# MOD KEY 32

## Hardware Manual

Hardware Release 1

System Practice 01420 HWG01 Issue 1-1 August 21, 1987 This manual has been developed by TIE/communications, Inc. It is intended for the use of its customers and service personnel, and should be read in its entirety before attempting to install or program the system. Any comments or suggestions for improving this manual would be appreciated. Forward your remarks to:

TTE/communications, Inc. 8 Progress Drive Shelton, CT 06484

Attention: Manager, Technical Publications

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# MOD KEY 32

01420 HWG

## REVISION CONTROL

Revision	Date	Change								
1-0	- 15 July 87	. Preliminary hardware manual.								
1-1	· 21 August 87	Release 1 of Hardware Manual, corrected FCC number for Korean-made KSU. Added introductory material to manual.								
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This manual is divided into two sections:

SECTION 1 INTRODUCTION consists of a brief system description. instructions for completing the Order Sheet, and some general installation guidelines. Read this section first to get an overview of the system.

SECTION 2 INSTALLATION provides complete installation details. Read this section and you will learn how to select the installation site, install the system and connect various pieces of optional equipment.

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## MOD KEY 32

The new standard for American business.

A complete system with all the major features already built in.

Expandable to 32 extensions and 12 outside lines

## The System

The MOD KEY 32 (Figure 1-1) is a highly reliable, computerized telephone system that will improve office communications. All the features needed are already built into this complete telephone system. No expensive add-on equipment is necessary to have the sophistication of Handsfree Intercom, easy call processing and personal convenience.

A self-contained Key Service Unit (KSU) and two-pair wiring simplify installation, growth and change.

## The Telephones

Select from a variety of telephones and tailor a system to meet your needs.

The DELPHI 16 and BUSINESSCOM 16 telephones provide access to 6 outside lines and a variety of features with just the press of a button, with or without Speakerphone. The Executive Telephone adds the convenience of 10 keys for Direct Station Selection (DSS) or Speed Dialing. Use these keys also for a 10 extension Busy Lamp Field.

The DELPHI 32 and BUSINESSCOM 32 telephones enhance the system with one-button access to 12 outside lines.

The Line Access and Ringing feature permits any line to be programmed to appear on any or all telephones.

Program Private Lines, or assign WATS or special long-distance lines to selected extensions.

Introduction

#### The Features

Easy to use features provide efficient and cost-effective communications.

#### Busy Lamp Field

This feature shows at a glance which extensions are in use.

#### Conferencing

Three-way Conference calls are simple to make.

#### Last Number Redial

The telephone remembers the last number dialed. Dial it again at the press of a key.

## Loud Ringing

In noisy or remote areas, assign one or two extensions for loud ringing.

#### Multi-Path Intercom

Separate Intercom paths allow more than one Intercom conversation to take place simultaneously.

## Music on Hold and Background Music

Music lets callers know they have not been forgotten while placed on Hold. Background Music provides a pleasant working atmosphere.

#### Night Ringing

Don't miss important after-hours calls.

## Paging

Set up Page zones. Call groups of extensions, page throughout the building or even outside.

#### Save

Save a telephone number and redial it later with the press of a key.

#### Speakerphone/Handsfree (Optional)

Talk comfortably, without lifting the handset.

## Speed Dialing

Sclect and store up to 10 commonly called numbers at every extension. Store 89 additional numbers in memory for every user's access.

#### Transfer

Any extension can answer and easily Transfer calls.

1-3

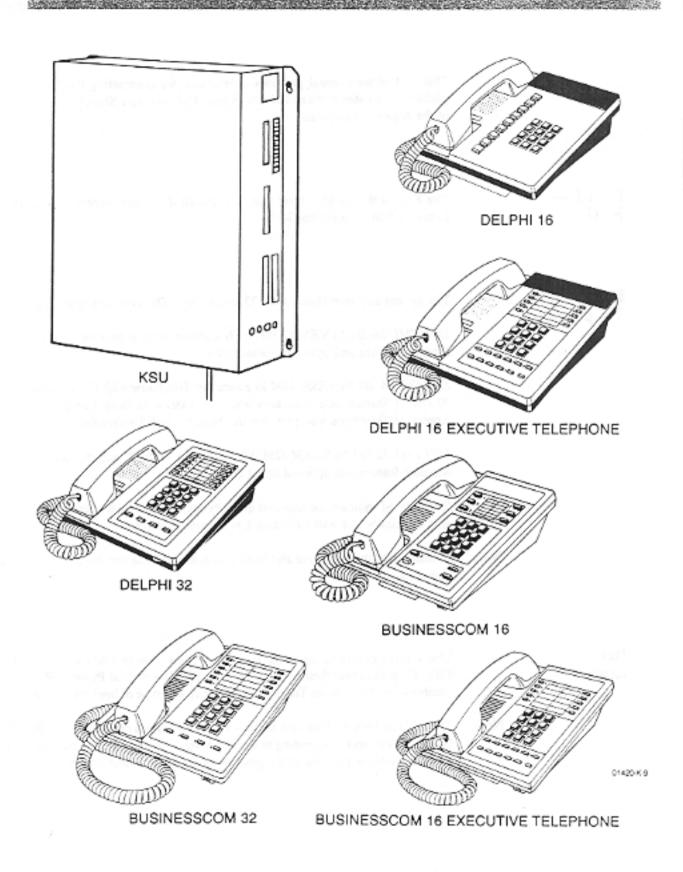


Figure 1-1 INTRODUCING THE MOD KEY 32

Introduction

## COMPLETING THE ORDER SHEET

This part of the manual provides instructions for completing the Order Sheet (Table 1-1), located at the end of this section. Use the Order Sheet to make a record of the required equipment.

## Item 1 — KSU

The KSU is the metal cabinet that contains all the system control components. Every system requires one KSU,

## Item 2 — Telephones

The system accommodates up to 32 telephones. The available types are:

DELPHI 16/BUSINESSCOM 16 Telephone with 6 outside line keys, the Monitor feature and optional Speakerphone.

DELPHI 16/BUSINESSCOM 16 Executive Telephone with 6 outside line keys, 10 Direct Station Selection keys and a 10 extension Busy Lamp Field. The Executive Telephone also provides the Monitor and Speakerphone features.

DELPHI 32/BUSINESSCOM 32 Telephone with 12 outside line keys, the Monitor feature and optional Speakerphone.

On Table 1-1 indicate the required quantity and style of each telephone. Indicate also the number of wall mounting kits the site requires.

#### Note:

In addition to the telephone and handset, each telephone box contains a modular line cord.

## Item 3 — Lines

The system connects up to 12 loop-start lines. These lines can be CO or PBX/Centrex, Dual Tone Multifrequency (DTMF) or Dial Pulse (DP), in any combination. Indicate on Table 1-1 the quantity and type of lines the site requires.

#### Note:

The telco or PBX provides the lines in a type 57, 50-pin connector (the RJ21X). Order this connector according to the line assignments in Table 2-3 (page 2-34). Always maintain a record of the position of the lines in this connector.

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## Item 4 — Installation Equipment

## 66M1-50 Connecting Blocks

The 66M1-50 blocks provide the connection point between the system KSU and the cable for each extension. Order the blocks as follows:

Number of Extensions	66M1-50 Blocks Required
1-12	1
13-24	2
25-32	3

(See Note!)

Indicate on Table 1-1 the number of 66M1-50 connecting blocks the site requires. Order 50 bridging clips for each block.

Order an additional connecting block (called a CO block) if the site requires Power Failure Cut-Through telephones. The CO block should include a type 57 female connector for the telco RJ21X. Specify type 66M1-50R or 66M3-50R. Order bridging clips for this block also (30 minimum).

Note: Install the CO block only if you are an FCC certified installer.

#### 25-Pair Cable

Each 66M1-50 block requires a 25-pair cable to connect to the KSU. For an extension block, the cable has a type 57 female connector on one end and unterminated conductors on the other. For the CO block, the cable has a male type 57 connector on one end and free conductors on the other. If the site does not require a CO block, order a 25-pair cable with a type 57 female connector on one end and a type 57 male connector on the other.

#### Station Cable

Two-pair twisted station cable connects the telephones to the 66M1-50 connecting blocks. Estimate the quantity of station cable the site requires and enter the amount on Table 1-1. Review page 2-2, Station Cable Requirements, before ordering the cable.

#### Modular Jacks

Order one 625 type modular jack for each telephone. Make sure that the jacks ordered use screw type terminals, not push-on type terminals.

Introduction

Also order this block if the site requires External Page and/or Door Chime Boxes.

## Item 4 — Installation Equipment (Continued)

#### Ground Wire

The third wire in the KSU AC power cord provides a suitable ground for most installations. If the site requires additional grounding, order 14 AWG ground wire (solid copper) to connect the KSU to a known earth ground. Make this wire as short as possible, but no longer than 25 feet (7.6 meters).

## Surge Protector

For protection against power line transients, order a power line surge protector. Refer to page 2-8 for a list of recommended types.

## Item 5 — Optional Equipment

#### Common Audible Loud Bell

The system provides relay contacts to control a customer-provided Common Audible Loud Bell. This bell is typically a DC Buzzer or ringer, powered by a customer-provided DC power supply. Indicate on Table 1-1 if the site requires a Common Audible Loud Bell.<sup>1</sup>

#### Loud Extension Bells

Use the same type of DC buzzer or ringer used for the common Audible Loud Bell for the Loud Extension Bells. The system provides relay contacts for two Loud Extension Bells. Indicate on Table 1-1 how many Loud Extension Bells the site requires.<sup>1</sup>

#### Power Failure Alarm

The system supplies relay contacts for connecting to customer-provided Power Failure Alarm equipment. Indicate on Table 1-1 if the site requires a Power Failure Alarm.

#### Music Source

Order a customer-provided music source if the installation requires Background Music and/or Music on Hold. This music source must provide a 10mW, 600 Ohm output signal. Indicate on Table 1-1 if the site requires this music source.

## External Paging Equipment

The system outputs two 600 Ohm paging ports for External Paging. These ports connect to customer-provided External Paging equipment. Indicate on Table 1-1 if the site requires External Paging Equipment.

Make sure the device requirements do not exceed the ratings of the system relay contacts (i.e., 100mA@24.V.DC).

