

**INSTRUCTION MANUAL
FOR
36A
KEY TELEPHONE SYSTEM**

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K36A
KEY TELEPHONE SYSTEM

1. INTRODUCTION

1.1 This section covers the general description and use of the 36A Key Telephone System.

2. GENERAL

2.1 The 36A Key Telephone System (KTS) is used in conjunction with other key telephone equipment to provide a number of central office (CO) or private branch exchange (PBX) lines on one telephone set or a combination of such lines on a number of telephone sets. The system permits the use of up to 36 TEL-TOUCH ®(T-T) and/or rotary dial telephone sets, with up to four simultaneous and private talking links providing for a 36-station Tel-Touch and/or dial selective inter-communicating circuit. The system is designed to visually and audibly signal the subscribers' station telephones in a variety of ways so that a subscriber with a number of CO/PBX lines and/or an intercom line may identify the condition of each line (incoming call, line busy, hold, intercom call, etc.).

3. KTS CONSTRUCTION

3.1 The 36A KTS (figure 1) consists of a basic mounting package, designated a Key Service Unit (KSU), which consists of a mounting frame, four mounting assemblies, a power supply, two wiring harnesses and a cover.

3.2 The mounting assemblies receive associated plug-in boards in varying combinations to meet subscriber requirements. The plug-in boards, designated Key Telephone Units (KTU's), are printed circuit boards upon which are assembled integrated circuits, solid state components, resistors, etc.

3.3 Installation of the KTS provides for flexibility, convenience, and economy in meeting an initial requirement, and can be expanded as the need arises.

3.4 Approximate weight of a complete 36A KTS is 93 pounds.

4. FEATURES

4.1 The 36A KTS provides for:

- a. Originating calls to and receiving calls from a CO/PBX line.
- b. Visual and audible signals for incoming CO/PBX calls.
- c. Steady visual signals while a station of the KTS makes a line busy.
- d. Holding CO or PBX lines.
- e. Winking or steady visual signals to indicate a held line.
- f. Removing the hold condition when a station of the KTS again seizes the line, or when a line is momentarily opened.
- g. Bridging a station ringer across the CO or PBX line.
- h. Operation of the CO or PBX line under local power failure conditions.
- j. Up to 12 CO/PBX lines, with expansion in increments of one.
- k. Time-out on intercom calls not completed.
- m. Intercommunication between different stations associated with the KTS without resorting to outside facilities.
- n. Intercommunication for up to 36 stations, with expansion in increments of three.
- p. Up to four simultaneous and private talking links on the intercommunication circuit, with link expansion in increments of two.
- q. Sequential use of available links on the intercommunication circuit.
- r. Use of Tel-Touch telephone sets only, rotary dial telephone sets only, or any combination of Tel-Touch and rotary dial telephone sets

2.

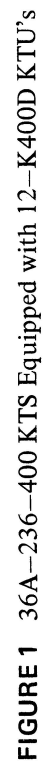


FIGURE 1 36A–236–400 KTS Equipped with 12–K400D KTU's

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- (up to a maximum of 36) on the intercommunication circuit.
- s. Lamp flashing and interrupted ringing at the called station on intercommunication calls.
- t. Busy and ring tones at the calling station on intercommunication calls.
- u. Full privacy on all intercommunication calls.
- v. Automatic hold on intercom calls, with busy tone at the waiting party (last party clear on intercom calls).
- w. Simple installation and expansion.
- b. CK450 Apparatus Mounting Assemblies - Three mountings to accommodate four plug-in printed circuit KTU's each. Connections to the assemblies are made to connectors at the rear of the assemblies.
- c. CK364 Surround/Mother Board Assembly - A mounting to accommodate 20 plug-in printed circuit KTU's. Connections to the assembly are made to a mother board at the rear of the assembly.
- d. K400D CO or PBX Line KTU's - Twelve plug-in printed circuit boards which are the line control circuits between the CO or PBX line and the subscriber line.
- e. CK3641 (181580-101) station KTU's - Twelve plug-in printed circuit boards (three stations per board) which provide interface between the intercom stations and the link boards, and provide the switching to connect the calling and called stations.
- f. CK3642 (181581-101) Link KTU's - Two plug-in printed circuit boards (two links per board) which provide interface between the line and common control boards and switch in the ring and busy tones.
- g. CK3643 (181582-101) Common Control 1 KTU-A plug-in printed circuit board which decodes dial pulses and the Tel-Touch binary outputs of the CK353 Detector KTU, providing outputs corresponding to the dialed intercom number. This printed circuit board also contains the line scanner.
- h. CK3644 (181583-101) Common Control 2 KTU-A plug-in printed circuit board which contains a link scanner, a dial pulse detector, the line scanner control, digit steering circuitry plus interface and other control circuits for the intercom system.
- j. CK3645 (181584-101) Tone KTU-A plug-in printed circuit board which provides the dial tone, ring tone, busy tone, lamp winking and lamp flashing signals.

