

# EKS-701

GENERAL DESCRIPTION,  
INSTALLATION AND  
MAINTENANCE



**ITT** Telecom

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# EKS-701

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**ELECTRONIC KEY SYSTEM  
GENERAL DESCRIPTION  
INSTALLATION AND MAINTENANCE**



## EXHIBIT J

### USER INSTRUCTIONS

This device has been granted a registration number by the Federal Communications Commission, under Part 68 Rules and Regulations for direct connection to the telephone lines. In order to comply with these FCC Rules, the following instructions must be carefully read and applicable portions followed completely:

1. Direct connection to the telephone lines may be made only through a standard plug-ended cord to the utility-installed jack. No connection may be made to party or coin phone lines. Prior to connecting the device to the telephone lines, you must:
2. Call your telephone company and inform them you have an FCC registered device you desire to connect to their telephone lines. Give them the number(s) of the line(s) to be used, the make and model of the device, the FCC registration number and ringer equivalence. This information will be found on the device or enclosed with instructions as well as the jack suitable for your device.
3. After the telephone company has been advised of the above you may connect your device if the jack is available, or after the telephone company has made the installation.
4. Repairs to the device may be made only by the manufacturer or his authorized agent. This applies at any time during and after warranty. If such unauthorized repair is performed, registration, connection to the telephone lines and remainder of warranty period all become null and void.
5. If, through abnormal circumstances, harm to the telephone line is caused, it should be unplugged until it can be determined if your device or the telephone line is the source. If your device is the source, it should not be reconnected until necessary repairs are effected.
6. Should the telephone company notify you that your device is causing harm, the device should be unplugged. The telephone company will, when practicable, notify you, that temporary discontinuance of service may be required. However, where prior notice is not applicable, the telephone company may temporarily discontinue service, if such action is reasonably necessary, in such cases the telephone company must (A) promptly notify you of such temporary discontinuance, (B) afford you the opportunity to correct the condition and (C) inform you of your rights to bring a complaint to the FCC under their rules.
7. The telephone company may make changes in its communications facilities, equipment, operations or procedures, where such action is reasonably required in the operation of its business and is not inconsistent with FCC rules. If such changes can be reasonably expected to render the customer's devices incompatible with telephone company facilities, or require modification or alteration, or otherwise materially affect its performance, written notification must be given to the user, to allow uninterrupted service.
8. The following instructions shall also apply in the KX registration:
  - (a) The user should inform the telephone company of the FCC registration number and the ringer equivalence number (if applicable). This information should be filed in affidavits given the phone company and recorded in logs kept by installation and maintenance personnel.
  - (b) That where the TX and KX adjuncts require connections or changes to the internal wiring of the registered telephones or systems, instructions must be provided to inform the user that such connections or changes can be accomplished only by the registration grantee, the grantee's authorized agents, equipment manufacturers, telephone companies, registered telephone refurbishers, and those qualified for installation of unprotected systems under Section 68.215 of the FCC rules. (For equipment that can be installed in a fool-proof manner, and have demonstrated such means of connection in the registration application, the above restrictions are not applicable).
  - (c) FCC rules require the user of KX or TX registered apparatus be informed that installation of such can be made only with the permission of the owner of the host equipment. No connection may be made to party or coin phone lines. Complying to the above is required.



# EKS-701 ELECTRONIC KEY SYSTEM

## GENERAL DESCRIPTION, INSTALLATION AND MAINTENANCE

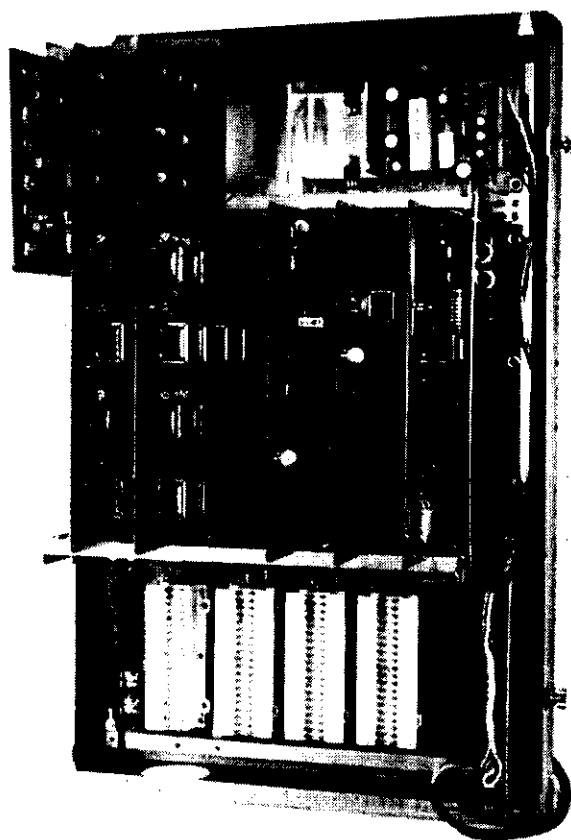
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## 1. INTRODUCTION

1.01 This section provides information on the ITT EKS-701 Electronic Key System, (see Figure 1) including a description of the system and instructions for installation and maintenance.

1.02 This section is reissued to include a description of the off-hook ringing feature available with systems containing level AR3 software and to provide instructions for application of this feature through strapping options. Also in this issue, user comments have been incorporated into practices and procedures to provide required clarification.



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Figure 1: EKS-701 Electronic Key System

## RELATED DOCUMENTS

1.03 Documents related to this section are listed in Table A.

## 2. GENERAL DESCRIPTION

2.01 The EKS-701 is a stored program controlled electronic key system utilizing microprocessor technology in the key service unit (KSU) and in the telephone. This provides a controlled transmission path used for line talk path, line hold, intercom talk path, and line indications while using three-pair cable between the KSU and each telephone.

2.02 The program memory is EPROM (erasable and programmable read-only memory). Voice paths are provided by space division switching using CMOS (complementary metal-oxide semiconductor) cross points; thus conserving space and

TABLE A  
RELATED DOCUMENTS

DOCUMENT TITLE	DOCUMENT NUMBER
Station Operating Instructions	30-701-450
Station User's Guide	30-701-451
Central Processing Unit (CPU) PCB, Abbreviated Description	36-701-201
Interface (I/F) PCB, Abbreviated Description	36-701-202
Voice Switch/ Tone PCB, Abbreviated Description	36-701-203
Tel-Touch 3-Line Toll Restriction PCB, Abbreviated Description	36-701-204
Tel-Touch 5-Line Toll Restriction PCB, Abbreviated Description	36-701-205
Tel-Pulse Toll Restriction PCB, Abbreviated Description	36-701-206
3-CO/PBX Line PCB, Abbreviated Description	36-701-207
2-CO/PBX Line PCB, Abbreviated Description	36-701-208
CO-X PCB, Abbreviated Description	36-701-209
8-Station PCB, Abbreviated Description	36-701-210
DC/DC Converter PCB, Abbreviated Description	36-701-211
Wall Adapter Kit, Instructions	36-701-212

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reducing power consumption. In case of power failure and resumption, the system restarts automatically.

**2.03** Circuits are contained on printed circuit boards (PCBs) for ease of installation, replacement, and maintenance. Various features are implemented by installing miniature shorting clips or straps on the PCBs.

**2.04** The KSU is designed for wall mounting and is easily installed. The power supply is externally mounted and connected to the KSU by a 2-wire cable. The telephones are desk sets but may be wall mounted by using an optional wall mounting kit.

**2.05** The EKS-701 will accept both TEL-TOUCH® and TEL-PULSE® dialing; therefore, telephones with either type dial may be used in the system. Note, however, that if toll restriction is to be provided, all telephones to be restricted must have the same type dial: either Tel-Touch or Tel-Pulse.

**2.06** Incoming calls may be handled by individual station users or by an attendant; outgoing call facilities are available to all station users. This allows the EKS-701 to be used in many applications and provide great versatility.

**2.07** The EKS-701 has been registered with the Federal Communications Commission as a fully protected key system.

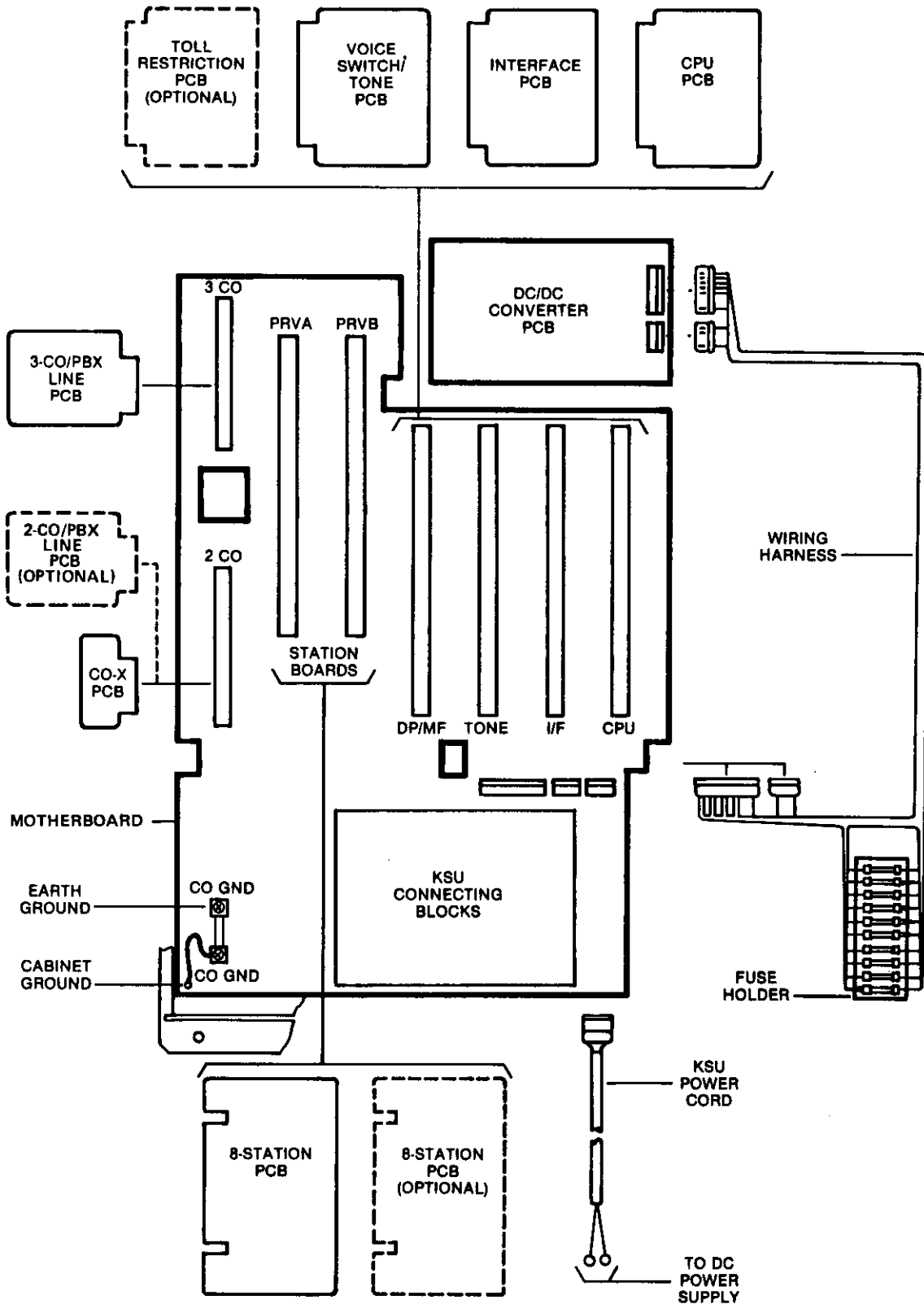
*Note:* "This equipment complies with the requirements in Part 15 of the FCC Rules for a Class A computing device. Operation of this equipment in a residential area may cause unacceptable interference to radio and TV reception requiring the operator to take whatever steps are necessary to correct the interference."