Item 5 — Optional Equipment (Continued)

## Power Failure Cut-Through Telephones

The system provides connection for three customer-provided Power Failure telephones. Indicate on Table 1-1 how many of these telephones the site requires. Specify also if these telephones should be DTMF (2500 type) or DP (500 type). The type of line installed for lines 1, 2 and 3 determines the telephone type. Order one additional 625 type modular jack for each Power Failure Cut-Through telephone. Also order additional station cable.

#### Door Chime Boxes

The system provides for connection of Door Chime Boxes in place of the telephones at extension positions 31 and 32. Indicate on Table 1-1 how many Door Chime Boxes the site requires (up to two).

### SMDR Printer

The system provides a serial RS-232-C port and a parallel printer port for Station Message Detail Recording (SMDR). Indicate on Table 1-1 if the site requires a parallel or serial printer for SMDR.

#### SMDR Printer Cable

A serial printer connects to the system with a 25-pin RS-232-C cable. The serial cable end that plugs into the KSU must have a female, 25-pin subminiature connector. A parallel printer connects to the system with a standard parallel printer cable. The parallel cable end that plugs into the KSU must have a male, 25-pin subminiature connector. In either case, the requirements of the printer selected determines the connector on the printer cable end. Indicate on Table 1-1 the type of cable the selected printer requires.

Introduction

## Related System Documents

Following is a list of related system documents:

Description	Part Number
MOD KEY 32 Software Manual	. 01420SWG01
MOD KEY 32 Program Record Form	. 01420PRF01
MOD KEY 32 Feature Handbook	. 01420MBG01

## Site Requirements

Install the KSU in a clean, dry and secure location. Make sure the location is not accessible to unauthorized personnel. This location should meet the standards outlined in the Bell Functional Product Class Criteria of September, 1978, in publication PUB 48002. Refer to paragraph 3.4.3.2 (C), Indoors — With Environmental Control. This publication states:

Equipment intended for use in a controlled environment is exposed to temperatures between 40 degrees F (4 degrees C) and 100 degrees F (38 degrees C) and relative humidities between 5 percent and 95 percent. [If the temperature is] above 78 degrees F (26 degrees C), the maximum relative humidity may be limited to that corresponding to a specific humidity of 140 grains per pound of dry air (e.g., 49 percent relative humidity at 100 degrees F (38 degrees C)).

#### Note:

To maximize system life, maintain the same environmental conditions as for any sophisticated computer system.

Mount the KSU on the wall only. Provide ample room at the installation site for mounting the KSU and related equipment. Maintain at least 3 feet (91.5 cm) between the room ceiling and the top of the KSU. Always allow adequate space for air circulation. Install the equipment in an area free from static electricity (e.g., dry copiers) and excessive vibration (e.g., heavy machinery) and away from caustic chemicals and/or dampness.

Provide a dedicated three-wire 120 V AC, 60Hz, 15 amp circuit with a NEMA 5-15R receptacle for the KSU. You may connect a separate earth ground to the KSU, in addition to the third-wire ground in the AC circuit. Refer to Section 2 for grounding requirements. If installing optional equipment requiring 120 V AC, connect it to an AC circuit other than the dedicated AC line. This prevents transients from the optional equipment from coupling through the AC line into the system.

## FCC and Telco Requirements

The Federal Communications Commission (FCC) has established rules and regulations for the operation and installation of privately owned telephone equipment. According to Part 68 (Connection of Terminal Equipment to the Telephone Network) and its amendments, the FCC requires several actions before and during installation of customer-provided telephone equipment. The following paragraphs outline these actions.

## Notification to Telco

The operating telephone company may request the following information about the system:

(a) The particular lines used (telephone numbers xxx-xxxx through xxx-xxxx).

(b) Model: MOD KEY 32

Manufacturer: TIE/communications, Inc.

FCC Registration Numbers: BJ286G-16526-KF-E

BJ29QL-16896-KF-E

Ringer Equivalence: 0.4B Registered Jack: RJ21X

## FCC Approved Connectors

Connect this system to telephone company lines only with FCC approved plugs and jacks.

## Installation Training

TIE/communications, Inc., and its regional offices offers instruction for certified installation.

#### Incidence of Harm

If trouble occurs, the FCC requires the customer to disconnect the registered equipment from the telephone line. This allows the customer to determine if the equipment is malfunctioning. If the registered equipment is malfunctioning, stop using the equipment until you correct the problem.

The telephone company (telco) may temporarily stop service if the customerprovided equipment is causing harm to the telco network. When practical, the telco must notify the customer before temporarily stopping service. The telco must attempt to inform the customer before actually stopping service. The telco must also provide customers with an opportunity to correct the problem. In addition, the telco must advise customers of their right to bring complaint procedures before the FCC.

(continued)

## FCC and Telco Requirements (Continued)

## Radio Frequency Interference

### Warning:

This equipment generates, uses, and can radiate Radio Frequency Energy. If not used in accordance with the instruction manual, this equipment may cause interference to radio communications. It has been tested and complies with the limits for a Class A computing device according to Subpart J of Part 15 of FCC Rules. A Class A computing device provides reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference. If this occurs, the FCC requires that the user (at his own expense) take the measures required to correct the interference.

Determine if this equipment is causing interference to radio or television reception by turning the equipment off and on. If an interference problem exists, try the following to solve the problem:

- (a) Re-orient the receiving antenna.
- (b) Relocate the receiver with respect to the equipment.

The following booklet, prepared by the FCC, may be helpful:

How to Identify and Remove Radio-TV Interference Problems

Order this booklet from:

U.S. Government Printing Office Washington, D.C. 20402 (Stock No. 004-000-00345-4)

#### Radio Frequency Susceptibility

If you install the system in a strong radio frequency (RF) field, the field may affect proper system operation. The use of the proper installation and grounding procedures outlined in this manual will help to minimize the RF susceptibility.

## FCC and Telco Requirements (Continued)

## Hearing Aid Compatibility

FCC rules prohibit the use of non-hearing aid-compatible telephones in the following locations:

- a. Any public or semi-public location where coin-operated or credit card telephones may be found.
- Elevators, highways, and tunnels (automobile, subway, railroad, or pedestrian)
   where a person with impaired hearing might be isolated in an emergency.
- Places where telephones are installed specifically to alert emergency authorities (such as fire, police, or medical assistance personnel).
- d. Hospital rooms, residential health care facilities, convalescent homes and prisons, specifically where telephones are used for signaling life-threatening or emergency situations if alternative signaling methods are not available.
- e. Workstations for hearing-impaired personnel.
- f. Hotel, motel, apartment lobbies; in stores where telephones are used by patrons to order merchandise; in public transportation terminals where telephones are used to call taxis, or to reserve lodging or regual automobiles.
- g. Hotel and motel rooms. At least ten percent of the rooms must contain hearing aid-compatible telephones; or contain jacks for plug-in hearing aid-compatible telephones which will be provided to hearing-impaired customers upon request.

## Responsibility of Grantee

The FCC prohibits alteration or modification of this equipment not expressly shown in this manual. If the installer suspects equipment malfunction, he should disconnect the system from the telephone company lines by unplugging the RJ21 connector.

Introduction

## TABLE 1-1 ORDER SHEET

		Recurrents
	Part Number	Required Quantity
Item I—KSU		
MOD KEY 32 KSU	60070	
Item 2—Telephones (32 max.)		
DELPHI 16 Telephone	60030	
DELPHI 16 Telephone (with Speakerphone)		
DELPHI 16 Executive Telephone	60032	
DELPHI 32 Telephone	60080	
DELPHI 32 Telephone (with Speakerphone)		
DELPHI wall mounting kit	41643	
BUSINESSCOM 16 Telephone	60010(B)	
BUSINESSCOM 16 Telephone (with Speakerphone)	60011	
BUSINESSCOM 16 Executive Telephone	60007	
BUSINESSCOM 32 Telephone	60085	
BUSINESSCOM 32 Telephone (with Speakerphone)	60086	
BUSINESSCOM wall mounting kit	60049	•
Item 3—Lines (12 max.)		
Loop Start Lines		
DTMF CO Lines <sup>1</sup>		
DTMF PBX/CENTREX Lines <sup>1</sup>		
DP CO Lines <sup>1</sup>		
DP PBX/CENTREX Lines <sup>1</sup>		
Item 4—Installation Equipment		
66M1-50 Connecting Blocks1		
66M1-50R or 66M3-50R Connecting Block <sup>1</sup>		
25-Pair Cable		
Station Cable <sup>1</sup>		
Modular Jacks <sup>1</sup>		
Ground Wire <sup>1</sup>		
Surge Protector <sup>1</sup>		
Item 5-Optional Equipment		
Common Audible Loud Bell <sup>1</sup>		and the same of th
Loud Extension Bells <sup>1</sup>		
Power Failure Alarm <sup>1</sup>		
Music Source <sup>1</sup>		
External Paging Equipment <sup>1</sup>		
Power Failure Cut-Through Telephones (3 max.)1		DPDTMF
Door Chime Boxes (2 max.)	60005	
SMDR Printer <sup>1</sup> (Parallel or Serial)		
SMDR Printer Cable <sup>1</sup> (Parallel or Serial)		

Hem not available from TIE/communications, Inc.

This section presents the system installation in six parts.

Installing the KSU shows how to prepare the installation site and hang the KSU on the wall.

Extension Cabling explains the cabling from the telephone jacks to the KSU.

Installing the Telephones provides the instructions for connecting and testing the telephones.

Connecting to the Telco Lines tells how to connect the outside (telco) lines to the system.

Installing the Optional Equipment explains how to connect the following optional equipment items to the system:

- A Common Audible Loud Bell
- Loud Extension Bells
- A Power Failure Alarm
- A Music Source
- External Paging equipment
- Power Failure Cut-Through Telephones
- Door Chime Boxes
- An SMDR Printer

Default Configuration presents the default system configuration. The system enables this configuration when initialized.

Before proceeding with the installation, carefully review this section. Also, read the table containing the system's physical and electrical specifications.

Caution:

Make sure that the telephone company provides primary protection for the system's outside lines. This protects the system from lightning and power surges on the telco lines.

If the system requires service or repair work, do not disassemble the unit and attempt to service it. Take the system to a qualified serviceman or contact TIE/communications, Inc., for assistance.

Note: Read and follow any instructions on the MOD KEY 32 equipment.

