

**TIE PRACTICE TP30899**

# **EK-308**

## **Description and Installation Manual**

**Issue 2**

**Feb 1980**

This manual has been developed by TIE/communications, Inc. It is intended for the use of its customers and service personnel.

Any comments or suggestions for improving this manual would be appreciated. Forward your remarks to:

TIE/communications, Inc.  
5 Research Drive  
Shelton, CT 06484

Attention: Manager, Technical Publications

The information in this manual is subject to change. While every effort has been made to eliminate errors, the company disclaims liability for difficulties arising from interpretation of the information contained herein.





## NOTICE TO CUSTOMERS

TIE's EK-308 Key Telephone System is registered in accordance with provisions of Part 68 of the Federal Communications Commission's Rules and Regulations. Customers are advised that under FCC regulations the following provisions must be adhered to:

### MEANS OF CONNECTION

Connection to telephone company lines must be made with FCC-approved plugs and jacks. Connections to TIE's EK-308 system must be made with the RJ-14C and RJ11C connectors.

### NOTIFICATION TO TELEPHONE COMPANY

Customers must give sufficient notice to the telephone company before connecting and disconnecting customer-provided equipment to telephone company lines. Customers must further advise the telephone company as to the particular lines affected and the FCC Registration Number and Ringer Equivalence Number of the equipment.

EK-308 Registration Number: BJ286G-67716-KN-E

EK-308 Ringer Equivalence: 0.3B.

### INCIDENCE OF HARM

The telephone company shall notify customers, where practical, in the event that customer-provided equipment causes harm to the telephone network of possible temporary discontinuance of service. In the event of such discontinuance of service, the telephone company must attempt to advise the customer prior to such discontinuance, afford customers an opportunity to correct the problem and advise customers of their right to bring complaint procedures before the FCC.

### COMPATIBILITY TO TELEPHONE NETWORK

Customers shall be given prior notification of any alteration to telephone company equipment, operations or procedures which may be expected to affect customer-provided equipment operation.

### RESPONSIBILITY TO GRANTEE

When power failure telephones are equipped in the system, installation and maintenance of the equipment is to be effected only by an authorized agent of TIE/communications.

Alterations or modifications of the equipment not expressly shown in TIE installation procedures are prohibited.

The customer is advised to disconnect the equipment from telephone company lines in the event of suspected equipment malfunction. Disconnections MUST be made at the RJ14C or RJ11C connectors.

The TIE EK-308 system is NOT authorized for use in coin or party line applications.

**Warning:** This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the instruction manual, may cause interference to radio communications. As temporarily permitted by regulation, it has not been tested for compliance with the limits for Class A computing devices pursuant to Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference. Operation of this equipment in a residential area is likely to cause interference in which case the user at his own expense will be required to take whatever measures may be required to correct the interference.



# INTRODUCTION

The purpose of this manual is to provide the descriptive and procedural information necessary to install, test and maintain the TIE EK-308 Electronic Key Telephone System. It is assumed that the installer has a basic understanding of key systems theory and operation. With that knowledge and this manual, the installer will be able to install, test, and maintain the EK-308 system.

The EK-308 key service unit, power supply, and telephones are the fundamental components of the system. Information on installation, connections, strapping, and testing is provided.

It is recommended that the installer thoroughly familiarize himself with the information contained in this manual prior to initiating installation of the system.

It is further recommended that this manual and other job related information be left at the job site to aid personnel on repair and rearrangement visits. Options, and any special wiring should be recorded for use by personnel on future visits to the job. This can save both time and money.

If, during installation, or service calls, problems or questions arise that cannot be resolved by using the information contained in this and related manuals, assistance is available from the TIE Technical Service Department, Monday through Friday, as follows:

For assistance in Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington and Wyoming, between 8:30 AM and 5:30 PM, Pacific time, call:

415-592-1929

For assistance in Illinois, Indiana, Iowa, Kansas, Kentucky, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, and Wisconsin, between 8:30 AM and 5:30 PM, Central time, call:

312-595-4400

For assistance in Alabama, Arkansas, Florida, Georgia, Louisiana, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee and Texas, between 8:30 AM and 5:30 PM, Eastern time, call:

404-447-1314

For assistance in all other states, between 8:30 AM and 5:30 PM, Eastern time, call:

203-929-7373

For EMERGENCY assistance at times other than above, call:

203-929-7920

| TABLE OF CONTENTS - SECTION 1 |                               |      |      |   |      |
|-------------------------------|-------------------------------|------|------|---|------|
| PARA                          | SUBJECT                       | PAGE | PARA | SUBJECT   | PAGE |
| 1.00                          | INTRODUCTION                  | B1   | 4.24 | Additional Strapping Options                      | B5   |
| 2.00                          | GENERAL DESCRIPTION           | B1   | 4.25 | Intercom Privacy                                  | B5   |
| 3.00                          | POWER SUPPLY                  | B1   | 4.26 | Privacy   | B5   |
| 4.00                          | INSTALLATION                  | B1   | 4.27 | No Privacy  | B6   |
| 4.01                          | Selection of Equip. Location  | B1   | 4.28 | Privacy Strapping                                 | B6   |
| 4.03                          | KSU Mounting                  | B2   | 4.30 | Automatic Recall                                  | B6   |
| 4.07                          | Power Supply Mounting         | B2   | 4.32 | Busy Station Alert Tone                           | B6   |
| 4.11                          | Grounding the System          | B3   | 4.34 | Optional Cards - Installation<br>and Strapping    | B7   |
| 4.16                          | Expanding the System          | B3   | 4.35 | 3rd C.O. Line Circuit                             | B7   |
| 4.18                          | Expansion Card Installation   | B4   | 4.37 | Multi-line Conference                             | B7   |
| 4.22                          | KSU Station Feature Strapping | B4   | 4.38 | Flashing or Grounding Circuit                     | B7   |
|                               | EK-308 Telephones             | B4   | 4.42 | Optional Features Requiring<br>External Equipment | B8   |
|                               | Box Options                   | B5   | 4.44 | BGM and MOH                                       | B8   |
|                               | ICM Box                       | B5   | 4.47 | External Paging Amplifier                         | B8   |
|                               | Background Music              | B5   | 4.51 | Alarm Signal Repeating                            | B9   |
|                               | Alarm                         | B5   | 4.54 | Station Cable Connections                         | B9   |
|                               |                               |      | 4.59 | Connection of C.O. Lines                          | B10  |
|                               |                               |      | 4.62 | Power Failure Connections                         | B10  |
| FIG                           | FIGURES                       | PAGE | FIG  | FIGURES   | PAGE |
| 1                             | Expansion Card Installation   | B2   | 7    | Connectors on SIU-A Card                          | B8   |
| 2                             | Connectors on SLU-A Card      | B3   | 8    | Connectors on FGU-A Card                          | B8   |
| 3                             | Option Card Installation      | B4   | 9A   | LTB-A Terminal Layout                             | B9   |
| 4                             | Connectors on CPU-A Card      | B6   | 9B   | LTB-B Terminal Layout                             | B9   |
| 5                             | Connectors on 4SU-A Card      | B7   | 10   | LTB-C Terminal Layout                             | B9   |
| 6                             | Connectors on 4IU-A Card      | B7   |      |   |      |
| TBL                           | TABLES                        | PAGE | TBL  | TABLES  | PAGE |
| 1                             | KSU Strapping for Telephones  | B5   | 3    | External Connections to KSU                       | B10  |
| 2                             | KSU Strapping for Boxes       | B6   |      |   |      |

| TABLE OF CONTENTS - SECTION 2 |                              |      |      |                             |      |
|-------------------------------|------------------------------|------|------|-----------------------------|------|
| PARA                          | SUBJECT                      | PAGE | PARA | SUBJECT                     | PAGE |
| 1.00                          | INTRODUCTION                 | B1   | 4.01 | Dial Installation           | B2   |
| 2.00                          | GENERAL INSTALLATION         | B1   | 4.05 | Dial Replacement            | B3   |
| 2.02                          | Cable Installation           | B1   | 4.09 | Power Failure Signalling    | B3   |
| 2.04                          | Proper Wiring                | B1   | 4.14 | Tel. Conn. to the System    | B4   |
| 2.06                          | Cable Limits                 | B1   | 5.00 | INTERCOM BOX INSTALLATION   | B4   |
| 2.07                          | Cable Designation & Function | B1   | 5.06 | ICM Box Conn. to the System | B5   |
| 3.00                          | TELEPHONE DESCRIPTION        | B2   | 6.00 | DOOR BOX INSTALLATION       | B5   |
| 4.00                          | TELEPHONE INSTALLATION       | B1   | 6.02 | Installation                | B5   |
| FIG                           | FIGURES                      | PAGE | FIG  | FIGURES                     | PAGE |
| 1                             | ANU Terminal Locations       | B2   | 4    | Buzzer Installation         | B4   |
| 2                             | Dial Mounting Arrangement    | B3   | 5    | Door Box Terminal Locations | B5   |
| 3                             | Dial Terminal Board          | B4   |      |                             |      |
| TBL                           | TABLES                       | PAGE |      |                             |      |
| 1                             | Dial Connections             | B3   |      |                             |      |

| TABLE OF CONTENTS - SECTION 3 |                              |      |      |                            |      |
|-------------------------------|------------------------------|------|------|----------------------------|------|
| PARA                          | SUBJECT                      | PAGE | PARA | SUBJECT                    | PAGE |
| 1.00                          | INTRODUCTION                 | B1   | 3.00 | TEST PROCEDURES            | B2   |
| 2.00                          | OPERATIONAL TESTS - GENERAL  | B1   | 4.00 | PARTS LIST                 | B15  |
| FIG                           | FIGURES                      | PAGE | FIG  | FIGURES                    | PAGE |
| 1                             | LTB-A/LTB-B Pwr. Fail. Conn. | B2   | 6    | Telephone Interface        | B18  |
| 2                             | SLU/CPU Audio Paths          | B16  | 7    | Box Interface              | B18  |
| 3                             | 4SU Audio Paths              | B17  | 8    | EK-308 Telephone Schematic | B19  |
| 4                             | SIU Audio Paths              | B17  | 9    | EK-308 Box Schematic       | B19  |
| 5                             | 4IU Audio Paths              | B17  | 10   | Voice Switching Schematic  | B20  |
| TEST                          | PROCEDURE                    | PAGE | TEST | PROCEDURE                  | PAGE |
| 1                             | Idle system                  | B2   | 3H   | Privacy                    | B8   |
| 2                             | Seizure and All-call         | B2   | 3J   | Privacy Release            | B8   |
| 3                             | C.O. Line Tests              | B5   | 4    | Intercom Call Tests        | B8   |
| 3A                            | Idle Lines                   | B5   | 4A   | Automatic Hold             | B8   |
| 3B                            | Seizure                      | B5   | 4B   | Resignal                   | B8   |
| 3C                            | Dialling                     | B5   | 4C   | Answer Via Hold Key        | B8   |
| 3D                            | Incoming Ring                | B6   | 4D   | Handsfree Answer           | B9   |
| 3E                            | Answer                       | B6   | 4E   | Mike Mute                  | B9   |
| 3F                            | Hold                         | B7   | 4F   | Restore Talkback           | B9   |
| 3G                            | Timed Recall                 | B7   | 4G   | Handset Answer             | B9   |
|                               |                              |      | 4H   | Exclusion                  | B9   |

continued

SECTION 3080, Table of Contents - continued

| TEST | PROCEDURE              | PAGE | TEST | PROCEDURE                    | PAGE |
|------|------------------------|------|------|------------------------------|------|
| 4I   | Do Not Disturb         | B10  | 7    | Monitor Tests                | B12  |
| 4J   | Alternate Point Answer | B10  | 7A   | Activate                     | B12  |
| 5    | Flash Key Tests        | B10  | 7B   | Output Transmission Gates    | B13  |
| 5A   | Loop Flash             | B10  | 7C   | Input Transmission Gates     | B13  |
| 5B   | Ground Flash           | B11  | 7D   | Calling While Monitor Active | B13  |
| 6    | Multi-line Conference  | B11  | 8    | Door Boxes                   | B14  |
|      |                        |      | 9    | Alarm Signal                 | B14  |

TABLE OF CONTENTS - SECTION 4

| PARA | SUBJECT             | PAGE | PARA | SUBJECT               | PAGE |
|------|---------------------|------|------|-----------------------|------|
| 1.00 | INTRODUCTION        | C1   | 4.00 | OPERATION             | C4   |
| 2.00 | GENERAL             | C1   | 5.00 | SPEAKERPHONE LOCATION | C4   |
| 3.00 | INSTALLATION        |      |      |                       |      |
| FIG  | FIGURES             | PAGE | TBL  | TABLES                | PAGE |
| 1    | DTB Strap Location  | C2   | 1    | DTB Connections       | C3   |
| 2    | DTB Terminal Layout | C3   |      |                       |      |



## TIE EK-308 KEY SERVICE UNIT - INSTALLATION

### 1.00 INTRODUCTION

1.01 The following information is provided for installation of the TIE EK-308 Electronic Key Telephone System key service unit.

### 2.00 GENERAL DESCRIPTION

2.01 The EK-308 KSU is 8.5 inches (21.6 cm) wide, 12 inches (30.5 cm) high and 4.16 (10.6 cm) deep. The KSU is equipped with a cover which can be removed by loosening two screws on each side of the KSU and pulling the cover forward. Removal of the cover will expose the circuit cards. There are two common cards shipped with the KSU. The cards are arranged in layers; the bottom card being the SLU-A Station Interface and Logic card and the top card the CPU-A Central Processor card.

2.02 A third expansion card may be added by the installer to increase the capacity of the system from 4 to 8 stations. The common cards and the expansion card are connected with flat ribbon cables.

2.03 Fuses are provided on some cards to protect the telephone interface circuits from shorts or reversals.

2.04 Each card has strapping connectors for programming the features of the system.

2.05 There are three option cards which may be added to the system. Three connectors are located on the SLU-A card which accept the option cards. The option cards are:

- LNU-A - Third LINE card
- MCU-A - Multi-line conferencing card
- FGU-A - Flashing card

### 3.00 POWER SUPPLY

3.01 The power supply is 9.5 inches (24.2 cm) wide, 7 inches (17.8 cm) high and 6.5 inches (16.5 cm) deep. The power supply provides +18 volts and -18 volts with current limiting on the output leads. The +18 and -18 voltages are fused at 2.5 Amperes each. A single fuse is provided in the AC line. The power supply is equipped with a metal cover and meets UL requirements.

### 4.00 INSTALLATION

#### 4.01 Selection of Equipment Location

4.02 Considering the factors listed below, select a suitable site for installation of the KSU.

- a) Availability of 105 to 125 volt, 60 Hz, single phase, 3-wire (*parallel blade and ground*) power outlet. See paragraph 4.09.
- b) Location of the CO/PBX line terminations.
- c) Location of the majority of local stations. The practical objective of equipment location is to minimize cable runs.
- d) Location of telephone ducts, or conduit, if provided.
- e) Availability of space to allow for accessing and servicing the equipment.
- f) A well ventilated area having a temperature range of from +32° (0°C) to +120° (+50°C) Fahrenheit is recommended.
- g) A good earth ground must be provided, using 14-gauge or larger wire. A cold-water pipe with joints and meters by-passed by 14-gauge or larger straps will provide a suitable ground.

4.03 KSU Mounting

4.04 The TIE EK-308 KSU is configured for wall-mounting ONLY.

*lead* When a concrete, masonry, or damp surface is selected for the mounting site, the KSU **MUST** be mounted on a customer-provided backboard.

4.05 On the surface to which the KSU is to be mounted, locate the 4 points which correspond to the keyhole type mounting holes in the back panel of the KSU assembly.

4.06 The method of fastening the assembly is determined by the surface to which it is to be fastened. Using suitable fasteners, secure the assembly to the mounting surface.

4.07 Mounting the Power Supply

4.08 The TIE EK-308 Power Supply is constructed to be wall-mounted ONLY.

*lead* To provide for proper ventilation, and to prevent wire clippings in the power supply, it should be mounted adjacent to the KSU. **DO NOT** mount below the KSU.

4.09 Select a mounting location close enough to the TIE EK-308 KSU to permit its 4 foot power cord to plug into the power supply and close enough to an 110VAC outlet to permit the 5 foot power supply cord to be plugged in.

