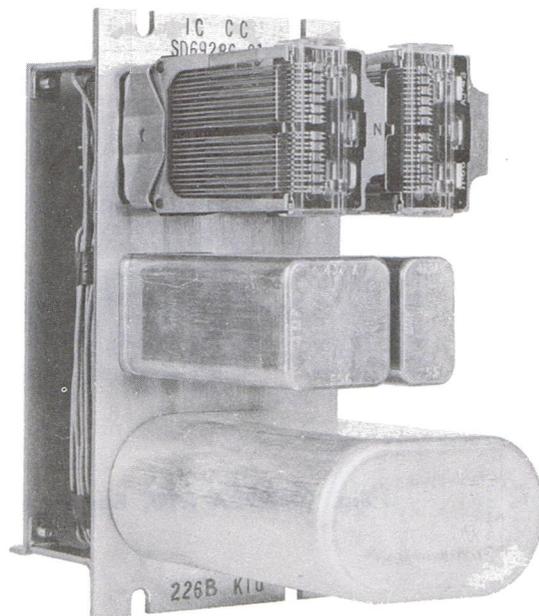


Fig. 13—226B KTU, Add-On Conferencing Control Circuit



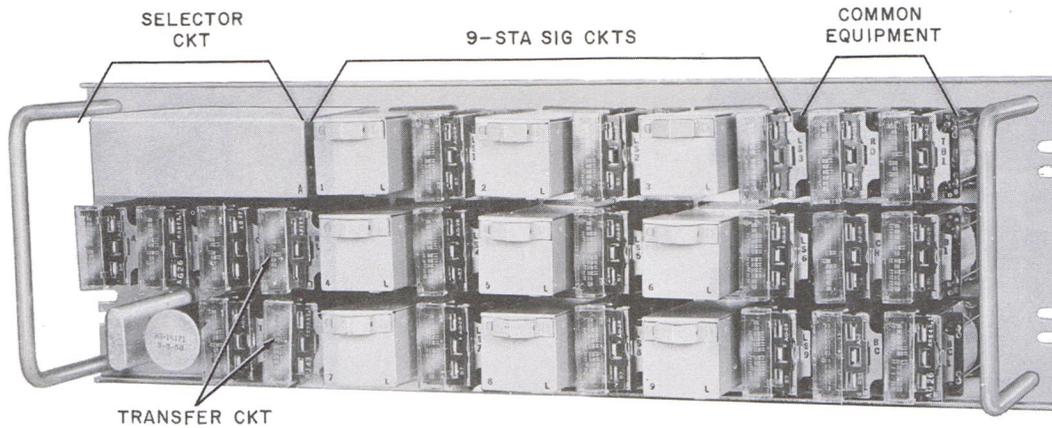


Fig. 17—234A KTU, Battery Feed and Signaling (Single-Link) Selector and Transfer Circuit

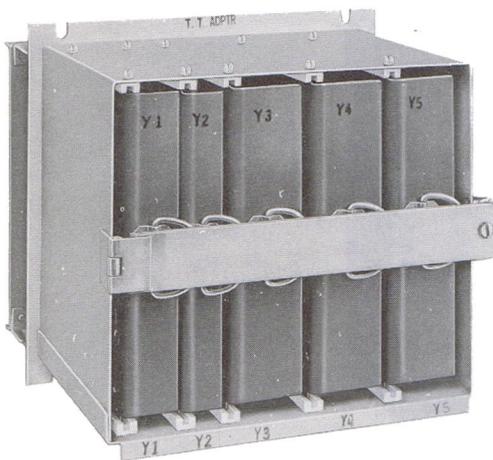


Fig. 18—247B KTU, TOUCH-TONE Adapter

### 3. INSTALLATION

3.01 Before commencing the installation of a 6A system arrangement observe the following:

- Determine from the service order and work sheet the type arrangement and features required by the customer.
- Select the key telephone units required by referring to Table A.
- Select a suitable mounting facility.
- Select an adequate power supply.

3.02 A careful review of the immediate needs of the customer, together with a consideration for his future rearrangements and requirements, will be beneficial in determining the method of installation. Since each installation will vary to a degree because of individual requirements, they

should be arranged in a manner that will permit maximum flexibility under the particular circumstances.

**3.03** The installation of apparatus, key telephone units, keys, station sets, and other items common to general station work is covered in the section pertaining directly to each item.



**Handling of key telephone units sometimes results in damage to wire-spring relays. After mounting, visually inspect all wire-spring relays for the following:**

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

**3.04** Certain features can be obtained by strapping between individual key telephone units. Other features require such leads as *T*, *R*, *L*, *LG*, *S*, *SI*, *A* and *AI*, normally associated with station apparatus. For ease of wiring both at the time of original installation and at the time of future additions or rearrangements, it is suggested that such leads be brought out and terminated at a common cross-connecting point.

**3.05** Plant series sections covering the 6A Key Telephone System arrangements are as follows:

(a) Connections

- 518-410-400—Selector Only
- 518-410-401—Single-Talking Link

- 518-410-402—Two-Talking Link

(b) Maintenance

- 518-410-300—Selector Only
- 518-410-301—Single-Talking Link
- 518-410-302—Two-Talking Link

**3.06** Information covering the 247A (MD) and 247B (TOUCH-TONE adapters) key telephone units are covered in Sections 518-310-113 and 518-310-114, respectively.

**3.07** For maintenance of the 204-type selector which is a part of the 207C or 234A KTU refer to Sections 069-339-801 and 026-708-801.

**3.08** For detailed operational information refer to the following:

- CD- and SD-69286—Intercommunicating Line Circuit
- CD- and SD-69288—Panel Mounted Units
- CD- and SD-69294—Visual and Audible Signal Circuits
- CD- and SD-69447—TOUCH-TONE Adapter Circuit (247A KTU)
- CD- and SD-69529—TOUCH-TONE Adapter Circuit Type D2 (247B KTU)