

Fig. 1—311A16D Key Service Unit

◆ TABLE A ◆

## REPLACEABLE KSU COMPONENTS

COMPONENTS		REQUIRED PER KSU	
DESCRIPTION	CODE	311A15(MD)	311A16D
Selector	207C	1	1
Amplifier and Tone Supply (Note 1)	57A (MD) 57B	1	1
Tone Cutoff and Current Limiting Circuit (Note 2)	252A (MD) 252B	1	1
Switching Unit (Note 3)	253A (MD) 253B	1	1
Connecting Blocks	66B3-50	4	4
Apparatus Mounting	16C	1	1
Cover	117A	1	1

*Notes:*

- The 57B control unit is electrically interchangeable with the 57A when terminals 7 and 8 are strapped rather than 7 and 17. These units are equipped with the following boards:

	<u>57A Control Unit</u>	<u>57B Control Unit</u>
Receiver	812459212 or P-24E921	812853224 or P-28E322
Transmit	812459279 or P-24E927	812853232 or P-28E323
Control	812459246 or P-24E924	812853240 or P-28E324

- The 252A KTU does not provide the current limiting circuit and is not interchangeable with 252B KTU.
- The 253B KTU provides improved transmission path. Not interchangeable with 253A KTU in 311A16D KSU but 311A15 can be modified to accept 253B KTU.

(c) *Replaceable Optional Components:*

- KTU, 253B ) One of each required for expansion of each additional six stations in 311A16D KSU
- KTU, 216B )
- KTU, 253A ) One of each required for expansion of each additional six stations 311A15 (MD) KSU
- KTU, 216B )

**Note:** 216B KTU must be used since it is not mechanically interchangeable with 216A KTU.

- D-180006 Kit of Parts - required at each station equipped with 3-type speakerphone

to limit the volume of the 55-type control unit. **Not required with 4-type speakerphone.**

- Speaker, Loud, KS-16846L1 - used at outdoor or noisy locations where additional speaker volume is required.
- KTU, 227B - one required for each three stations desiring a bell or buzzer in lieu of the tone signaling from the 694-type subset.
- KTU, 237B - PBX add-on circuit for 311A16D KSU - 311A15 (MD) KSU must be modified
- TOUCH-TONE ® option

◆ TABLE B ◆

COMPONENTS REQUIRED WITH 247-TYPE KTU

COMPONENTS	247A KTU (MD)	247B KTU
Resistor, 1000 ohm, 1 watt KS-13491L1 or equivalent	1	
Diode, 400J or equivalent	3 plus 1 per A lead	1 per A lead
KTU, 228A	1	1

(d) **Components for Addition of PBX Add-On Option to 311A15 (MD) KSU**

- KTU, 237B
- KTU, 227-type or equivalent
- Resistor, 100 ohm, 10 watt KS-14603L2A or equivalent
- Resistor, 226 ohm, 3 watt or equivalent (2 required)

(e) **3-Type Speakerphone Service:** Refer to Section 512-620-100.

(f) **4-Type Speakerphone Service:** Refer to Section 512-700-100.

**Design Features**

- (a) The basic KSU package is equipped to perform switching and signaling functions for up to six stations (1st group).
- (b) Space and wiring are provided for growth, in increments of 6, to a maximum of 18 stations. One 253-type and one 216B KTU must be ordered and installed separately (see Ordering Guide) for each additional group of six stations.

**Note:** Modification of the 311A15 (MD) KSU is required when using the 253B KTU for expansion.

- (c) All components of the KSU are factory-wired to the four 66B3-50 connecting blocks.
- (d) Individual stations or conference groups are selected by dial or nonlocking signal key.

(e) Dialing codes and key designations assigned to the stations within each group are as follows:

GROUP	DIAL CODE AND DESIGNATION	CONFERENCE SELECTION
1st	4 to 9	0 or 0BC
2nd	21 to 26	20 or 20BC
3rd	27 to 29, 31 to 33	30 or 30BC

Dial code 1 is not used due to the operation of the 207C selector and 2 and 3 are reserved as first digits in the two digit codes.