Use the following table as a reference for the system's electrical and physical specifications. At no time should any portion or component of the system exceed these specifications in any way.

#### MOD KEY 32 SPECIFICATIONS (Page 1 of 2)

## Maximum System Capacity:

CO Lines

12 (All CO lines must have adequate lightning protection

installed, such as carbon blocks, gas tubes, etc.)

Extensions

32

Intercom Links

#### Station Cable Requirements:

Cable Type

Two-pair twisted, solid copper conductors. 20-24 AWG.

Max. Cable Runs 2000 feet (610 meters) for 20 AWG wire, 1500 feet (457.5

meters) for 22 AWG wire and 1200 feet (366 meters) for 24

AWG wire.

Max. Cable

60 Ohms maximum per wire

Resistance

#### KSU Input Power Requirements:

Dedicated 105-126 V AC, 57-63 Hz, single phase. The KSU power supply is circuit breaker protected.

#### KSU Power Dissipation:

Fully Loaded

150 watts maximum, 80 watts nominal

## KSU Dimensions and Weights:

Height: 20%"

Depth: 514"

53.1cm

13.4cm

Width: 17"

Weight: 24 lbs.

43.5cm

10.9 kg.

## MOD KEY 32 SPECIFICATIONS (Page 2 of 2)

## Switching Principle:

Microprocessor-controlled, solid-state, analog switching matrix with stored program control.

## Environmental Operating Conditions:

Temperature:

0 to 40 degrees C

(32 to 104 degrees F)

Humidity:

5% to 95% relative, noncondensing

To maximize system life, maintain the same environmental conditions as for any sophisticated computer system.

## Music On Hold/Background Music:

Input Impedance: 600 Ohm

Input Level: 0.5 Volts peak (max.)

## External Relay Contacts:

Quantity:

4 total; 2 for extension ring, 1 for loud ring and 1 for

power failure

Maximum

Current:

100mA

Maximum

Voltage:

24 V DC

#### Battery Back Up:

Built-in battery retains Random Access Memory (RAM) for up to 14 days when fully charged.

#### FCC Registration Information:

Model: MOD KEY 32

Manufacturer: TIE/communications, Inc.

FCC Registration Numbers: BJ286G-16526-KF-E

BJ29QL-16896-KF-E

Ringer Equivalence: 0.4B Registered Jack: RJ21X

Tools and Extension Equipment Follow the installation steps in order. Carefully follow the instructions and diagrams presented in each section of the installation. Be sure to read the precautionary safeguards which follow each set of instructions.

Before beginning, check the following charts to be sure that the necessary extension equipment and tools are on hand.

## Extension Equipment

- · Telephone instrument for each extension
- 625 type modular jack for each extension<sup>1</sup>
- Modular line cord for each extension (packed with each telephone)
- Two-pair twisted station cable (enough to connect each modular jack to the KSU)
- 66M1-50 connecting blocks (3 max.)
- 66M1-50R or 66M3-50R CO block (1 max.)
- · Bridging clips for the blocks
- Fasteners for mounting KSU, blocks and jacks

#### Tools

- Tape measure for equipment layout
- Level for leveling KSU
- · Drill for mounting equipment
- Punch-down tool for cross connecting wires
- · Wire stripper for wiring modular jacks
- · Sheathing tool for 25-pair cable
- Flat blade screwdriver
- · Markers to label blocks and cables

Screw type terminals only. Do not use modular jacks with push-on type terminals.

Before installing the KSU, choose an appropriate site to mount the unit. The location should be within 25 feet (7.6 meters) of the RJ21X connector from the telephone company that contains the outside lines. Install the KSU in a clean, dry, centrally-located spot where it is out of direct sunlight. Make sure that the area is free of moisture (water, dampness, etc.) and away from any equipment which might vibrate.

When choosing a site for the KSU, always keep the following considerations in mind:

- Never install the KSU where it may come in contact with water.
- Never block the vents on the KSU. These vents prevent the unit from overheating. Always provide proper ventilation for the unit. Never place any objects inside the KSU vents.
- Be sure there is at least three feet between the top of the KSU and the ceiling.

Provide a separate 120 V AC 60Hz outlet for the system. This outlet should be a NEMA 5-I5R receptacle on its own dedicated branch. If there are other outlets on the system branch, disable them or clearly mark them to prohibit use. The outlet must be within 8 feet (2.4 meters) of the KSU.

Mounting the KSU

Follow the steps below for a successful installation:

- Step 1 Using Figure 2-1 as a guide, locate a stable mounting surface for the system. If possible, install a backboard for the KSU and the connecting blocks. Use a suitably sized piece of plywood (¾ " exterior grade) for the backboard. Never mount the KSU on an unstable surface where it might fall.
- Step 2 On the mounting surface, mark the four holes for the KSU mounting screws. To provide easy access to the KSU cabling, don't mount the unit too close to a corner.
- Step 3 Drill pilot holes at the points marked in step 2, and insert suitable fasteners. The fasteners should have a ¼" shank diameter.
- Step 4 Screw in the fasteners until the clearance between the fastener head and the mounting surface is ¼ ".

(continued)

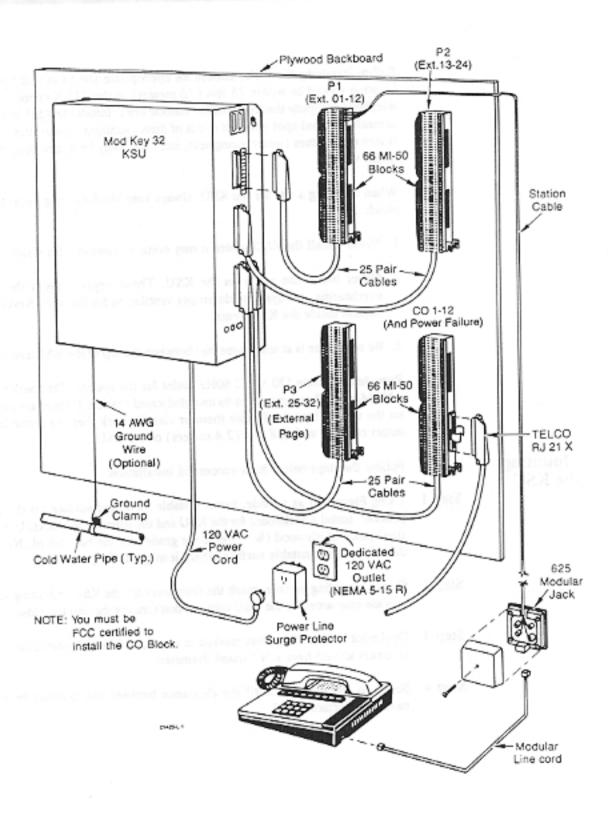


Figure 2-1 INSTALLING THE MOD KEY 32 (Page 1 of 2)

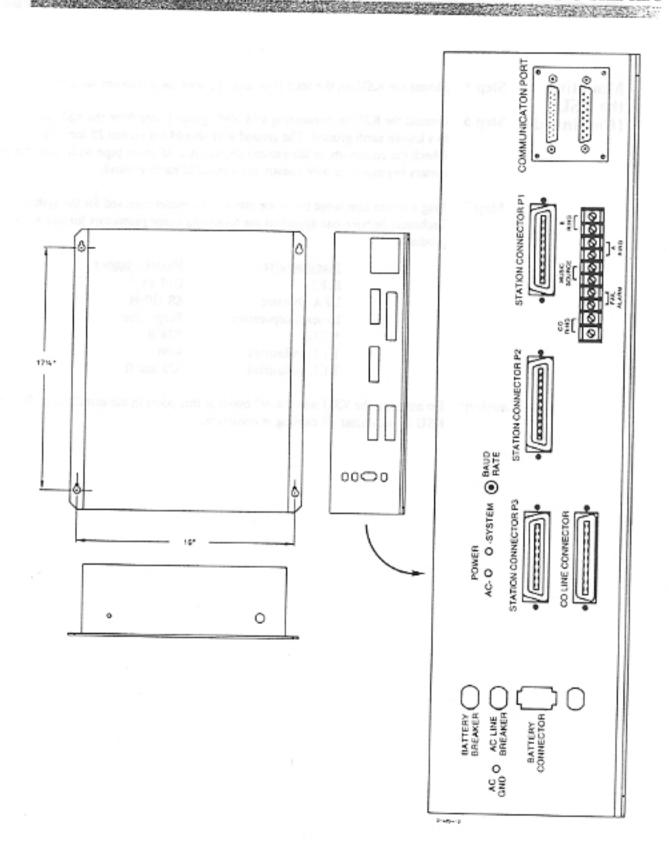


Figure 2-1 INSTALLING THE MOD KEY 32 (Page 2 of 2)

Installation

Mounting
the KSU
(Continued)

- Step 5 Mount the KSU on the four fasteners. Tighten each fastener securely.
- Step 6 Ground the KSU by connecting a 14 AWG ground wire from the KSU ground lug to a known earth ground. The ground wire should not exceed 25 feet (7.6 meters). Check the continuity of the ground source. A cold water pipe with all joints and meters bypassed usually constitutes a suitable earth ground.
- Step 7 Plug a power line surge protector into the AC outlet reserved for the system. TIE Technical Service has approved the following surge protectors for use with TIE products:

Manufacturer	Model Number
E.F.I.	DPI 4531
LEA Dynatec	SS-120-H
Lynex Corporation	Surge One
MCG	P210B
T.I.I. Industries	4391
T.I.I. Industries	428 mk II

Caution: Do not plug the KSU into the AC outlet at this point in the installation. Plug the KSU in only after all cabling is complete.

2-8

These units also provide A.C. line RFI protection.

## Mounting the Connecting Blocks

Mount the 66MI-50 connecting blocks for the extensions to the right of the KSU according to Figure 2-1. The number of blocks required depends on the number of extensions to be installed, as follows:

Extensions						В	locks
1-12							. 1
13-24							.2
25-32							. 3

Note:

If the system is not fully loaded, consider installing additional connecting blocks to accommodate future expansion.

If the site requires Door Chime Boxes or an amplifier for External Paging, install the block for extensions 25-32. Install this block even if the site does not require extensions 25-32. Refer to page 2-28 for installation details on External Paging Refer to page 2-35 for installation details on Door Chime Boxes.