### 3. SYSTEM CONFIGURATION

**3.01** The basic EKS-701 System (see Figure 2) is equipped to operate with up to 3 CO/PBX lines and 8 stations and may be expanded to a maximum capacity of 5 CO/PBX lines and 16 stations. Two intercom links using single-button, direct station selection (DSS) signaling are standard. However, activation of the second intercom link is a strapping option. An all call announcing path is provided along with a variety of standard system features. The basic system includes the following items:

- (a) DC/DC Converter PCB
- (b) Motherboard Assembly
- (c) Central Processing Unit (CPU) PCB
- (d) Interface (I/F) PCB
- (e) Voice Switch/Tone PCB
- (f) 3-CO/PBX Line PCB
- (g) CO-X PCB





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Figure 2: System Layout

(h) 8-Station PCB

(j) KSU Connecting Blocks

**3.02** Expansion of the basic system is possible through the addition of optional PCBs. The number of CO/PBX lines may be increased to 5 by replacing the CO-X PCB with a 2-CO/PBX line PCB. However, the basic system option of a second intercom link is forfeited if the fifth CO/PBX line is used. Station capacity may be increased to 16 by installing an additional 8-station PCB. Toll restriction is available by adding one toll restriction PCB: either Tel-Touch (multifrequency) or Tel-Pulse (dial pulse) may be used, depending on the type of dialing to be restricted.

**3.03** A power supply may be ordered with the basic system and is recommended; however, an equivalent power source may be used. Power supply specifications are listed in Table B.

#### 4. EQUIPMENT PART NUMBERS

**4.01** Part numbers for the EKS-701 electronic key system and associated equipment are listed in Table C.

#### 5. FEATURES

**5.01** The following features are available with an EKS-701 Electronic Key System:

- (a) Alarm Signal\* †
- (b) Call Announcing
  - (1) Call Announcing with Handsfree Answer-back
  - (2) All Call Announcing
- (c) Conference Calls
  - (1) Two CO/PBX Lines with One Station
  - (2) One CO/PBX Line with Two or More Stations
- (d) CO/PBX Calls
  - (1) Incoming Alerting Signal
  - (2) Off-Hook Ringing
  - (3) Automatic Hold Recall

TABLE B  
EKS-701 POWER SUPPLY SPECIFICATIONS

Model:	Elgin Electronics 15675 (or equivalent)
Input Single Phase:	60 Hz $\pm$ 0.5 Hz, 120 $\pm$ 10% VAC, 1.5 amps
Output Regulation:	24 $\pm$ 2 VDC, 4 amps
Net Weight:	13 lbs. (5.90 Kg)
Dimensions:	Height: 11 $\frac{1}{4}$ " (285.75 mm), Width: 7 $\frac{1}{2}$ " (190.5 mm), Depth: 5 $\frac{1}{4}$ " (133.35 mm)
Ripple:	Less than 30 mV RMS
Operating Ambient Temperature:	32° F to 122° F (0° C to 50° C)
Color:	Telephone Gray

NOTES: The Model 15675 Elgin Power Supply provides the following qualities.

1. Short circuit proof or fuse protected.
2. Test jacks for monitoring of output voltages.

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TABLE C  
EQUIPMENT PART NUMBERS

DESCRIPTION	ITT PART NUMBER
<b>EKS-701 ELECTRONIC KEY SYSTEM</b> Includes the Following: KSU Cabinet Cover Assembly Motherboard Assembly Wiring Harness Fuse Holder (with fuses) KSU Power Cord KSU Connecting Blocks DC/DC Converter PCB 3-CO/PBX Line PCB CO-X PCB 8-Station PCB Voice Switch/Tone PCB Interface (I/F) PCB Central Processing Unit (CPU) PCB Shorting Clips Spare Fuses General Description, Installation and Maintenance Manual Station Operating Instructions	EKS 701 - 308
<b>OPTIONAL EQUIPMENT</b> Power Supply 2-CO/PBX Line PCB 8-Station PCB Tel-Touch 3-Line Toll Restriction PCB Tel-Touch 5-Line Toll Restriction PCB Tel-Pulse Toll Restriction PCB	186230-101 188336-101 188333-101 188330-101 188331-101 188332-101
<b>REPLACEMENT PARTS</b> 3-CO/PBX Line PCB CO-X PCB 8-Station PCB Voice Switch/ Tone PCB Interface(I/F) PCB Central Processing Unit (CPU) PCB DC/DC Converter PCB Shorting Clips KSU Power Cord	188335-101 188334-101 188333-101 188329-101 188328-101 188327-101 188326-101 188344-101 188348-101
<b>TEL-TOUCH TELEPHONE (WITH CORDS AND ELECTRONIC TONE RINGER)</b>	2701CL-MOE-60M*
<b>TEL-PULSE TELEPHONE(WITH CORDS AND ELECTRONIC TONE RINGER)</b>	2701CL-MOE-60T*
<b>REPLACEMENT PARTS FOR TELEPHONES</b> Handset Assembly Handset Cord (7 feet) Line Cord (Silver Satin-7 feet) Button Designation Tabs Station User's Guide	188339-0CL* 9018CL-048* 183438-084 188347-101 030701-451
<b>WALL ADAPTER KIT FOR TELEPHONE</b>	188342-101

\*CL indicates the color of the telephone. Substitute the number 44 in place of CL for light ash colored telephones. Substitute the number 45 in place of CL for cocoa brown colored telephones.

- (4) Direct CO/PBX Access
- (5) Hold
- (6) Speaker Monitoring
- (7) Line Preselection
- (e) Dialing
  - (1) Last Number Redial (Tel-Pulse Dial Only)
  - (2) On-Hook Dialing with Call Progress Monitoring
  - (3) Toll Restriction\* †
- (f) Do Not Disturb
- (g) Flash Key
- (h) Intercom
  - (1) Intercom Calls (DSS)
  - (2) Alternate Answering Position
- (j) Microphone Off
- (k) Music
  - (1) Background Music\* †
  - (2) Music-On-Hold
- (l) Paging (External)\* †
- (m) Power Fail Operations
  - (1) Automatic Restart
  - (2) Automatic Extension Transfer †

\* Requires a strapping operation other than factory strapping.

† Requires additional equipment.

## 6. FEATURES DESCRIPTION

### ALARM SIGNAL

**6.01** The alarm signal feature allows an external sensor to be connected to the KSU connecting block at terminals AL1 and AL2. When the sen-

sor is activated, the designated telephones emit an alternating high/low pitched signal; disabled only when the sensor is turned off or disconnected. This feature is enabled by strapping the 8-station PCB for each station designated to signal an alarm and installing an external sensor. The alarm signal overrides all call announcing calls but does not override call announcing with handsfree answerback. A station answering a call announce call in the handsfree mode will not receive an alarm signal until the handsfree mode is disabled (handset is lifted or call is completed).

*Note:* The alarm signal does not operate during interruption of power to the KSU.

### CALL ANNOUNCING

**6.02** Call announcing is built into the basic system in the forms of call announcing with handsfree answerback and all call announcing.

#### A. Call Announcing with Handsfree Answerback

**6.03** Call announcing with handsfree answerback is accomplished by (1) depressing the DSS button of the station desired, (2) receiving a single confirmation tone, and (3) speaking into the handset. The called party receives a single alerting tone each time the button is depressed and may answer either by the handsfree method or by lifting the handset. If the called station is off-hook, the voice transmission will be received at a reduced volume.

#### B. All Call Announcing

**6.04** All call announcing is accomplished by (1) depressing and holding the DND/AC button of the telephone, (2) receiving a double confirmation tone, and (3) speaking into the handset. All stations in the system receive a double alerting tone. All off-hook stations receive voice transmission at a reduced volume. All call announcing overrides background music and call announcing but is independent of intercom.

### CONFERENCE CALLS

**6.05** The capability to establish a conference call is an available feature of the EKS-701. A conference is either of two types: two CO/PBX lines in conference with one station or one CO/PBX line in conference with two or more stations.

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*Note:* There is no compensation for the loss in transmission volume levels that may be experienced during conference calls.

### A. Two CO/PBX Lines with One Station

**6.06** To establish a conference call with two CO/PBX lines and one station, proceed as follows:

- (a) Establish a call with a CO/PBX line.
- (b) Depress the hold button placing the established call on hold.
- (c) Depress an idle CO/PBX line button and dial the number of the second CO/PBX line conferee.
- (d) When the call to the second CO/PBX line conferee is established, simultaneously depress both the held and established CO/PBX line buttons; the conference call is established.

**6.07** During a conference call the two CO/PBX lines may be placed on hold by depressing the hold button. These CO/PBX lines may then be answered at any station in the system by simultaneously depressing both CO/PBX line buttons. Also, while both CO/PBX lines are on hold, each CO/PBX line may be alternately answered and placed on hold for private conversation between one CO/PBX line and one station. To return to the conference, simultaneously depress both CO/PBX line buttons.

### B. One CO/PBX Line with Two or More Stations

**6.08** To establish a conference call with one CO/PBX line and two or more stations, proceed as follows:

- (a) Establish a call with a CO/PBX line.
- (b) Depress the DSS button of the second station conferee; the CO/PBX line will automatically be placed on hold.
- (c) When the call to the second station conferee has been established, inform the conferee of the conference call and of the CO/PBX line being held.

(d) Depress the line button of the held CO/PBX line; the second station conferee receives busy tone.

(e) Depress and hold the PRRL button until the second station conferee depresses the proper CO/PBX line button.

(f) Release the PRRL button; the conference call is established.

**6.09** With the one CO/PBX line and two-station conference established, additional stations may be added as follows:

(a) Request the second station conferee to notify each station user to be added to the conference call.

(b) Depress and hold the PRRL button while the second station conferee contacts each additional station conferee.

(c) The second station conferee notifies each additional station conferee of the conference call and of the appropriate CO/PBX line button.

(d) Each station user joins the conference call by depressing the appropriate CO/PBX line button.

(e) After all station conferees have joined the conference, release the PRRL button; the conference call is established.

**6.10** The following is an alternate method for adding stations to an established line-to-station call:

(a) Depress and hold the DND/AC button while all call announcing those station users to be included in the conference. The CO/PBX line is automatically placed on hold.

(b) Depress the held CO/PBX line button.

(c) Depress and hold the PRRL button while each station conferee joins the conference call by depressing the appropriate CO/PBX line button.

(d) Release the PRRL button; the conference call is established.

**CO/PBX CALLS****A. Incoming Alerting Signal**

6.11 Each station may be allowed to receive an incoming alerting signal (ringing) whenever a CO/PBX line call is incoming. Ringing is permitted or denied by strapping on the 8-station PCB. An incoming call will cause the CO/PBX line button indicators to flash at all stations.

*Note:* Stations strapped for ringing will receive ringing on all incoming calls.

**B. Off-Hook Ringing**

6.12 The EKS-701 Electronic Key System may be arranged for off-hook signaling when equipped with a Central Processing Unit (CPU) PCB containing level AR3 software. A strapping option allows off-hook stations to receive muted ringing when a CO/PBX line has an incoming call. Refer to strapping information in paragraph 8.15 to enable this feature.

**C. Automatic Hold Recall**

6.13 The basic system is equipped with an automatic hold recall feature. A CO/PBX call left on hold longer than 120 seconds will ring at the hold initiating station. The held CO/PBX line indicator alternately winks and lights until the call is answered. This feature is allowed or denied by strapping on the interface PCB.

**D. Direct CO/PBX Access**

6.14 All telephones in the system are provided direct access to all CO/PBX lines. All CO/PBX lines are accessed by depressing the CO/PBX line button for the line desired. The accessing station line button indicator winks; on all other telephones, the line button indicator is lit.