4.10 Using suitable fasteners, secure the power supply to the mounting surface.

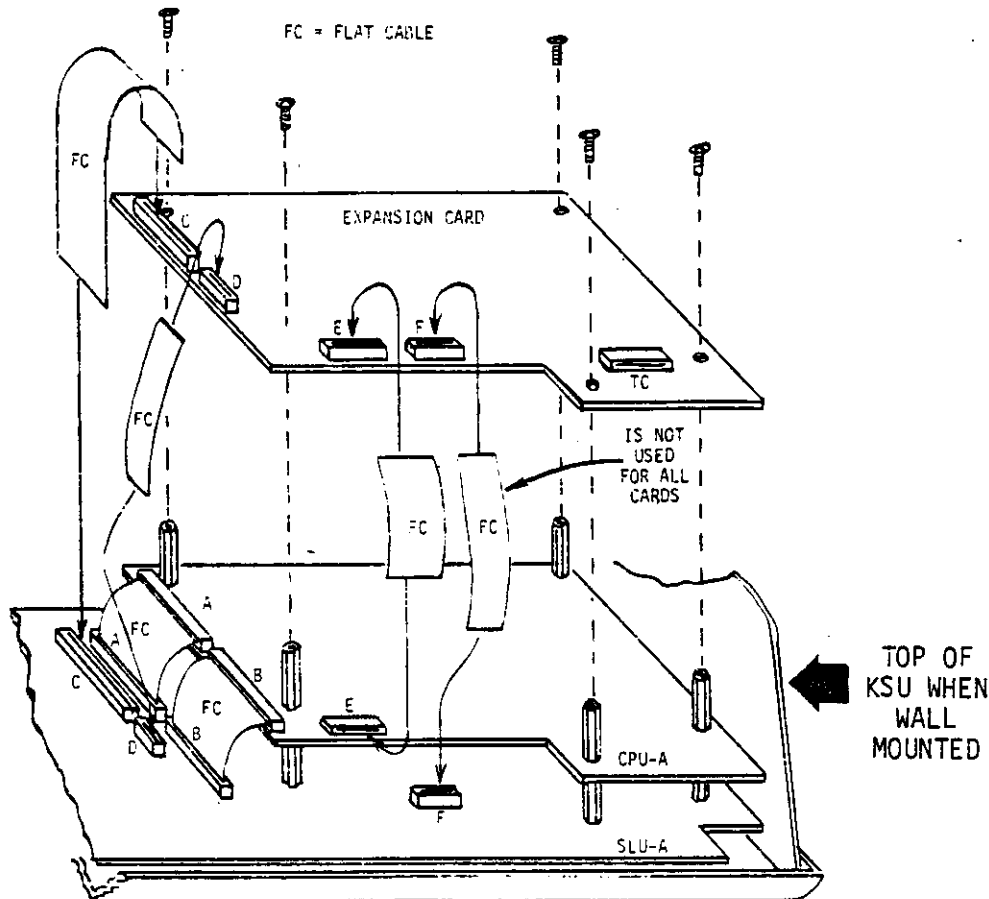


FIGURE 1 - EXPANSION CARD INSTALLATION

4.11 Grounding the System

4.12 After the KSU has been wall-mounted, it MUST be properly grounded.

DO NOT USE THE  
3RD WIRE (GREEN)  
OF THE AC CORD  
FOR EARTH GROUND.

4.13 It is recommended that the AC service outlet used be the 3-wire (parallel blade and ground) type. A 3-wire to duplex adapter SHOULD NOT be used.

4.14 An additional earth ground must be provided for proper operation of the system. In most installations, a metallic cold-water pipe will provide a good earth ground. The installer should check that the cold-water piping is metallic and has no joints or sections of non-metallic pipe. If the cold-water

system is found to be inadequate for grounding purposes, an alternate grounding means must be used.

4.15 The wire used to ground the KSU should be as short as possible and 14-gauge or larger. This wire should be connected to the KSU grounding lug located in the KSU just above the power cable entrance hole.

4.16 Expanding the System  
(From 4 to 8 stations)

4.17 The basic EK-308 KSU is shipped from the factory with two circuit cards (SLU-A and CPU-A) that contain control and interface circuits for only four key telephones. To expand the system or to add intercom or door answering stations, another card must be added to the KSU. The selection of this card will depend upon the type of station to be added. This is because the interface circuits are different for electronic key telephones and intercom boxes. One of the following cards may be added to expand the system:

a) 4SU-A - Provides interface cir-

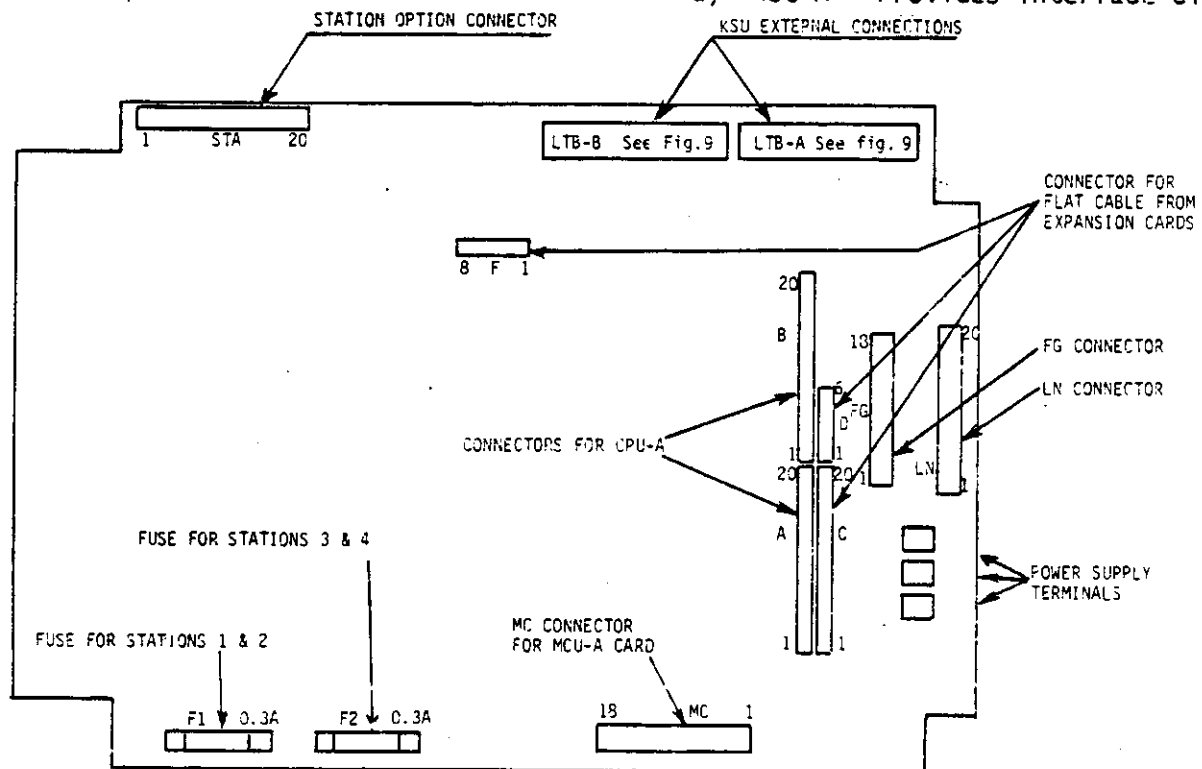


FIGURE 2 - CONNECTORS ON SLU-A CARD

- cuits for four EK-308 telephones.
- b) 4IU-A - Provides interface circuits for any combination of intercom and door boxes totaling 4.
- c) SIU-A - Provides interface circuits for two EK-308 telephones and two intercom or door boxes.

4.18 Expansion Card Installation

4.19 The selected expansion card is installed in the KSU by placing it on top of the stand-offs in the KSU. The card is positioned with the terminals for the station cable to the right side of the card. Fasten the card to the stand-offs with the screws provided. Refer to figure 1.

4.20 With the flat ribbon cables provided, connect the card as shown in figure 1.

*read* When installing the flat ribbon cable, be certain that the exposed contacts of the cable are facing the terminals of the connector.

4.21 To insert the flat ribbon cable in the connector, grasp each side of the flat cable between thumb and forefinger, place the cable into the connector and push into place.

4.22 KSU Station Feature Strapping

4.23 There are a number of options, for signalling and background music, which can be programmed in the KSU at the interface circuit for each station. There are different options available for different types of stations.

EK-308 Telephone Options:

- a) Off-hook (and on-hook) Signalling.  
This is factory standard strapping. A station with this strap will receive C.O. audible signals for all C.O. lines at all times. The audible signal is muted if the station is off-hook.
- b) On-hook (only) signalling.  
A station with this strap will receive C.O. audible signals for

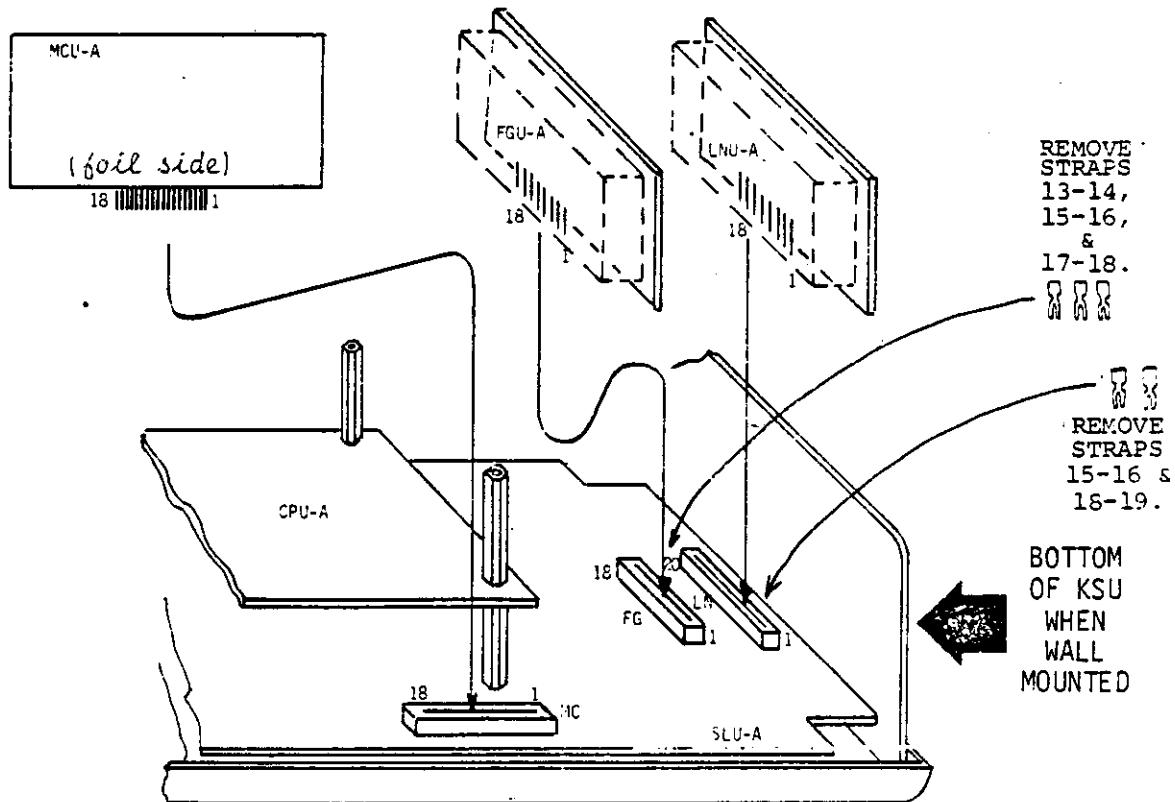


FIGURE 3 - OPTION CARD INSTALLATION

- all C.O. lines only when the station is on-hook.
- c) **No C.O. audible signals.**  
To block C.O. audible signals to a station, remove the above audible signal strap.
- d) **Background Music (BGM)**  
Stations with this strap will receive BGM when an external music source is connected to the MS1 and MS2 terminals. This is factory standard strapping.

*Note Refer to table 1 for feature/strap location for each station.*

Intercom or Door Box Options:

- a) **ICM Box**  
The presence of this strap informs the system that the interface is for an ICM box. Removal of this strap will cause the interface to operate as a door box. This strap is factory standard.
- b) **Background Music (BGM)**  
With this strap installed, the station will receive BGM when an external music source is connected to the KSU. This is factory standard strapping.

c) **Alarm**

With this strap installed, alarm signals will be transmitted to the door box so that it can be heard by neighbors outside the house.

*Note Refer to table 2 for feature/strap location for each box.*

4.24 Additional KSU STRAPPING Options

4.25 Privacy on the Intercom: The system is equipped with only one intercom path. The path may be arranged for privacy after the call has been answered; that is, when the call is in the handset-to-handset mode. To assist the installer in determining whether or not to provide privacy on the intercom, the following paragraphs describe the operation and call handling procedures with or without privacy on the intercom.

4.26 With Privacy: Other stations may NOT enter an intercom call in the handset-to-handset mode (after the call has been answered). If the intercom is busy, incoming calls must be announced by using the all-call feature. The all-call announcement will preempt the intercom call in progress and will be heard at all stations EXCEPT stations on C.O. line calls.

TABLE 1 - KSU STRAPPING FOR EK-308 TELEPHONES

|   |                                     |      |       |       |                                      |      |       |       |
|---|-------------------------------------|------|-------|-------|--------------------------------------|------|-------|-------|
| NOTE: The EK-308 tele-<br>phones served by the<br>SIU card (when equip-<br>ped) will always be<br>stations 5 and 6. | STRAP ON SLU-A CARD<br>SEE FIGURE 2 |      |       |       | STRAP ON 4SU-A CARD<br>SEE FIGURE 5  |      |       |       |
|   |                                     |      |       |       | STRAP ON<br>SIU-A CARD<br>SEE FIG. 7 |      |       |       |
| STATION<br>FEATURE  | 1                                   | 2    | 3     | 4     | 5                                    | 6    | 7     | 8     |
| OFF-HOOK (and ON-HOOK)<br>SIGNALLING  | 1-2                                 | 6-7  | 11-12 | 16-17 | 1-2                                  | 6-7  | 11-12 | 16-17 |
| ON-HOOK (ONLY)<br>SIGNALLING  | 2-3                                 | 7-8  | 12-13 | 17-18 | 2-3                                  | 7-8  | 12-13 | 17-18 |
| BACKGROUND MUSIC (BGM)  | 4-5                                 | 9-10 | 14-15 | 19-20 | 4-5                                  | 9-10 | 14-15 | 19-20 |

TABLE 2 - KSU STRAPPING FOR EK-308 BOXES

|   |                                     |     |       |       |                                      |     |
|---|-------------------------------------|-----|-------|-------|--------------------------------------|-----|
| NOTE: The EK-308 Door Boxes served by the SIU card (when equipped) will always be stations 7 and 8. | STRAP ON 4IU-A CARD<br>SEE FIGURE 6 |     |       |       | STRAP ON<br>SIU-A CARD<br>SEE FIG. 7 |     |
|   | STATION                             | 5   | 6     | 7     | 8                                    | 7   |
| FEATURE   |                                     |     |       |       |                                      |     |
| INSERT FOR ICM BOX<br>REMOVE FOR DOOR BOX   | 1-2                                 | 5-6 | 9-10  | 13-14 | 1-2                                  | 5-6 |
| BGM FOR ICM BOX<br>or<br>ALARM FOR DOOR BOX   | 3-4                                 | 7-8 | 11-12 | 15-16 | 3-4                                  | 7-8 |

4.27 Without Privacy: After an intercom call has been answered (in the handset-to-handset mode) any other station may enter the intercom call simply by going off-hook.

4.28 Intercom Privacy Strapping

4.29 Strap the IP connector (see figure 4) on the CPU-A board as follows:

a) To provide privacy, strap 2-3.

b) To remove privacy, strap 1-2.

4.30 Automatic Recall of Held Calls:

The system is arranged to signal a station which has placed a call on HOLD and left it on HOLD for a predetermined length of time. This 'time-to-recall' period may be adjusted from 16 to 112 seconds in increments of 16 seconds.

4.31 Strap the AR connector (see figure 4) on the CPU-A board as follows to provide the desired 'time-to-recall' period:

- 16 seconds - strap 1-2
- 32 seconds - strap 3-4
- 48 seconds - strap 1-2 and 3-4
- 64 seconds - strap 5-6
- 80 seconds - strap 1-2 and 5-6
- 96 seconds - strap 3-4 and 5-6
- 112 seconds - strap 1-2, 3-4 & 5-6

Note: The system is strapped at the factory to provide 112 seconds for recall.

4.32 Busy Station Alert Tone for All-Call

4.33 Because of the single audio path in the EK-308 telephone, all-call announcements can NOT be received when the station is busy on a C.O. line call. However, the KSU

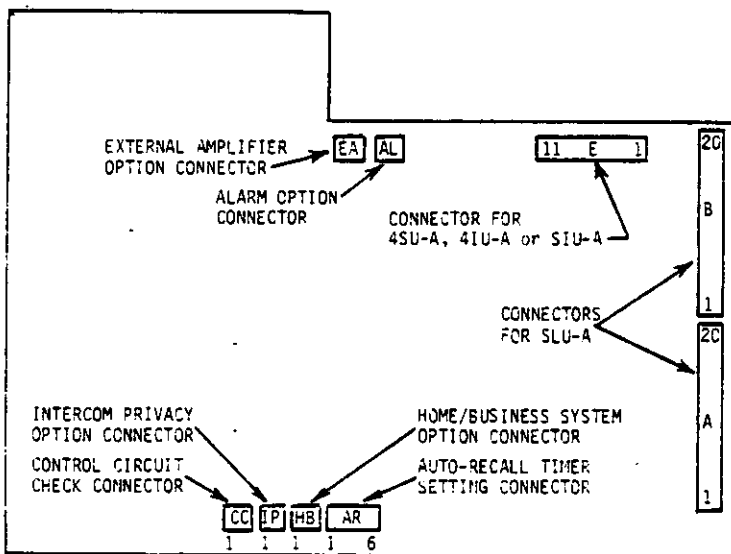


FIGURE 4 - CONNECTORS ON CPU-A CARD

may be strapped to transmit an alert tone to stations busy on C.O. calls whenever the all-call circuit is used. This tone is normally provided in home installations and is NOT provided in business installations. The HB connector (see figure 4) on the CPU-A card is strapped as follows for all-call alert tone:

- NO alert tone - strap 1-2
- With alert tone - strap 2-3

4.34 Optional Cards - Installation and Strapping

4.35 Third C.O. Line Circuit: The LNU-A card is an optional circuit which may be installed in the KSU to provide a 3rd C.O. line. When this card is installed, the monitor circuit cannot be used.

