

NO. 2A COMMUNICATION SYSTEM (BUSINESS INTERPHONE)

IDENTIFICATION, INSTALLATION, AND OPERATION

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1. GENERAL

1.01 The 2A Communication System provides for 2-way communications between two stations or between a group of up to six stations. The system consists of one key telephone set and one 694A or B subscriber set at each station, and a 311A16D key service unit (formerly identified as a 311A15 KSU which is being rated MD).

1.02 This section is issued to cover information previously contained in Sections 518-430-100 and 518-430-200 which are hereby canceled, and to include information on the following:

- 311A16D KSU.
- 247-type KTU TOUCH-TONE® adapter and associated 228A KTU.
- 227B KTU.
- 237B KTU add-on conference unit.
- Field modification of 311A15 KSU (MD) to include PBX add-on circuit.
- Field modification of 311A15 (MD) KSU to use 253B KTUs when expanding system stations.
- Change lead designation from *TO* to *ST*.

2. IDENTIFICATION

(a) *Ordering Guide for 2A Communication System*

(1) *Basic Replaceable Components*

- Set, Subscriber, 694A-(*) or Set, Subscriber, 694B-(*)
- Set, Telephone, Key (wired for A lead control)
- Unit, Service, Key, 311A16D
- (*) -3 (black), -51 (moss green), -58 (light beige), -60 (light beige), -61 (light gray)

(2) *Replaceable Components of 311A16D KSU*

- Block, Connecting, 66B3-50
- Cover, 117A
- Mounting, Apparatus, 16C
- Unit, Control, 57B
- P-28E322 Printed Wiring Board Assembly (Receive)
- P-28E323 Printed Wiring Board Assembly (Transmit)
- P-28E324 Printed Wiring Board Assembly (Control)
- Unit, Telephone, Key, 207C
- Unit, Telephone, Key, 252B
- Unit, Telephone, Key, 253B

(3) *Replaceable Optional Components*

- Unit, Telephone, Key, 216B
 - Unit, Telephone, Key, 253B
- } system expansion of six additional stations
- Kit of Parts, D180006 (3-type speaker-phone station)
 - Speaker, Loud, KS-16846, L1 (external loudspeaker)
- Unit, Telephone, Key, 227 B (one for each three stations)
- } audible signaling
- Unit, Telephone, Key, 237B (PBX add-on circuit)

- Resistor, 1000-ohm, 1 watt, KS-13491, L1, or equivalent
- Diode, 400J, or equivalent (3 required plus 1 for each A lead)
- Unit, Telephone, Key, 228A
- Unit, Telephone, Key, 247A
- P-48F439 Printed Wiring Board Assembly (PC1)
- P-48F442 Printed Wiring Board Assembly (PC2)
- P-48F445 Printed Wiring Board Assembly (PC3)

TOUCH-TONE circuit using 247A (MD) KTU

- Diode, 400J, or equivalent (one required for each A lead)
- Unit, Telephone, Key, 228A
- Unit, Telephone, Key, 247B
- Pack, Circuit, Nos. Y-1 through Y-5 (ordered individually)

TOUCH-TONE circuit using 247B KTU

(4) *Components for Optional Field Modification of 311A15 KSU (MD)*

- Resistor, 100-ohm, 10-watt, KS-14603, L2A, or equivalent
- Resistor, 226-ohm, 3-watt, KS-14603, L3A, or equivalent (two required)
- Unit, Telephone, Key, 227A, or B, or equivalent
- Unit, Telephone, Key, 237B

PBX add-on circuit

(b) *Design Features*

(1) The basic KSU package is equipped to perform switching and signaling functions for a system of up to *six stations* (first group).

(2) Space and wiring are provided in the KSU for growth, in increments of 6, of up to 18 stations. One 253A or B and one 216B KTU must be ordered separately and plugged into their respective connectors (Fig. 1 or 2) for each additional group of six stations.

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

(3) Major components of KSU are shown in Table A.

(4) All components of the KSU are factory-wired to four connecting blocks (Fig. 3).

(5) Dial selection or nonlocking signal key selection for a maximum of 18 stations or 3 conference groups of 6 stations each (207C and 253A or B KTUs).