**E. Hold**

6.15 A call on a CO/PBX line is placed on hold by depressing the hold button. An intercom call cannot be placed on hold. A call is automatically placed on hold when a DSS button or a DND/AC button is depressed. A CO/PBX line placed on hold may be answered at any station in the system. If a call on a CO/PBX line is to be answered at another station, proceed as follows:

(a) Depress the DSS button of the station where the call is to be answered; the CO/PBX line is on hold.

(b) When the called station user answers, notify the user of the held call.

(c) The receiving station user depresses the held CO/PBX line button and answers the call.

**F. Speaker Monitoring**

6.16 A call may be monitored through the telephone speaker while the handset is on-hook. This feature allows the station user, when placed on hold, to monitor the other party's return while remaining on-hook. Any transmission from the other party is heard through the telephone speaker. Speaker monitoring may also be used for group listening of a call. To initiate speaker monitoring of a call in progress, depress the SPK button while replacing the handset. The SPK button indicator is lit when depressed. A station user monitoring a call may join in the conversation by lifting the handset. Lifting the handset extinguishes the SPK button indicator and speaker monitoring ceases. To resume speaker monitoring, the SPK button is depressed while replacing the handset.

*Note:* Speaker monitoring allows listening only. The telephone handset must be used for talk.

**G. Line Preselection**

6.17 A CO/PBX line may be selected before the handset is lifted by depressing the idle CO/PBX line button and (within 5 seconds) lifting the handset. If the handset is not lifted within 5 seconds, the call cannot be completed; the button must again be depressed. The CO/PBX line button indicator gives a double wink indication when the handset is lifted.

**DIALING****A. Last Number Redial (Tel-Pulse Dial Only)**

6.18 This feature allows the last number dialed to be automatically dialed again when the # button on the keypad is depressed. Last number redial is available only with Tel-Pulse dials. If the EKS-701 is operating behind a PBX, a pause for CO

dial tone may be required after the trunk access code is dialed. To insert this pause into a number to be redialed, dial the access code, depress the keypad # button, and dial the desired number. If the same number is to be dialed again, depress the # button and the access code is automatically dialed. When dial tone is received, depress the # button again and the remainder of the number is automatically dialed.

### **B. On-Hook Dialing with Call Progress Monitoring**

**6.19** On-hook dialing with call progress monitoring is a feature of the basic system. To initiate this feature, proceed as follows:

- (a) With the handset on-hook, depress the desired CO/PBX line button and the SPK button. (The sequence is not important but the second button must be depressed within five seconds of the first.)
- (b) Dial the desired number; dial tone, ringback tone, and the called party's answer can be monitored with the handset on-hook.
- (c) Lift the handset to talk.

### **C. Toll Restriction**

**6.20** Any station may be assigned toll restriction. This feature prevents the completion of designated long distance or local calls from a particular station. This is accomplished by identifying numbers peculiar to the types of calls to be restricted and monitoring the dialed digits. The restrictions are divided into the three classifications listed in Table D. Toll restriction requires that a toll restriction PCB be installed in the system and that both the toll restriction and the 8-station PCBs be strapped. See paragraph 8.06 for a description of the toll restriction PCBs available.

### **DO NOT DISTURB**

**6.21** The telephones are factory strapped to permit the Do Not Disturb feature. When the handset is on-hook and the DND/AC button is depressed, the button indicator is lit. Incoming CO/PBX line calls, intercom calls, all call announce transmissions, and background music to the station are inhibited; however, associated feature button indicators are lit when the feature is activated. An

alarm signal or automatic hold recall signal overrides Do Not Disturb and is heard at the station. Station users that initiate an intercom call to a station operating in the Do Not Disturb mode will receive busy tone.

### **FLASH KEY**

**6.22** The flash key permits the station user that is off-hook to receive CO/PBX dial tone without replacing the handset. When the flash key is depressed, the line loop is opened but the seized line is not released; allowing the station user to maintain control of the CO/PBX line. This feature may be used if a mistake is made in dialing or if a called number is busy and CO/PBX dial tone is again desired.

### **INTERCOM**

#### **A. Intercom Calls (DSS)**

**6.23** An intercom call is initiated at a station by depressing the DSS button of the station to be called. The called station user hears a single alerting tone and may answer handsfree or by lifting the handset. Each time the calling party depresses the DSS button the signal is repeated. The hold button indicator on each telephone in the system is lit, except on the station being called. The indicator on the called station flashes until the handset is lifted. The hold button indicators on all stations will then be lit. The intercom link is cleared when one party replaces the handset.

**6.24** The second intercom link is enabled by strapping the interface PCB. With the second intercom link enabled, use of the fifth CO/PBX line is forfeited. The indicator for the second intercom link appears under the fifth CO/PBX line button. If the first intercom link is in use, but is not in the handsfree mode, the system will automatically select the second intercom link for a second intercom call. When the first intercom link is operating in the handsfree mode, the second intercom link cannot be accessed and returns busy tone.

*Note:* There is no time-out period for handsfree conversations. Although these calls disable the second intercom link, they may continue for extended periods of time.

TABLE D  
TOLL RESTRICTION CLASSES

CLASS	RESTRICTS	ALLOWS
A	No restrictions	All calls allowed
B	All 0+ calls. Toll calls outside home area code.  (See notes 1 and 2.)	$\begin{array}{c} 1 \\ \downarrow \\ 11, \quad 1 + \downarrow 11 \\ 9 \qquad \qquad 9 \end{array} \quad (\text{See note 1.})$ <p>800 +, 1 + 800 +</p> $\begin{array}{c} 1 \ 2 \ 0 \\ \downarrow \downarrow \downarrow \\ 9 \ 9 \ 9 \end{array} +, \quad 1 + \begin{array}{c} 1 \ 2 \ 0 \\ \downarrow \downarrow \downarrow \\ 9 \ 9 \ 9 \end{array} +$ <p>(See note 2.)</p>
C	All 0+ calls. Toll Calls Local CO calls.  (See note 3.)	$\begin{array}{c} 1 \\ \downarrow \\ 11, \quad 1 + \downarrow 11 \\ 9 \qquad \qquad 9 \end{array} \quad (\text{See note 1.})$ <p>800 +, 1 + 800 +</p>

## NOTES:

- Classes B and C allow calls to INWATS (800) and to CO service numbers (911, 1 + 411, etc.).
- Class B allows calls where the first digit is 1, 2, 3, 4, 5, 6, 7, 8, or 9, the second digit is 2, 3, 4, 5, 6, 7, 8, or 9 and the third digit is any number. In most areas of the USA, this means that area codes are denied and CO prefixes are allowed. However, in locales that use CO prefixes with 1 or 0 as the center digit, calls to those COs will be denied. Class B also allows calls to all prefixes without 1 or 0 as the center digit. Therefore, some toll calls will be allowed by class B if there is a CO within the home area code that is not an EAS (free) call.
- Class C denies all trunk calls (including local) except those listed in note 1 above.

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**B. Alternate Answering Position**

**6.25** An intercom call may be answered at an alternate station by lifting the handset and depressing the PRRL button. Handsfree answer-back is not allowed at the alternate answering station.

**MICROPHONE OFF**

**6.26** When using a telephone in the handsfree mode, depressing the DND/AC button inhibits the microphone circuit; the receive mode remains functional. When the DND/AC button is depressed, the button indicator is lit. Depressing the DND/AC button again returns to handsfree mode.

**MUSIC****A. Background Music**

**6.27** Any station in the system may receive background music if an external music source with a low impedance output is provided and proper

strapping is performed. The music volume at the station is controlled by the volume control thumb-wheel on the right side of the telephone. System music volume is controlled at the music source or by adjusting VR3 on the voice switch/tone PCB. Background music ceases when a call is initiated or received or when the DND/AC button is depressed. Music is restored when the call is completed and the handset is replaced. Background music may also be inhibited at a station by (1) lifting the handset, (2) depressing the hold button, and (3) replacing the handset. To restore background music to a station, (1) lift the handset, (2) depress the hold button, and (3) replace the handset.

**B. Music-On-Hold**

**6.28** Music-on-hold is supplied either by the system, in the form of two different synthesized music tunes, or by an external music source. The system may also be arranged for no music-on-hold. The music source is selected by strapping the interface PCB. Music-on-hold is received at any station placed on hold. External music volume is controlled at the source or by adjusting VR1 on the interface PCB.



*Note:* The external music source may provide music for both background music and music-on-hold or two separate music sources may be used.

**PAGING (EXTERNAL)**

**6.29** External paging is available when the interface (I/F) PCB is properly strapped and a paging amplifier is connected at the KSU connecting block. Paging is accessed by depressing the DSS button for the sixteenth station. When paging access is successful, a double confirmation tone is heard and a double alerting tone is heard through paging equipment speakers.

**POWER FAIL OPERATIONS**

**A. Automatic Extension Transfer**

**6.30** The EKS-701 has built-in power failure transfer. When power to the system fails, all calls in process are dropped. One station is assigned as the power fail station for each CO/PBX line according to appearance on the KSU connecting blocks. When power fails, the CO/PBX lines automatically bypass the system and connect directly to the power fail stations.

**6.31** CO/PBX calls may be answered or initiated at power fail stations; however, lamp indications are disabled. An external ringer may be installed

at pins provided on the KSU connecting block, or a dedicated, single-line telephone may also be connected to the KSU block for power fail instead of a ringer.

**B. Automatic Restart**

**6.32** An automatic restart is built into the system which restarts all operations when power is restored. All active calls on power fail circuitry are dropped when power is restored.

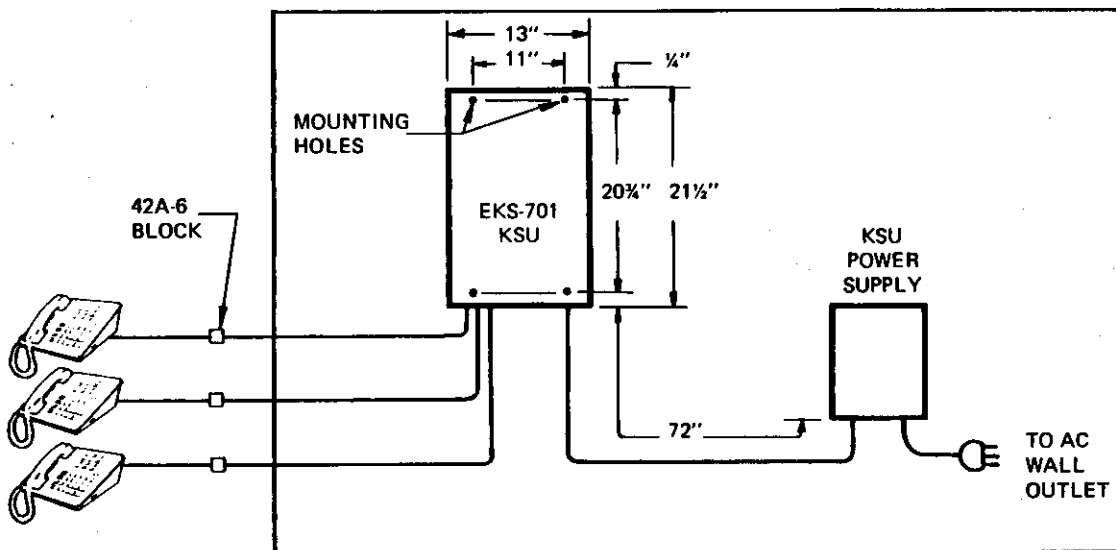
**7. INSTALLATION**

**ENVIRONMENTAL REQUIREMENTS**

**7.01** For proper system operation, the temperature of the equipment room should be maintained between -10 °C (-14 °F) and 55 °C (131 °F) with a maximum relative humidity of 95 % at 35 °C (95 °F). For storage purposes, the temperature should be maintained between -40 °C (-40 °F) and 70 °C (158 °F) with a maximum relative humidity of 95 % at 35 °C (95 °F).