5. SYSTEM COMPONENTS

5.1 The basic 36A KTS consists of a basic mounting package, designated a KSU, which consists of a mounting frame, four mounting assemblies, a power supply, wiring, and a cover. Added to the mounting assemblies, as required, are plug-in printed circuit boards. A simple KTS may consist of the KSU, six CO/PBX line KTU's, and an intercom consisting of one line KTU, one link KTU, two common control KTU's, one detector KTU, one translator KTU, a tone KTU, and an interrupter KTU. The intercom may be expanded in increments of three to a total of 36 stations, with link expansion in increments of two to a total of four.

5.2 The complete intercom consists of one mounting assembly plus 20 plug-in printed circuit KTU's. The CO/PBX line circuits may be expanded in increments of one to a total of 12.

6. DESCRIPTION OF KTS ASSEMBLIES

6.1 Following is a list of assemblies, part of which may comprise a 36A KTS.

- a. CK550-1 (181579-101) KSU - A prewired mounting frame, three CK450 Apparatus Mounting Assemblies, one CK364 Surround/Mother Board Assembly, a CK615 Power Supply and a cover. All connections to external equipment are made to connecting blocks at the rear of the mounting frame.

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- k. CK3646 (181585-101) Interrupter KTU-A plug-in printed circuit board which provides the interrupted ringing voltage and interrupted 10 vac to give lamp flashing and lamp winking. This printed circuit board also contains a -12 vdc power supply and various miscellaneous circuits.
- l. CK353 (181586-101) Detector KTU-A plug-in printed circuit board which detects the Tel-Touch low and high signals, one from the low group (L1, L2, L3, or L4) and one from the high group (H1, H2, or H3).
- m. CK354 (181587-101) Translator KTU-A plug-in printed circuit board which separates the Tel-Touch multifrequency signals into two groups, a low group (L1, L2, L3, and L4) and a high group (H1, H2, and H3). The detected signals (L1, L2, L3, or L4 and H1, H2, or H3 from Detector CK353) are converted into binary form.
- n. CK615 (181592-101) Power Supply-A wire-in power supply which provides all the voltages required by the 36A KTS. The power supply operates from 115/230 vac, 50/60 Hz.
- p. CK617 (181670-101) Power Supply - A wire-in auxiliary power supply which is used in conjunction with a CK615 Power Supply when more than 160 lamps are connected. Includes interrupter.

6.2 Table 1 lists the number of each type of assembly that may be installed in the CK550-1 KSU. The coding scheme for the 36A key telephone system is shown in table 2. Figure 2 shows the location of each assembly. The CK353 and CK354 KTU's are required only when Tel-Touch telephone sets are used on the intercom circuit.

7. BLOCK DIAGRAM DESCRIPTION

7.1 This basic circuit description is for a complete system, as shown in figure 3, however, all systems may not have all the assemblies shown in figure 3.

7.2 LINE CIRCUIT

7.2.1 When a station telephone has direct access to a CO/PBX line, incoming and outgoing calls are conducted in the usual manner. The ringing, lamp flashing and lamp winking voltages required for signalling at the station telephones are obtained from the Interrupter KTU.

7.3 INTERCOM CIRCUIT

7.3.1 The intercom station lines are connected to the CK3641 Station Line KTU's. These KTU's provide interface with the CK3642 Link KTU's and contain matrix circuitry for switching the calling and called intercom stations. The Station Line KTU's are controlled by signals generated by the Common Control KTU's.

7.3.2 When power is first applied, or any time the selected link becomes busy, a link scanner on the CK3644 Common Control 2 KTU scans until a free link is found. When a free link is found the intercom circuitry is ready to receive a call.

7.3.3 The CK3644 KTU provides two options:

- a. A time-out feature.
- b. Provides a steady lamp indication at all intercom stations in either of the following conditions:
 - 1. When the Common Control is not available; i.e., when there is a call in progress or all available links are in use, or,
 - 2. Only when all available links are in use.

7.3.4 In the idle condition the station line scanner is continuously scanning. When a calling station goes off-hook, the scanner locates the calling line and generates a signal which:

- a. Stops and disables the station line scanner.
- b. Switches the matrix to connect the Station Line KTU and the Link KTU.

Dial tone, from the Tone KTU, is returned to the calling station via the Common Control, Link and Line KTU's, indicating the intercom circuitry is ready to receive dial information.