4.36 The LNU-A card plugs into the LN connector (see figure 2) on the SLU-A board. Remove straps 15-16 and 18-19 before installing the card. Install the card with the components on top of the card (see figure 3).

4.37 Multi-line Conference Circuit: The addition of an MCU-A card to the KSU permits any two C.O. lines to be conferenced together via an isolation transformer. Only one conference may be established at any time. The MCU-A card is installed in the MC connector (see figure 2) on the SLU-A board. Refer to figure 3 for mounting detail.

4.38 Flashing or Grounding Circuit: The FGU-A card may be added to the KSU to provide a FLASH key function. This feature is usually added when the system is installed behind a PBX which employs flash recall of the operator or flash for transfer. This could be accomplished without the installation of an FGU-A card, but it requires the manipulation of the hookswitch and the line button and this operation becomes awkward to accomplish.

4.39 Some PBX's employ a ground on one side of the loop to initi-

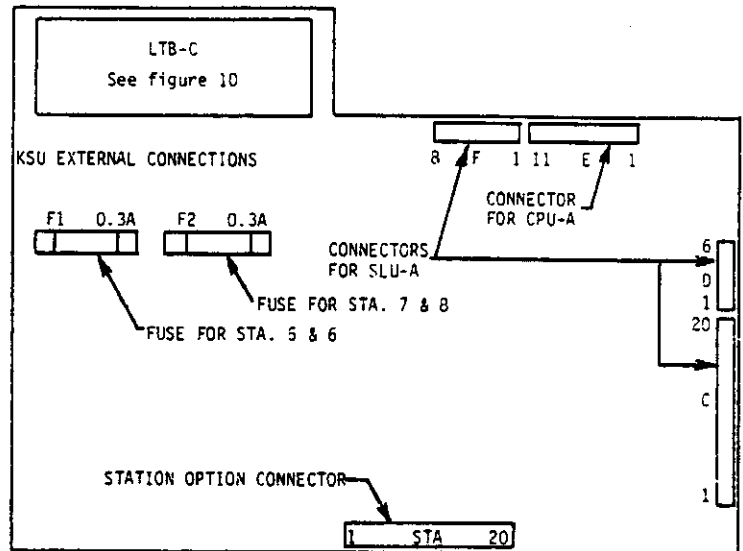


FIGURE 5 - CONNECTORS ON 4SU-A CARD

ate call transfer. The FGU-A card may be strapped to provide this feature.

4.40 Before the FGU-A card is installed, it must be strapped to provide either 'open loop flash' or 'ground on one side of the line'. Straps are required for each line. The connector on the FGU-A is designated LN1, LN2 and LN3. Strap the connector (see figure 8) as follows:

- a) For open loop flash - strap 1-2 for each line.

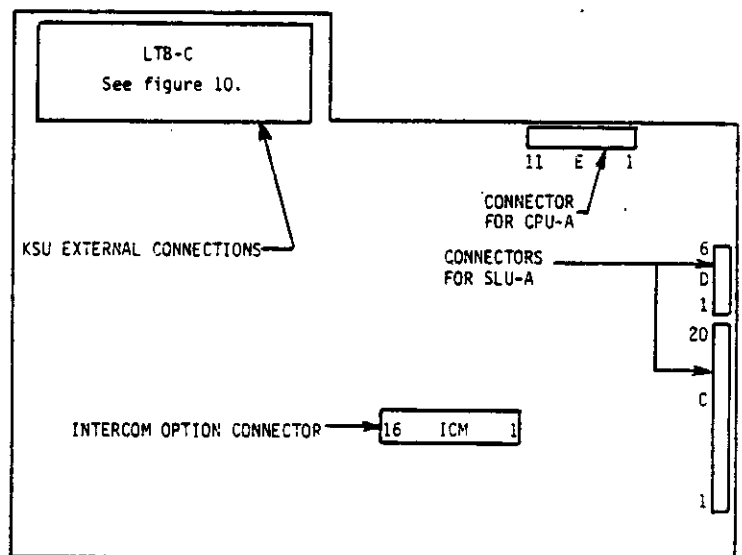


FIGURE 6 - CONNECTORS ON 4IU-A CARD

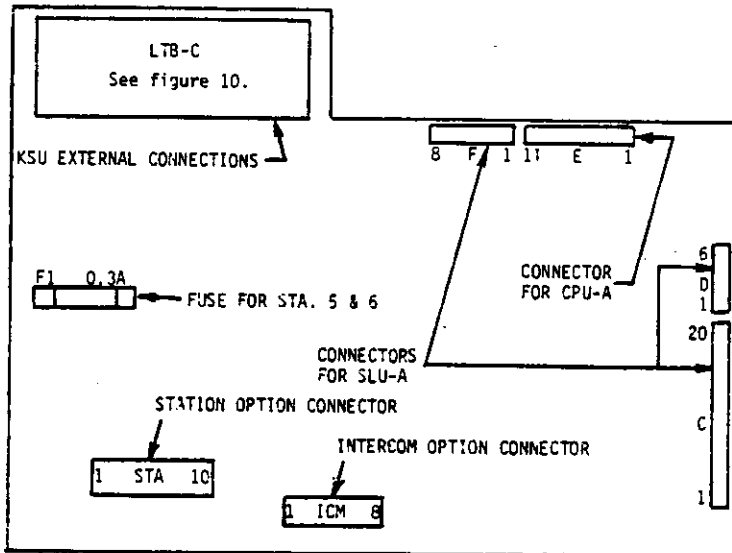


FIGURE 7 - CONNECTORS ON SIU-A CARD

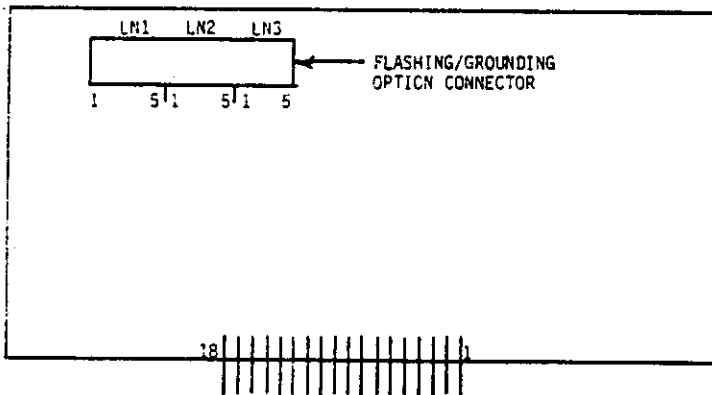


FIGURE 8 - CONNECTORS ON FGU-A CARD

Note: If an LNU-A card is NOT equipped, the LN3 connector on the FGU-A card must be strapped 1-2.

b) For ground on loop transfer strap 2-3 and 4-5 for each line.

*When the FGU-A is installed for 'ground on loop' transfer, the installer must run a ground lead from the ETH terminal on LTB-B to the KSU ground lug located just above the KSU cable entrance hole. See paragraph 4.15. DO NOT connect ground to the GND on terminal board LTB-B.*

4.41 The FGU-A card plugs into the SLU-A card in the connector marked FG (see figure 2). Remove the straps from 13-14, 15-16 and 17-18 be-

fore installing the FGU-A card. These straps must be replaced if the card is ever removed. The card is plugged in with the components on the top (see figure 3 for details).

4.42 Optional Features Requiring External Equipment

4.43 There are four optional features which may be added to the system that require the addition of customer-provided external equipment. These are background music (BGM), music-on-hold (MOH), access to an external paging system and connections for an external alarm system. The following describes these options and provides installation information for each.

4.44 BGM and MOH: Both background music (BGM) and music-on-hold (MOH) can be provided by connecting an external music source such as a tape deck or radio tuner to the KSU. BGM provides music via the loudspeakers in the telephones or intercom boxes which are strapped to receive BGM (refer to paragraph 4.23) in the KSU.

4.45 MOH provides music to C.O. lines which have been placed on HOLD. The presence of music reassures the held party that the call has not been abandoned.

4.46 To provide both BGM and MOH, connect an external music source having an output impedance between 2000 and 10000 ohms to the MS1 and MS2 terminals on the LTB-A terminal board (see figure 9).

4.47 External Paging Amplifier: An external paging amplifier and paging system may be connected to the EK-308 system. This will permit call-announcements to be heard in large or noisy areas such as a manufacturing area, warehouse, lumber yard, barn, garden, etc.



4.48 The KSU may be strapped to transmit all-call announcements only, or all-call announcements and background music to the external paging system. This strapping is performed on the EA connector (see figure 4) on the CPU-A card.

4.49 Strap the EA connector as follows:

- a) For all-call only - strap 2-3
- b) For all-call and BGM - strap 1-2

4.50 The external paging amplifier is connected to the EA1 and EA2 terminals (see figure 9) on the LTB-A terminal board. It is recommended that shielded cable be used for connecting the KSU to the external paging system. The shield should be grounded at the external amplifier.

4.51 Alarm Signal Repeating: The EK-308 system may be used to transmit an alarm signal to every station in the system. When activated by an external alarm system, a high pitched warbling tone is transmitted to the stations. Strapping of the KSU permits this alarm signal to be activated by either an open circuit or a closed circuit on the external alarm leads. This strapping is accomplished on the AL connector (see figure 4) of the SLU-A card.

4.52 Strap the AL connector as follows:

- a) For open circuit activated alarm, strap 1-2.
- b) For closed circuit activated alarm, strap 2-3.

4.53 The system may optionally arranged to transmit the alarm signal to a door box so that it can be heard by neighbors or by those outside the building. The KSU connections for the activating alarm system leads are made to terminals AL1 and AL2 (see figure 9) on the LTB-A terminal board.

4.54 Station Cable Connections

4.55 The LTB-A and LTB-B terminal boards are designed to be plugged into each other to provide direct con-

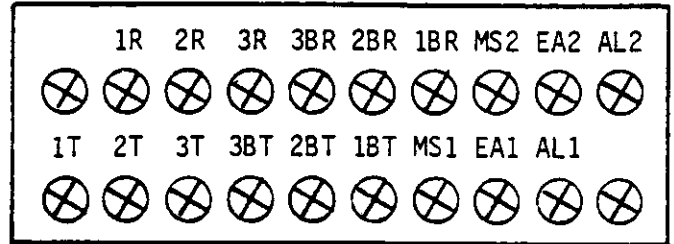


FIGURE 9A - LTB-A TERMINAL LAYOUT

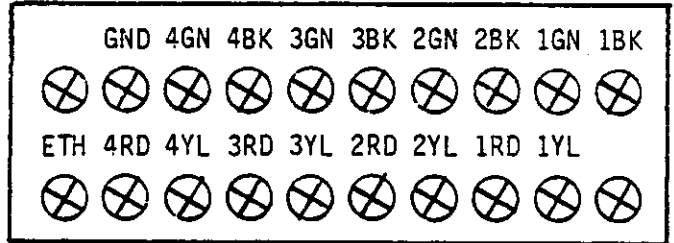


FIGURE 9B - LTB-B TERMINAL LAYOUT

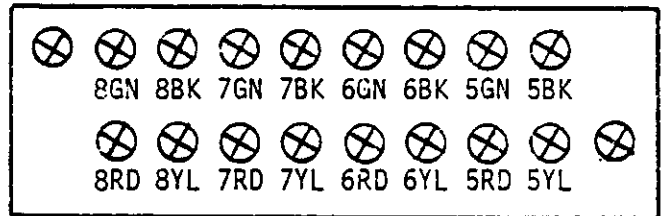


FIGURE 10 - LTB-C TERMINAL LAYOUT

nection from the C.O. lines to certain preassigned stations. This permits the stations to operate in the "power failure" mode, as a single line instrument if the KSU has to be removed for service (see paragraphs 4.57 and 4.58).

*When connecting cables to the KSU, the installer should leave sufficient slack to permit the LTB-A and LTB-B terminal boards (which can be unplugged from the KSU) to be plugged together.*

4.56 Terminals are provided on the LTB-B and LTB-C terminal boards (see figures 9 & 10) for connection of the four wire (quad) cables from each station. See table 3 for the location of each station

connection. Station number assignment will be determined by the location of the station cable connection to the LTB-B and LTB-C terminal boards.

4.57 Consideration should be given to the station number assignment because the system provides automatic cut through of C.O. lines to preassigned stations on power failure. The preassigned stations are connected as follows:

- a) C.O. line 1 to stations 1 and 4.
- b) C.O. line 2 to station 2.
- c) C.O. line 3 (if provided) to station 3.

4.58 Stations connected to a C.O. line during power failure may answer or originate calls on the associated line only. The telephone will function as a single line set. For these stations to respond to C.O. ringing signals, they must be equipped with high impedance (high voltage) ringers or buzzers. Refer to section on EK-308 telephone.

4.59 Connection of C.O. Lines

4.60 C.O. line connections are factory wired on terminals on the LTB-A terminal board. See table 3 for the location of the terminals for each line. Figure 9 shows the layout of the LTB-A terminal board (for reference only).

4.61 Cables have been factory wired to the LTB-A terminal board. These cables are equipped with modular connectors (plugs) to plug into FCC approved RJ14-C connectors. One cable provides the connections for lines 1 and 2. A second cable is used for connection to line 3 (if provided).

4.62 Connections for Power Failure Bells or Ringers

4.63 Terminals are provided on the LTB-A terminal board for the connection of external power failure bells or ringers. Other commonly available line indicating devices which will respond to C.O. ringing signals could be connected to these terminals. Even a

TABLE 3

| EXTERNAL CONNECTIONS TO KSU         |                |            |           |            |
|-------------------------------------|----------------|------------|-----------|------------|
| CONNECTION SOURCE                   | TERMINAL BOARD | TERMINAL   | SEE PARA. |            |
| C.O. LINE 1                         | LTB-A          | 1T<br>1R   | 4.59      |            |
| C.O. LINE 2                         |                | 2T<br>2R   |           |            |
| C.O. LINE 3                         |                | 3T<br>3R   |           |            |
| STATION 1                           | LTB-B          | 1RD<br>1GN | 4.54      |            |
| STATION 2                           |                | 1YL<br>1BK |           |            |
|                                     |                | 2RD<br>2GN |           |            |
| STATION 3                           |                | 2YL<br>2BK |           |            |
|                                     |                | 3RD<br>3GN |           |            |
| STATION 4                           |                | 3YL<br>3BK |           |            |
|                                     |                | 4RD<br>4GN |           |            |
| STATION 5                           |                | 4YL<br>4BK |           |            |
|                                     | 5RD<br>5GN     |            |           |            |
| STATION 6                           | LTB-C          | 5YL<br>5BK | 4.54      |            |
|                                     |                | 6RD<br>6GN |           |            |
| STATION 7                           |                | 6YL<br>6BK |           |            |
|                                     |                | 7RD<br>7GN |           |            |
| STATION 8                           |                | 7YL<br>7BK |           |            |
|                                     |                | 8RD<br>8GN |           |            |
| MUSIC SOURCE                        |                |            |           | 8YL<br>8BK |
| EXTERNAL AMPLIFIER                  |                | LTB-A      |           | MS1<br>MS1 |
| ALARM SIGNAL                        | EA1<br>EA2     |            | 4.50      |            |
| P.F. BELL - LINE 1                  | AL1<br>AL2     |            | 4.53      |            |
| P.F. BELL - LINE 2                  | 1BT<br>1BR     |            | 4.62      |            |
| P.F. BELL - LINE 3                  | 2BT<br>2BR     |            |           |            |
| EARTH GROUND<br>NO CONN. - SEE NOTE | LTB-B          | 3BT<br>3BR | 4.41      |            |
|                                     |                | ETH<br>GND |           |            |

Note: The GND terminal IS NOT earth ground. DO NOT connect ground to the GND terminal.

standard three-line key telephone could be connected to these terminals for use during power failures. During normal operation these terminals are not connected to the C.O. lines. Only during power failures are these terminals connected to the C.O. lines.



## TIE EK-308 STATION INSTALLATION

### 1.00 INTRODUCTION

1.01 This section contains information for the installation of the three types of station equipment which may be used with the TIE EK-308 key telephone system. The three types are:

1. TIE EK-308 key telephone.
2. EK-308 Intercom box.
3. EK-308 Door box.

### 2.00 GENERAL INSTALLATION

2.01 Installation of all types of stations is usually a simple matter of running cable, installing dials and faceplates in the telephones, installing the key designations and number cards, and plugging the instrument into a modular connector.

2.02 Cable Installation: The same type of 4-conductor, non-shielded, random-twist (*quad*) cable is used for all types of instruments in the TIE EK-308 system.

2.03 A separate cable must be installed from the KSU to each station (*home run*). Cables for the EK-308 telephones and intercom boxes are wired to modular jacks located in the vicinity of each station. The cable for the door box is terminated on screw terminals inside the unit.

2.04 Proper Wiring: The interface circuits in the KSU for the EK-308 telephone are different from that used for the intercom box. Telephones should NOT be plugged into cables wired for intercom boxes and vice-versa.

2.05 Check carefully for proper connections at the KSU and the modular jack before plugging the station in. The instrument will not function properly, and damage may result, if the cable is not properly connected to the KSU.