**SITE PLANNING**

**7.02** The following items must be considered before installation of the EKS-701 begins: (Refer to Figure 3.)



NOTE: Depth of KSU with cover is 9 1/4 inches.

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Figure 3: Typical Installation

- (a) The length of the power cord must be considered and the power supply must be located within cord length of a 110 VAC wall service outlet. The AC outlet should not be controlled by an external switch that could be accidentally turned off. It is recommended the AC outlet be on an isolated circuit.
- (b) Sufficient space must be provided to accommodate the dimensions of the KSU, and a backboard or substantial wall must be available for mounting the KSU.
- (c) Access to earth ground must be provided.
- (d) Quantity and location of the telephones must be identified to determine the location of mounting blocks and cable requirements.
- (e) Future system requirements must be considered to allow for expansion.
- (f) Easy access to the system for servicing must be provided.

**7.03** The following locations are to be avoided as installation sites:

- (a) Near heat or steam producing equipment.
- (b) In an extremely dusty atmosphere.
- (c) Areas with extremes of temperature and humidity.
- (d) Near a passageway or aisle used for moving machinery or vehicles.
- (e) Near a reproduction or copying machine or in the vicinity of strong magnetic or RF (radio-frequency) fields.

### **KSU AND POWER SUPPLY**

**7.04** Remove the KSU from the shipping carton. Place it with the cover up on a level work surface. Loosen the knobs holding the cover in place. Lift the cover and set it aside. Inspect the KSU and remove any packing material. The PCBs are shipped installed in the KSU; check to see that all of the PCBs are securely in place.

*Caution: The EKS-701 contains static sensitive components. Personnel who may be required to handle PCBs or wiring must have knowledge of proper handling techniques and have safeguard equipment necessary for protecting static sensitive devices.*

**7.05** Mount the power supply. Plug the power supply cord into the AC outlet. Using a voltmeter connected to the output terminals, check to ensure that the output voltage is 22 to 26 VDC. (See Table B.) Unplug the power supply.

*Warning: Hazardous voltages may be present and exposed on the power supply. Exercise caution to avoid the possibility of electric shock.*

**7.06** Mount the KSU on the wall using four bolts or screws. Refer to Figure 3 for the location of the mounting holes and dimensions of the cabinet. Install the key system ground by connecting a 14-gauge copper wire between the ground screw (CO GND) and earth ground. (See Figure 2.)

*Caution: To avoid damage to PCBs, unplug the power supply before removing or reinstalling a PCB, before making new station connections, and before work is performed on existing station connections.*

**7.07** Remove all PCBs (except the DC/DC converter) from the KSU. Connect the power cord, installed inside the KSU, to the power supply as shown in Figure 4. Ensure the cord is connected with the proper polarity. Plug the power supply cord into the AC outlet and check for any blown fuses. At the DC/DC converter, check that voltage levels agree with those labeled on the connector.

**7.08** Unplug the power supply cord at the AC outlet. At the KSU, insert the PCBs into the board connectors. Plug the power supply cord into the AC outlet and again check for any blown fuses. Unplug the power supply cord.

### **INDIVIDUAL TELEPHONES**

**7.09** Ensure that all wiring connections to the system are properly made. Test the system after each connection is made to reduce troubleshooting problems once system installation is complete. This is accomplished after making the

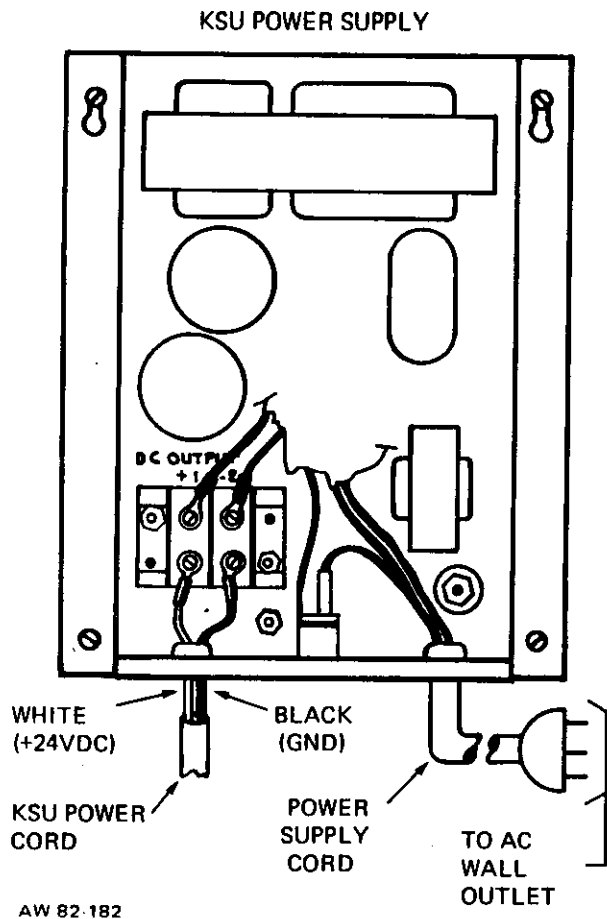


Figure 4: Typical KSU Power Cord Connections

required connections by (1) supplying power to the system, (2) checking to see that all is working properly, (3) unplugging the power supply, and (4) proceeding to the next connection step.

**7.10** A type 42A-6 (or equivalent) modular station connecting block should be mounted on the wall near the planned location of each telephone. The telephones are connected to the modular station connecting blocks by plugging the modular line cord of the telephone into the connecting block jack.

**7.11** Use 3-pair cable to connect the modular station connecting blocks to the KSU connecting blocks. (Refer to Figure 5 for a layout of the KSU connecting blocks.) Route all cabling through the hole in the bottom of the KSU frame. Connect one end of each 3-pair cable to the KSU blocks for each station as shown in Figure 6. Connect the other end of each 3-pair cable to the modular station connecting block of the corresponding station as shown in Figure 6.

**7.12** Note that only fifteen DSS buttons appear on a telephone although sixteen stations are possible. The DSS button for a station does not appear on the telephone at that station. When the designation tabs (provided with each telephone) are placed on each telephone, the station number is to be omitted from its own telephone. This may cause a station number to appear on a different button location on different telephones, but permits the same station number to be used to signal a station from any telephone. Therefore, the number of a station remains the same regardless of the position its button holds on the telephone. (See Figure 7.) The name or initials of the station user may be placed on the designation tabs to help identify the desired station button. Designation tabs are installed by (1) lifting the plastic cover from the button, (2) inserting the designation tab inside the cover, and (3) placing the cover back on the button. Depress the button to ensure that the cover is correctly positioned.

#### CO/PBX LINE CONNECTIONS

**7.13** Connect the CO/PBX lines to KSU connecting block TA as shown in Figure 8; note that each pair of wires is made up of CO tip and CO ring. Supply power to the system and verify the basic CO/PBX line operation of the EKS-701. Unplug the power supply before proceeding with additional wiring.

#### EXTERNAL EQUIPMENT CONNECTIONS

**7.14** Install external equipment such as external paging equipment, alarm sensors, or external music source and connect it to the KSU connecting block at the terminals provided. (See Figure 9.) Input impedance for an external music source or external paging equipment is 600 ohms.

##### A. Paging Equipment

**7.15** Two pairs of pins are located on the KSU connecting block for connecting external paging equipment. (See Figure 9). One pair of pins is used in a system with one 8-station PCB; the other pair of pins is used in a system with two 8-station PCBs. When using only one 8-station PCB, do not install a telephone at the eighth station circuit; when using two 8-station PCBs, do not install a telephone at the sixteenth station circuit.

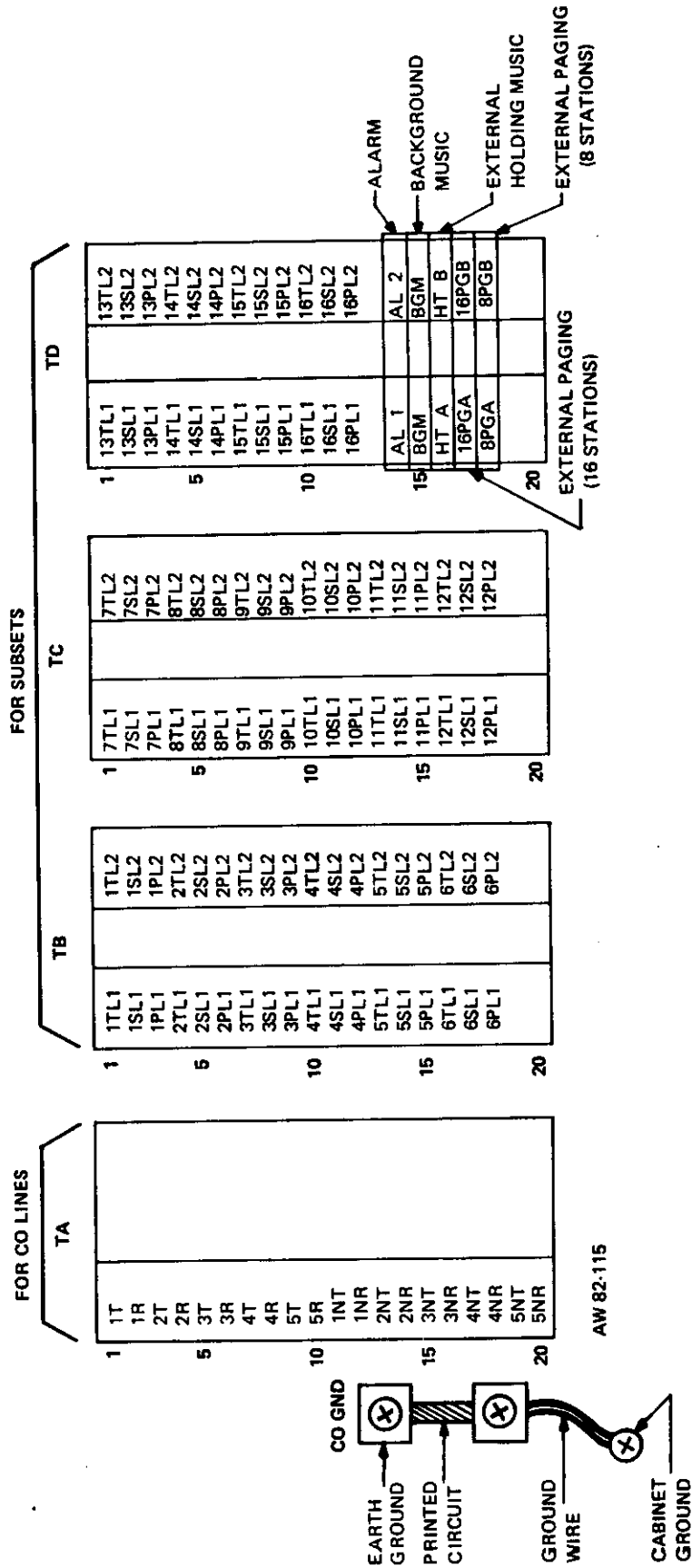


Figure 5: KSU Connecting Blocks

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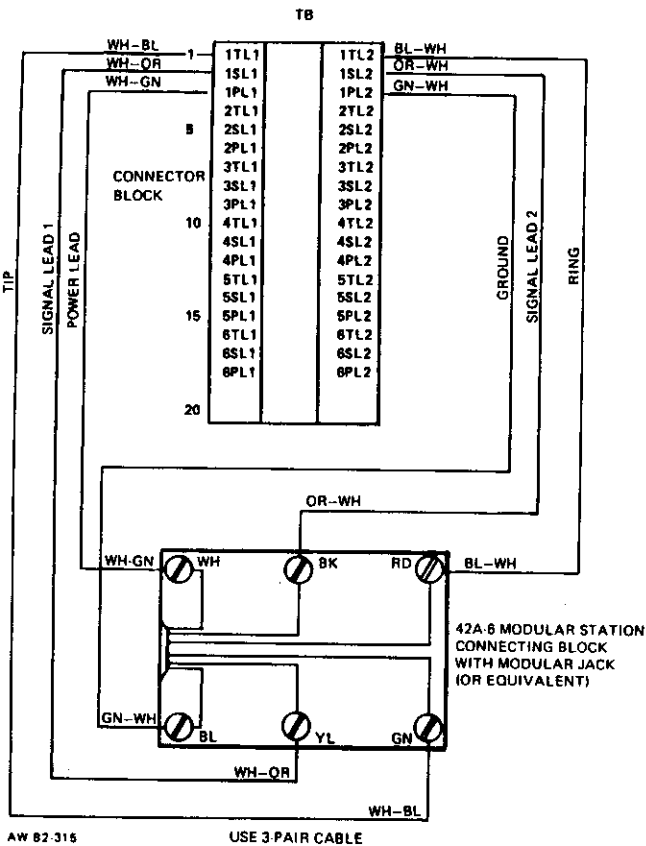