7.3.5 Tel-Touch signals from the calling station

KSU	KTU									
	K400D CO/PBX Line KTU	CK3641 Line KTU	CK3642 Link KTU	CK3643 Common Control #1 KTU	CK3644 Common Control #2 KTU	CK3645 Tone KTU	CK3646 Interrupter KTU	CK353 Detector KTU	CK354 Translator KTU	CK615 Power Supply
CK550-1	12	12	2	1	1	1	1	1	1	1

CODE
CK550-1

DESCRIPTION

Basic mounting, power supply and cover, wall mounted, wired to accommodate (but not equipped with) the following KTU's:

1. Up to 12 K400D CO/PBX Line KTU's.
2. An intercom consisting of up to 12 CK3641 Line KTU's, two CK3642 Link KTU's, one CK3643 Common Control #1 KTU, one CK3644 Common Control #2 KTU, one CK3645 Tone KTU, one CK3646 Interrupter KTU, one CK353 Detector KTU and one CK354 Translator KTU.

TABLE 1 KTS Code

000	36 A	1	18	2	00
Unused at present	Basic unit co/ prewired mounting w/ power supply and cover	1 - rotary dial only 2 - rotary or Tel-Touch	No. of compl. sta. 03 - 3 stations 06 - 6 stations 09 - 9 stations 12 - 12 stations 15 - 15 stations 18 - 18 stations 21 - 21 stations 24 - 24 stations 27 - 27 stations 30 - 30 stations 33 - 33 stations 36 - 36 stations	No. of links 2 - 2 links 4 - 4 links	Unused at present

Notes:

1. Provides for a maximum of 12 co or PBX line KTU's.
2. Order K400D KTU's separately.
3. Order 181597-101 backboard separately