2.06 Cable Limits: Maximum cable for each station will depend on the wire size used. Maximum cable lengths are as follow:

- 24-gauge wire - 500 feet
- 22-gauge wire - 800 feet

### 2.07 Cable Designation and Function

| COLOR           | EK-308 TELEPHONE      | INTERCOM BOX OR DOOR BOX |
|-----------------|-----------------------|--------------------------|
| RED<br>GREEN    | AUDIO<br>TRANSMISSION | TRANSMIT                 |
| YELLOW<br>BLACK | DATA<br>AND<br>POWER  | RECEIVE                  |

### 3.00 EK-308 TELEPHONE DESCRIPTION

3.01 The TIE EK-308 telephone is an electronic key telephone which is usable only with the EK-308 KSU. The telephone uses two pair (*non-shielded, untwisted*) cable to connect to the KSU. One pair is used for audio transmission and the other pair is used for data and power transmission.

3.02 Because a standard 500 type network, dial and handset are employed, the EK-308 telephone will operate as a single line instrument when connected directly to a C.O. or PBX line.

3.03 The EK-308 telephone is a multi-line telephone with access to as many as three lines, and an intercom with DSS access to 7 other stations. The telephone also provides many modern key system functions.

### 4.00 EK-308 TELEPHONE INSTALLATION

#### 4.01 Dial Installation:

4.02 The EK-308 telephone set is packaged without a dial. A variety of dials may be used in the EK-308. A dial kit, consisting of a dial with mounting brackets and wired to dial terminal board (DTB), must be ordered and installed in each telephone.

4.03 Before installing the dial, strap the D connector in the telephone as shown in table 1. Refer to figure 1 for location of the 'D' connector. This connector is strapped at the factory for rotary or OUT-PULSE dials and must be changed if tone dials are used.

4.04 Install the dial as follows:

- a) Remove the faceplate by placing a small screwdriver or paper clip in the slot between the faceplate and housing and lifting gently to disengage the faceplate.

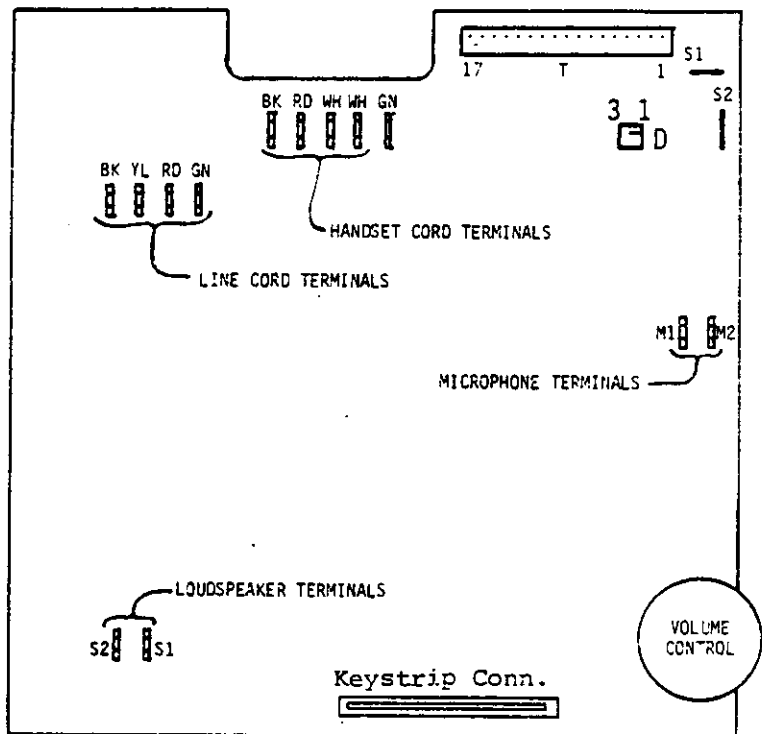


FIGURE 1 - ANU TERMINAL LOCATIONS



*DO NOT* place screwdriver in microphone hole on right side of the telephone.

- b) Plug the DTB board into connector 'T' in the telephone (see figure 1 for location). The DTB board is plugged in with the terminals toward the rear of the set (with pin 1 on the right side).
- c) The dial is then mounted by placing the slots of the dial brackets over the tabs of the support brackets and sliding the complete dial assembly to the right (see figure 2).

d) Replace the faceplate.

4.05 Dial Replacement:

4.06 The easiest way to change a dial in the EK-308 set is to replace the complete dial assembly. However, most standard dials with leads terminated in spade terminals may be connected to a DTB and installed in the EK-308. Connect the leads of the dial to the DTB as shown in table 1. Refer to figure 3 for locations of terminals on the DTB board.

4.07 Remove the dial brackets from the old dial and re-mount on the new dial. Before installing the dial in the telephone, strap the 'D' connector as required. See table 1.

4.08 When the dial is in position in the telephone, install the proper faceplate.


4.09 Power Failure Signalling:

4.10 The EK-308 system provides power failure cut-through to preassigned stations as shown below:

- Line 1 is connected to stations 1 and 4.
- Line 2 is connected to station 2.
- Line 3 (if provided) is connected to station 3.

4.11 During a power failure, telephones connected to these lines will function as single line instruments. The keys and LED's (lights) of the telephone are NOT operable. However, outside calls may be placed on the assigned line from these stations (if equipped with dials which do not use local power) or incoming calls may be answered on the assigned line.

4.12 To provide an indication of an incoming call, these stations must be equipped with a high impedance (high voltage) buzzer which will respond to ringing signals.

 Only FCC approved buzzers or bells may be connected to the C.O. line. To further comply with FCC regulations, the combined ringer equivalence numbers (REN) of all ring detection devices on one line must NOT EXCEED 5.0.

4.13 Install the buzzer as follows:

TABLE 1 - DIAL CONNECTIONS

| DTB<br>TERMINAL<br>BOARD | DIAL TYPE         |                 |                  |
|--------------------------|-------------------|-----------------|------------------|
|                          | ROTARY<br>TAP-511 | STONE<br>350/A1 | OUTPULSE<br>250B |
| P3                       | YL                |                 |                  |
| P4                       | YL                |                 |                  |
| RB                       |                   |                 | OR               |
| SG                       |                   |                 | HVY BK           |
| L1                       |                   | OR-BK           | VI               |
| C                        |                   | BL              |                  |
| B                        |                   | RD              |                  |
| T                        |                   |                 |                  |
| K1                       |                   |                 |                  |
| OG                       |                   |                 | BK               |
| AG                       |                   |                 |                  |
| LK                       |                   |                 |                  |
| GN                       | WH                | WH              |                  |
| R                        | WH                | RD-GN           |                  |
| RR                       | BL                | BK              | GN               |
| S                        |                   | WH-BL           |                  |
| K2                       |                   |                 |                  |
| F                        | GN                | GN              | BL               |
| R1                       |                   |                 |                  |
| T1                       |                   |                 |                  |
| X1                       |                   |                 |                  |
| X2                       |                   |                 |                  |
| CONN D                   | STRAP 1-2         | STRAP 2-3       | STRAP 1-2        |

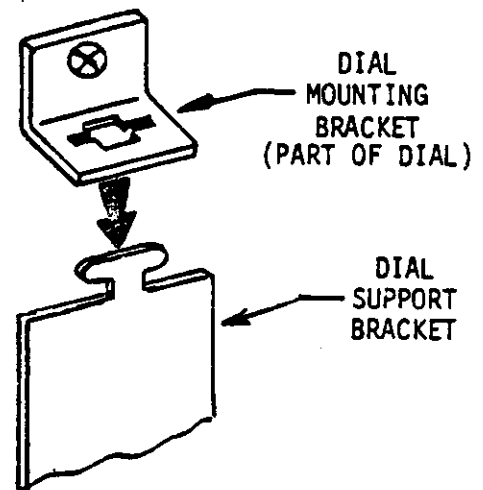


FIGURE 2  
DIAL MOUNTING ARRANGEMENT

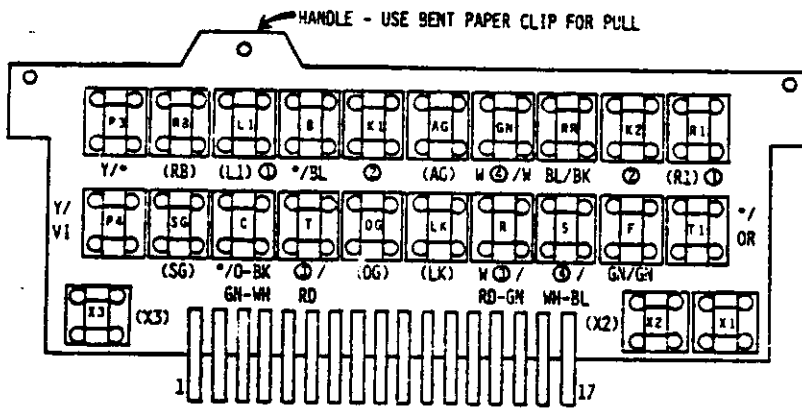
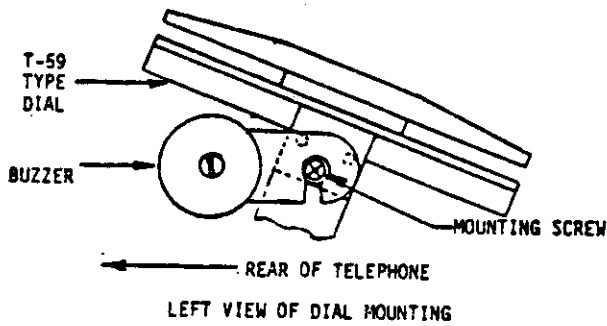


FIGURE 3 - DIAL TERMINAL BOARD (DTB)

- a) Remove the dial kit from the telephone.
- b) Mount the buzzer under the screw for the dial bracket on the right side of the dial as shown in figure 4.
- c) Connect one buzzer lead to the 'F' terminal on the DTB and connect the other lead to terminal R1.
- d) Plug in the dial and install the dial on the support brackets.




Buzzer is mounted on keypad type dials in the same manner.

FIGURE 4 - BUZZER INSTALLATION

4.14 Telephone Connections to the System:

4.15 After all internal connections are made in the EK-308 telephone and the faceplate has been installed, the 4-wire cord of the set is plugged into a modular connector which has been wired to a "telephone interface" (4SU-A and SIU-A) at the KSU.

 Telephones plugged into modular connectors wired for an intercom box will NOT function.

4.16 When the telephone is plugged in, a short burst of tone may be heard at all stations in the system.

5.00 INTERCOM BOX INSTALLATION

5.01 An intercom box may be installed in locations not requiring access to outside lines. It can receive intercom calls with hands-free reply and all-call announcements. Operation of the "DND" (Do Not Disturb) button will make the station busy to intercom calls and all-call announcements. All-call announcements may be made from the intercom box by depressing the "AC" button for the duration of the announcement.

5.02 An intercom box must be installed in locations where the 'monitor' feature is desired. The intercom box is the transmitter unit for the area to be monitored. Operation of the "MON" key of an intercom box permits that station to be monitored from any telephone (only) in the system. While this monitor function is activated at an intercom box, it may still receive intercom calls or initiate all-call announcements.

5.03 The intercom box is designed to sit on a desk (or similar surface) or may be wall-mounted.

5.04 For desk use, two soft rubber strips with pressure-sensitive backing are provided with unit to prevent sliding. To install the strips:

- a) Turn the unit up-side down.



- b) Remove the covering from the soft rubber strips.
  - c) Insert the strips into the slots in the bottom of the unit.
- 5.05 To wall mount the unit:
- a) The unit should be located on a surface near the modular connector.
  - b) Remove the rear cover from the unit by removing the screw in the front of the unit.
  - c) Mount the rear cover on the wall using the hardware provided.
  - d) Mount the box assembly on the rear cover and secure with the front screw.

#### 5.06 Intercom Box Connections to the System

5.07 The intercom box plugs directly into a modular connector wired to an intercom interface circuit in the KSU. To identify those connectors wired for an intercom box, a label is provided with each intercom box. This label should be affixed to the modular connector which is wired for an intercom box.



*If the intercom box is plugged into a modular connector wired for an EK-308 telephone, it will not function properly, and will draw excessive current causing a fuse to blow in the KSU.*

## 6.00 DOOR BOX INSTALLATION

6.01 The door box provides the convenience of answering the door from any telephone in the system. It is suggested that the door box be installed above the door, out of reach of children and vandals. The unit should be mounted on a surface protected by an overhang where it is protected from the weather (the unit is water resistant, but not water tight).

#### 6.02 Installation:

6.04 The door box should be installed as follows:

- a) Remove the rear cover by loosening the screw on the front of the unit.
- b) Feed the 4-wire cable from the KSU through one of the square holes in the rear cover and mount the cover on a flat surface with the hardware provided. Mount the cover with the slots at the bottom.
- c) Connect the 4 wires of the cable to the terminals on the printed circuit card of the box (see figure 5).
- d) The cable from the door box must be wired to an intercom interface circuit at the KSU (4IU-A or SIU-A). Check the wiring carefully. The door box will NOT function properly if incorrectly wired.
- e) Test the door box for proper operation.
- f) Install the front assembly on the rear cover and secure by tightening the screw on the front of the unit.

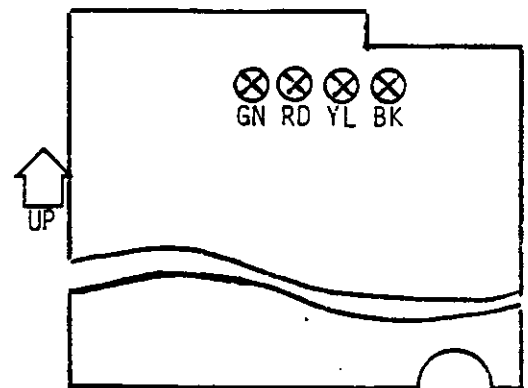


FIGURE 5  
DOOR BOX TERMINAL LOCATIONS



## SYSTEM TESTS & MAINTENANCE

### 1.00 INTRODUCTION

1.01 This section covers operational tests, including expected results and what to do when they do not occur, KSU replacement procedure, maintenance recommendations and recommended spare parts list.

### 2.00 OPERATIONAL TESTS - GENERAL

2.01 When installation is complete, the installer should test all lines and stations in the system for proper operation. All operating features should be tested at each station, where applicable.

2.02 When power is applied to the system initially, the matrix and power relays in the KSU should operate immediately. Operation of these relays can be heard when the system is plugged in. Two to three seconds later, one relay in each telephone will operate and a short burst of tone may be heard from the telephone loudspeakers.

2.03 The installer should test the system systematically in order to cover all features at all stations. In some cases two persons will be required to substantiate the operation of the feature.



*The circuit boards in the KSU and the stations contain CMOS solid state devices. Normal precautions should be taken when handling these components. Handle circuit boards by the edges; do NOT touch the solid state components. Disconnect the KSU AC line cord before inserting or unplugging the circuit boards.*

2.04 The KSU is designed to be removed from service without disabling all

telephones in the system. As the KSU contains only two main circuit boards, the installer may elect to replace the KSU, to expedite correction of a problem, rather than change a circuit board at the installation site. The stations connected to the LTB-B terminal board will be automatically connected to the C.O. lines when power is removed from the KSU in accordance with paragraphs 4.57 and 4.58 of section 1. Stations will receive incoming ringing signals if they have been arranged per paragraph 4.09 through 4.13 in section 2. The LTB-A and LTB-B terminal boards are connected to each other to facilitate removal of the KSU.

2.05 To remove the KSU:

- a) Unplug the KSU AC power cord.
- b) Unplug the LTB-A and LTB-B terminal boards. DO NOT disconnect the station leads from their terminals.
- c) Slip the cables out of the notch in the bottom of the KSU.
- d) Plug the LTB-B into the LTB-A as shown in figure 1. Note the position of the keys in the LTB-A connectors.

2.06 The following tables outline each test and the result to be expected. If the expected result does not occur, information is provided to proceed to correct the result.

2.07 The background music (BGM), when provided, and All-call paging features are tested first. When working properly, these two features indicate that most of the system is functioning correctly and correction of subsequent unexpected test results are more easily accomplished.

2.08 The EK-308 system telephones utilize non-locking keys. The

line key may be depressed before lifting the handset from its cradle when seizing a C.O. line. However, if the handset has not been removed before 5 seconds have elapsed, after depressing the line key, the processor will ignore that the line key has been depressed.

### 3.00 TEST PROCEDURES

3.01 Before starting the tests, plug in the AC power cord of the KSU. If background music (BGM) and/or music-on-hold (MOH) is provided, turn on the music source. If BGM is provided start the test procedure at test #1. If BGM is NOT provided start the procedure with test #2.

3.02 Functional schematics have been provided (pages B16 through B20) to aid the installer, should a problem develop during system installation.