(6) Dialing codes 0, 20, and 30 and nonlocking key designations 0BC, 20BC, and 30BC are preassigned to the three conference groups. The dialing codes and key designations assigned to the stations within each group are as follows:

GROUP	STATION CODES AND DESIGNATIONS	CONFERENCE SELECTION
First	4 to 9	0 or 0BC
Second	21 to 26	20 or 20BC
Third	27 to 29, 31 to 33	30 or 30BC

TABLE A
KSU COMPONENTS

COMPONENTS	REQUIRED PER KSU	
	311A15 (MD)	311A16D
207C KTU — Selector	1	1
57A (MD) Control Unit — Amplifier and Tone Supply	1	
57B Control Unit — Amplifier and Tone Supply		1*
252A (MD) KTU — Tone Cutoff	1	
252B KTU — Tone Cutoff and Current Limiting Circuit		1†
253A (MD) KTU — Switching Unit	1	
253B KTU — Switching Unit	1§	1‡
66B3-50 Connecting Blocks	4	4
16C Apparatus Mounting	1	1
117A Cover	1	1

* The 57B is electrically interchangeable with 57A (MD) when terminals 7 and 8 are strapped rather than terminals 7 and 17.

† The 252B provides a current limiting circuit not provided by a 252A (MD). Units not interchangeable.

‡ The 253B provides an improved transmission path. Not interchangeable with 253A (MD).

§ The 311A15 (MD) KSU must be modified to accept a 253B KTU.

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

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

(8) Hands-free listening and talking at the called station with loudspeaker volume control (694A or B subscriber set). The 694B provides an OFF-ON switch for individual control of subscriber sets.



There are limitations to the use of the 694A and B subscriber sets in noisy locations. The limitations and specific rules pertaining to proper installation of the subscriber set are described in 3 (a) (1) and must be followed.

(9) Voice switching amplifier when using hands-free operation, and tone supply (57A or B).

(10) Additional microphone sensitivity and speaker coverage in noisy locations (KS-16846, List 1 loudspeaker).

(11) Intermixed rotary and TOUCH-TONE dial stations (247-type and 228A KTUs).

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

(13) Key telephone sets wired for A lead control at each station.

(14) Two-way communication between any two stations.

(15) Conferencing from any station to any one of three groups of up to six stations.

