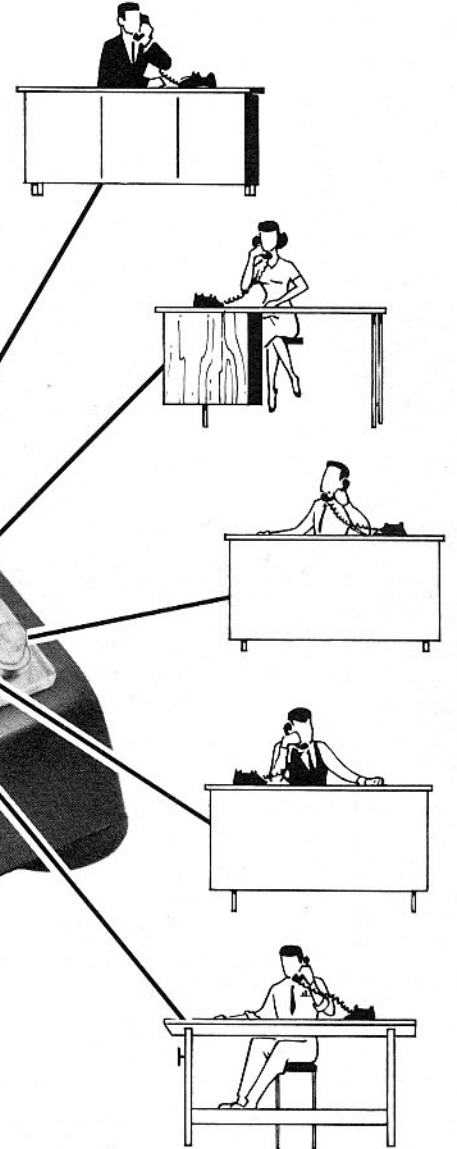


# K1A1 KEY TELEPHONE SYSTEM



# ITT KELLOGG

INTERNATIONAL TELEPHONE & TELEGRAPH CORP.

TELECOMMUNICATIONS DIVISION  
6650 South Cicero Avenue, Chicago 38, Illinois

## GENERAL DESCRIPTION

## INTRODUCTION

The KIAI Key Telephone System is a switching system designed to visually and audibly signal subscriber stations on one or more lines from a Central Office (CO) or Private Branch Exchange (PBX) without the assistance of an attendant or operator.

The system used in conjunction with its various options, is capable of providing greater flexibility, more convenience, increased efficiency and improved service to any telephone user.

The system enables the subscriber to utilize the following features:

- a. Answer and originate calls on from one to five Central Office, PBX, Intercom or Private lines and combinations thereof.
- b. Hold calls on from one to five Central Office or PBX lines, while another line is used.
- c. Answer and originate calls on Ringdown and Automatic Tie Lines between stations in the Key Telephone System.
- d. Answer and originate calls on lines to distant individual station telephone sets.
- e. Answer and originate calls on Manual or Dial Intercom Lines between stations in the Key Telephone System.
- f. Automatically exclude other stations from a line, permitting confidential calls.

## SYSTEM COMPONENTS

The KIAI Key Telephone System basically consists of various relay type switching assemblies designated as "Key Telephone Units" and a power supply. The quantity and types of units used depends on installation requirements. The Key Telephone Units are mounted in an apparatus cabinet. The power supply is mounted in, or adjacent to the apparatus cabinet.

Figures 1-1 through 1-17 show the Key Telephone Units (KTU's) available for use in the KIAI Key Telephone System (KTS). The following is a description of these components:

A. Apparatus Cabinet (see Figures 1-1 and 1-2)

The apparatus cabinet consists of an apparatus mounting frame assembly and a cover. The mounting frame assembly has a hinged gate-type assembly affording easy access to the terminal side of the mounted apparatus. The gate assembly provides two rows of mounting space each 7" high, each row having

horizontal space available for any number of Key Telephone Units with a total horizontal requirement of 21-9/16" or less.

The apparatus mounting frame assembly includes a wood backboard which serves to insulate the cabinet from any surface on which it is mounted. The cover has a beige gray wrinkle finish and is furnished with an inner lining of sound absorbent material for acoustical purposes.

The overall dimensions of the unit are: 16-1/16 inches high, 26-1/16 inches wide and 9-3/8 inches deep.

B. K201B Fuse Mounting Panel (not shown)

The K201B KTU provides the necessary fuse mounting blocks required to provide fuse protection when a local 24 volt d-c battery and 10 volt 60 cycle a-c power sources are used to power the system. It is a modular type unit with seven fuse blocks, each having a set of two fuse posts. The fuse posts are wired to a terminal panel having screw type terminals for external connection. Six terminals are also provided for common ground connections within the system. Standard fuse wire of the recommended current rating is suitable for use with this unit. (Fuses are not normally furnished with the K201B KTU.)

The overall dimensions of the unit are: 6-15/16 inches high, 2-5/32 inches wide and 3 inches deep. One K201B KTU is optional for each KIAI KTS.

C. K202B Key Telephone Unit (see Figure 1-3)

The K202B KTU provides the necessary components and circuitry to enable a subscriber to answer and originate calls on one Central Office or PBX Line. It is a modular type unit with a ring-up relay, answer relay, hold relay and other components, all of which are mounted on a metal panel and wired to a terminal panel having screw type terminals for external connections.

The circuit provides:

1. A continuous audible signal for incoming calls.
2. A steady visual signal for incoming calls and while a station makes a line busy.
3. A holding feature which permits the subscriber to apply a "hold" on the line by depressing a hold key associated with the telephone set.
4. Removal of the "hold" when a station again seizes the line or when the line is opened momentarily at the Central Office or PBX.

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5. Operation of all Central Office or PBX lines under local power failure conditions.

The overall dimensions of the unit are: 6-15/16 inches high, 3-1/32 inches wide and 4 inches deep. One K202B KTU is required per CO or PBX line.

### D. K203A Key Telephone Unit (see Figure 1-4)

The K203A KTU provides the necessary components and circuitry to enable a subscriber to automatically signal and talk on a designated tie line by lifting the telephone handset and depressing the key associated with the tie line. It is a modular type unit with a retard coil, talking battery relay, cut-out relay, two line relays and other components, all of which are mounted on a metal panel and wired to a terminal panel having screw type terminals for external connections.

The circuit provides:

1. A steady visual signal for incoming calls.
2. A continuous audible signal for incoming calls.
3. A steady visual signal while a station of the Key Telephone System makes a line busy.
4. For automatically signaling the distant station on outgoing calls.
5. After a call has been answered, prevention of incoming audible and visual signals at either end of the tie line until both stations have disconnected.