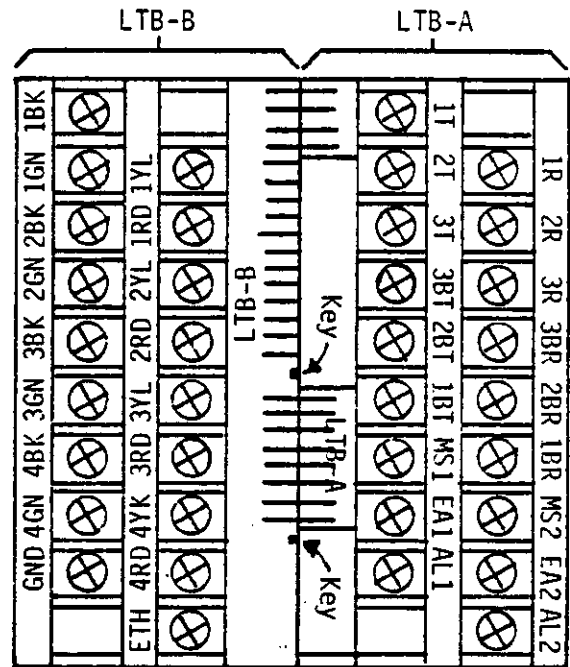


Figure 1  
LTB-A/LTB-B Power Failure Connections

| TEST  | ACTION              | EXPECTED RESULT  | PROBLEM PROCEDURE   |
|---|---------------------|--|---|
| #1 Idle - with BGM  | See paragraph 3.01. | BGM heard from all telephones and boxes arranged for BGM. See tables 1 and 2 in section 1. | No BGM heard: <ol style="list-style-type: none"> <li>1. BGM not turned on.</li> <li>2. Station not strapped for BGM in KSU.</li> <li>3. Dial DTB not properly plugged in.</li> <li>4. Station cable not properly connected:                             <ol style="list-style-type: none"> <li>a) Check quad wiring.</li> <li>b) Check fuses in KSU (figures 2, 5 &amp; 7 in sect. 1).</li> </ol> </li> <li>5. Flat cables in KSU not properly connected.</li> <li>6. Music source not properly connected.</li> <li>7. No power to KSU:                             <ol style="list-style-type: none"> <li>a) Check AC power cord.</li> <li>b) Check fuses in power supply - unplug the supply first.</li> </ol> </li> </ol> <p style="text-align: right;"><i>continued</i></p> |
| <div style="border: 1px solid black; padding: 5px; margin: 10px auto; width: 80%;"> <p><b>BEFORE STARTING THE TESTS</b></p> <p>Prior to starting the tests, the installer should measure the output voltage of the power supply. It should be measured at the power lead entrance terminals in the KSU. The measurements should be made from the common lead (<i>green</i>) to the -18V lead (<i>black</i>) and to the +18V lead (<i>red</i>). The power supply output for each potential should be ±.5 volts.</p> </div> |                     |  |   |

| TEST                           | ACTION  | EXPECTED RESULT   | PROBLEM PROCEDURE  |
|--------------------------------|---|---|--|
|                                |   |   | <p>Still no BGM - all stations:</p> <ol style="list-style-type: none"> <li>1. Replace the CPU-A board or the KSU (see paragraph 2.04)</li> </ol> <hr/> <p>Still no BGM - some stations:</p> <ol style="list-style-type: none"> <li>1. Replace telephone or ICM box.</li> <li>2. Replace SLU (sta. 1-4) or SIU, 4SU or 4IU (stations 5-8).</li> </ol> |
| <p>#2 Seizure and All-call</p> | <p>At a telephone set, lift the handset from its cradle.</p>  | <p>BGM removed, if provided.</p>  | <p>Music not removed:</p> <ol style="list-style-type: none"> <li>1. Check hookswitch.</li> <li>2. Check DTB straps.</li> <li>3. Replace telephone.</li> </ol>  |
|                                | <p>Depress and <u>hold</u> the All-call button.</p>   | <p>HOLD LED lit steadily at all stations.<br/>AC LED lit steadily at all ICM boxes.</p> | <p>No LED lit at any sta.:</p> <ol style="list-style-type: none"> <li>1. Dial improperly connected at calling station; check dial wiring.</li> <li>2. No power to KSU.               <ol style="list-style-type: none"> <li>a) Unplug KSU power cord.</li> <li>b) Check KSU fuses.</li> <li>c) Reconnect AC cord.</li> </ol> </li> </ol>             |
|                                | <p>Still no LED's lit:</p> <ol style="list-style-type: none"> <li>1. a) Unplug KSU and check power supply fuses.</li> </ol>   |   |  |
|                                | <p>Still no LED's lit:</p> <ol style="list-style-type: none"> <li>1. Flat cables not connected properly; unplug KSU and check all flat cable connections (see figure 1 in section 1). Reconnect power.</li> </ol> |   |  |
|                                | <p>Still no LED's lit:</p> <ol style="list-style-type: none"> <li>1. Replace CPU-A board or the KSU (see paragraph 2.04).</li> </ol>  |   |  |
|                                | <p>Some but not all LED's lit:</p> <ol style="list-style-type: none"> <li>1. Station cable not</li> </ol> <p><i>continued</i></p>   |   |  |

| TEST         | ACTION                           | EXPECTED RESULT   | PROBLEM PROCEDURE   |
|--------------|----------------------------------|---|---|
| #2 continued |                                  |   | <p>properly connected. Check wiring.</p> <ol style="list-style-type: none"> <li>2. KSU fuse open, Check appropriate circuit board.</li> <li>3. Called telephone defective. Replace telephone.</li> <li>4. Station interface defective. Replace appropriate card; Sta. 1-4 - SLU<br/>Sta. 5-8 - SIU, 4SU or 4IU.</li> </ol>  |
|              | When AC button was depressed --- | All stations should get double splash tones and the announcement at all except the calling station. | <p>All LED's lit but no audio at any station.</p> <ol style="list-style-type: none"> <li>1. No sidetone at calling station;               <ol style="list-style-type: none"> <li>a) Handset defective or improperly wired. Check handset wiring &amp; components</li> <li>b) Dial or DTB not properly connected. Check.</li> <li>c) Open RD/GN pair.</li> <li>d) Defective interface. Replace SLU SIU or 4SU card.</li> </ol> </li> <li>2. Calling station HAS sidetone;               <ol style="list-style-type: none"> <li>a) Flat cables in KSU not properly connected. Check.</li> <li>b) All-call amplifier defective. Replace CPU-A or KSU.</li> </ol> </li> </ol> <p>No splash tones or announcement at some stations:</p> <ol style="list-style-type: none"> <li>1. At stations with no announcing;               <ol style="list-style-type: none"> <li>a) Loudspeaker defective or disconnected.</li> <li>b) Volume control too low.</li> <li>c) Dial or DTB not properly connected.</li> </ol> </li> </ol> <p style="text-align: right;"><i>continued</i></p> |

| TEST   | ACTION   | EXPECTED RESULT                            | PROBLEM PROCEDURE  |
|--|--|--|--|
| #2 continued   |  |  | d) Improper station cable connections<br>e) Flat cable in KSU improperly connected.<br>f) Station defective; replace.<br>g) Station interface defective; replace appropriate card.<br>Sta. 1-4 SLU.<br>Sta. 5-8 SIU, 4SU or 4IU. |
| <p><i>Note: When all-call announcements can be made from one telephone to all stations in the system, with proper LED indications at each station, the following has been established:</i></p> <p>a. The power supply is functioning properly.</p> <p>b. The KSU processor is functioning.</p> <p>c. Both data and audio signals are being received by each station.</p> |  |  |  |
| #3 C.O. Line Tests   | Read paragraph 2.08.                           |  |  |
| #3A Idle Lines   | All stations on-hook.                          | No C.O. line LED's lit.                    | C.O. LED lit at any station, check KSU fuses.  |
| #3B Seizure  | At a station, go off-hook.                     | BGM removed, if provided.                  | BGM not removed: See test #2.  |
|  | Depress line button.                           | LED lights steadily at all telephones.     | No LED light: Replace station.   |
|  |  | Dial tone received.                        | No dial tone:<br>1. Check C.O. line and LTB-A connections.<br>2. Check flat cables in KSU.<br>3. Check FGU connector straps (fig 3, sect 1).<br>4. Matrix malfunction; replace appropriate SLU, SIU, 4SU or 4IU.                 |
| #3C Dialling   | Dial the number of another line in the system. | Ringback tone heard in telephone receiver. | Can not break dial tone:<br>1. C.O. line reversed. Check C.O. cable connection.<br>2. Station cable audio pair (GN/RD) reversed.   |

continued

| TEST              | ACTION  | EXPECTED RESULT  | PROBLEM PROCEDURE  |
|-------------------|---|--|--|
| #3C continued     |   |  | 3. Modular connector not properly wired inside the telephone.<br>4. Dial improperly connected.<br>5. Dial defective.<br>6. Telephone defective; replace telephone.   |
| #3D Incoming Ring | Wait after dialling. If the system has one line only, call a known party and have them call you back. | A few seconds after dialling, incoming ring tone should be heard at stations strapped to receive C.O. audible (1 second on, 4 seconds off).<br><br>DO NOT HANG-UP. | No C.O. audible at any station:<br>1. KSU not strapped for C.O. audible.<br>2. C.O. line not properly connected.<br>3. Line circuit not responding to C.O. audible signal;<br>a) For line 1 or 2, replace SLU-A or replace KSU.<br>b) Check for proper installation of LNU-A or replace LNU-A (see 4.36 in section 1).<br><br>NO C.O. audible at some stations:<br>1. Station not strapped for C.O. audible (see 4.23 in section 1).<br>2. Telephone defective; replace telephone.<br><br>The LED in the line key of the incoming line should flash at 60 IPM (once each second) at all telephones.<br><br>DO NOT HANG-UP. |
| #3E Answer        | Lift the handset at the C.O. audible station.<br><br>continued  | C.O. audible muted (low level) if station is arranged for off-hook signalling (see table 1 in section i).<br><br>DO NOT HANG-UP.                                   | No flashing LED at any telephone:<br>1. Replace the CPU-A card or replace the KSU.<br><br>No flashing LED at one or some stations:<br>1. Replace the telephone<br>2. Replace the CPU-A or the KSU.<br><br>No muting: replace telephone.  |



| TEST                 | ACTION  | EXPECTED RESULT   | PROBLEM PROCEDURE   |
|----------------------|---|---|---|
| #3E Answer continued | Depress the flashing C.O. line key.   | LED's in called C.O. line keys steadily lit at all telephones.<br><br>DO NOT HANG-UP.   | LED's go out or continue to flash:<br><br>1. Replace answering tel.<br>2. Replace CPU-A or KSU.   |
|                      |   | Conversation established between the two telephones.<br><br>DO NOT HANG-UP.   | No talk path established:<br><br>1. Handset defective or improperly connected.<br>2. Dial or DTB improperly connected.<br>3. Telephone defective; replace telephone.<br>4. Replace appropriate SLU, 4SU or SIU. |
| #3F Hold             | At the 1st station, depress the HOLD key.   | The LED in the 1st line at the 1st telephone should flutter ( <i>I-hold signal - 480 IPM, 8 Hz</i> )<br><br>The LED's in the 1st line at all other telephones should flash at 120 IPM ( <i>twice per second</i> ).<br><br>DO NOT HANG-UP.   | No hold flash at any telephone:<br><br>1. Line released, hold relay not operating; replace SLU ( <i>lines 1 or 2</i> ) or LNU ( <i>line 3</i> ).<br>2. Replace CPU or KSU.                                      |
|                      |   | Music ( <i>if MOH is provided</i> ) should be heard at the 2nd telephone.<br><br>DO NOT HANG-UP   | No I-hold flash at 1st telephone or no hold flash at one or some telephones; replace telephone.   |
|                      |   | Music ( <i>if MOH is provided</i> ) should be heard at the 2nd telephone.<br><br>DO NOT HANG-UP   | No music at 2nd telephone<br><br>1. Music source not turned on.<br>2. Music source not properly connected.<br>3. LTB-A not properly connected.<br>4. MOH amplifier defective; replace CPU-A or KSU.             |
| #3G Timed Recall     | Action from 3F. Do not release the hold condition.<br><br><br><br><br><br><br><br><br><br><br>DO NOT HANG-UP. | Depending upon KSU strapping ( <i>paragraph 4.31 in section 1</i> ), incoming C.O. audible should be heard at the 1st station ( <i>only</i> ) after the proper period of time has elapsed.<br><br><i>Note: Only the telephone with the I-hold flash will receive the recall C.O. audible signal. This can be any telephone in the system.</i> | No C.O. audible after time has elapsed:<br><br>1. Replace the telephone.<br>2. Replace the CPU-A or the KSU.  |

| TEST  | ACTION  | EXPECTED RESULT   | PROBLEM PROCEDURE   |
|---|---|---|---|
| #3G Timed Recall cont'd.  | Reanswer the 1st telephone by depressing the flashing line key.<br>DO NOT HANG-UP.              | Same as #3E   | Same as #3E   |
| #3H Privacy   | At the 1st telephone, depress the HOLD key.   | Same as #3F.  | Same as #3F.  |
|   | At the 1st telephone, depress the line key with the steady LED.<br>DO NOT HANG-UP.              | No music on the 2nd line; no conversation established with the 2nd telephone.   | No privacy on C.O. line:<br>1. Replace the 2nd telephone.<br>2. Replace CPU-A or KSU.   |
| #3J Privacy Release   | At the 2nd telephone, depress the PR RL key.  | Conversation established between the two telephones or music is heard at both telephones.   | Can not release privacy:<br>1. Replace the 2nd telephone.<br>2. Replace the CPU-A or replace the KSU.   |
| <i>The next three tests are intercom tests involving C.O. line calls.</i>   |   |   |   |
| #4 Intercom Call  | If the call between the 1st and 2nd telephones has been terminated it should be re-established. | Conversation between 1st and 2nd telephones on 2 C.O. lines.  | Same as #3E.  |
| #4A Automatic Hold  | At the 1st station, depress the ICM key for the 2nd station.                                    | 1st line goes on hold; 2nd station receives music and double splash tone indicating an intercom call. 1st party hears double splash tone in handset.<br>LED in HOLD key flutters at 2nd set and is steady at all other telephones. AC LED lit at all ICM boxes. | No splash tones at the telephones:<br>1. Reverse the procedure and signal from the 2nd to the 1st phones.<br>a) If the 2nd call is successful, replace the 1st telephone.<br>b) If the 2nd attempt is not successful, replace the CPU-A or the KSU. |
| #4B Resignal  | Resignal the 2nd station by depressing the key for that station a second time.                  | Double splash tone heard at both stations. No conversation established between the two telephones.<br>LED's same as #4A.  | LED does not light:<br>Same as test 2 - All-call.   |
| #4C Answer Via Hold Key   | At the 2nd telephone, depress the HOLD key.   | 2nd C.O. line goes on hold. Conversation established between the two telephones.  | If 2nd line call does not hold; same as #3F.  |
|   |   |   | If ICM call not established; see #4G.   |
| <i>This completes C.O. line testing except for Flash key and Conference calls. These are covered later in this section.</i> |   |   |   |

| TEST                  | ACTION  | EXPECTED RESULT   | PROBLEM PROCEDURE  |
|-----------------------|---|---|--|
| #4D Hands-free Answer | Release the C.O. lines and proceed with intercom tests. Signal 2nd station from the 1st station using the station key.<br><br>DO NOT HANG-UP. | Single splash tone at both stations and LED's lit as in test 4A.                          | Same as #4A.   |
|                       |   | Handsfree conversation from 2nd station to handset at 1st station after call announcement | No call-announcing:<br>1. See test #4E and #4I; Do Not disturb.<br>2. See test #2 - All-Call<br><br>No Talkback:<br>1. See test #4E and #4I; Do Not Disturb.<br>2. Microphone defective or improperly connected. Microphone is polarity sensitive and must be connected properly -<br>Red lead to M1<br>White lead to M2<br>(See figure 1 in section 2).<br>3. Station defective; replace station.<br>4. Voice switch circuit defective; replace CPU-A or KSU.<br>5. Interface not switching; replace appropriate card -<br>Sta. 1-4, SLU board.<br>Sta. 5-8, SIU, 4SU or 4IU. |
| #4E Mike Mute         | At the 2nd station, depress the DND key.  | 2nd station can not be heard at the 1st station.<br><br>DND LED lights.                   | Microphone does not cut-off or DND LED does not light:<br>1. Defective station; replace the station.   |
| #4F Restore Talkback  | At the 2nd station, depress the DND key a second time.  | DND LED goes out.<br><br>Talkback to 1st station can resume.                              | Same as #4A and #4D.   |
| #4G Handset Answer    | At the 2nd station, lift the handset from its cradle.<br><br>DO NOT HANG-UP.  | Conversation now handset to handset. HOLD LED in 2nd station lit steadily.                | Call does not transfer to handset:<br>1. Telephone defective; replace telephone.   |
| #4H Exclusion         | If the system is NOT strapped for exclusion on intercom calls (paragraph 4.28 in section 1) and a 3rd party lifts the handset --              | 3rd party enters the conversation   | 3rd party can not enter the call:<br>1. 3rd party station or station interface defective; replace.   |