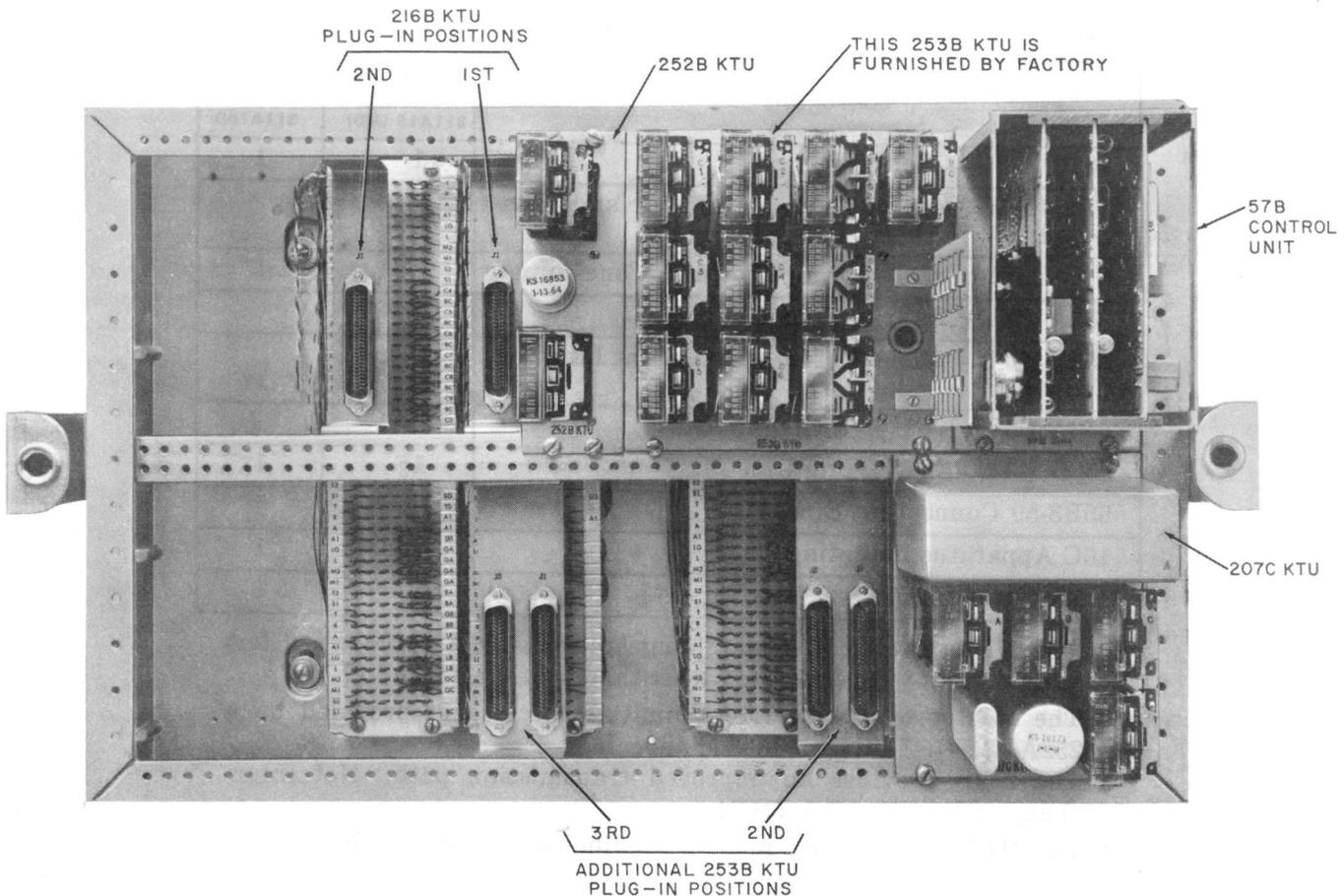


Fig. 1 — 311A16D Key Service Unit

(16) Circuit busy lamps at each station.

(17) Flashing lamp incoming visual signal to a called station or stations. (Interrupter unit is *not* provided by the system. Provide visual signal circuit from associated key system or an equivalent circuit.)

(18) Bridging one or more PBX lines to any station (a 237B KTU per line) with following limitations:

- The PBX lines associated with the bridging circuit must be equipped with hold features of the same configuration.
- The bridging circuit allows *only* handset operation when connected to PBX line.

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

- 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.