The unit can be wired so as to signal one station or the common audible signal whichever is preferred. Also since the busy lamp will stay lit until both ends hang up, either end can hold.

The overall dimensions of the unit are: 6-15/16 inches high, 3-15/32 inches wide and 4 inches deep. One K203A KTU is required per Automatic Tie Line. An Automatic Tie Line unit is also required at the distant end.

### E. K204A Key Telephone Unit (see Figure 1-5)

The K204A KTU provides the necessary components and circuitry to enable a subscriber to signal manually and talk on a designated tie line. It is a modular type unit with a talking battery relay, ring-out relay, ring-in relay, ring relay and other components, all of which are mounted on a metal panel and wired to a terminal panel having screw type terminals for external connections.

The circuit provides:

1. A continuous audible signal for incoming calls.

2. A steady visual signal for incoming calls.
3. A steady visual signal while the local station of the Key Telephone System makes a line busy.
4. For manually signaling the distant station on outgoing calls.
5. Prevention of false operation of incoming call signals on disconnect or other transients.

With this unit signaling is accomplished by lifting the telephone handset, depressing the key associated with the tie line, and operating the signaling key associated with the tie line. The signaling key may be a second key on the telephone or an external key. The manual signaling feature permits the calling party to make use of code signaling when more than one station is connected at the distant end. This unit can be wired so as to signal one station or the common audible signal whichever is preferred. No hold feature is available with this unit.

The overall dimensions of the unit are: 6-15/16 inches high, 3-29/32 inches wide and 4 inches deep. One K204A KTU is required per Ringdown Tie Line. A Ringdown Tie Line Unit is required at the distant end of the line if connected to another KIAI KTS, or a regular Ringdown Trunk if connected to a distant switchboard.

### F. K205A Key Telephone Unit (see Figure 1-6)

The K205A KTU provides the necessary components and circuitry to enable a subscriber to signal and talk on a line to a distant telephone station. It is a modular type unit with a talking battery relay, cut-out relay, ring-out relay, two line relays and other components, all of which are mounted on a metal panel and wired to a terminal panel having screw type terminals for external connections.

The circuit provides:

1. A continuous audible signal for incoming calls.
2. A steady visual signal for incoming calls.
3. A steady visual signal while a station of the Key Telephone System makes a line busy.
4. For manually signaling the distant station on outgoing calls.
5. Prevention of false operation of incoming call signals if the local station disconnects before the distant station.

When this unit is used, the station at the distant end need only pick up the handset and the station at the Key equipment end is automatically signaled. The station at the Key equipment end must signal manually with a key. This signaling key may be a second key

on the telephone or an external key. This unit can be wired so as to signal one station or the common audible signal whichever is preferred. The signal is a continuous one. Also since the busy lamp will stay lit until both ends hang up, either end can hold.

The overall dimensions of the unit are: 6-15/16 inches high, 3-29/32 inches wide and 4 inches deep. One K205A KTU is required per Station Line.

#### G. K209A Key Telephone Unit (see Figure 1-7)

The K209A KTU provides the necessary components and circuitry to provide flashing visual signals for incoming calls, and time out of visual and audible signals. It is a modular type unit with a time out relay, power failure relay, two flashing relays and other components, all of which are mounted on a metal panel and wired to a terminal panel having screw type terminals for external connection.

The circuit provides:

1. Flashing visual signals for incoming calls on KTU's: K202B, K203A, K204A, K205A and K207A, B or C (when a K208A KTU is provided).
2. Release of visual and audible signals after 30 seconds, if the call is unanswered or abandoned.
3. Supplementary control of the rate of charge when power is supplied from a local storage battery with voltage control of charge.

The overall dimensions of the unit are: 6-15/16 inches high, 4-25/32 inches wide and 4 inches deep. One K209A KTU is required for each KIAI KTS where only K202B KTU's are used. If the Hold Lamp Wink Circuit (K210A) is not used, the K209A KTU will provide lamp flashing and incoming signal time out for six lines. If the hold lamp wink signal is used, the K209A KTU will provide the lamp flashing and incoming signal time out feature for five lines.

#### H. K210A Key Telephone Unit (see Figure 1-8)

The K210A KTU provides the necessary components and circuitry to produce a wink condition on the lamp associated with a line being held. It is a modular type unit with a wink start relay, wink relay, wink timing relay and other components, all of which are mounted on a metal panel and wired to a terminal panel having screw type terminals for external connections.

With the wink feature, the lamp of a held line is off three hundredths of a second during each second of operation giving the impression of a wink. The wink is easily distinguishable from the flashing signal of an incoming call which flashes the line lamp off one-third second and on one-third second during each cycle of operation. If the wink signal feature is not used, a held line appears the same as a busy line;

having its line lamp illuminated steady.

The overall dimensions of the unit are: 6-15/16 inches high, 2-19/32 inches wide and 4 inches deep. One K210A KTU will provide the wink feature for five CO or PBX lines.

#### I. K211A Key Telephone Unit (see Figure 1-9)

The K211A KTU provides the necessary components and circuitry for four circuits. These circuits are: (1) Common Audible Signal Control, (2) Ringing Lamp, (3) Battery Feed Noise Suppression, and (4) Manual Intercom Signal and Battery Feed. It is a modular type unit containing a ring-in relay, a battery feed relay and other components, all of which are mounted on a metal panel and wired to a terminal panel having screw type terminals for external connections.

1. The Common Audible Signal Control Circuit provides power to operate the bell or buzzer for incoming call signals when two independent common audible signals are required. The audible signal will follow incoming ringing to K202B, K212A or K204A KTU's and will be steady for incoming calls to K203A or K205A KTU's.
2. The Ringing Lamp Circuit is provided to prevent ringing current from exceeding safe limits and to improve the performance of small ringing generators under maximum load.
3. The Battery Feed Noise Suppression Circuit provides for suppression of noise on dc power supplies.
4. The Manual Intercom Signal and Battery Feed Circuit provides:
  - a. A steady visual signal while a station of the system makes this line busy.
  - b. Talking battery for the stations interconnected by this circuit.
  - c. Arrangements for manually signaling between stations.

The overall dimension of the unit are: 6-15/16 inches high, 3-1/32 inches wide and 4 inches deep. When required, one K211A KTU is used per KIAI KTS.

#### J. K212A Key Telephone Unit (see Figure 1-10)

The K212A KTU provides the necessary components and circuitry to enable a subscriber to answer and originate calls on three central office or PBX lines. It also provides the lamp flashing and incoming signal time out features to accommodate five lines. It is a modular type unit with three ringup relays, three hold relays, three answer relays, a time

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out relay, a power failure relay, two flashing relays and other components, all of which are mounted on a metal panel and wired to a terminal panel having screw type terminals for external connections.