**Note:** Any station may be assigned to another conference group or may appear in all conference groups. However, each group is limited to six stations or stations and extensions.

(f) Control of line seizure tone to originating station and tone signaling at called station (252-type KTU). The 252B KTU in the 311A16D KSU also provides a current limiting circuit for improved transmission.

(g) Hands-free listening and talking at a called station equipped with a subset. The 694-type subset provides loudspeaker volume control. In addition, the 694B provides an OFF-ON switch for individual control of subscriber sets.

**Note:** Hands-free conversation is not possible between subsets connected as extensions to one station code.



**There are limitations to the use of the 694-type subscriber sets in noisy locations. The limitations and rules pertaining to proper installation of the subscriber set are described in Part 3.**

- (h) Voice switching amplifier when using hands-free operation, and tone supply 57-type control unit.
- (i) Additional speaker coverage in noisy locations (KS-16846L1 loudspeaker).
- (j) Intermixed rotary and TOUCH-TONE dial stations (247-type and 228A KTUs).

(k) Audible signaling to a called station not equipped with a 694-type subscriber set (227A or B KTU).

(l) Any key or nonkey telephone set wired for **A** lead control can be used at the stations.

(m) Two-way voice communication between any two telephone equipped stations.

(n) Conferencing from any telephone equipped station to any one of three groups of up to six stations.

(o) Circuit busy lamp at each station and flashing incoming lamp at called stations where associated telephone is provided. (Interrupter unit is not provided by the system. Provide visual signal from associated key system or an equivalent circuit.)

(p) Bridging one or more PBX lines to any 2A system station (a 237B KTU per line) with the following limitations.

(1) The PBX lines associated with the bridging circuit must be equipped with hold features of the same configuration.

(2) The bridging circuit allows **only** handset operation when connected to PBX line.

(3) Up to six stations using handsets may be included in a bridging conference, but is **not** recommended. Each station will subject the circuit to an additional transmission loss.

(4) The 311A15 (MD) KSU must be field-modified to accept the bridging KTU. (The modification also provides a current limiting circuit for improved transmission.)

**Note:** A modified 311A15 (MD) KSU provides a circuit which is electrically the same as the circuit provided by the 311A16D KSU.

#### Application

(a) Designed to work with key telephone sets associated with 1A1 and 1A2 Key Telephone Systems. Optional association with PBX lines.

### 3. INSTALLATION

#### Station Components

##### (a) Installation Rules:

(1) One telephone set and/or one 694A or B subscriber set may be installed at each station. If desired, a station may be equipped with subscriber set only.

**Note:** The maximum number of subscriber sets for a conference group is six. If subsets are connected as extensions to a station, the number of subset equipped stations in the conference group must be reduced by a like number. More than six telephone sets can be connected in a conference group but those in excess of six must be connected as extensions to one of the station codes. Any bridged telephone set going off-hook will cut off the conversation between hands-free stations.

(2) The subscriber set need not be placed in same location as telephone set.

**Note:** A subscriber set may be located on a loading dock, and the telephone set placed inside to allow locking at night. Locate telephone at closest possible point to outside unit.

(3) Inform customer that due to a voice switching amplifier, the system **may not** function satisfactorily in noisy locations unless **only** handset-to-handset operation is used.

**Note:** A noisy location exists when there is any objectionable disturbance which is as loud or louder than the speech level of, and not directly related to, the conversation used during hands-free operation.

(4) Satisfactory hands-free operation can be expected if normal conversations are conducted within 3 feet of the microphone. This distance may be increased as the voice level is raised above normal levels.

(b) Install telephone set and/or 694A or B subscriber set at each station. Rotary and TOUCH-TONE dial sets may be intermixed, but each must be wired for **A** lead control.

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- (c) Nonplug-ended station sets—subscriber set may be connected to 44- or 66E-type connecting blocks. Plug-ended sets—a 149A adapter, or equivalent, is required to bring out the subscriber set leads.
- (d) If wider area coverage is required, install a KS-16846L1 external loudspeaker. Position loudspeaker more than 3 feet and facing 90 degrees or more away from subscriber set.
- (e) Maximum dc loop resistance of 50 ohms for telephone set as well as for subscriber set.