| TEST                       | ACTION  | EXPECTED RESULT  | PROBLEM PROCEDURE   |
|----------------------------|---|--|---|
| #4H Exclusion continued    | If the system is strapped for privacy on the intercom and a 3rd party picks up the handset<br><br>Hang-up all stations.   | 3rd party can not enter the call.                      | No exclusion:<br>1. Check exclusion strapping (see 4.28 in section 1) on the CPU-A in the KSU.<br>2. Replace the CPU-A or the KSU.      |
| #4I Do Not Disturb         | At the 2nd station, depress the DND key.  | DND LED lights.  | No DND lit:<br>1. Defective station; replace station.   |
|                            | At the 1st station, call the station with the lit DND key.  | Busy tone heard at the calling station.                | DND station disturbed:<br>1. DND station defective; replace.<br>2. Replace CPU-A or the KSU.  |
|                            | At the 2nd station, depress the DND key again   | DND LED goes out.                                      | DND stays lit:<br>1. Defective station; replace.  |
|                            | Call the 2nd station from the 1st station.  | Same as #4D.   | Same as #4D.  |
|                            | At the 2nd station, depress the DND key.  | Same as #4E.   | Same as #4E.  |
|                            | At the 1st station, hang-up.  | DND and flashing HOLD LED's go out at the 2nd station. | DND stays lit:<br>1. Defective station; replace.  |
| #4J Alternate Point Answer | At the 1st station, call the 2nd station.   | Same as #4D.   | Same as #4D.  |
|                            | At a 3rd station, lift the handset.   | 3rd party can not pick up the call.                    | Call picked up:<br>1. Replace the 3rd telephone.<br>2. Replace the CPU-A or the KSU.  |
|                            | At the 3rd telephone, depress the PR RL key.  | 3rd telephone picks up the call.                       | Call can not be picked up at 3rd telephone:<br>1. Defective 3rd telephone; replace.<br>2. Defective interface: replace SLU, SIU or 4SU. |
| #5 Flash Key               | <i>This test should be performed if the telephones are to utilize the Flash key function. The KSU must be equipped with an FGU-A circuit board. Refer to paragraph 4.38 in section 1.</i> |  |   |
| #5A Loop Flash             | At the telephone, lift the handset and depress a C.O. line key.<br><br><i>continued</i>   | Dial tone received.                                    | Same as #3B.  |

| TEST                     | ACTION  | EXPECTED RESULT  | PROBLEM PROCEDURE   |
|--------------------------|---|--|---|
| #5A Loop Flash continued | Dial the digit '2'.   | Dial tone removed.   | Same as #3C.  |
|                          | Depress the FLASH key momentarily.  | Dial tone returns when key is released.  | Hum on line when key is depressed:<br>1. FGU not properly strapped for "LOOP" flash (see paragraph 4.40 in section 1).<br><br>Dial tone does not return:<br>1. Check FGU strapping.<br>2. Replace FGU-A.<br>3. Replace telephone.<br>4. Replace CPU-A or KSU. |
| #5B Ground Flash         | <i>Note: This feature is generally used when the EK-308 is installed behind a PBX which requires a ground on the transmission path to transfer inside calls or recall the attendant. The FGU-A card is factory strapped for ground flash.</i> |  |   |
|                          | If the PBX is arranged for transfer of outside calls, have the attendant extend an incoming call to you.  | Incoming call received.  | Same as #3D and #3E.  |
|                          | Momentarily depress the Flash key.  | Inside dial tone received or attendant recalled (may hear attendant ringing signal). | No inside dial tone or no attendant recall:<br>1. System not arranged for this feature.<br>2. Same as #5A when dial tone is not returned.   |
| #6 Multi-line Conference | <i>Note: This feature requires that an MCU-A circuit card be installed on the SLU-A board. Refer to paragraph 4.37 and figure 3 in section 1 for details.</i>   |  |   |
|                          | At the telephone, call a known party for a conference.  | Same as #3, A, B & C.  | Same as #3, A, B & C.   |
|                          | Hold that call.   | Same as #3F.   | Same as #3F.  |
|                          | Place a 2nd call on the next line to another party for the conference.  | Same as #3, A, B & C.  | Same as #3, A, B & C.   |
|                          | Hold that call.   | Same as #3F.   | Same as #3F.  |
|                          | Simultaneously depress both fluttering line keys.   | Both outside parties and the testing station are conferenced together.               | No conference:<br>1. Check MCU installation.<br>2. Replace MCU-A.<br>3. Replace CPU-A or KSU.   |

| TEST                 | ACTION   | EXPECTED RESULT   | PROBLEM PROCEDURE   |
|----------------------|--|---|---|
| #7 Monitor           | <p>Note: The monitor feature can not be used if the system is equipped with 3 C.O. lines. If the system does not have 3 C.O. lines, the LN connector on the SLU-A board must have pins 15-16 and 18-19 strapped together (factory wiring).</p> |   |   |
| #7A Monitor Activate | <p>Select an ICM box and a telephone to be the monitor stations (ICM boxes transmit and telephones receive).</p> <p>At the ICM box, depress the MON key.</p>   | <p>LED in the MON key is lit steadily.</p>                    | <p>No LED lit:</p> <ol style="list-style-type: none"> <li>1. No power to ICM box; check cord and cable to KSU.</li> <li>2. Check LTB-C connections</li> <li>3. Replace ICM box.</li> <li>4. Replace interface; 4IU or SIU.</li> </ol>   |
|                      |  | <p>BGM removed (if provided).</p>                             | <p>BGM not removed:</p> <ol style="list-style-type: none"> <li>1. Check another box;                             <ol style="list-style-type: none"> <li>a) if BGM is not removed, replace CPU or the KSU.</li> <li>b) if BGM is removed, replace interface unit, SIU or 4IU.</li> </ol> </li> </ol>                                   |
|                      | <p>At the monitor telephone, depress the MON key.</p>  | <p>BGM removed (if provided).</p>                             | <p>BGM not removed:</p> <ol style="list-style-type: none"> <li>1. Same as #2.</li> </ol>  |
|                      |  | <p>LED in MON key flashes at 60 IPM in monitor telephone.</p> | <p>No flashing LED:</p> <ol style="list-style-type: none"> <li>1. Replace telephone.</li> <li>2. Replace CPU-A or KSU.</li> </ol>   |
|                      |  | <p>LED at all other stations lit steadily.</p>                | <p>No LED lit at other stations:</p> <ol style="list-style-type: none"> <li>1. If all stations; replace CPU-A or KSU.</li> <li>2. If one or some stations; replace station.</li> </ol>  |
|                      | <p>At the ICM box, speak in a normal voice.</p>  | <p>Speech is heard at the monitor telephone.</p>              | <p>No speech heard:</p> <ol style="list-style-type: none"> <li>1. See #4D, no talkback.</li> <li>2. Check LN connector straps (fig 3, sec. 1).</li> <li>3. Try another box; if speech is heard, replace box interface.</li> <li>4. Try another telephone; if speech is heard, replace the interface for the 1st telephone.</li> </ol> |

continued

| TEST                                  | ACTION  | EXPECTED RESULT  | PROBLEM PROCEDURE  |
|---------------------------------------|---|--|--|
| #7A Monitor Activate continued.       |   |  | 4. If speech is not received from another telephone, replace CPU-A or KSU.   |
| #7B Monitor Output Transmission Gates | <p><i>Note: Test #7A when successful indicates that the monitor amplifier on the CPU-A board is working, and the system has the ability to switch the ICM box to the monitor station using the monitor vertical of the transmission matrix.</i></p> <p><i>This test should indicate, when successful that one ICM box can be switched to all monitor telephones.</i></p> <p>Using the working ICM box, repeat test #7A from each telephone in the system.</p> | Same as #7A.   | <p>LED's and/or BGM not functioning correctly:</p> <ol style="list-style-type: none"> <li>1. Same as #7A.</li> </ol> <p>Speech not received at the monitor telephone:</p> <ol style="list-style-type: none"> <li>1. If LED in telephone is functioning correctly, replace the telephone interface, SLU or SIU.</li> <li>2. If the LED indication is not correct, replace the telephone.</li> <li>3. If speech is still not received, replace the CPU-A.</li> </ol> |
| #7C Monitor Input Transmission Gates  | <p><i>Note: Test #7B indicates, when successful, that all telephones function properly as monitor telephones.</i></p> <p><i>This test should indicate, when successful, that all ICM boxes can be switched to all monitor telephones.</i></p> <p>Using any telephone, repeat test #7A from the remaining ICM boxes in the system.</p>   | Same as #7A.   | <p>LED's and/or BGM not functioning correctly:</p> <ol style="list-style-type: none"> <li>1. Same as #7A.</li> </ol> <p>Speech not received at the monitor telephone:</p> <ol style="list-style-type: none"> <li>1. Replace the ICM box interface, SIU or 4IU.</li> <li>2. If still not successful replace the CPU.</li> </ol>   |
| #7D Calling While Monitor Is Active   | <p>Establish a monitor condition between any telephone and any ICM box.</p> <p>Lift the handset at the monitor telephone.</p> <p><i>continued</i></p>   | <p>Same as #7A.</p> <p>Sound from ICM box heard in handset of the telephone.</p> | <p>Same as #7A.</p> <p>Sounds not switched to handset:</p> <ol style="list-style-type: none"> <li>1. Replace the telephone.</li> </ol>   |

| TEST  | ACTION  | EXPECTED RESULT   | PROBLEM PROCEDURE   |
|---|---|---|---|
| #7D cont'd                                  |   | Monitor LED flashes.  | Replace telephone.  |
|   | Select a C.O. line and depress the line key.                  | Dial tone received.   | Same as #3B.  |
|   |   | Monitor LED flashes.  | Replace telephone.  |
|   | Dial '2'.   | Dial tone removed.  | Same as #3C.  |
|   |   | Sounds from ICM box not heard in handset.   | Replace telephone.  |
|   | Hang-up.  | MON LED still flashes.  | Replace telephone.  |
| Sounds from ICM box heard from loudspeaker. |   | Replace telephone.  |   |
| #8 Door Boxes                               | Listen at door box for BGM, if provided.                      | No BGM heard.   | BGM heard:<br>1. Check strapping on 4IU or SIU (see table 2 in section 1).<br>2. Replace box interface; 4IU or SIU.   |
|   | From a telephone or ICM box, make an all-call announcement.   | All-call <u>not</u> heard at door box.  | All-call heard:<br>1. Same as #8 above.   |
|   | At a telephone, depress the station key for the door box(es). | Single splash tone heard at door box and handsfree talkback can be heard at the telephone.                                      | No splash tone:<br>1. Same as #2.<br>No talkback:<br>1. Same as #4D.  |
| #9 Alarm Signal                             | Activate the alarm circuit, if provided.                      | Loud warbling tone heard at all stations. The tone should only be heard at the door box if the KSU is strapped for this option. | No tone at any station:<br>1. Check alarm wiring to KSU (LTB-A, terminals AL1 and AL2).<br>2. Check that 'open' or 'closure' option is strapped on the CPU-A and agrees with the output from the alarm system.<br>3. Check the flat cable "B" from SLU to CPU.<br>4. Replace CPU-A. |
|   |   |   | No tone at telephone:<br>1. Place a C.O. line on hold and wait for recall time-out and C.O. audible tone;<br>a) If there is C.O. audible after the time-out period, replace the CPU-A.<br>b) If no C.O. audible is heard, replace the telephone.                                    |

continued



| TEST   | ACTION | EXPECTED RESULT | PROBLEM PROCEDURE  |
|--|--------|-----------------|--|
| #9 cont'd                                    |        |                 | <p>No tone at any ICM box:</p> <ol style="list-style-type: none"> <li>1. Check to see if splash tone is received on All-call;               <ol style="list-style-type: none"> <li>a) no splash tone, same as #2.</li> <li>b) splash tone received, replace the CPU-A.</li> </ol> </li> </ol> <p>Tone at door box when not required:</p> <ol style="list-style-type: none"> <li>1. Check strapping on SIU or 4IU interface board.</li> </ol> |
| <i>This completes testing of the system.</i> |        |                 |  |

#### 4.00 SPARE PARTS

4.01 Following is a list of spare parts which should be maintained for field repair and replacement purposes. At least one of each should be on hand when 1 to 10 systems are in service and 2 or more of each for larger numbers of systems in service.

4.02 An inventory of spare dials, faceplates, line and handset cords, handsets, transmitter and receiver caps, key caps and designation sheets should be maintained to support the number of telephones in service.

4.03 Consult TIE's current price list for the complete inventory of EK-308 system components.

#### SPARE PARTS LIST

| <u>PART NUMBER</u> | <u>ORDER CODE</u> | <u>DESCRIPTION</u>                           |
|--------------------|-------------------|--|
| 30800              | 308 KSU           | Basic EK-308 system KSU.                     |
| 30805              | EBK-28            | EK-308 System Power Supply.                  |
| 30810              | 308 DOOR BOX      | Door Answering Box.                          |
| 30820              | 308 ICM BOX       | Intercom Box.                                |
| 30830              | 4SU-A             | 4 Station Interface Card.                    |
| 30840              | 4IU-A             | 4 Intercom Box Interface Card.               |
| 30850              | SIU-A             | 2 Station and 2 Intercom Box Interface Card. |
| 30860              | MCU-A             | Multiline Conference Card.                   |
| 30870              | FGU-A             | Flashing/Grounding Card.                     |
| 30880              | LNU-A             | 3rd Line Card.                               |
| 30890              | EK 308            | EK-308 Electronic Key Telephone Set.         |