TABLE 2 Coding Scheme for 36A Key Telephone System

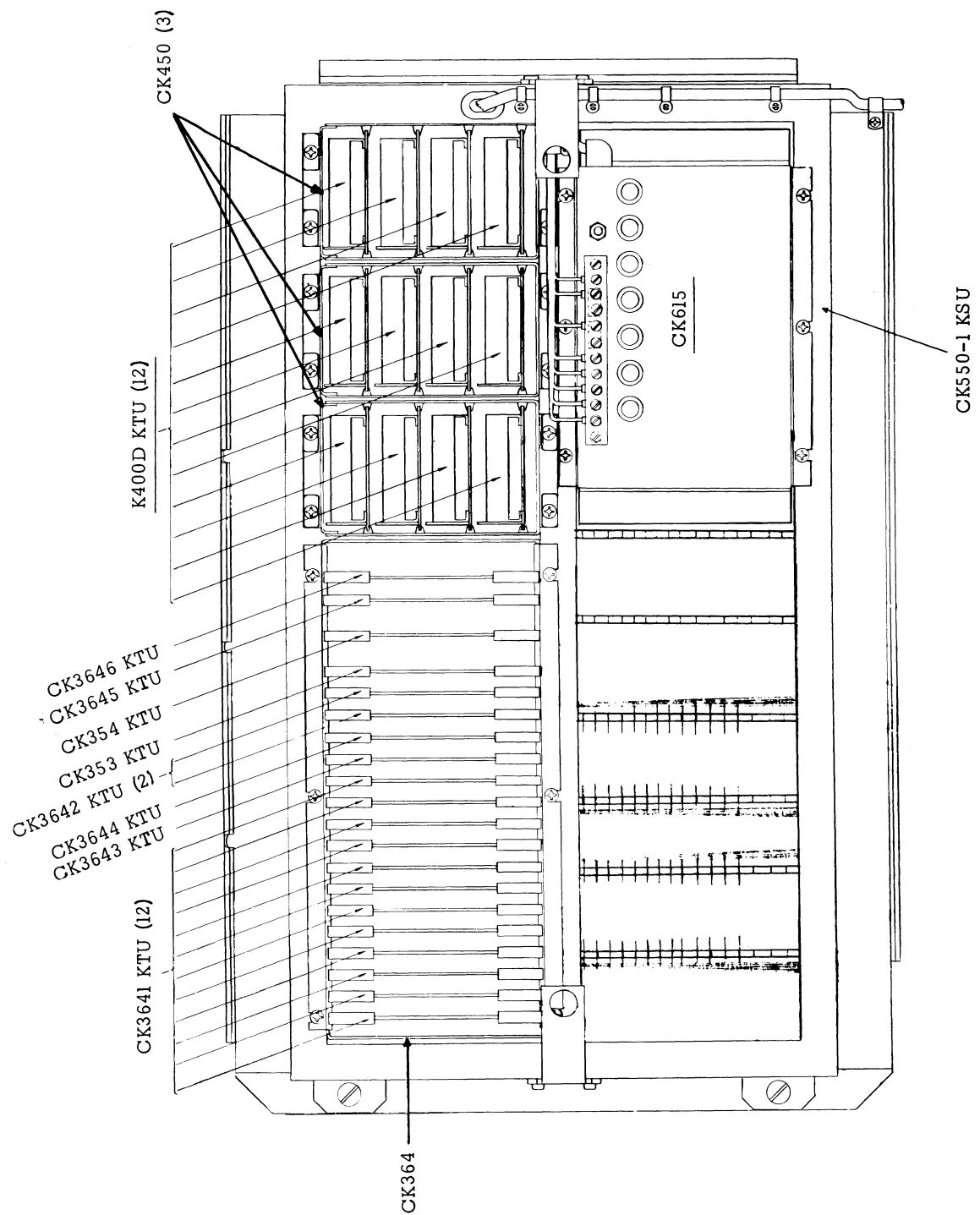


FIGURE 2 Assembly Locations

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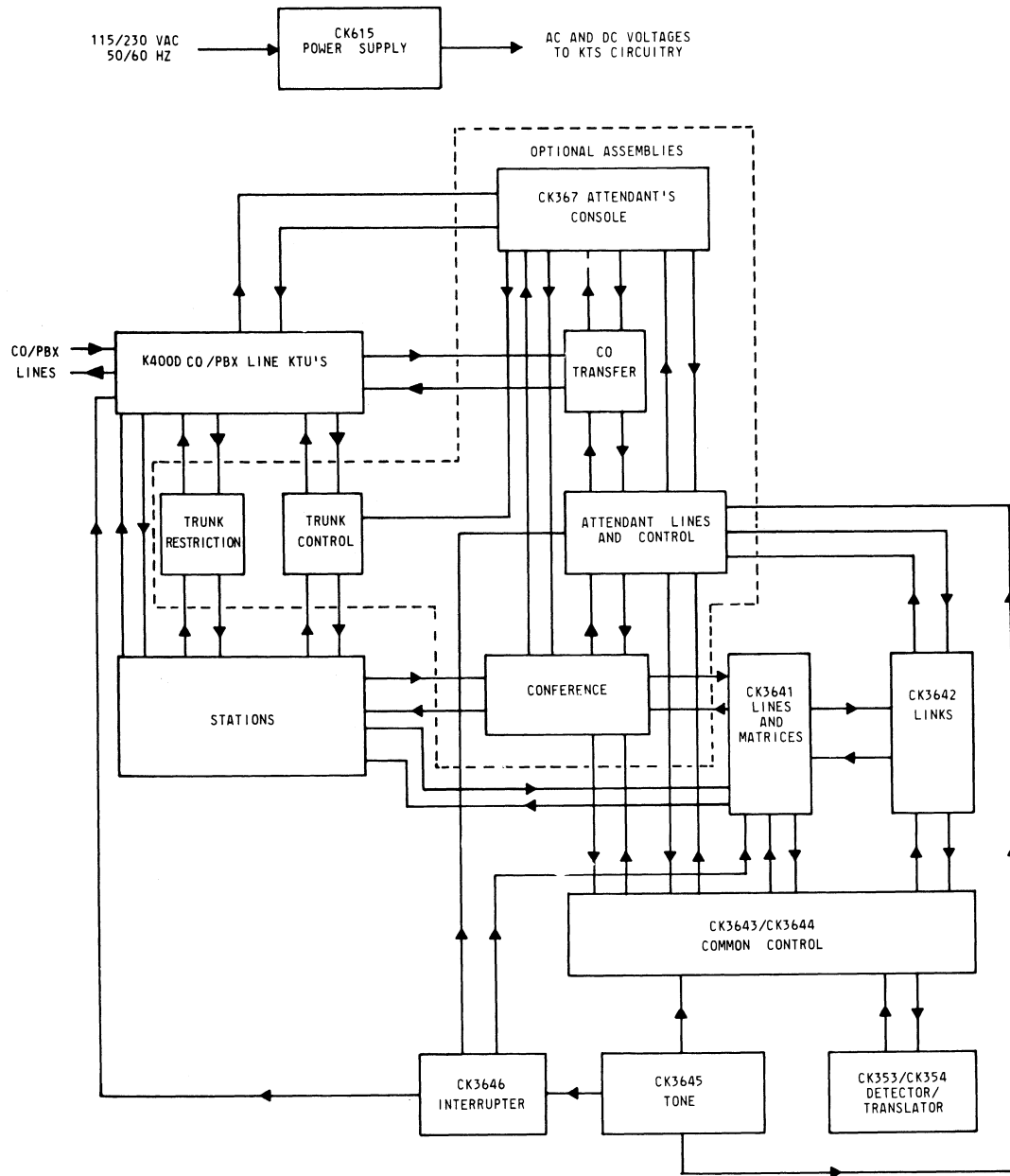


FIGURE 3 Block Diagram

are applied to the CK353 Detector KTU via the Line, Link, and Common Control KTU's. The CK353 and CK354 KTU's decode the Tel-Touch multifrequency tones and apply binary outputs to the CK3643 Common Control 1 KTU. The CK3643 KTU decodes the binary inputs. Dial pulses from a calling station are applied to the CK3643 KTU where they are detected and decoded.