### **311A15 (MD) or 311A16D KSU**

- (a) Locate KSU near associated 1A1 or 1A2 Key Telephone System. Install apparatus mounting per Division 463.
- (b) KSU is equipped for six stations. Install a 216B and 253-type KTU for each additional six stations at the locations shown in Fig. 1 and 2.

**Note:** As indicated in Table A, the 253A KTU is not interchangeable with the 253B. In addition the 216B KTU is not mechanically interchangeable with the 216A.

- (c) When necessary, install a distribution frame between KSU and key telephone system to provide a cross-connect terminal field for adding or changing lines or stations.
- (d) Inspect the 57-type control unit to ensure the three printed circuit boards are properly seated.

### **Optional Components**

- (a) Separate mounting facilities must be provided for the optional components (Fig. 5). No provision is made for their inclusion in the KSU.
- (b) TOUCH-TONE Stations—when TOUCH-TONE stations are provided, install an adapter (247-type KTU) and terminating facilities (228A KTU).
- (c) PBX add-on feature:
  - (1) Install one 237B KTU for each line to be bridged to the system. A 227-type KTU

or equivalent must also be added when the add-on is provided in the 311A15 (MD) KSU.

- (2) Provide nonlocking key and lamp at each station controlling add-on circuit. Key and lamp can be part of the telephone set or external.
- (3) Control stations must be equipped with a hold key.
- (d) **D-180006 Kit of Parts:** When a station is equipped with a 3-type speakerphone, install a D-180006 Kit of Parts in the associated 55A or B control unit as follows:

- (1) Remove upper left terminal board mounting screw from control unit.
- (2) Install printed wiring board using longer screw furnished with key.

(e) **227A (MD) or B KTU:** When an audible signal, ie, a bell or buzzer, is desired at a station in lieu of a 694-type subscriber set, install a 227A or B KTU near the KSU. The KTU will provide an audible signal circuit for three stations.

### (f) **Power Supply:**

- (1) If power supply associated with key telephone system is insufficient to supply the 2A Communication System, install a 19- or 20-type power unit, a 101G (J-86731A), or equivalent power supply.
- (2) Lamp supply should be from 10-volt ac terminals or from same supply provided for associated equipment.
- (3) Obtain interruptions for lamp signals from key system interrupter unit or equivalent circuit.

**Note:** For interrupted lamp signals, an *ST* lead also must be provided to associated equipment to start the common interrupter unit. In earlier 2A Communication Systems, the start lead may be designated *TO*.

