INTER-TEL

824

INSTALLATION AND FIELD MAINTENANCE MANUAL

Issue 1, June 1984

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IMPORTANT:

1. Customers connecting this equipment to the telephone network shall, before such connection is made, give notice to the telephone company of the particular line(s) to which such connection is to be made, and shall provide the telephone company with the following information:

   - FCC Registration Number, BE287V-13275-MF-E
   - Ringer Equivalence Number, 0.8A
   - Type of jack to be ordered from the telephone company, RJ-21X or RJ-14C

   The telephone company should also be given notice upon final disconnection of this equipment from the particular line(s).

   It is also the responsibility of the customer to provide the telephone company with registration numbers of any other devices which are configured for connection to the telephone network.

2. It is prohibited by the telephone company to make connections to party lines or to a coin telephone service.

3. Under certain circumstances the telephone company may temporarily discontinue service and make changes in facilities and services which may affect the operation of this equipment; however, the customer shall be given adequate notice in writing to allow the customer an opportunity to maintain uninterrupted service.

4. Users should not make adjustments, repairs or attempt to service this equipment. In the event that a problem originates, contact the local authorized factory service representative.

   In the event of trouble with the telephone line(s), this equipment must be disconnected from the telephone line(s). If trouble ceases, the equipment must be repaired by an authorized factory service representative. If the trouble continues to occur with the equipment disconnected, the telephone company should be notified that they have a problem. If this is the case, repairs or adjustments made by the telephone company will be made at their expense.

WARNING:

This equipment generates and uses radio frequency energy and if not installed and used properly, that is, in strict accordance with the manufacturer's instructions, may cause interference to radio and television reception. It has been type tested and found to comply with the limits for a Class A computing device in accordance with the specifications in Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference in a residential installation. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient the receiving antenna

- Relocate the computer with respect to the receiver

- Move the computer away from the receiver

- Plug the computer into a different outlet so that computer and receiver are on different branch circuits.

If necessary, the user should consult the dealer or an experienced radio/television technician for additional suggestions. The user may find the following booklet prepared by the Federal Communications Commission helpful:

"How to Identify and Resolve Radio-TV Interference"

This booklet is available from the U.S. Government Printing Office, Washington, D.C. 20402, Stock No. 004-000-00398-5.

OVERVIEW

CONTENTS   PAGE

1. INTRODUCTION

1.01 The 824 system is a versatile electronic key telephone sys-
tem designed to meet the needs of growing businesses. Modular
design makes the system easy to install and service, and the pro-
grammable features provide a variety of services to meet each
customer's needs. The system has capacity for eight Central
Office (C.O.) lines, 24 stations, two intercom paths, and one
path for paging.

1.02 This manual, geared especially to service personnel, ex-
plains installation, programming, operation and maintenance of
the system.

1.03 Another Inter-Tel publication for this system is the 824
Owner's Guide (part number 247.8001-0). Its purpose is to pro-
vide the user and sales person with an overview of the system
hardware and a complete operation manual.

2. HARDWARE SUMMARY

2.01 The SYSTEM SPECIFICATIONS section of this manual describes
the hardware. As a brief introduction, this section includes the
Key Service Unit (KSU), Keysets, and Door-Mates.

A. KEY SERVICE UNIT (KSU)

2.02 The Key Service Unit (KSU) houses the circuit boards and the system power supply. The KSU performs all control and switching activities for the system. This includes detecting incoming calls, processing data-controlled features, and controlling the interaction between stations, C.O. lines, and intercom paths.

B. KEYSETS

2.03 Four types of keysets are used on the 824 system. They are the Standard Keyset, Display Keyset, and Display and Standard Power Failure Transfer Keysets. The Display Keyset has a 16-character liquid crystal display (LCD) for showing applications in use, such as number dialed, keyset status, date and time, messages, etc.

2.04 In case of power failure, special switching circuitry in the KSU controls the switching of the C.O. lines to the appropriate Power Failure Transfer (PFT) Keysets. These PFT Keysets, which are used as regular keysets during normal operation, allow incoming calls to be answered during a power failure.

C. DOOR-MATES

2.05 The Door-Mate is an optional piece of equipment which can be used as a talkback speaker in remote locations. Keysets are programmed to answer or call the Door-Mate.

3. INSTALLATION SUMMARY

3.01 In addition to the SYSTEM SPECIFICATIONS section, the INSTALLATION section gives complete instructions to plan the installation and install the system.

3.02 A floor plan should be developed in preparation for installation. The mounting board for the Main Distribution Frame (MDF) should be made large enough to accommodate the Key Service Unit (KSU), connectors, external equipment, and allow room for expansion.

3.03 The KSU location should be planned in relation to its environment, power requirements, and the length of the cabling necessary to connect it to the stations.

3.04 The INSTALLATION section contains instructions for installing the following:

- Cabling
- Main Distribution Frame (MDF) Cabling
- Key Service Unit (KSU)
- Keysets
- Door-Mates
- Battery Back-Up
- Other External Equipment

4. MAINTENANCE SUMMARY

4.01 Service is designed for the modular level. In the event of a failure, the defective module should be replaced by the service personnel from their inventory of spare parts.

4.02 All lamps used in the system are solid state, Light-Emitting Diodes (LED's). The use of LED's greatly reduces the possibility of burned out components, due to their low failure rate and minimal power consumption.

4.03 This manual contains a TROUBLESHOOTING section and a DIAGNOSTIC PROGRAMMING section to aid service personnel in diagnosing system problems. The REPLACEMENT PARTS section lists parts available from Inter-Tel.

4.04 Strict quality assurance standards for manufacturing and through field testing provide the system with the high degree of reliability demanded by today's high-technology market.

5. FEATURES AND PROGRAMMING SUMMARY

5.01 The FEATURES section of this manual provides an in-depth explanation of the available features. The SYSTEM PROGRAMMING section provides complete programming procedures. If a feature requires programming or additional equipment, this information is given.

5.02 Features requiring additional hardware include: Station Message Detail Recording (SMDR), Door-Mates, remote contacts, external Music-On-Hold, battery back-up, and external paging.

5.03 Programming is performed through a programming terminal and through the CPU PCB Maintenance Panel. Available features include:

Programming Terminal

- Station Speed Call List
- Keyset Monitor
- Station Monitor
- C.O. Line Monitor
- Station Set-Up Data
- Toll Restriction Programming
- Name Registration
- Message Registration
- Flexible Ringing Arrangement
- Immediate Ringing
- Four Toll Restriction Classes
- Account Codes on Station Message Detail Recording (SMDR)

CPU Maintenance Panel

- C.O. Line Equipping
- DTMF or Dial Pulse Signalling
- Incoming Ring Tone
- FAX Line
- CES Ring Identification
- PBX Access Code
- Intercom Number Assignment
- Door-Mate Answering/Selectable Ring
- Handsfree Answering/Voice Announcing
- System Hold and I-Hold
- Page Zones
- Long Speech Warning
- Toll Restriction Classes
- C.O. Line Restriction
- Direct Ring-in on C.O. Lines
- Calendar and Clock Settings
- System Speed-Dial Number Clear
- Station Speed-Dial Number Clear
- Conference Calls
- Auto Key Feature
- Hold Recall Timer
- Transfer Recall Timer
- Dial Tone Enable/Disable
- "Meet Me" Page and Intercom
- Station Message Detail Recording (SMDR)

SYSTEM SPECIFICATIONS

CONTENTS   PAGE

1. INTRODUCTION

1.01 The 824 system can be configured with 8 C.O. lines and 24 keysets. The whole system operates from the Key Service Unit. Four keyset models are available, including Standard and Display keysets, and Standard and Display keysets with Power Failure Transfer. Optional hardware features include Door-Mates, Station Message Detail Recording output device, battery back-up, external paging, external music, and remote contacts.

1.02 Hardware comprising the entire system is described in this section of the manual. In addition, Section 9 lists system features which have "capacities" (or quantity limits). Photographs of the keysets, Door-Mate, and Key Service Unit are located at the end of this section. For installation methods, refer to the INSTALLATION section.

2. 824 KEYSETS

2.01 A maximum of 24 keysets may be connected to the KSU. Standard and Display keyset models are available, and both may be equipped as Power Failure Transfer units. For photographs, refer to Figures 2-1 and 2-4 on pages 2-12 and 2-15. Keysets are further described in the STATION FEATURES section.

2.02 All keysets are equipped with a pushbutton keypad, eight C.O. line keys, an internal speaker, voice volume control, and a 6dB receiver volume control. The Standard keysets have seven feature keys, while the Display keysets have ten. Both models have 24 Direct Station Selector (DSS) keys, and for Display keysets the DSS keys are equipped with LED's to serve as a Busy Lamp Field (BLF), indicating station status.

2.03 Display keysets have a liquid crystal display (LCD), which shows up to 16 characters. When in use, the display shows date, time, number dialed, messages, intercom call indications, station status, among other applications.

2.04 The Power Failure Transfer (PFT) feature was developed so the system could receive incoming calls during power outages. Under normal conditions, PFT keysets operate like regular keysets. When AC power is lost and battery back-up is not provided or has been drained, the system automatically switches to the Power Failure mode; calls in progress are dropped. Incoming calls ring in directly to the PFT keysets.

2.05 The system assigns one C.O. line to one PFT keyset, in circuit number order, with a maximum of eight per system (not to exceed the number of C.O. lines equipped). The eight C.O. lines are assigned to the first eight station circuits. For example, C.O. circuit 1.1 will ring in on station circuit 1.1, C.O. circuit 1.2 will ring in on station circuit 1.2, etc.

2.06 Two optional devices are available for the keysets. All keysets may be equipped with a plastic instruction stand (part number 828.1008) which extends up from the back of the keyset. This stand is approximately three inches wide and will hold note cards. Available for the Phoenix keyset models is a card directory (part number 809.1092). This device is installed on the bottom of the keyset. A tab extending out on the side of the keyset is used to pull this directory pad out. The user may write in telephone numbers or intercom numbers.

3. DOOR-MATES

3.01 The Door-Mate is an optional piece of equipment which is used to monitor remote areas and serves as a talkback unit. Two units may be installed and keysets must be programmed to access them. When someone rings a Door-Mate, it is identified to station users by its own melody. Door-Mate #1 plays "Home on the Range" and Door-Mate #2 plays "Greensleeves". Volume is controlled on the DOOR PCB. Refer to Figure 2-5 on page 2-16.

4. EQUIPMENT DIMENSIONS

KSU Dimensions		Keyset Dimensions		Door-Mate Dimensions	
Height	19 in.	Height	3 in.	Height	1.5 in.
Width	14 in.	Width	8.5 in.	Width	4 in.
Depth	9 in.	Depth	8.5 in.	Depth	5.5 in.
Weight	30 lbs.	Weight	5 lbs.	Weight	1.5 lbs.

5. KEY SERVICE UNIT (KSU)

A. KSU DESCRIPTION

5.01 The KSU houses the system power supply, nine-slot cardfile, and printed circuit boards (PCB's). It performs all control and switching activities for the system, detects incoming calls, processes data-controlled features, and controls the interaction between keysets, C.O. lines, and intercom paths. Although the KSU may be mounted on a shelf, Inter-Tel recommends to wall mount it. Refer to Figure 2-6 on page 2-17.

5.02 The system is a microprocessor-controlled, space division system. Memory includes 48K bytes ROM and 14K bytes RAM on the Central Processor Unit (CPU) printed circuit board (PCB). Each keyset contains a four-bit microprocessor that communicates with the main microprocessor on the CPU PCB.

5.03 The KSU contains PCB's which control and coordinate the functions of the system. Up to nine PCB's may be installed, depending on the system's configuration; only one PCB is optional. Each PCB is described in Section E.

        1 Central Processor Unit (CPU) PCB
        2 Central Office Interface (COI) PCB's
        3 Key Telephone Interface (KTI) PCB's
        1 Main Distribution Frame (MDF) PCB
        1 Miscellaneous (MISC) PCB
        1 Door-Mate (DOOR) PCB -- optional

B. POWER SUPPLY

5.04 The power supply provides power to the KSU, all stations, and Door-Mates. It requires a 105-125VAC, 60Hz, single-phase commercial power source.

5.05 The power supply may be equipped with battery back-up to support the system during a power outage or "brown-out" condition. Refer to Section 8 for more information.

5.06 One fuse on the power supply has a 6A 250V value. Operating voltages and power outputs are as follows:

    +27VDC   3.2A maximum   Keyset
     +5VDC   1.5A maximum   Logic Levels

NOTE: +5VDC is the only regulated voltage.

C. ENVIRONMENTAL REQUIREMENTS

Requirements	In Operation	In Storage
Temperature	32° to 80° F	4° to 185° F
Humidity (Non-Condensing)	20% to 85%	0% to 85%
Altitude	Up to 10,000 ft.	Up to 40,000 ft.

D. CENTRAL OFFICE (C.O.) LINE CHARACTERISTICS

Characteristics		Protection	
Loss from TELCO to C.O. lines	0dB	Tip-to-Ring	1500V transient
Ringer Equivalence	0.8A	To Ground	1500VAC RMS
Ringing Voltage	40-100VAC		

E. PRINTED CIRCUIT BOARDS (PCB'S)

5.07 Descriptions of each printed board are given below. Photographs of all PCB's are located in the INSTALLATION section.

Central Processor Unit (CPU) PCB

5.08 The system's CPU PCB contains the main controlling microprocessor and its associated control, logic, and memory circuits. This includes the central processor with up to 48K bytes of ROM storage, 14K bytes of RAM storage, system clocks, a battery for data base protection, and a Maintenance Panel for system programming.

5.09 The CPU PCB provides central software control for the KSU. It functions under the control of a generic program, stored in the ROM, which is activated when the system is initially programmed.

5.10 The Battery Jumper on the PCB is shipped in the open position to protect the battery. It should be enabled during installation to protect the data base. If the battery is fully charged, the data base will be protected for a maximum of 25 days. Allow two days for the battery to charge when installing the system.

Central Office Interface (COI) PCB's

5.11 There may be two COI PCB's per system. There are two types available, one with circuitry for two C.O. lines, and one with circuitry for four. If 2-COI PCB's are installed, the PCB inserted into COI slot 1 is assigned lines 1 and 2, top to bottom; slot 2 has lines 5 and 6. With 4-COI PCB's installed, slot 1 has lines 1-4 and slot 2 has lines 5-8.

5.12 Each circuit in the U11 sockets may be designated as a DTMF or a Dial Pulse circuit by inserting the appropriate chip. DTMF chips are assigned part number 4089; Dial Pulse chips have part number 400994. A switch next to each chip must be set to DP for Dial Pulse or PB for DTMF.

5.13 Each circuit has a 3dB C.O. line attenuation pad to reduce the incoming signal on extremely hot lines.

COI Jumper PCB

5.14 The COI Jumper PCB is inserted in the second COI slot when only one COI PCB is installed. It provides the C.O. termination to the backplane.

Key Telephone Interface (KTI) PCB'S

5.15 There may be three KTI PCB's per system. There are two types available; one with circuitry for four keysets and one with circuitry for eight.

5.16 Each of the circuits on a KTI PCB is assigned a circuit number by the PCB's physical location in the KSU and the location of the circuit on the PCB. Intercom numbers are assigned when the system is initialized, but may be changed. Refer to SYSTEM PROGRAMMING.

5.17 A 1.0A power fuse on each KTI PCB protects the KSU from shorts at the stations. Fuse F1, a 0.3A fuse on the speech path, protects the KSU from shorts on the tip and ring wires. The fuses may be obtained from Inter-Tel's Order Processing Department.

Main Distribution Frame (MDF) PCB

5.18 The MDF PCB provides keyset connections, C.O. line connections, a jack to attach the external music-on-hold source, an RS232C communications port, and line separation switches. It also includes connections for Door-Mates and external equipment. For more information on the C.O. line, keyset, and Door-Mate connections, refer to Section 6, MAIN DISTRIBUTION FRAME (MDF) on page 2-7.

5.19 A 1/8-inch mini-phone connector on the front edge of the MDF PCB is for an external music source.

5.20 A 25-pin subminiature "D" female connector on the front of the MDF PCB is the RS232C communications port, used to attach the programming terminal and the Station Message Detail Recording (SMDR) output device. Refer to Section 7, SMDR AND PROGRAMMING TERMINAL REQUIREMENTS.

5.21 The line separation switches are used for troubleshooting C.O. lines. In order to verify a C.O. line connection, the Master-Tel connection (on the MISC block of the MDF) is used with the line separation switches (on the MDF PCB) to connect standard 2500 sets or technician's test sets. By pressing the switch for the trouble line (1-8), it is disconnected from the system.

5.22 The external equipment which can be installed with the system are as follows:

A.   The FAX line monitor allows the system to share a line with the user's FAX machine. When the FAX machine is in use, the system turns on the keyset LED for that line number and denies access to that line.

B.   Page Zone 9 provides voice output connection to the customer-supplied external amplifier. The paging transfer connection is a make/break connection dependent on Zone 9 paging.

C.   There are three remote contacts which serve as ON/OFF switches. They may be connected to electrical devices such as lights, security door locks, or sprinkler systems. They are accessed on Display keysets by pressing the Remote (RMT) key and digits 1, 2 or 3.

Miscellaneous (MISC) PCB

5.23 The MISC PCB includes circuitry to select either the internal or external music-on-hold option; if internal music is selected, there is circuitry to choose one of two synthesized melodies. It also controls the external page volume, selects one of two ringing tones for the keysets, and generates all tones available in the system.

5.24 The MISC PCB provides an AGC circuit which automatically holds the music-on-hold volume to a predetermined level that is slightly lower than the normal voice volume, as required by FCC regulations. Optimal input level is 1 VRMS.

5.25 Switch SW0 (EXT/MSC) is used to select internal/external MOH. Switch SW1 (MSC A/B) selects one of two tunes for MOH. Switch SW2 (HI/LO) sets the ring tone high or low on all keysets.

Door-Mate Interface (DOOR) PCB

5.26 If optional Door-Mate units are installed, the DOOR PCB provides circuitry to connect up to the units. It includes a volume control for the Door-Mate paging and talkback functions. Door-Mates are terminated through the MISC block on the MDF and the MDF PCB.

6. MAIN DISTRIBUTION FRAME (MDF)

6.01 Connections between incoming C.O. lines, keysets, and the PCB's in the KSU are made on the Main Distribution Frame (MDF), which is made up of industry-standard connection blocks.

6.02 First, two-pair cable is run to all keysets and is terminated on four-conductor modular jack assemblies. The other end of each cable is terminated on a designated MDF station (KTI) block. Each KTI block supports up to 12 keysets.

6.03 Then one-pair cable is run to the two Door-Mate units. The other end is terminated on the MDF's miscellaneous (MISC) block. Other external hardware, such as paging equipment and remote contacts, is also terminated on the MISC block.

6.04 Using a 25-pair cable, C.O. lines are connected to the MDF C.O. lines block from the TELCO RJ-21X or RJ-14C connector.

6.05 Next, the KSU PCB's are connected to the MDF blocks. Four special cables must be made. Using 25-pair cable, a 50-pin female amphenol connector is attached to the KSU end of each cable; the other end is terminated on the designated block--one C.O. line block, two KTI blocks, and one MISC block. The interface is completed by plugging the female connector into the corresponding male connector on the MDF PCB. The MDF PCB completes the connection to the KTI, COI, MISC and DOOR PCB's.

7. SMDR AND PROGRAMMING TERMINAL REQUIREMENTS

7.01 The following requirements must be met for the SMDR output device or a programming terminal to be connected to the system.

A. Both devices must be RS232C compatible and have a male 25-pin subminiature "D" connector.

B. Both must be formatted for serial ASCII with no parity and must have full-duplex communications capability.

C. Both devices must communicate at 300 baud.

8. BATTERY BACK-UP

8.01 Customer-provided batteries may be connected to the system to prevent loss of service in the event of a power failure. When the power supply off, the battery back-up function is automatically connected. A warning bell or light can be hooked up to signal the user when power drops.

```
***************************************************
*                    CAUTION                      *
* If the power supply ON/OFF switch is turned     *
* OFF, battery back-up is not enabled.  To test   *
* this feature, unplug the AC power cord.         *
***************************************************
```

8.02 The 824 system requires a 24VDC battery pack and must use lead calcium grid batteries which have a 2.27V charge per cell. To obtain 24 volts, batteries must be connected in series, must be of the same type and have the same amp-hour rating, and must have the same level of charge/discharge.

8.03 The batteries are trickle-charged by a float voltage of 27.3VDC. Calculation is made by multiplying the number of cells (12) by the charge per cell (2.27V).

```
***************************************************
*                    CAUTION                      *
* Battery discharge time could vary depending     *
* on the battery manufacturer's specifications.   *
***************************************************
```

8.04 Two different battery sizes may be used. Battery back-up is selected by setting the INTERNAL/EXTERNAL switch on the front of the power supply. The EXTERNAL switch selects large batteries which are connected outside of the KSU. The INTERNAL switch selects small batteries which are mounted inside the KSU with the brackets provided.

8.05 If you select the smaller batteries, you are limited to the amount of system support available. Two 12VDC batteries may be installed and the dimensions which fit the mounting brackets are 3-3/4" high, 2-5/8" wide, and 6" deep.

8.06 Before purchasing the batteries, calculate the amp/hour rating. This is determined by the power needed to run the system and the length of time the battery pack must support the system if AC power fails. Calculate the rating as follows:

(1) Determine the minimum and maximum amounts of current drawn by each PCB in the KSU, using the following currents. The minimum values represent the circuitry in an idle condition (no calls in progress). Maximum values represent the circuitry in an active condition. The CPU figures include the current drain caused by the power supply circuitry.

PCB	Minimum (amps)	Maximum (amps)
CPU	.136	.138
4-KTI (4 Display keysets)	.334	.415
8-KTI (8 Display keysets)	.478	.595
2-COI	.085	.087
4-COI	.085	.087
MISC	.110	.112
DOOR	.015	.017

(2) Add the currents of all PCB's to determine the total system current. Be sure to multiply the individual PCB currents by the number of identical PCB's in the system.

(3) Using the chart below, first locate the calculated battery current in the left column. Then move across in that row until you reach the column with the desired back-up hours. The figure shown is the battery amp-hour rating to ask for when purchasing the batteries.

Back-Up Time (Hrs)

		1	2	3	4	5	6	7	8	9	10
Battery Current (amps)	1	2	3.5	4	5.5	6	8.5	9.5	10	10.5	11
	2	4	7	8	10.5	12	17	19	20	21	22
	3	6	10	12	16	18	25	28	30	31.5	33
	4	8	14	16	21	24	34	37	40	42	44

9. SYSTEM FEATURE CAPACITIES

9.01 Below is a summary of system feature capacities; that is, features which have usage or installation limitations.

<u>Keysets</u> (maximum combinations)	24
Standard Keysets	24
Display Keysets	24
Power Failure Transfer Keysets (Standard or Display)	8

<u>Speech Channels</u>

C.O. Lines	8
Intercom Paths	2
Paging Paths	1
Music-On-Hold Source	1

<u>Features with Capacities</u>

Paging	
Internal Zone Page	3
External Zone Page	1
All-Page	1
Speed Calling	
System Lists	1
Station Lists	24
Numbers per System List	100
Numbers per Station List	24
Digits per Entry	16
Simultaneous 3-party Conference Calls	2 or 4 (See Note)
Queueing per C.O. Line	5
Call Waiting	
Intercom Call Waiting Initiated per Station	1
Intercom Calls Waiting at a Station	1
C.O. Calls Waiting at one Station	8
Toll Restriction	
Allowed Area Codes	30
Classes of Service	4
Designated "WATS" Lines	8

NOTE: The number of simultaneous conferences depends on the type of conference. There can be a maximum of two simultaneous conferences if each has two inside parties and one outside party, because it uses the two intercom paths. If each conference has one inside party and two outside parties, it is possible to have four simultaneus conferences, using the eight C.O. lines available.

FIGURE 2-1.   824 PHOENIX DISPLAY KEYSET
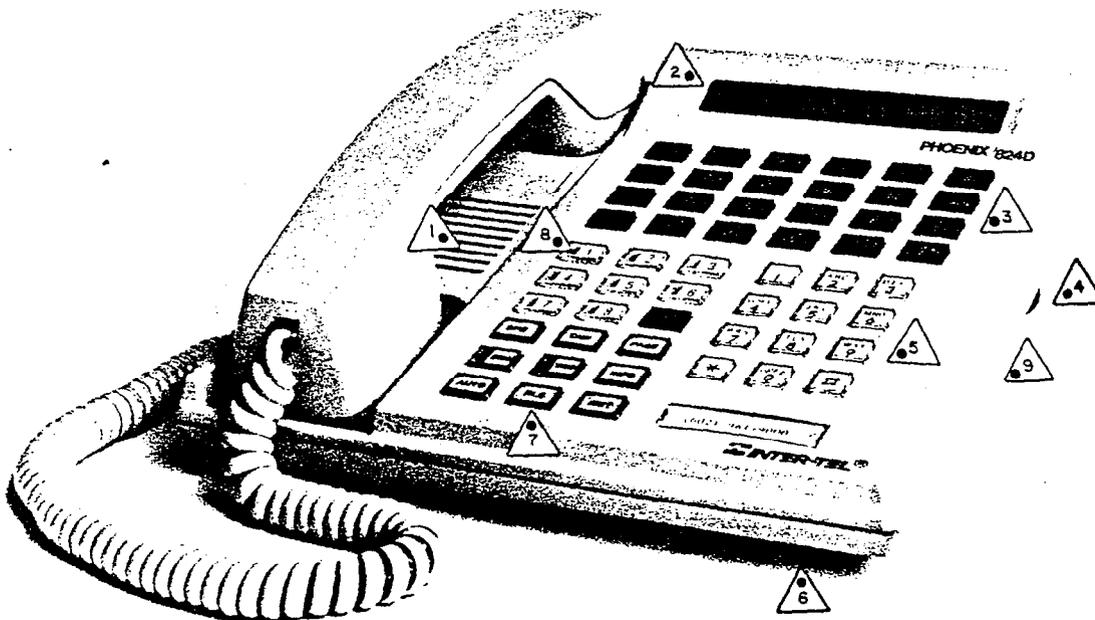
△1	INTERNAL SPEAKER		△5	PUSHBUTTON KEYPAD
△2	16 CHARACTER DISPLAY		△6	HANDSFREE ANSWERBACK MICROPHONE
△3	24 DIRECT STATION SELECT/ BUSY LAMP FIELD KEYS		△7	10 SPECIAL FEATURE KEYS
△4	VOICE VOLUME CONTROL		△8	8 C.O. LINE KEYS
			△9	RECEIVER VOLUME CONTROL

FIGURE 2-2.   824 HITEC DISPLAY KEYSET

1	24 DIRECT STATION SELECT/ BUSY LAMP FIELD KEYS	5	RECEIVER VOLUME CONTROL
2	16 CHARACTER DISPLAY	6	10 SPECIAL FEATURE KEYS
3	8 C.O. LINE KEYS	7	HANDSFREE ANSWERBACK MICROPHONE
4	VOICE VOLUME CONTROL	8	PUSHBUTTON KEYPAD
		9	INTERNAL SPEAKER

FIGURE 2-3.   824 PHOENIX STANDARD KEYSET

△ 1	PUSHBUTTON KEYPAD	△ 5	HANDSFREE ANSWERBACK MICROPHONE
△ 2	24 DIRECT STATION SELECT KEYS	△ 6	7 SPECIAL FEATURE KEYS
△ 3	VOICE VOLUME CONTROL	△ 7	C.O. LINE KEYS
△ 4	RECEIVER VOLUME CONTROL	△ 8	INTERNAL SPEAKER

FIGURE 2-4.   824 HITEC STANDARD KEYSET
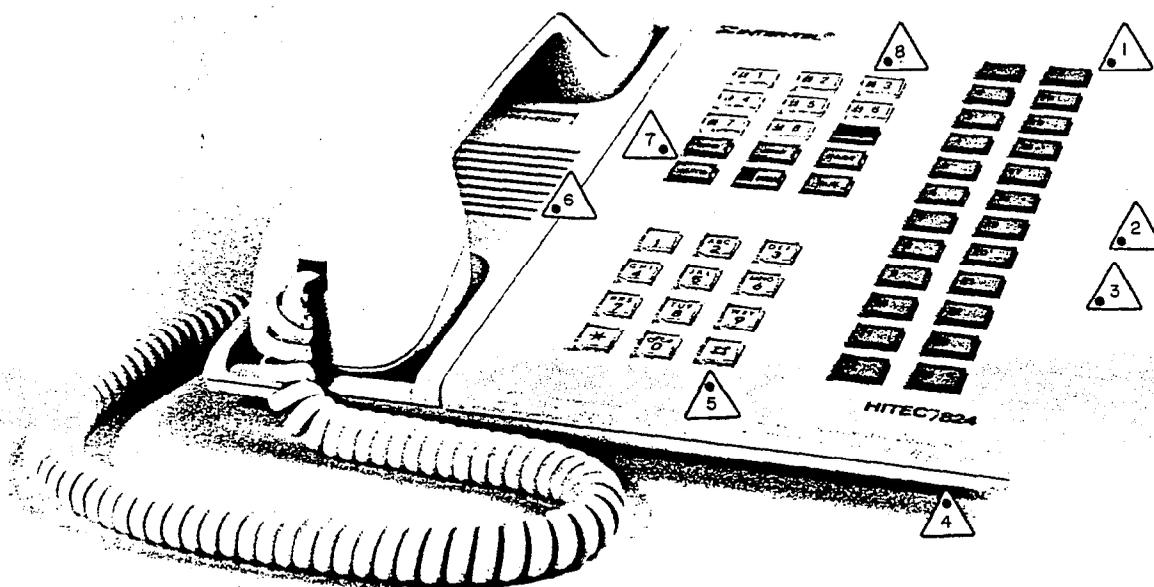
△1	24 DIRECT STATION SELECT KEYS	△5	PUSHBUTTON KEYPAD
△2	VOICE VOLUME CONTROL	△6	INTERNAL SPEAKER
△3	RECEIVER VOLUME CONTROL	△7	7 SPECIAL FEATURE KEYS
△4	HANDSFREE ANSWERBACK MICROPHONE	△8	8 C.O. LINE KEYS

FIGURE 2-5.   DOOR-MATE
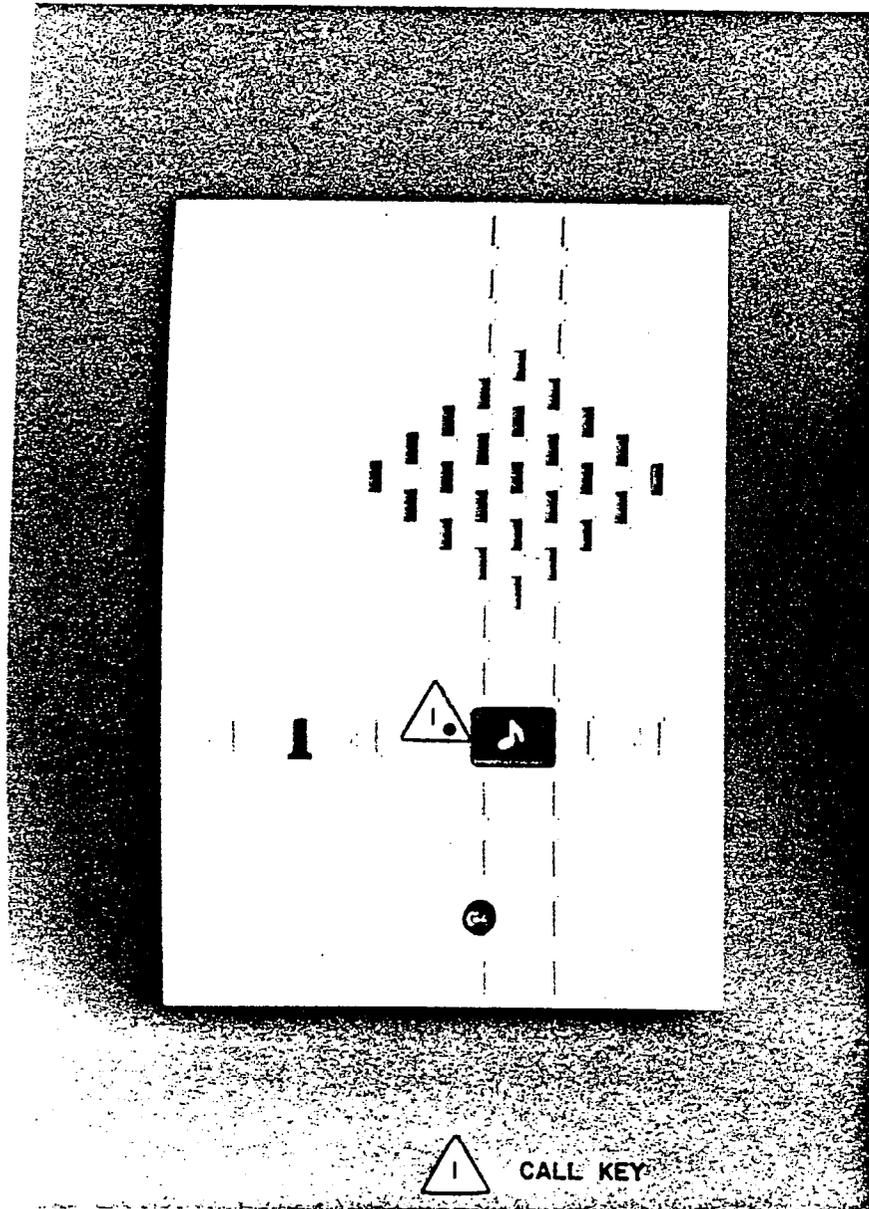
FIGURE 2-6.   KEY SERVICE UNIT (KSU)
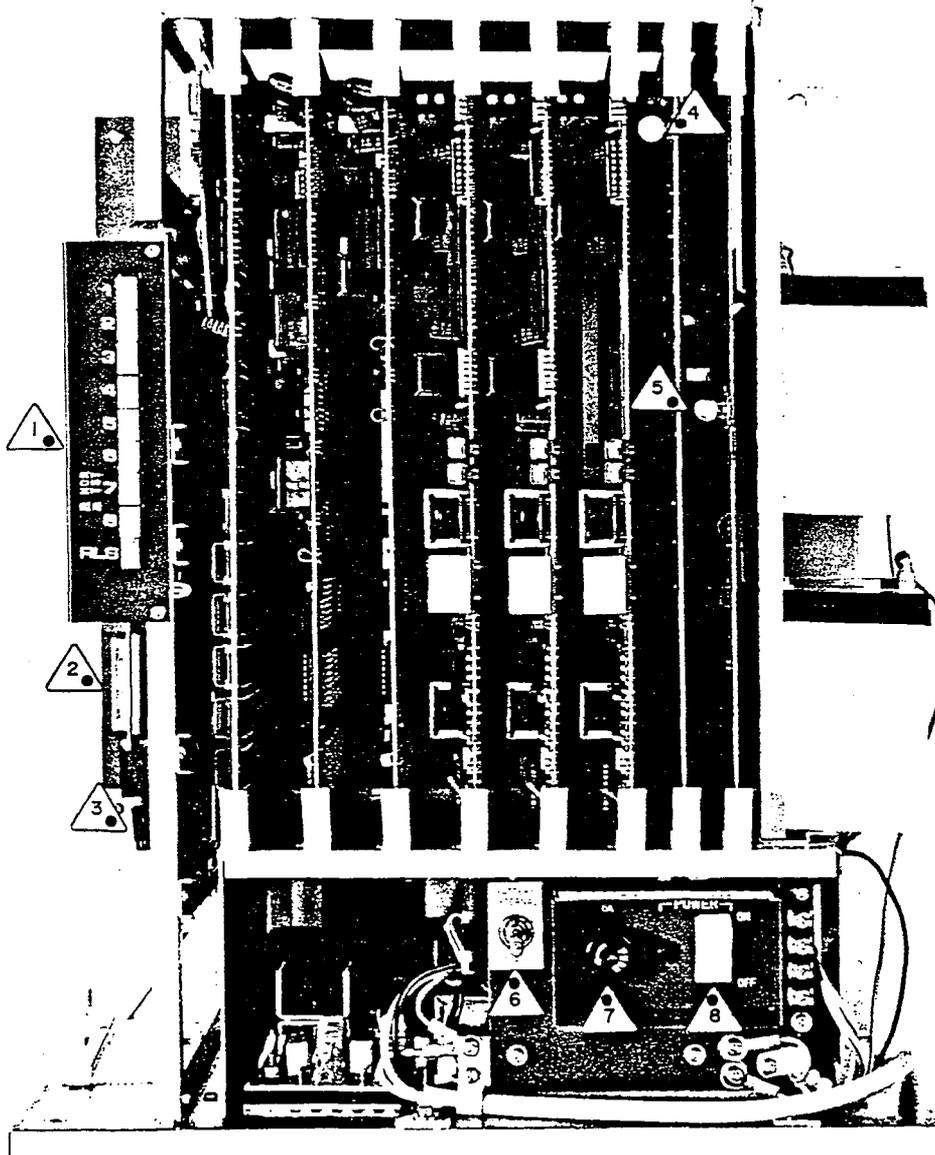
1	LINE SEPARATION SWITCHES	5	DOOR-MATE VOLUME CONTROL
2	RS232C INTERFACE	6	BATTERY BACK-UP SELECT SWITCH
3	MOH PHONE JACK	7	AC LINE FUSE
4	EXTERNAL PAGE VOLUME CONTROL	8	AC POWER SWITCH

INSTALLATION

CONTENTS   **PAGE**

1. INTRODUCTION

1.01 This section describes the recommended procedures for installing the 824 system hardware. It includes suggestions for planning the installation, preparing the site, and providing the necessary cable, connectors, jacks, etc. Refer to SYSTEM SPECIFICATIONS for hardware descriptions.