*Continued on page B21.*

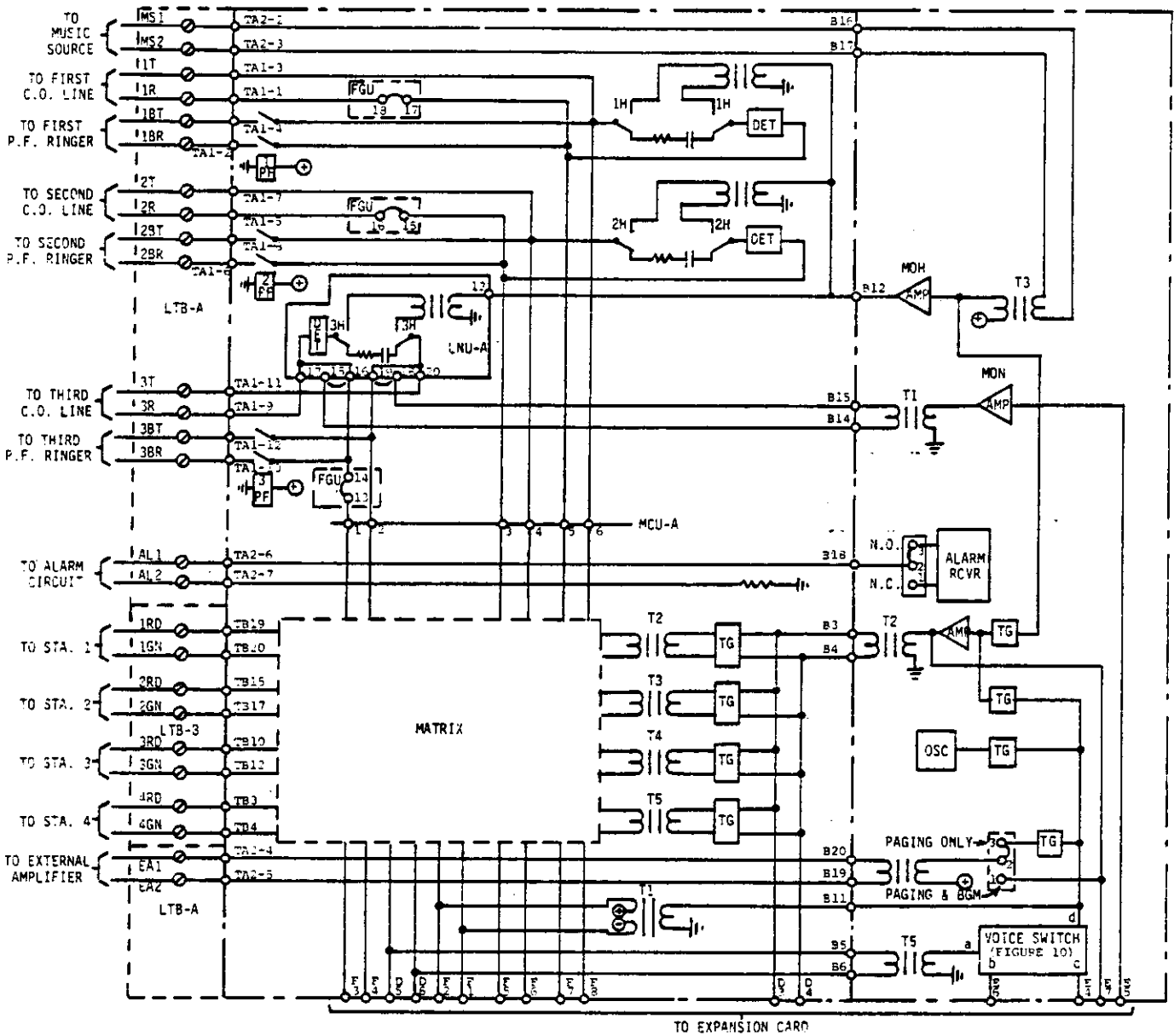


Figure 2 - SLU/CPU Audio Path Condensed Schematic

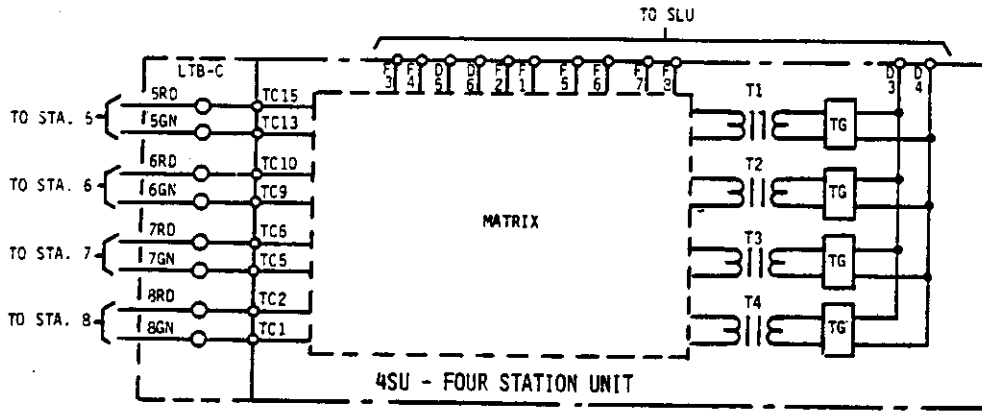


Figure 3 - 4SU Audio Path Condensed Schematic

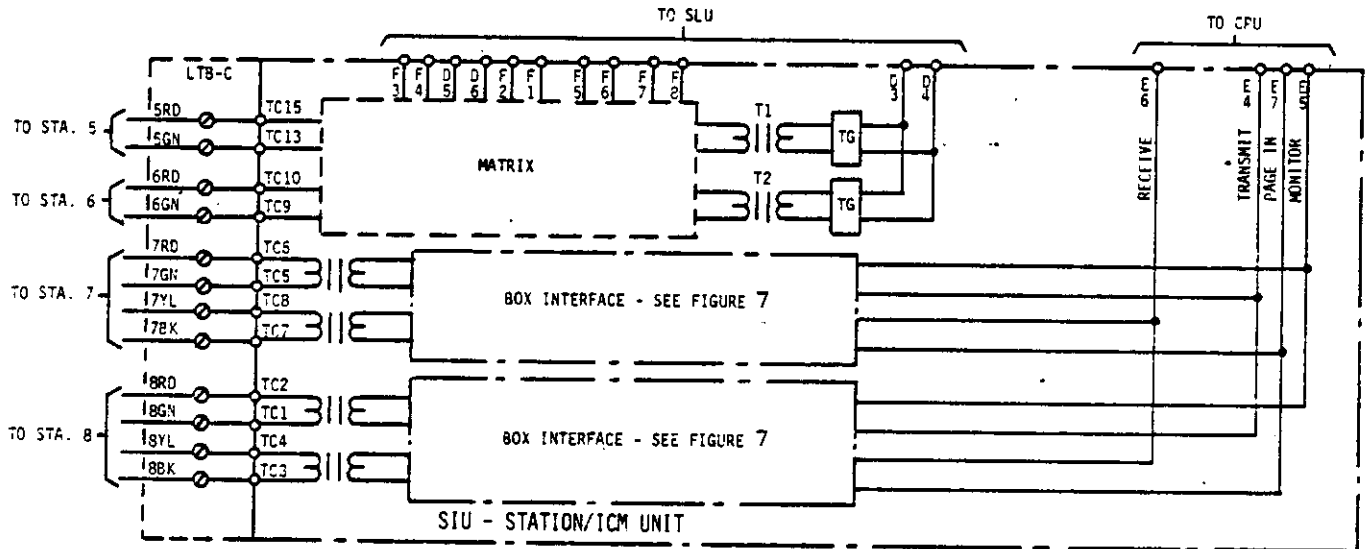


Figure 4 - SIU Audio Path Condensed Schematic

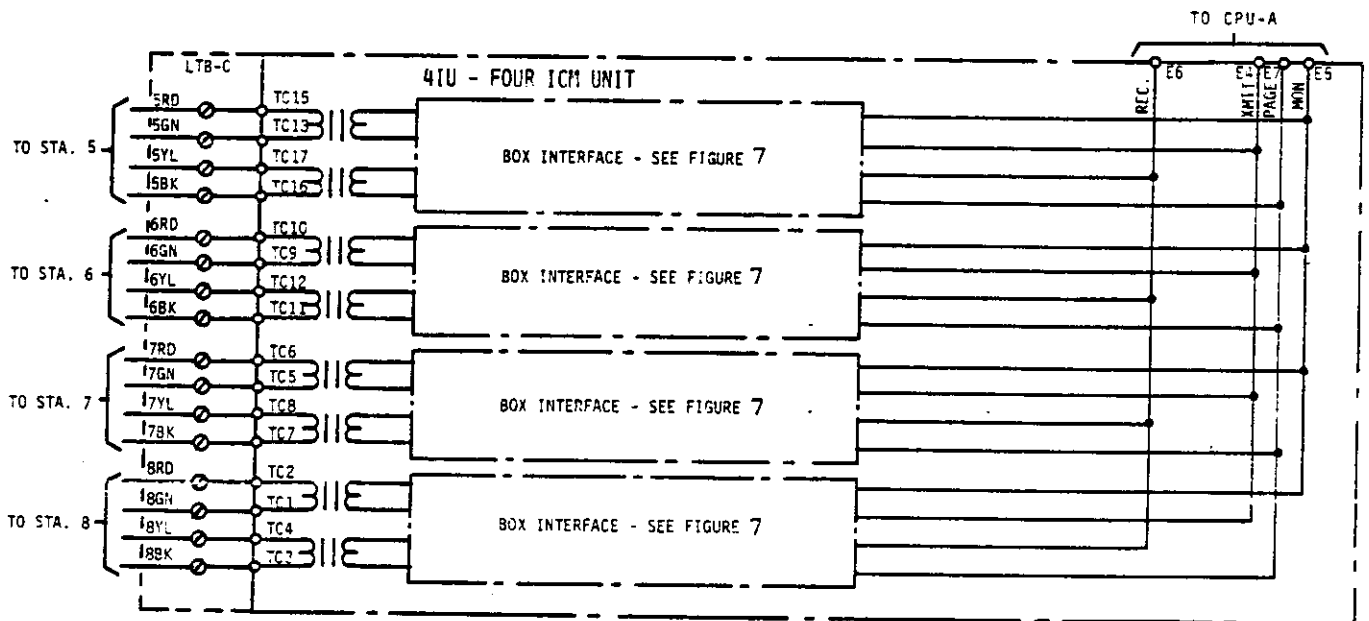


Figure 5 - 4IU Audio Path Condensed Schematic

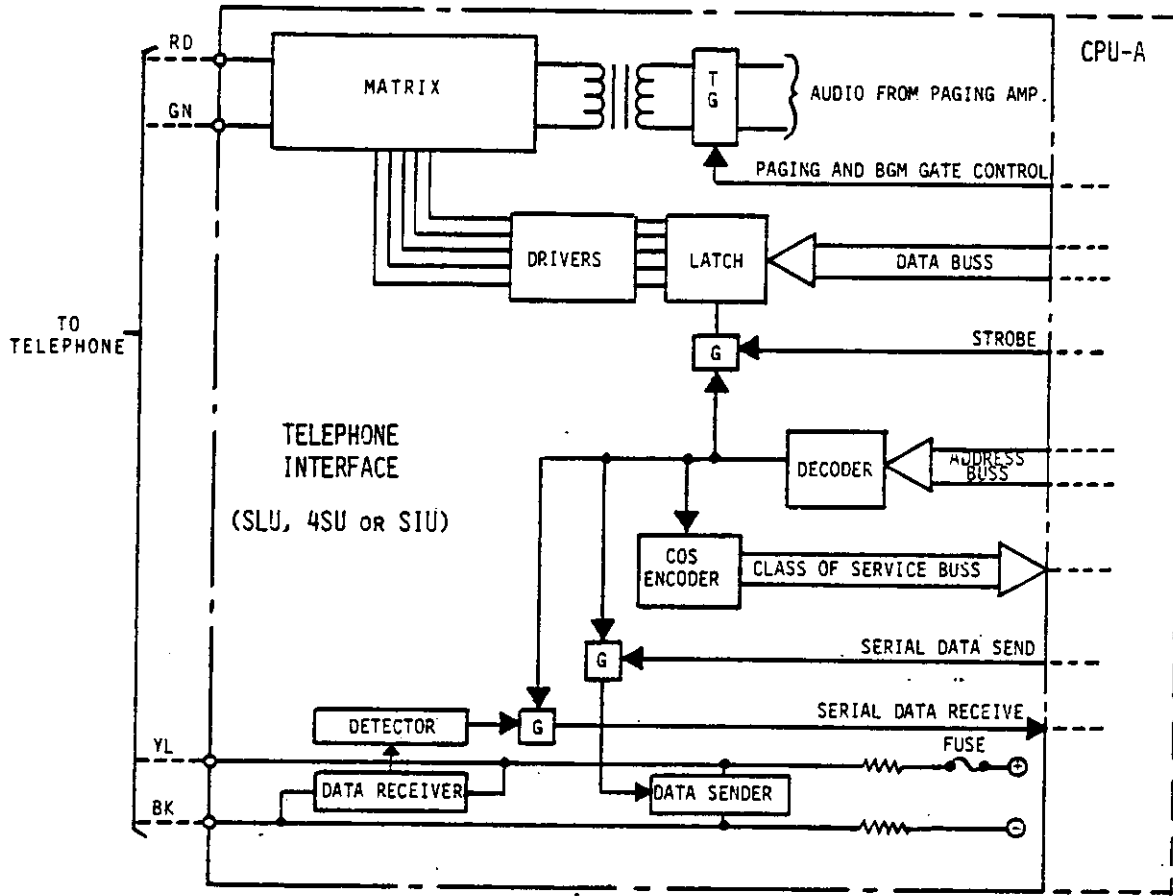


Figure 6 - Telephone Interface Condensed Schematic

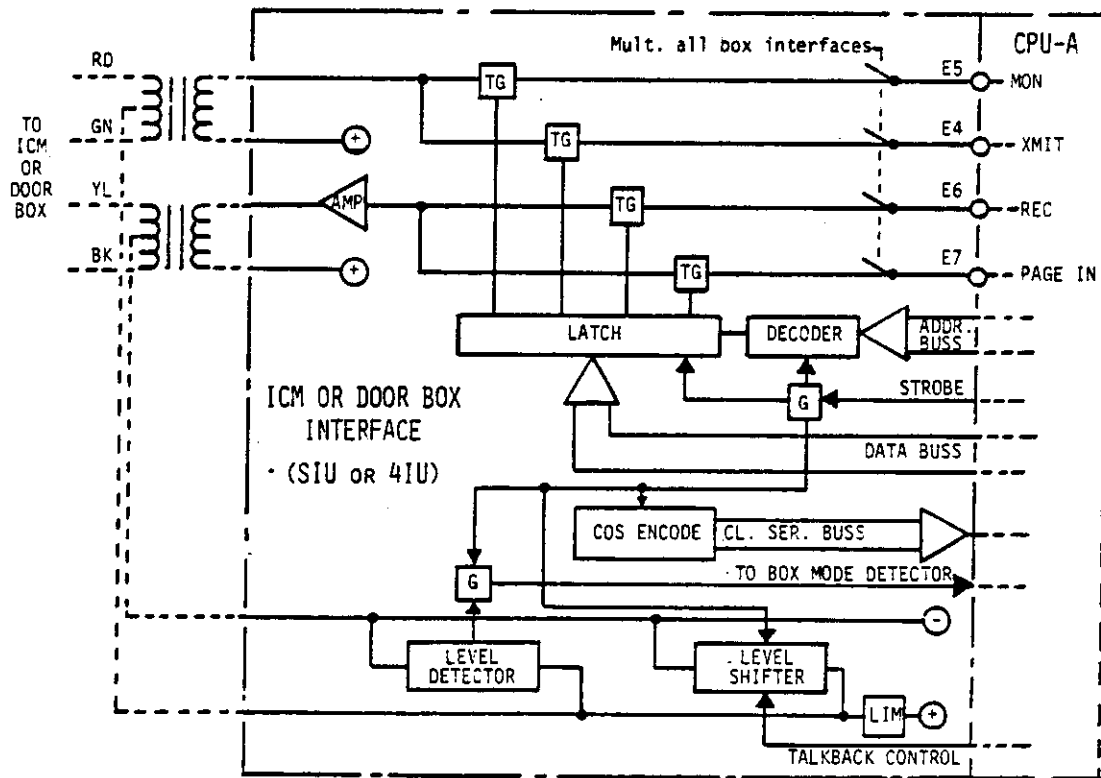


Figure 7 - Box Interface Condensed Schematic

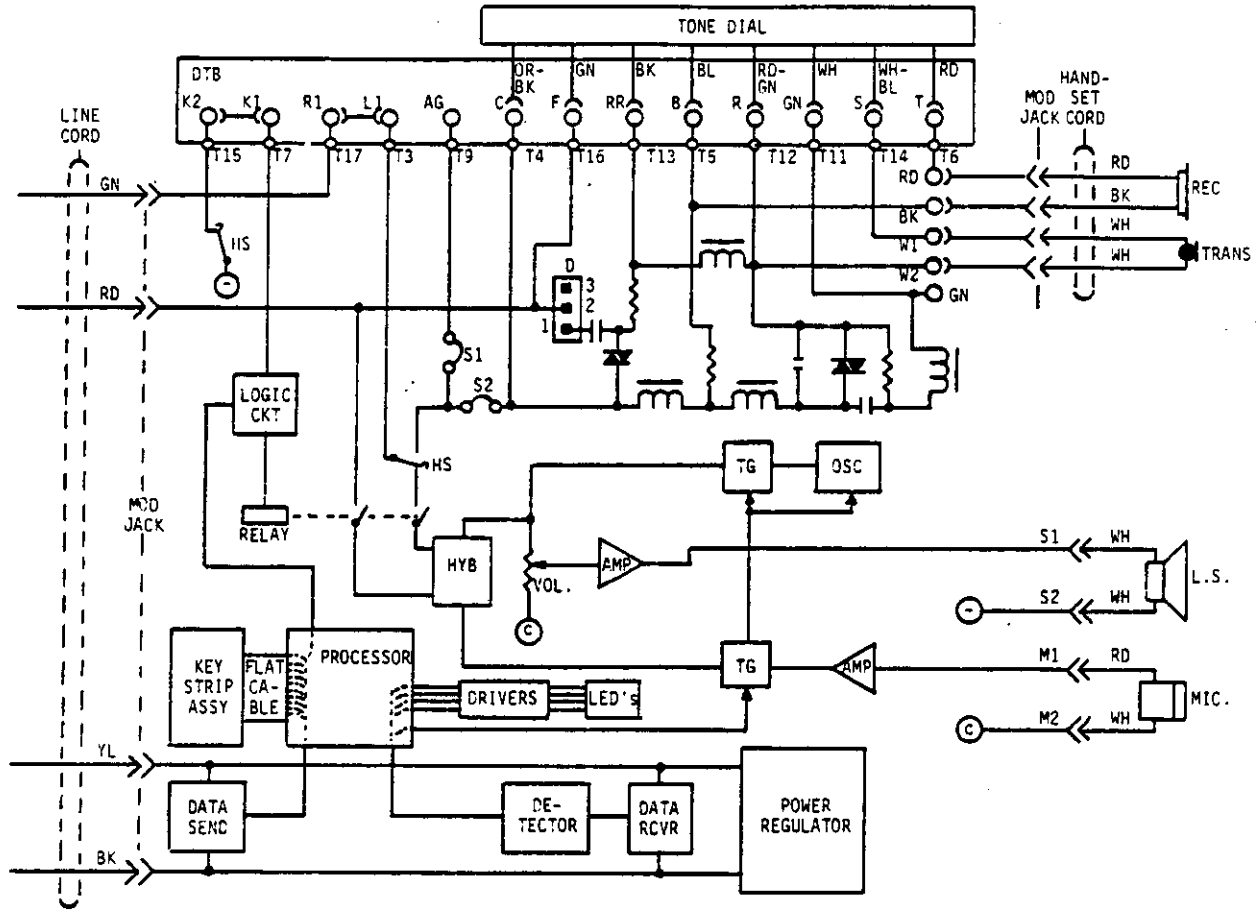


Figure 8 - EK-308 Telephone Condensed Schematic

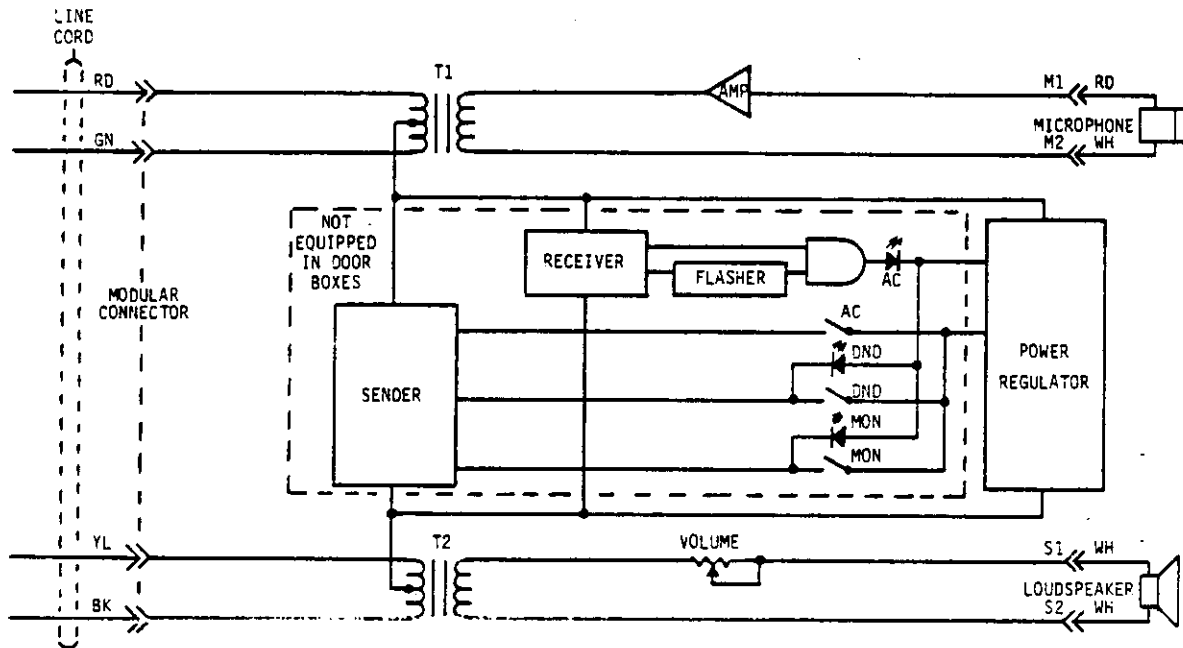


Figure 9 - EK-308 ICM Box Condensed Schematic

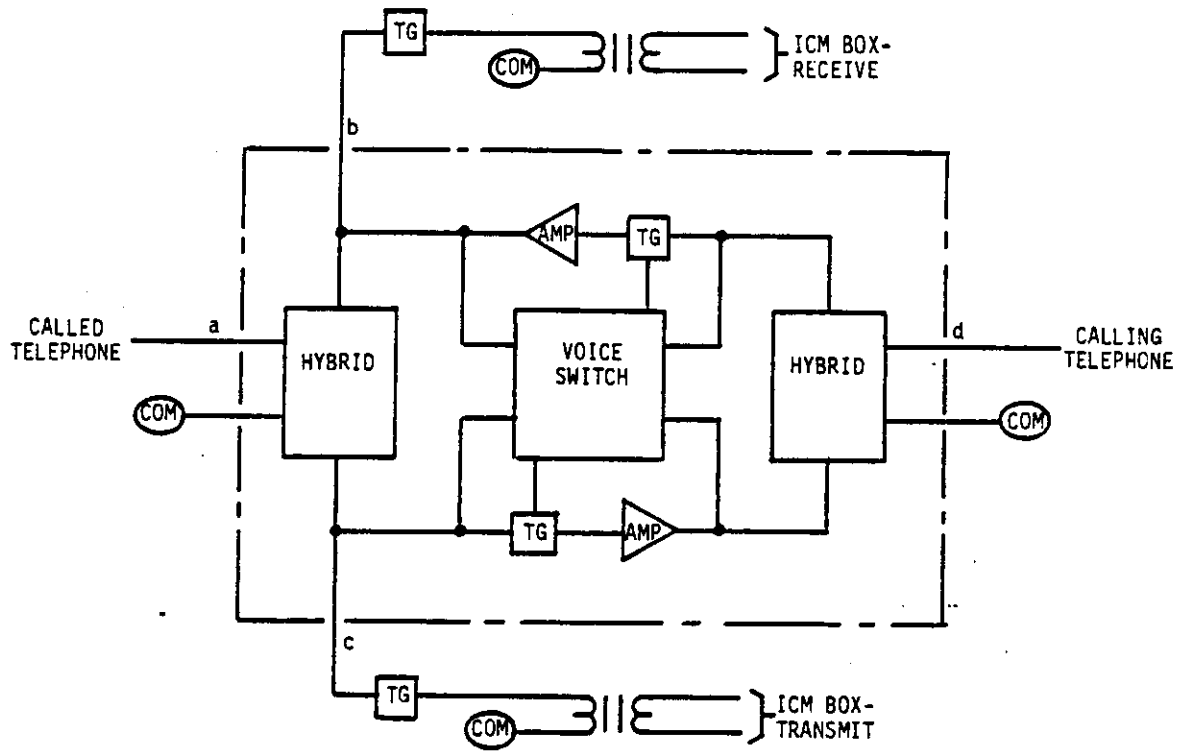


Figure 10 - Voice Switching Circuit Condensed Schematic

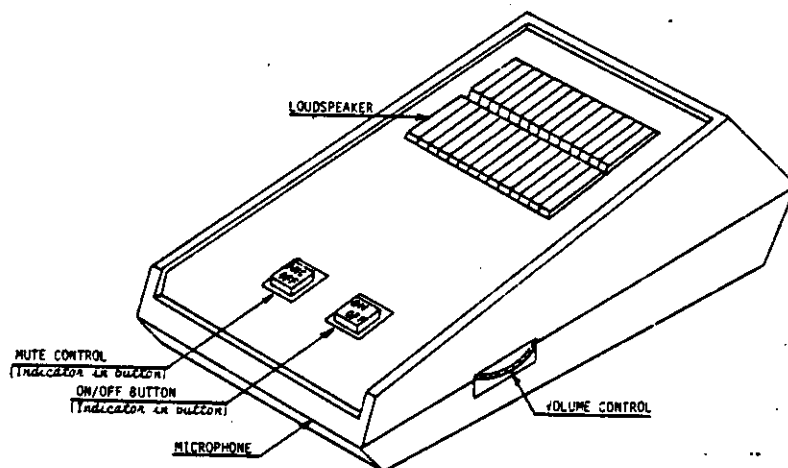
## Spare parts list - continued.

| <u>PART<br/>NUMBER</u> | <u>ORDER<br/>CODE</u> | <u>DESCRIPTION</u>  |
|------------------------|-----------------------|---|
| 30854                  | LTB-A                 | Line Terminal Board for C.O. lines and misc. external inputs. |
| 30855                  | LTB-B                 | Line Terminal Board for 4 telephones served by SLU-A card.    |
| 30856                  | LTB-C                 | Line Terminal Board for 4 stations served by interface cards. |
| 30874                  | ---                   | 308 Microphone Assembly.                                      |
| 30875A                 | ---                   | Key Cap - Clear, C.O. button.                                 |
| 30875B                 | ---                   | Key Cap - Clear, DSS button.                                  |
| 30876                  | ---                   | Key Cap - Amber.  |
| 30877                  | ---                   | Key Cap - Red   |
| 30878                  | ---                   | 308 telephone key designation sheet.                          |
| 30879                  | ---                   | Flat ribbon cable package for basic KSU.                      |
| 30879A                 | ---                   | Flat ribbon cable package for 4SU-A or SIU-A expansion card.  |
| 30879B                 | ---                   | Flat ribbon cable package for 4IU-A expansion card.           |
| 90021                  | Short<br>Bar B        | Jumper pins for telephone and KSU installer strapping.        |
| -----                  | ---                   | Fuse 2½ Amp AGC   |
| -----                  | ---                   | Fuse 2 Amp MDX  |
| -----                  | ---                   | Fuse 0.3 Amp AGC  |





## TIE EK308/E402 SPEAKERPHONE - INSTALLATION



### 1.00 INTRODUCTION

1.01 This section provides the electrical and mechanical information required for installation of the TIE E-402 Speakerphone when used with all models of the TIE EK-308 key telephone set.

### 2.00 GENERAL

2.01 The EK-308 key telephone sets will provide handsfree loudspeaker telephone operation when used with the TIE E-402 Speakerphone.

2.02 Speakerphone operation may be enabled without the loss of any of the normal operating features associated with the EK-308 key telephone set. To assure optimum performance of the E-402, however, it is recommended that the EK-308 be strapped, in the KSU, for 'on-hook' signaling (refer to paragraph 4.23b and table 1 in section -1 for details).

2.03 When the E-402 Speakerphone is used with the EK-308 telephone, an AC Adapter (TIE part number 30869) is re-

quired to power the speakerphone. Refer to paragraphs 3.01q and 3.02.

2.04 The E-402 is directly compatible with the EK-308 when used with the following types of TIE dials:

ROTARY - SRDK (TIE part number 14 14526), 6-lead dial equipped with 2 sets of shunt contacts and a DTB board.

TONE - TDK-C (TIE part number 14525-A), conventional 10/11-lead speakerphone compatible tone dial equipped with a DTB.

OUTPUT PULSE - ODK (TIE part number 14505), 5-lead (+ shield) OUTPUT PULSE DIAL<sup>®</sup> equipped with a DTB.

MEMORY OUTPUT PULSE - 450M-ODK (TIE part number 14551) 6-lead (+ shield) MEMORY<sup>®</sup> OUTPUT PULSE DIAL<sup>®</sup> equipped with a DTB. Refer to TIE Practices, section 4902 for programming and dialling information.

### 3.00 INSTALLATION

3.01 To install the TIE E-402 Speakerphone with the EK-308 key telephone set, proceed as follows:

- a) Unplug the EK-308 set from its modular jack.
- b) Remove the faceplate from the telephone by placing a small screwdriver or paper clip in the slot between the faceplate and the housing (*bottom of the faceplate*) and pry gently upward to disengage the faceplate. Pull the faceplate forward to remove it.
- c) Loosen the captive screws (*bottom left and upper left faceplate corners*) and remove the housing from the set. Disconnect the loudspeaker leads for convenience in working on the set.
- d) Remove the dial, and DTB if equipped.
- e) Located in the center rear of the set is the modular line cord connector. Adjacent to the right side of the connector is a rubber filler plug. Remove the filler plug and insert the E-402 cord through the opening. Be careful not to pull the spade-tips off the leads while inserting the cord.
- f) If a MEMORY<sup>®</sup>OUTPUT PULSE DIAL<sup>®</sup> is to be installed proceed to step g). If any of the other dials in table 1 are to be installed, proceed to step h).
- g) Modify the DTB by soldering a strap between SG and X3. This strap must be soldered to the back of the DTB as shown in figure 1. Use a small piece of 24-gauge wire for the strap. Be careful to avoid solder bridges to adjacent runs on the DTB.



*When removing straps from the DTB, use a pair of pliers and pull on the spade-tips only. Do not pull on the lead itself.*

- h) Remove straps L1 to R1 and K1 to K2 on the DTB, if present.

- i) Connect the E-402 leads and the speakerphone compatible dial leads to the DTB in accordance with table 1. Refer to figure 2 for terminal locations on the DTB board.
- j) Make sure that the D connector on the HANU board of the set is strapped in accordance with table 1.
- k) Plug the DTB board into the T connector in the telephone set. The DTB is plugged in with the terminals toward the rear of the set, with pin 1 on the right side.
- l) Located directly in front of the E-402 cord entrance hole, in the base of the set, are 2 square holes, separated by a narrow strip. Hook the strain-relief hook over the narrow strip to secure the E-402 cord.