## Cabling from the KSU to the Extension Blocks

## Location Considerations

You may want to consider three facts before cabling and installing the extensions:

- Since you program all system options from extension 01, it may be appropriate
  to limit access to this telephone.
- Extension 06 serves as the operator or attendant's extension make sure that the operator is assigned this extension.
- Install Door Chime Boxes only at extension positions 31 and 32. For these
  extension positions, the Door Chime Box takes the place of the telephone. Refer
  to page 2-35 for instructions on how to install the Door Chime Boxes.

Installation

#### The Extension Blocks

The extension blocks are standard split 66MI-50 blocks. Each block has 50 horizontal rows of terminals arranged in four vertical columns (as shown below). In each row, the terminals in columns 1 and 2 connect together. The terminals in columns 3 and 4 connect. The left columns (1 and 2) and the right columns (3 and 4) connect only when you install bridging clips.

## Connecting to the Extension Blocks

To connect an extension block to the KSU, use a 25-pair cable. Select a cable with a type 57 female connector on one end and unterminated conductors on the other.

- Step 1 Use Figure 2-1 to determine the KSU receptacle to which the extension block corresponds.
- Step 2 At each block, follow Table 2-1 and punch down the unterminated cable end in column 1. Punch down all free conductors, even if the site does not require all extensions on the block. Mark the connectorized cable end for easy identification later on.
- Step 3 Install bridging clips between columns 2 and 3 at each extension block. This establishes continuity across the block. Remove the clips during troubleshooting, if necessary.
- Step 4 Using Table 2-1 and Figure 2-1 as a guide, plug the type 57 connectors into the KSU.

## Cabling from the Extension Blocks to the Telephones

Use station cable to connect the modular jacks (at the telephone location) to the extension blocks. At the KSU location, mark each station cable for easy identification. If possible, directly connect (home run) the cable from the modular jack to the extension block.

Caution: For 20 AWG wire, cable runs should not exceed 2000 feet (610 meters). For 22 AWG wire, cable runs should not exceed 1500 feet (457.5 meters). For 24 AWG wire, cable runs should not exceed 1200 feet (366 meters).

- Step 1 Punch down the station cable in column 4 on the blocks according to the assignments on Table 2-1.
- Step 2 Open a modular jack. Wire one end of a piece of station cable to the terminals in the jack according to the following chart:

Terminal												Wire Color
GRN (G)					,	į	,		,			WHT-BLU
												BLU-WHT
BLK (B)										,		WHT-ORN
YEL (Y)		ı	ı	ı				i			ı	ORN-WHT

Close the jack. Repeat step 2 for each extension.

Caution: Do not connect a telephone as an off-premises extension.

For example, do not place an extension in a different building from the KSU. Voltage overloads (e.g., lightning) can damage the system.

Caution: Route station cable away from any electromagnetic interference sources, such as electrical motors and fluorescent lights.

> Make sure the station cable runs are at least 2 in. (5.1cm) from any electric light or power circuit conductors. Be sure also that the cable runs are at least 2 in. (5.lem) from any Class 11 circuit.

Installation

Refer to the National Electrical Code, Article 800, Communications Circuits.

25-PAI	IR CABLE	I	P1 (EXT 01	MODULAR			
CONN. PIN	COLOR	ST.	BLOCK TERM.	FUNC.	JACK TERM COLOR		
26	WHT-BLU	01	1	AT	GRN		
1	BLU-WHT		2	AR	RED		
27	WHT-ORN		3	BT	BLK		
2	ORN-WHT		4	BR	YEL		
28	WHT-GRN	02	5	AT	GRN		
3	GRN-WHT		6	AR	RED		
29	WHT-BRN		7	BT	BLK		
4	BRN-WHT		8	BR	YEL		
30	WHT-SLT	03	9	AT	GRN		
5	SLT-WHT		10	AR	RED		
31	RED-BLU		11	BT	BLK		
6	BLU-RED		12	BR	YEL		
32	RED-ORN	04	13	AT	GRN		
7	ORN-RED		14	AR	RED		
33	RED-GRN		15	BT	BLK		
8	GRN-RED		16	BR	YEL		
34	RED-BRN	05	17	AT	GRN		
9	BRN-RED		18	AR	RED		
35	RED-SLT		19	BT	BLK		
10	SLT-RED		20	BR	YEL		
36	BLK-BLU	06	21	AT	GRN		
11	BLU-BLK		22	AR	RED		
37	BLK-ORN		23	BT	BLK		
12	ORN-BLK		24	BR	YEL		
38	BLK-GRN	07	25	AT	GRN		
13	GRN-BLK		26	AR	RED		
39	BLK-BRN		27	BT	BLK		
14	BRN-BLK		28	BR	YEL		
40	BLK-SLT	08	29	AT	GRN		
15	SLT-BLK		30	AR	RED		
41	YEL-BLU		31	BT	BLK		
16	BLU-YEL		32	BR	YEL		
42	YEL-ORN	09	33	AT	GRN		
17	ORN-YEL		34	AR	RED		
43	YEL-GRN		35	BT	BLK		
18	GRN-YEL		36	BR	YEL		
44	YEL-BRN	10	37	AT	GRN		
19	BRN-YEL		38	AR	RED		
45	YEL-SLT		39	BT	BLK		
20	SLT-YEL		40	BR	YEL		
46	VIO-BLU	11	41	AT	GRN		
21	BLU-VIO		42	AR	RED		
47	VIO-ORN		43	BT	BLK		
22	ORN-VIO		44	BR	YEL		
48	VIO-GRN	12	45	AT	GRN		
23	GRN-VIO		46	AR	RED		
49	VIO-BRN		47	BT	BLK		
24	BRN-VIO		48	BR	YEL		
50 25	VIO-SLT SLT-VIO		C	NO ONNECTI	ON		

25-PA	IR CABLE		P2 (EXT 13	MODULAR			
CONN. PIN	COLOR CODE	ST.	BLOCK TERM.	FUNC.	JACK TERM COLOR		
26	WHT-BLU	13	1	AT	GRN		
1	BLU-WHT		2	AR	RED		
27	WHT-ORN		3	BT	BLK		
2	ORN-WHT		4	BR	YEL		
28	WHT-GRN	14	5	AT	GRN		
3	GRN-WHT		6	AR	RED		
29	WHT-BRN		7	BT	BLK		
4	BRN-WHT		8	BR	YEL		
30	WHT-SLT	15	9	AT	GRN		
5	SLT-WHT		10	AR	RED		
31	RED-BLU		11	BT	BLK		
6	BLU-RED		12	BR	YEL		
32	RED-ORN	16	13	AT	GRN		
7	ORN-RED		14	AR	RED		
33	RED-GRN		15	BT	BLK		
8	GRN-RED		16	BR	YEL		
34	RED-BRN	17	17	AT	GRN		
9	BRN-RED		18	AR	RED		
35	RED-SLT		19	BT	BLK		
10	SLT-RED		20	BR	YEL		
36	BLK-BLU	18	21	AT	GRN		
11	BLU-BLK		22	AR	RED		
37	BLK-ORN		23	BT	BLK		
12	ORN-BLK		24	BR	YEL		
38	BLK-GRN	19	25	AT	GRN		
13	GRN-BLK		26	AR	RED		
39	BLK-BRN		27	BT	BLK		
14	BRN-BLK		28	BR	YEL		
40	BLK-SLT	20	29	AT	GRN		
15	SLT-BLK		30	AR	RED		
41	YEL-BLU		31	BT	BLK		
16	BLU-YEL		32	BR	YEL		
42	YEL-ORN	21	33	AT	GRN		
17	ORN-YEL		34	AR	RED		
43	YEL-GRN		35	BT	BLK		
18	GRN-YEL		36	BR	YEL		
44	YEL-BRN	22	37	AT	GRN		
19	BRN-YEL		38	AR	RED		
45	YEL-SLT		39	BT	BLK		
20	SLT-YEL		40	BR	YEL		
46	VIO-BLU	23	41	AT	GRN		
21	BLU-VIO		42	AR	RED		
47	VIO-ORN		43	BT	BLK		
22	ORN-VIO		44	BR	YEL		
48	VIO-GRN	24	45	GRN			
23	GRN-VIO		46	RED			
49	VIO-BRN		47	BLK			
24	BRN-VIO		48	YEL			
50 25	VIO-SLT SLT-VIO		CON	NO NECTIO	N		

25-PAIR CABLE		P3 (EXT 25-32)			MODULAR	
CONN. PIN	COLOR CODE	ST.	BLOCK TERM.	FUNC.	JACK TERM COLOR	
26	WHT-BLU	25	1	AT	GRN	
1	BLU-WHT		2	AR	RED	
27	WHT-ORN		3	BT	BLK	
2	ORN-WHT		4	BR	YEL	
28	WHT-GRN	26	5	AT	GRN	
3	GRN-WHT		6	AR	RED	
29	WHT-BRN		7	BT	BLK	
4	BRN-WHT		8	BR	YEL	
30	WHT-SLT	27	9	AT	GRN	
5	SLT-WHT		10	AR	RED	
31	RED-BLU		11	BT	BLK	
6	BLU-RED		12	BR	YEL	
32	RED-ORN	28	13	AT	GRN	
7	ORN-RED		14	AR	RED	
33	RED-GRN		15	BT	BLK	
8	GRN-RED		16	BR	YEL	
34	RED-BRN	29	17	AT	GRN	
9	BRN-RED		18	AR	RED	
35	RED-SLT		19	BT	BLK	
10	SLT-RED		20	BR	YEL	
36	BLK-BLU	30	21	AT	GRN	
11	BLU-BLK		22	AR	RED	
37	BLK-ORN		23	BT	BLK	
12	ORN-BLK		24	BR	YEL	
38 13 39 14	BLK-GRN GRN-BLK BLK-BRN BRN-BLK	OR DOOR BOX	25 26 27 28	AT AR BT BR	GRN RED BLK YEL	
40	BLK-SLT	32	29	AT	GRN	
15	SLT-BLK	OR	30	AR	RED	
41	YEL-BLU	DOOR	31	BT	BLK	
16	BLU-YEL	BOX	32	BR	YEL	
42 17 43 18	YEL-ORN ORN-YEL YEL-GRN GRN-YEL	PAGE 1	33 34 35 36	P1 T P1 R		
44 19 45 20	YEL-BRN BRN-YEL YEL-SLT SLT-YEL	PAGE 2	37 38 39 40	P2 T P2 R	IA CI	
46 21 47 22	VIO-BLU BLU-VIO VIO-ORN ORN-VIO	11 21 10	41 42 43 44	On Color		
48 23 49 24	VIO-GRN GRN-VIO VIO-BRN BRN-VIO		45 46 47 48	2011 2011	- [	
50	VIO-SLT		NO			
25	SLT-VIO		CONNECTION			

## Powering up the System

#### The LEDs

Once all extension cabling is complete, plug the KSU AC power cord into the dedicated AC outlet. Two LEDs to the left of the P3 receptacle indicate power status. Both LEDs should be on. If only one LED is on, have the unit serviced. When you disconnect the system from the AC power, both LEDs go out.