2. SITE PLANNING

2.01 Suggestions for planning the 824 installation are listed on the next page. They include Key Service Unit (KSU) site planning and tools and supplies required.

A. KEY SERVICE UNIT (KSU) SITE PLANNING

2.02 Prior to installing the 824 equipment, select a centralized location for the KSU and Main Distribution Frame (MDF) which will minimize cable run lengths from each station and provide the proper environmental conditions.

A. Availability to 105-125VAC, 60Hz single-phase commercial power.

NOTE: This must be a dedicated, separately fused AC input for proper operation. It is highly recommended that the ground wire also be dedicated to this outlet. All three wires (power, neutral, and ground) should be run directly from the breaker box to the KSU outlet.

B. Select the KSU location to minimize cable run length. All keysets connected to the system must not exceed the loop limit of 40 ohms or 800 feet (using 24 gauge wire). Door-Mate units should not exceed the loop limit of 20 ohms or 400 feet.

C. The selected location should not be exposed to direct sunlight, high humidity, heat radiation, dust, or strong magnetic fields (such as heavy motors and large copy machines).

D. The maximum room temperature is 80°. The temperature range inside the KSU must be within 32° to 104°F. To maintain this limit, the equipment should be located in a climate controlled room.

E. Ample air space should be provided for the KSU since the power supply is convection cooled.

F. When wall-mounting any equipment, select a wall which is strong enough to support twice as much weight as the equipment to be mounted. The KSU weighs approximately 30 pounds; the keyset weighs approximately five pounds.

G. The physical space required for the Main Distribution Frame (MDF) will not exceed a 3 X 4-foot area. This area is sufficient to wall mount the KSU, all connection blocks, and external equipment (such as paging amplifiers and equipment used with remote contacts).

H. Allow room for the SMDR output device and system back-up batteries.

B. **TOOLS AND SUPPLIES REQUIRED**

A. A digital voltmeter is required to check the power supply, and ensure correct wiring of the modular jack assemblies. Accuracy of the meter must be ±0.25% or better.

B. An AMP MI-1 Butterfly connector machine or equivalent is used to assemble the 50-pin amphenol connectors for the MDF PCB.

C. Supply 25-pair cable and 50-pin female amphenol connectors to make interface cables connecting the MDF blocks to the four connections on the MDF PCB.

D. Supply one-pair cable to run from the MDF to the Door-Mates, if included.

E. Supply two-pair (four-conductor) cable to run from the MDF to the individual stations.

F. Supply up to 24 four-conductor modular jack assemblies to connect the keysets to the cable.

G. Supply standard 66M150 type blocks and bridging clips.

H. Supply standard telephone hand tools.

3. CABLING

3.01 Standard floor plans should be developed to aid in proper station wiring in a star configuration from the KSU. Prepare a cable identification plan using station circuit numbers.

3.02 Circuit numbers are assigned as follows. The system can hold up to three KTI PCB's; each supports four or eight keysets. The first digit of the circuit number identifies one of the PCB slots. The second digit identifies one of the circuits on the PCB. For example, circuit number 3.7 identifies the seventh circuit on the third KTI PCB.

A. RUNNING CABLE

3.03 Run two-pair cable to each station location shown on the floor plan. Both ends of every cable must be labeled with the circuit number. Run one-pair cable to each Door-Mate location. Follow these guidelines:

A. Avoid cable runs parallel to fluorescent light fixtures or AC lines not in conduit. If they are unavoidable, run the cable perpendicular to the obstacles.

B. Do not run cables inside electrical conduit already occupied by AC power cable.

C. Do not run cables near equipment with electric motors or past strong magnetic fields, such as large copy machines or arc welding equipment.

D. Do not place cables where they will be stepped on or rolled over by office furniture.

E. Hot pre-wires are NOT permitted. They act like an antenna and may transmit data errors to the KSU, causing the corresponding KTI PCB to reset repeatedly.

F. Refer to Section 4E, LOOP RESISTANCE TESTS, page 3-13.

B. MODULAR JACKS

3.04 Terminate the station end of the cable on the four-conductor modular jack assemblies, as shown below in Figure 3-1.

FIGURE 3-1. KEYSET MODULAR JACK ASSEMBLY WIRING

---
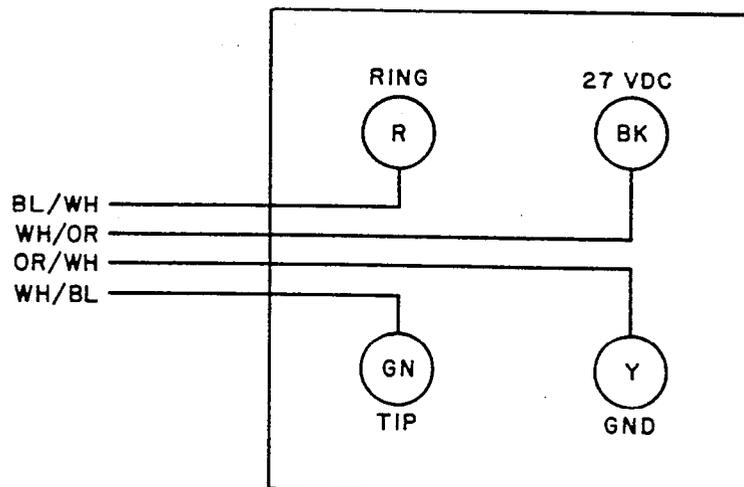
4. ASSEMBLING THE MAIN DISTRIBUTION FRAME (MDF) BACKBOARD

4.01 The MDF is the point at which the KSU, the stations, and the C.O. lines are connected to one another. It is extremely important that this be done accurately.

4.02 The MDF backboard should be constructed to present a neat appearance, readily facilitate changes, have cables of proper length, and be correctly labeled. A 3X4-foot 3/4-inch plywood backboard should be adequate to mount the connector blocks, KSU, and external equipment. All connector blocks should be clearly labeled. Refer to Figure 3-2 below. This section includes:

    A. Connecting C.O. Lines to the MDF
    B. Connecting Station Cables to the MDF
    C. Connecting Door-Mates and External Equipment to the MDF
    D. Loop Resistance Tests

FIGURE 3-2. MAIN DISTRIBUTION FRAME LAYOUT
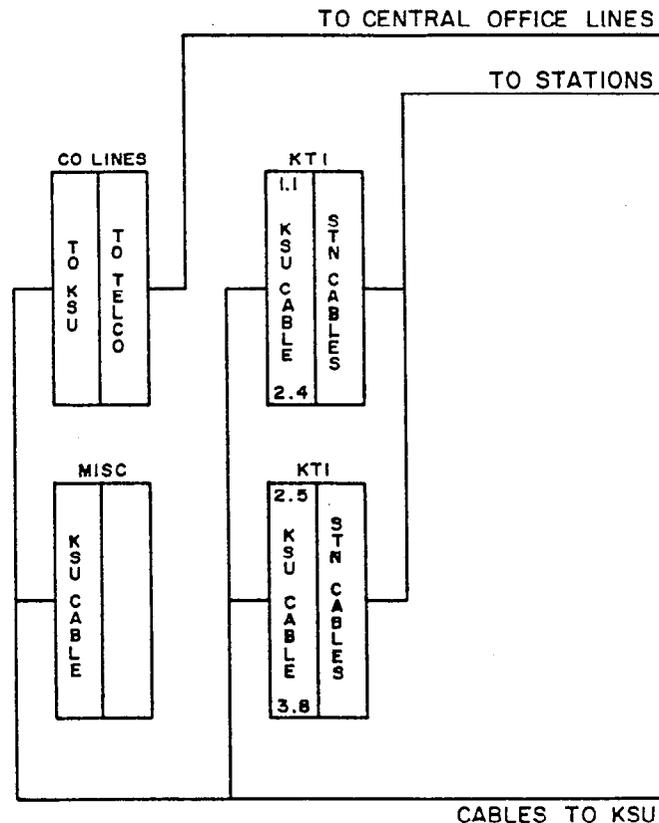
NOTE : ALL BLOCKS ARE 66M 150 TYPE

A. CONNECTING C.O. LINES TO THE MDF

4.03 Central Office (C.O.) lines are typically terminated on an RJ-21X or RJ-14C connector. Then you terminate the lines on the MDF. Refer to Figure 3-3 on the next page.

(1) One connection block on the MDF is dedicated for all C.O. line connections. Terminate a 25-pair cable from the right side of this block to the RJ-21X or RJ-14C. Label both ends.

(2) Make an MDF PCB termination cable using 25-pair cable. Use enough cable to reach from the KSU to the MDF:

    a. Attach a 50-pin female amphenol connector to the KSU end of the cable.

    b. On the MDF end of the cable, terminate the wires on the left side of the C.O. Lines block.

    c. Use bridging clips to complete the connections.

    d. Leave the PCB end of the cable hanging until the KSU is installed.

4.04 <u>Lightning Protection:</u> To ensure adequate lightning protection, install gas discharge tubes to ground on each C.O. line. This must be done external to the system on the Central Office side of the line. This protection should give energy absorption and filter low-level surge potentials on the C.O. lines.

FIGURE 3-3.   C.O. LINE TERMINATIONS ON THE MDF

WH/BL	TI
BL/WH	RI
WH/OR	T2
OR/WH	R2
WH/GN	T3
GN/WH	R3
WH/BR	T4
BR/WH	R4
WH/SL	T5
SL/WH	R5
R/BL	T6
BL/R	R6
R/OR	T7
OR/R	R7
R/GN	T8
GN/R	R8
R/BR	
BR/R	
R/SL	
SL/R	

GN/V
V/BR
BR/V
V/SL
SL/V

TO C.O. CONNECTOR
ON MDF PCB

TO TELCO
RJ-21X
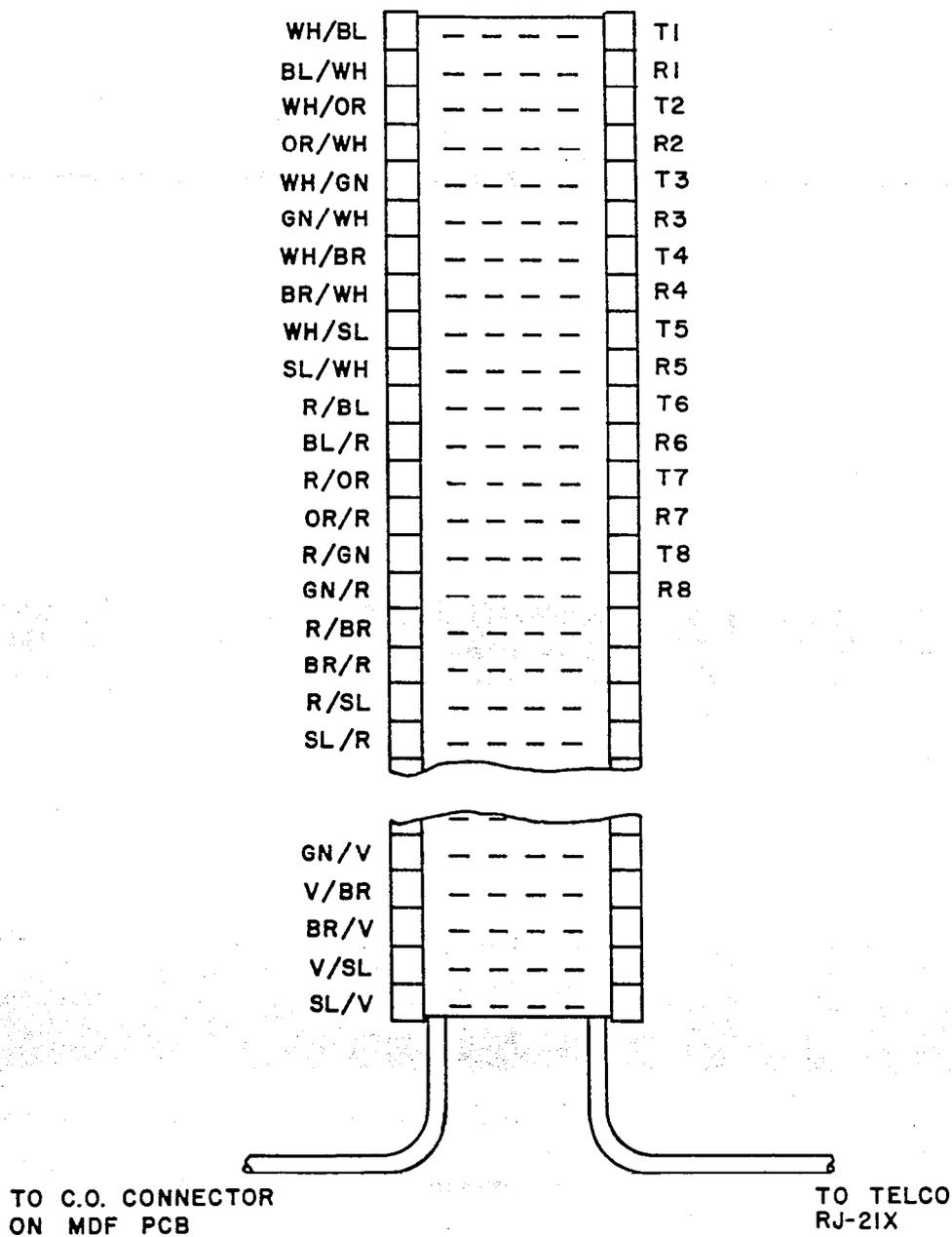
B. CONNECTING STATION CABLES TO THE MDF

4.05 After station cables are run, they are connected to the MDF as described below.   Refer to Figure 3-4 and Figure 3-5 on the following pages.

   (1) Ensure both ends of the cable are labeled with the circuit number.

   (2) Terminate each station cable on the right side of the designated KTI block.

   NOTE: Each KTI block supports up to 12 stations.

   (3) Make an MDF PCB termination cable using 25-pair cable. Use enough cable to reach from the KSU to the MDF:

   a.   Attach a 50-pin female amphenol connector to the KSU end of the cable.

   b.   On the MDF end of the cable, terminate the wires on the left side of the KTI block.

   c.   DO NOT use bridging clips at this point. Leave the PCB end of the cable hanging until the KSU is installed.

FIGURE 3-4.   STATION CABLE TERMINATIONS
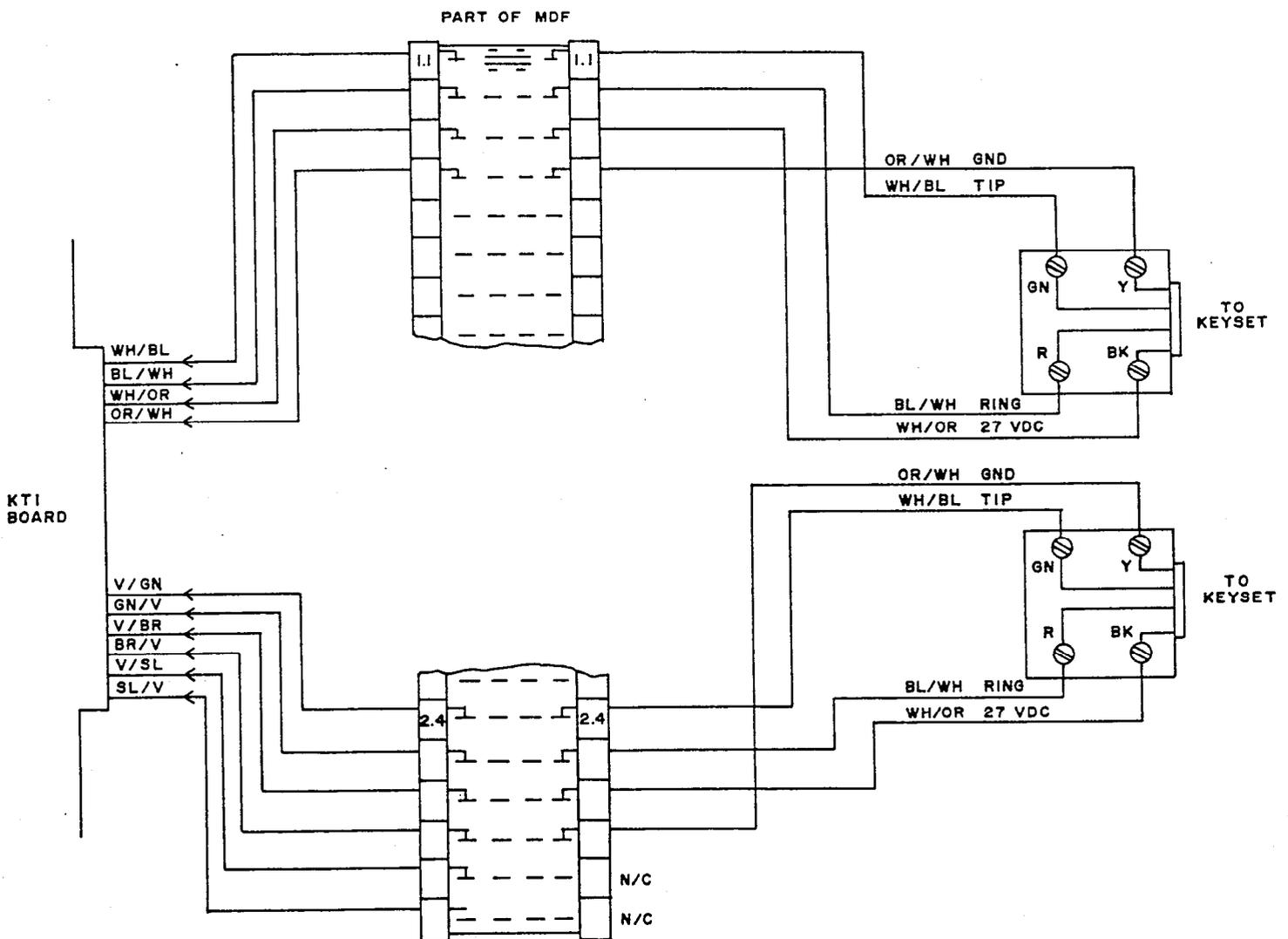
FIGURE 3-5.   STATION CABLE TERMINATIONS ON THE KTI BLOCK

Terminal Number	Cable Pair	Terminal Designation	Function	Station Circuit Number	
26	WH – BL	T1	TIP CKT 1	1.1	2.5
1	BL – WH	R1	RING CKT 1		
27	WH – OR	+1	+38V CKT 1		
2	OR – WH	G1	GROUND CKT 1		
28	WH – GN	T2	TIP CKT 2	1.2	2.6
3	GN – WH	R2	RING CKT 2		
29	WH – BR	+2	+38V CKT 2		
4	BR – WH	G2	GROUND CKT 2		
30	WH – SL	T3	TIP CKT 3	1.3	2.7
5	SL – WH	R3	RING CKT 3		
31	R – BL	+3	+38V CKT 3		
6	BL – R	G3	GROUND CKT 3		
32	R – OR	T4	TIP CKT 4	1.4	2.8
7	OR – R	R4	RING CKT 4		
33	R – GN	+4	+38V CKT 4		
8	GN – R	G4	GROUND CKT 4		
34	R – BR	T5	TIP CKT 5	1.5	3.1
9	BR – R	R5	RING CKT 5		
35	R – SL	+5	+38V CKT 5		
10	SL – R	G5	GROUND CKT 5		
36	BK – BL	T6	TIP CKT 6	1.6	3.2
11	BL – BK	R6	RING CKT 6		
37	BK – OR	+6	+38V CKT 6		
12	OR – BK	G6	GROUND CKT 6		
38	BK – GN	T7	TIP CKT 7	1.7	3.3
13	GN – BK	R7	RING CKT 7		
39	BK – BR	+7	+38V CKT 7		
14	BR – BK	G7	GROUND CKT 7		
40	BK – SL	T8	TIP CKT 8	1.8	3.4
15	SL – BK	R8	RING CKT 8		
41	Y – BL	+8	+38V CKT 8		
16	BL – Y	G8	GROUND CKT 8		
42	Y – OR	T9	TIP CKT 9	2.1	3.5
17	OR – Y	R9	RING CKT 9		
43	Y – GN	+9	+38V CKT 9		
18	GN – Y	G9	GROUND CKT 9		
44	Y – BR	T10	TIP CKT 10	2.2	3.6
19	BR – Y	R10	RING CKT 10		
45	Y – SL	+10	+38V CKT 10		
20	SL – Y	G10	GROUND CKT 10		
46	V – BL	T11	TIP CKT 11	2.3	3.7
21	BL – V	R11	RING CKT 11		
47	V – OR	+11	+38V CKT 11		
22	OR – V	G11	GROUND CKT 11		
48	V – GN	T12	TIP CKT 12	2.4	3.8
23	GN – V	R12	RING CKT 12		
49	V – BR	+12	+38V CKT 12		
24	BR – V	G12	GROUND CKT 12		

C. CONNECTING DOOR-MATES AND EXTERNAL EQUIPMENT TO THE MDF

4.06 The MDF PCB has a Miscellaneous connector which provides the interface from the KSU to the MDF for Door-Mates, the FAX line monitor, external paging equipment, three remote contacts, the Master-Tel connection, and the KSU frame ground. Refer to SYSTEM SPECIFICATIONS for descriptions of these features.

4.07 To connect the equipment to the MDF, refer to Figure 3-6 on the next page. Then proceed as follows:

(1) Terminate the equipment on the right side of the MISC block.

(2) Make an interface cable to connect the MISC block to the KSU. Use 25-pair cable long enough to reach.

a. Attach a female 25-pair amphenol connector to the KSU end of the cable. Label both ends.

b. Connect the other end to the left side of the MISC block.

c. Leave the MDF PCB end of the cable hanging until the KSU is installed.

(3) Install bridging clips for all connections except the Door-Mates.

FIGURE 3-6.   MISCELLANEOUS TERMINATIONS ON THE MISC BLOCK
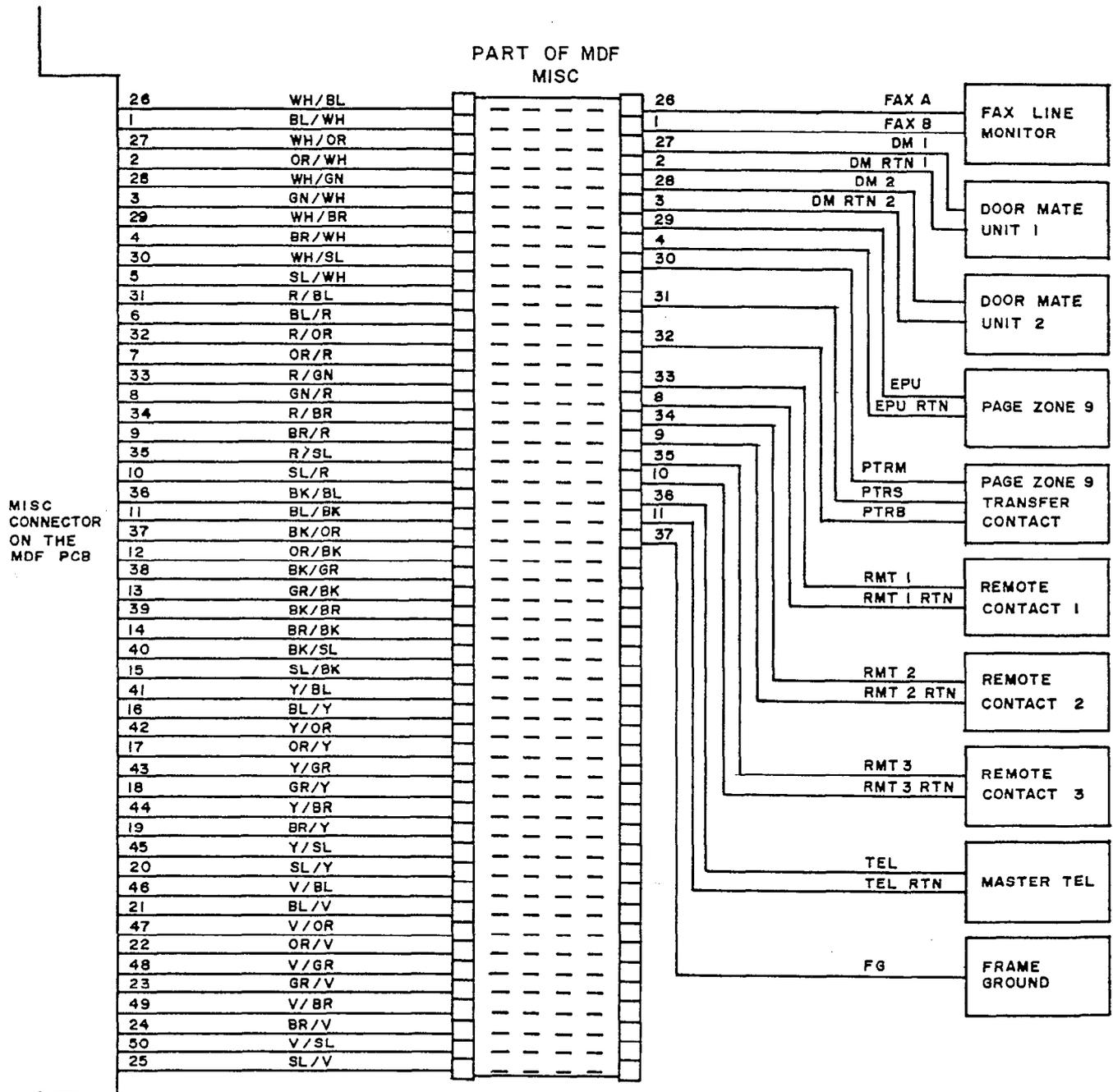
D. LOOP RESISTANCE TESTS

4.08 Keysets must not exceed the loop limit of 800 feet or 40 ohms, using 24 AWG wire. The loop limit applies to any station, even with a Power Failure Transfer keyset. Door-Mate units must not exceed loop limits of 400 feet or 20 ohms.

4.09 Excessive and/or high resistance connections reduce the cable lengths. Using larger gauge (smaller AWG number) or multiple 24 AWG wires for the power pair increases these cable lengths. Both pairs must maintain proper loops.

Station Loop Resistance Test

(1) Ensure bridging clips have not been installed at the MDF and there are no keysets connected to the cables being tested.

(2) Place a short across the RED and GREEN wires on the modular jack.

(3) On the KTI block of the MDF, measure across the WHITE/-BLUE BLUE/WHITE pair.

(4) This should read under 40 ohms. If it is higher, use heavier gauge wire or double up by running another pair.

(5) Remove the short after the test is complete.

(6) Repeat this test for the other pair. Place a short across the YELLOW and BLACK wires on the jack and measure across the WHITE/ORANGE ORANGE/WHITE pair.

Door-Mate Loop Resistance Test

(1) Place a short across the two Door-Mate wires.

(2) Measure the Door-Mate's two wires on the MISC block of the MDF.

(3) This should read under 20 ohms. If it is higher, use heavier gauge wire or double up by running another pair.

(4) Remove the short after the test is complete.

KTI Bridging Clips

4.10 After testing the loop resistances and correcting cabling problems, complete the terminations on the MDF by placing bridging clips on the KTI blocks and MISC block.

```
***********************************************
*                 CAUTION                     *
* Hot pre-wires are not permitted.  Do not    *
* bridge cables with unequipped stations.     *
* Failure to comply may cause data errors,    *
* which in turn will cause the corresponding  *
* KTI PCB to reset repeatedly.                *
***********************************************
```

5. KEY SERVICE UNIT (KSU) INSTALLATION

5.01 This section includes the following;

    A. Unpack the Equipment
    B. Power Supply Installation
    C. Printed Circuit Board (PCB) Installation
    D. Complete the KSU Installation

A. UNPACK THE EQUIPMENT

(1) Unpack the equipment, check it against the packing slip, and inspect it for damage. If equipment is missing or damaged, contact Inter-Tel's Order Processing Department immediately.

(2) Check all PCB assemblies as follows:

    a. Handle all PCB's by the edges only. They contain static-sensitive components.

    b. Check the solder side of each PCB. Remove any shipping foam or tape attached.

    c. Inspect each PCB for shorted components.

    d. All PCB's except for the Central Processor Unit (CPU) PCB are fully loaded. If any circuits are missing, contact Inter-Tel's Field Service Department.

    e. The CPU PCB has five EPROMS. Socket U32 should be empty. Check that the EPROMS are in the sequential positions shown in Figure 3-10 on page 3-23.

    f. Return all PCB's to their protective anti-static bags until they are installed in the KSU.

B. POWER SUPPLY INSTALLATION

5.02 The power supply assembly is shipped installed in the system. Instructions are given for installation in case replacement is necessary.

```
**************************************************
*                   CAUTION                      *
*  Take care when working inside the KSU.        *
*  There may be live voltages.                   *
**************************************************
```

Installation

(1) Remove the KSU's cover by removing two screws at the top, two screws at the bottom, and lifting it off.

(2) If the power supply is shipped installed in the cabinet, make sure all connections are correct. Refer to Figures 3-7 and 3-8 on the following pages.

OR, (3) If the power supply is not installed:

    a. Remove the two screws at the bottom of the cabinet.

    b. From the front, slide the power supply assembly into the lower right corner of the cabinet. Secure it with the two screws. Refer to SYSTEM SPECIFICATIONS, Figure 2-6, page 2-17.

    c. Connect the power supply cable from the power supply unit to the backplane terminals, located on the right side of the KSU. Refer to Figure 3-8 on page 3-18.

Label	Wire
GND (+24V)	Blue
GND (+5V)	Grey
+5V	Yellow
-24V	Orange

    NOTE: Each connection also has a Grey wire which leads to the noise filter on the side of the KSU.

    d. Double check all connections to make sure they are correct.

    e. The AC power cord enters from the bottom front and connects behind the switch panel. It is held in place by a plastic stress relief strap. Refer to Figure 3-7.