The circuit provides:

1. A continuous audible signal on incoming calls.
2. A flashing visual signal on incoming calls.
3. Release of visual and audible signals after 30 seconds, if the call is unanswered or abandoned.
4. A steady visual signal to indicate "busy" whenever in use.
5. A holding feature which permits the subscriber to apply a "hold" on the line by depressing a hold key associated with the telephone set.
6. Removal of the "hold" when a station again seizes the line or when the line is opened momentarily at the Central Office or PBX.
7. Operation of all Central Office or PBX lines under local power failure conditions.

The overall dimensions of the unit are: 6-15/16 inches high, 9-3/16 inches wide and 4 inches deep. This unit contains the equivalent of three K202B KTU's and one K209A KTU.

### K. K26B and K29A Key Telephone Units (see Figures 1-11 and 1-12)

The K26B and K29A KTU's provide the necessary apparatus to provide automatic cut-off of stations associated with an individual line appearing at several stations.)

Both units are of the modular type with the K26B KTU containing a cut-out relay and other components and the K29A KTU containing a cut-thru relay and other components. All of the components of each unit are mounted on a metal panel and are wired to a terminal panel having screw type terminals for external connections.

Four optional arrangements can be provided for use with the K202B, K203A, K204A, K205A and K212A KTU's, they are as follows:

1. A station can cut-off others and cannot be cut off.
2. A station can cut-off others and can be cut-off except during a call.
3. A station or group of stations cannot cut-off others and can be cut-off except during a call.

4. A station cannot cut-off others and can be cut-off at any time.

The Key Telephone Units required to provide the above conditions are respectively as follows:

1. One K26B KTU per line and one K29A KTU per station per line.
2. One K26B KTU per line and one K29A KTU per station per line.
3. One K26B and one K29A KTU per line and one K29A KTU per station or groups of stations.
4. None — This condition applicable only to one of the stations that can be cut-off in accordance with conditions 1, 2, 3 above.

The K26B KTU can also be used with the K207A, B or C KTU's (when a K208A KTU is provided) for automatically cutting off all other stations from the line, when the line is seized by one of the stations.

Both units have overall dimensions of: 3-1/2 inches high, 4-3/4 inches wide and 2-3/4 inches deep. The K26B and K29A KTU's must be mounted on Mounting Bracket Assembly 80251 for use on the 79600 Apparatus Mounting. Each 80251 Mounting Bracket Assembly is arranged to mount two angle bracket KTU's of the K26B and K29A type.

### L. K207A Key Telephone Unit (see Figure 1-13)

The K207A KTU provides the necessary components and circuitry for one intercom line having facilities for dial selection of, and automatic signaling to, nine stations; any station being able to dial any other station. It is a modular type unit with a two-bank selector switch, pulsing relay, control relay, signaling relay, timing relay and other components, all of which are mounted on a metal panel and wired to a terminal panel having screw type terminals for external connections.

The circuit provides:

1. Talking battery for the stations interconnected by this circuit (maximum of nine).
2. For operating the audible signal of the desired station; the selection of the station made by stepping a single digit selector in response to pulses from a station dial.
3. A steady visual signal while a station of the system makes this line busy.

Number assignments for the nine intercom stations are "2" to "0".

The overall dimensions of the unit are: 6-15/16 inches high, 5-21/32 inches wide and 4 inches deep.

M. K207B\* and K207C Key Telephone Units (see Figure 1-14)

The K207B\* and K207C KTU provides the necessary components and circuitry for one intercom line having facilities for dial selection of, and automatic signaling to, either nine or seventeen \*\* stations; any station being able to dial any other station.

It is a modular type unit with a two-bank selector switch, pulsing relay, control relay, signaling relay, timing relay, and other components, all of which are mounted on a metal panel and wired to a terminal panel having screw type terminals for external connections.

The circuit provides:

1. Talking battery for the stations interconnected by this circuit.
2. For operating the audible signal of the desired station, the selection of the station being made by stepping a single digit selector in response to pulses from a station dial.
3. A steady visual signal while a station of the system makes this line busy.

Number assignments for the nine intercom stations are "2" to "0". The overall dimensions of the unit are: 6-15/16 inches high, 5-7/32 inches wide and 6-1/2 inches deep.

\*The manufacture of the K207B KTU has been discontinued and is only included for reference.

\*\*The K40A KTU (Signal Transfer Circuit) must be provided for seventeen stations.

**NOTE**

The flashing line lamp and automatic cutoff features (K208A and K26B KTU's) cannot be provided when the Signal Transfer Circuit (K40A KTU) is used and vice versa.

N. K40A Key Telephone Unit (see Figure 1-16)

The K40A KTU provides the necessary components and circuitry to expand one K207B or C KTU from nine to a maximum of seventeen stations. It is a modular type unit with a transfer relay and other components, all of which are mounted on a metal panel and wired to a terminal panel having screw type terminals for external connections.

Single digit dialing is utilized for signaling eight of the seventeen stations and two digit dialing is utilized for the remaining nine stations. Number assignments for the seventeen intercom stations are "3" to "0", "21", and "23" to "20".

The overall dimensions of the unit are: 3-1/2 inches high, 4-3/4 inches wide, and 2-3/4 inches deep. The K40A KTU must be mounted on Mounting

Bracket Assembly 80251 for use on the 79600 Apparatus Mounting.

O. K208A Key Telephone Unit (see Figure 1-15)

The K208A KTU provides the necessary components and circuitry to produce a flashing lamp signal for the dial intercom line of a KIAI KTS. It is a modular type unit with three line relays, three lamp signaling relays and other components, all of which are mounted on a metal panel and wired to a terminal panel having screw type terminals for external connections.

The circuit provides:

1. A flashing visual signal at the station whose number is dialed. (Steady at all other stations).
2. Relighting of the lamp "steady" when the called station answers.
3. The means, on an optional basis thru the use of a K26B KTU, for automatically cutting off all other stations from the line, when the line is seized by one of the stations.
4. When the stations are cut-off by the seizure of the line by one of the stations, provides means of reconnecting only the station whose number has been dialed by the station seizing the line.
5. When the automatic station cut-off feature is used, provides for freeing the line to all stations when the stations connected to the line disconnect.

The overall dimensions of the unit are: 6-15/16 inches high, 3-15/32 inches wide and 4 inches deep. Each K208A KTU will provide flashing intercom line lamps at three stations when used with the nine station Intercom Circuit (K207A, B or C KTU) and the Lamp Flashing Circuit (K209A or K212A KTU).