Figure 6: Typical Station Wiring

HOLD	CO 1	CO 2	CO 3	CO 4	CO 5
PRRL	1	2	3	4	5
SPK	7	8	9	10	11
DND/AC	12	13	14	15	16

BUTTON DESIGNATIONS FOR STATION NUMBER 6

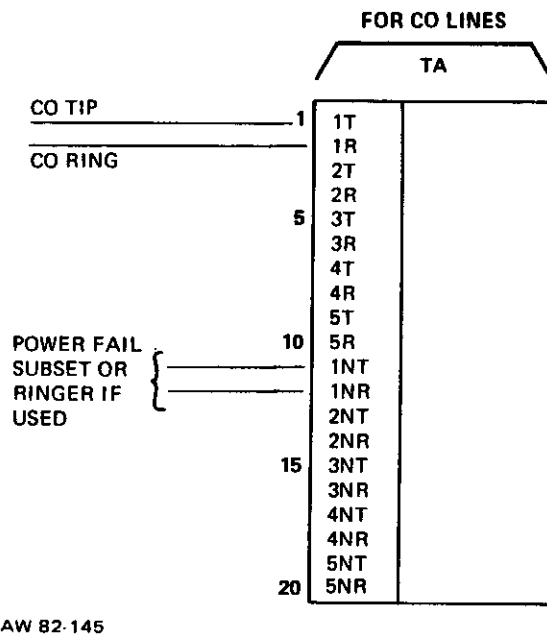
HOLD	CO 1	CO 2	CO 3	CO 4	CO 5
PRRL	1	3	4	5	6
SPK	7	8	9	10	11
DND/AC	12	13	14	15	16

BUTTON DESIGNATIONS FOR STATION NUMBER 2

NOTE: Notice that the DSS button for station 3 is in a different location for two stations but the SAME NUMBER (3) has been assigned to the third station. To signal the third station, depress the DSS button labeled 3. Note also that a DSS button does not appear for each telephone's own station number.

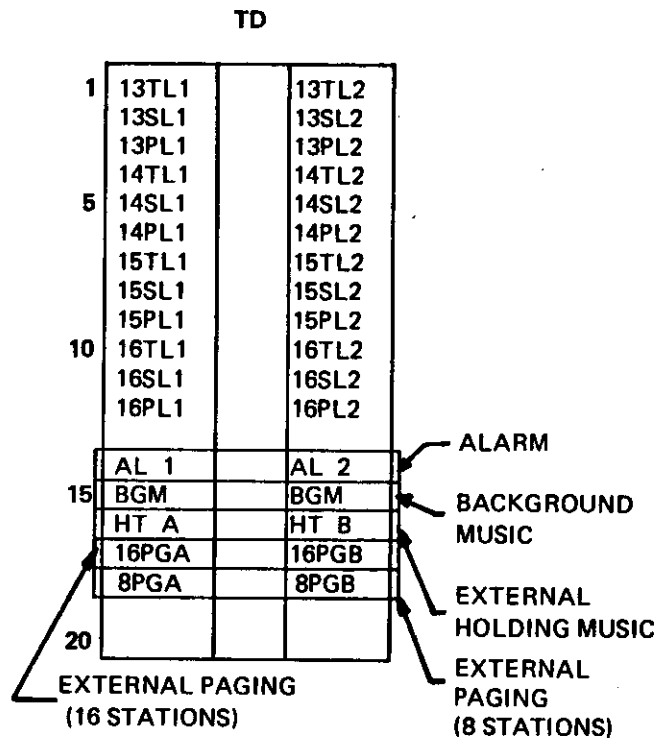
AW 82-144

Figure 7: Typical Button Designations on Telephones



AW 82-145

Figure 8: CO/PBX Line Connections



AW 82-146

Figure 9: External Equipment Connections

## B. Music-On-Hold Equipment

7.16 An external music source may be connected to the KSU connecting block as shown in Figure 9. Input impedance for the external music source is 600 ohms.

## C. Sensors

7.17 An external sensor may be connected to the KSU connecting block at terminals AL1 and AL2.

## 8. STRAPPING INFORMATION

8.01 Strapping must be performed on the PCBs to enable the desired features at each station. Miniature shorting clips are provided with the KSU and are used to short the required pins. Available strapping options are listed in Table E. If the system contains level AR3 software, strapping in addition to that listed in Table E must be performed to enable off-hook ringing. This additional strapping is described in paragraph 8.15.

### A. 8-Station PCB

8.02 The 8-station PCB strapping pins are used to enable incoming call alerting signals, background music, alarm, and toll restriction for eight stations. The PCB is factory strapped for the incoming call alerting signal and class A toll restriction at each station. Strap the desired options for each station on the 8-station PCB as follows: (Refer to Figure 10 for the location of strapping pins on the PCB.)

- (a) For incoming call alerting signal, strap together pins 1 and 2 on the appropriate CN strapping block.
- (b) For background music, strap together pins 3 and 4 on the appropriate CN strapping block.

*Note:* After installing shorting clip, momentarily remove handset from cradle to enable background music.

- (c) To receive an external alarm signal, strap together pins 5 and 6 on the appropriate CN strapping block.

*Note:* Alarm signal also requires strapping on the interface (I/F) PCB.

- (d) For class A toll restriction, pins 7 and 8 and pins 9 and 10 on the appropriate CN strapping block remain open.

- (e) For class B toll restriction, strap together pins 9 and 10 on the appropriate CN strapping block. (Pins 7 and 8 on the CN strapping block are open.)

- (f) For class C toll restriction, strap together pins 7 and 8 and strap together pins 9 and 10 on the appropriate CN strapping block.

*Note:* Toll restriction also requires strapping on the toll restriction PCB.

- (g) Refer to paragraph 8.15 for additional strapping instructions for systems containing level AR3 software.

### B. Interface (I/F) PCB

8.03 The interface (I/F) PCB strapping pins are for enabling hold recall, selecting a second intercom link, enabling external paging, selecting held party disconnect timing, selecting the type of alarm start, selecting the source of music-on-hold, and selecting the internal music-on-hold tune. Referring to Figure 11 for the location of strapping pins, strap the PCB as follows:

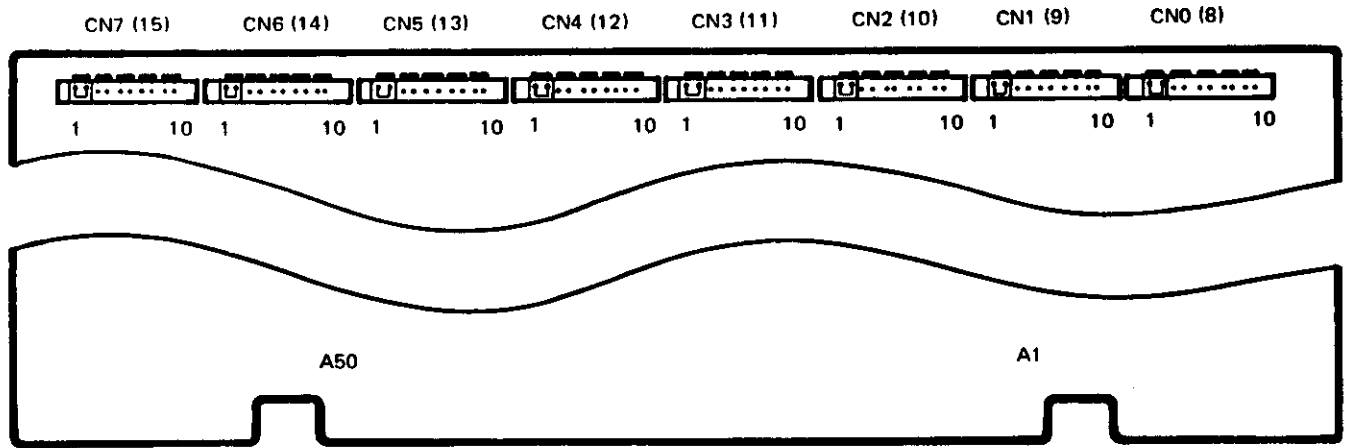
- (a) Hold recall is enabled by strapping on the TM strapping block. If automatic hold recall is desired after 120 seconds, pins 1 and 2 remain open. (This is factory strapping.) Hold recall is disabled by strapping together pins 1 and 2.
- (b) A second intercom link is selected by strapping together pins 3 and 4 on the TM strapping block.
- (c) For external paging, strap together pins 1 and 2 on the NM strapping block.
- (d) Held party disconnect timing is selected by strapping the NM strapping block. With pins 3 and 4 open, the timing selection is 420 ms to 560 ms. With pins 3 and 4 strapped together, the timing selection is 180 ms to 280 ms. Should a CO/PBX party that has been placed on hold hang up before a station user in the EKS-701 system returns to the held line, the line will disconnect only if an open circuit (rather than a reversal of battery and ground) is provided from the CO or PBX for a period of time exceeding that selected by strapping (either 560 ms or 280 ms).