## Battery Backup

A Nickel Cadmium (NICAD) battery inside the KSU maintains system Random Access Memory (RAM) if AC power fails. Once fully charged, this battery holds memory for up to 14 days. The battery reaches full charge after the system runs off AC power for about 72 hours.

#### The Circuit Breakers

Two circuit breakers on the KSU provide overload protection. The one-amp circuit breaker, located beneath the P3 receptacle, is for AC power. The three-amp breaker is for external battery backup. Consider this breaker only when you connect an external battery backup unit.

## Troubleshooting Tips

If the AC Power LED is out, check the 1-amp AC power breaker.

- If it has popped out, push it in. If it pops out again, check the AC receptacle for 120 V AC. If the receptacle checks out O.K., unplug the system and have the unit serviced.
- If the breaker has not popped out and the AC LED is not lit, check the AC receptacle for 120 V AC. If the receptacle checks out O.K., unplug the system and have the unit serviced.

Installation

## Installing Extension 01

Step 1 Plug one end of the modular line cord into the extension 01 telephone.

Step 2 Plug the other end of the modular line cord into the modular jack for extension 01.

Caution:

The following procedure erases all Speed Dial numbers and sets the programming options to their preset values. Refer to page 2-41 for the system Default Configuration. This procedure does not change SMDR Time and Date.

Step 3 To initialize the system from extension 01:1

- Do not lift handset.
- Dial # \*.
- Press HOLD twice. Line key LEDs 1-5 illuminate.

LED 1 on indicates that the system ROM checksums are correct.

LED 2 on indicates that the CPU RAM is functioning.

LED 3 on indicates that the system volatile RAM is functioning.

LED 4 on indicates that the system user-programmable RAM is functioning.

LED 5 on indicates that the system is doing a cold start (i.e., initial start-up).

LED 6 is out.

LEDs 1-5 go out after about 10 seconds.

2 - 16

Only do this check from station 01.

Installing Extensions 02-32

- Step 1 Plug one end of the modular line cord into the telephone.
- Step 2 Plug the other end of the modular line cord into the telephone's modular jack.
- Step 3 To check out extension operation:
  - Lift handset.
  - Listen for Intercom dial tone.
  - · Dial a connected extension.
  - Listen for ringing.

If possible, have someone at the called extension answer the ring.

· Hang up.

Repeat steps 1 through 3 for all connected extensions.

Step 4 If an extension does not function, go to page 2-9 and recheck the wiring. If necessary, check the voltages at the extension modular jack according to the following chart:

Terminal	Meter Lead	Voltage
	BLACK	+24 V DC
	BLACK	

When measuring voltages, always use a high impedance multimeter (Fluke 8012A or equivalent). Measure voltages with the extension connected.

#### Connecting to the Telco RJ21X

Once you connect all the extensions and power up the system, connect the system to the telco lines. These lines allow the placing and receiving of outside calls.

- Note: If the site requires power failure cut-through telephones, install a CO block. Install this block only if you are a certified installer. Refer to page 2-31 for additional details.
- Step 1 Locate the telco RJ21X type 57 male connector. It contains the outside lines. Refer to Table 2-3 (page 2-34) for line assignments. The telco installs the RJ21X within 25 feet (7.6 meters) of the KSU.
- Step 2 Locate the 25-pair cable that has a type 57 male connector on one end and a type 57 female connector on the other. This cable should be no longer than 25 feet.
- Step 3 Plug the male end of the 25-pair cable into the KSU receptacle marked CO LINE CONNECTOR. Plug the female end of the cable into the telco RJ21X.

#### Testing the Outside Lines

Unless modified in system programming, all 12-button telephones access lines 1-12. If you initially install 6-button and 12-button telephones in the same system, the 6-button telephones access only lines 1-6. If you initially install *only* 6-button telephones, extension 05 accesses lines 7-12. All other 6-button telephones access lines 1-6.

Test only those lines that are actually installed in the telco RJ21X. For example, if the telco provides lines 1-5, test only lines 1-5.

TIE/communications, Inc., offers classes for installation training and certification.

Step 1 Determine if the connected CO lines are Dual Tone Multifrequency (DTMF) or Dial Pulse (DP). If the lines are DTMF, proceed directly to step 2. If the lines are DP, perform the following steps before proceeding to step 2.

To convert the system to the DP mode:

- Do not lift handset.
- From extension 01, dial # \* 92.

Caution: This procedure sets the system to the DP mode for outside calls. The procedure also returns the following programming options to their preset values:

Program 1 (User Programmable Features/Line Access and Ringing)

Program 4 (Toll Restriction)

Program 8

Program 9 (all routines)

This procedure does not erase Speed Dial numbers.

Step 2 To test the outside lines, from a functioning extension:

Press a line key. Listen for CO dial tone.

The line key LED must illuminate. Refer to the previous page to determine the default configuration key-to-line assignment.

Place a test call. CO dial tone stops.

To test incoming ring for another line, call back into the system.

Hang up, and repeat the procedure for the remaining outside lines.

#### This part covers the installation of:

- A Common Audible Loud Bell
- Loud Extension Bells
- A Power Failure Alarm
- The Music Source
- · External Paging Equipment
- · Power Failure Cut-Through Telephones
- Door Chime Boxes
- An SMDR Printer

#### Installing A Common Audible Loud Bell

A Common Audible Loud Bell (Figure 2-2) provides ringing in areas where the normal telephone ringing is not adequate. The system has relay contacts for a Common Audible Loud Bell that close whenever an outside call rings into the system. The system outputs these relay contacts on the CO RING terminal strip lugs.

Caution: The Common Audible Loud Bell relay contacts are dry contacts rated at 24 V DC

@ 100mA. Do not connect equipment that exceeds these specifications.

If the Loud Bell has requirements that exceed the rating of the relay contacts, use additional external relays. Do not use the Loud Bell (CO RING) contacts to switch AC power.

- Typical Installation
  - The steps that follow describe a typical Common Audible Loud Bell installation. Depending on the equipment connected, the actual installation may differ.
- Step 1 Use station cable to connect the Loud Bell control to the terminal strip lugs labeled CO RING.
- Step 2 Plug the Loud Bell AC supply cord into an AC outlet. Do not use the system dedicated outlet for the Loud Bell AC supply.

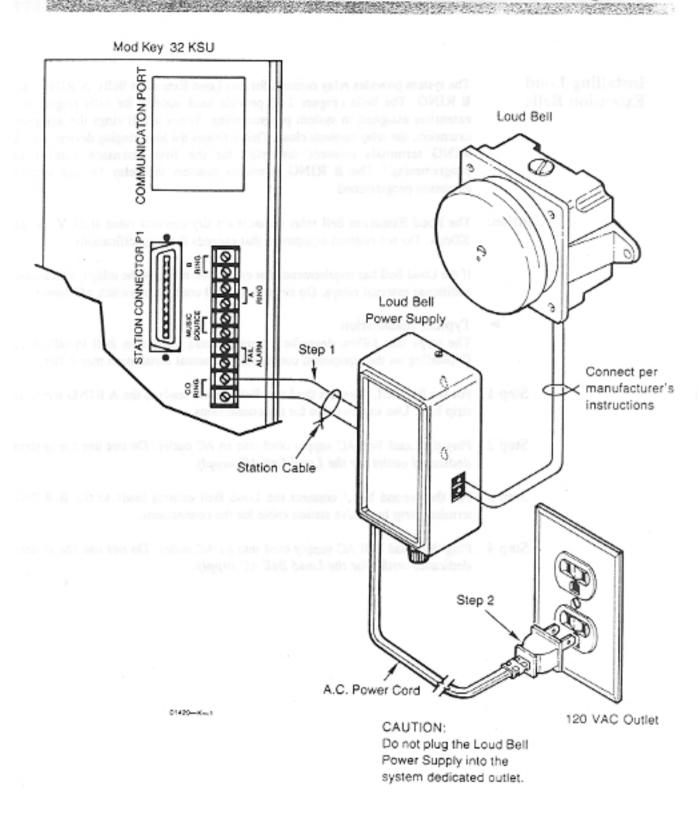


Figure 2-2 INSTALLING A COMMON AUDIBLE LOUD BELL

#### Installing Loud Extension Bells

The system provides relay contacts for two Loud Extension Bells: A RING and B RING. The bells (Figure 2-3) provide loud audible for calls ringing the extension assigned in system programming. When a call rings the assigned extension, the relay contacts close. This activates the loud ringing device. The A RING terminals connect the relay for the first extension entered in programming. The B RING terminals connect the relay for the second extension programmed.

#### Caution:

The Loud Extension Bell relay contacts are dry contacts rated at 24 V DC @ 100mA. Do not connect equipment that exceeds these specifications

If the Loud Bell has requirements that exceed the rating of the relay contacts, use additional external relays. Do not use the Bell contacts to switch AC power.

#### Typical Installation

The steps that follow describe a typical Loud Extension Bell installation. Depending on the equipment connected, the actual installation may differ.

- Step 1 For the first bell, connect the Loud Bell control leads to the A RING terminal strip lugs. Use station cable for the connections.
- Step 2 Plug the Loud Bell AC supply cord into an AC outlet. Do not use the system dedicated outlet for the Loud Bell AC supply.
- Step 3 For the second bell,<sup>1</sup> connect the Loud Bell control leads to the B RING terminal strip lugs. Use station cable for the connections.
- Step 4 Plug the Loud Bell AC supply cord into an AC outlet. Do not use the system dedicated outlet for the Loud Bell AC supply.

Refer to Program 6 (Routine 5) in the Software Manual.