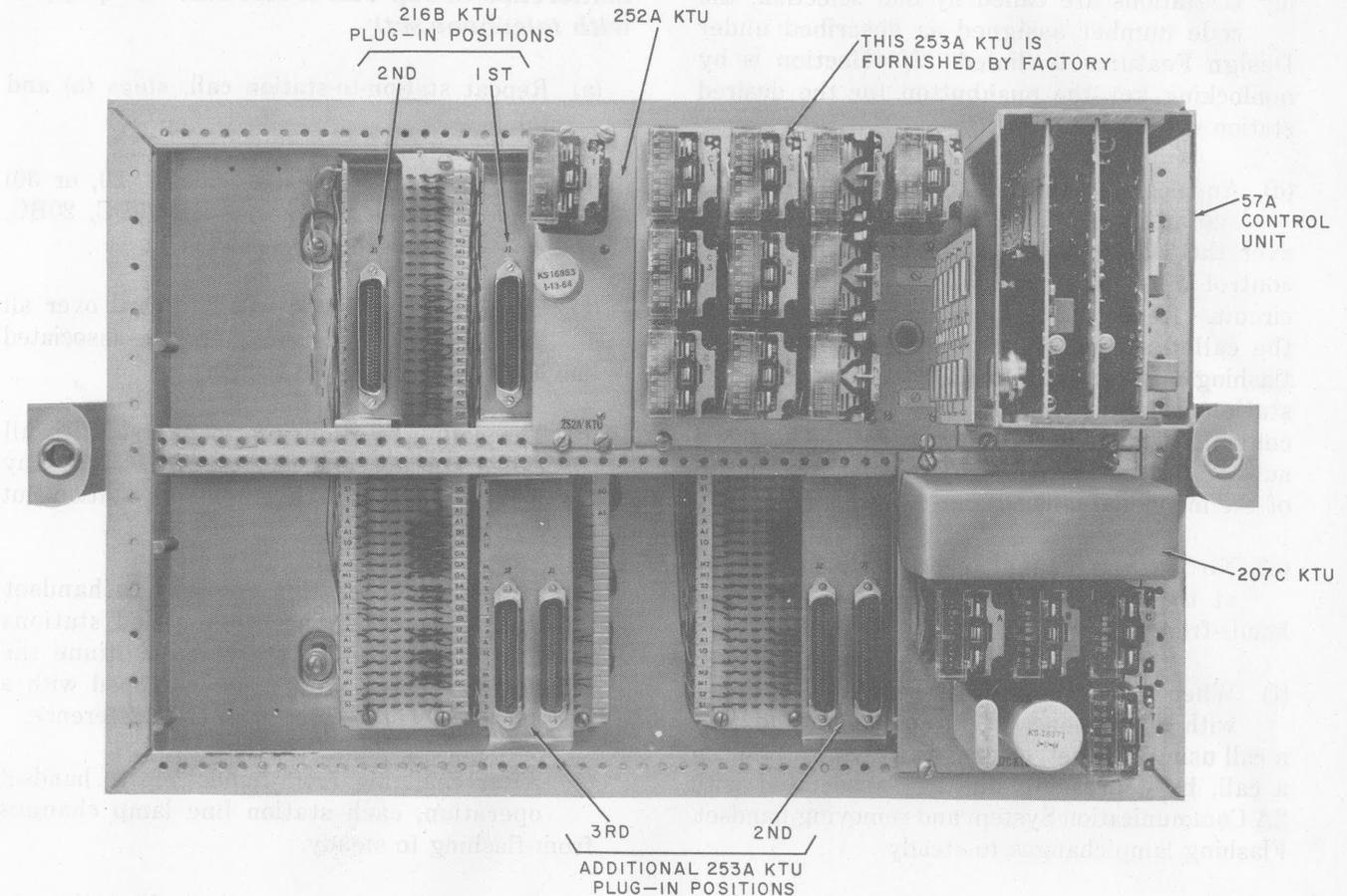


Fig. 2—311A15 (MD) Key Service Unit

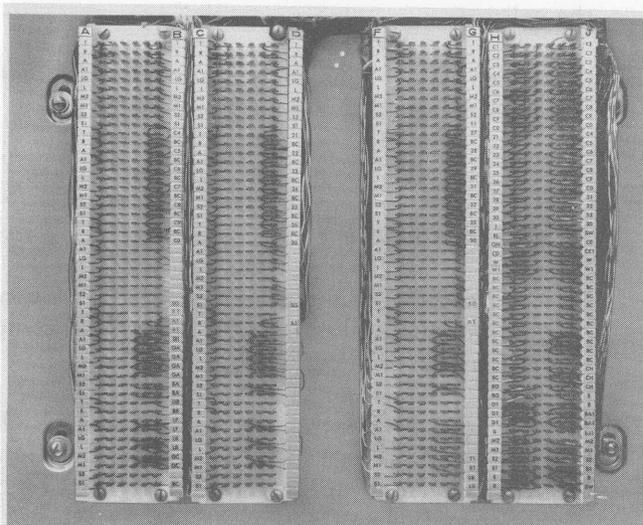


Fig. 3—66-Type Connecting Blocks A to J for 311A16D or 311A15 KSU

#### 4. OPERATION

##### *Station-To-Station Call (From station equipped with telephone set)*

- (a) If using key telephone set, depress line button associated with 2A Communication System and lift handset. If nonkey set, merely lift handset.

**Note:** An off-hook condition at any station disconnects the associated microphone and speaker.

- (b) Line seizure tone will be heard and the associated line lamp will light steady. The steady lamp will also appear at all other 2A Communication System stations to indicate the circuit is busy.