FIGURE 3-7. SYSTEM POWER SUPPLY
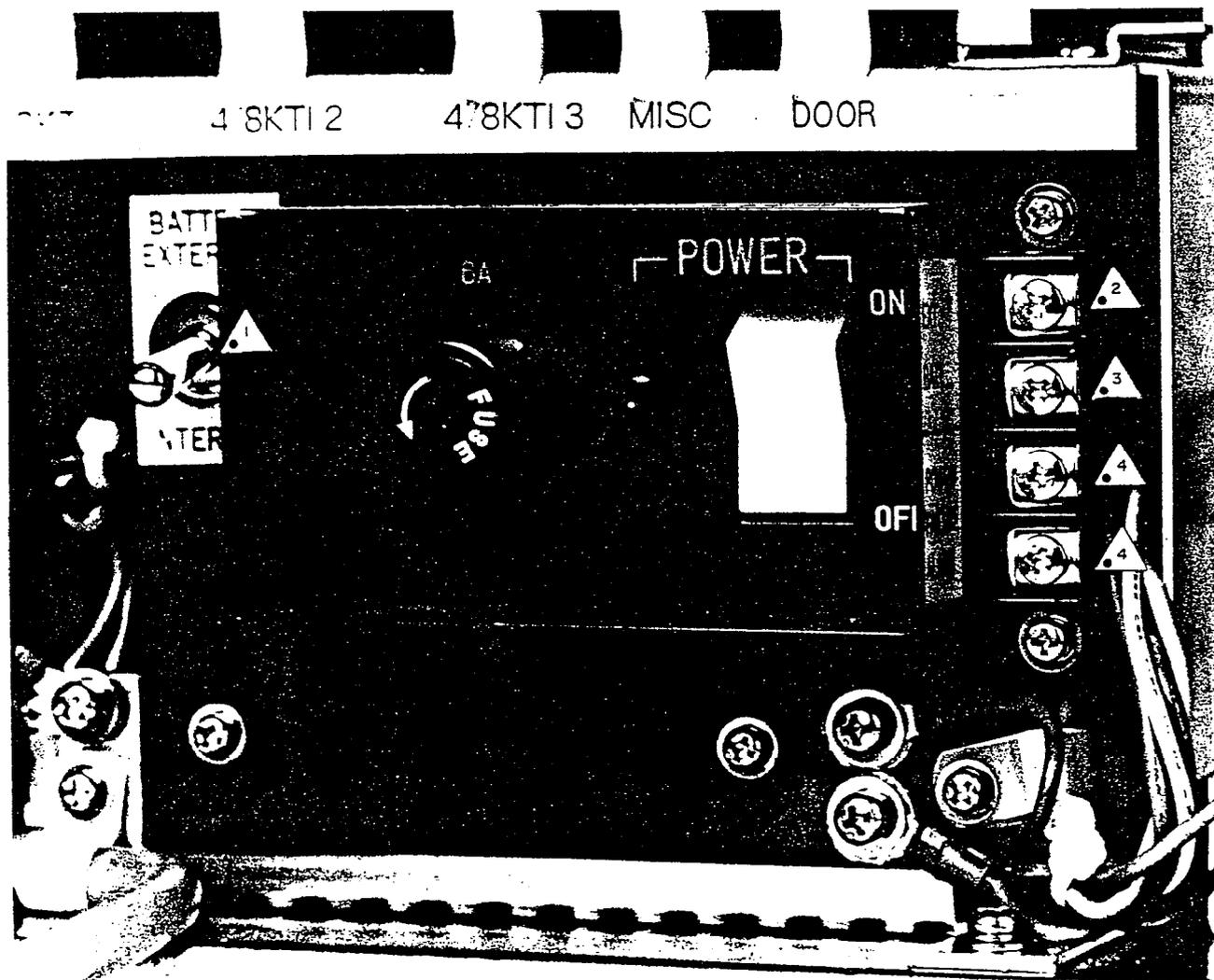
⚠1 BATTERY BACKUP SELECT SWITCH

⚠2 (+) EXTERNAL BATTERY CONNECTION

⚠3 (—) EXTERNAL BATTERY CONNECTION

⚠4 POWER FAILURE ALARM CONTACTS

FIGURE 3-8.   POWER SUPPLY CONNECTIONS ON THE BACKPLANE
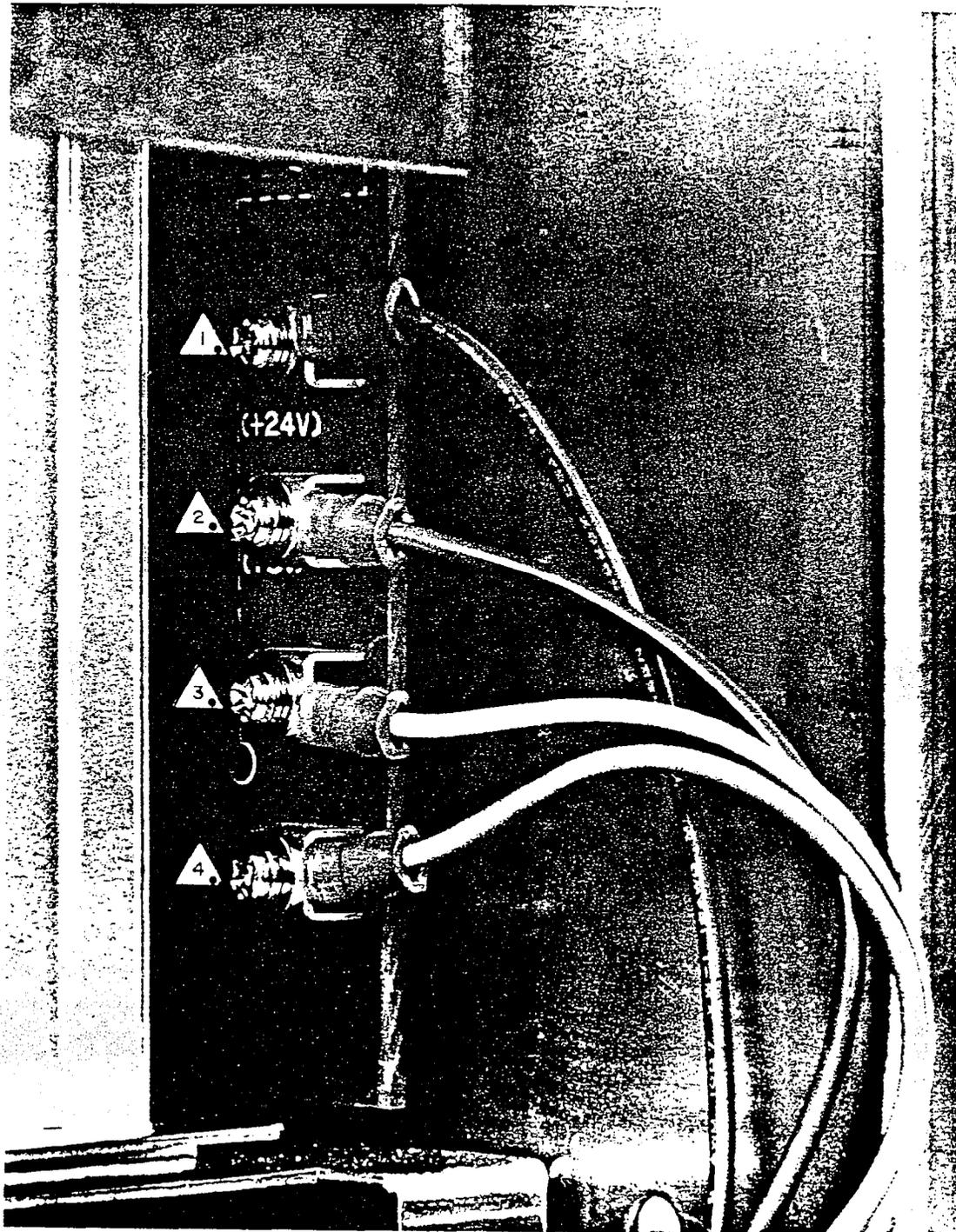
△1	+24V GROUND	△3	+5V
△2	+5V GROUND	△4	+24V

Power Supply Electrical Test

(1) Make sure the power supply 6A 250V fuse is in good working order.

(2) The power supply ON/OFF switch must be in the OFF position. Also make sure there are no PCB's installed in the cardfile at this time.

(3) Plug the power cord into the dedicated 105-125VAC, 60Hz outlet.

(4) Set the ON/OFF switch to the ON position.

(5) Locate the test points on the right side of the backplane. Using a digital voltmeter, measure the voltages. Refer to Figure 3-8. Ensure the following tolerances:

Voltages	Range
+24VDC	23.5V to 27.5V
+5VDC	4.9V to 5.1V

(6) If the readings are not within the tolerances, **DO NOT PROCEED.** Contact Inter-Tel's Field Service Department for assistance.

(7) If the voltages are within the specified limits, turn off the power and unplug the AC power cord.

Grounding Requirements

5.03 The KSU power cord should be connected to its dedicated AC circuit. Proceed as follows:

(1) Mount a Grounding Terminal on the MDF backboard.

(2) Run a solid #10 gauge wire from a cold-water pipe ground to the Grounding Terminal.

(3) Run a #10 gauge wire from the KSU Frame Ground to the Grounding Terminal. Refer to Figure 3-18 on page 3-35.

(4) Connect the Frame Ground from the MISC connection block to the Grounding Terminal. Refer to Figure 3-6 on page 3-12.

Power Failure Transfer Alarm

5.04 A warning bell or light may be connected to the power supply to notify the user of a power drop. This requires a separate power source for the bell or light. Refer to Figure 3-7 on page 3-17.

Voltage Surge Protection

5.05 AC voltage surges may make the system malfunction, cause misregistration, false logic, and damage to the electronic components. To prevent surges, Inter-Tel recommmends the use of an AC line conditioner or surge protector. Follow these specifications to select surge protection. The device must:

    A.   Clip fast voltage transients at 300VDC nominal in 5 nanoseconds or less.

    B.   Sustain the input voltage level when the AC source drops below 97VAC.

    C.   Prevent extraneous signals carried into the equipment on the AC input, even though the AC outlet has a separately fused dedicated circuit.

C. PRINTED CIRCUIT BOARD (PCB) INSTALLATION

```
***********************************************
*                  CAUTION                    *
* Do not insert or remove PCB's with the      *
* power on.  The PCB's will be damaged.        *
***********************************************
```

Main Distribution Frame Unit (MDF) PCB

5.06 The MDF PCB is shipped installed in the KSU. If it is necessary to replace it, remove the two screws at the top and bottom of the PCB and slide it out of the KSU. Insert the new PCB with the amphenols facing left and tighten the screws. Refer to Figure 3-9 on the next page.

FIGURE 3-9.   MAIN DISTRIBUTION FRAME (MDF) PCB

△1	EXTERNAL FEATURE INTERFACE	△3	RS232C INTERFACE	△5	MOH PHONE JACK
△2	LINE SEPARATION SWITCHES	△4	CENTRAL OFFICE LINE INTERFACE	△6	KEYSET INTERFACE EXT. 1-12
				△7	KEYSET INTERFACE EXT. 13-24

Central Processor Unit (CPU) PCB

5.07 Install the CPU PCB as described below. For a photograph, refer to Figure 3-10 on the next page.

(1) Place the Battery Jumper in the position to enable data base protection. The jumper must be set from the center pin to the pin marked "1".

(2) Verify that the ON/OFF switch on the power supply is in the OFF position.

(3) Install the CPU PCB with components facing left in the cardfile slot labeled "CPU".

(4) Turn the ON/OFF switch ON.

(5) Obtain a reading of 5.0VDC +0.1V on the cardfile. If the voltmeter does not read 5VDC, remove AC power to the KSU and take out the PCB. After the PCB is removed, repeat the check for shorted components. If the voltage is still not within tolerance, refer to the TROUBLESHOOTING section. If the voltage is within tolerance with the PCB installed, proceed to the next step.

(6) Observe the Light-Emitting Diodes (LED's) on the front edge of the CPU PCB for the following indications:

   a. The top LED blinks approximately once a second.

   b. The second LED (counting down) is off.

   c. The third LED is almost constantly on, with a slight flicker.

   d. The bottom-most LED is constantly on.

(7) If the LED indications are not as stated above, **DO NOT PROCEED.** Turn off the system power, wait approximately 15 seconds, and repeat Steps 3 through 6 above. If the LED's still do not function as described, **DO NOT PROCEED.** Refer to the TROUBLESHOOTING section.

(8) Turn off the power to the KSU.

FIGURE 3-10.   CENTRAL PROCESSOR UNIT (CPU) PCB
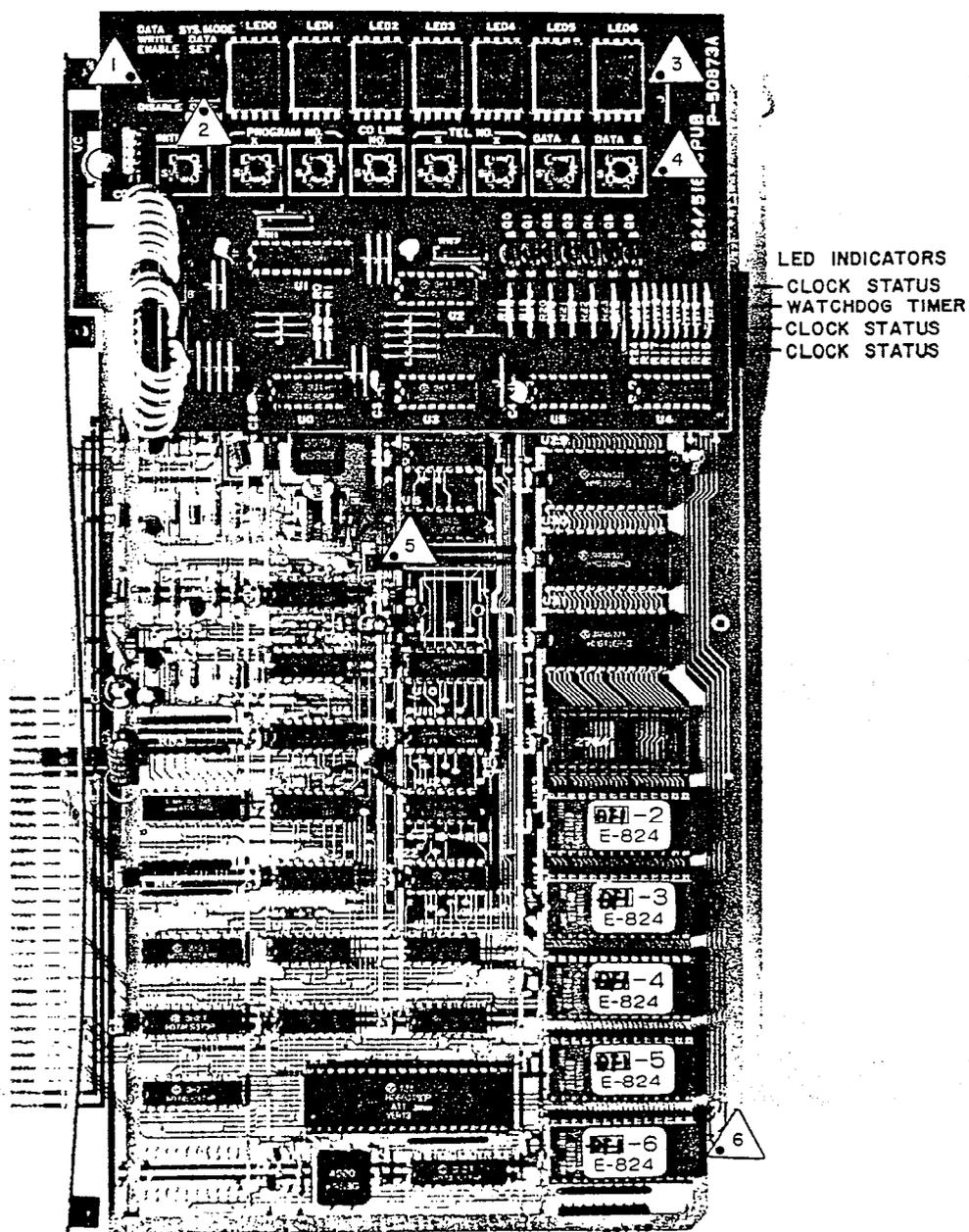
△1	DATA WRITE ENABLE/ DISABLE SWITCH	△4	PROGRAMMING DATA SELECT SWITCHES (8 PL)
△2	SYSTEM MODE DATASET/ OPERATE SWITCH	△5	BATTERY JUMPER
△3	PROGRAMMING INDICATORS (7 PL)	△6	ROM STORAGE (6 PL)

Central Office Interface (COI) PCB

5.08 Two different versions of the COI PCB are available. One has circuitry for two C.O. lines; one has circuitry for four. Refer to Figures 3-11, 3-12 and 3-13 on the following pages.

5.09 Each circuit may be configured for DTMF or Dial Pulse signalling. DTMF and Dial Pulse signalling may be mixed; however, be aware that not all Central Offices are equipped to accept DTMF signalling.

5.10 Two COI PCB's may be installed. If only one is used, a COI Jumper PCB must be inserted in the second slot. This PCB is shipped with the KSU.

(1) Each circuit in locations U11A and B (or U11A through D) may be either DTMF (chip number 4089) or Dial Pulse (chip number 400994). If DTMF, the switch next to each chip must be set to PB. If Dial Pulse, set the switch to DP.

(2) With the system power off, install a COI PCB in the first available slot labeled "2/4COI" with the components facing left.

(3) Turn power on. The LED's on the front of the PCB (two or four depending on the number of circuits on the PCB) will flash once and go out. After five seconds, the LED's on the CPU PCB will light. If the LED indications are not as stated, refer to the TROUBLESHOOTING section.

(4) Obtain a reading of 5.0VDC ±0.1V on the cardfile as described for the CPU PCB. Ensure tolerance.

(5) Turn off the power to the KSU.

(6) Repeat this procedure for the next COI PCB.

OR, (7) Insert the COI Jumper PCB in the second "2/4 COI" slot with the solder side facing right.

(8) Obtain a reading of 5.0VDC ±0.1V on the cardfile as described for the CPU PCB. Ensure tolerance.

(9) If the reading is not within specifications, the PCB may not be seated properly. Reinsert it and take another reading.

(10) Turn off the power.

> NOTE: Each circuit has a 3dB C.O. line attenuation pad to reduce the incoming signal on extremely hot lines.

FIGURE 3-11. 4-COI CENTRAL OFFICE INTERFACE PCB

LED INDICATORS
CIRCUIT 1
CIRCUIT 2
CIRCUIT 3
CIRCUIT 4

3dB C.O. LINE ATTENUATION
PAD— CIRCUIT 1

3dB C.O. LINE ATTENUATION
PAD— CIRCUIT 2

3dB C.O. LINE ATTENUATION
PAD— CIRCUIT 3

3dB C.O. LINE ATTENUATION
PAD— CIRCUIT 4

1 DTMF/DIAL PULSE
SELECT SWITCH CKT'S 1-4
LEFT TO RIGHT, RESP.

2 DTMF/DIAL PULSE
GENERATOR I.C. CKT'S 1-4
LEFT TO RIGHT, RESP.
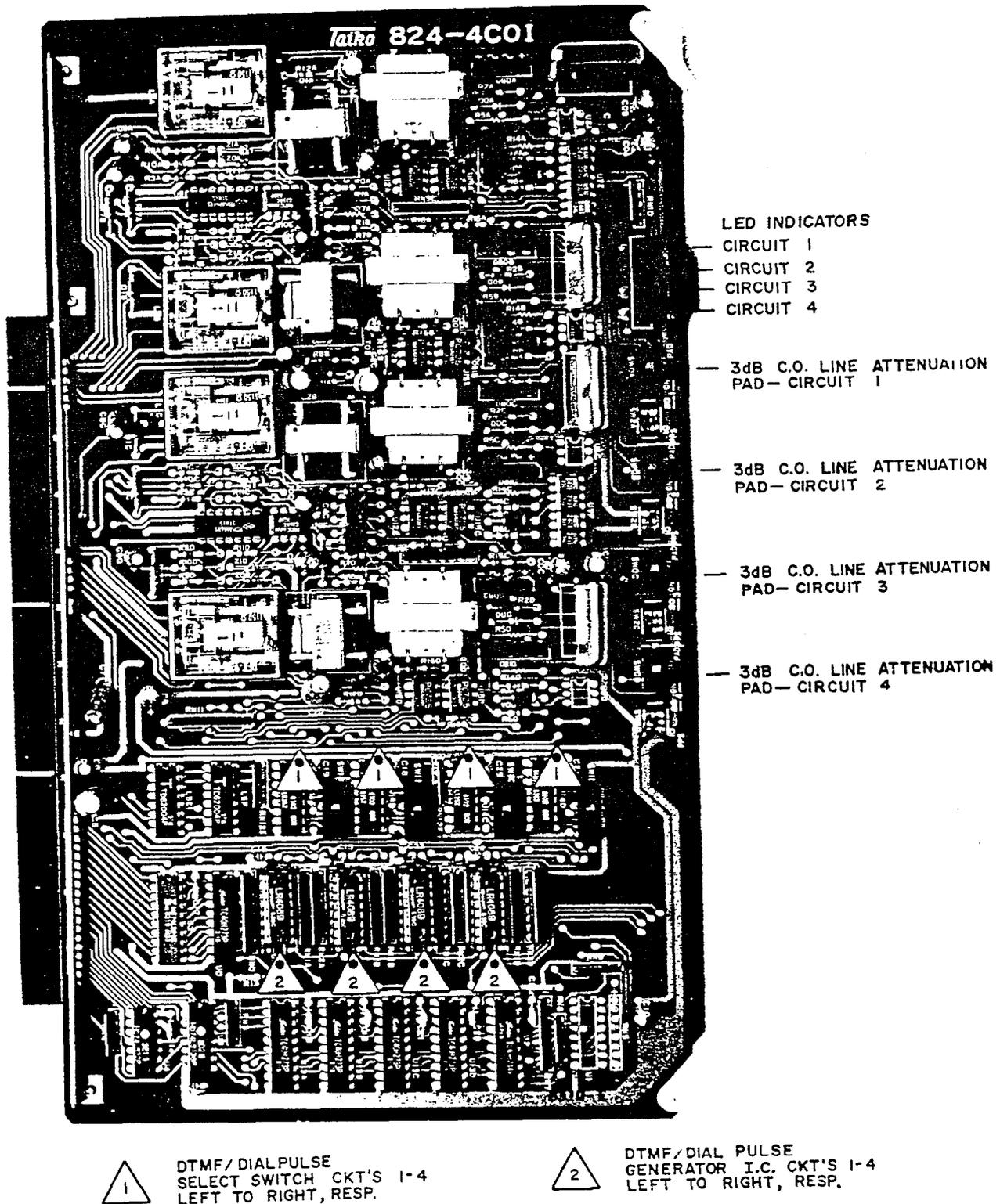
FIGURE 3-12.   2-COI CENTRAL OFFICE INTERFACE PCB

LED INDICATORS
CIRCUIT 1
CIRCUIT 2
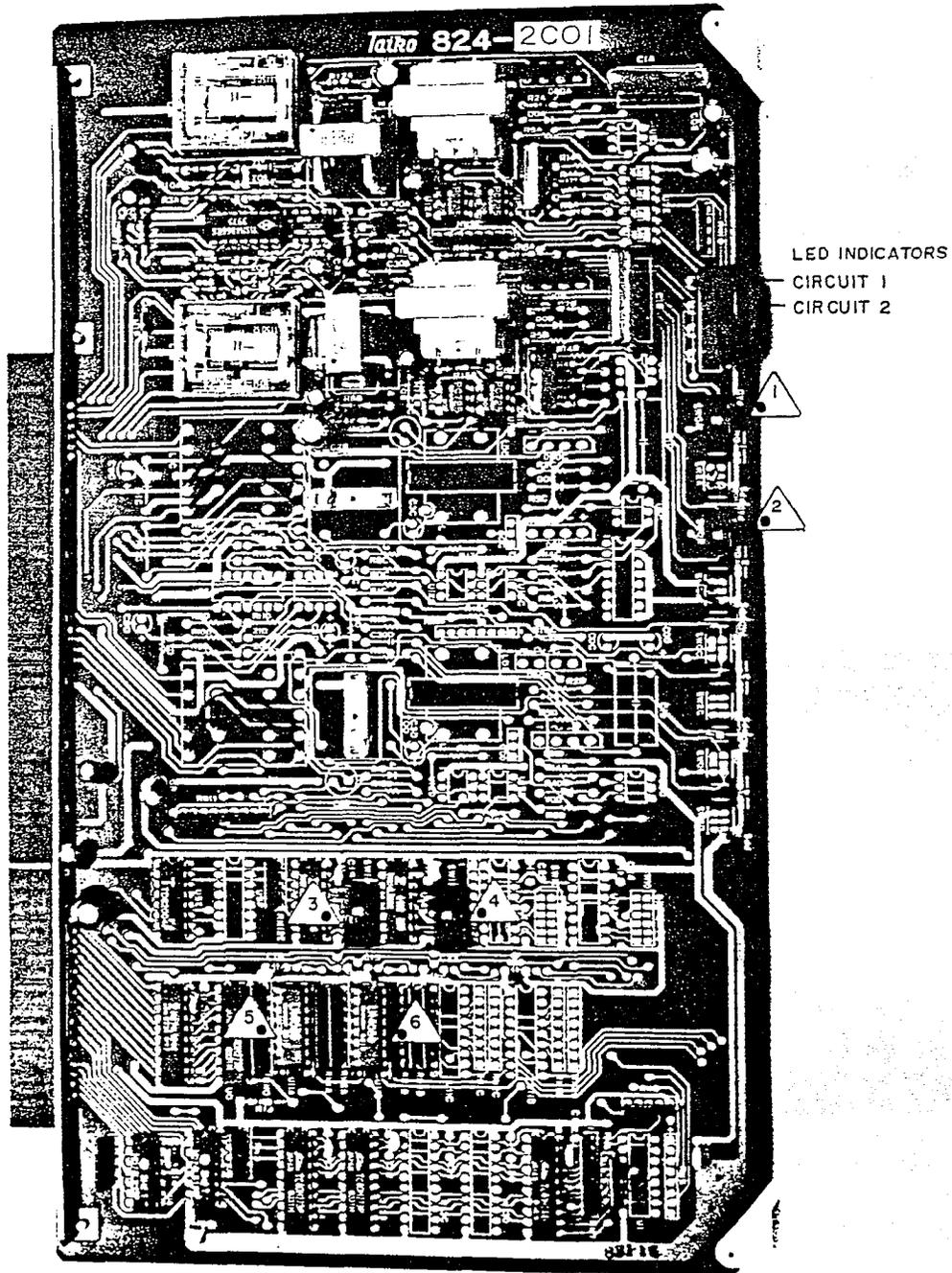
△1	3 dB C.O. LINE ATTENUATION PAD, CIRCUIT 1	△4	DTMF/DIAL PULSE SELECT, CIRCUIT 2
△2	3 dB C.O. LINE ATTENUATION PAD, CIRCUIT 2	△5	DTMF/DIAL PULSE GENERATOR IC, CIRCUIT 1
△3	DTMF/DIAL PULSE SELECT, CIRCUIT 1	△6	DTMF/DIAL PULSE GENERATOR IC, CIRCUIT 2

FIGURE 3-13.   COI JUMPER PCB
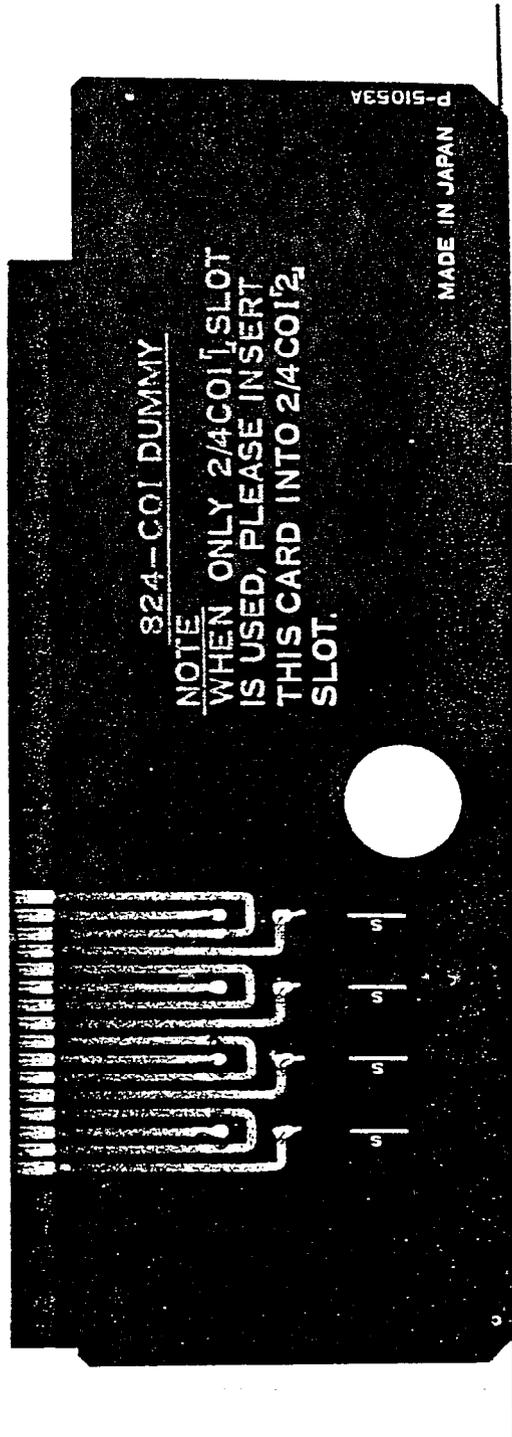
Key Telephone Interface (KTI) PCB

5.11 Two different KTI PCB's are available. One has circuitry for four keysets; one has circuitry for eight. There may be a maximum of three KTI PCB's in the system. Refer to Figures 3-14 and 3-15 on the following pages.

    (1) With the system power off, install a KTI PCB in the first available slot marked "4/8KTI" with components facing left.

    (2) Turn power on. All four or eight LED's (depending on the number of circuits on the PCB) will flash once and go out. The LED's on the CPU PCB will light. If the LED indications are not as stated, refer to the TROUBLE-SHOOTING section.

    (3) Obtain a reading of 5.0VDC $\pm$0.1V on the cardfile as described for the CPU PCB. Ensure tolerance.

    (4) Turn off the power to the KSU.

    (5) Repeat this procedure for each additional KTI PCB.

FIGURE 3-14. 8-KTI KEY TELEPHONE INTERFACE PCB

LED INDICATORS
- CIRCUIT 1
- CIRCUIT 2
- CIRCUIT 3
- CIRCUIT 4

- CIRCUIT 5
- CIRCUIT 6
- CIRCUIT 7
- CIRCUIT 8
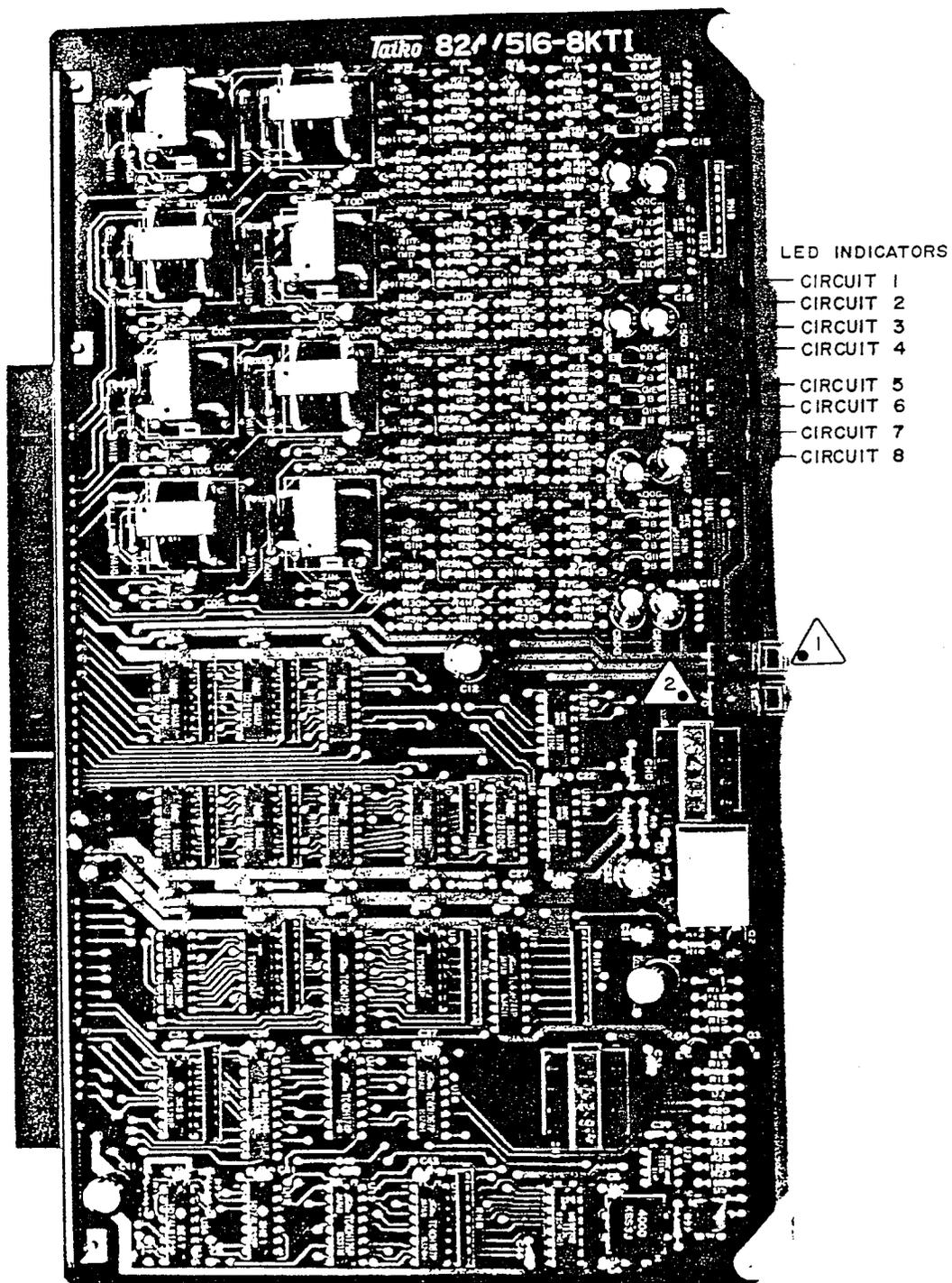
⚠️1 STATION SPEECH PATH FUSE (.3 AMP)

⚠️2 STATION POWER FUSE (1.0 AMP)

FIGURE 3-15.   4-KTI KEY TELEPHONE INTERFACE PCB

LED INDICATORS
CIRCUIT 1
CIRCUIT 2
CIRCUIT 3
CIRCUIT 4
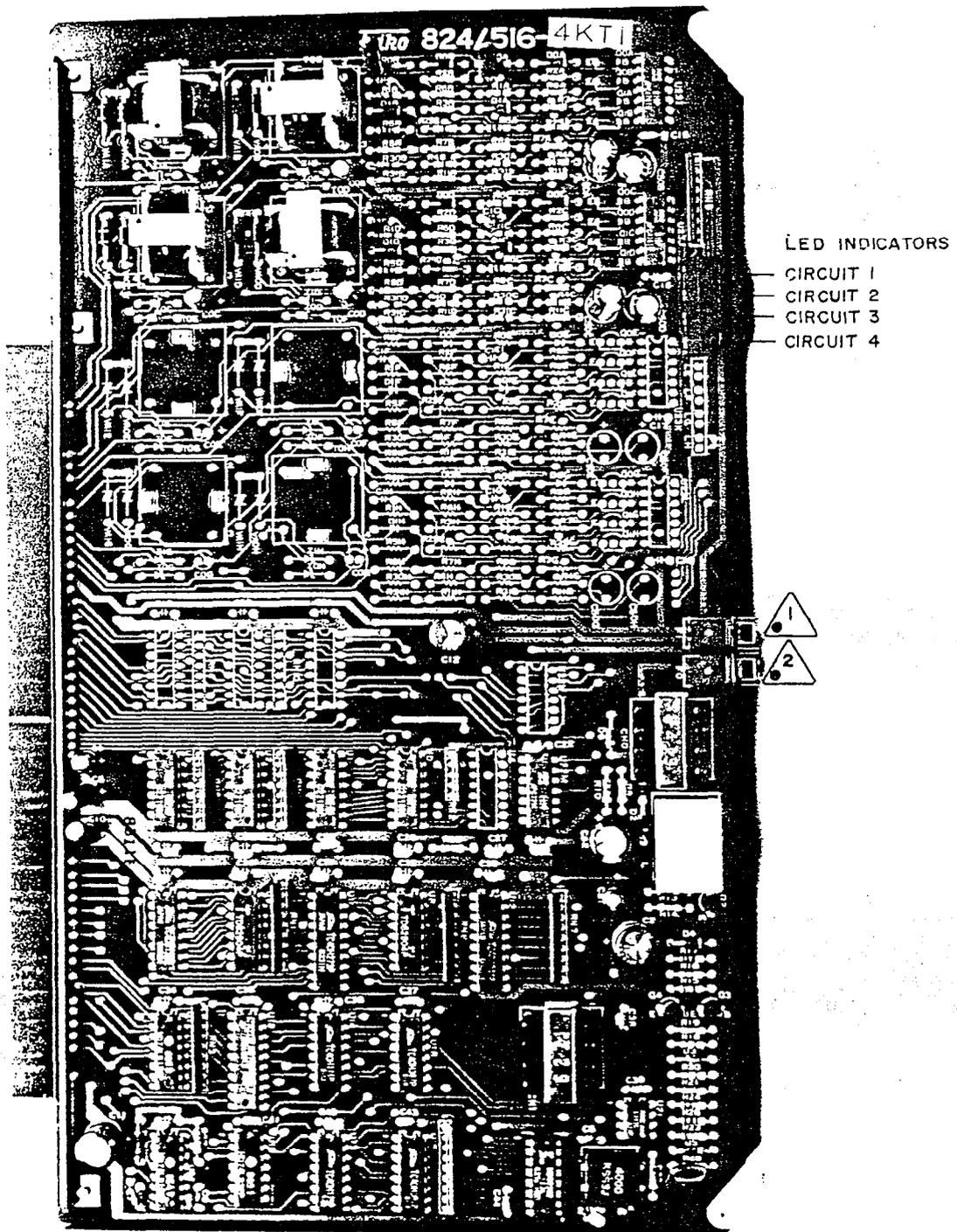
/1\ STATION SPEECH PATH FUSE
     (.3 AMP)

/2\ STATION POWER FUSE
     (1.0 AMP)

Miscellaneous (MISC) PCB

5.12 One MISC PCB must be installed in the system. Refer to Figure 3-16 on the next page.

   (1) Set these three switches as follows:

      SW0 - For External Music-On-Hold, set to EXT. For Internal Music, set to MSC.