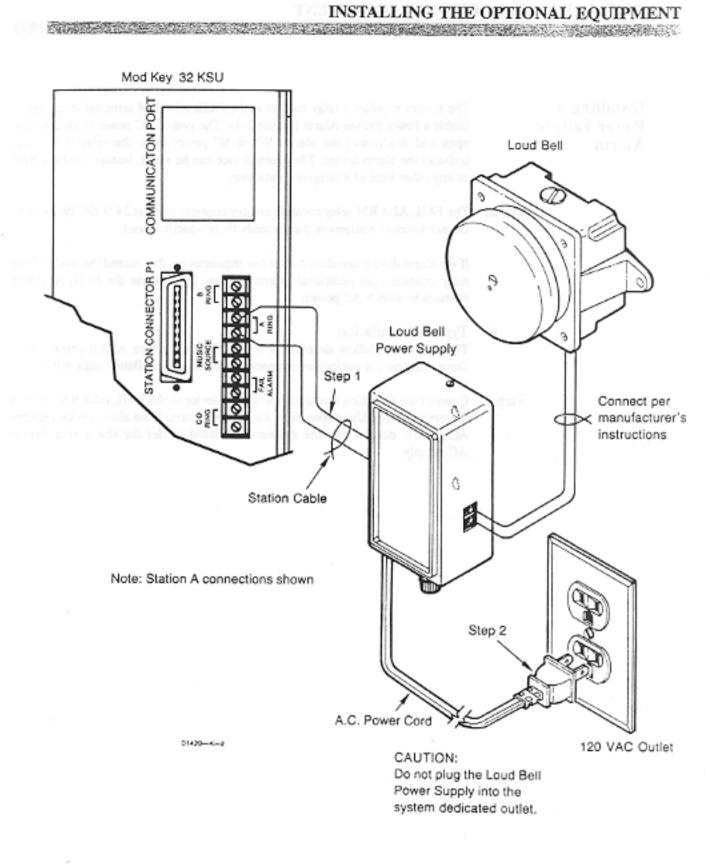


Figure 2-3 INSTALLING LOUD EXTENSION BELLS

### Installing a Power Failure Alarm

The system supplies a relay contact at the FAIL ALARM terminal strip lugs to enable a Power Failure Alarm (Figure 2-4). The system AC power holds the relay open and deactivates the alarm. When AC power fails, the relay closes and activates the alarm device. The alarm device can be a bell, buzzer, flashing light or any other kind of emergency indicator.

Caution: The FAIL ALARM relay contacts are dry contacts rated at 24 V DC @ 100mA. Do not connect equipment that exceeds these specifications.

> If the alarm device detection circuit has requirements that exceed the rating of the relay contacts, use additional external relays. Do not use the FAIL ALARM contacts to switch AC power.

#### Typical Installation

The steps that follow describe a typical Power Failure Alarm installation. Depending on the equipment connected, the actual installation may differ.

Step 1 Connect the detection circuit on the alarm device to the FAIL ALARM lugs on the terminal strip. Use station cable for the connection. If the alarm device requires AC power, do not use the system-dedicated outlet for the alarm device AC supply.

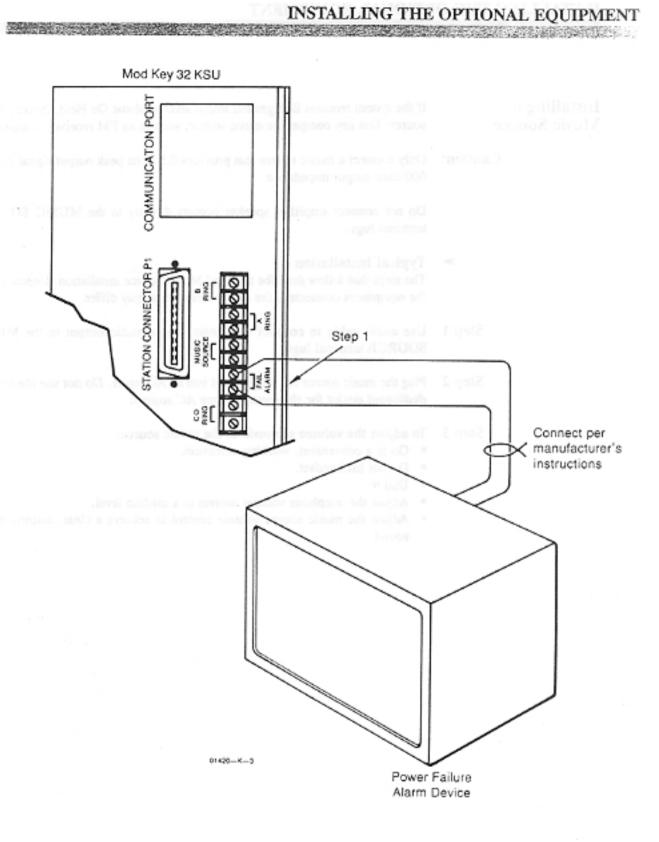


Figure 2-4 INSTALLING A POWER FAILURE ALARM

#### Installing a Music Source

If the system requires Background Music and/or Music On Hold, install a music source. Use any compatible music source, such as an FM receiver or tape deck.

Caution: Only connect a music source that provides 0.5 Volts peak output signal through 600 ohm output impedance.

> Do not connect amplifier speaker outputs directly to the MUSIC SOURCE terminal lugs.

#### Typical Installation

The steps that follow describe a typical Music Source installation. Depending on the equipment connected, the actual installation may differ.

- Step 1 Use audio cable to connect the music source audio output to the MUSIC SOURCE terminal lugs.
- Step 2 Plug the music source AC supply cord into an AC outlet. Do not use the systemdedicated outlet for the music source AC supply.

#### Step 3 To adjust the volume of music at the music source:

- · Go to a convenient, working extension.
- Do not lift handset.
- Dial 9.
- Adjust the telephone volume control to a median level.
- Adjust the music source volume control to achieve a clear, distortion-free sound.

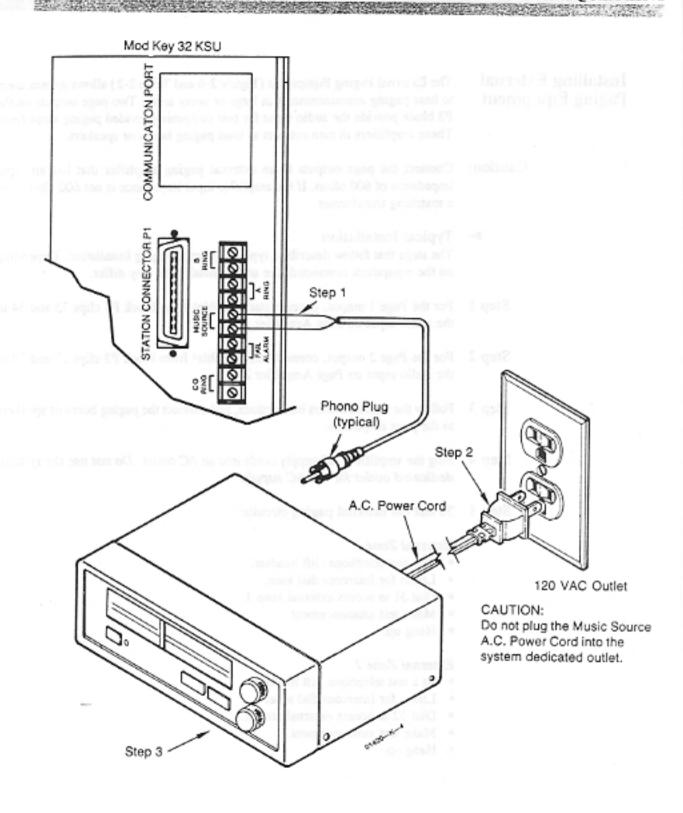


Figure 2-5 INSTALLING A MUSIC SOURCE

### Installing External Paging Equipment

The External Paging Equipment (Figure 2-6 and Table 2-2) allows system users to hear paging announcements in large or noisy areas. Two page outputs on the P3 block provide the audio input for two customer-provided paging amplifiers. These amplifiers in turn connect to loud paging horns or speakers.

Caution:

Connect the page outputs to an external paging amplifier that has an input impedance of 600 ohms. If the amplifier input impedance is not 600 ohms, use a matching transformer.

#### ▶ Typical Installation

The steps that follow describe a typical External Paging Installation. Depending on the equipment connected, the actual installation may differ.

- Step 1 For the Page 1 output, connect station cable<sup>1</sup> from block P3 clips 33 and 34 to the audio input on Page Amplifier 1.
- Step 2 For the Page 2 output, connect station cable<sup>1</sup> from block P3 clips 37 and 38 to the audio input on Page Amplifier 2.
- Step 3 Follow the manufacturers instructions, and connect the paging horns or speakers to the page amplifiers.
- Step 4 Plug the amplifiers AC supply cords into an AC outlet. Do not use the systemdedicated outlet for the AC supply.
- Step 5 To test the external paging circuits:

#### External Zone 1

- · At a test telephone, lift handset.
- Listen for Intercom dial tone.
- Dial 51 to access external zone 1.
- Make test announcement.
- Hang up.

#### External Zone 2

- At a test telephone, lift handset.
- · Listen for Intercom dial tone.
- Dial 52 to access external zone 2.
- Make test announcement.
- Hang up.

Some sites may require shielded audio cable.