TABLE E  
STRAPPING OPTIONS

FEATURE	STRAPPING OPERATION	PCB	
Receive Alerting Signal for Incoming CO/PBX Calls	CN 1-2 (Shorted)*	8-Station PCB	
Receive Background Music	CN 3-4 (Shorted)		
Receive External Alarm Signal	CN 5-6 (Shorted)		
Toll Restriction Class A Class B Class C	CN 7-8, 9-10 (Both Open)* CN 7-8 (Open), 9-10 (Shorted) CN 7-8 (Shorted), 9-10 (Shorted)		NOTE: Toll Restriction requires that strapping operations also be performed on the toll restriction boards.
Enable Hold Recall After 120 Sec. Disable Hold Recall	TM 1-2 (Open)* TM 1-2 (Shorted)	Interface PCB	
Enable Second Intercom Path	TM 3-4 (Shorted)		
Enable External Paging	NM 1-2 (Shorted)		
Held Party Disconnect Timing 420 ms-560 ms 180 ms-280 ms	NM 3-4 (Open)* NM 3-4 (Shorted)		
Alarm Sensor Contact Type Break type (Normally closed) Make type (Normally open)	AL 1-2 (Shorted) AL 2-3 (Shorted)		
Source of Holding Music External Internal No Music	SS 1-2 (Shorted) SS 3-4 (Shorted)* SS 5-6 (Shorted)		
Internal Holding Music Tune 1 Tune 2	MS 1-2 (Shorted) MS 2-3 (Shorted)*		
Enable Do Not Disturb Disable Do Not Disturb	DNF 1-2 (Shorted)* DNF 2-3 (Shorted)		Telephone PCB
Toll Restriction (not behind PBX) Toll Restriction (behind PBX with one access digit) Toll Restriction (behind PBX with two different access digits)	No Strapping Required  Strap TK1 pins 3-4 and set DSW1 Strap TK1 pins 5-6 and set DSW1 and DSW2		Toll Restriction PCB

\*Factory Strapping

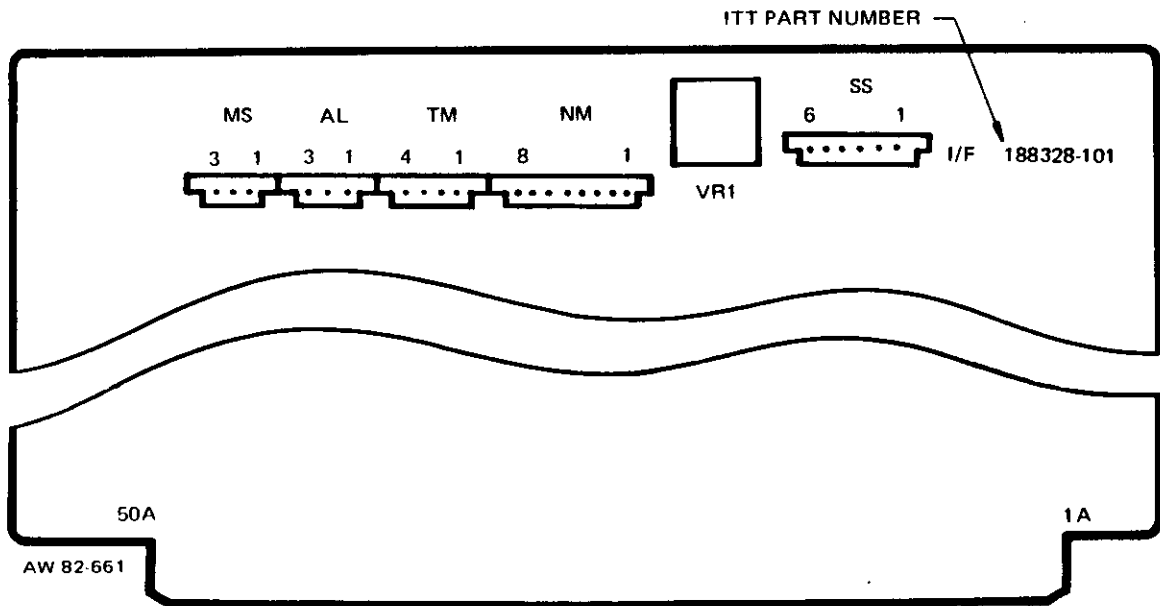
AW 82 221



NOTE: Since this PCB may be used for either the first or second group of eight stations, two number designations appear for each station's CN strapping block. CN 0 through CN 7 correspond to the first eight stations (1 through 8). CN 8 through CN 15 corresponds to the last eight stations (9 through 16).

AW 82-662

Figure 10: Strapping Pin Locations on the 8-Station PCB



AW 82-661

Figure 11: Strapping Pin Locations on the Interface (I/F) PCB



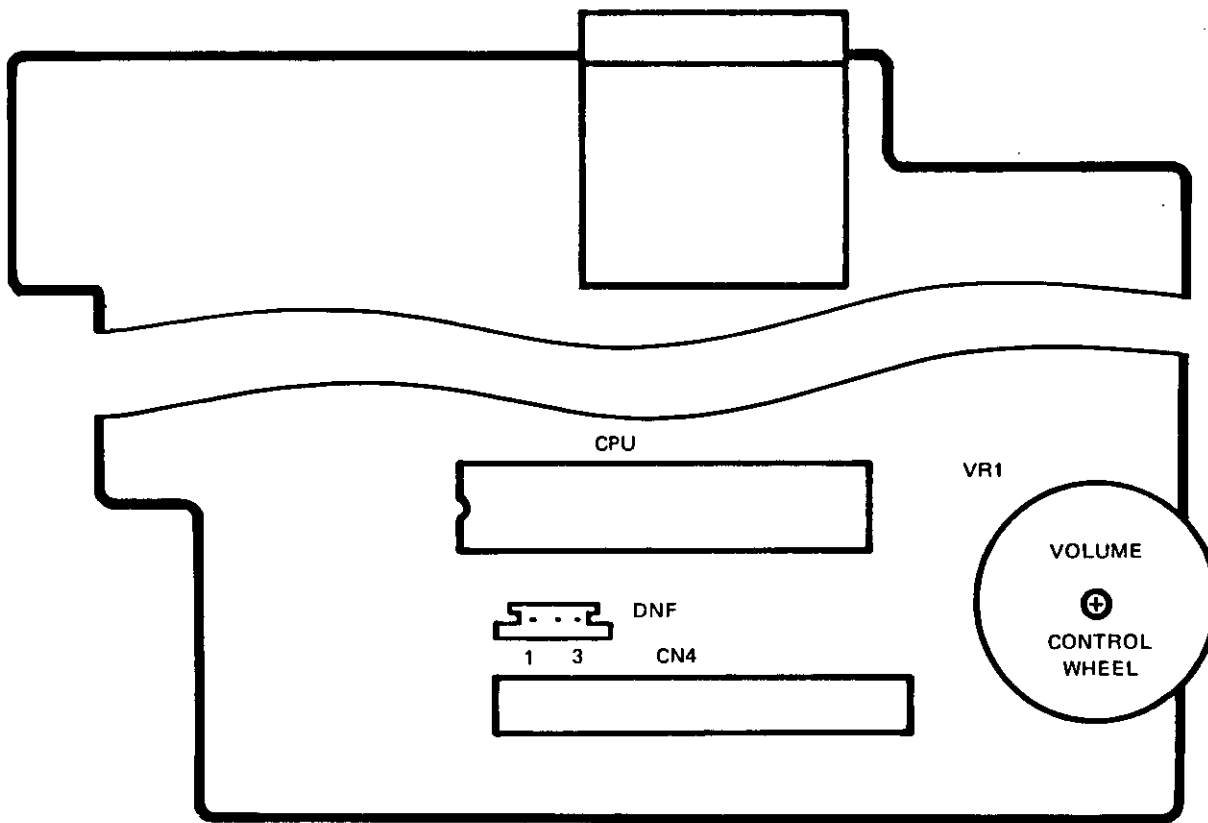
- (e) The type of contact for the alarm start sensor is selected by strapping pins on the AL strapping block. For break-type (normally closed) contacts, strap together pins 1 and 2. For make-type (normally open) contacts, strap together pins 2 and 3.
- (f) External or internal source for music-on-hold is selected by strapping on the SS strapping block. For an external music source, strap together pins 1 and 2. For an internal music source, strap together pins 3 and 4. (This is factory strapping.) For no music on hold, strap together pins 5 and 6.
- (g) Internal music-on-hold is selected by strapping on the MS strapping block. For tune 1, strap together pins 1 and 2. For tune 2, strap together pins 2 and 3. (This is factory strapping.)
- (h) Refer to paragraph 8.15 for additional instructions for strapping systems equipped with level AR3 software.

**C. Telephone PCB**

**8.04** Each telephone contains a PCB with strapping pins for permitting or denying the Do Not Disturb feature. This strapping is performed on the DNF strapping block. (Refer to Figure 12 for the location of the strapping pins.) To permit the DND feature, strap together pins 1 and 2 on the DNF strapping block. (This is factory strapping.) To deny the DND feature, strap together pins 2 and 3 on the DNF strapping block.

**D. Central Processing Unit (CPU) PCB**

**8.05** The central processing unit (CPU) PCB is a plug-in central processing circuit. This PCB assembly contains a Z80 microprocessor, EPROM, and other circuitry necessary to process system data. A flashing indicator located on the edge of the PCB indicates the processor is functioning. This PCB also contains a manual reset switch that restarts all operations in the system when depressed. Several strapping pins located on the CPU



AW 82-663

Figure 12: Strapping Pin Locations on the Model 2701 Electronic Telephone PCB

PCB are used for special test purposes and are not normally used in the field. The EPROM software configuration level is checked by locating the stamped designation on the memory IC. (See Figure 13.)

**E. Toll Restriction PCBs**

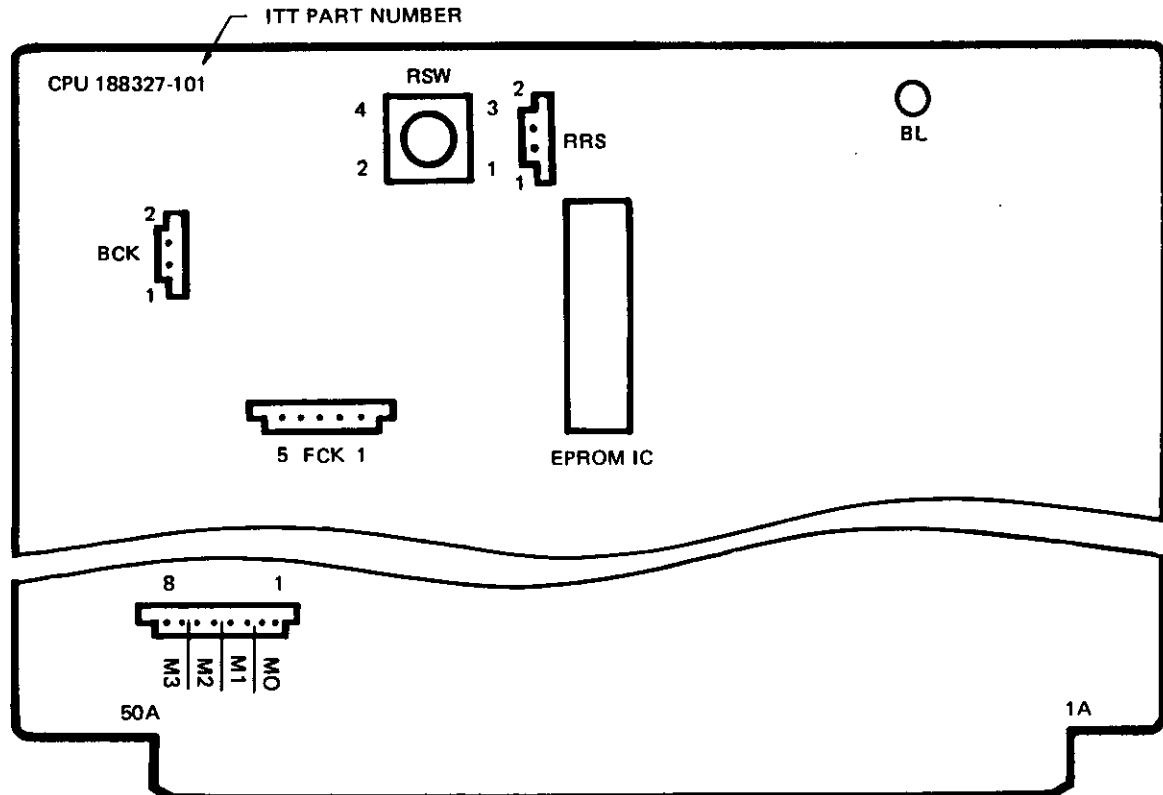
**8.06** Any one of three different toll restriction PCBs may be used in the EKS-701: (1) Tel-Pulse toll restriction PCB (dial pulse), (2) Tel-Touch 3-line toll restriction PCB (multifrequency), and (3) Tel-Touch 5-line toll restriction PCB (multifrequency). When a Tel-Pulse toll restriction PCB is used, only Tel-Pulse dialing is restricted; when a Tel-Touch toll restriction PCB (either 3 or 5-line) is used, only Tel-Touch dialing is restricted. A Tel-Touch, 3-line toll restriction PCB is used with a 3-CO/PBX line system. A Tel-Pulse, toll restriction PCB or a Tel-Touch, 5-line toll restriction PCB may be used with either a 3-CO/PBX line or 5-CO/PBX line system.