(c) **Application**

Designed to work with key telephone sets associated with 1A1 and 1A2 Key Tele-

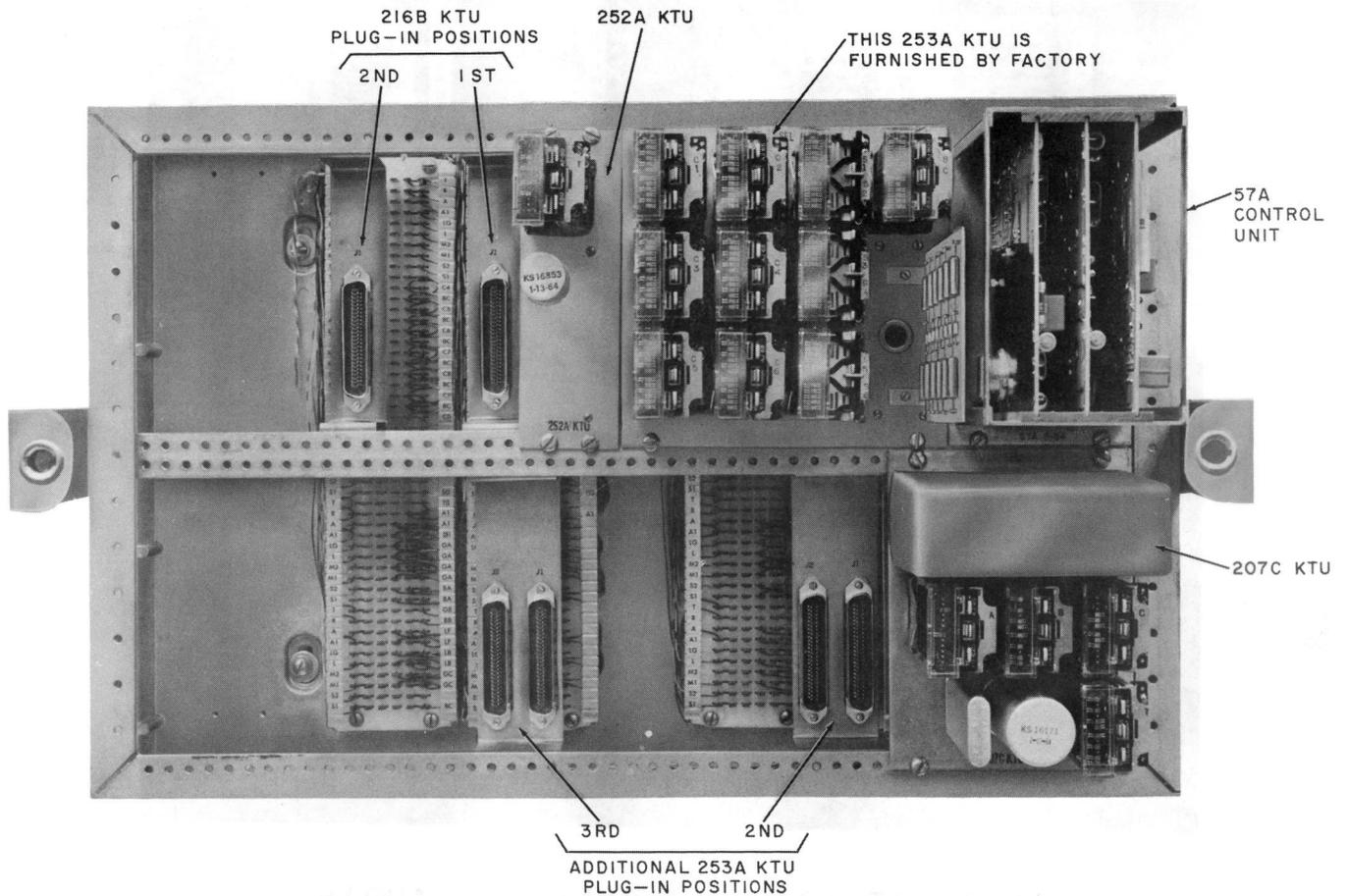


Fig. 2 — 311A15 (MD) Key Service Unit

phone Systems. Optional association with PBX lines.

(d) *Operating Features*

- (1) 694A or B subscriber set — controls (see Fig. 4)
 - VOL — volume control for subscriber set speaker or optional external loud-speaker.
 - OFF-ON — switch to enable or disable the subscriber set at will (provided on 694B subscriber set only).

3. **INSTALLATION**

(a) *Station Components:*

(1) Installation Rules



Limitations placed on the physical location of station equipment require the following rules be strictly adhered to:

- Customer must need a 2-way voice inter-phone system and *not a one-way* paging system.
- Only one telephone set and one 694A or B subscriber set may be installed at each station.