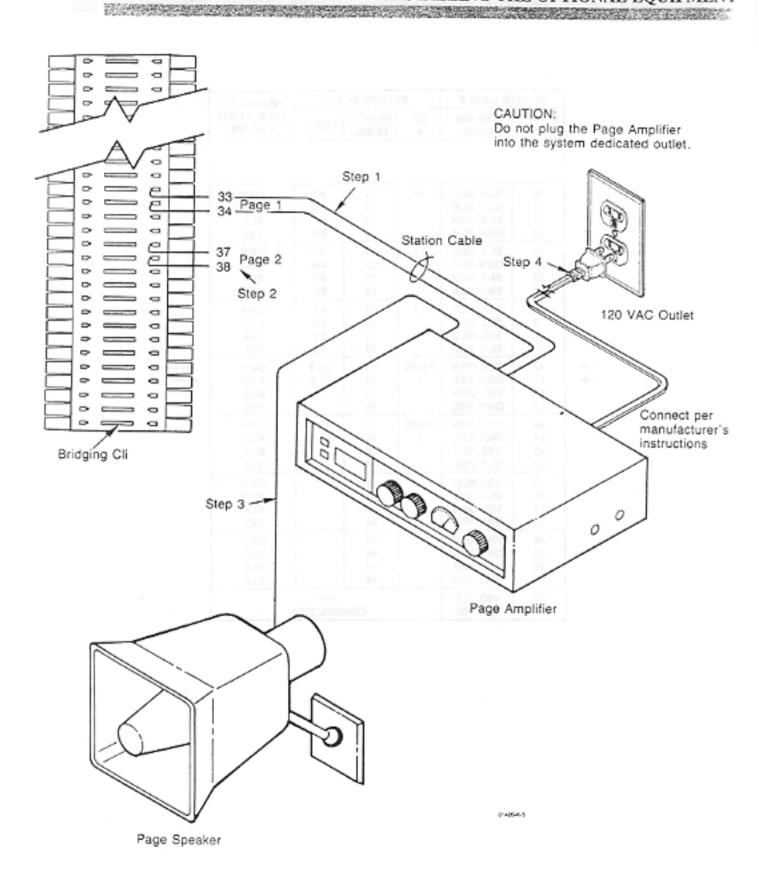


Figure 2-6 INSTALLING EXTERNAL PAGING EQUIPMENT

## TABLE 2-2 CONNECTIONS FOR EXTERNAL PAGING EQUIPMENT (P3)

25-PA	R CABLE	P:	3 (EXT 25-	MODULAR			
CONN. PIN	COLOR CODE	ST.	BLOCK TERM.	FUNC.	JACK TERM COLOR		
36 11 37 12	BLK-BLU BLU-BLK BLK-ORN ORN-BLK	30	21 22 23 24	AT AR BT BR	GRN RED BLK YEL		
38 13 39 14	BLK-GRN GRN-BLK BLK-BRN BRN-BLK	31	25 26 27 28	AT AR BT BR	GRN RED BLK YEL		
40 15 41 16	BLK-SLT SLT-BLK YEL-BLU BLU-YEL	32	29 30 31 32	AT AR BT BR	GRN RED BLK YEL		
42 17 43 18	YEL-ORN ORN-YEL YEL-GRN GRN-YEL	PAGE 1	33 34 35 36	PI T PI R	GRN RED BLK YEL		
44 19 45 20	YEL-BRN BRN-YEL YEL-SLT SLT-YEL	PAGE 2	37 38 39 40	P2 T P2 R	GRN RED BLK YEL		
46 21 47 22	VIO-BLU BLU-VIO VIO-ORN ORN-VIO	50	41 42 43 44		GRN RED BLK YEL		
48 23 49 24	VIO-GRN GRN-VIO VIO-BRN BRN-VIO		45 46 47 48		GRN RED BLK YEL		
50 25	VIO-SLT SLT-VIO		CON	NO NECTIO	N		

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Installing Power Failure Cut-Through Telephones

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Power Failure Cut-Through activates when commercial power fails. It allows system users to place and answer outside calls with single line telephones. The system provides connection for up to three Power Failure Cut-Through telephones (Figure 2-7). If the CO lines are Dual Tone Multifrequency (DTMF), use 2500 type telephones for cut-through. If the CO lines are Dial Pulse (DP), use 500 type telephones.

Note: Power Failure Cut-Through requires the installation of a CO block. Install this block only if you are an FCC certified installer.

- Typical Installation
   The system provides Power Failure Cut-Through connections on the CO block.
- Step 1 Mount a 66MI-50R or 66M3-50R CO block in a convenient spot to the right of the KSU. The block should have a type 57 female plug on the side to accept the telco RJ2IX. Refer to Figure 2-1 if necessary.
- Step 2 To connect to the CO block:
  - Use a 25-pair cable with a type 57 male connector on one end and unterminated conductors on the other.
  - Using Table 2-3 as a guide, punch down all unterminated conductors on CO block column 1.
  - Plug the type 57 male connector into the KSU CO LINE CONNECTOR.
  - Plug the telco RJ21X (type 57 male connector) into the female plug on the side of the CO block.

Installing Power Failure Cut-Through Telephones (Continued) Step 3 For each power failure telephone, install a 625 modular jack in a convenient location. Use station cable, Table 2-3 and the following chart to connect the 625 jack to the CO block.

PF Ext	Terminal	Signal	625 Term.
1	49	PF1T	GRN
	50	PF1R	RED
2	4	PF2T	GRN
	8	PF2R	RED
3	12	PF3T	GRN
	16	PF3R	RED

Step 4 Plug each power failure telephone into its assigned modular jack.

Step 5 To test the power failure telephones:

- · Unplug the KSU.
- · Lift the handset on a power failure telephone.
- Listen for CO dial tone.
- Dial a test number.
- Hang up.

To test the telephone ringers, from another telephone place a call to the line connected to the power failure telephone.

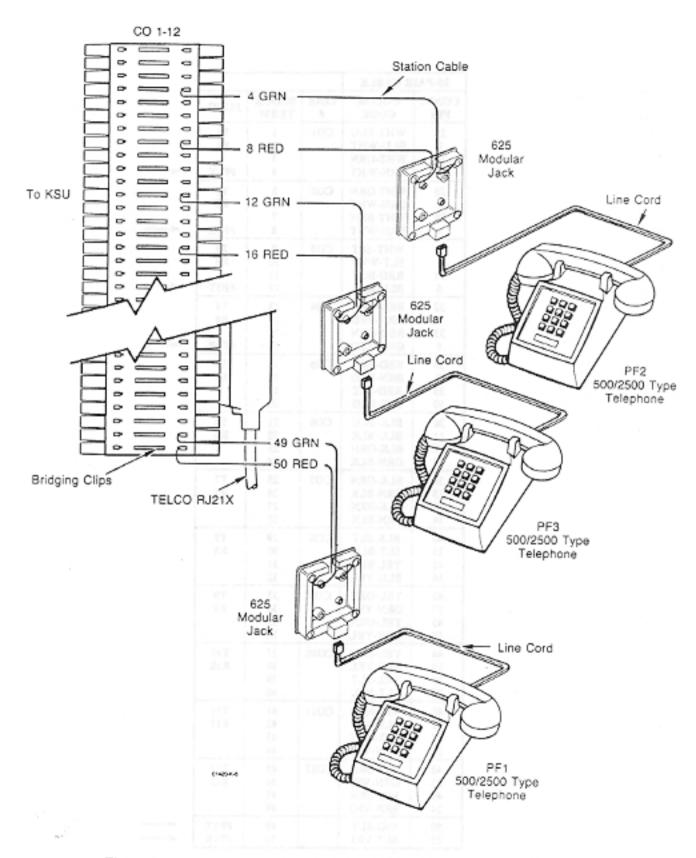


Figure 2-7 INSTALLING POWER FAILURE CUT-THROUGH TELEPHONES

# TABLE 2-3 CONNECTIONS FOR POWER FAILURE TELEPHONES

25-PAI	R CABLE			
CONN. PIN	COLOR CODE	LINE	BLOCK TERM.	FUNC.
26	WHT-BLU	COI	1	TI
1	BLU-WHT		2	RI
27	WHT-ORN		3 4	PF2T
2	ORN-WHT			
28	WHT-GRN	CO2	5	T2 R2
3	GRN-WHT		7	K2
29	BRN-WHT		8	PF2R
30	WHT-SLT	C03	9	Т3
5	SLT-WHT	COS	10	R3
31	RED-BLU		11	-
6	BLU-RED		12	PF3T
32	RED-ORN	CO4	13	T4
7	ORN-RED		14	R4
33	RED-GRN		15	
8	GRN-RED		16	PF3R
34	RED-BRN	CO5	17	T5
9	BRN-RED		18	R5
35	RED-SLT		19	
10	SLT-RED		20	-
36	BLK-BLU	C06	21	T6
11	BLU-BLK	Jan 1970	22	R6
37	BLK-ORN ORN-BLK		23 24	-
12		202		T7
38	BLK-GRN	CO7	25 26	R7
13 39	GRN-BLK BLK-BRN		27	~
14	BRN-BLK		28	
40	BLK-SLT	CO8	29	T8
15	SLT-BLK	1000	30	R8
41	YEL-BLU	100	31	
16	BLU-YEL	100	32	
42	YEL-ORN	C09	33	T9
17	ORN-YEL	1	34	R9
43	YEL-GRN	73	35	1
18	GRN-YEL	1	36	
44	YEL-BRN	CO10	37	T10
19	BRN-YEL	1	38	R10
45	YEL-SLT		39	1
20	SLT-YEL		40	
46	VIO-BLU	CO11	41	T11
21	BLU-VIO		42 43	R11
47 22	ORN-VIO		44	
		0013	45	T12
48	GRN-VIO	CO12	45	R12
23 49	VIO-BRN		47	K.12
24	BRN-VIO		48	
50	VIO-SLT		49	PFIT
25	SLT-VIO		50	PFIR

#### Installing the Door Chime Boxes

The system accepts two Door Chime Boxes, installed in place of extensions 31 and 32. When a caller at the Door Chime Box presses the chime box button, the system sends a distinctive signal to the extension(s) assigned in system programming.

#### Typical Installation

- Step 1 Run station cable from the KSU location to the Door Chime Box location.
- Step 2 Pull the back off the Door Chime box. Run the station cable up the groove in the back of the box and through the hole in the top.
- Step 3 Use two screws to fasten the back of the Door Chime Box to the desired location.
- Step 4 Strip the sheathing off the exposed station cable. On each conductor, strip the insulation back about ½-inch. Wire the Door Chime Box according to the following chart and Figure 2-8.

Station Cable Color	At D	
WHT/BLU		Green
BLU/WHT		
WHT/ORN		Yellow
ORN/WHT		Black

Step 5 Push the front of the Door Chime Box into the back until it snaps in place.

Installing the Door Chime Boxes (Continued) Step 6 Connect the station cable on block P3 according to Table 2-4.