**8.07** Strapping for toll restriction is performed on the TK1 strapping block of the toll restriction PCBs. Strapping is the same for Tel-Pulse or Tel-Touch type PCBs; only one type PCB can be used in the system at one time. Toll restriction is assigned to a station and not to a CO/PBX line. Strapping for toll restriction varies depending on the use of the EKS-701 with or without PBX equipment.

**8.08** The toll restriction PCB monitors each number dialed at a station and verifies that the number is allowed. Therefore, toll restriction is dependent on 8-station PCB strapping as well as toll restriction PCB strapping. (See Figures 10 and 14.)

*Note:* Toll restriction does not operate during a power failure.

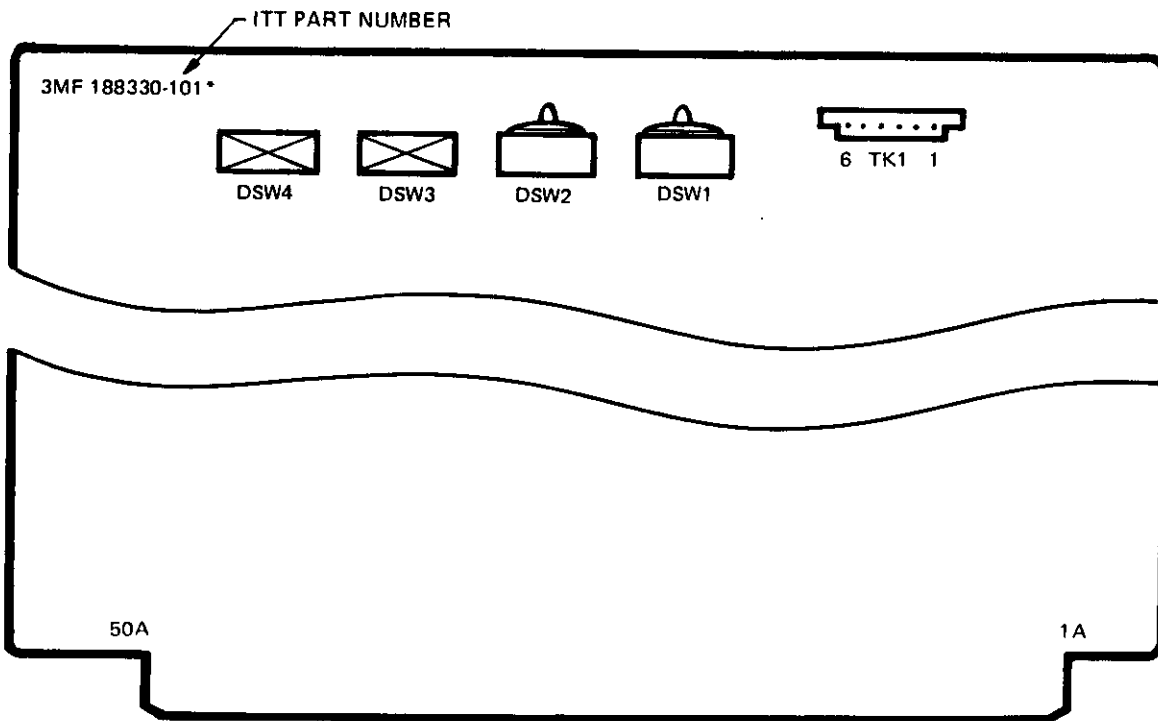
**8.09** Toll restriction is divided into three classifications of service: class A is for unrestricted dialing and allows any type of call to be completed; class B is used to restrict toll calls to an area code different from that of the dialing station, but allows local calls, CO service calls, calls to IN-WATS numbers, and toll calls in the home area



**NOTE:** Strapping Blocks RRS, BCK, and FCK are for factory test purposes only. No straps are to be installed on these blocks. Pins M0, M1, M2 and M3 are also for factory test purposes. These pins must not be strapped.

AW 82-664

**Figure 13: EPROM IC Location on the Central Processing Unit (CPU) PCB**



\*The ITT Part Number for a Tel-Touch 5-Line Toll Restriction PCB (5 MF) is 188331-101 and the ITT Part Number for a Tel-Pulse Toll Restriction PCB (DP) is 188332-101. The Tel-Touch 3-Line Toll Restriction PCB (3 MF) is shown as an example. The strapping operations are the same for each board.

AW 82-665

Figure 14: Strapping Pin Locations on the Toll Restriction PCB

code; and class C allows only CO service calls, internal (PBX) calls, and calls to INWATS numbers with all other calls denied. (See Figure 15 and Table D.)

**8.10** When the EKS-701 is not used behind PBX equipment and Class B toll restriction is desired, strap together pins 9 and 10 on the appropriate CN strapping block(s) of the 8-station PCB for each station to be restricted.

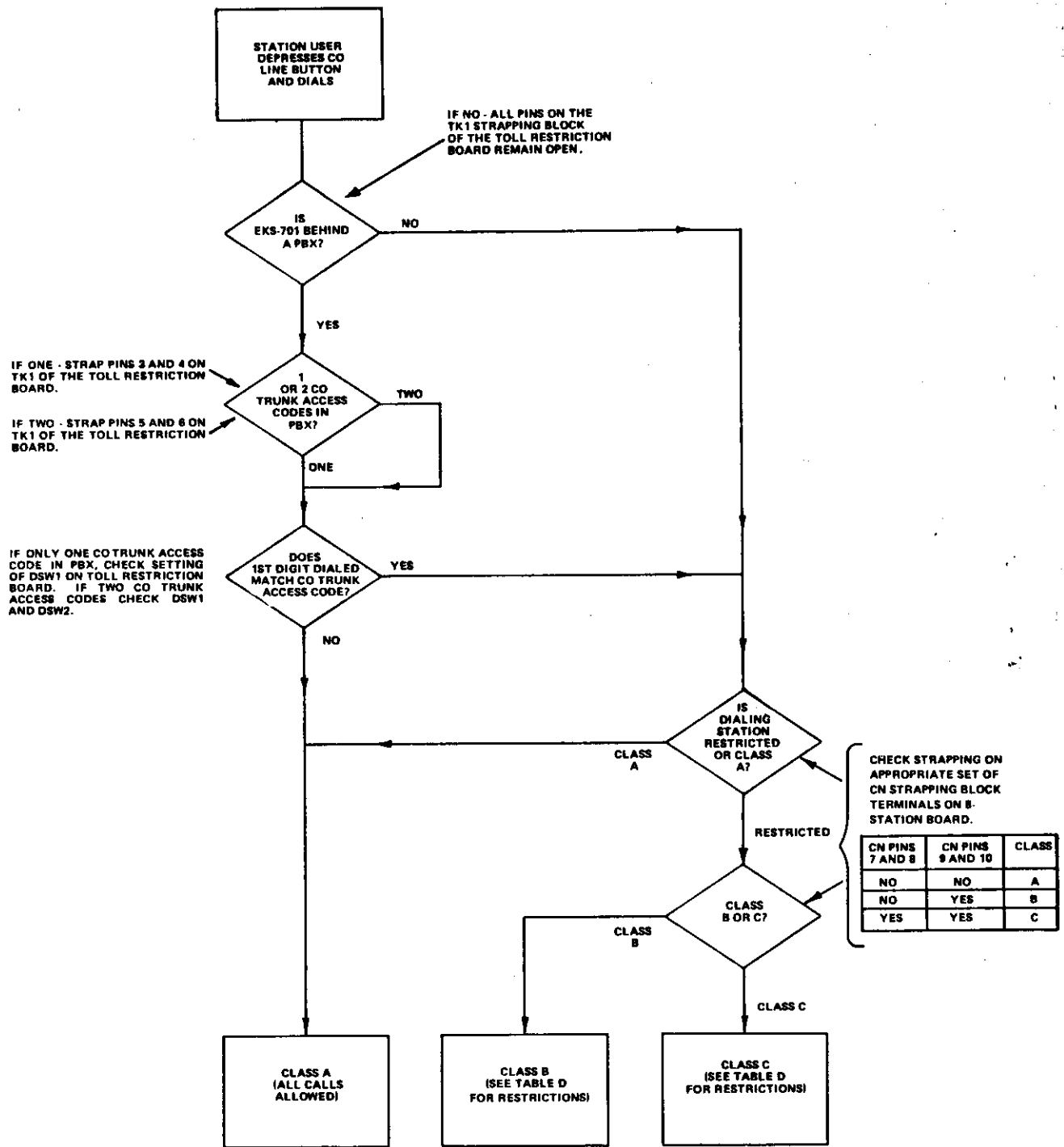
**8.11** When the EKS-701 is used behind PBX equipment and Class B toll restriction is desired, strap together pins 9 and 10 on the appropriate CN strapping block(s) of the 8-station PCB for each station to be restricted. If the PBX has one single-digit trunk access code to be monitored for toll restriction, strap together pins 3 and 4 on the TK1 strapping block and set rotary switch DSW1 to the access digit. (Example: If the digit 9 must be dialed in the PBX to access an outside line, set DSW1 to 9.) If the PBX has two different single-digit access codes to be monitored for toll restriction, strap together pins 5 and 6 on TK1 and leave pins 3 and 4 open. Set DSW1 to the first access digit and set DSW2 to the second access

digit. (Example: If the digits 9 and 8 must be dialed to access different outside lines, set DSW1 to 9 and DSW2 to 8.)

*Note:* Toll restriction of this type is designed to operate with PBX equipment requiring only single-digit access codes.

**8.12** When the EKS-701 is not used behind PBX equipment and Class C toll restriction is desired, strap together pins 7 and 8 and strap together pins 9 and 10 on the appropriate CN strapping block(s) of the 8-station PCB for each station to be restricted.

**8.13** When the EKS-701 is used behind PBX equipment and Class C toll restriction is desired, strap together pins 7 and 8 and strap together pins 9 and 10 on the appropriate CN strapping block(s) of the 8-station PCB for each station to be restricted. If the PBX has one single-digit trunk access code to be monitored for toll restriction, strap together pins 3 and 4 on the TK1 strapping block and set rotary switch DSW1 to the access digit. (Example: If the digit 9 must be dialed in the PBX to ac-



AW 82-213

Figure 15: EKS-701 Toll Restriction

cess an outside line, set DSW1 to 9.) If the PBX has two different single-digit access codes to be monitored for toll restriction, strap together pins 5 and 6 on TK1 and leave pins 3 and 4 open. Set DSW1 to the first access digit and set DSW2 to the second access digit. (Example: If the digits 9 and 8 must be dialed to access different outside lines, set DSW1 to 9 and set DSW2 to 8.)

*Note:* Toll restriction of this type is designed to operate with PBX equipment requiring only single-digit access codes.

**F. Voice Switch/Tone PCB**

**8.14** The voice switch/tone PCB provides the circuitry for handsfree answerback, tones internal to the system, background music interface, and external paging interface. The background music volume is adjusted using VR3 located on this board. VR2 may be adjusted to eliminate clipping occurring during call announcing. No strapping is required. (See Figure 16.)