- (c) If stations are called by dial selection, the code number assigned as described under Design Features is dialed. If selection is by nonlocking key the pushbutton for the desired station is operated.
- (d) An incoming call is indicated at the called station by a 1/2 second, 550-660 cycle tone over the station loudspeaker from the 57-type control unit, under control of the tone cutoff circuit. At the same time the steady lamp at the called station, if supplied, will change to flashing and continue to flash as long as called station is hands-free. Volume of the tone is controlled by the 694-type subset. The 694B subset also has an ON-OFF switch for control of the individual unit.
- (e) No further manual operation is necessary at the called station to answer and talk hands-free.
- (f) When privacy is desired at stations equipped with a telephone set, attendant may answer a call using handset, or change to handset during a call, by depressing line key associated with 2A Communication System and removing handset. Flashing lamp changes to steady.
- (g) When called station is using handset, it may return to hands-free operation by replacing handset. Steady lamp changes to flashing.



***When a called station is using hands-free operation, a third station connecting to line over a busy signal will cut off the called station. When third station hangs up, the system returns to original call.***

- (h) When called station is using hands-free operation, calling station must hang up to release the circuit.
- (i) When called station is using handset, the last station to hang up will release the circuit.
- (j) If called station does not answer, calling station must restore handset before attempting second call.

***Conference Group Call (From station equipped with telephone set)***

- (a) Repeat station-to-station call, steps (a) and (b).
- (b) Dial the designated dial code (0, 20, or 30) or operate the nonlocking key (0BC, 20BC, or 30BC) for the group desired.
- (c) The 1/2 second tone will be heard over all loudspeakers in the group and the associated line lamps will change to flashing.
- (d) The calling station may converse with all called stations and each called station may converse hands-free with the calling station but not with each other.
- (e) If any called station changes to handset during the call, the other called stations **must** also change to handset to continue the conversation. Any station not equipped with a telephone set will be cut out of the conference.
- (f) After changing from hands-free to handset operation, each station line lamp changes from flashing to steady.
- (g) When on handset operation, all stations in group may converse with each other.
- (h) A called station cannot return to hands-free operation if it has changed to handset during the call.
- (i) When using handset operation, all stations must hang up to release the circuit.

***PBX Add-On Circuit***

- (a) To bridge a PBX line to any system station, the control station establishes an incoming or outgoing connection.
- (b) The control station then places the PBX call on hold and calls the desired system station as covered in steps (a) through (c) for a station-to-station call.

**Note:** A PBX line can be connected to a conference group but it is not recommended.

- (c) The 2A station **must** go to handset operation before being connected to bridging circuit because the circuit design does not include hands-free operation at the called station.
- (d) The control station operates the nonlocking control key to bridge the system station to the PBX line. At the same time the line lamp associated with the add-on circuit will light steady.
- (e) Control station may leave established circuit by hanging up or by operating another pickup key.
- (f) Control station may rejoin an operated circuit at any time.
- (g) The circuit will terminate when all 2A stations hang up.
- (h) Control station may terminate bridging circuits by reoperating the nonlocking control key.
- (i) Control station may elect to remain connected to either the PBX line or the 2A line by operating the desired pickup key before terminating the bridging circuit.