TABLE 2-4 DOOR CHIME BOX CONNECTIONS

25-PAI	R CABLE	CC	ONNECTO	MODULAR	
CONN. PIN	COLOR	ST.	BLOCK TERM.	FUNC.	JACK TERM COLOR
38 13 39 14	BLK-GRN GRN-BLK BLK-BRN BRN-BLK	31	25 26 27 28	AT AR BT BR	
40 15 41 16	BLK-SLT SLT-BLK YEL-BLU BLU-YEL	32	29 30 31 32	AT AR BT BR	

Step 7 To test the Door Chime Box (after the software assignment is made)1:

#### At Door Chime Box

· Press chime button.

Distinctive signal sounds at the Door Chime Box and at the assigned extension.

· When extension answers, speak toward box.

#### At Called Extension

- · When chime sounds, lift handset.
- Dial Door Chime Box code (31 or 32).
- · Press MEM to talk. Release to listen.

Refer to Program 9 (Routine \*) and Program 2 in the Software Manual.

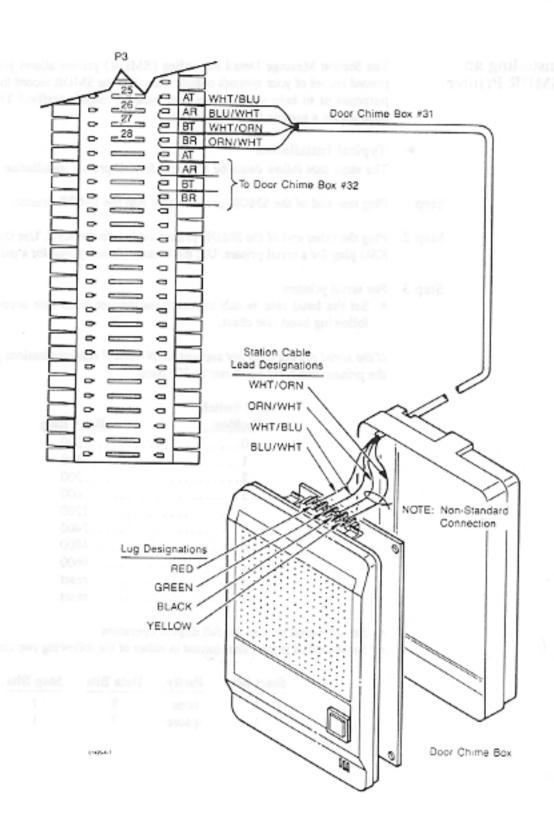


Figure 2-8 INSTALLING THE DOOR CHIME BOX

#### Installing an SMDR Printer

The Station Message Detail Recording (SMDR) printer allows you to make a printed record of your system's outside calls. Use the SMDR record for accounting purposes or to help you analyze your system's outside traffic. The following page shows a sample SMDR printout.

## ➤ Typical Installation

The steps that follow describe a typical SMDR printer installation:

- Step 1 Plug one end of the SMDR printer cable into the SMDR printer.
- Step 2 Plug the other end of the SMDR printer cable into the KSU. Use the top (male) KSU plug for a serial printer. Use the bottom (female) plug for a parallel printer.
- Step 3 For serial printers:
  - Set the baud rate switch to match the printer baud rate according to the following baud rate chart.

If the serial printer does not support XON/XOFF communications protocol, set the printer and KSU band rate at 300 band.

KSU S Posit	_	 ŀ	1											В	9	ı	10	1	R	at	e
0.								,									3	0	0		
1.					,										,		1	1	0		
2.													,	,	,		3	0	0		
3.											,	,					6	Ю	0		
4.							,	,	,	,	,					]	2	0	0		
5.				,		,	,									2	14	0	0		
6.																4	18	0	0		
7.			,	,	,	,										9	16	Ю	0		
8.													,		,	. 1	e	St	eŧ		
9.			è				,			,						. 1	e	S	et		

- Set the serial printer for full duplex operation.
- Set the serial printer data format in either of the following two configurations:

Start Bits	Parity	Data Bits	Stop Bits
1	none	8	1
1	ignore	7	1

Refer to Program 6 (Routines 1, 2 and 4) in the Software Manual.

### Sample SMDR Printout

TYP	st	LN	DATE	START	DURATION	TIME RINGING	PHONE NUMBER
BLK	12	02	06/18/87	10:57:04	00:00:02		O O
OTG	12	06	06/18/87	10:57:10	00:00:07		12039262027
RNA	00	01	06/18/87	10:57:27		00:31	12039202027
INC	12	01	06/18/87	10:58:09	00:00:06	00:03	

#### Headings and Abbreviations

TYP . . . . . Type of call

BLK - Blocked by Toll Restriction

OTG - Outgoing

RNA - Ring No Answer (call rings in but is not answered)

INC - Answered Incoming call

ST ..... Extension involved in call LN .... Line involved in call DATE .... Date call was made

START..... Time call started
DURATION .... Elapsed time of call

TIME RINGING . . . . Number of rings before user answered call

PHONE NUMBER.... Number user dials

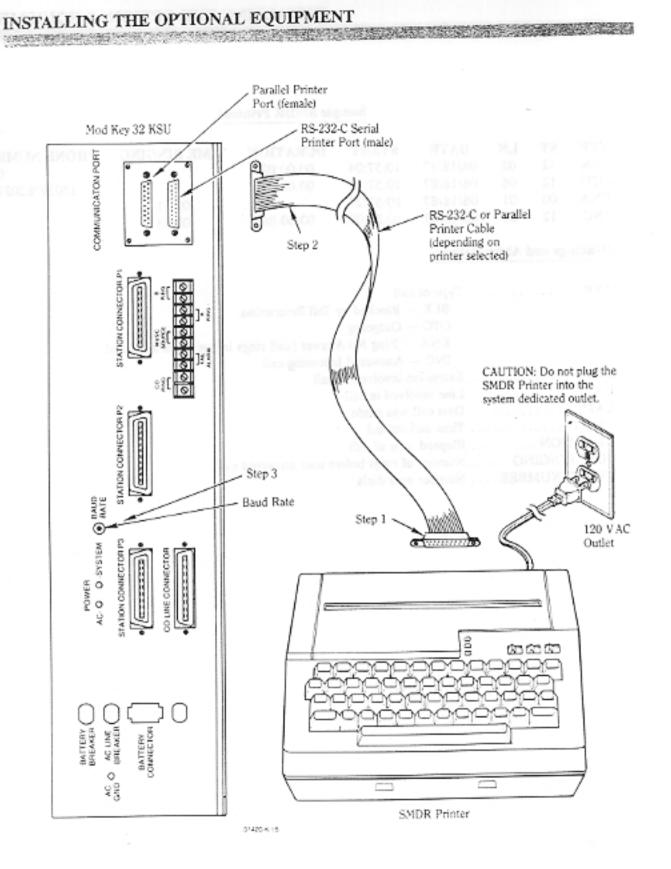


Figure 2-9 INSTALLING AN SMDR PRINTER

Initializing the system (page 2-16, Step 3) enables the default configuration. This activates the standard features and sets the program options to their preset values. The following chart shows the default configuration for the standard features and program options. For the program options, the chart also indicates the associated program and routine number. To change a program option from its preset value, use the MOD KEY 32 Software Manual (P/N 01420SWG01).

#### MOD KEY 32 DEFAULT CONFIGURATION (Page 1 of 2)

Feature	Program	Routine	Preset Value
Background Music/Music	-	01 0100	Always enabled (requires optional
On Hold			equipment)
Call Waiting, External	2		External Call Waiting beeps disabled
Call Waiting, Internal	-	200	Always enabled
Conference, Add-On	_	200	Always enabled
Conference, Multi-Line	100-20		Always enabled
Dial Delay Timer	9	1	
Dial Mode	8	-	DTMF
Digit Counter	5	Speed Dis Speed Dis	Maximum number of dialed digits = 25
Direct Station Selection Keys1	_	-	Always enabled
Do Not Disturb <sup>2</sup>		-	Always enabled
Door Chime Recipients	2		Chimes at 31 and 32 disabled (i.e., chimes do not ring at any station)
Door Chime Box	9	*	No Door Chime Boxes installed
Exception Codes	5	_	None
Flash	8	_	Open Loop Flash enabled
Flash Timer	9	5	560mS
Handsfree/Speakerphone3	-		Always enabled
Hold	9	6	No Hold Recall interval (calls do not recall)
ntercom Calls	9	8	All calls ring
Interdigit Wait Timer	9	7	57.75mS
Last Number Redial		-	Always enabled
Line Access and Ringing	1	4	If you install only 6-line sets,
			extensions 01-04 and 06-32 have lines
			1-6. Extension 05 has lines 7-12.
			If you install a mixture of 6-line and
			12-line sets, all 12-line sets have lines
			1-12. All 6-line sets have lines 1-6.
			All lines are two-way (incoming and
			outgoing). All lines ring all phones.
ine Groups	8	me	All lines in group 1
oud Bell Extensions	6	5	Disabled (no extension assigned)
Make/Break Timers	9	2 & 3	Make = 36.75mS Break = 63mS (40/60 at 10 pps)
dicrophone Mute <sup>2</sup>	-	_	Always enabled
Monitor	-	-	Always enabled (for sets without speakerphones)

<sup>1</sup> Executive Telephone only.

Executive and 12-line telephones only.

With optional Speakerphone telephones only.

## MOD KEY 32 DEFAULT CONFIGURATION (Page 2 of 2)

Feature	Program	Routine	Preset Value
Night Ringing	2	2	Not Assigned
Nonrestricted Line	8		Disabled (no lines assigned)
Paging, External Zone	(10 to 10)	Selffee	Always enabled (requires optional equipment)
Paging, Internal	3	_	All extensions in zone 1
Pause Timer	9	4	1.52 seconds
PBX/Centrex Compatibility	7	_	No codes assigned
Privacy Release	9	8	Privacy enabled
Pulse To Tone Conversion		_	Always enabled (when manually implemented)
Release of Abandoned Calls on Hold	9	8	Disabled
Save	_		Always enabled
SMDR Date	6	2	Unassigned
SMDR Print Options	6	4	All outgoing calls recorded
SMDR Time	1	1	Unassigned
Speed Dial, System	_	-	Always enabled
Speed Dial Shortcuts	-		Always enabled
Speed Dial, Extension	_	_	Always enabled
Toll Restriction	4		Dialing unrestricted
Transfer	_		Always enabled
User Programmable Features	1	0-3	No features assigned (all Function keys are lines)
Volume Control	770	pur Oile	Always enabled

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Product Literature

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