- m) Mount the dial by placing the slots of the dial brackets over the tabs of the support brackets and sliding the complete dial assembly to the right.
- n) Reconnect the loudspeaker leads to the S1/S2 terminals on the HANU board.
- o) When installing OUTPUT PULSE DIALS<sup>®</sup>, make sure that the HVY BK lead is connected as shown in table 1.
- p) Replace the upper housing and faceplate.
- q) Plug the AC adapter into the rear of the speakerphone.

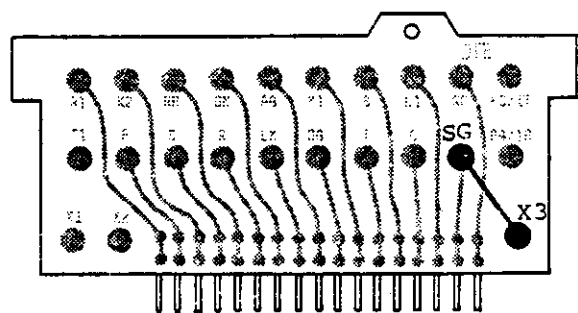


Figure 1  
DTB (Solder side) Strap Location

Table 1 - DTB Connections for E-402 Speakerphone and Dial

| DTB BOARD | ROTARY |         | 10/11 LEAD TONE |         | TIE 250B |         | MEMORY OUTPUTPULSE |         |
|-----------|--------|---------|-----------------|---------|----------|---------|--------------------|---------|
|           | DIAL   | E-402   | DIAL            | E-402   | DIAL     | E-402   | DIAL               | E-402   |
| P3        | YL     | LBL     |                 | LBL     |          | LBL     |                    | LBL     |
| P4        | YL     | GN      | VI              | GN      |          | GN      |                    | GN      |
| RB        |        |         |                 |         | OR       |         | OR-WH              |         |
| SG        |        | BL      |                 | BL      | HVY BK   | BL      | SL-WH #            | BL      |
| L1        | **     | SL      | **              | SL      | **       | SL      | **                 | SL      |
| C         |        |         | GN-WH & OR-BK   |         |          |         | VI                 |         |
| B         |        |         | BL Ø            |         |          |         |                    |         |
| T         |        |         | RD              |         |          |         |                    |         |
| RR        | BL     | WH      | BK              |         | GN       | WH      | GN                 | WH      |
| OG        |        |         |                 |         | BK       |         | BK-WH              |         |
| AG        |        |         |                 |         |          |         |                    |         |
| LK        |        | LGN     |                 | LGN     |          | LGN     |                    | LGN     |
| R         | WH     |         | RD-GN           |         |          |         |                    |         |
| GN        | WH     |         | WH              |         |          |         |                    |         |
| S         |        |         | WH-BL           |         |          |         |                    |         |
| K1        | **     | BK      | **              | BK      | **       | BK      | **                 | BK      |
| K2        | **     | YL      | **              | YL      | **       | YL      | **                 | YL      |
| F         | GN     |         | GN              |         | BL       |         | BL                 |         |
| R1        | **     | BR      | **              | BR      | VI**     | BR      | **                 | BR      |
| T1        |        |         | OR              | WH      |          |         |                    |         |
| X1        |        | PK & VI |                 | PK & VI |          | PK & VI |                    | PK & VI |
| X2        |        | OR      |                 | OR      |          | OR      |                    | OR      |
| X3        |        |         |                 |         |          |         | HVY BK#            |         |
| D CONN    | 1-2    |         | 2-3             |         | 1-2      |         | 1-2                |         |

# Refer to figure 1.

\*\* Remove strap if present.

Ø Not present on 10-lead dials.

Tape & store RD E-402 lead.

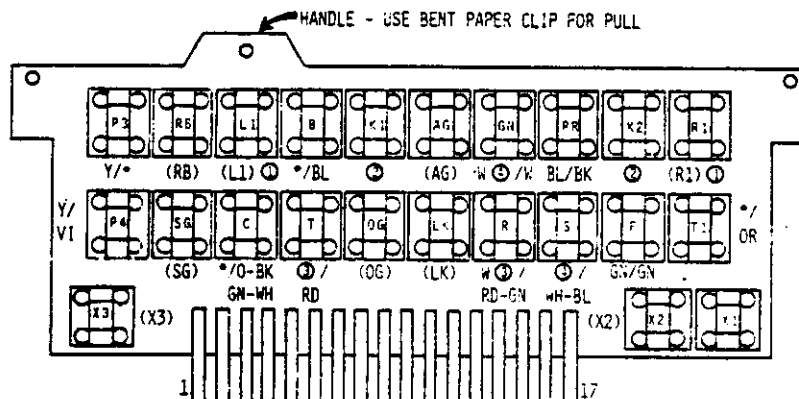


Figure 2 - Dial Terminal Board (DTB) Terminal Layout

3.02 Located on the P.C. board inside the E-402 is a power switch. The switch should be in the 20V position (*factory standard*) for operation with the EK-308 telephone set and the AC adapter.

3.03 No other connections or adjustments are required in the E-402 Speakerphone.

## 4.00 OPERATION

4.01 Operation of the E-402 Speakerphone is simple and straight-forward. The E-402 is illustrated on page C1 of this section. The basic controls that are of concern to the user are pointed out in the drawing. The control functions are as follows:

**ON/OFF BUTTON** Momentarily depressing the ON/OFF button is the same as lifting the handset of the EK-308 telephone set. A line button must be depressed to select the desired C.O. line or a DSS button for an intercom call. An LED in the ON/OFF button indicates when the E-402 is ON.

Momentarily depressing the ON/OFF button the second time will turn the E-402 OFF.

**HANDSET TO E-402** When the station user decides to go from handset operation to speakerphone operation, simply depress the ON/OFF button on the E-402 and hang-up the EK-308 handset.

**VOLUME CONTROL** The volume control is conventional and adjusts the level of sound from the loudspeaker in the E-402.

Best performance is usually obtained with low levels of volume control.

**MIC OFF BUTTON** The MIC OFF button turns the microphone OFF to provide privacy when desired by the station user. When the MIC OFF button is lit, the distant party will not hear any conversation from the speakerphone end.

## 5.00 SPEAKERPHONE LOCATION

5.01 The E-402 is designed to match the EK-308 in size and appearance. The two sets complement each other when placed side-by-side. The units should sit directly on a hard surface (e.g., *desk, table, credenza, etc.*) and as far away as possible from noise sources, such as typewriters, radios, etc.

5.02 DO NOT place the E-402 in hard-surfaced corners or under low shelves; these locations may cause echo or transmission problems.

5.03 The unit should be placed at least 2-inches back from the edge of the surface upon which it sits. Obstacles should NOT be placed in front of the microphone.

## TECHNICAL ASSISTANCE

When problems or questions arise during installation or servicing that cannot be resolved using this or related documents, then contact TIE Technical Service Department as follows:

For assistance between 8:30 AM and 5:00 PM, Eastern time, call:

**(203) 929-7373**

For assistance in the event of an **ABSOLUTE** emergency at other times than those listed, call:

**(203) 929-7920**