      SW1 - If Internal Music was selected, choose a tune. For "Home on the Range," select MSC-A. For "Greensleeves," select MSC-B.

      SW2 - Select High (HI) or Low (LO) ring tone for the keysets.

   (2) With the system power off, install the MISC PCB in the slot labeled "MISC" with components facing left.

   (3) Turn the power on. Obtain a reading of 5.0VDC +0.1V on the cardfile as described for the CPU PCB. Ensure tolerance.

   (4) Turn off the power to the KSU.

   (5) When all paging equipment has been connected and powered up, adjust the volume of the external page pre-amp circuit. Rotate potentiometer VR0 in a clockwise direction to increase the volume or counterclockwise to decrease it.

Door-Mate (DOOR) PCB

5.13 The DOOR PCB is used if Door-Mates are included in the system. It has circuitry for up to two Door-Mate units. Refer to Figure 3-17 on page 3-33.

   (1) With the system power off, install the DOOR PCB in the slot labeled "DOOR" with components facing left.

   (2) Turn the power on. Obtain a reading of 5.0VDC +0.1V on the cardfile as described for the CPU PCB. Ensure tolerance.

   (3) Turn off the power to the KSU.

   (4) When the entire system has been connected and powered up, adjust the volume of the Door-Mate talkback and paging. Rotate potentiometer VR0 in a counterclockwise direction to increase the volume or clockwise to decrease it.

FIGURE 3-16.   MISCELLANEOUS (MISC) PCB
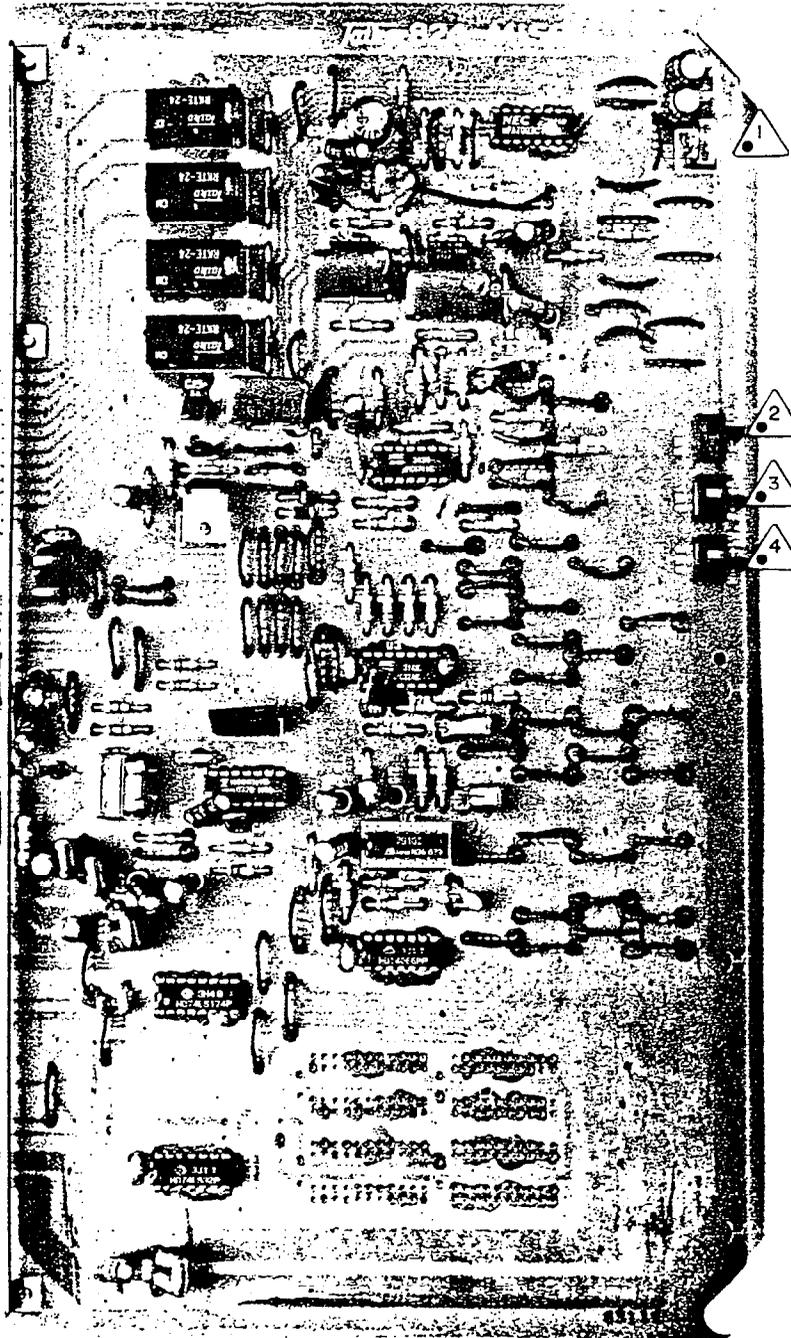
△1 EXTERNAL PAGE VOLUME
     CONTROL

△2 EXTERNAL/INTERNAL MOH
     SELECT

△3 INTERNAL MOH TUNE SELECT

△4 HI/LO RING TONE SELECT

FIGURE 3-17.   DOOR-MATE (DOOR) PCB
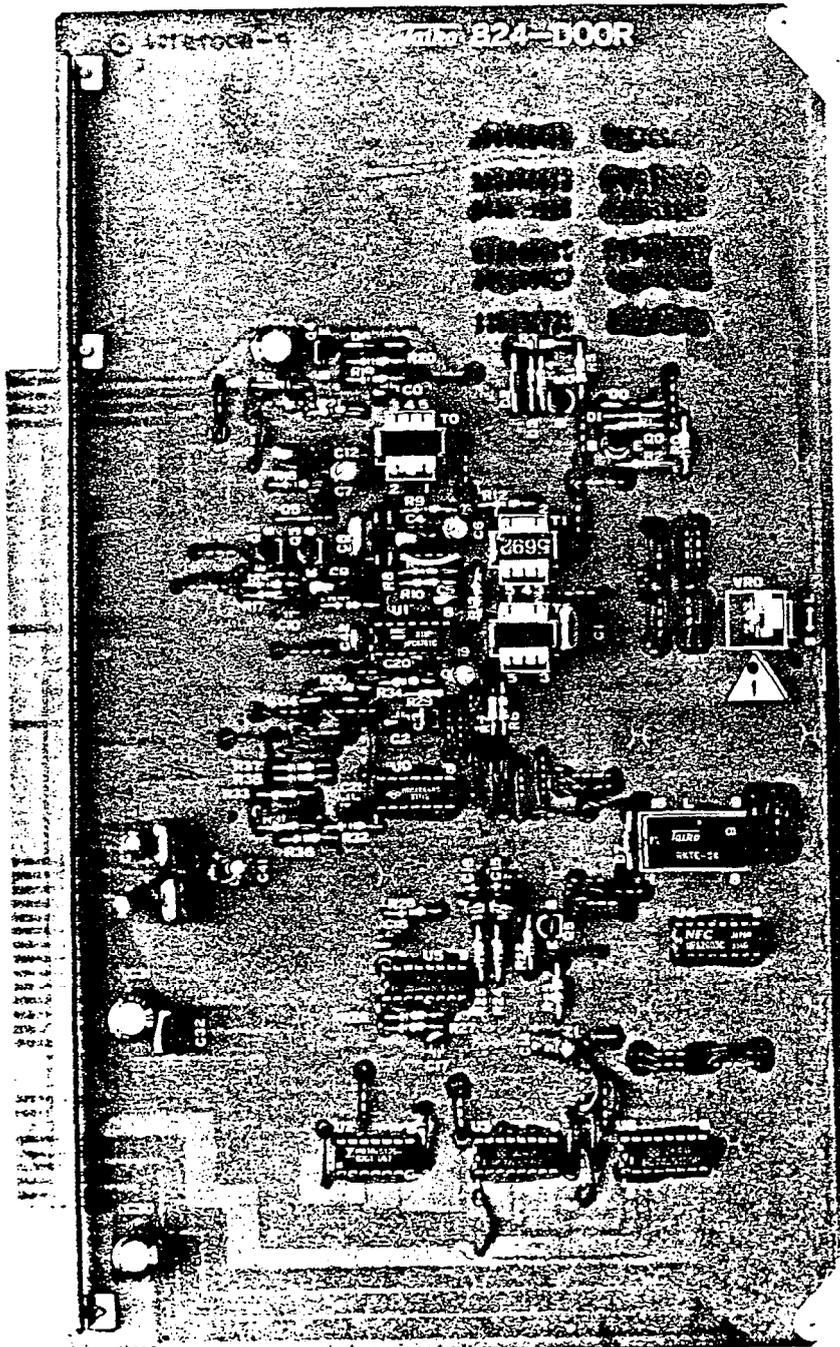
⚠ DOOR-MATE VOLUME CONTROL

D. COMPLETE THE KSU INSTALLATION

5.14 The last steps to installing the KSU are: wall mount it, connect interface cables, and replace the cover. Inter-Tel recommendeds that the KSU be wall mounted, as opposed to attaching it to a shelf. For proper ventilation, do not put it in a corner.

(1) To wall mount the KSU, make certain the wall can support twice the weight (approximately 60 pounds). Attach it with four screws through the holes at each corner.

(2) Connect the four interface cables from the MDF. Refer to Figure 3-18 on the next page and follow these steps:

    a. Feed each cable through the bottom access cutout on the left of the KSU (below the MDF PCB).

    b. Then feed them under the protruding bracket.

    c. Attach each female connector to the corresponding male connector.

    d. Secure the cables with tie wraps around the cables and bracket.

(3) After programming the data base, attach the cover and secure it at each corner with the four screws provided.

FIGURE 3-18.   KSU CABLING FROM MDF BACKBOARD TO MDF PCB
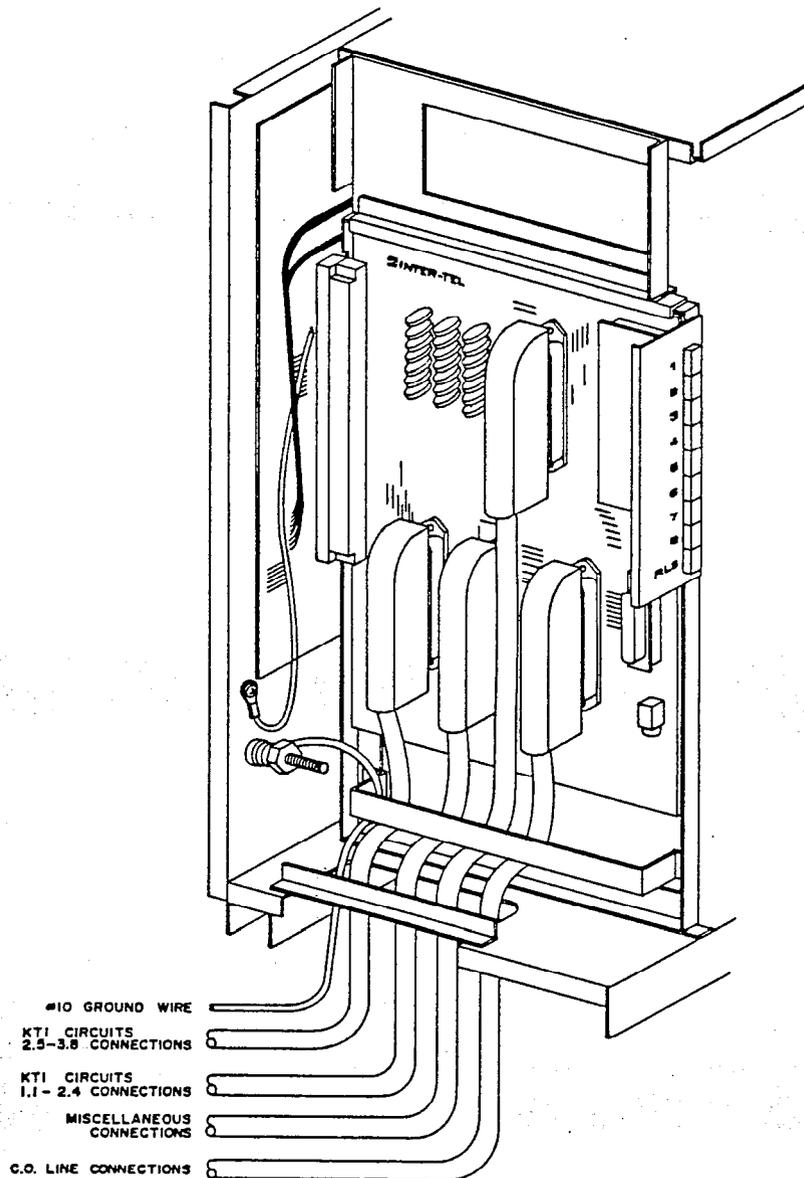
6. KEYSET INSTALLATION

6.01 The system may be configured with 24 keysets and eight of them may be Power Failure Transfer (PFT) units. Keysets are installed in the following manner. Photographs of the keyset bottoms and control boards are shown in Figures 3-22 to 3-25 on pages 3-40 to 3-43.

(1) Unpack the keysets, check for damage, and make sure all modular parts are included. The modular parts include the keyset, one seven-foot two-pair power cord, one standard two-pair handset cord, and one handset. The Hitec models will include one brass strap and screw for stress relief when the power cord is plugged into the bottom of the keyset. If there is damage or if parts are missing, contact Inter-Tel's Order Processing Department.

(2) Turn on power to the KSU.

(3) Without the keyset connected, check that the +27VDC from the KSU is on the BLACK terminal in the jack. Ground is on the YELLOW terminal. If -27VDC is measured, check the cabling for a reverse pair. Incorrect voltage polarity will result in a blown fuse when the keyset is connected.

(4) Mount the jack on the wall.

(5) Set the intercom number dial setting using the switch on the bottom of the keyset. These numbers are assigned by subtracting "one" from the second digit of the circuit number. Refer to the listing below.

Circuit Number	Extension Number	Dial Setting	Circuit Number	Extension Number	Dial Setting
1.1	1	0	2.5	13	4
1.2	2	1	2.6	14	5
1.3	3	2	2.7	15	6
1.4	4	3	2.8	16	7
1.5	5	4	3.1	17	0
1.6	6	5	3.2	18	1
1.7	7	6	3.3	19	2
1.8	8	7	3.4	20	3
2.1	9	0	3.5	21	4
2.2	10	1	3.6	22	5
2.3	11	2	3.7	23	6
2.4	12	3	3.8	24	7

(6) Plug the power cord into the modular jack and the keyset.

Hitec Power Cord Stress Relief Strap

6.02 On the Hitec models, mount the stress relief strap on the bottom of the keyset.

FIGURE 3-19. KEYSET POWER CABLE STRESS RELIEF STRAP

STRESS RELIEF
CLAMP

CABLE

TOP VIEW
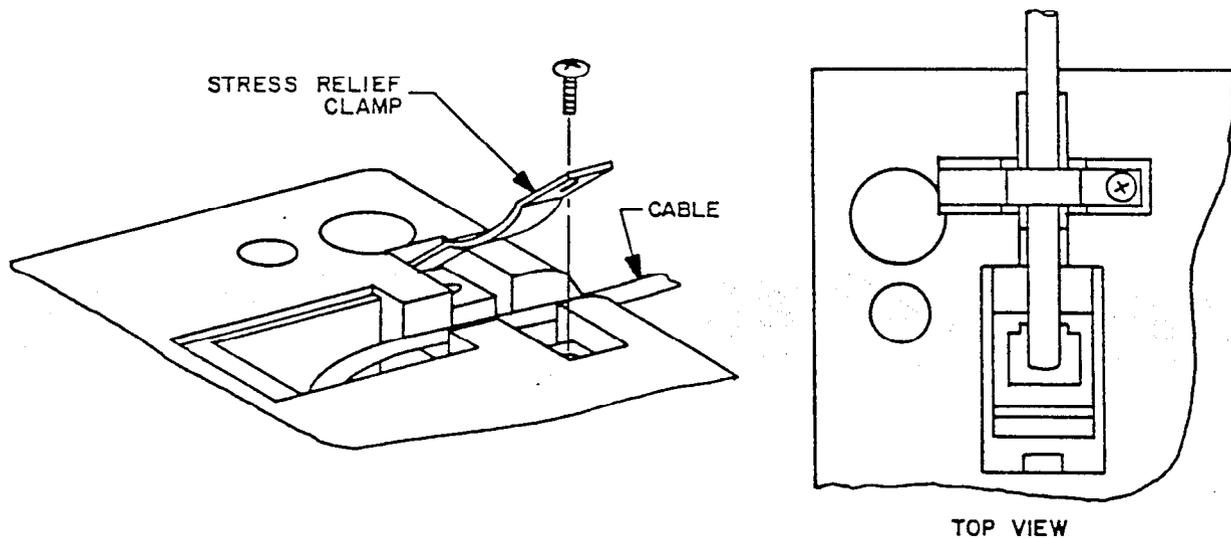
Wall Mounting Hitec Keysets

(1) Attach the Wall-Mounted Bracket with the two screws.

(2) Attach the "T" Bracket to the base of the keyset, using the three screws provided.

(3) Just below the handset hookswitch on the front of the keyset, remove the plastic strip to expose two holes. Attach the handset adaptor, using the two screws provided. Then replace the plastic strip.

(4) Slip the "T" Bracket onto the Wall-Mounted Bracket. Secure it with the thumbscrew through the bottom of the wall bracket and into the keyset.

FIGURE 3-20. WALL MOUNTING HITEC KEYSETS
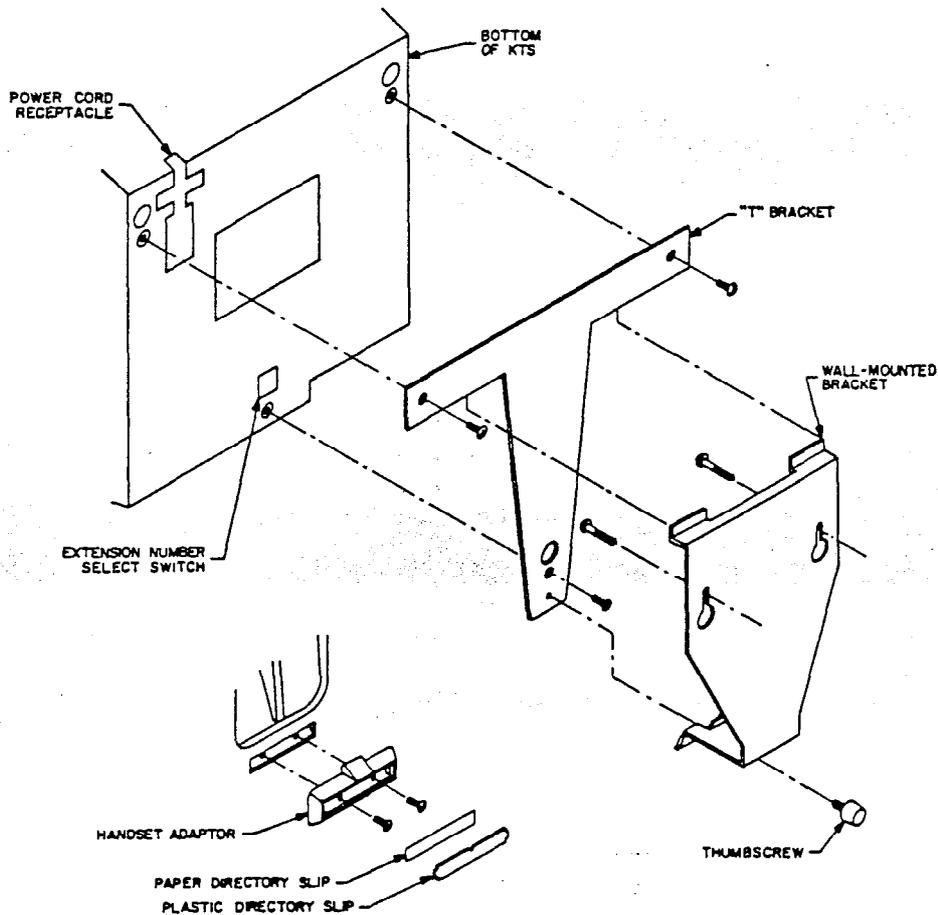
Wall Mounting Phoenix Keysets

(1) Attach the Wall-Mounted Bracket with the two screws.

(2) Slide the "T" Bracket into the Directory Mount slot on the base of the keyset. Attach it at the bottom, using the one screw provided.

(3) Just below the handset hookswitch on the front of the keyset, remove the plastic strip to expose two holes. Attach the handset adaptor, using the two screws provided. Then replace the plastic strip.

(4) Slip the "T" Bracket onto the Wall-Mounted Bracket. Secure it with the thumbscrew through the bottom of the wall bracket and into the keyset.

FIGURE 3-21.   WALL MOUNTING PHOENIX KEYSETS
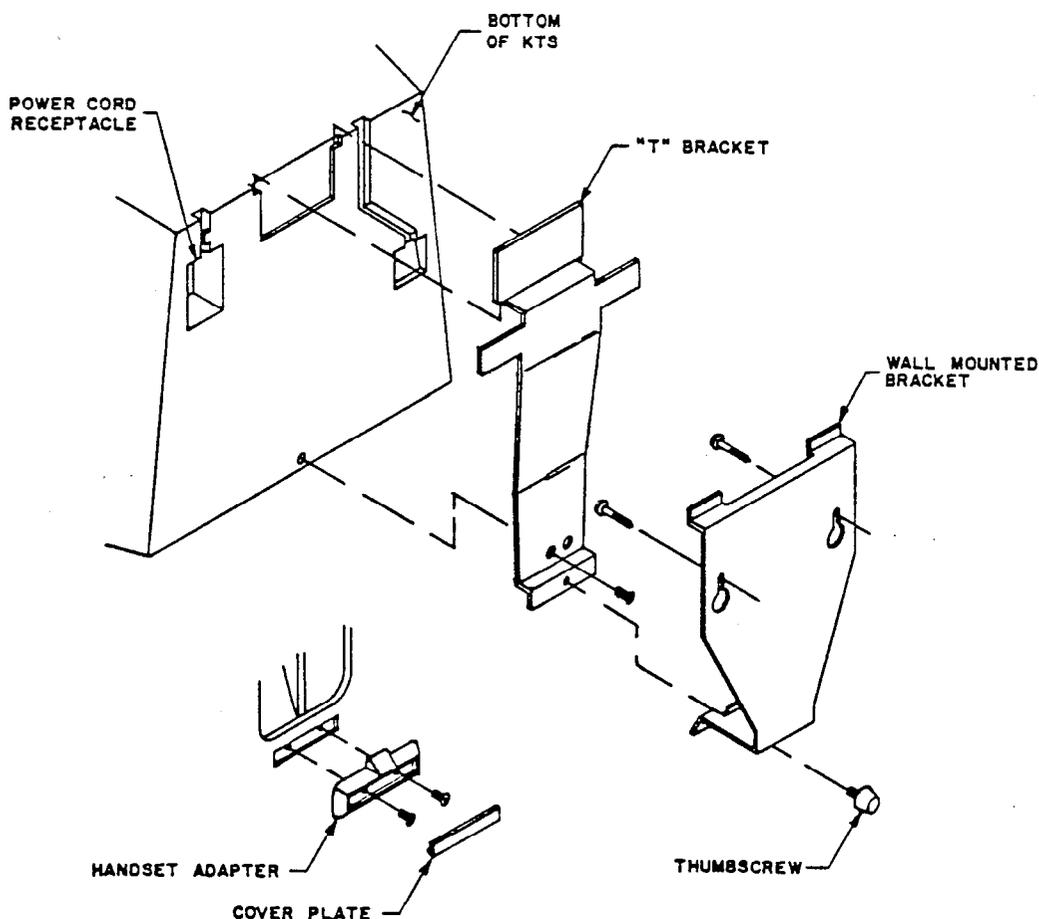
FIGURE 3-22.   824 HITEC KEYSET BOTTOM
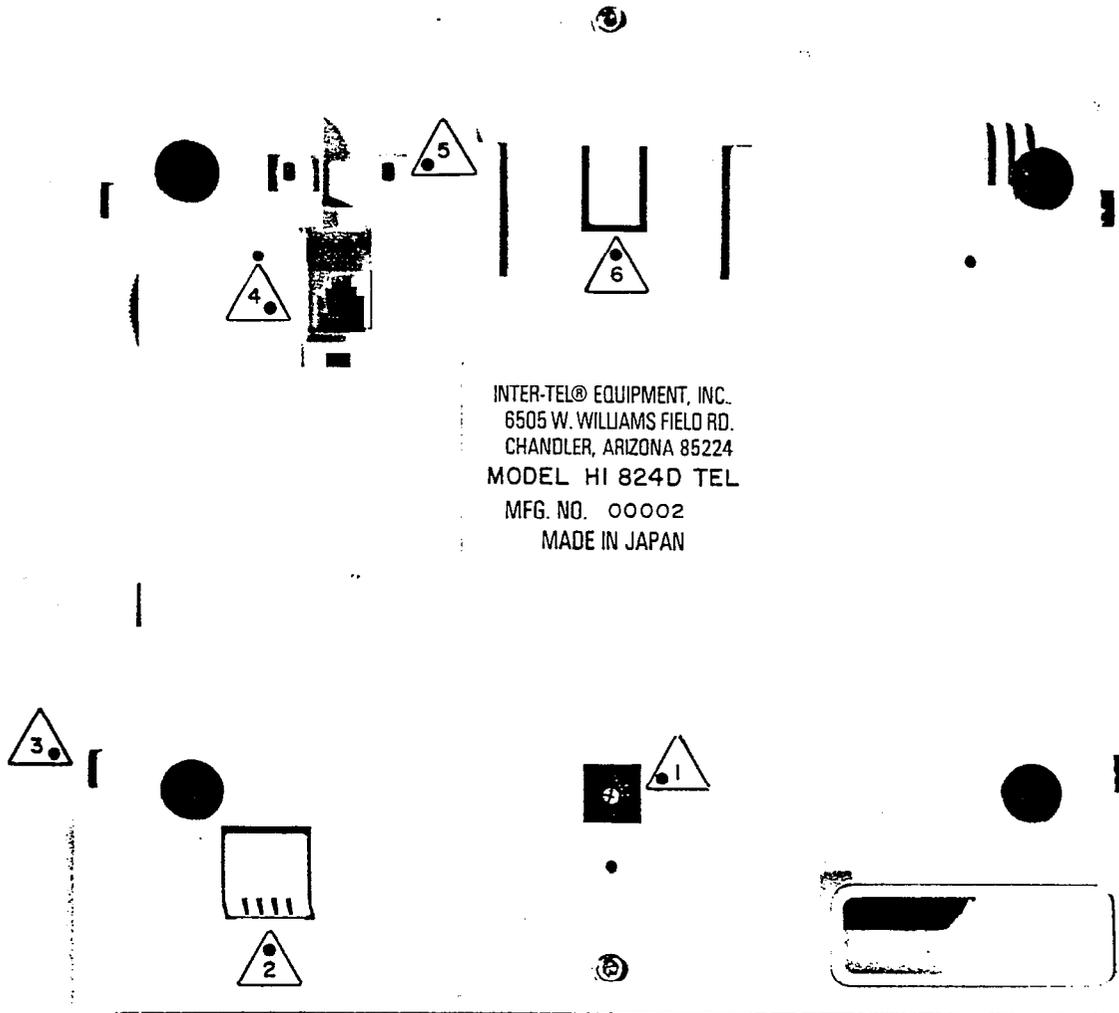
FOR DISPLAY AND STANDARD KEYSETS

INTER-TEL® EQUIPMENT, INC.
6505 W. WILLIAMS FIELD RD.
CHANDLER, ARIZONA 85224
MODEL HI 824D TEL
MFG. NO. 00002
MADE IN JAPAN

△1 EXTENSION NUMBER SELECT SWITCH	△4 MODULAR POWER JACK
△2 HANDSFREE ANSWERBACK MICROPHONE	△5 STRESS RELIEF STRAP RECESS
△3 BASE RELEASE TAB (2 PL)	△6 DIRECTORY MOUNT

FIGURE 3-23.   824 PHOENIX KEYSET BOTTOM

FOR DISPLAY AND STANDARD KEYSETS

INTER-TEL® EQUIPMENT, INC.
6505 W. WILLIAMS FIELD RD.
CHANDLER, ARIZONA 85224
MODEL PHX 824D $^{TEL}/_{PF}$
MFG. NO. 00910
MADE IN JAPAN
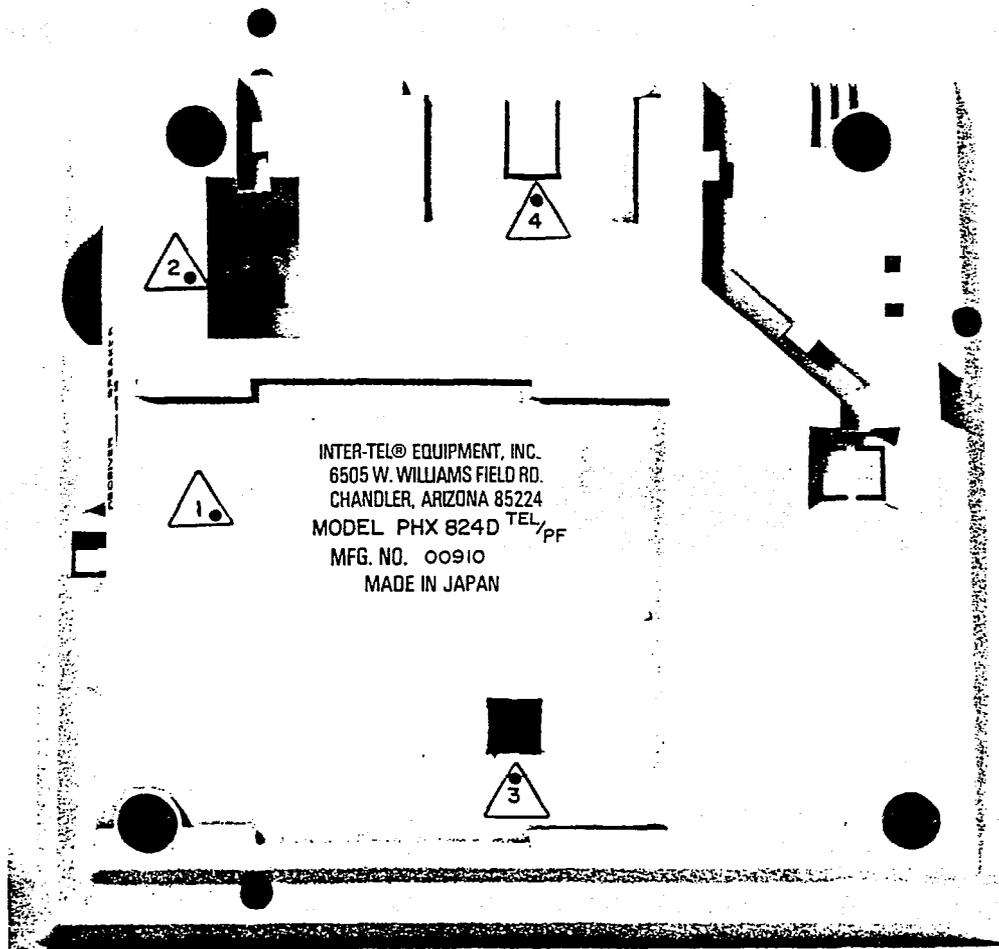
$\triangle{1}$ DIRECTORY

$\triangle{2}$ MODULAR POWER JACK

$\triangle{3}$ EXTENSION NUMBER SELECT SWITCH

$\triangle{4}$ DIRECTORY MOUNT

FIGURE 3-24.   824 STANDARD KEYSET CONTROL BOARD

FOR HITEC AND PHOENIX KEYSETS

⚠1   POWER FAILURE
      RINGER CONNECTIONS

⚠2   INTERNAL SPEAKER

⚠3   HANDSFREE ANSWERBACK
      MICROPHONE

⚠4   MICROPHONE CONNECTION

FIGURE 3-25.   824 DISPLAY KEYSET CONTROL BOARD

FOR HITEC AND PHOENIX KEYSETS
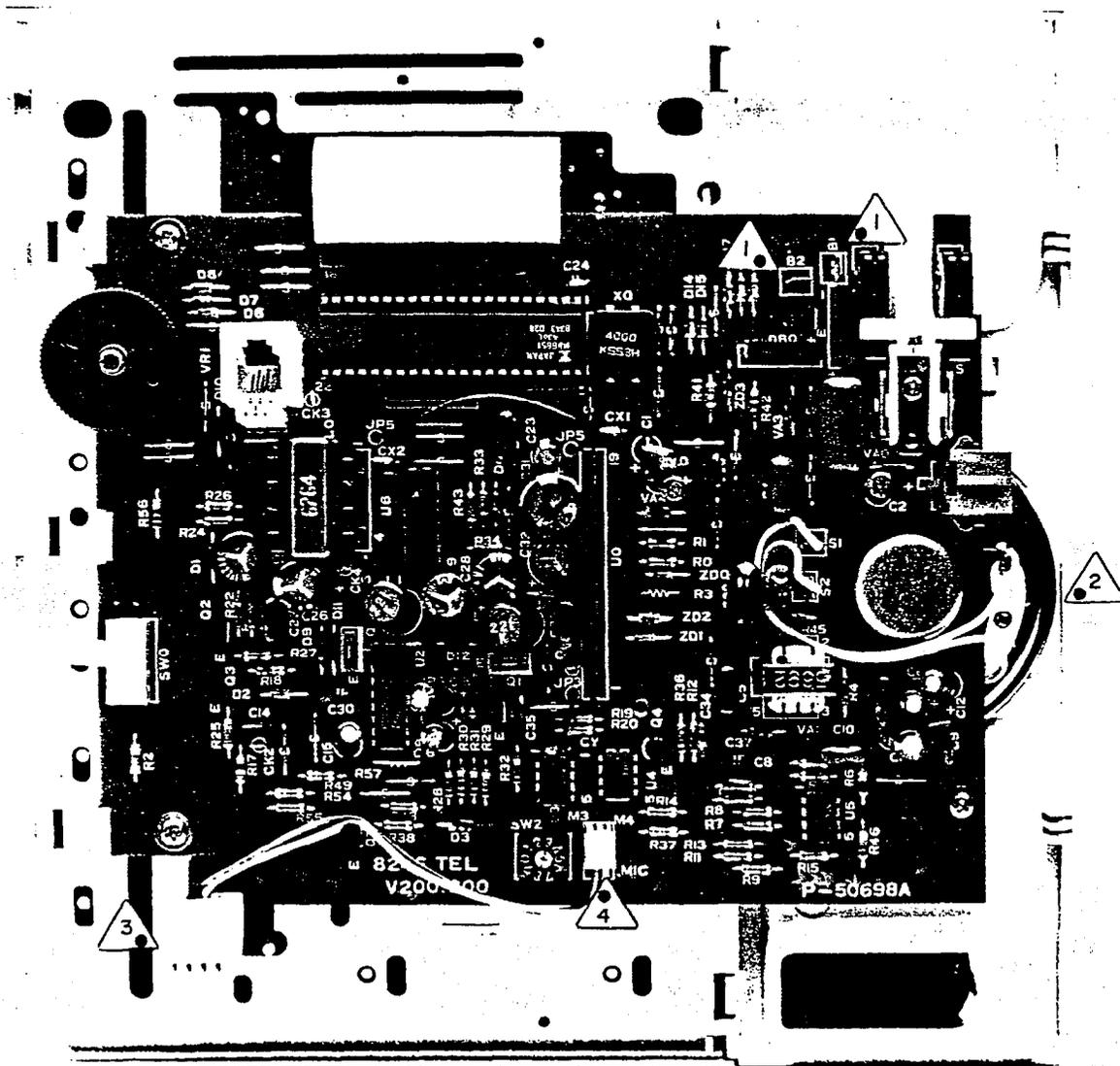
⚠1	POWER FAILURE RINGER CONNECTIONS	⚠3	MICROPHONE CONNECTION
⚠2	INTERNAL SPEAKER	⚠4	HANDSFREE ANSWERBACK MICROPHONE

7. DOOR-MATE INSTALLATION

7.01 The system may support two Door-Mate units. The one-pair cable should already have been run to the Door-Mate locations and terminated on the MDF (as instructed earlier in Sections 3A and 4C). Refer to Figures 3-26 and 3-27 on the following pages and install them as follows:

(1) Unpack and inspect each Door-Mate for damage. If damage is found or parts are missing, contact Inter-Tel's Order Processing Department.