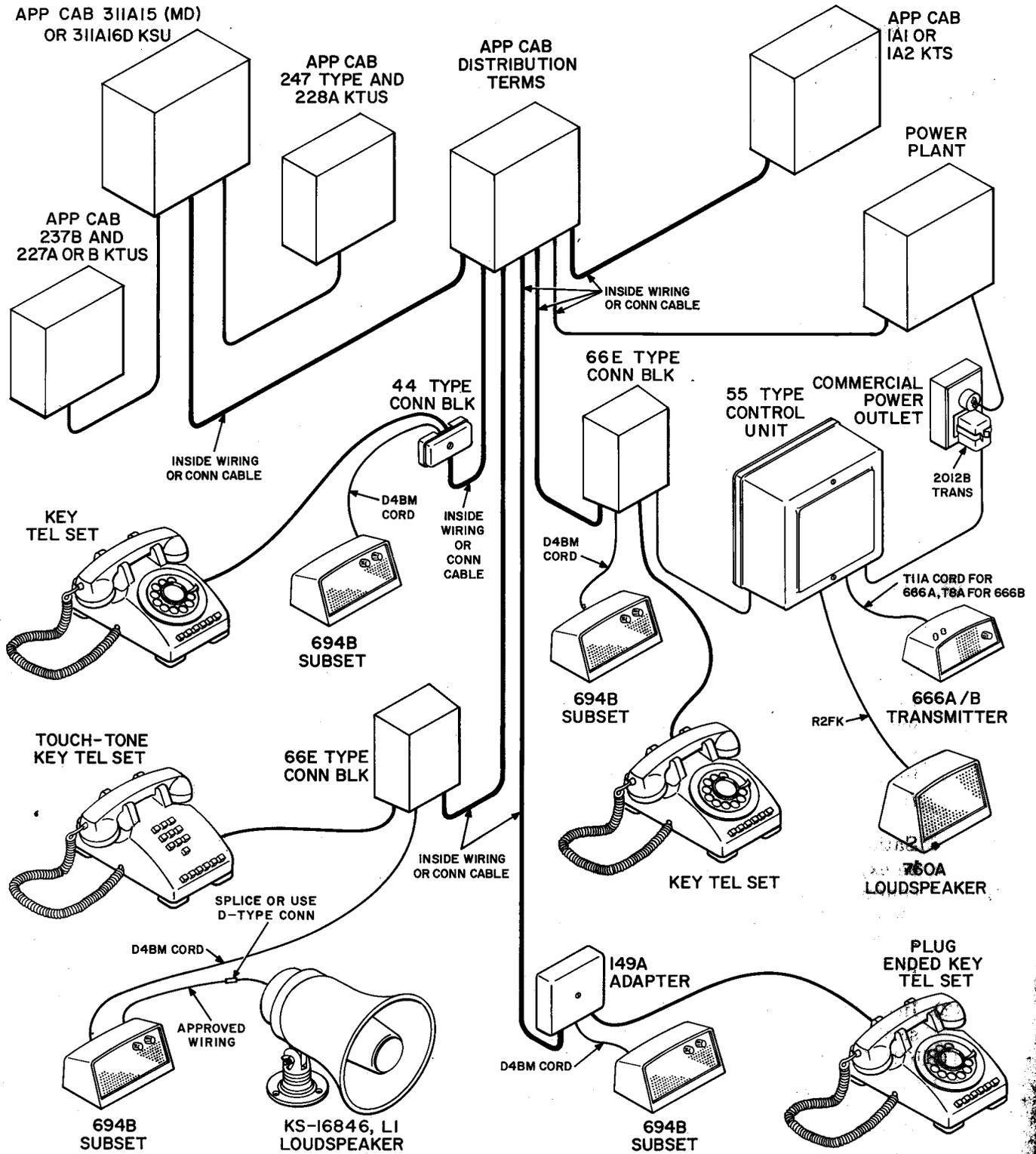


Fig. 5 — Layout of Typical 2A Communication System Installation

Note: Extension station sets are *not recommended* because of transmission impairment, a bridged station using handset cuts off the hands-free station, and bridged stations not being able to conduct hands-free conversation with each other.

- The subscriber set must be placed in same location as telephone set. **The attendant must be able to hear and be heard clearly over the unit while at the telephone location.**

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

- 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.

- 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.
- (2) Install telephone set and 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.
 - (3) 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.
 - (4) If wider area coverage is required, install a KS-16846, List 1 external loud-

speaker. Position loudspeaker more than 3 feet and facing 90 degrees or more away from subscriber set.

- (5) Maximum dc loop resistance of 50 ohms for telephone set as well as for subscriber set.

(b) **311A15 (MD) or 311A16D KSU:**

- (1) Locate KSU near associated 1A1 or 1A2 Key Telephone System. Install apparatus mounting per Section 463-140-200.
- (2) KSU is equipped for six stations. Install a 216B and a 253A or B KTU for each additional six stations (Fig. 1 or 2).
- (3) When necessary, install a distribution frame between KSU and key telephone system. Provides quick cross-connect terminal field for adding or changing lines or stations.
- (4) Inspect 57-type control unit to ensure the three printed circuit boards are properly seated.