**G. Off-Hook Ringing**

**8.15** When the EKS-701 KSU is equipped with a Central Processing Unit (CPU) PCB containing level AR3 software, strapping options may be

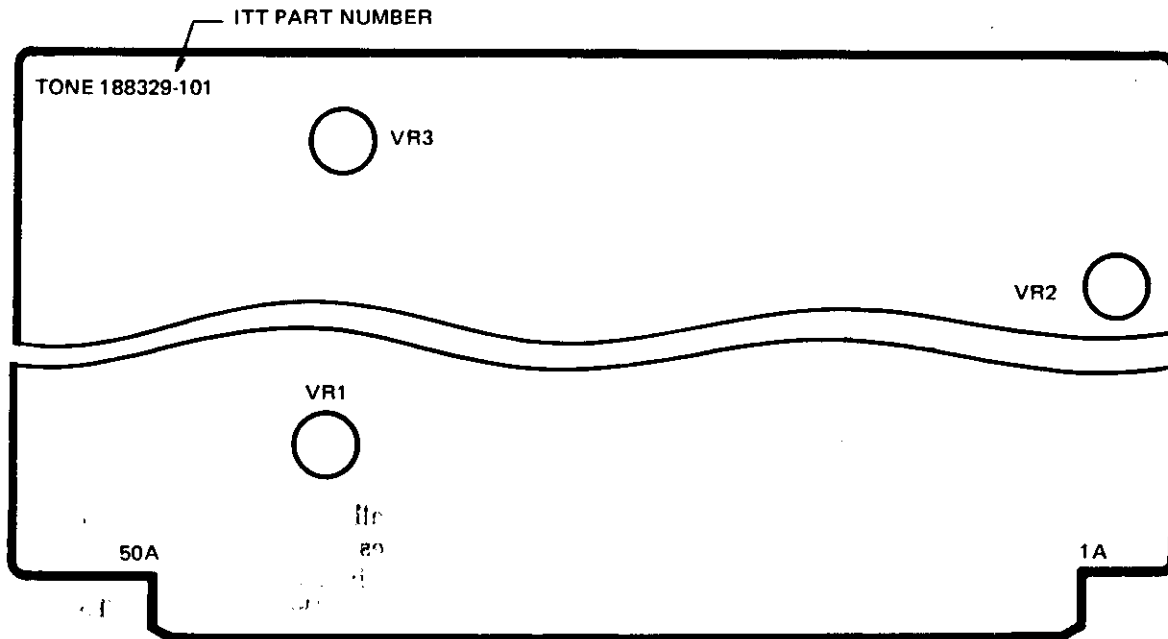
performed to permit off-hook stations to receive muted ringing when a CO line has an incoming call. Strapping is the same for systems containing level AR3 software and earlier systems except for additional strapping required to enable off-hook ringing.

**8.16** The EKS-701 KSU with level AR3 software is shipped with interface PCB NM strapping block pins 5 and 6 open. The 8-station PCB may be strapped for background music at each applicable station. Strapping together pins 5 and 6 of interface PCB NM strapping block makes background music available to all stations. The 8-station PCB may now be strapped for off-hook ringing at individual stations. Stations users that wish to inhibit background music may do so by (1) lifting the handset, (2) pressing the hold button, and (3) replacing the handset.

**8.17** To enable off-hook ringing proceed as follows: (See Table F.)

(a) *At the CPU PCB:* Check that EPROM software is at level AR3 by locating the stamped designation on the memory IC.

(b) *At the Interface PCB:* Strap together pins 5 and 6 of the NM strapping block. (See Figure 11.)



**NOTE:** VR3 may be adjusted to control background music volume to all stations.  
 VR2 may be adjusted to eliminate clipping during call announcing.  
 VR1 is factory adjusted; no field adjustments are to be made to this variable rheostat.

AW 82-666

**Figure 16: Variable Rheostat Locations on the Voice Switch/Tone PCB**

TABLE F

## ADDITIONAL STRAPPING OPTIONS WITH LEVEL AR3 SOFTWARE

FEATURE	STRAPPING OPTION	PCB
Pins 3 and 4 of the CN strapping block on the 8-Station PCB are used to enable or inhibit background music for each station.	NM 5-6 (OPEN)	Interface (I/F) PCB
Pins 3 and 4 of the CN strapping block on the 8-Station PCB are used to enable or inhibit off-hook ringing.	NM 5-6 (SHORTED)	
No background music.	CN 3-4 (OPEN)	8-Station PCB (With NM 5-6 OPEN)
Receive background music.	CN 3-4 (SHORTED)	
No off-hook ringing.	CN 3-4 (OPEN)	8-Station PCB (With NM 5-6 SHORTED)
Enable off-hook ringing.	CN 3-4 (SHORTED)	

NOTE: The strapping requirements for CN pins 3 and 4 on the 8-Station (PRV) PCB are determined by NM pins 5 and 6 on the Interface (I/F) PCB. Also, enabling off-hook ringing causes background music to be received by all stations.

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(c) *At the 8-station PCB:* Select stations to receive off-hook ringing by strapping together pins 3 and 4 of the associated CN strapping block. (See Figure 10.)

## 9. MAINTENANCE

### PCB HANDLING PRECAUTIONS

**Caution:** *The EKS-701 contains static sensitive components. Personnel who may be required to handle PCBs or wiring must have knowledge of proper handling techniques and have safeguard equipment necessary for protecting static sensitive devices.*

**9.01** The human body can easily accumulate high voltage static-electric charges. Precautions must be taken to prevent this charge from damaging static-sensitive components. The following are standard handling precautions for static-sensitive devices.

(a) Touch the equipment framework (or any similarly grounded item) to dissipate any stored charge immediately prior to removing, inserting, or otherwise handling a PCB.

(b) Hold the PCB by the edge and avoid touching component pins or edge connectors.

(c) Cover work surfaces with conductive material connected to earth ground. A ground clip connected to a static-protective shipping bag provides an adequately protected work surface.

(d) Use flexible ground straps attached to the wrist to continuously discharge static electricity.

(e) Store PCBs in static-protective bags.

(f) Unplug the power supply before removing or inserting a PCB.

**9.02** To install a PCB in the KSU, engage the edges of the PCB in the guides and push the PCB in all the way. Ensure that it is firmly seated in the connector. To remove a PCB, pull on the front edge of the board.

**9.03** Field repair of EKS-701 PCBs is not recommended and may void the warranty. If a PCB should fail, enclose it in a

static-protective bag and pack it securely in a carton. Enclose a description of the fault symptoms.

**9.04 Ship defective PCBs to:**

ITT Telecommunications Corporation  
 Fulton Drive  
 Corinth, Mississippi 38834

ATTN: Repair Department

**PREVENTIVE MAINTENANCE**

**9.05 Preventive maintenance on the EKS-701 consists of visual inspection and cleaning as required. The frequency of this type of maintenance can best be determined by the local installing company, taking into account the operating environment. Visually inspect all connections on the system to determine that they are well-seated and secure. Wires and cables should be sufficiently slack so that they do not pull free or break under vibration. Severe dust build-up on the PCBs can insulate the components and prevent effective convection cooling. A light film of dust will not impair efficiency and does not require cleaning. When cleaning is required, use a soft, long bristled brush to move the dust toward a vacuum cleaner intake. Do not insert a vacuum cleaner wand into the equipment; PCB components could be damaged.**

**FAULT DIAGNOSIS**

**9.06** When a fault is encountered during installation or reported by a system user, first determine the nature and extent of the fault according to the following categories.

(a) *System fault:* The fault is system wide and evident in all stations, i.e., the system is completely inoperative or a system feature such as conference calling cannot be accessed by any station.

(b) *Station fault:* The fault is localized to one station that is completely inoperative or allows only a limited number of system features to be accessed.

**9.07** Built-in maintenance aids will assist in diagnosing a fault. Table G, Maintenance Aids, lists the location and function of all switches, indicators, and fuses in the system.

**9.08** Once a fault has been categorized, refer to Table H for possible causes and corrective actions.

**9.09** Tables J and K list the proper audible and visual indications that are to be expected when testing the telephones.

TABLE G

MAINTENANCE AIDS

DEVICE TYPE	FUNCTION	PCB ASSEMBLY
Red Indicator	Flashing: CPU is operating properly. Off: Power failure or when reset switch is held in.	CPU PCB
RSW Pushbutton Switch	Manual Reset Switch: Resets all system operations.	
Red Indicator (one per line)	On: Line is in use. Flashing: Dialing is taking place (Tel-Pulse Only). Off: Line is not in use.	CO/PBX Line PCB
Standard Cylindrical Clear, Buss (3AG) Type Fuse	Main Fuse 3-CO/PBX, 2-CO/PBX Line PCB, Voice Switch/Tone PCB 8-Station PCB A, 8-Station PCB B Station Circuits 0 through 3 Station Circuits 4 through 7 Station Circuits 8 through 11 Station Circuits 12 through 15 All PCBs CPU PCB GND	Fuse Holder F1 (5A) F2 (2A) F3 (2A) F4 (2A) F5 (2A) F6 (2A) F7 (2A) F8 (2A) F9 (2A) F10 (2A)

TABLE H  
FAULT DIAGNOSIS

FAULT	INDICATION	PROBABLE CAUSE AND CORRECTIVE ACTION
System is completely inoperative.	Indicator on the CPU PCB is off.	<ul style="list-style-type: none"> <li>- No AC power to the power supply. Make sure the power supply cord is plugged in and KSU power cord is properly connected. Verify AC outlet.</li> <li>- No DC output from power supply. Verify DC voltage output. Check power supply fuse.</li> <li>- Faulty DC/DC converter PCB. Verify voltage outputs at DC/DC converter connectors.</li> <li>- Check system fuses.</li> <li>- Faulty CPU PCB. Replace PCB.</li> </ul>
Station is inoperative.	Indicators of station's telephone will not function.	<ul style="list-style-type: none"> <li>- Faulty line or handset cord. Replace cord.</li> <li>- Faulty telephone. Replace telephone.</li> <li>- Faulty cable or bad cable connections on KSU or 42A-6 blocks. Replace cable.</li> <li>- Check system fuses.</li> </ul>
System feature is inoperative at one station.	Indicator at station is off.	<ul style="list-style-type: none"> <li>- Improper strapping of PCBs. Verify proper strapping operations.</li> <li>- Improper station connections. Verify connections.</li> <li>- Check system fuses.</li> <li>- Replace telephone.</li> </ul>
System feature is inoperative at all stations.	Indicator at all stations is off.	<ul style="list-style-type: none"> <li>- Improper strapping of PCBs. Verify proper strapping operations.</li> <li>- Improper station connections. Verify station connections.</li> <li>- Check system fuses.</li> <li>- Damaged printed circuit board. Replace the PCB for that feature.</li> </ul>
Clipping is present during call announcing	Clipping sounds over speaker or broken transmission.	<ul style="list-style-type: none"> <li>- Adjust VR1 on the Voice Switch/Tone PCB.</li> <li>- Faulty telephone. Replace telephone.</li> <li>- Replace Voice Switch/Tone PCB.</li> </ul>



TABLE J  
AUDIBLE SIGNALS

TONE	INDICATION	EXPLANATION
Dial	Continuous Tone.	Line is clear, call may be dialed.
Busy	Tone is on, off, on, off.	The party you have dialed is busy with another call or is in the Do Not Disturb mode.
Ringback	Ring Tone American (RTA) 1 sec. on, 3 sec. off.	Signal that is given when a party is called.
Confirmation	Single Tone.  Double Tone.	Signal that is heard when a DSS button is depressed.  Signal that is heard when an All Call Announcing call or external page is made.
Alarm	Alternating high/low pitched signal.	Alarm sensor has been activated.
Hold Recall	Ring Tone American (RTA) 1 sec. on, 3 sec. off.	When a call is left on hold too long, station initiating hold will automatically ring.

TABLE K  
VISUAL INDICATIONS

CONDITION	INDICATION	EXPLANATION
Idle	Indicator off.	The line is free.
Busy	Indicator on.	Line is in use at another station.
Active (I-Use)	Indicator winks (on, off, on) twice rapidly every two seconds (30 IPM).	Indication at station that is using the line.
Calling	Indicator flashes on-off at regular intervals (60 IPM).	Incoming call on this line.
Hold (I-Hold)	Indicator winks (on, off, on) at regular intervals (120 IPM).	Indication at all stations except the station initiating hold.
Hold	Indicator winks rapidly (240 IPM)	Indication at station initiating hold.
Hold Recall	Indicator repeats, wink for 3 sec., on for 1 sec.	The call on the line has been on hold for too long. Station initiating hold automatically rings.

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