7.3.6 The called station number, from the CK3643 KTU, is applied to the Station Line KTU's. The line scanner gate of the called station is enabled and the matrix circuitry switches to complete the connection between the calling and called stations. Ringing and lamp flashing signals are applied to the called station via the Line KTU. Busy or ring tone is returned to the calling station via the Link and Line KTU's. The calling station intercom lamp remains lit steadily and the called station intercom lamp will flash.

7.3.7 The link circuit disengages from the common control and the link scanner scans to a free link to await the next call. When the called

station answers, the ringing and lamp flashing signals are removed and communication is established between the two stations. The calling and called station intercom lamps are now lit steadily.

7.3.8 When the call is complete, the intercom stations go on-hook, both intercom lamps extinguish, and the intercom circuitry is returned to the idle condition.

7.3.9 Figure 3 shows the relationship of some of the optional assemblies.

8. OPERATING INSTRUCTIONS

8.1 GENERAL

8.1.1 Operation of the KTS is extremely simple. The pushbuttons on the station telephones (figure 4) serve to switch the talking circuit to any one line. Visual signalling by illuminating buttons insures rapid identification of calling, busy, or held lines, and prevents interruption of calls in progress.

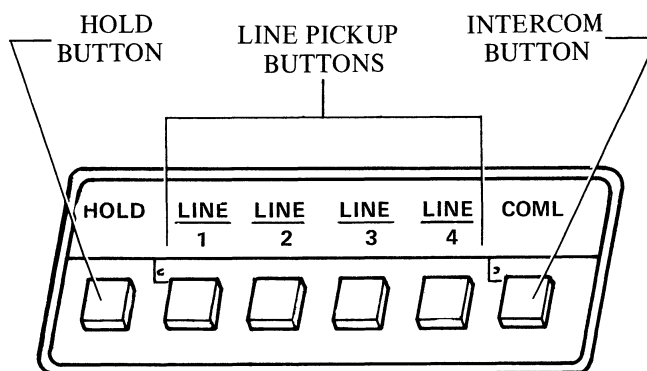


FIGURE 4 Button Panel of Key Telephone Set

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NOTE: Intercommunicating calls are private.

8.2 CO or PBX CALLS

8.2.1 CO or PBX Incoming Calls

8.2.1.1 Incoming calls on CO or PBX lines are audibly indicated by the station ringer or buzzer. Key telephone sets equipped with signal indicating lamps also provide a visual signal indicating which line has an incoming call waiting to be answered by illuminating the button (flashing lamp) of the associated line at all stations at which the line appears. An incoming call is answered by pressing the line pick-up button associated with the audible and/or visual signal(s) received, and picking up the telephone handset.

8.2.2 Holding CO or PBX Lines

8.2.2.1 When it is desired to hold a CO or PBX line call for the purpose of obtaining information over another line, transferring an incoming call, etc., the hold button is depressed. This causes a holding bridge to be placed across the line and causes the lamp associated with the line being held to wink so that other stations will know the line is in use and held.

8.2.2.2 When the subscriber (or the station to which the call has been transferred) desires to pick up the held line, the pick-up button associated with that line is depressed and the hold condition is automatically released, permitting the subscriber (or the person to whom the call was transferred) to converse on the line.

8.2.2.3 The visual hold signal in conjunction with the holding feature enables a subscriber to distinguish between a line in a normal busy condition, a line with an incoming call, or a line in a held condition. This wink signal feature uses the same signal lamp used for line and busy signals, but has a long on period and a short off period, giving the impression of a wink when the line is in a held condition.

8.2.3 CO or PBX Outgoing Calls

8.2.3.1 Outgoing CO or PBX calls are originated by lifting the telephone handset, depressing the line pick-up button associated with the desired

line, and dialing the desired number.

8.2.4 Disconnection for CO or PBX Calls

8.2.4.1 Upon completion of the conversation, returning the handset to the cradle will restore the line to the idle (non-busy) condition.

8.3 INTERCOMMUNICATION LINE

8.3.1 An outgoing call is originated by depressing the intercom button, lifting the telephone handset and dialing the desired station number. The intercom lamp will light steadily when the handset is lifted if the intercom button is depressed.

8.3.2 The desired station is selected by dialing the required digits. For intercom stations 1 through 36, two digits are used for station identification. At the completion of dialing, the bell at the called station only will ring, and the intercom lamp at the called station only will flash, indicating to the called station that a call is to be answered. The ringing and lamp flashing is terminated when the calling station replaces the telephone handset, or when the called station answers.

8.3.3 An incoming call is answered by depressing the intercom button and lifting the handset. When the intercom line is in use the intercom lamp at the calling and called stations only will be illuminated steadily.