P. K232A Key Telephone Unit (see Figure 1-17)

The K232A KTU provides the necessary components and circuitry to furnish the following features:

1. Interrupted audible signal - 1 second on, 3 seconds off.
2. Lamp flash - 0.5 second on, 0.5 second off.
3. Lamp wink - 0.475 second on, 0.025 second off.
4. Busy tone - 0.5 second on, 0.5 second off.
5. Manual intercommunication line with busy lamp.
6. Time out circuit.

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It is a modular type unit with a "plug-in" type 10-volt 60-cycle a-c motor driven interrupter or repeat cycle timer, a snap action start relay, battery feed relay, time out relay and a thermal delay relay, all of which are mounted on a metal panel and wired to a terminal panel having screw type terminals for external connections.

The overall dimensions of the unit are: 6-15/16 inches high, 3-15/32 inches wide and 7 inches deep.

This unit contains, in addition to an interrupted ringing supply, the equivalent of the following Key Telephone Units:

1. K209A - Lamp Flashing and Time Out Circuit (except power failure feature).
2. K210A - Hold Lamp Winking Circuit.
3. K211A - Manual Intercom Circuit.

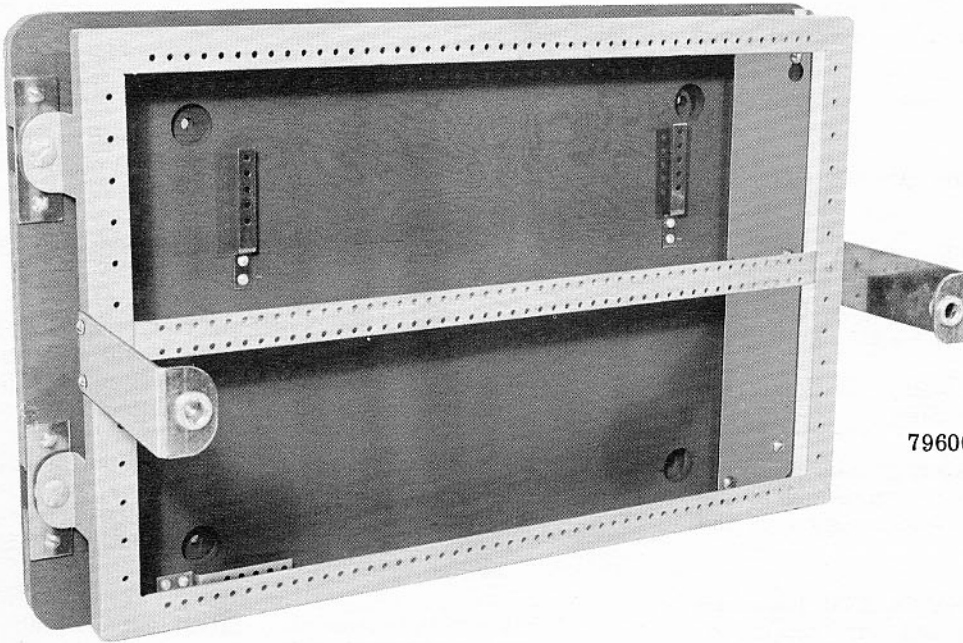


Figure 1-1.  
79600, Apparatus Mounting  
Frame Assembly

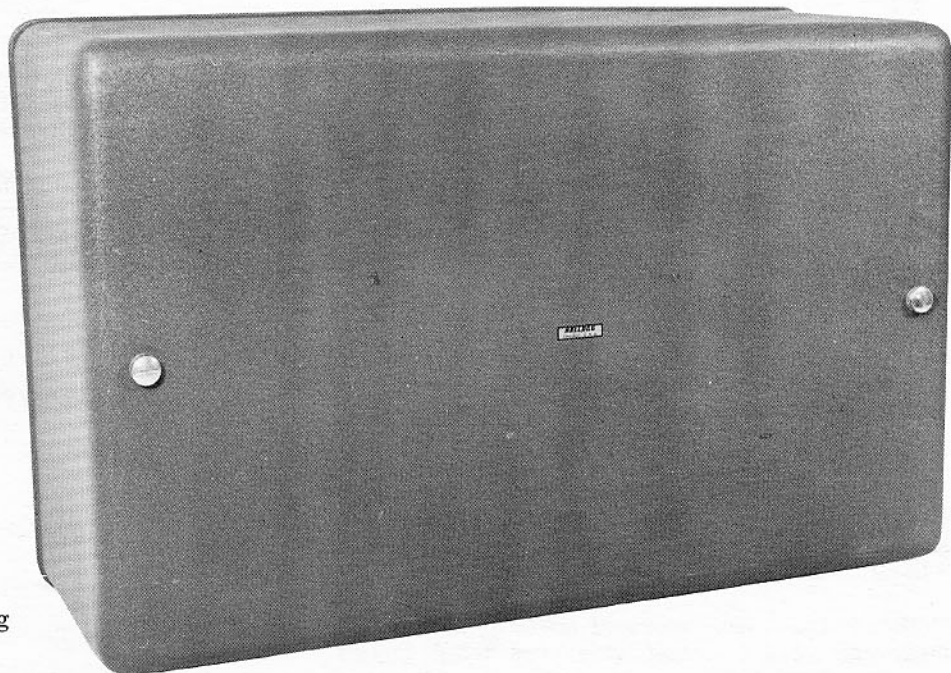


Figure 1-2.  
79601, Apparatus Mounting  
Frame Cover

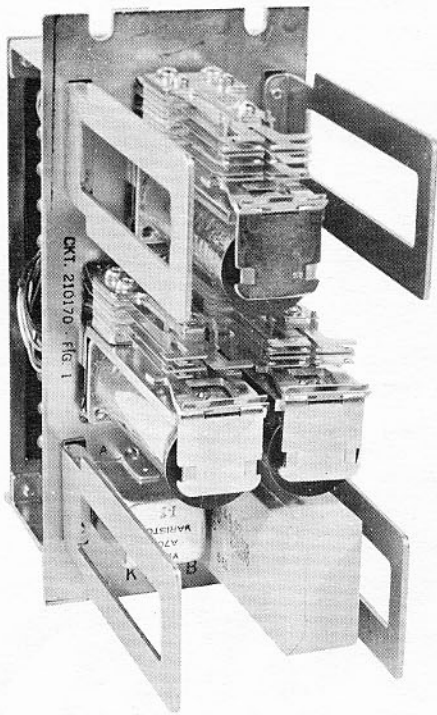


Figure 1-3.  
K202B KTU, C.O. Or PBX Line  
Circuit

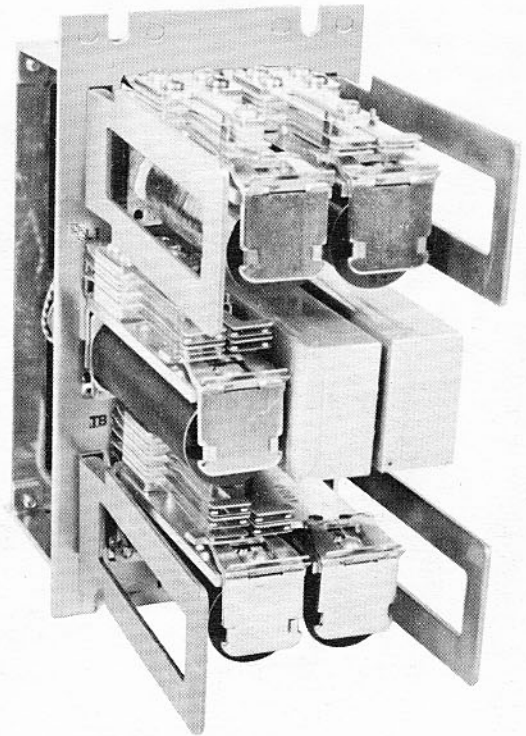