(2) On the front of the Door-Mate, remove the single screw and separate it from the Wall-Mount Bracket.

(3) Attach the Wall-Mount Bracket to the wall, placing it over the cable. Secure it with the two screws provided.

(4) Connect the cable to the Door-Mate. Either wire may be attached to either screw terminal.

(5) Place the Door-Mate back into the bracket and secure with the one screw originally removed.

FIGURE 3-26.   WALL MOUNTING THE DOOR-MATE
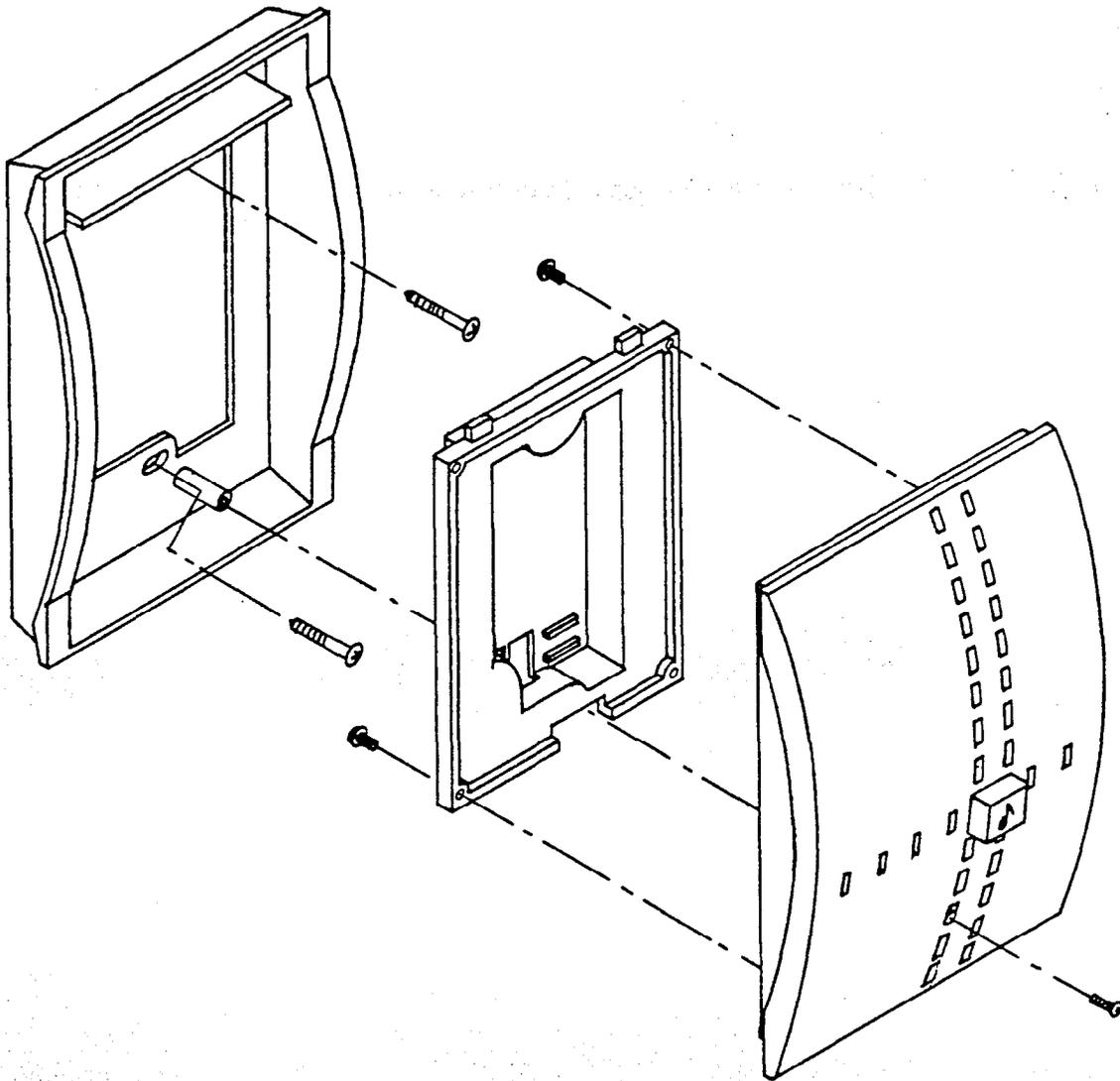
FIGURE 3-27.   DOOR-MATE BOTTOM

INTER-TEL® EQUIPMENT, INC.
6505 W. WILLIAMS FIELD RD.
CHANDLER, ARIZONA 85224
MODEL   DOOR MATE
MFG. NO. 00087
MADE IN JAPAN
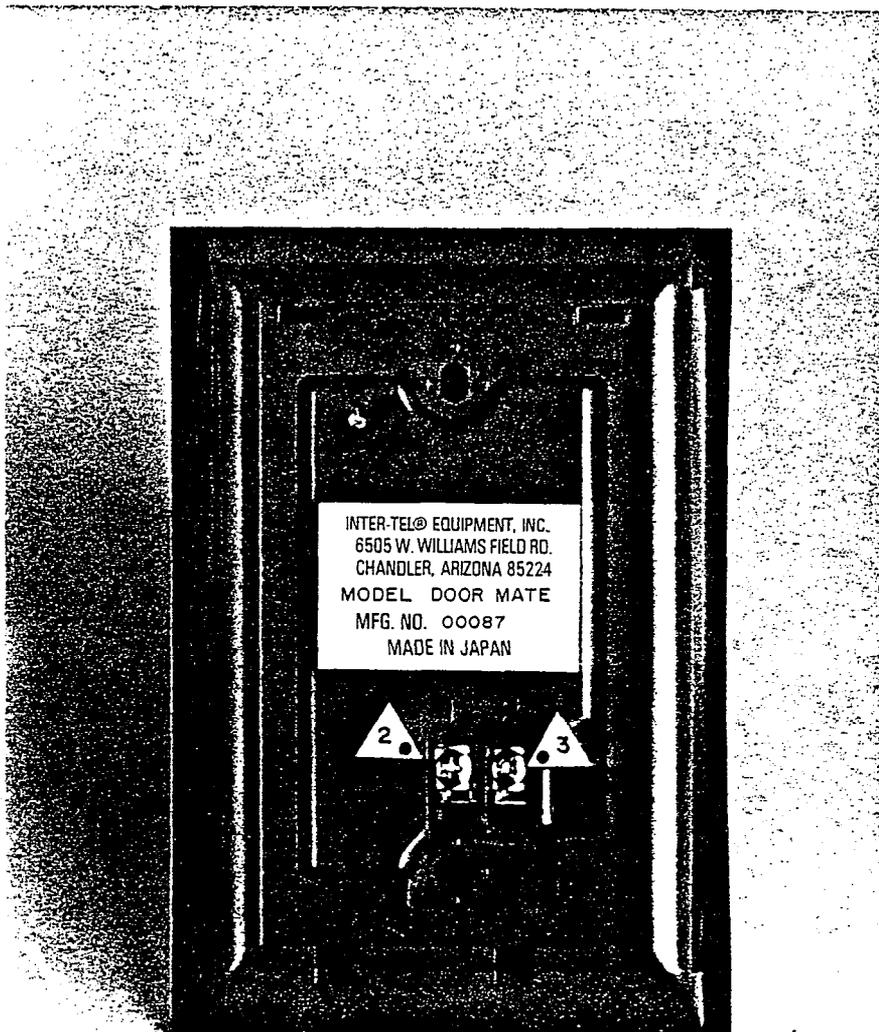
△2 TERMINAL I

△3 TERMINAL 2

8. BATTERY BACK-UP INSTALLATION

8.01 There are two battery styles available for use with the system. Depending on the physical size chosen, they are either installed inside the KSU with the provided mounting brackets or are installed outside the KSU. Refer to SYSTEM SPECIFICATIONS for information about selecting batteries for system back-up. The type and size are critical.

(1) Connect the batteries in series to obtain 24V and make sure they are connected in correct polarity. They must be of the same ampere/hour rating and also have the same charge/discharge level. They must be lead calcium grid batteries and charge at a rate of 2.27V per cell.

(2) On the front of the power supply, set the battery EXTERNAL/INTERNAL switch. This is dependent on the size of batteries used.

   a. If you are installing small batteries on the inside of the KSU, put the switch in the INTERNAL position.

   b. If you are installing full-size batteries outside of the KSU, put the switch in the EXTERNAL position.

(3) Turn off AC power to the KSU.

(4) Refer to Figure 3-7 on page 3-17. Then connect the batteries to the power supply as follows:

   a. The internal batteries connect to the RED (+) and BLACK (-) wires exiting from the lower right front of the power supply. A jumper wire is provided to connect the internal batteries.

   b. The external batteries connect to the EXT BATT screw terminals on the right edge of the power supply.

(5) Turn on the AC power.

(6) Wait approximately six hours for the battery pack to partially charge.

   NOTE: Since charging time depends on the amp/hour rating, this may vary. The system charges at a low rate to protect against battery damage.

(7) After an adequate time to partially charge, pull the AC power plug to remove power. Make sure the system is operating. If not, measure voltage across the battery connection. A voltage of 20-24V must be present to run the system. If less than 20V, replug the AC power cord and allow more time to charge before testing it again.

(8) Re-apply AC power to the system.

9. INSTALL THE SMDR OUTPUT DEVICE

9.01 The output device for the Station Message Detail Recording (SMDR) feature must have these characteristics:

A. It must be RS232C compatible, formatted for serial ASCII with no parity.

B. It must communicate at 300 baud.

C. The RS232C interface must be equipped with a male 25-pin subminiature "D" connector. Consult the owners guide for the device to verify that the individual pin functions are identical. If necessary, change the connector on the device to match the requirements for the system. Pin functions for the interface are as follows:

Function	MDF PCB
Ground	1
Receive Data	2
Transmit Data	3
Clear to Send	5
Data Set Ready	6
Ground	7
Carrier Detect	8
Data Terminal Ready	20

9.02 To connect the output device to the MDF PDB:

(1) Before connecting the terminal cable to the MDF PCB, turn on the AC power to both the device and the system. This prevents electrical surges from being transmitted by the interface.

(2) Carefully connect the RS232C interface cable from the device to the RS232C connector on the MDF PCB.

10. INSTALL EXTERNAL MUSIC-ON-HOLD

10.01 There is a female connector on the MDF PCB for an external music source. It will accept a 1/8-inch mini-phone jack which can be purchased at any electronic parts store.

10.02 To install the customer-supplied external music source:

(1) Attach the mini-phone jack wire to the music source, either at the earphone jack or directly to the speaker output wires.

(2) Then plug it into the connector on the MDF PCB.

(3) Make sure SW0 switch on the MISC PCB is in the EXT position. Refer to page 3-31.

SYSTEM PROGRAMMING

CONTENTS   **PAGE**

1. INTRODUCTION

1.01 This section describes the initialization and programming procedures for the 824 system's data base. Initialization is necessary for proper system operation. It must be performed as part of the system installation, when a new Central Processor Unit (CPU) printed circuit board (PCB) is installed, or after the power has been off for more than 25 days. Programming enables service personnel to tailor the system for each user's unique needs.

```
*****************************************
*   PROGRAMMING MUST ONLY BE PERFORMED   *
*       BY TRAINED SERVICE PERSONNEL     *
*****************************************
```

2. PROGRAMMING METHODS

A. PROGRAMMING TERMINAL

2.01   Some of the data base information is programmed on-site, using an input/output device such as a CRT or printer terminal with a keyboard.   The terminal is connected to the Main Distribution Frame (MDF) PCB and must have these characteristics:

(1) RS232C compatible.

(2) Formatted for serial ASCII with no parity.

(3) Full-duplex transmission at 300 baud.

(4) The RS232C interface on the programming terminal must be equipped with a male 25-pin subminiature "D" connector. Consult your programming terminal owner's guide to verify that the individual pin functions are identical.   If not, rewire the RS232C connector on the programming terminal to match the 824's requirements.   Pin functions for the 25-pin interface are as follows:

Function	MDF PCB
Ground	1
Receive Data	2
Transmit Data	3
Clear to Send	5
Data Set Ready	6
Ground	7
Carrier Detect	8
Data Terminal Ready	20

2.02   The communication between the programmer and the system is in plain English.   The terminal displays a short question, and the programmer responds with a yes, no, numeric value, name or message.   Valid responses are given throughout the procedures in this section.

B. MAINTENANCE PANEL

2.03 Switches on the Maintenance Panel of the CPU PCB are also
used to program the data base. The switch functions are:

- Data Write
- System Mode Data Set
- Initialize

2.04 The Light-Emitting Diodes (LED's) on the Maintenance Panel
are controlled by the Function switches below them. These
switches are used to select the program numbers and data codes.
Where there are two switches, two digits may be entered in that
field. There are LED'S and Function switches for:

- Program Number Indication (2 switches)
- C.O. Line Number Indication
- Intercom Number Indication (2 switches)
- Data A Field
- Data B Field

2.05 The CPU Maintenance Panel switches and LED'S are shown in
Figure 4-1 on the next page.

FIGURE 4-1.   CPU MAINTENANCE PANEL
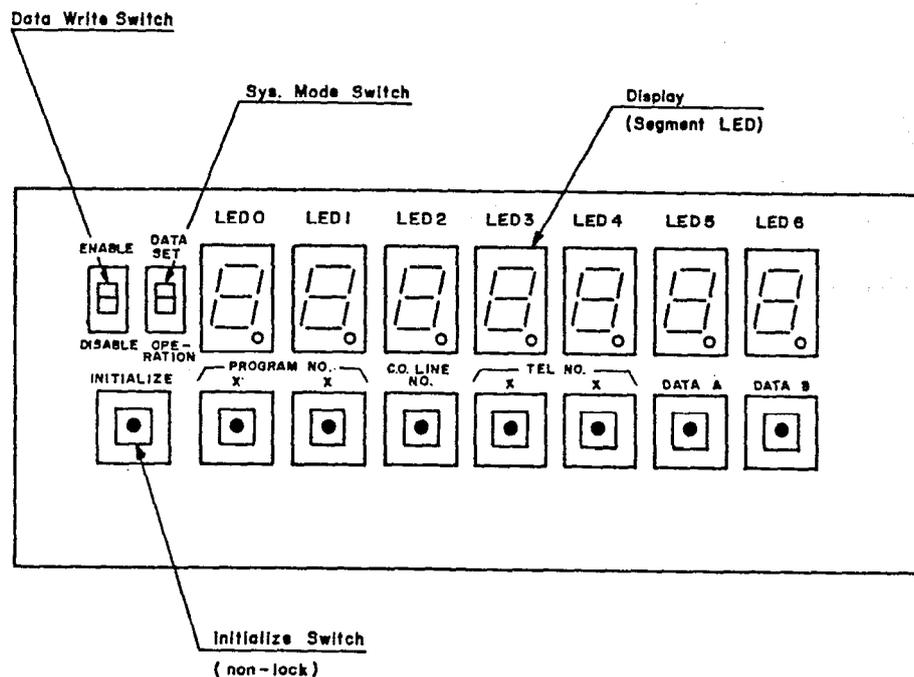
Data Write switch: This switch is placed in the ENABLE position
to allow data to be entered into the system memory.   It must be
enabled for both terminal and maintenance panel programming.
When in the DISABLE position, data changes will not be recorded
in the memory.

System Mode switch: This switch is placed in the DATA SET posi-
tion to allow programming through the Maintenance Panel.   OPERA-
TION returns the system to normal operation mode.

Initialize switch: This switch is used to initialize the system
data base.

Program Number switches: These are used to select the program
routine numbers.

C.O. Line Number switch: This switch is used when programming
C.O. line features such as ring-in and line restriction.

Intercom Number (TEL NO.) switches: These switches are used to
designate the station to be programmed for intercom features such
as hold, paging and night answer.

Data A and Data B switches: These are used to enter the program-
ming options.

3. SYSTEM PROGRAMMING

A. INITIAL PROGRAMMING OUTLINE

3.01 Below is an outline of the suggested steps to follow to initially program the system. Procedures for each step are given throughout this section.

(1) Set the Data Write switch on the CPU PCB in the ENABLE position to program the data base.

(2) Initialize the system using the Initialize switch.

(3) Place the System Mode switch on the CPU PCB in the DATA SET position.

(4) Enter the system programming data using the Function switches on the CPU PCB Maintenance Panel. During initial programming, it is necessary to clear the station- and system-stored speed-dial numbers (Programs 50 and 51).

(5) Place the System Mode switch in the OPERATION position.

(6) Connect the programming terminal and sign on.

(7) Perform the Toll Restriction, Name Registration, and Message Registration programming routines using the terminal.

(8) Use the END program to exit the programming mode and dis- connect the terminal.

(9) Place the Data Write switch in the DISABLE position.

B. PROGRAM PLANNING SHEETS

3.02 Programming Terminal and Function Switch Program Planning Sheets are provided for your use (Figures 4-3 and 4-4, on pages 4-24 to 4-27). Planning makes programming easier, quicker, and more efficient. The Program Planning Sheets also provide a record of programmed features for future reference.

C. SYSTEM INITIALIZATION

3.03 This routine initializes the system data base. It configures the software as follows:

- All lines are equipped and set for DTMF signalling.

- All lines ring in to intercom number 1.

- The system speed-dial number entry station is intercom number 1.

- All outgoing calls are recorded on the Station Message Detail Recording (SMDR) printout.

- Transfer Recall Time is set to 60 seconds.

- Hold Recall Time is set to 60 seconds.

- All keysets can access all C.O. lines; none are restricted.

- The PBX access code is preset to 9.

- All keysets are in Toll Restriction Class A.

- Intercom numbers are assigned as follows:

CKT = IC Number	CKT = IC Number	CKT = IC Number
1.1 = 1	2.1 = 9	3.1 = 17
1.2 = 2	2.2 = 10	3.2 = 18
1.3 = 3	2.3 = 11	3.3 = 19
1.4 = 4	2.4 = 12	3.4 = 20
1.5 = 5	2.5 = 13	3.5 = 21
1.6 = 6	2.6 = 14	3.6 = 22
1.7 = 7	2.7 = 15	3.7 = 23
1.8 = 8	2.8 = 16	3.8 = 24

- All keysets are enabled for handsfree answering and voice announcing.

- Page zones are assigned as follows:

Page Zone	Intercom Numbers
1	1-8
2	9-16
3	17-24
All-Call	1-24

3.04 To initialize the system data base:

(1) Ensure that the System Mode switch is in the OPERATION position. This procedure will drop all calls in progress.

(2) Place the Data Write switch in the ENABLE position.

(3) While pressing the Initialize switch, place the System Mode switch in the DATA SET position. After the program number appears, place the System Mode switch back in the OPERATION position.

(4) Return the Data Write switch to the DISABLE position.

D. USING THE MAINTENANCE PANEL

Function Switch Operation

3.05 To enter data using the Function Switches and LED's:

(1) Place the System Mode switch in the DATA SET position and the Data Write switch in the ENABLE position. This procedure will drop all calls in progress.

(2) Select each program using the two Program Number switches below LED 0 and LED 1.

(3) Select the C.O. line by pressing the C.O. Line No. switch below LED 2 until the correct number is displayed.

(4) Select the intercom number by pressing the two Tel No. switches below LED 3 and LED 4 until the correct numbers are displayed.

(5) Select the program code in Data A (LED 5) and/or Data B (LED 6) switches.

(6) Repeat the procedure until all desired program functions have been selected.

(7) Place the System Mode switch in the OPERATION position to return the system to normal operation. Place the Data Write switch in the DISABLE position. Any changes made will take effect when another program routine is selected or when the System Mode switch is set in the OPERATION position.

3.06 Features can be entered for all C.O. lines by entering a "0" and for all intercom numbers by entering "00", if these values are indicated in Figure 4-2.

FIGURE 4-2.   FUNCTION SWITCH PROGRAMMING

Program # Name	C.O. Line	Intercom Number	Data LED A	B	Initialized
10 C.O. Line Equipped DTMF/Dial Pulse	1-8	--	Line equipped 0 - no 1 - yes	0 - DP 1 - DTMF	All lines equipped and DTMF
11 C.O. Line Type	0-8	--	0 - C.O. 1 - PBX	Hookflash 0 - no 1 - yes	All lines independent C.O. - no hookflash
12 Incoming Ring Tone	0-8	--	--	0 - low 1 - high	All lines set for low ring tone
13 FAX Line	1-8	--	--	0 - no 1 - yes	No FAX line assigned
14 CES Ring ID	--	--	--	0 - no 1 - yes	Lines not assigned CES ID
15 PBX Access Code	--	--	--	0-9	Code preset to 9
20 Intercom Number Assignment	--	01-24	01-24		Refer to SYSTEM INITIALI-ZATION
21 Door-Mate/Select-able Ring Assign-ment (Night Answer)	--	01-24	Door-Mate 0 - no 1 - yes	Select Ring 0 - no 1 - yes	Intercom numbers 1-3 assigned to answer and access Door-Mate, Intercom number 1 - Select Ring

FIGURE 4-2. FUNCTION SWITCH PROGRAMMING (CONT'D)

Program # Name	C.O. Line	Intercom Number	Data LED A	B	Initialized
22 Handsfree Answer/ Voice Announce or Tone	--	00-24	0 - voice announce 1 - tone	Handsfree 0 - yes 1 - no	All keysets assigned to handsfree and voice announcing
23 Keyset Hold Setting	--	00-24	--	0 - system 1 - I-Hold	All keysets set for system hold
24 Page Zone Setting	--	01-24	All-Call 0 - no 1 - yes	Page Zone 0 - none 1 - zone 1 2 - zone 2 3 - zone 3	Refer to Section 3C, SYSTEM INITIALIZA- TION
25 Long Speech Warning	--	00-24	--	0 - no 1 - yes	No keyset set for warning
30 Toll Restriction Class of Service	--	00-24	--	Class 0 - A 1 - B 2 - C 3 - D	All keysets set for Class A
31 Line Restriction	0-8	00-24	--	Originate outgoing calls 0 - no 1 - yes	No lines restricted
32 Incoming C.O. Line Flash and/or Tone	0-8	00-24	Flash 0 - no 1 - yes	Tone 0 - no 1 - yes	Circuit number 1.1 preset for flash and tone all lines

FIGURE 4-2. FUNCTION SWITCH PROGRAMMING (CONT'D)

Program #	Name	C.O. Line	Intercom Number	Data LED A	B	Initialized
40	Year	--	--	00-99		--
41	Month	--	--	01-12		--
42	Day	--	--	01-31		--
43	Day of Week	--	--		0 - Mon 1 - Tues 2 - Wed 3 - Thurs 4 - Fri 5 - Sat 6 - Sun	--
44	Hour	--	--	00-23		--
45	Minute	--	--	00-59		--
50	Clear System Speed-Dial Numbers	--	--	--	Data Clear 0 - no 1 - yes	--
51	Clear Station Speed-Dial Numbers	--	--	--	Data Clear 0 - no 1 - yes	--
52	System Speed-Dial Storing Keyset	--	--	01-24		Intercom number 1 assigned to enter system speed-dial numbers

Function Switch Programming Descriptions

3.07   The following paragraphs give details of the available Program Numbers and their functions.

    A.   <u>Program Number 10 - C.O. Lines Equipped and DTMF or Dial Pulse Designated</u>: This program identifies the C.O. lines connected to the system and designates them for DTMF or Dial Pulse signalling. The Data A field sets the lines equipped and the Data B field sets DTMF or Dial Pulse. During initialization, all lines are equipped and set for DTMF.

    B.   <u>Program Number 11 - Type of C.O. Line</u>: This program determines the C.O./PBX option and indicates whether the hookflash option will be enabled. Program Numbers 14 and 15 also assign PBX functions. The Data A field indicates whether the line will be a C.O. or PBX line. The Data B field indicates whether or not a 750 msec. hookflash will be generated. All lines are initially assigned as C.O. lines with no hookflash.

    C.   <u>Program Number 12 - Incoming Ring Tone</u>: This designates the ring tone of each C.O. line as low tone (450/600Hz) or high tone (600/800Hz). All lines are initially set for low ring tone. The ring tone switch on the MISC PCB must be set in the HI position to allow high tone.

    D.   <u>Program Number 13 - FAX Line</u>: This program identifies a line to be shared by station users and a FAX machine. When the FAX machine is in use, the line key will indicate a busy line which cannot be accessed by any station. No line is assigned to the FAX machine during initialization.

    E.   <u>Program Number 14 - CES Ring Indentification</u>: This program enables the system to detect one of two ring signals from the Central Office and PBX's which are illustrated below. In the same way, it also affects the ring on keysets with direct ring-in lines. The first cycle shown below represents the most common signal (one-second on/two-seconds off cycle), and is set by entering a "0" in the Data B field. The second cycle shown represents the signal requiring the CES Ring Identification (.25-second on/.25-second off). It is set by entering "1" in the Data B field.

        Common Ring Cycle

        **Ring Cycle with
CES Ring ID**

F. Program Number 15 - PBX Access Code: A digit (0-9) can
    be designinated as the PBX access code. This code is the
    number dialed to access a PBX line. This code is auto-
    matically dialed when using a speed-dial number and the
    system checks it for toll restriction. It is initially
    set to 9.

G. Program Number 20 - Intercom Number Assignment: Intercom
    numbers can be assigned to circuits other than those set
    during initialization. (Refer to Section 3C, SYSTEM
    INITIALIZATION.) Be careful not to assign the same in-
    tercom number to two circuits. If assignments are dupli-
    cated, only the lowest-numbered circuit will ring when
    the intercom number is dialed. Unassigned numbers will
    generate a busy signal when dialed.

H. Program Number 21 - Door-Mate/Selectable Ring Assignment
    (Night Answer): This program determines the stations
    that will access and ring in for Door-Mate calls and/or
    enables Selectable Ring (Night Answer). The Data A field
    enables the station for Door-Mate access/answering and
    the Data B field enables the station to use a key command
    to cause incoming C.O. calls to ring and flash on the
    keyset. Intercom number 1 is initially assigned both
    functions and intercom numbers 2 and 3 are set to access
    the Door-Mate.

I. Program Number 22 - Handsfree Answering: This program
    enables or disables the speaker and microphone in the
    keyset. Data A controls the speaker to voice announce or
    ring until answered. Data B controls the microphone,
    allowing handsfree answering or requiring the user to
    lift the handset. All keysets are initialized with both
    the speaker and microphone enabled. If Data A is set for
    tone, the microphone must be disabled in Data B.

J. Program Number 23 - Keyset Hold Setting: System Hold or
    I-Hold can be assigned to each station. When System Hold
    is used, an outside call on hold will cause the line key
    to flash on all keysets and can be picked up by any sta-
    tion in the system. When on I-Hold, the line key flashes
    only on the keyset where the call was placed on hold and
    the call can only be accessed by that keyset or by using
    the reverse transfer feature. All keysets are set for
    System Hold during initialization.

K. Program Number 24 - Page Zone Setting: This program
    places a station in a page zone and/or the All-Call zone.
    The Data A field enables or disables All-Call page, and
    the Data B field assigns the zone number. Initially, all
    stations are in the All-Call zone and assigned to page
    zones as described in Section 3C, SYSTEM INITIALIZATION.

L. Program Number 25 - Long Speech Warning: Stations can be programmed to receive a double tone through the speaker every three minutes when a station user is engaged in an outside call. This is not assigned to any station during initialization.

M. Program Number 30 - Toll Restriction Class of Service: Each station may be assigned to one of the following toll-restriction classes. All keysets are assigned to Class A during initialization. See also Figure 4-5, Toll Restriction Table, on page 4-28 and Toll Restriction Programming on page 4-19.

Class	Allowed Calls
A	Completely unrestricted. However, can be restricted from dialing local information (411).
B	Permits calls beginning with 800, 900, or 911, Long Distance Information (LDI), Specialized Common Carrier (SCC), calls within the allowed area codes and local calls. May be restricted from dialing local information.
C	Allows calls beginning with 800 or 911, LDI, SCC, and local calls. Also, calls within the local area code are permitted. May be restricted from dialing local information.
D	Calls beginning with 800 or 911, LDI, and local calls are allowed. May also be permitted to dial local information.

N. Program Number 31 - Line Restriction: Each station can be restricted from using any combination of C.O. lines 1-8. A station user attempting to use a restricted line will hear a busy signal. No lines are restricted during initialization.

O. Program Number 32 - Incoming C.O. Call Flash/Tone: Each station can be assigned for direct ring-in of any combination of C.O. lines 1-8. Station can be set for flash and/or tone. However, tone cannot be used without flash. Only circuit number 1.1 is preset to flash and tone for all lines.

FIGURE 4-2.   FUNCTION SWITCH PROGRAMMING (CONT'D)

Program # Name	C.O. Line	Intercom Number	Data LED A	B	Initialized
90 Conference Calls	--	--	1 C.O.- 2 Inside 0 - no 1 - yes	2 C.O.- 1 Inside 0 - no 1 - yes	Both conference types enabled
91 Auto Key	--	--	--	0 - disable 1 - enable	Feature enabled
92 Hold Recall Timer	--	--	--	0 - none 1 - 60 sec 2 - 120 sec 3 - 180 sec 4 - 240 sec 5 - 255 sec	Preset to 60 seconds
93 Dial Tone	--	--	--	0 - disable 1 - enabled	Feature enabled
94 "Meet Me" Page/ Intercom	--	--	--	0 - any keyset 1 - same zone	Enabled for any keyset
95 Transfer Recall Time	--	--	--	0 - none 1 - 60 sec 2 - 120 sec 3 - 180 sec 4 - 240 sec 5 - 255 sec	Preset to 60 seconds
96 SMDR Printout	--	--	--	1 - All calls 2 - local & long distance 3 - long distance only	Preset for all calls

P. Program Numbers 40-45 - Calendar Settings: The calendar
    and clock are set using the following programs:

Program	Range
40 - Year	00-99
41 - Month	01-12
42 - Day	01-31
*43 - Day of Week	0 = Mon, 1 = Tues, 2 = Wed, 3 = Thurs, 4 = Fri, 5 = Sat, 6 = Sun
44 - Hour	00-23 (00 is midnight)
45 - Minute	00-59

Q. Program Number 50 - Clear System Speed-Dial Numbers: The
    system speed-dial data may be erased from the data base
    by entering "1" in the Data B field. The system auto-
    matically resets to "0" after erasing the stored numbers.

R. Program Number 51 - Clear Station Speed-Dial Numbers:
    The station speed-dial data may be erased from the data
    base by entering "1" in the Data B field. The system
    automatically resets to "0" after erasing the stored
    numbers.

S. Program Number 52 - System Speed-Dial Keyset: This pro-
    gram determines the keyset that will be used to enter the
    system speed-dial numbers. It is initially assigned to
    intercom number 1.

T. Program Number 90 - Conference Calls Enable/Disable: The
    system can be enabled or disabled for one or both types
    of conference calls. Initially, both types (two inside/-
    one outside and one inside/two outside) are permitted.

U. Program Number 91 - Auto Key Enable/Disable: The AUTO
    feature key can be enabled or disabled for the entire
    system. It is enabled during initialization.

V. Program Number 92 - Hold Recall Timer: This sets the time limit that a call will remain on hold before re-calling the station. The Hold Recall Timer can be set to the following values (initially set to 60 seconds):

Data B	Timer Value
0	no timer
1	60 seconds
2	120 seconds
3,	180 seconds
4	240 seconds
5	255 seconds

W. Program Number 93 - Dial Tone Enable/Disable: The intercom dial tone may be enabled or disabled for the entire system. Initially, the intercom dial tone is enabled.

X. Program Number 94 - "Meet Me" Page/Intercom: This program determines the extent to which station users can pick up "Meet-Me" pages and intercom calls from other extensions. A "0" in the Data B field allows any internal path to be picked up by any keyset. A "1" limits "Meet Me" to the station's page zone. Initially enabled for all keysets.

Y. Program Number 95 - Transfer Recall Timer: This sets the time limit that a call will ring unanswered before re-turning to the station that transferred it. The Transfer Recall Timer can be set to the same values as the Hold Recall Timer. It is initially set to 60 seconds.