8.3.4 Upon completion of the call, the line will return to the idle (non-busy) condition when both handsets are returned to the cradles.

8.4 OPERATION WITH LOCAL POWER FAILURE

8.4.1 Should all power to the equipment fail, all lines except the CO or PBX lines will become inoperative. With CO or PBX lines it is possible to make an outgoing call during a power failure since selection of a line and removal of the station handset permits the subscriber to originate a call regardless of the availability of local power to the KTS. If, during a local power failure, the local ringing supply remains operative (auxiliary battery), the common audible signals, if provided, will operate during an incoming call, but will follow the incoming ringing on the line rather

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than locking-in, as would be the case when power is available to the system. During a complete local power failure it is possible to receive incoming calls on CO or PBX lines only if ringers are bridged across the line to operate on incoming ringing current. No visual signals will be available and the intercom circuit will be in-

operative.

9. ORDERING INFORMATION

9.1 Following is a list of assemblies for the 36A KTS.

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ITEM	DESCRIPTION	PART NUMBER
K400D	KTU	400D962
CK550-1	KSU (See Paragraph 2.1, Section CK550)	181579-101
CK3641	Line KTU	181580-101
CK3642	Link KTU	181581-101
CK3643	Common Control No. 1 KTU	181582-101
CK3644	Common Control No. 2 KTU	181583-101
CK3645	Tone KTU	181584-101
CK3646	Interrupter KTU	181585-101
*CK353	Detector KTU	181586-101
*CK354	Translator KTU	181587-101
	Spares Kit (Fuses)	181588-101
	Backboard Assembly	181589-101
CK615	POWER SUPPLY	181592-101
CK617	POWER SUPPLY (AUXILIARY)	181670-101
*	NOTE: BACKBOARD ASSEMBLY IS OPTIONAL. ORDER SEPARATELY.	

CK550-1 KEY SERVICE UNIT

CIRCUIT DESCRIPTION

1. GENERAL

1.1 This section contains a general description of the CK550-1 Key Service Unit (KSU).

2. DESCRIPTION

2.1 The CK550-1 KSU (figure 1) is a metal backboard upon which are assembled five quick-connect connecting blocks, cable clamps and cable hooks for station cables, and a mounting frame hinged and locked to the backboard. Mounted on the hinged mounting frame are three CK450 Apparatus Mounting Assemblies, a CK364 Surround/Mother Board Assembly, a power distribution terminal board, and a CK615 Power Supply. An optional wooden backboard (181589-101) may be ordered.

2.2 The KSU is completely prewired between the connecting blocks, the power distribution terminal board, CK450 and CK364 assemblies, and the power supply. It is designed for wall mounting and is equipped with a fiberglass cover. The approximate dimensions of the KSU are 18-1/2 inches high by 29 inches long by 10-1/2 inches deep. Approximate weight of the CK550-1 KSU is 80 pounds.

2.3 Following is a description of the CK450 Apparatus Mounting Assemblies, the CK364 Surround/Mother Board Assembly and the CK615 Power Supply:

- a. **CK450 Apparatus Mounting Assemblies**
- Three metal chassis approximately 3-3/4 inches wide by 6 inches long by 6 inches deep, each. Each assembly holds four K400D Line boards and is attached to the hinged mounting frame with four screws. All connections to a CK450 assembly connectors are made via a KSU wiring harness and the power distribution terminal board.
- b. **CK364 Surround/Mother Board Assembly** -
A metal chassis approximately 13-3/4 inches

long by 6 inches high by 7 inches deep. This assembly holds 12 CK3641 Line boards, two CK3642 Link boards, one CK3643 Common Control 1 board, one CK3644 Common Control 2 board, one CK3645 Tone board, one CK3646 Interrupter board, one CK353 Detector board, and one CK354 Translator board. All connections to the CK364 assembly are made to a mother board via a wiring harness and the power distribution terminal board.

- c. **CK615 Power Supply** - The power supply, which provides all the voltages required by the KTS is approximately 10-3/4 inches long by 7 inches high by 7-3/4 inches deep. It is held to the hinged mounting frame by six screws. All connections between the power supply and the rest of the CK550-1 KSU are made via a wiring harness. Power input (115/230 vac, 50/60 Hz) is made via a power cord (part of the power supply). For a detailed circuit description and list of parts for the power supply refer to SECTION CK615 of this manual.

3. FUNCTION

3.1 The CK550-1 KSU provides inter-connections between the external equipment and the circuit boards, provides support and protection for the circuit boards, and provides all power voltages required by the KTS. Figure 2 is an inter-connection diagram of the KSU, excluding the power supply circuitry. Refer to SECTION CK615 for information pertaining to the CK615 Power Supply.

3.2 The CK550-1 KSU's with serial numbers up to and including 150 are designated CK550-1G1, and KSU's with serial numbers 151 and subsequent are designated CK550-1G2. The only difference between the KSU's is the type of CK450 Apparatus Mounting Assembly used.