Figure 1-4.  
K203A KTU, Automatic Tie Line Circuit

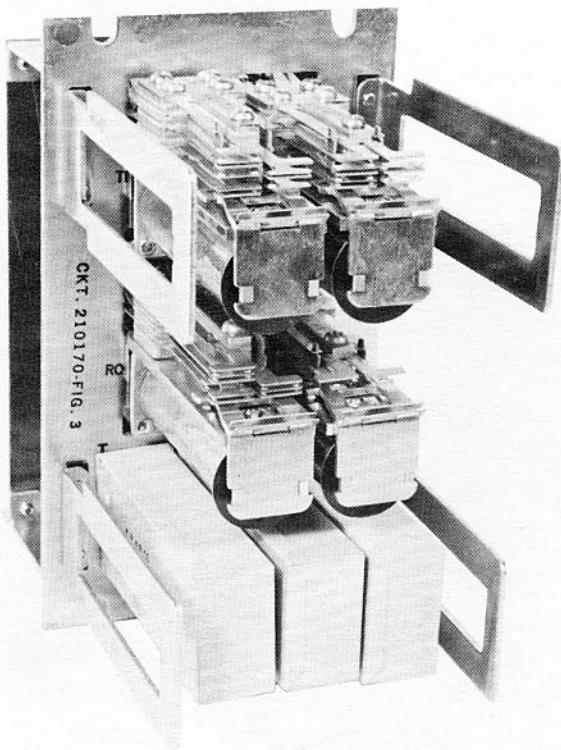


Figure 1-5.  
K204A KTU, Ringdown Tie Line  
Circuit

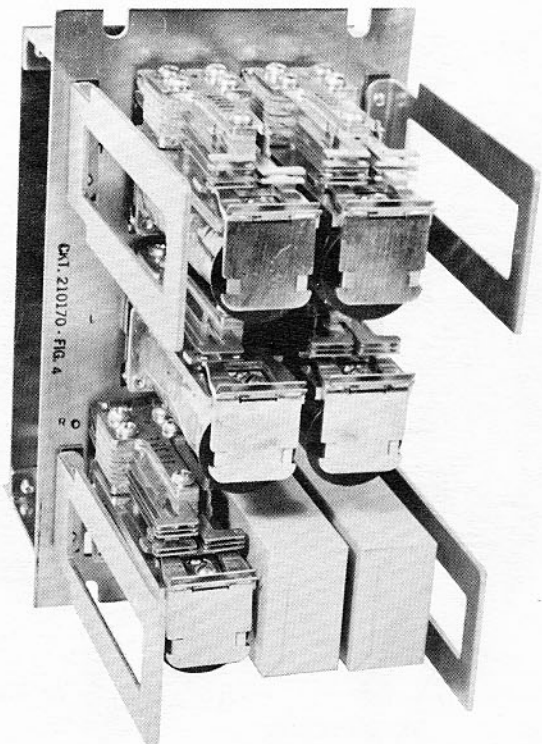


Figure 1-6.  
K205A KTU, Station Line Circuit

Covers Removed For Clarity

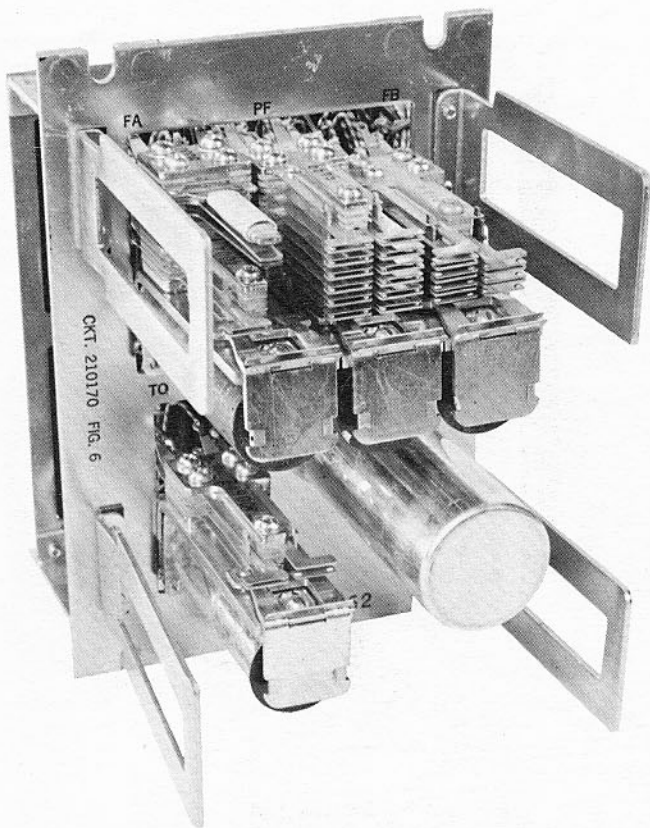


Figure 1-7.  
K209A KTU, Lamp Flashing And  
Incoming Signal Time Out Circuit

Figure 1-8.  
K210A KTU, Hold Lamp Wink Circuit

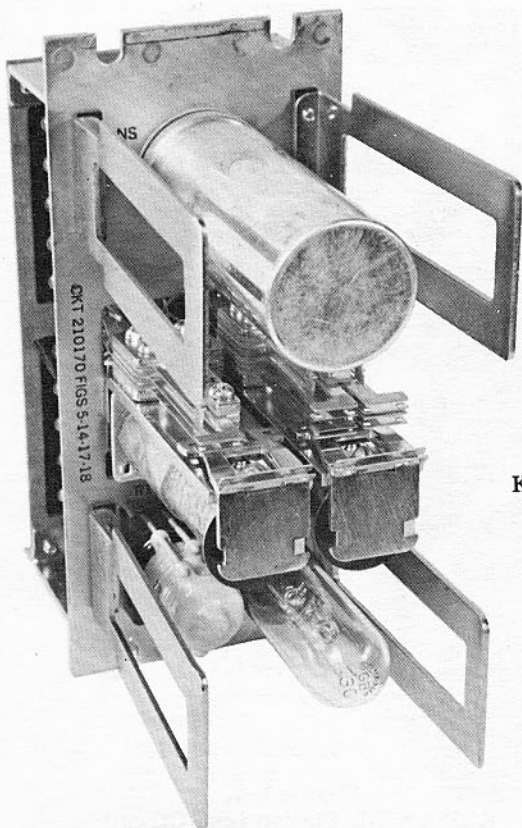
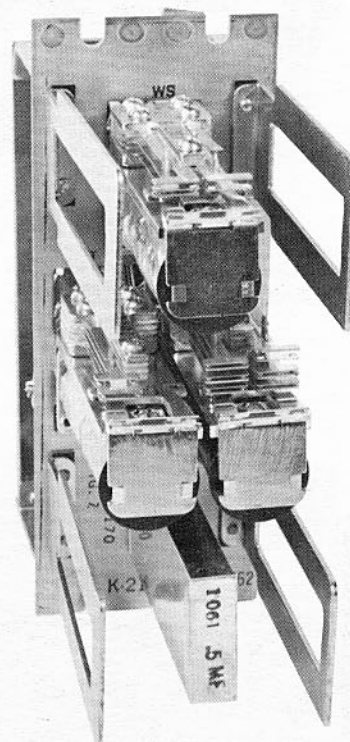


Figure 1-9.  
K211A KTU, Common Equipment

Covers Removed For Clarity

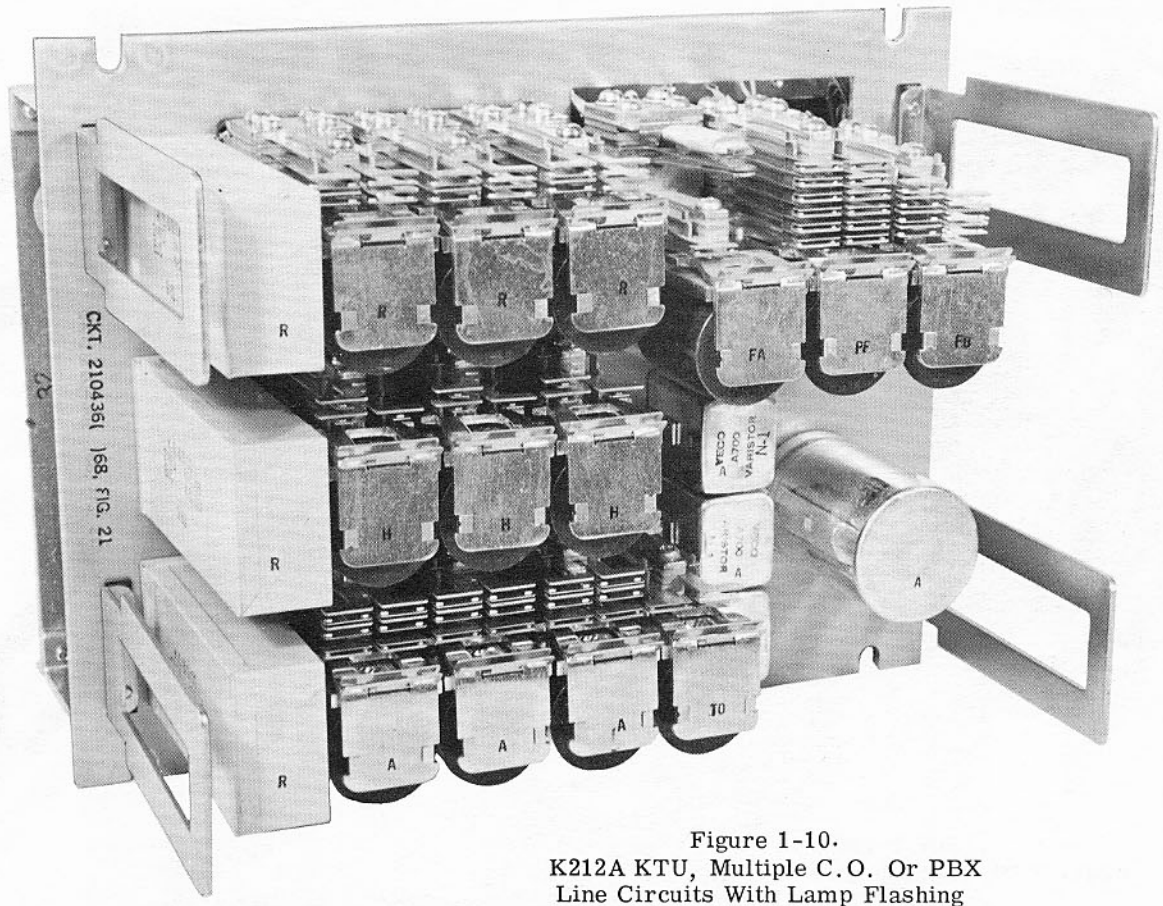


Figure 1-10.  
K212A KTU, Multiple C. O. Or PBX  
Line Circuits With Lamp Flashing  
And Time Out