Z. Program Number 96 - SMDR Printout: The Station Message Detail Recording (SMDR) can be programmed to monitor all calls, outgoing local and long distance calls, or only long distance calls. It is preset during initialization to monitor all calls. The SMDR options are as follows:

Data B   Calls Monitored

1   All calls -- The SMDR begins monitoring 15 seconds after the call is dialed.

2   Outgoing calls when 7 or more digits are dialed -- The SMDR begins monitoring 45 seconds after the call is dialed.

3   Outgoing calls when 8 or more digits are dialed -- The SMDR begins monitoring 45 seconds after the call is dialed.

E. USING THE PROGRAMMING TERMINAL

Operating the Terminal

3.08 This section describes how to use the programming terminal.

A. Sign-On Message: To access programs, you must first sign on to the system by using the BREAK command or key. The sign-on message includes the system model, the software version, a list of programs, and the program selection prompt.

B. Equal Sign (=): The equal sign (=) prompt indicates that you must respond to the program line displayed. When the equal sign follows the program selection prompt "MENU (1-11)?" you may select a program. Within a program, the equal sign prompt is asking for an entry, followed by a carriage return.

C. BREAK Command: The BREAK command is used to sign on to the system and to terminate a program. When the BREAK command or key is used, the sign-on message and program selection prompt appear. If you are within a program and want to terminate it, simply use BREAK.

D. Time-Out or END Message: The system contains a built-in timer which is activated during any of the programming modes. This timer is reset each time information is entered. If no entries are made within two minutes, the system signs off, terminates all programming, displays the END message and prints out any buffered SMDR information. If a time-out occurs, any programming done up to that point will be executed and you may use the BREAK command to re-display the sign-on message and continue programming.

E. Command Line and <CR>: The system uses the command line format for data entry. Your entry is not acknowledged until you enter a carriage return. This allows you to check the entry for errors before execution. Throughout this section, <CR> refers to the carriage return key.

F. ERROR Message: The "ERROR" message indicates that your entry was incorrect. When the error message displays, the system reprints the line in question and the equal sign (=) prompt.

G. Upper Case Letters: The system software will only accept upper case letters in the command entries.

Terminal Set-Up

3.09 To connect the terminal to the MDF PCB:

(1) Turn on the AC power to both the programming terminal and the system <u>before</u> connecting the terminal cable to the MDF PCB RS232C connector. This will prevent any electrical surges during the interface.

(2) Carefully connect the RS232C interface cable from the programming terminal to the RS232C port on the MDF PCB.

(3) Place the Data Write switch on the CPU PCB in the ENABLE position to allow customer data base changes.

System Sign-On

3.10 Once the terminal is set up, use the BREAK key or command to sign on to the system. The sign-on message consists of the system model and version, a menu of programs available, and the program selection prompt.

```
              824    VER 1.0
              INTER-TEL INC.
              COPYRIGHT 1984

              1. DATA LOAD
              2. DATA SAVE
              3. STN SPEED CALL LIST
              4. KTS MONITOR
              5. STN MONITOR
              6. C.O. MONITOR
              7. STN SETUP DATA
              8. TOLL RESTRICTION
                   PROGRAMMING
              9. NAME REGISTRATION
              10.MESSAGE REGISTRATION
              11.END
              MENU (1-11)?=
```

3.11 The last line displayed is the program selection prompt. Enter the code (1-11) for the desired program and carriage return <CR>.

3.12 After accessing a program, pertinent information will be displayed on the terminal. The Data Save, Data Load, KTS Monitor, STN Monitor, C.O. Monitor, and STN Set-Up Data programs are only used for diagnostic purposes and are discussed in the DIAGNOSTIC PROGRAMMING section of this manual. Procedures for the STN Speed Call List, Toll Restriction Programming, Name Registration, Message Registration and END programs are described in the following paragraphs.

STN Speed Call List (3)

3.13 To view the station-stored speed-dial numbers:

(1) Enter 3<CR>. The terminal will respond:

STN SPEED CALL LIST
ENTER LAST CKT NO. DISPLAYED (1-24)?=

(2) Enter the last intercom number to be displayed and <CR>. The terminal will respond with a list of all 24 speed-dial numbers for each intercom up to the number entered. It will display in the following format:

```
CKT NO. XX
00:       16029619000
01:       18005238180
   .           .
   .           .
   .           .
24:       9675913
```

(3) When all requested numbers have been displayed, the terminal will print "LIST END" and the program selection prompt.

Toll Restriction Programming (8)

3.14 To create a customized toll restriction table for the system, follow the procedures below. Also refer to Toll Restriction Class of Service programming on page 4-14 and Figure 4-5, Toll Restriction Table, on page 4-28.

(1) Enter 8<CR>. The terminal will respond with the current toll restriction data:

```
TOLL RESTRICTION
   PROGRAMMING
WATS LINE ID =
1+DIAL (Y/N) = Y
411 ALLOWED CLASS = 0 1
SCC LOCAL NUMBER =
CLASS 1 AREA CODE =
CORRECT (Y/N) =
```

(2) If the information is correct enter Y<CR> to return to the program selection prompt.

OR, (3) If the information needs to be changed, enter N<CR>. The terminal will display each line individually.

    a. If the entry printed in the list is correct, press <CR> to access the next line.

    b. If the entry is incorrect, enter the new information as instructed in the following steps.

    c. If the entry should be erased, press the space bar once and <CR>.

(4) WATS LINE ID =

Enter the C.O. line number(s) (1-8) and <CR>. These lines may be used by toll-restricted stations to place long distance calls. This does not need to be an actual WATS lines; it can be a local C.O. line, FX line, PBX line, etc. Enter consecutive numbers using a hyphen and separate non-consecutive numbers with a comma (i.e. 1-4, 6,8). No C.O. lines are designated as WATS lines during initialization.

(5) 1+DIAL (Y/N) =

Enter Y<CR> if the customer is required to dial a "1" to make long distance calls, or N<CR> if "1" is not needed. The 1+DIAL is enabled during initialization.

(6) 411 ALLOWED CLASS =

Enter 0, 1, 2, 3, or any combination and <CR>. This number represents the toll restriction classes assigned by Program Number 30 on the Maintenance Panel. Entering the toll class number allows 411 calls to be made by keysets assigned to that toll class. This is preset to 0 and 1 during initialization.

(7) SCC LOCAL NUMBER =

Enter the seven-digit local SCC number and <CR>. This will allow toll classes A, B, and C to place long distance calls using an SCC number. The SCC number is not preset during initialization.

(8) CLASS 1 AREA CODE
1=

This determines the allowed area codes for Toll Class B.
No area codes are preset during initialization.

a. Enter a three-digit area code. One or two digits may
    be entered, allowing any digit to be dialed. For ex-
    ample entering 9 allows calls to all area codes 900
    through 999, or entering 91 allows calls to area
    codes 910 through 919.

    1. If <CR> is entered after the area code, the pro-
        gram selection prompt will appear.

    2. If the SHIFT and + keys are pressed at the same
        time, the next area code number will appear.

b. You may continue to enter up to 30 area codes, or
    press <CR> to exit at any time.

Name Registration (9)

3.15 This program allows you to enter a name into each of the 24
circuit positions that will appear on Display keysets for inter-
com calls and messages. To register the names:

(1) Enter 9<CR>. The terminal will respond:

NAME REGISTRATION
1=

(2) Enter a name up to six characters long for intercom num-
    ber 1.

    a. If <CR> is entered after the name, the program
        selection prompt will appear.

    b. If the SHIFT and + keys are pressed simultaneously,
        the next intercom number will appear.

(3) You may continue to enter names, or press <CR> to exit at
    any time.

Message Registration (10)

3.16 This program allows you to enter up to 20 filed messages available to station users. To change the initialized messages:

(1) Enter 10<CR>. The terminal will respond with a list of the first five current or initialized messages. The first four cannot be changed.

(2) To change or review any message 5-20, enter a new message up to 16 characters long.

    a. If <CR> is entered after the message, the program selection prompt will appear.

    b. If the SHIFT and + keys are pressed the next message number will appear.

    c. Press the SHIFT and + if you want to go to the next message without changing the currently-displayed message.

    d. To erase a message without entering a new message, enter a space and <CR> or SHIFT +.

(3) You may continue to cycle through the messages by entering SHIFT + , or press <CR> to exit at any time.

3.17 The messages are initialized as follows:

```
 1= BACK AT     XX:00
 2= TRIP,BACK ON  XX
 3= CALL XXXXXXXXXX
 4= AT STATION     XX
 5= OUT OF OFFICE
 6= GONE TO LUNCH
 7= BACK SOON
 8= GONE HOME
 9= IN MEETING
10= IN CONFERENCE
11= IN ACCOUNTING
12= IN DATA PROCESS
13= IN LIBRARY
14= IN WAREHOUSE
15= WITH GUEST
16= WITH CLIENT
17= WITH PATIENT
18= ON BREAK
19= ON VACATION
20= ON SALES CALL
```

End (11)

3.18 To leave the programming mode and allow the Station Message Detail Recording (SMDR) printout to continue:

(1) Enter 11<CR>. The terminal will respond:

ONLINE END

(2) After two minutes, any SMDR information which has been buffered during the programming mode will print.

NOTE: If the END program is not used, the system will time out two minutes after the last entry, and the END message will display. Any buffered SMDR information will also print.

FIGURE 4-3. PROGRAMMING TERMINAL PROGRAM PLANNING SHEET

TOLL RESTRICTION (8):

WATS LINE(S) = _____

1+DIAL= Y or N

411 ALLOWED CLASS= A=0 B=1 C=2 D=3

SCC LOCAL NUMBER= _____

CLASS B AREA CODES= (up to 30)

___, ___, ___, ___, ___, ___, ___, ___, ___, ___,

___, ___, ___, ___, ___, ___, ___, ___, ___, ___,

___, ___, ___, ___, ___, ___, ___, ___, ___, ___

NAME REGISTRATION (9): (up to 24 names, six characters each)

Intercom	Name	Intercom	Name	Intercom	Name
1	_____	9	_____	17	_____
2	_____	10	_____	18	_____
3	_____	11	_____	19	_____
4	_____	12	_____	20	_____
5	_____	13	_____	21	_____
6	_____	14	_____	22	_____
7	_____	15	_____	23	_____
8	_____	16	_____	24	_____

MESSAGE REGISTRATION (10): (up to 20 messages, 16 characters each)

1	BACK AT XX:00	11	_____
2	TRIP,BACK ON XX	12	_____
3	CALL XXXXXXXXXX	13	_____
4	AT STATION XX	14	_____
5	_____	15	_____
6	_____	16	_____
7	_____	17	_____
8	_____	18	_____
9	_____	19	_____
10	_____	20	_____

FIGURE 4-4.   FUNCTION SWITCH PROGRAM PLANNING SHEET

C.O. LINES: (check features to be programmed)

Line #	Program #10 Equip	DTMF	Program #11 C.O./PBX	Hookflash	Program #12 Ring Tone	Program #13 FAX
1	___	___	___	___	___	___
2	___	___	___	___	___	___
3	___	___	___	___	___	___
4	___	___	___	___	___	___
5	___	___	___	___	___	___
6	___	___	___	___	___	___
7	___	___	___	___	___	___
8	___	___	___	___	___	___

SYSTEM FEATURES:

Program Number	Feature
14	CES RING ID - Y=1 or N=0
15	PBX ACCESS CODE (0-9) - ____
50	SYSTEM SPEED-DIAL CLEAR - Y=1 or N=0
51	STATION SPEED-DIAL CLEAR - Y=1 or N=0
52	SPEED-DIAL STORING KEYSET (01-24) - ____
90	CONFERENCE CALLS: 2-in/1-out - Y=1 or N=0
	1-in/2-out - Y=1 or N=0
91	AUTO KEY - Y=1 or N=0
92	HOLD RECALL TIMER (circle one) - none 60 120 180 240 255
93	INTERCOM DIAL TONE - Y=1 or N=0
94	INTERCOM "MEET ME" - Any=0 or Page Zone only=1
95	TRANSFER RECALL (circle one) - none 60 120 180 240 255
96	SMDR - All=1 or Local & LD=2 or LD Only=3

NOTE: Remember to set the calendar and clock, programs 40-45.

FIGURE 4-4. FUNCTION SWITCH PROGRAM PLANNING SHEET (CONT'D)

Program Number 20 - Intercom Number Assignments (20): Write in the intercom number for each circuit.

1.1 ___	2.1 ___	3.1 ___
1.2 ___	2.2 ___	3.2 ___
1.3 ___	2.3 ___	3.3 ___
1.4 ___	2.4 ___	3.4 ___
1.5 ___	2.5 ___	3.5 ___
1.6 ___	2.6 ___	3.6 ___
1.7 ___	2.7 ___	3.7 ___
1.8 ___	2.8 ___	3.8 ___

STATION FEATURES:

Write in the intercom number(s) to be enabled for each feature or "00" for all intercom numbers, if allowed (indicated by an asterisk).

Program Number	Feature	Intercom Number(s)
21	Data A - Door-Mate	_____
	Data B - Selectable Ring	_____
22	Data A - Handsfree Answering	* _____
	Data B - Voice Announcing	* _____
23	System Hold	* _____
	I-Hold	* _____
24	Page Zone - All Call	_____
	Zone 1	_____
	Zone 2	_____
	Zone 3	_____
25	Long Speech Warning	* _____
30	Toll Restriction Class - A	* _____
	B	* _____
	C	* _____
	D	* _____
31	Line Restriction - Line 1	* _____
	Line 2	* _____
	Line 3	* _____
	Line 4	* _____
	Line 5	* _____
	Line 6	* _____
	Line 7	* _____
	Line 8	* _____
	All Lines 0	* _____

FIGURE 4-4.   FUNCTION SWITCH PROGRAM PLANNING SHEET (CONT'D)

Program   Intercom
Number   Feature   Number(s)

32   Incoming C.O.:   Flash -
                              Line 1   *_____
                              Line 2   *_____
                              Line 3   *_____
                              Line 4   *_____
                              Line 5   *_____
                              Line 6   *_____
                              Line 7   *_____
                              Line 8   *_____
                      All Lines 0   *_____

                              Tone -
                              Line 1   *_____
                              Line 2   *_____
                              Line 3   *_____
                              Line 4   *_____
                              Line 5   *_____
                              Line 6   *_____
                              Line 7   *_____
                              Line 8   *_____
                      All Lines 0   *_____

                      STATION PROGRAMMING SUMMARY
                   (copy and fill out for each station)

            Intercom Number _____   Circuit Number _____

Check enabled features: Toll Restriction Class: ____

Door-Mate   ____   Lines Restricted:_____
Selectable Ring   ____
Handsfree Answering   ____   Incoming C.O. Lines:
Voice Announcing   ____   Ring _____
System Hold   ____   Flash_____

I-Hold   ____
Page Zone   1   ____
            2   ____
            3   ____
        All-Call   ____
Long Speech Warning   ____

FIGURE 4-5.   TOLL RESTRICTION TABLE

TYPE OF CALL	CLASS A	CLASS B	CLASS C	CLASS D
Operator Ø		✕	✕	✕
Long Distance [1] (XXX) XXX-XXXX [1] XXX-XXXX		Optional Area Code Only	✕	✕
900 Toll Call [1] (900) XXX-XXXX			✕	✕
Toll Free Call [1] (800) XXX-XXXX				
Local Information [1] 411	*****Optional for all classes*****			
SCC Office Code			Must be Matched	✕
Designated WATS lines	*If allowed C.O. line for station*			
Long Distance Information [1] 555-XXXX [1] (XXX) 555-XXXX				
Emergency [1] 911				
Local Call				

DIAGNOSTIC PROGRAMMING

CONTENTS   PAGE

1. INTRODUCTION

1.01 The Diagnostic Programming section contains detailed information and procedures for using the programming terminal to monitor printed circuit board (PCB) and keyset activity. Diagnostic programs include:

- Keyset (KTS) Monitor to display keyset activity.

- Station (STN) Monitor to display Key Telephone Interface (KTI) PCB circuit activity.

- C.O. Monitor to display C.O. line activity.

- Station Set-Up Data to display the programmed features for each keyset.

- Data Load and Data Save procedures are being developed, but are not yet available. You will be sent a Tech Tip which explains the procedures.

1.02 Instructions for connecting and operating the programming terminal are located in the SYSTEM PROGRAMMING section.

2. KEYSET (KTS) MONITOR (4)

2.01 This program allows you to monitor a keyset's activity. The printout will contain ASCII characters which can be decoded using Figure 5-1 on page 5-5. To monitor a keyset:

(1) Enter 4<CR>. The terminal will respond:

KTS MONITOR
ENTER CKT NO.(1-24)?=

(2) Enter the circuit number (1-24) of the keyset to be monitored and <CR>. Data will appear as the keyset is used, which can be decoded using Figure 5-1.

NOTE: The intercom numbers and circuit numbers are assigned during initialization. If they have been changed, use the initialized value for the circuit in this programming procedure.

(3) Enter <CR>. Response:

ENTER CKT NO. (1-24)?=

a. If you want to continue with another keyset, enter the circuit number and <CR>.

b. To terminate the program, use the BREAK command or key. The program selection prompt will display on the terminal.

3. STATION (STN) MONITOR (5)

3.01 This program allows you to monitor activity of the KTI PCB circuits. The printout will contain hexidecimal data which can be decoded using Figure 5-2 on page 5-6. To monitor a KTI PCB circuit:

(1) Enter 5<CR>. The terminal will respond:

STN MONITOR
ENTER CKT NO.(1-24)?=

NOTE: The intercom numbers and circuit numbers are assigned during initialization. If they have been changed, use the initialized value for the circuit in this programming procedure.

(2) Enter the circuit number (1-24) to be monitored and <CR>.
Response:

```
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00
 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 0
0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00
 00 00 00 00 00 00
ENTER CKT NO.(1-24)?=
```

(3) To monitor another circuit, enter the circuit number and
<CR>. The information for that circuit will be displayed
as shown above.

OR, (4) To terminate the program, use the BREAK command or key.
The program selection prompt will display.

4. C.O. MONITOR (6)

4.01 This program allows you to monitor activity on a C.O. line
circuit. The printout will contain hexidecimal data which can be
decoded using Figure 5-3 on page 5-8. To monitor a C.O. line:

(1) Enter 6<CR>. The terminal will respond:

```
C.O. MONITOR
ENTER C.O. NO.(1-8)?=
```

(2) Enter the C.O. line number (1-8) to be monitored and
<CR>. Response:

```
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00
 00 00 00 00 00 00 00
ENTER C.O. NO.(1-8)?=
```

(3) To monitor the activity of another C.O. line, enter the
C.O. line number (1-8) and <CR>. The information for
that line will be displayed as shown above.

OR, (4) To terminate the program, use the BREAK command or key.
The terminal will return to the program selection prompt.

5. STATION SET-UP DATA (7)

5.01 This program is used to display the features programmed for a selected station. Hexidecimal data will display which can be decoded using Figure 5-4 on page 5-9. To display station set-up data:

(1) Enter 7<CR>. The terminal will respond:

ENTER CKT NO. (1-24)?=

(2) Enter the desired station circuit number (1-24) and <CR>. Response:

00 00 00 00 00 00 00 00 00
ENTER CKT NO. (1-24)?=

NOTE: The intercom numbers and circuit numbers are assigned during initialization. If they have been changed, use the initialized value for the circuit in this programming procedure.

(3) To display another station's set-up data, enter the circuit number and <CR>.

OR, (4) To return to the program selection prompt, use the BREAK command or key.

FIGURE 5-1. KEYSET (KTS) MONITOR DISPLAY DATA

Key Code	Definition	Key Code	Definition
SP	1 on the Keypad	%	DSS Key 1
!	2 on the Keypad	5	DSS Key 2
"	3 on the Keypad	E	DSS Key 3
0	4 on the Keypad	U	DSS Key 4
1	5 on the Keypad	&	DSS Key 5
2	6 on the Keypad	6	DSS Key 6
@	7 on the Keypad	F	DSS Key 7
A	8 on the Keypad	V	DSS Key 8
B	9 on the Keypad	'	DSS Key 9
P	* on the Keypad	7	DSS Key 10
Q	0 on the Keypad	G	DSS Key 11
R	# on the Keypad	W	DSS Key 12
#	C.O. Line Key 1	(	DSS Key 13
3	C.O. Line Key 2	8	DSS Key 14
C	C.O. Line Key 3	H	DSS Key 15
S	C.O. Line Key 4	X	DSS Key 16
$	C.O. Line Key 5	)	DSS Key 17
4	C.O. Line Key 6	9	DSS Key 18
D	C.O. Line Key 7	I	DSS Key 19
T	C.O. Line Key 8	Y	DSS Key 20
+	HOLD Key	*	DSS Key 21
;	SPD Key	:	DSS Key 22
K	AUTO Key	J	DSS Key 23
[	PAGE Key	Z	DSS Key 24
,	CNF Key	–	INFO Key
<	MEM Key	=	MSG Key
\	RMT Key	L	RLS Key
		`	Off-Hook
		a	On-Hook

FIGURE 5-2. STATION (STN) MONITOR DISPLAY DATA

BYTE	LABEL	CONTENTS	
00	STAT	STATION STATUS	
01	INST	INFORMATION STATUS	
02	MOD	STATION MODE	
03	RSXP	REAL SPEECH CROSS-POINT NUMBER	
04	ABSM	ABSENCE/MESSAGE INFORMATION	
05	PSDA	PRESELECTION DATA	
06	TIMP	PRESELECTION TIMER (3 SEC)	
07	INFO	INFORMATION FLAG (SILENT CALL)	
08	TIMI	INFORMATION TIMER (30 SEC)	
09	ATM	ABSENCE TERMINATION MEMORY	
0B	LCDS	LC DISPLAY START POINTER	
0C	LCDE	LC DISPLAY END POINTER	
0D	LCDD	LC DISPLAY DATA BUFFER	
41	LD0	C.O. LINE 2	C.O. LINE 1
42	LD1	C.O. LINE 4	C.O. LINE 3
43	LD2	C.O. LINE 6	C.O. LINE 5
44	LD3	C.O. LINE 8	C.O. LINE 7
45	LD4	HOLD	MEMORY
46	LD5	NOT USED	NOT USED
47	LD6	NOT USED	NOT USED
48	CNTL	CONTROL DATA	
49	REDL	REDIAL DATA (8 BYTES)	
51	LACON	LAST CHANNEL CONNECTED CROSS-POINT NUMBER	
52	SPDD	SPEED DIAL WORK AREA	
53	RTHF	HIGH TONE RING FLAG	
54	RESD	STATION RESERVED	
55	--	NOT USED	

Station Status

00 No Connection
01 On-Hook Idle
02 Off-Hook Idle
10 Originating Station
   (intercom call)
11 Incoming Intercom Call
   On-Hook (while being
   processed)
12 Incoming Intercom Call
13 Destination Station
   (intercom call)
20 C.O. Call Originator
23 C.O. Call Destination
   (ringing)
31 Zone Page or All-Call Origin
32 Zone Page Receive
34 Originating External Page
35 Door-Mate Ring-In
36 Door-Mate Call

Station Mode

01 Night Mode (Selectable Ring)
02 Station Busy
08 Clock Flag
X0 MEM Lamp Off Timer

Real Speech Cross Point

XP NO.	Application
01-08	C.O. Line 1-8
09	Group Page Generation
0A	GND (Idle)
0B	Intercom Channel 1
0C	Intercom Channel 2
0D	Group Page Received
0E	Intercom Dial Tone
0F	C.O. Ring-In High Tone
10	C.O. Ring-In Low Tone

FIGURE 5-2. STATION (STN) MONITOR DISPLAY DATA (CONT'D)

Absence Message Info

00-14	Message Data
40	Message Registered
80	Do-Not-Disturb

Control Data

08	Beep Tone Enable
10	Speaker On
20	Microphone On

Lamp Data Info (LD0-LD1)

0	Lamp Off
1	Incoming Door-Mate Call (120 IPM w/flutter)
3	Line In Use (solid)
5	Ring-In (30 IPM)
6	I-Hold (60 IPM w/flutter)
7	System Hold (60 IPM)
9	Access (15 IPM)
A	Camp On (120 IPM)

Dial Data

Data	Dial Digit
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9
A	0
B	*
C	#

LCD Display Data Buffer

	MSB 2	3	4	5	6	7
0	SP	0	@	P	`	p
1	!	1	A	Q	a	q
2	"	2	B	R	b	r
3	#	3	C	S	c	s
4	$	4	D	T	d	t
5	%	5	E	U	e	u
6	&	6	F	V	f	v
L 7	'	7	G	W	g	w
S 8	(	8	H	X	h	x
B 9	)	9	I	Y	i	y
A	*	:	J	Z	j	z
B	+	;	K	[	k	{
C	,	<	L	\	l		
D	-	=	M	]	M	}
E	.	>	N	^	N	
F	/	?	O	_	O	

FIGURE 5-3.   C.O. MONITOR DISPLAY DATA

BYTE	LABEL	CONTENTS
00	COST	C.O. LINE STATUS
01	COL1	CONNECTED TO USER NO. 1
02	COL2	CONNECTED TO USER NO. 2 (CONFERENCE)
03	FLG1	SOFTWARE FLAG 1
04	DST	DIAL SEND TIMER
05	TIM1	TIMER 1 (2 BYTES)
07	FLG2	SOFTWARE FLAG 2
08	DBUF	DIAL BUFFER
09	RBUF	REDIAL BUFFER
18	DSC	DIAL SEND COUNTER
19	PDSC	DIAL SEND COUNTER PBX
1A	FLG3	CHECK FLAG
1B	REST	OUTGOING RESTRICT FLAG
1C	TIM2	TIMER 2 (2 BYTES)
1E	TIM3	TIMER 3
1F	RECL	RECALL TIMER (XFR AND HOLD)
20	--	NOT USED
21	--	

C.O. Line Status

00	Not Used
01	C.O. Line In Use
02	System Hold
03	I-Hold
04	FAX In Use
05	Queue
06	Not Used
07	Conference 2 In/1 Out
08	Conference 1 In/2 Out
09	Incoming C.O. Call

Software Flag 1

80	Toll Restrict Check
7C-04	Speed Dial Timing
02	Tone Dial Control
01	Speed Dial Pause

Software Flag 2

40	Account Code Flag
20	Speed Dial PBX Access Code Send
10	Not Used
08	Hookflash Flag
04	Incoming Call Flag
02	Hold Flag
01	Speed Dial Flag - Conference

Check Flag

80	Timer 3 Select
40	Timer 2 Select
20	Check Ring Type - Normal
10	Check Ring Type - CES
08	First Digit Timeout Flag
04 & 02	SCC Control Flags
01	PBX Code Request

FIGURE 5-4.   STATION SET-UP DISPLAY DATA

BYTE	LABEL	CONTENTS
00	EXT	EXTENSION NUMBER (01-18) HEX
01	COAL	C.O. LINES ALLOWED (TABLE 1)
02	ILF	INCOMING C.O. FLASH (TABLE 1)
03	ILT	INCOMING C.O. TONE (TABLE 1)
04	COS	CLASS OF SERVICE
05	PAG	PAGING ZONE
06	OPT	STATION OPTIONS
07	--	NOT USED
08	--	

Table 1

Bit	Line
01	1
02	2
04	3
08	4
10	5
20	6
40	7
80	8

Class of Service

80	Class 0 (A)
40	Class 1 (B)
20	Class 2 (C)
10	Class 3 (D)

Paging Zone

01	Zone 1
02	Zone 2
04	Zone 3
80	All-Call

Station Options

01	Not Used
02	Not Used
04	Handsfree Answer Disable
08	Long Speech Warning
10	Enable I-Hold
20	Select Ring
40	Door-Mate Call
80	Tone Call Enable

TROUBLESHOOTING

CONTENTS   PAGE

1.   INTRODUCTION

1.01 This section describes the troubleshooting procedures to follow in the event of a system malfunction. System repair is limited to replacement of modules, (e.g., printed circuit board, power supply, keyset, etc.). Repair beyond module replacement is not authorized and is not covered in this manual.

2.   DEFECTIVE UNIT RETURN POLICY

2.01 **Return Authorization Tags**: To return a unit, obtain a Material Return Authorization (MRA) Tag from Inter-Tel's MRA Department and attach it to the defective unit. The following guidelines will help you properly fill out the MRA Tag.

>   **NOTE:** Inter-Tel does not accept the return of defective units without MRA tags.

  (1) Obtain an MRA number from your Inter-Tel order processing clerk.

  (2) Identify the unit by the equipment name, part number, and serial number.

  (3) Describe the defect and, if applicable, the circuit number related to the defect.

  (4) Document the estimated service time prior to failure.

  (5) Attach the upper portion of the tag to the defective equipment. Retain the bottom portion for your files.

  (6) Write the MRA number on the outside of the box before shipping.

3. TROUBLESHOOTING PROCEDURE

A. PRELIMINARY TROUBLESHOOTING CHECKLIST

3.01 Use this troubleshooting checklist before you start the system troubleshooting procedures. It may save you time and possibly eliminate the need for detailed troubleshooting.

CHECKLIST:

(1) Is the problem caused by user errors? Refer to FEATURES for correct procedures.

(2) Has the equipment been disconnected or disabled? Refer to INSTALLATION and SYSTEM PROGRAMMING for more information.

(3) If the problem involves an optional feature, has the option been enabled?

(4) Are printed circuit boards and equipment cables securely seated and connected? Refer to INSTALLATION for details.

(5) Check all LED's for proper indication. Refer to Section B, LIGHT-EMITTING DIODE INDICATIONS.

(6) Is the problem caused by optional external equipment connected to the system, such as auto-dialers, headsets, loud ringing adapter, etc.?

(7) If the problem persists, proceed to Section C, SYSTEM TROUBLESHOOTING PROCEDURES.

B. LIGHT-EMITTING DIODE (LED) INDICATIONS

3.02 The CPU PCB and each COI and KTI PCB in the KSU contains Light-Emitting Diodes (LED's) that indicate specific functions. Figures 6-1 and 6-2, on pages 6-4 and 6-5, indicate the normal condition of each LED. To correct LED problems:

A. When the power to the KSU is turned on, the LED's on the COI and KTI PCB's should flash once and the CPU PCB LED's should begin flashing after 5 seconds. If they do not:

   (1) Remove the faulty PCB.

   (2) Wait 10 seconds and re-insert the PCB.

   (3) If the LED's still do not function correctly, replace the PCB.

B. If the NMI LED (second from the top) on the CPU is lit, reset the system by turning off the power for 10 seconds then turning the power on. If the NMI LED lights up frequently, contact Inter-Tel Field Service for assistance.

C. If the three LED's on the CPU PCB are not flashing at the proper rates:

   NOTE: The top LED flashes once a second, the second LED is not lit unless a non-maskable interrupt has occurred, the third is almost constantly on and flickering slightly, and the bottom is constantly on.

   (1) Remove all PCB's and check the +5VDC on the KSU power supply.

   (2) Inspect the CPU PCB components, integrated circuit sockets and EPROMS as described in INSTALLATION.

   (3) With the system power off, replace the CPU PCB. Turn on the power and check the +5VDC.

   (4) If the CPU PCB is within tolerance, replace each of the other PCB's, one at a time, and check the +5VDC after each. Each time, turn off the power, insert the PCB, and turn on the power.

   (5) If problem persists, contact Inter-Tel Field Service for assistance. The power supply may be faulty.

FIGURE 6-1.   LIGHT-EMITTING DIODE INDICATIONS

PCB	LED Location	Description
CPU	A,C,D	Clock Status LED's
		Indicates that the CPU is functioning. Rate of flash indicates the clock status in the system.
	B	NMI LED (normally off)
		Indicates that a non-maskable interrupt has occurred.
COI	A-D	Circuit LED's (normally off)
		Indicates that the C.O. line associated with the LED is accessed. LED's C and D are not used on a 2-COI PCB.
KTI	A-H	Circuit LED's (off when not in use)
		Indicates that the station associated with that circuit is in use. LED's E-H are not present on 4-KTI PCB's.

NOTE: Refer to Figure 6-2, on the next page, for the LED locations.

FIGURE 6-2.   LED LOCATIONS

CPU PCB — A, B, C, D

4-COl PCB — A, B, C, D

2-COl PCB — A, B, C, D

8-KTI PCB — A, B, C, D, E, F, G, H

4-KTI PCB — A, B, C, D
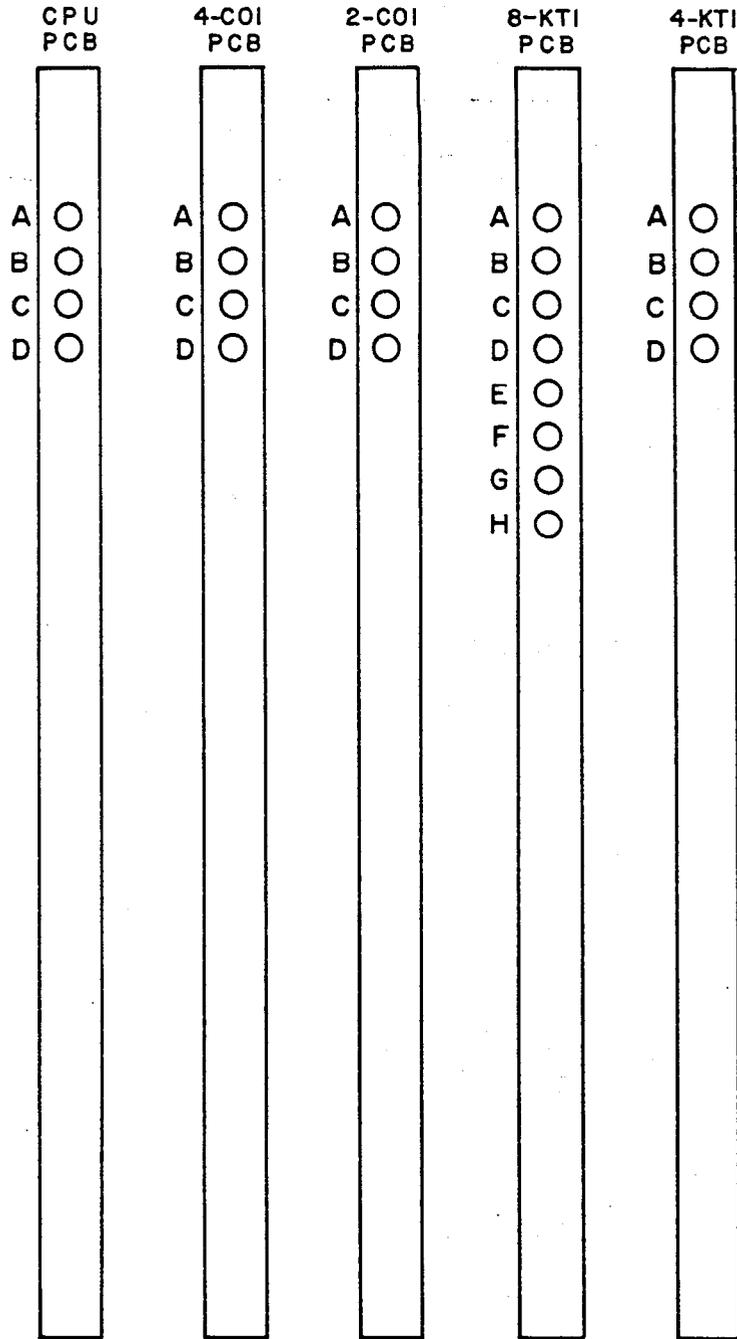
C. SYSTEM TROUBLESHOOTING PROCEDURES

3.03 The troubleshooting procedures for correcting equipment failures have been divided into four separate categories:

- Feature Failure
- Internal Communications
- External Communications
- System Malfunctions

Feature Failure

3.04 If the problem involves system features:

(1) Try the feature according to the instructions in the FEATURES section to determine if the problem is due to user errors.