(c) **Optional Components:**

(1) **247-Type KTU**

- When TOUCH-TONE stations are provided, install a 247A (MD) or B TOUCH-TONE adapter near KSU (see Section 518-310-113 or 518-310-114).
- Install a 228A KTU, or equivalent, to provide termination facilities for the adapter circuit.

(2) **237B KTU**

- When the add-on PBX line feature is desired, install (near the KSU) one 237B for each line to be bridged to the system. **Note:** A 227A or B KTU, or equivalent, must also be installed when the add-on feature is provided in a 311A15 (MD) KSU.
- Provide nonlocking key and lamp at each station controlling add-on circuit.
- Control stations must be equipped with a hold key.

(3) **D-180006 Kit of Parts:** When a station is equipped with a 3-type speakerphone, install a D-180006 kit of parts on the associated 55A or B control unit as follows:

- Remove upper left terminal board mounting screw from control unit.
- Install printed wiring board using longer screw furnished with kit.

(4) **227A 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.

(5) **Power Supply**

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

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

4. OPERATION

(a) **Dial Selection**

- (1) **To originate a call** from any station to another system station
- Depress 2A line button, remove handset.

Note: An off-hook condition at any station disconnects the associated microphone and loudspeaker for that station.

- Listen for line seizure tone, observe steady line lamp.

Note: Busy circuit steady lamp appears at all other system stations.

- Dial code number of desired station.
- If called station does not answer, calling station must hang up before attempting a second call.

(2) **Answering at called station**

- Incoming call is indicated by a 1/2-second 550-600 cycle tone over station loudspeaker.
- Steady line lamp changes to flashing.
- Attendant may answer hands-free without any manual operation.



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.

- When privacy is desired, attendant may answer a call using handset, or change to handset during a call, by depressing line key and removing handset. Flashing lamp changes to steady.
- When called station is using handset, it may return to hands-free operation by replacing handset. Steady lamp changes to flashing.

(3) **Disconnect**

- When called station is using hands-free operation, calling station must hang up to release the circuit.
- When called station is using handset, the last station to hang up will release the circuit.

(b) **Nonlocking Key Selection**

- (1) **To originate a call from another system station**

- Depress 2A line button, remove handset.
- Listen for line seizure tone, observe steady line lamp.
- Operate nonlocking pushbutton of desired station.
- After operating pushbutton, the circuit functions in the same manner as a dial initiated call.

(c) Conference Call

(1) To originate a call from any station to a conference group

- Perform same operation as for individual station call, however dial assigned code or operate designated key for the desired group.
- A 1/2-second, 550-600 cycle tone is heard over loudspeaker of each called station in the group.
- Each called station line lamp changes from steady to flashing.
- The calling station may converse with all called stations.
- Each called station may converse hands-free with calling station but not with each other.



When the called stations are on hands-free operation, any other station which connects to the line over the busy signal will cut off all called stations. All stations off-hook must hang up before the call can be originated again.

- If any called station changes to handset during the call, the other called stations **must** also change to handset to continue the conversation.
- After changing from hands-free to handset operation, each station line lamp changes from flashing to steady.
- When on handset operation, all stations in group may converse with each other.

- A called station cannot return to hands-free operation if it has changed to handset during the call.
- When using handset operation, all stations must hang up to release the circuit.

(d) Add-on PBX Line

(1) To bridge an associated PBX line to any system station

- Control station establishes an incoming or outgoing connection to the PBX line.
- Place the PBX connection on HOLD.
- Signal desired 2A station as outlined in (a), (b), or (c), to establish a talking path.

Note: A PBX line may be bridged to a conference group, but it is not recommended.

- 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.
- Operate nonlocking control key at control station to bridge PBX line to the 2A station.
- Associated circuit lamp at control station will light.
- Control station may leave established circuit by hanging up or by operating another pickup key.
- Control station may rejoin an operated circuit at any time.
- The circuit will terminate when all 2A stations hang up.
- Control station may terminate bridging circuits by operating the nonlocking control key.
- 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.