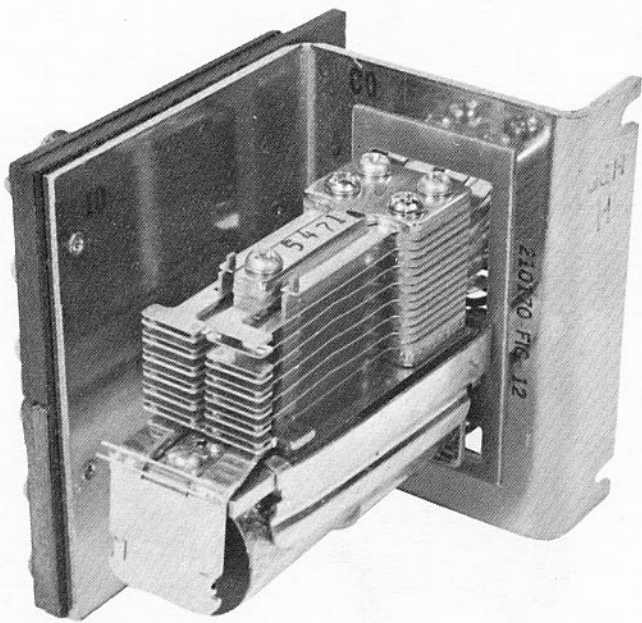


Figure 1-11.  
K26B KTU, Automatic Cut-Off Circuit

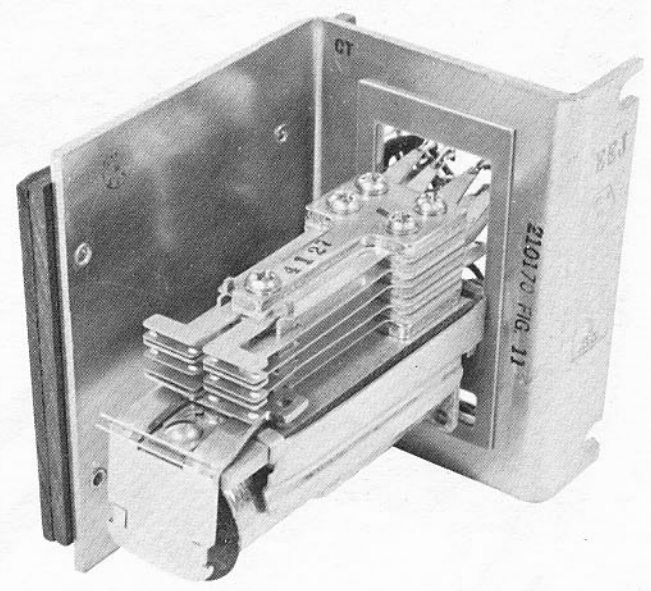


Figure 1-12.  
K29A KTU, Cut-Through And  
Control Circuit

Covers Removed For Clarity

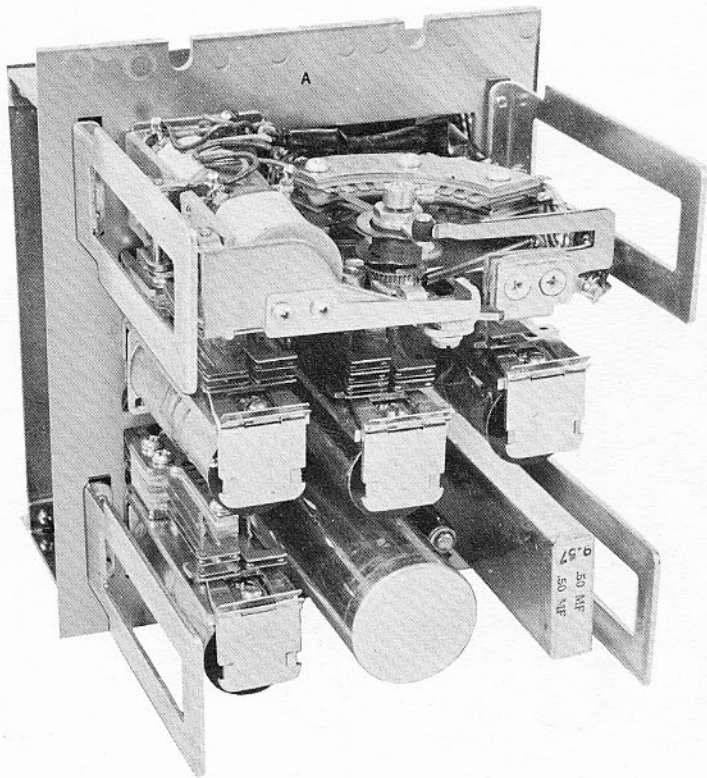


Figure 1-13.  
K207A KTU, Dial Intercom Circuit

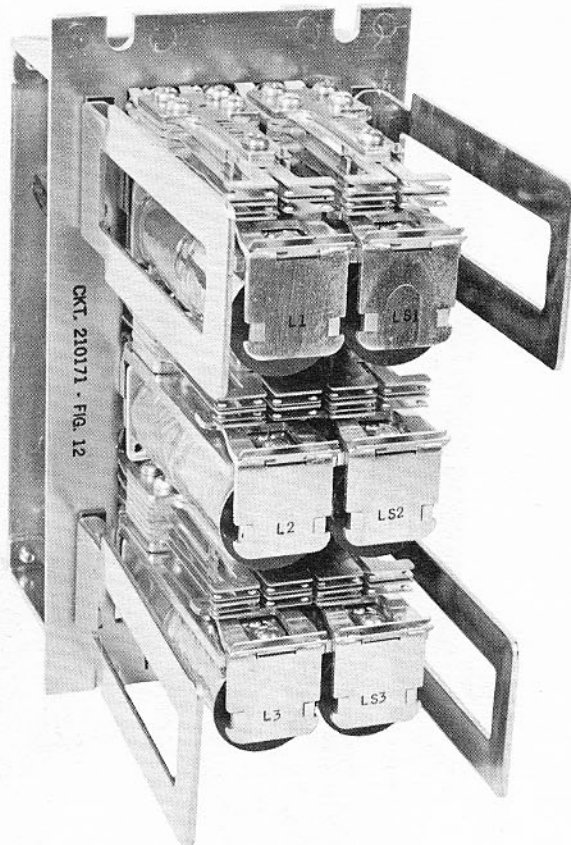


Figure 1-15.  
K208A KTU, Lamp Flashing And  
Automatic Cut-Off Control Circuit

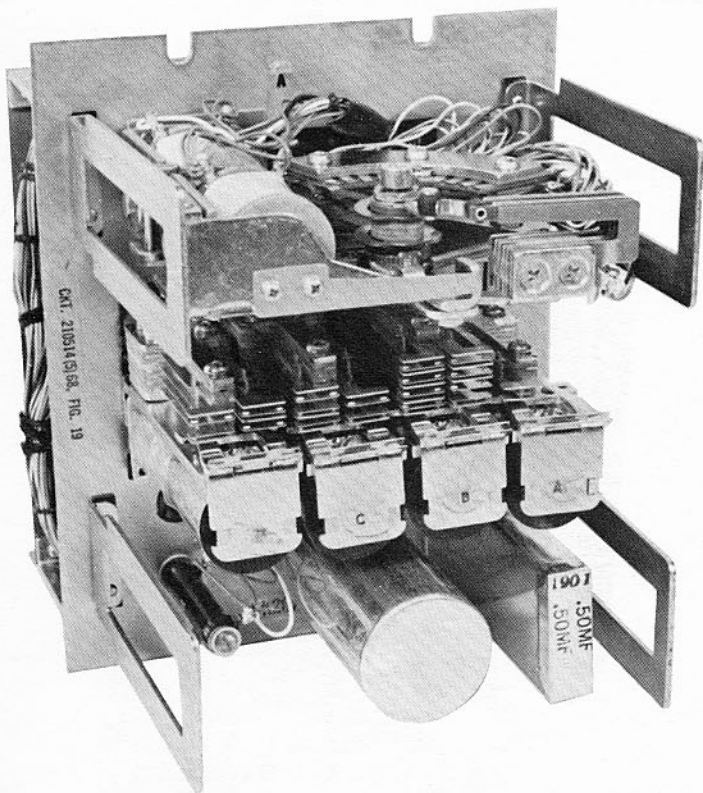


Figure 1-14.  
K207C KTU, Dial Intercom Circuit