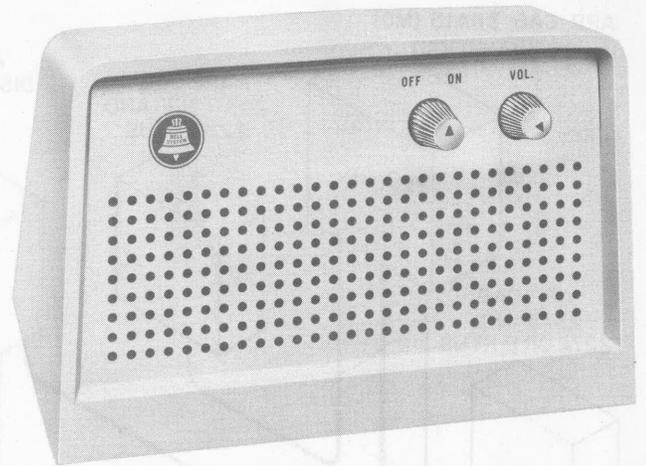


Fig. 4—694B Subscriber Set

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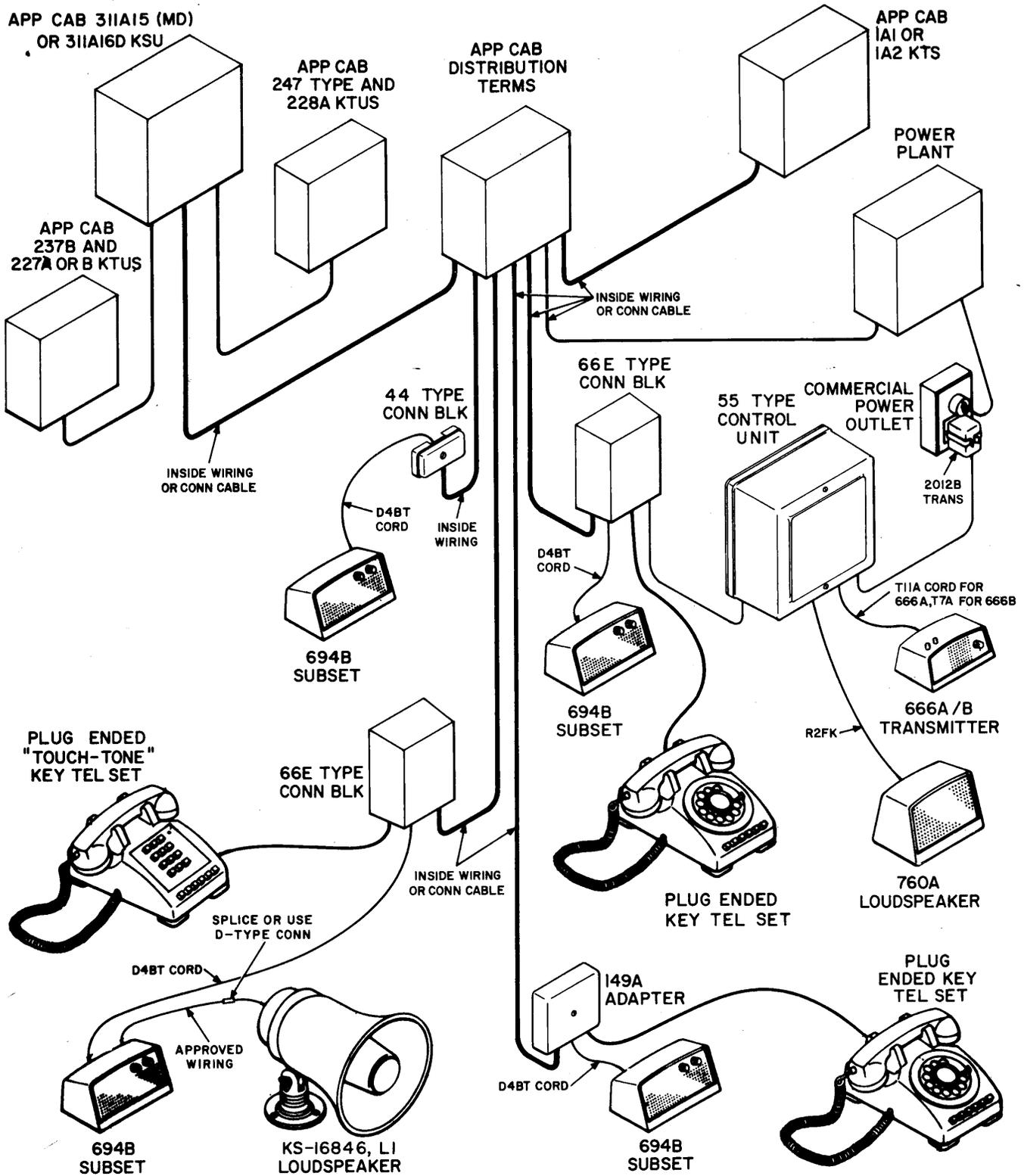