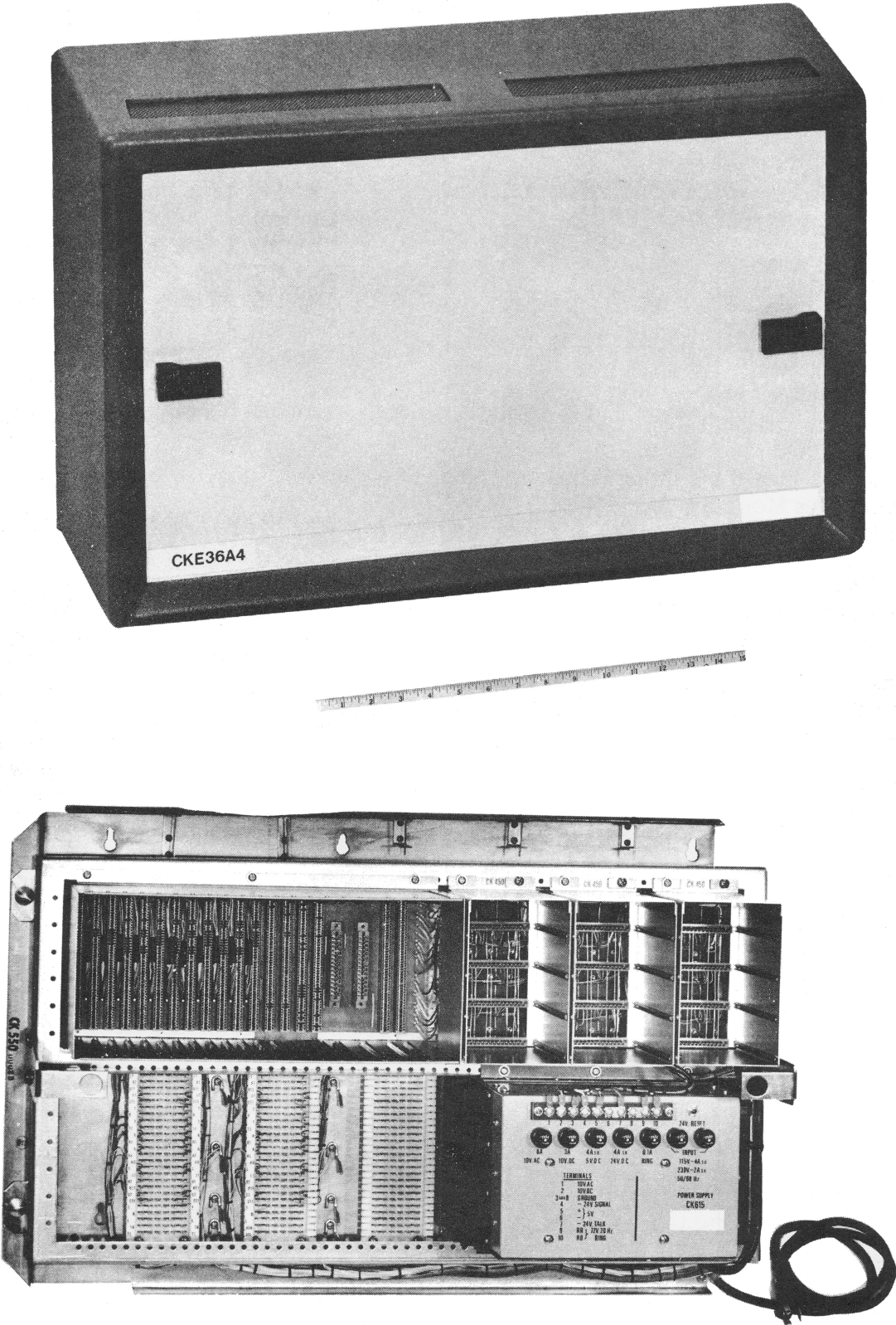


FIGURE 1 CK550-1 KSU

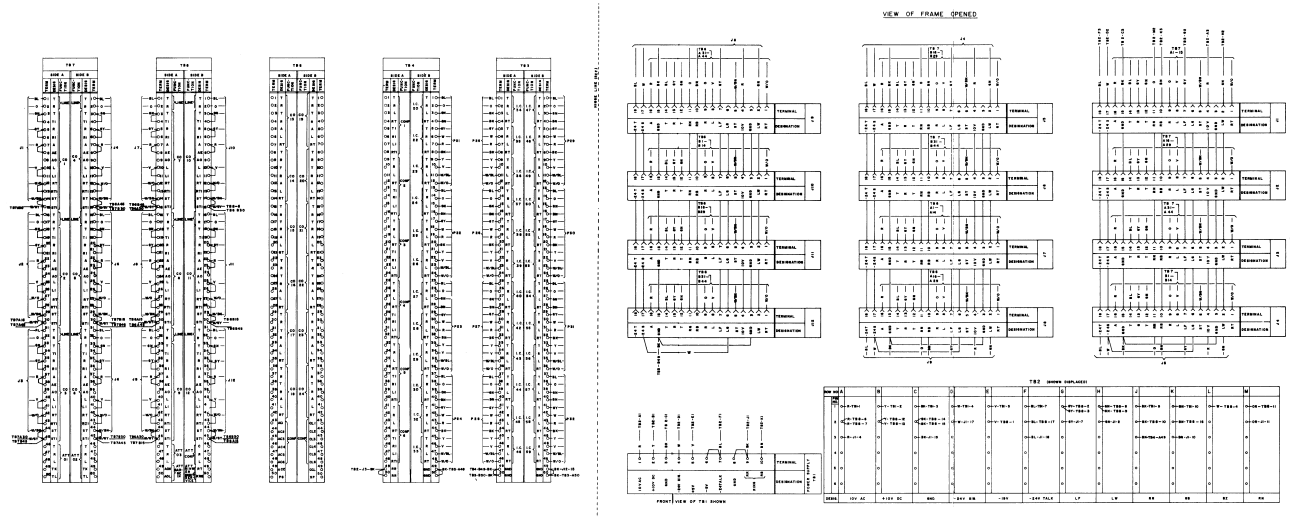
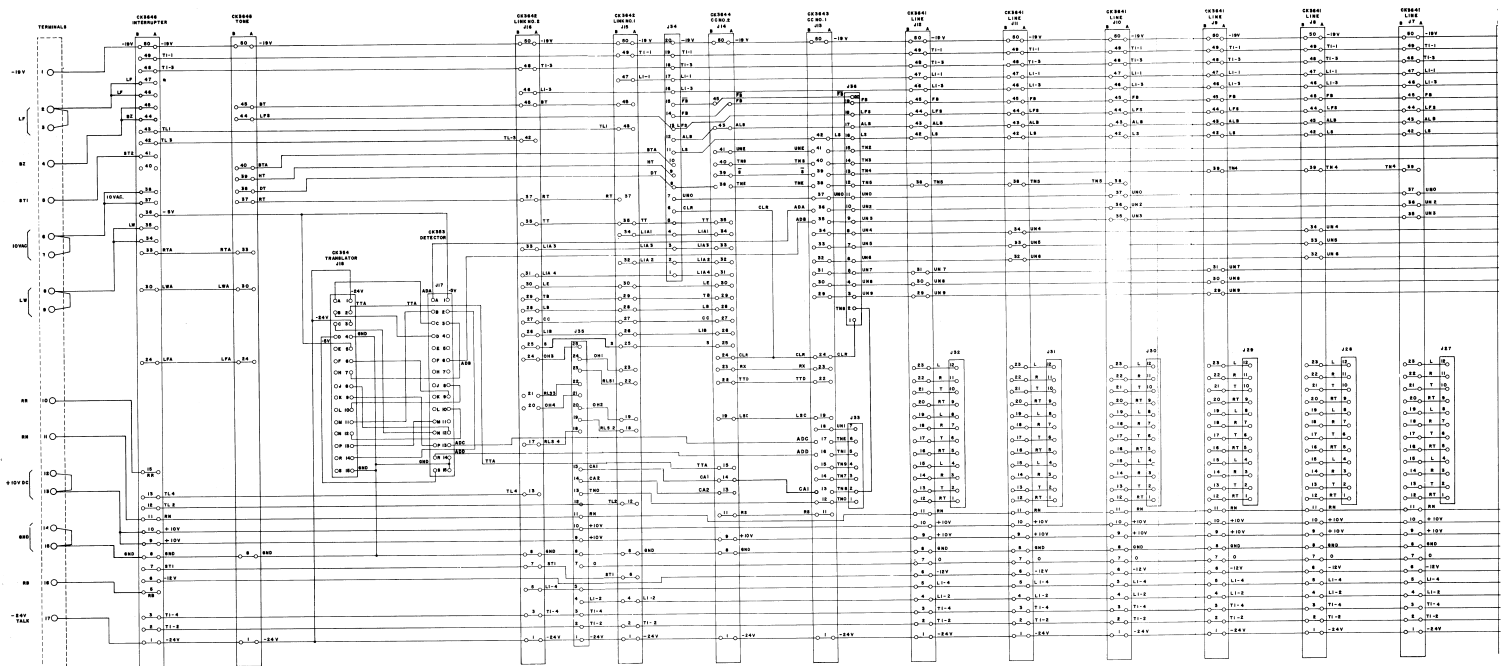


FIGURE 2 Interconnection Diagram CK550-1 KSU (Sheet 1)

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