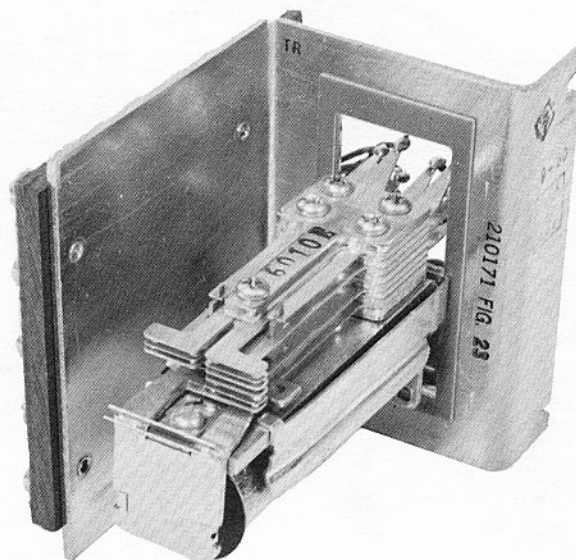
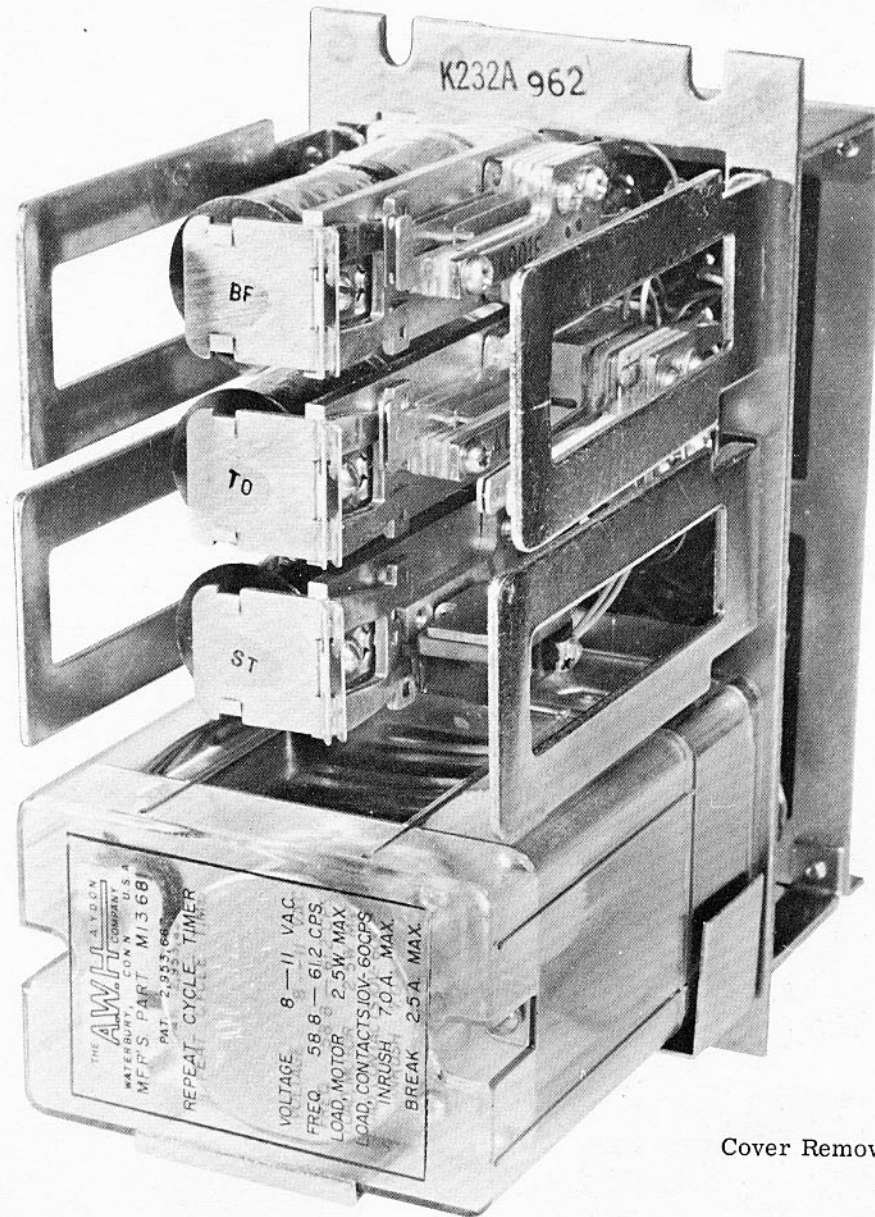
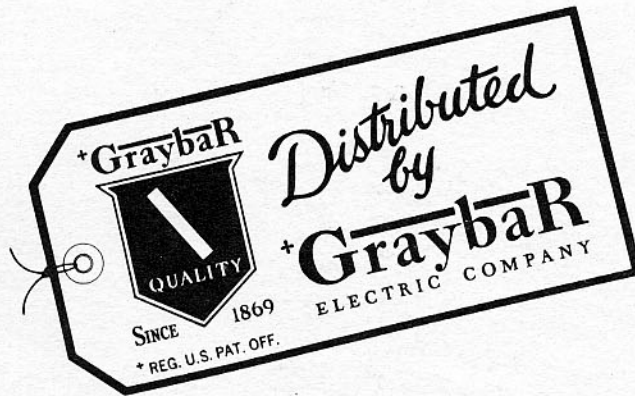


Figure 1-16.  
K40A KTU, Signal Transfer Circuit



Cover Removed For Clarity

Figure 1-17.  
K232A KTU, Ringing, Lamp Flash, Lamp Wink, Incoming  
Signal Time-Out And Manual Intercom Circuit



# ITT KELLOGG

INTERNATIONAL TELEPHONE & TELEGRAPH CORP.

## *K1A1 KEY TELEPHONE SYSTEM General Description*

Section 1, General Description from the K1A1 Key System Practice, circa 1956.

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