(2) If the feature does not work properly, remove the keypad portion. Examine the contacts under the feature button for dirt or dust and clean if necessary.

(3) If the problems persist, proceed to Figure 6-3, Feature Failure Troubleshooting Chart, on the next page.

Internal Communications

3.05 If the problem involves only internal calls, refer to Figure 6-4, Internal Communications Troubleshooting Chart, page 6-9.

External Communications

3.06 If the problem involves only external calls, refer to Figure 6-5, External Communications Troubleshooting Chart, page 6-11.

System Malfunctions

3.07 If the problem involves the entire system, refer to Figure 6-6, System Malfunctions Troubleshooting Chart, page 6-12.

3.08 The following troubleshooting charts list symptoms, possible causes and corrective actions. Perform the corrective actions in the order given. If the problem persists, contact Inter-Tel Field Service for assistance.

FIGURE 6-3.   FEATURE FAILURE TROUBLESHOOTING CHART

Symptom	Probable Cause	Corrective Action
Cannot place a call on hold	User error	Refer to FEATURES for correct procedures.
	Defective keyset	Replace the keyset.
	Defective CPU PCB	Contact Inter-Tel Field Service for assistance.
Cannot put the keyset on Call Forwarding	User error	Refer to FEATURES for correct procedures.
	Defective keyset	Replace the keyset.
	Defective CPU PCB	Contact Inter-Tel Field Service for assistance.
Cannot put the keyset in Do-Not-Disturb	User error	Refer to FEATURES for correct procedures.
	Defective keyset	Replace the keyset.
	Defective CPU PCB	Contact Inter-Tel Field Service for assistance.
Last Number Redial feature not working	User error	Refer to FEATURES for correct procedures.
	Defective keyset	Replace the keyset.
	Defective CPU PCB	Contact Inter-Tel Field Service for assistance.
Cannot transfer outside calls to other keysets	User error	Refer to FEATURES for correct procedures.
	Called station is in Do-Not-Disturb	Any station in Do-Not-Disturb cannot receive transferred calls.
	Defective keyset	Replace the keyset.
	Defective CPU PCB	Contact Inter-Tel Field Service for assistance.

FIGURE 6-3.   FEATURE FAILURE TROUBLESHOOTING CHART (CONT'D)

Symptom	Probable Cause	Corrective Action
Speed-dial number memory lost or not working	User error	Refer to FEATURES for correct procedures.
	Data base erased	Reprogram the feature. Refer to SYSTEM PROGRAMMING.
	Power to data base was removed	Place the battery strap in the ON position. Reprogram the data base.
	Defective keyset	Replace the keyset.
	Defective CPU PCB	Contact Inter-Tel Field Service.
Cannot initiate a conference	User error	Refer to FEATURES for correct procedures.
	Conference option not programmed	The system must be programmed for conferencing.
	Defective keyset	Replace the keyset.
	Defective CPU PCB	Contact Inter-Tel Field Service.
Cannot initiate a page	User error	Refer to FEATURES for correct procedures.
	No paging zones programmed in the data base	Ensure that the stations are programmed for paging. Refer to SYSTEM PROGRAMMING.
	Defective keyset	Replace the keyset.
	Defective CPU PCB	Contact Inter-Tel Field Service.
Paging times out in less than 30 seconds	User error	Refer to FEATURES for correct procedures.
	Defective KTI PCB	Replace the faulty KTI PCB.
	Defective keyset	Replace the keyset.
	Defective CPU PCB	Contact Inter-Tel Field Service.

FIGURE 6-4. INTERNAL COMMUNICATIONS TROUBLESHOOTING CHART

Symptom	Probable Cause	Corrective Action
No intercom dial tone	Dial tone option not enabled	Check programming. Dial tone may be disabled through system programming.
	Extension number switch not set correctly	Refer to INSTALLATION for settings.
	Defective cabling	Check cable connections.
	Defective keyset	Replace the keyset.
	Defective KTI PCB	Replace the corresponding PCB.
Cannot place intercom calls	Extension number switch not set correctly	Refer to INSTALLATION for settings.
	Defective keyset	Replace the keyset.
	Defective KTI PCB	Replace the corresponding PCB.
Data noise in keyset	Defective cabling or connections	Check for loose or open connections, or crossed wires.
	Defective keyset	Replace the keyset.
	Defective KTI PCB	Replace the corresponding PCB.
Keyset not working	Defective keyset	Replace the keyset.
	Defective cabling	Check for loose or open connections in corresponding cabling.
	Defective fuse on KTI PCB	Replace the fuse.
	Extension number switch not set correctly	Refer to INSTALLATION for settings.
	Defective KTI PCB	Replace the corresponding PCB.

FIGURE 6-4.   INTERNAL COMMUNICATIONS TROUBLESHOOTING CHART (CONT'D)

Symptom	Probable Cause	Corrective Action
Other station converstions can be heard on the line	Defective KTI PCB	Replace the corresponding PCB.
	Defective CPU PCB	Contact Inter-Tel Field Service.
	"Meet Me" feature interferring with intercom call	"Meet Me" accesses the first intercom path when there is not a page in progress. This may interrupt a handsfree intercom call.
Keyset will not ring when called (busy signal or wrong keyset rings)	Programming error	Use program number 20 to ensure that intercom numbers are not duplicated or unassigned. If duplicated, the lowest-numbered circuit rings. Unassigned numbers produce a busy signal.
	Extension number switch not set correctly	Refer to INSTALLATION for settings.
	Defective keyset	Replace the keyset.
No names or messages appear on Display keyset	User error	Refer to FEATURES for correct procedures.
	Programming error	Check message and name registration programming for blank entries.
	Defective keyset	Replace the keyset.
	Defective CPU PCB	Contact Inter-Tel Field Service.
Power Failure Transfer keyset does not connect to C.O. line during power failure	Keyset not equipped	Replace with PFT keyset.
	Defective COI PCB	Replace COI PCB.
	Defective keyset	Replace the keyset.

NOTE: These symptoms are isolated to one keyset only.   For identical problems involving more than one keyset, refer to Figure 6-6, page 6-12.

FIGURE 6-5.   EXTERNAL COMMUNICATIONS TROUBLESHOOTING CHART

Symptom	Probable Cause	Corrective Action
Cannot obtain C.O. dial tone	C.O. Line(s) restricted	Check the station option programming for that keyset.
	Defective keyset	Replace the keyset.
	Defective KTI PCB	Replace the KTI PCB.
	Defective COI PCB	Replace the COI PCB.
	Defective CPU PCB	Contact Inter-Tel Field Service for assistance.
Cannot place an outside call. C.O. dial tone present (intercom works).	Keyset is toll retricted	Check the station option programming for that keyset.
	Defective keyset	Replace the keyset.
	Defective CPU PCB	Contact Inter-Tel Field Service for assistance.
Outside calls being dropped during conversation or upon answering C.O. call.	Loop current interrupt from Central Office	Central Office must supply constant loop current.
	Insufficient loop current supplied by Central Office	Central Office must supply 20mA loop current minimum.
	Defective keyset	Replace the keyset.
	Defective COI PCB	Replace the COI PCB.
	Defective CPU PCB	Contact Inter-Tel Field Service for assistance.

NOTE: These symptoms are isolated to one keyset only. For
        identical problems involving more than one keyset, refer
        to Figure 6-6, the next page.

FIGURE 6-6. SYSTEM MALFUNCTIONS TROUBLESHOOTING CHART

Symptom	Probable Cause	Corrective Action
All keysets in the system will not operate. No LED indication when a line key is pressed.	Main power fuse open	Examine the fuse and replace it if necessary. CAUTION: Do not exceed maximum rating of fuse.
	Open connection in the cable between power supply and KSU cardfile.	Turn off the system. Use an ohmmeter to check the cable connector and replace or repair the faulty cable.
	Fuses on the KTI open	Examine the KTI fuses and PCB replace if faulty.
	Defective power supply or PCB	Remove all PCB's from the KSU. Use a voltmeter and check the supply voltage on the terminal block of the power supply. If the voltage is not 23.5-27.5VDC, replace the power supply. If the voltage is correct, then replace the PCB's one at a time, checking the +5VDC, until the defective PCB is isolated.
A group of 4 or 8 keysets (4- or 8-KTI PCB) not working. No LED indication when a line key is pressed. All sets are on one KTI PCB.	Defective fuse on KTI PCB	Replace the fuse.
	Defective KTI PCB	Replace the KTI PCB.
	Defective or miswired amphenol connector on the MDF PCB.	Remove the cable from the MDF PCB and use meter to verify the pinout of the cable.
	Defective CPU PCB	Contact Inter-Tel Field Service for assistance.
	Defective receptacle on the KSU backplane	Replace the KSU.

FIGURE 6-6.   SYSTEM MALFUNCTIONS TROUBLESHOOTING CHART (CONT'D)

Symptom	Probable Cause	Corrective Action
A group of 4 or 8 keysets (4- or 8-KTI PCB) reset repeatedly	Hot pre-wire	Hot pre-wires are not allowed. For these cables, do not complete the bridging on the KTI block.
	Extension number switch setting not correct on keyset	Refer to INSTALLATION for correct settings.
	Defective cable	Check for loose cabling. Meter the cable, check for shorts, loop resistance, opens, etc.
	Defective keyset	Determine which keyset is faulty and replace it.
	COI Jumper PCB not seated properly (affects circuits 1.5 through 1.8)	Reseat the COI Jumper PCB.
No intercom dial tone on any keyset in the system	Option not enabled	Check system programming to ensure that dial tone has not been disabled.
	Defective MISC PCB	Replace the MISC PCB.
Door-Mate not working	Option not enabled	Check system programming to ensure that Door-Mate access/ answering has been enabled.
	No DOOR PCB in the KSU	DOOR PCB must be installed.
	Defective cable	Check Door-Mate cabling. Refer to INSTALLATION for details.
	Defective Door-Mate	Replace the Door-Mate.
	Defective DOOR PCB	Replace the DOOR PCB.
	Defective MISC PCB	Replace the MISC PCB.
	Defective CPU PCB	Contact Inter-Tel Field Service for assistance.

FIGURE 6-6.   SYSTEM MALFUNCTIONS TROUBLESHOOTING CHART (CONT'D)

Symptom	Probable Cause	Corrective Action
No ring tone on any keyset in the system.	Defective MISC PCB	Replace the MISC PCB.
	Defective CPU PCB	Contact Inter-Tel Field Service.
C.O. line inoperative throughout system	Line separation switch pushed in	Press the red RLS button on the switch on the MDF PCB.
	Defective C.O. line from Central Office	Disconnect the C.O. line from COI at MDF. Use a test set to verify the C.O. connection.
	Defective COI cable	Check COI cabling. Refer to INSTALLATION for details.
	Defective COI PCB	Replace the COI PCB.
	Defective CPU PCB	Contact Inter-Tel Field Service.
Terminal will not communicate with CPU PCB	Baud rates of the terminal and CPU PCB not the same	Match the baud rates of the printer and the CPU PCB. Set printer at 300 baud.
	Miswired or defective cable	Repair or replace connecting cable. See INSTALLATION for proper RS232C pinout.
	RS232C interface on MDF PCB is faulty	Examine RS232C interface for faulty solder connections or broken pin. Contact Inter-Tel Field Service for assistance. Replace the MDF PCB if faulty.
	Defective CPU PCB	Contact Inter-Tel Field Service.
Repeated occurrence of dropped calls	AC line is not dedicated	Have dedicated AC line installed from the main power panel with a third wire ground. Ensure telephone power is on its own circuit breaker.
	KSU located near a strong magnetic field. (power transformers or copying machines)	Relocate the KSU to an isolated room a minimum of 20 feet away from any equipment that produces a magnetic field.
	Defective CPU PCB	Contact Inter-Tel Field Service.

REPLACEMENT PARTS

CONTENTS   PAGE

1. INTRODUCTION

1.01 This section provides the information necessary to order replacement parts for the 824 system.

2. ORDERING PROCEDURE

2.01 When ordering equipment for the 824 system, it is necessary to provide the following information to your Order Processing clerk:

- Company name
- Purchase order number
- Required date of shipment
- Part number(s) of equipment ordered
- Quantity required

3. REPLACEMENT PARTS LIST

3.01 Refer to Figure 7-1 on the next page, which lists every part available that is authorized for replacement on the 824 system.

4. RECOMMENDED SPARE PARTS

4.01 It is mandatory that spare parts be kept on hand to insure the best possible customer service.

4.02 Refer to Figure 7-2 on page 7-4, which lists the quantities of spare parts recommended to adequately maintain and service ten 824 systems.

FIGURE 7-1. REPLACEMENT PARTS

Part Description	HITEC Number	PHOENIX Number
Keysets		
824 Standard Keyset	248.3000	247.3000
824 Power Failure Transfer Standard Keyset	248.3100	247.3100
824 Display Keyset	248.3200	247.3200
824 Power Failure Transfer Display Keyset	248.3300	247.3300
Keyset Components		
Line Cord	813.1039	813.1041
Handset Cable	813.1038	813.1042
Handset Assembly	817.3027	817.3026
Transceiver for Handset	817.3028	817.3028
Housings		
824 Standard Keyset Top	810.5165	810.5162
824 Standard Keyset Bottom	810.5166	810.5163
824 Standard Keyset Faceplate	810.5167	--
824 Display Keyset Top	810.5165	810.5164
824 Display Keyset Bottom	810.5166	810.5163
824 Display Keyset Faceplate	810.5168	--
Wall Mount Adapter Kit	828.1006	828.1028
Keyset Control Boards		
Standard Keyset Keyboard and LED	248.3010	247.3020
Standard Keyset Control Board Assembly	247.3010	247.3010
Display Keyset Keyboard and LED	248.3210	247.3210
Display Keyset Control Board Assembly	247.3242	247.3242
Standard Power Failure Transfer Keyset Control Board Assembly	247.3110	247.3110
Display Power Failure Transfer Keyset Control Board Assembly	247.3232	247.3232
Keyset Button Caps		
824 Standard Keyset	812.1029	812.1030
824 Display Keyset	812.1031	812.1028

FIGURE 7-1. REPLACEMENT PARTS (CONT'D)

The following part numbers are the same for both Phoenix and Hitec models:

Key Service Unit

824 KSU and Power Supply with battery charger	247.1100
Power Supply with battery charger	247.1210
CPU PCB with timer	247.2100
DTMF COI PCB (4 lines)	247.2200
DTMF COI PCB (2 lines)	247.2220
Dial Pulse COI PCB (4 lines)	247.2210
Dial Pulse COI PCB (2 lines)	247.2230
KTI PCB (8 keyset)	247.2300
KTI PCB (4 keyset)	247.2310
MISC PCB	247.2400
DOOR PCB	247.2500
COI Jumper PCB	247.2600
MDF PCB	247.2700

Other

PFT Ringer Adapter Kit	828.1030
Fuse - 1.0A (non-standard)	802.1010
Fuse - 0.3A (non-standard)	802.1018
Plastic Instruction Stand	828.1008
Card Directory for Phoenix Keyset	809.1092
Owner's Guide	247.8001-0
Installation & Maintenance Manual	247.8002-0
User's Guide	247.8003-0

FIGURE 7-2. RECOMMENDED SPARE PARTS

Part Number	Description	Quantity
247.1100	KSU and Power Supply w/battery charger	1
247.1210	Power Supply with battery charger	1
247.2100	CPU PCB with timer	2
247.2300	8-KTI PCB	2
247.2310	4-KTI PCB	2
247.2200	DTMF 4-COI PCB	2
247.2220	DTMF 2-COI PCB	2
247.2210	Dial Pulse 4-COI PCB	1
247.2230	Dial Pulse 2-COI PCB	1
247.2400	MISC PCB	1
247.2500	DOOR PCB	1
247.2600	COI Jumper PCB	1
247.2700	MDF PCB	1
802.1010	1.0A fuse	10
802.1018	0.3A fuse	10
248.3000	824 Standard Keyset, Hitec	4
247.3000	824 Standard Keyset, Phoenix	4
248.3100	Standard Power Failure Transfer Keyset, Hitec	1
247.3100	Standard Power Failure Transfer Keyset, Phoenix	1
248.3200	824 Display Keyset, Hitec	1
247.3200	824 Display Keyset, Phoenix	1
248.3300	Display Power Failure Transfer Keyset, Hitec	1
247.3300	Display Power Failure Transfer Keyset, Phoenix	1
813.1039	Line Cord, Hitec	2
813.1041	Line Cord, Phoenix	2
813.1038	Handset Cable, Hitec	1
813.1042	Handset Cable, Phoenix	1

FEATURES

CONTENTS   PAGE

INTRODUCTION TO FEATURES

The 824 system, in addition to its stylish appearance and easy installation and programming, provides over 100 user-friendly features. These features have been divided into the following categories:

System Features: This category includes features for the entire system.

- Station Message Detail Recording (SMDR)
- Flexible Attendant Arrangements
- Selectable Ring (Night Answer)
- Power Failure Capabilities
- Dual-Tone Multi-Frequency (DTMF) or Dial Pulse Signalling
- Music-On-Hold
- Call Privacy
- Toll Restriction
- Direct Ring-in Lines
- Variable Time-Out Capabilities

Station Features: Features available at each station are included in this category. They are further categorized as follows:

- Keyset General Features
- Intercom Features
- Outside Call (C.O.) Features
- Special Station Features
- Special Display Keyset Features

SYSTEM FEATURES

1. INTRODUCTION

1.01 System features of the 824 system include the following:

- Station Message Detail Recording (SMDR)
- Flexible Attendant Arrangements
- Selectable Ring (Night Answer)
- Power Failure Capabilities
- Dual-Tone Multi-Frequency (DTMF) or Dial Pulse Signalling
- Music-On-Hold
- Call Privacy
- Toll Restriction
- Direct Ring-in Lines
- Variable Time-Out Capabilities

2. STATION MESSAGE DETAIL RECORDING (SMDR)

2.01 The Station Message Detail Recording (SMDR) is a standard feature of the 824 system which provides a detailed record of outgoing calls (long distance and local) and may include selected incoming calls.

2.02 This data may be recorded on a customer-provided printer or alternate device (such as magnetic tape or floppy disk). This output device is connected to the RS232C port on the Main Distribution Frame (MDF) printed circuit board (PCB).

2.03 SMDR options, using Maintenance Panel Program 96, include:

A. All outgoing local and long distance calls -- The SMDR begins monitoring 15 seconds after the telephone number is dialed.

B. Outgoing calls longer than 30 seconds in duration -- The SMDR output device begins monitoring 45 seconds after the telephone number is dialed.

C. Long distance calls (eight digits or more) -- The SMDR output device begins monitoring 45 seconds after the telephone number is dialed.

D. A record of incoming calls if the station user enters an account code.

2.04 The following paragraphs describe the call data items included in the SMDR output report, given in the order in which they appear in Figure 8-1 on the next page.

FIGURE 8-1. SMDR PRINTOUT

EXT	DIALED NO.	ELAPSED TIME	CO	ACCT
STATION NUMBERS	DIALED NUMBERS	DURATION OF CALL TIME OF DAY	C.O. LINE NUMBER	ACCOUNT CODE

2.05 Day Header: A page header is generated daily at midnight when the real time clock cycles from 2359 to 0000. Included in the header is the date (month, day, year, day of week) and column headings for the SMDR printout.

2.06 Station Number: This identifies the originator of the outgoing call, showing the intercom number.

2.07 Number Dialed: The telephone number (up to 30 digits) dialed by the station user is shown here. This field will be blank for incoming calls.

2.08 Duration of Call: This gives the number of minutes and seconds elapsed. The timer starts 15 seconds after the end-of-dialing sequence and ends when the C.O. line in use is released. In the case of an incoming call, duration is timed from the moment the account code is entered. The timer advances every second and times for a maximum of 255 minutes before starting again at 0.

2.09 Time of Day: This field records the time the call starts, showing hour and minutes in international (24-hour clock) time.

2.10 C.O. Line Number: This field identifies the C.O. line used to place or receive the call.

2.11 Account Code: An account code (up to six digits) may be entered during a C.O. call to help identify the call for billing purposes. For example, if your business assigns account numbers to clients, calls to and from them may be identified by that number. This makes it easy to locate the data later and charge the client for the call. An incoming call will appear on the SMDR printout only if an account code is entered during the call. For more information, see page 8-18.

3. FLEXIBLE ATTENDANT ARRANGEMENTS

3.01 The 824 system may be configured for one-attendant, multiple-attendant, or no-attendant operation, using Maintenance Panel Programs 31 and 32.

3.02 One-Attendant Operation: With this feature, incoming C.O. lines are programmed to ring in at one station.

3.03 Multiple-Attendant Operation: Incoming C.O. lines are programmed to ring in at two or more stations.

3.04 No-Attendant Operation: With this feature, incoming and outgoing calls may be handled without the use of an attendant. C.O. lines are programmed to ring in at all stations.

4. SELECTABLE RING (NIGHT ANSWER)

4.01 Stations can be programmed for Selectable Ring (Maintenance Panel Program 21), which allows the user to turn ringing on or off for all C.O. lines at any time. See page 8-35 for procedures.

5. POWER FAILURE CAPABILITIES

5.01 For times when commercial AC power is disrupted, the 824 system may be equipped with power failure equipment. This includes a system battery back-up and/or the power failure transfer arrangement.

A. BATTERY BACK-UP

5.02 The power supply for the 824 system provides a trickle-charge circuit for system battery back-up. In the event of a power loss, these customer-provided batteries are automatically activated and the system remains fully operational. They also protect the system in a "brown-out" condition.

B. POWER FAILURE TRANSFER (PFT) ARRANGEMENT

5.03 In the event of an AC power loss, systems without battery back-up may be equipped with an optional power failure transfer system.

5.04 Optional Power Failure Transfer (PFT) keysets are used. Under normal conditions, they function as regular keysets. In the event of an AC power loss, C.O. lines are switched directly to these stations to answer incoming calls.

5.05 The system supports up to eight PFT keysets (one per in- coming C.O. line). The PFT function is automatically enabled at the KSU in the event of a power failure. Refer to SYSTEM SPECI- FICATIONS for details.

C. DATA BASE BACK-UP

5.06 Power for the customer's data base memory is provided as an integral part of the CPU PCB. The data base back-up protects customized programming and system and station speed dial numbers.

5.07 A battery on the CPU PCB is trickle-charged from the system power supply. In the event of a power failure, this battery protects the data base memory for up to 25 days before reprogram- ming is required.

6. DUAL-TONE MULTI-FREQUENCY (DTMF) OR DIAL PULSE SIGNALLING

6.01 DTMF or dial pulse selection permits the keysets to be equipped with pushbutton keypads. The C.O. line signal deter- mines whether DTMF or dial pulse is used.

6.02 Any combination of DTMF or dial pulse signalling may be mixed on a line-by-line basis on the Central Office Interface (COI) PCB, using Maintenance Panel Program 10. A digital code is generated by the instrument and is decoded as either a DTMF or dial pulse signal.

6.03 For specialized applications (banking, computer call-ups, etc.), the asterisk (*) and pound (#) keys on the keypad may send a DTMF signal.

7. MUSIC-ON-HOLD

7.01 The system may be equipped with an optional music source for calls on hold and calls waiting. This feature not only makes the wait as pleasant as possible, but it assures the holding party that they are still connected.

7.02 Music-On-Hold is enabled on the MISC PCB. The music source is selected from an external source or from a choice of two synthesized melodies.

8. CALL PRIVACY

8.01 The call privacy feature restricts access to a call by all other station users. This applies to intercom and outside calls.

8.02 When a private intercom path is selected by lifting the handset and pressing the DSS key, no other station may seize the intercom path. However, a handsfree intercom call may be interrupted by the "Meet Me" feature, which accesses the lowest-numbered intercom path.

8.03 When a C.O. line is selected by pressing one of the eight line keys, no other station can seize that line. Control of the line may be transferred to another station through a conference or a call transfer.

9. TOLL RESTRICTION

9.01 As a cost-controlling feature, the 824 system has the capability of restricting specific stations from accessing C.O. lines or from making toll calls. These restrictions are programmed by service personnel. To cover these topics, this section contains the following:

    A. Toll Restriction Classes
    B. WATS Line Access
    C. Allowed Area Codes List
    D. Specialized Common Carrier (SCC) Access
    E. Local Information Calls

A. TOLL RESTRICTION CLASSES

9.02 The system has four toll restriction classes, which are assigned by Maintenance Panel Program 30.   They are:

    A.   Class A: Completely unrestricted, but may be restricted from dialing local information during programming.

    B.   Class B: Calls are allowed which begin with 800, 900, or 911. Long Distance Information (LDI) calls, SCC calls, local calls, and calls within the allowed area codes are also permitted. May be restricted from dialing local information.

    C.   Class C: Calls beginning with 800 or 911, LDI, SCC and local calls, as well as calls within the local area code are allowed. May be restricted from dialing local information.

    D.   Class D: Only local calls and calls beginning with 800 or 911 are permitted. May be allowed to dial local information.

9.03 Other toll-restriction features may also be programmed, using the Toll Restriction (8) program on the terminal. These include WATS line access, SCC access, local information calls, and the allowed area codes list. Each is discussed below.

B. WATS LINE ACCESS

9.04 A station may be programmed to have access to an unrestricted line which is used to place calls that may otherwise be denied. This line does not need to be an actual WATS line. It may be a local C.O. line, FX line, PBX line, etc., that the user wishes to exclude from the toll restriction function.

C. ALLOWED AREA CODES LIST

9.05 A list of up to 30 allowed area codes may be developed and applied to Toll Class B stations. The system will allow Class B stations to place calls to these area codes. If a toll/long distance call is denied, the station user hears a busy signal.

D. SPECIALIZED COMMON CARRIER (SCC) ACCESS

9.06 Any station, except those in Toll Class D, may have access to an SCC number. This number is used to place toll/long distance calls that are otherwise denied for the station.

E. LOCAL INFORMATION CALLS

9.07 Any of the four toll restriction classes may be programmed to allow local information calls (411 or 1411).

10. DIRECT RING-IN LINES

10.01 A C.O. line may be programmed to flash and/or ring in directly on only one keyset, creating a "private" line. Other stations may be restricted from this line during programming.

11. VARIABLE TIME-OUT CAPABILITIES

11.01 This feature provides varying time parameters for the 824 system. Figure 8-2 below lists the timers available. Timers are either preset or programmable. Where applicable, variable values are given.

FIGURE 8-2. AVAILABLE TIMERS

Timer	Default Value	Variable Range
Transfer Recall	60 sec	0,60,120, 180, 240, or 255 sec
Hold Recall	60 sec	
Call Waiting Tone (incoming C.O.)	15 sec	
Callback Ring Duration	15 sec	
Lamp Status (Flash Sequence)	Refer to Figure 8-4	
Preselect Time-out	15 sec	
SMDR - Long Distance Record	30 sec	
"ADD1" Interdigital Time-out	15 sec	
Abandoned Call Timer	10 minutes	
Page Time-out (Internal and External)	30 sec	
Long Speech Warning Tone	180 sec	

STATION FEATURES

1. INTRODUCTION

1.01 Station features of the 824 system include the following categories:

- Keyset General Features
- Intercom Features
- Outside Call (C.O.) Features
- Special Station Features
- Special Display Keyset Features

2. KEYSET GENERAL FEATURES

2.01 Features available to each keyset for all operations are described in this section, including the following:

A. Key Functions
B. LED Indications
C. Audible Tone Indications
D. Display Keysets
E. Volume and Ring Tone Control
F. Call Number Buffering
G. Direct Incoming Line Flexibility
H. C.O. Line Restrictions

A. KEY FUNCTIONS

2.02 All 824 keysets have a 12-key pushbutton keypad and eight C.O. line keys. Standard keysets have seven feature keys and Display keysets have ten feature keys. The line keys provide direct access to C.O. lines and the feature keys provide user-friendly operation of the system functions.

2.03 Both the Standard and the Display keysets have a 24-key Direct Station Selector (DSS) which allows access to intercom numbers with one keystroke. The DSS on the Display keyset is also a Busy Lamp Field (BLF) which has Light-Emitting Diodes (LED's) under the keys to indicate the status of each station.

2.04 The functions accessed by the feature keys are defined in Figure 8-3 on the next page.

FIGURE 8-3. KEY FUNCTIONS

Key	Function
HOLD	Places a call on system hold or I-hold, depending on system programming.
SPD	Programs and dials the stored speed-dial phone numbers. Also used to redial the last number dialed.
CNF	Used to set up a three-party conference, if the conference option is programmed.
PAGE	Accesses stations in programmed paging zones and the All-Call page.
AUTO	Automatically selects an available line key for dialing outgoing calls or for answering incoming calls. This key may be used on- or off-hook to preselect C.O. lines.
MEM	Used when registering keyset features (i.e. speed-dial numbers, messages, do-not-disturb, etc.).
RLS	Used to erase messages, or cancel do-not-disturb, call forwarding and other features. Also disconnects outside calls when on-hook.
MSG	Registers display messages.
INFO	Used to check the status of keysets.
RMT	Controls remote contacts for electrical devices (i.e. sprinkler systems, door locks, etc.)

B. LED INDICATIONS

2.05 The status of C.O. line keys, DSS/BLF keys and five of the feature keys is indicated by the LED in each key. The various flash rates of the LED's have distinct meanings as shown in Figure 8-4 on the next page. The flash rates are described below in Interruptions Per Minute (IPM):

a. STEADY   -   No flashing.

b. FAST   -   Flashes 120 IPM or two times per second. Flutters when some features are used.

c. MEDIUM   -   Flashes 60 IPM or one time per second. Flutters when some features are used.

d. SLOW   -   Flashes 30 IPM or once every two seconds.
e. DELAYED   -   Flashes 15 IPM or once every four seconds.

f. DOUBLE   -   Light repeatedly flutter-flashes twice and pauses.

FIGURE 8-4.   LED INDICATIONS

FLASH RATES	LINE KEYS	HOLD KEY	MEM KEY	MSG KEY	DSS KEY
STEADY (0 IPM)	Line in use on another keyset	All inter-com paths busy	Message is registered ---------- Special feature is activated	Message is registered	Station is off-hook ------------ In Do-Not-Disturb
FAST FLASH (120 IPM)		Intercom call waiting			
FAST FLUTTER (120 IPM)		Incoming Door-Mate call			
MEDIUM FLASH (60 IPM)	Call on System Hold				
MEDIUM FLUTTER (60 IPM)	Call on I-Hold ------------ Call transferred to keyset				
SLOW FLASH (30 IPM)	Incoming call				
DELAYED FLASH (15 IMP)	Call in progress				
DOUBLE FLUTTER			After special feature is activated ---------- After speed dial number is entered		

C. AUDIBLE TONE INDICATIONS

2.06 There are several audible tones on the 824 system, each with distinct "ringing" for each type of call. No harsh sounding bells are used, as signalling is accomplished using pleasant tone signals.

Ring Tones

2.07 The different ring tones are described below.

   (1) Ring tones heard through the keyset speaker while on-hook are:

     a. Long continuous tones (_ _ _)

        Incoming C.O. call
        Line now available from automatic line callback

     b. One double tone (--)

        Intercom call

     c. Repeating double tones (-- -- --)

        Private intercom call

   (2) Tones heard while off-hook are:

     a. Continuous busy signal (---------)

        Station is in Do-Not-Disturb mode
        C.O. line is busy
        All intercom paths are busy
        Another station is camped-on to the busy station you
          are calling
        You dialed an invalid intercom number
        Your keyset is toll-restricted
        Station called is in Do-Not-Disturb, Absent Mode or a
        message is recorded

     b. One tone every 15 seconds

        Station has incoming C.O. call waiting

     c. One double tone (--)

        Your station is camped-on to a busy station

     d. One tone every three minutes

        Long speech warning signal

Immediate Ringing

2.08 Immediate ringing is provided for all calls to a station. A called station receives ringing immediately after the station circuit is tested and found to be idle.

D. DISPLAY KEYSETS

2.09 Display keysets (824D) may be used on the system. These keysets are equipped with a liquid crystal display (LCD) for displaying call information and status messages. When the keyset is idle, the date and time are shown. Other messages are referenced throughout this section.

E. VOLUME AND RING TONE CONTROL

2.10 The volume for voice communication and signal tones heard through the keyset speaker are adjustable. Each keyset is equipped with a volume control thumbwheel on the right-hand side of the instrument. The handset (receiver) volume control slide switch affects the voice signals received through the handset.

F. CALL NUMBER BUFFERING

2.11 Digits dialed are buffered by the CPU, preventing the user from dialing too fast for processing.

G. DIRECT INCOMING LINE FLEXIBILITY

2.12 Direct incoming line flexibility is a feature that allows the user to assign any combination of the eight incoming C.O. lines to ring in and/or flash on specific stations. Assignments for ring-in are programmed, using Maintenance Panel Program 32.

2.13 Since the 824 system is a square key system, a C.O. line must appear as the same physical line key on all keysets, even if all keysets cannot access it.

H. C.O. LINE RESTRICTIONS

2.14 A station may be restricted from accessing any of the eight C.O. lines for outgoing calls, using Maintenance Panel Program 31. An attempt to use a restricted line produces a busy signal. However, calls on restricted lines may be received from and transferred to other stations.

3. INTERCOM FEATURES

3.01 The intercom features presented in this section are as follows:

    A. Flexible Intercom Numbering
    B. Voice Announcing
    C. Handsfree Answering
    D. Station-to-Station Calling
    E. Intercom Camp-On and Call Waiting

A. FLEXIBLE INTERCOM NUMBERING

3.02 All stations are accessed with one keystroke, by pressing a DSS key. Intercom number assignments are flexible and can be changed through the data base by service personnel. Duplicate intercom number assignments are not allowed.

B. VOICE ANNOUNCING

3.03 An internal speaker in the 824 keyset is initially enabled to allow voice announcing on intercom calls to idle stations. The called party will hear the announcement and may respond handsfree. This feature may be disabled with Maintenance Panel Program 22.

C. HANDSFREE ANSWERING

3.04 If your station is programmed for handsfree answering (Maintenance Panel Program 22), you may answer an intercom call from anywhere in the room, or you may lift the handset for a private conversation.

D. STATION-TO-STATION CALLING

3.05 Intercom calls can be placed from one station to another. One of the two available intercom channels is selected automatically when a DSS key is pressed.

3.06 If both channels are busy, you will receive a busy signal and the HOLD key will light. While the intercom paths are busy, C.O. calls may not be transferred.

3.07 To place an intercom call:

    (1) Lift the handset and listen for the intercom dial tone.

    (2) Press the DSS key. If the called station is idle, both parties will hear one double tone.

(3) The called station's speaker is activated if handsfree
    answering has been enabled for that station and you may
    announce yourself.

3.08 If the called station is busy, you may hang up and try
later or, without hanging up, camp on to the busy station and
wait until it is available. Refer to Section E, Intercom Camp-On
and Call Waiting.