Fig. 5—Layout of Typical 2A Communication System Installation Equipped With 3-Type Speakerphone

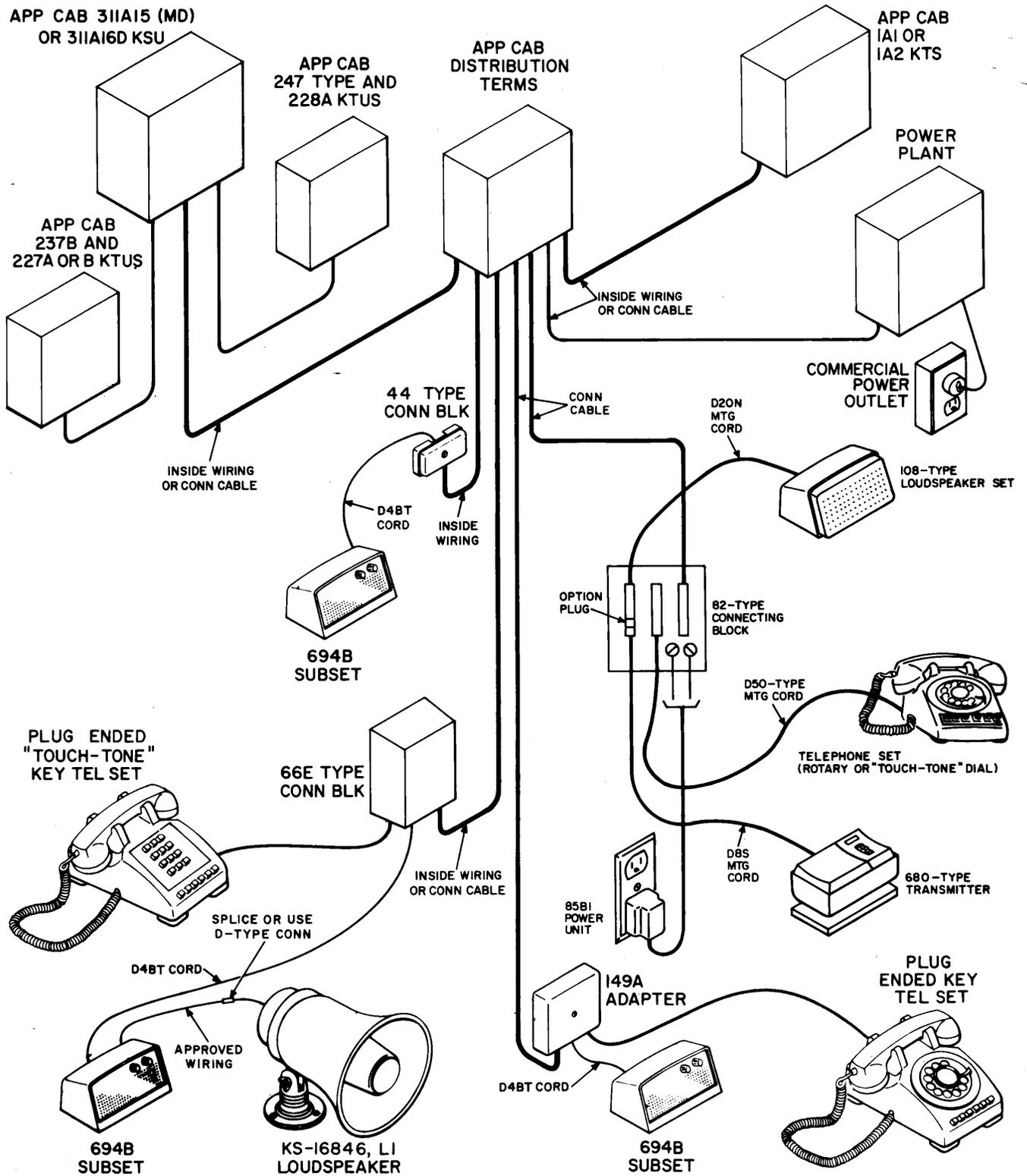


Fig. 6—Layout of Typical 2A Communication System Installation Equipped With 4-Type Speakerphone