3.09 If the called station is busy on an outside call, you will
hear one double tone. Display keysets will show "NAME:IN USE" or
"NAME:C/O CALL". If the called station is busy on an intercom
call, there will be one double tone and the HOLD key will light
steadily. Display keysets will show "NAME:IN USE" or "NAME:I/C
CALL".

3.10 If an unassigned, unequipped, or invalid intercom number is
dialed, the calling party will hear a continuous busy signal.
Display keysets will show "XX: NO PHONE".

3.11 <u>To receive an intercom call</u>: After hearing one double tone
and possibly a voice announcement, respond handsfree or lift the
handset for a private conversation. A Display keyset will show
"I/C CALL:NAME".

3.12 <u>To end an intercom call</u>: The call may be terminated by
hookflashing (if off-hook), pressing an available line key, or
hanging up.

E.   INTERCOM CAMP-ON AND CALL WAITING

3.13 This feature allows you to "camp-on" to a busy station and
wait until it is available. You are automatically camped-on as
long as you remain off-hook.

3.14 Any station user may camp-on to a busy station that is not
in Do-Not-Disturb mode, does not have a message set, or does not
have a previous camp-on waiting.

3.15 <u>To initiate intercom camp-on</u>:

(1) If the called station is busy, do not hang up.

(2) The called station is alerted to the call waiting by a
    fast flashing HOLD key and a double tone.

(3) When the busy station becomes available, you will be
    automatically connected.

3.16 To answer a waiting intercom call while on a C.O. call:

(1) Press the HOLD key to place the outside call on hold. The waiting intercom call will automatically connect.

(2) To reconnect with the C.O. call on hold, press the medium fluttering C.O. line key. The intercom call will be disconnected.

3.17 To answer a waiting intercom call while on another intercom call: Terminate the current intercom call. The intercom call waiting will automatically connect.

4. OUTSIDE CALL (C.O.) FEATURES

4.01 The 824 system connects to a maximum of eight C.O. loop start lines. Signalling may be either dial pulse or Dual-Tone Multi-Frequency (DTMF). Refer to SYSTEM FEATURES, Section 6.

4.02 The many outside call features available on the 824 system may be divided into the following categories:

A. Placing and Receiving Outside Calls
B. Alternate Methods for C.O. Line Selection
C. Alternate Methods of Dialing
D. Calls on Hold
E. Transferring Outside Calls
F. Recall Timers
G. Reverse Transfer
H. Conference Calls
I. C.O. Call Waiting

A. PLACING AND RECEIVING OUTSIDE CALLS

4.03 The basic procedures for placing outgoing calls and receiving incoming calls are described below. There are also many alternate procedures for selecting a C.O. line, dialing, and responding to different sources of calls (such as calls waiting, calls on hold, transferring calls, and conference calls). These topics are covered throughout this section of the manual.

4.04 Placing a C.O. Call:

(1) Lift the handset.

(2) Press an available unlit line key and listen for the outside dial tone. Display keysets show "NO.".

(3) Dial the desired telephone number. The numbers dialed appear on a Display keyset.

(4) The line key will flash at a delayed rate while the dialing and call are in progress. Display keysets show the elapsed time, which advances every ten seconds.

4.05 Receiving a C.O. Call:

(1) When a line key is flashing slowly and is accompanied by long, continuous tones (if programmed for audible ringing), lift the handset and press the flashing line key.

(2) The call is connected and the line key flashes at a delayed rate while the call is in progress. Display keysets show elapsed time.

4.06 To add an account code for SMDR reporting: An account code may be added during an outgoing call. This code will appear on the SMDR printout as a reference for charging the cost of the call. To do this, at least 15 seconds after dialing but prior to hanging up, press the pound (#) key and dial the account code (up to six digits).

4.07 To record an incoming call on the SMDR printout: The only way to record an incoming call on the SMDR printout is by entering an account code during the call. Upon answering an incoming call, enter the six-digit account code as described above in paragraph 4.06. The call will be timed starting at that point.

B. ALTERNATE METHODS FOR C.O. LINE SELECTION

4.08 The following sections explain the alternate methods for selecting C.O. lines. The topics discussed are as follows:

- Direct Line Key Selection
- Preselect Line On-Hook
- Automatic Line Selection -- Outgoing Call
- Automatic Line Selection -- Incoming Call
- C.O. Line Queuing

Direct Line Key Selection

4.09 This feature allows you to press any idle line key in order to seize a C.O. line for an outgoing call. A station user may have access to the eight C.O. lines, as determined in the data base. The LED status indicators for each line key aid in locating an available line. Refer to Figure 8-4, LED Indications, on page 8-12.

Preselect Line On-Hook

4.10 This feature allows the station user to preselect an available C.O. line while on-hook. After pressing the desired line key, you must take action within 15 seconds. This eliminates the possibility of a line being seized inadvertently and the line being tied up unnecessarily.

4.11 To preselect a C.O. line:

(1) Press an available C.O. line key.

(2) After hearing the outside dial tone, dial the telephone number within 15 seconds. Display keysets show elapsed time.

(3) Lift the handset when the called party answers.

Automatic Line Selection (AUTO) -- Outgoing Call

4.12 This feature also preselects an available C.O. line (if enabled with Maintenance Panel Program 91). However, the system selects the line for you. The lowest numbered available line (that is not restricted on your keyset) will be used.

4.13 To automatically preselect a C.O. line -- On-Hook:

(1) Press the AUTO key and you will hear the outside dial tone ("NO." appears on Display keysets).

(2) Dial the desired phone number within 15 seconds. The number dialed appears on Display keysets.

(3) When the called party answers, lift the handset (elapsed time displays).

4.14 To automatically preselect a C.O. line -- Off-Hook:

(1) Lift the handset and you will hear the intercom dial tone.

(2) Press the AUTO key and you will hear the outside dial tone.

(3) Dial the desired phone number. Display keysets show the number dialed.

Automatic Line Selection (AUTO) -- Incoming Call

4.15 Incoming calls may be answered with the automatic preselect line feature (if it has been enabled with Maintenance Panel Program 91). If lines are ringing simultaneously, the lowest numbered ringing line is selected.

4.16 To automatically select an incoming call:

(1) Press the AUTO key and lift the handset.

(2) The ringing line is connected. Elapsed time shows on Display keysets.

4.17 The call connected when using the AUTO key is determined by the following priority:

(1) Lowest-numbered line ringing in.
(2) Based on the lowest-numbered line:
    A call you placed on hold.
    A transferred call.
    Recalls to the station.
(3) Selects the lowest-numbered available C.O. line for an outgoing call.

C.O. Line Queuing

4.18 C.O. line queuing allows stations to be placed on a non-prioritized callback list, waiting for an available C.O. line. When the C.O. line becomes available, the system calls the waiting station, on a first in-first out basis. No station has queue override capabilities.

4.19 One C.O. line can have five queues requested at a time. All C.O. lines available to a station may be queued, but only one queue may be requested by the station user at one time.

4.20 To queue a busy C.O. line:

(1) Lift the handset and press a busy line key. You will hear a busy signal.

(2) Press the pound (#) key and hang up. The MEM key will double flash twice.

4.21 Queued line is available: When the busy line is available, the line key will flash at a slow rate and you will hear long, single tones. To answer:

(1) Lift the handset and press the flashing line key.

(2) When you hear the outside dial tone, proceed with the call. The number dialed appears on Display keysets.

4.22 If the waiting station is busy when the requested line is available, that station is placed back in the queue list. The next station waiting will receive a signal for the available line. If the waiting station is idle, the system signals the station for a maximum of 15 seconds. If unanswered after this time limit, the next person in line is signalled, and the unavailable party is removed from the queue list.

4.23 To cancel a C.O. line queue:

    (1) Lift the handset and press the pound (#) key.

    (2) Press the RLS key. All queues will be cancelled.

C. ALTERNATE METHODS OF DIALING

4.24 The methods available for dialing outside phone numbers are as follows:

- Off-Hook Dialing
- On-Hook Dialing
- Manually Dialing Specialized Common Carrier (SCC) Numbers
- Station Speed Dialing
- System Speed Dialing
- Speed Dialing SCC Numbers
- Last Number Redial

Off-Hook Dialing

4.25 To dial off-hook:

    (1) Lift the handset, then press an available line key and listen for the outside dial tone.

    (2) Dial the desired telephone number. The number dialed appears on Display keysets.

On-Hook Dialing

4.26 To dial on-hook:

    (1) Press an available line key and listen for the outside dial tone.

    (2) Within 15 seconds, dial the desired telephone number. The number dialed appears on Display keysets.

    (3) Lift the handset when the called party answers. Elapsed time appears on Display keysets.

4.27 <u>To disconnect when dialing on-hook:</u> After reaching a busy or unanswered line, you may disconnect by pressing the RLS key. The light under the line key will go out.

Manually Dialing Specialized Common Carrier (SCC) Numbers

4.28 <u>To dial SCC numbers:</u>

(1) Dial the SCC local number and listen for the special dial tone.

(2) Dial the SCC security code.

(3) Dial the area code and telephone number desired.

   NOTE: For your convenience, SCC numbers may be speed-dialed. Refer to paragraph 4.42.

Speed Dialing

4.29 The 824 system provides the speed dialing feature, allowing frequently-called numbers to be stored. The system has the capacity for up to 100 numbers to be stored and used by all stations. Additionally, each station can store up to 24 numbers for personal use.

4.30 Phone numbers may be changed or erased as desired. Since the numbers are stored in CPU memory, they are protected by battery back-up. Turning off system power or disconnecting keysets will not erase these numbers.

Station Speed Dialing

4.31 Each keyset has the capacity to store 24 frequently called numbers and each of the 24 memory locations is identified with a DSS key.

4.32 Each memory location can contain up to 16 digits, including area code and phone number. If your area requires 1+ dialing for direct long distance calls, also enter the 1 in your speed dial number.

4.33 <u>To store frequently called numbers:</u>

(1) Lift the handset and press the MEM key. Display keysets show "PROGRAM MODE".

(2) Press the SPD key and one of the DSS keys (1-24). Display keysets show the DSS number.

(3) Enter the phone number, including 1 (if required) and area code (up to 16 digits). Display keysets will show the first 12 digits at one time.

(4) Repeat steps 2 and 3 to store other numbers. If the same memory location code is used more than once, the last phone number entered with that code will be retained.

(5) When all numbers have been entered, press the MEM key and hang up.

4.34 <u>To change a station speed number:</u> Use the same procedure as given above in 4.33, Steps 1 through 5. The new number entered will replace the old one.

4.35 <u>To erase a station speed number:</u>

(1) Lift the handset and press the MEM key.

(2) Press the SPD key.

(3) Press the DSS key of the number to be erased.

(4) Press the pound (#) key.

(5) Press the MEM key again and hang up.

4.36 <u>To dial station speed numbers:</u>

(1) Lift the handset and select an available C.O. line.

(2) Press the SPD key.

(3) Press the desired key on the DSS. Display keysets show the first 12 digits of the telephone number dialed.

System Speed Dialing

4.37 Up to 100 system speed numbers are available to all station users. These numbers are entered by the station designated in Maintenance Program 52. Like station speed numbers, each can include up to 16 digits, including area code and phone number. If your area requires 1+ dialing for direct long distance calls, also enter the 1 in your speed dial number.

4.38 To store system speed numbers: From the designated system speed-dial programming station:

    (1) Lift the handset and press the MEM key. A Display keyset shows that you are in "PROGRAM MODE".

    (2) Press the SPD key and enter a two-digit memory location code (00-99) using the keypad. Display keysets show the number entered.

    (3) Enter the phone number desired, including 1 (if required) and area code (up to 16 digits). Display keysets show 12 digits of the number at one time.

    (4) Repeat steps 2 and 3 to store other numbers. If the same code is used more than once, the last phone number entered with that code will be retained.

    (5) When all number have been entered, press the MEM key and hang up.

4.39 To change a system speed number: Use the same procedure as given above in paragraph 4.38, Steps 1 through 5. The new number entered will replace the old one.

4.40 To erase a system speed number:

    (1) Lift the handset and press the MEM key.

    (2) Press SPD key.

    (3) Dial the two-digit memory location code (00-99).

    (4) Press the pound (#) key and hang up.

4.41 To dial system speed numbers:

    (1) While off-hook, select an available C.O. line.

    (2) Press the SPD key.

    (3) Dial the two-digit memory location code (00-99). Display keysets show the number dialed.

Speed Dialing Specialized Common Carrier (SCC) Numbers

4.42 Memory locations may be chained together for use with Specialized Common Carrier (SCC) numbers requiring more than 16 digits or pauses in the dialing sequence.

4.43 Three numbers (the SCC local number, your security code, and the telephone number) are "linked" together in the speed-dialing process.

4.44 When dialing SCC numbers, both station and system speed dial numbers may be combined. A maximum of 30 digits may be linked for speed dialing.

4.45 To store SCC numbers: Enter the SCC local number and security code as follows:

(1) Lift the handset and press the MEM key. Display keysets show "PROGRAM MODE".

(2) Press the SPD key and enter the memory location code:

a. For a station, press a DSS key.

OR, b. For the system, enter a two-digit code using the keypad (00-99).

(3) Enter the seven-digit SCC local number and then press the asterisk (*) key. The asterisk tells the system to expect another speed-dial number when this code is used. Display keysets will show the number as it is dialed.

(4) Press the SPD key again and enter another memory location code (refer to Step 2).

(5) Enter the SCC security code and then press the asterisk (*) key.

(6) Press the MEM key and hang up.

4.46 To speed-dial SCC numbers:

(1) Lift the handset and select an available C.O. line. Display keysets show "NO.".

(2) Press the SPD key and dial the memory location code for the SCC local number:

a. If station, press the DSS key.

OR, b. If system, enter the two-digit code (00-99).

(3) Listen for the special dial tone.

(4) Dial the memory location code for the SCC security code as in Step 2.

(5) Dial the long distance number desired, using one of two methods:

   a. If speed dialing, enter the memory location code.

OR, b. If manually dialing, press the pound (#) key; then dial the area code and telephone number.

Last Number Redial

4.47 This feature remembers the last phone number dialed on the keyset. If a number dialed is busy, there is no answer, or you get disconnected, you may redial the number while the line is open or later when you want to attempt the call again.

4.48 To redial the phone number while still on the line:

(1) When reaching an outside number which is busy or does not answer, do not hang up.

(2) Press the SPD key and the asterisk (*) key. The number will be immediately redialed. The telephone number appears on Display keysets.

4.49 To redial the last number used after disconnecting:

(1) Lift the handset and select an available C.O. line.

(2) Press the SPD key and then press the asterisk (*) key.
(3) The number will be redialed. Display keysets show the telephone number dialed.

D. CALLS ON HOLD

4.50 There are two methods for placing an outside call on hold. System hold allows any station to access that call, while I-HOLD places a call on hold only at one station. The hold method is determined for each keyset in Maintenance Panel Program 23.

4.51 If calls remain on hold for a specific amount of time, the "hold recall" feature notifies the holding station with a double tone and a medium fluttering line key. Refer to paragraph 4.64, Hold Recall.

4.52 To place a call on hold while on an outside call:

(1) Press the HOLD key. The call will be on System Hold or I-Hold, depending on your keyset's programming.

OR, (2) If your keyset is programmed for System Hold and you wish to put the call on I-Hold, press your DSS key.

(3) You will hear the intercom dial tone and the line key on your keyset will have a medium flutter. For other keysets, if the call is on System Hold, the line key will have a medium flash; if the call is on I-Hold, the line key will be steadily lit. The outside party will hear Music-On-Hold, if equipped.

4.53 To return to a call on hold: Press the flashing line key. The flash will return to a delayed flash rate.

E. TRANSFERRING OUTSIDE CALLS

4.54 This feature allows you to transfer an outside call to any other station. Intercom calls cannot be transferred.

4.55 To transfer a call to another station:

(1) While on an outside call, press the DSS key of the desired station. The line key will have a medium flutter and the outside call will be placed on I-Hold.

(2) If the called station is idle, both parties will hear one double tone and you may announce the call.

(3) The transfer will go through when you hang up or press the RLS key. If the called station is busy, the call will still be transferred and the busy station is alerted by a flashing line key.

4.56 To receive a transferred call:

(1) After hearing the double tone and possibly a voice announcement, lift the handset.

(2) The call will be automatically connected when the transferring station user hangs up.

(3) If you respond handsfree and the calling party hangs up, the transferred call will tone and·flash on a line key; in this case lift the handset and press the flashing line key to receive the call.

4.57 When transferring a call to another station, you may voice announce the call if that station is idle. The receiving station has the choice of accepting or refusing the call.

4.58 If the station is busy, you may reconnect with the calling party and notify them that the line is busy. The calling party may choose to call back, to leave a message, or to be camped-on.

4.59 To reconnect with a transferred call: If the receiving station does not answer, refuses the call being transferred, or is busy, press the medium fluttering line key to speak to the calling party.

4.60 To transfer a call to an unattended station: If there is no answer, you may transfer the call to that station and "park" it and then page the called party. To do so, transfer the call to that intercom number and hang up. Then page the called party and inform them that they have a call on their station.

4.61 If transferred calls are not answered in a specific amount of time, the "transfer recall" feature will return the call to the station which transferred it, alerting the user with a medium fluttering line key and a tone. Refer to paragraph 4.63, Transfer Recall.

F. RECALL TIMERS

4.62 The recall timer features make it is impossible for calls on hold or transferred to be forgotten. There are two programmable recall time limits -- Transfer and Hold. If a call is placed on hold or transferred for longer than the programmed limit, it will recall the station.

4.63 Transfer Recall: When any station, including the attendant, transfers an outside call to another station, the call must be answered within the Transfer Recall time limit. If there is no response, the call returns to the station that transferred it, alerting the user with a medium fluttering line key and ringing. The transfer recall timer is set in Maintenance Panel Program 95.

4.64 Hold Recall: After the Hold Recall time elapses, a call on hold recalls the station where it is waiting, alerting the user with one double tone and a medium fluttering line key. This timer is set in Maintenance Panel Program 92.

G. REVERSE TRANSFER

4.65 This feature allows the station user to "pick up" a call which is holding (I-HOLD) or was transferred and is ringing at another station. Intercom calls in the same paging zone as well as outside calls may be reverse transferred.

4.66 To pick-up a call on I-hold at another station:

    (1) Lift the handset and press the DSS key of the station where the call has been transferred or is holding.

    (2) Press the HOLD key.

    (3) Press the medium fluttering line key.

    (4) The call is now connected.

4.67 To pick-up an intercom call waiting at another station ("Meet Me"):

    (1) Lift the handset and press the DSS key of the station where the intercom call is waiting.

    (2) Press the asterisk (*) key.

    (3) The call is automatically connected.

H. CONFERENCE CALLS

4.68 The 824 system may include the conference call features, which permit a station user to establish a three-way conversation without operator assistance. The three parties may include (a) one inside station and two outside lines or (b) two inside stations and one outside line, as enabled in Maintenance Panel Program 90. Any station user may initiate one conference at a time, if a conference "circuit" is available.

4.69 Conference "circuitry" is software controlled and the number of simultaneous conferences depends on the C.O. lines and intercom paths equipped and available. A conference with one inside party and two outside lines uses two C.O. line channels. Up to four conferences of this type could be in progress, using eight C.O. lines. A conference with two inside parties and one outside line uses one intercom path. There could be two simultaneous conferences of this type, using the two intercom paths.

Two Inside Parties and One Outside Party

4.70   This feature allows a station user to initiate a conference with another inside station and an outside party. The initiating station has control of the conference and has the option to pass control to the other inside station.

4.71   To initiate a conference:

   (1) While on an outside call, press the CNF key.   The line key will medium flutter.

   (2) Press the DSS key of the inside party you wish to add to the conference and instruct him to lift the handset.

   (3) After the inside party lifts the handset, press the CNF key.   The line key will flash at the delayed rate, and all three parties may talk.   Display keysets will show elapsed time during the call.

4.72   To leave the conference: The initiating station user may leave the conference by hanging up. The remaining inside station automatically has control of the C.O. line. To re-enter the conference, the controlling station must add the other station, using the procedure above.

4.73   To end the conference: When the call is finished, the conference is ended by all parties hanging up.

One Inside Party and Two Outside Parties

4.74   This feature allows a three-party conference between one inside station and two outside parties.   The station user has control of the conference.

4.75   To initiate a conference:

   (1) Place the first outside call.

   (2) When that party is on the line, press the CNF key.   The line key will medium flutter flash.

   (3) Place the second outside call.

   (4) When that party is on the line, press the CNF key to bring the other party into the conference. The line keys will flash at the delayed rate.   Display keysets will show time elapsed during the call.

4.76 To end the conference: The conference is terminated and the outside calls are disconnected when the controlling party hangs up. The conference cannot be re-entered. To reconnect the parties, repeat the conference call procedure.

I. C.O. CALL WAITING

4.77 This feature allows an outside call to be "camped-on" to a busy station. The busy station is alerted by the slow flashing line key and a double tone. The camped-on caller receives Music-On-Hold if the system is equipped. An outside call may be camped-on by another station.

4.78 C.O. Call Waiting: If a C.O. call is waiting on your busy station, the line key will be flashing slowly for an incoming C.O. call or medium fluttering for a transferred call.

4.79 To answer a C.O. call waiting while on another C.O. call:

(1) End the original call and press the flashing line key.

OR, (2) Place the original call on hold and answer the other call as follows:

a. Press the HOLD key. The outside party will hear Music-On-Hold (if equipped). The line key will be medium fluttering.

b. Press the flashing line key to answer the waiting call. Elapsed time shows on Display keysets during the call.

c. To switch back to the original call and put the other call on hold, press the HOLD key and then press the line key of the original call.

OR, d. To reconnect with the original C.O. call after terminating the ongoing call, press the medium fluttering line key.

4.80 To answer a C.O. call waiting while on an intercom call: End the intercom call and press the flashing line key.

5. SPECIAL STATION FEATURES

5.01 This section includes the following special features:

A. Call Forwarding
B. Do-Not-Disturb
C. Paging Features
D. Long Speech Warning
E. Selectable Ring (Night Answer)
F. Door-Mate

A. CALL FORWARDING

5.02 This feature enables you to temporarily transfer intercom and outside calls to another station. Several stations may have calls forwarded to the same station.

5.03 To forward calls:

(1) Lift the handset and press the MEM key. Display keysets show "PROGRAM MODE".

(2) Press the CNF key. Display keysets show "CALL FORWARD".

(3) Press the DSS key of the station where the calls are to be forwarded. Display keysets show "FWD TO" and the name or number associated with the DSS key.

(4) Press the MEM key and hang up. The MEM key will double flash, then light steadily. The MSG key also lights on Display keysets.

5.04 To cancel call forward:

(1) Lift the handset and press the MEM key. Display keysets show "PROGRAM MODE".

(2) Press the RLS key. The light in the MEM key will double flash, then go out. The MSG key on Display keysets also goes out and the date/time message reappears.

5.05 Calls may not be forwarded to a station in the Do-Not-Disturb mode. You will hear a busy signal if this is attempted.

B. DO-NOT-DISTURB

5.06 This feature allows you to block all calls and pages to your station, but still allows outgoing calls to be placed.

5.07 To place a station in Do-Not-Disturb mode:

   (1) Lift the handset and press the MEM key. Display keysets show "PROGRAM MODE".

   (2) Press the asterisk (*) key. Display keysets show "DO NOT DISTURB".

   (3) Press the MEM key and hang up. The MEM key will double flash, then light steadily. Date and time will reappear on Display keysets.

5.08 To cancel Do-Not-Disturb mode:

   (1) Lift the handset and press the MEM key. Display keysets show "PROGRAM MODE".

   (2) Press the RLS key. The light under the MEM key will double flash, then go out. Date and time will reappear on Display keysets.

5.09 If any other station user tries to access this station while it is in the Do-Not-Disturb mode, they will hear a busy signal.

C. PAGING FEATURES

5.10 The paging features of the 824 system allow pages to stations in four internal zones. Three zones include selected stations and one zone (All-Call) may include all stations. Pages are heard through the speaker of each keyset.

5.11 Stations may be assigned to one paging zone and to the All-Call zone, as programmed with Maintenance Panel Program 24. Pages may be answered from any station using the "Meet Me" feature. If the paging path is busy, you will hear a busy signal.

5.12 An optional external paging amplifier may be installed. Refer to SYSTEM SPECIFICATIONS for details. The external page is assigned to zone 9 and the "Meet Me" feature cannot be used to pick up an external page.

5.13   To page the All-Call zone:

(1) Lift the handset and press the PAGE key.

(2) Press the digit 0 on the keypad.

(3) When you hear the double tone, you have 30 seconds to make your announcement.

5.14   To page an internal zone:

(1) Lift the handset and press the PAGE key.

(2) Press the zone code (1, 2, or 3) on the keypad.

(3) When you hear the double tone, you have 30 seconds to make your announcement.

5.15   To page an external zone:

(1) Lift the handset and press the PAGE key.

(2) Press the digit 9 on the keypad.

(3) After you hear the three tones, you have 30 seconds to make your announcement.

5.16   To directly page an individual: Use the paging procedure to a specific internal zone or the All-Call zone. The paged party may respond, using the "Meet-Me" page procedure. Maintenance Panel Program 94 determines whether the page can be picked up at any station or only within the page zone.

5.17   "Meet-Me" Page:

(1) After hearing yourself paged, lift the handset on any station where the page was received.

(2) Press the asterisk (*) key. You will be connected to the station where the page was placed.

D.   LONG SPEECH WARNING

5.18   For outside calls, stations may be programmed to generate a single warning tone through the speaker every three minutes as a reminder of elapsed time. This tone is not heard by the outside party.

E. SELECTABLE RING (NIGHT ANSWER)

5.19 Using Maintenance Panel Program 21, stations can be programmed for Selectable Ring (Night Answer), which allows the user to turn ringing on or off for all C.O. lines at their discretion.

5.20 To set programmed keyset to ring:

(1) Lift the handset and press the MEM key. Display keysets shows "PROGRAM MODE".

(2) Press the pound (#) key. "NIGHT ANSWER" appears on a Display keyset.

(3) Press the MEM key again. The MEM key will double flash, then light steadily.

5.21 To cancel selectable ring:

(1) Lift the handset and press the MEM key. "PROGRAM MODE" appears on a Display keyset.

(2) Press the RLS key. The MEM key will double flash , then go out, and the display message will return to date and time.

F. DOOR-MATE

5.22 Keysets may be programmed to access or answer the optional Door-Mates with Maintenance Panel Program 21. Door-Mates allow access to remote locations that do not require a keyset. With two Door-Mates, each is identified by its own melody. When the Door-Mate button is pressed, Door-Mate number one plays "Home on the Range" and number two plays "Greensleeves".

5.23 To access a Door-Mate:

(1) Lift the handset and press the digit 1 (Door-Mate #1) or 2 (Door-Mate #2) on the keypad.

(2) Your call will be automatically connected.

5.24 To answer the Door-Mate:

(1) When you hear the Door-mate music and the HOLD key has a fast flutter, lift the handset.

(2) If your station is programmed to answer the Door-Mate, your call will automatically be connected.

6. SPECIAL DISPLAY KEYSET FEATURES

6.01 Display keysets, with LCD message displays, can be used on the 824 system. These keysets also has LED's under the DSS keys to create a Busy Lamp Field (BLF). The special features of these keysets include:

    A. Remote Contacts
    B. Absent Mode
    C. Message Registration
    D. Keyset Status Checks
    E. Silent Calls

A. REMOTE CONTACTS

6.02 As an optional feature, Display keysets may be used to control electrical devices such as sprinkler systems, outside lights, door locks, etc..

6.03 <u>To turn on or off a remote device:</u>

    (1) Lift the handset and press the RMT key. The keyset displays "REMOTE".

    (2) Press the contact number on the keypad (1,2, or 3). The keyset will display the number pressed and indicate if the contact is "ON" or "OFF".

    (3) Press the asterisk (*) key to turn the contact on, or press the pound (#) key to turn it off.

B. ABSENT MODE

6.04 Display keysets may be placed in Absent Mode to enable message recording while you are away. If no calls are received while the station is in the Absent Mode, the ABSENT message will continue to display. Intercom calls generate messages showing the caller's name or extension number. If more than two calls are received, only the last two messages will be displayed.

6.05 <u>To place keyset in Absent Mode:</u>

    (1) Lift the handset and press the MEM key. The "PROGRAM MODE" message appears.

    (2) Press the MSG key. "RECORD MESSAGE" displays.

    (3) Press the MEM key again. "ABSENT" will display until a call is received. The MEM key will double flash and then the MEM and MSG keys will be steadily lit.

6.06 To cancel Absent Mode:

(1) Lift the handset and press the MEM key. The "PROGRAM MODE" message displays.

(2) Press the RLS key to return the keyset to the date/time message. The MEM key will double flash and then the MEM and MSG keys will go out.

C. MESSAGE REGISTRATION

6.07 You may leave a message on your keyset when you will be away. When the system is initialized messages are:

```
01   BACK AT      XX:00
02   TRIP,BACK ON  XX
03   CALL XXXXXXXXXXX
04   AT STATION     XX
05   OUT OF OFFICE
06   GONE TO LUNCH
07   BACK SOON
08   GONE HOME
09   IN MEETING
10   IN CONFERENCE
11   IN ACCOUNTING
12   IN DATA PROCESS
13   IN LIBRARY
14   IN WAREHOUSE
15   WITH GUEST
16   WITH CLIENT
17   WITH PATIENT
18   ON BREAK
19   ON VACATION
20   ON SALES CALL
```

6.08 Messages 1-4 have spaces for you to enter information cannot be changed. Messages 5-16 can be changed with the Message Registration (10) program on the terminal. Standard keysets may only use messages 5-13, as shown in the procedures below.

6.09 To register a message on a Display keyset:

(1) Lift the handset and press the MEM key to enter "PROGRAM MODE".

(2) Press the MSG key. "RECORD MESSAGE" displays.

(3) Enter the two-digit message code using the keypad or press the asterisk (*) key repeatedly to view the message list until the desired message appears. If you choose message 01, 02, 03 or 04, enter the special information using the keypad:

- BACK AT   XX:00 - Enter the hour you expect to return.

- TRIP,BACK ON XX - Enter the day of the month when you will return.

- CALL XXXXXXXXXX - Enter the telephone number (up to 11 digits) where you can be reached.

- AT STATION   XX - Enter the intercom number of the station where you can be reached.

(4) Press the MEM key to register the message.

6.10 To register a message on a Standard keyset:

(1) Lift the handset and press the MEM key.

(2) On the keypad, press the digit for the desired message.

```
1 - OUT OF OFFICE
2 - GONE TO LUNCH
3 - BACK SOON
4 - GONE HOME
5 - IN MEETING
6 - IN CONFERENCE
7 - IN ACCOUNTING
8 - IN DATA PROCESS
9 - IN LIBRARY
```

(3) Press the MEM key and hang up.

6.10 To cancel a message:

(1) Lift the handset and press the MEM key.   "PROGRAM MODE" appears.

(2) Press the RLS key.

D. KEYSET STATUS CHECKS

6.11 You may check the status of your station and for the remote contacts with a few keystrokes. This can be done at any time, even during a call.

6.12 To check keyset status:

(1) Press the INFO key. The "STATUS" message appears.

(2) Press the asterisk (*) key repeatedly to view the status of the keyset features in the following order:

- Last two callers while in Absent Mode or "NO CALLS RCVD".

- Elapsed time of last C.O. call.

- NO. (for future use)

- Call forward status (FWD TO XX or FORWARD OFF).

- Do-Not-Disturb status (DO NOT DISTURB or DND OFF).

- Night Mode status (NIGHT MODE or NIGHT MODE OFF).

- Message registered (FILED MSG OFF or actual message).

- Remote contacts (RMT:1OFF2OFF3OFF or ON).

(3) The status messages list will repeat if you continue to press the asterisk (*) key.

(4) To end the status check, press the INFO key again.

E. SILENT CALLS

6.13 This features allows you check to the status of other stations without placing a call. The Silent Call does not cause the called keyset to ring or display a message.

6.14 To check the status of other stations:

(1) Press the INFO key. The "STATUS" message appears.

(2) Press the DSS key of the station to be checked.

(3) A status message will appear on your keyset.   Possible
    status message include:

- C/O CALL - The station user is busy on an outside call.

- I/C CALL - The station user is busy on an intercom
  call.

- D/M CALL - The station user is busy on a Door-Mate
  call.

- IDLE - The station is not in use.

- IN USE - The station user is busy on a conference call
  or the handset is off-hook.

- PAGE - The station is being used for paging.

- PRGM MODE - The station is in program mode.

- DONT DTB - Station is in Do-Not-Disturb.

- OUT OF OFFICE or other message is registered.

- NO PHONE - If keyset is unplugged or unequipped.

(4) You may continue to check stations by pressing other DSS
    keys or end the status check by pressing the INFO key.

-- D cont'd --

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INTEGRATED SPEAKERPHONE OPERATION

In addition to answering incoming intercom calls handsfree, a keyset user can place and receive outside calls without lifting the handset, using the integrated speakerphone. This method allows the user to speak handsfree once the call is connected.

NOTES: 1. You cannot use the speakerphone to place an intercom or a conference call.

2. To place an outside call on hold while using the speakerphone, press the HOLD key. To return to the holding party, press the flashing line key.

To place an outside call handsfree (dialing on hook):

1. While on hook, press an unlit line key.

2. Dial the desired telephone number.

3. When the called party answers,

EITHER, respond handsfree.

OR, lift the handset for privacy.

NOTE: At any time during a handsfree outside call, you may lift the handset for a private conversation. To return to the speakerphone, press the AUTO key and replace the handset.

4. To disconnect, press the RLS key (if on hook) or hang up (if off hook).

To answer an outside call handsfree: When you hear long, continuous tones and see a flashing line key, press the flashing line key. You are connected to the outside call.

CHANGES AND ADDITIONS TO THE
824 INSTALLATION AND FIELD MAINTENANCE MANUAL
Issue 1, Part No. 247.8002

PROGRAMMING

Page	Location	Change
4-11	chart	Change 94 to: "Meet Me" Intercom
4-16	3.07, X.	Change to:

Program Number 94 - "Meet Me" Intercom: This program determines the extent to which station users can pick up "Meet Me" intercom calls from other extensions...

FEATURES

Page	Location	Change
8-2	2.02 D	Option D is available automatically. It is not affected by Maintenance Panel Program 96, as indicated in paragraph 2.03. An incoming call record appears whenever a station user enters an account code. Options A through C can be selected using the program.
8-34	5.16	Change paragraph to:

To directly page an individual: Use the paging procedure to a specific internal zone. The paged party may respond using the "Meet Me" page procedure.

B. Operate the PhoneBeam Speakerphone

The speakerphone can be turned on or off at any time during a call. To transfer from the speakerphone to the handset, lift the handset and press the speakerphone ON/OFF key. To disconnect, hang up. To transfer from the handset to the speakerphone, press the keyset HOLD key and replace the handset. Then press the speakerphone ON/OFF key and the flashing line key. To disconnect, press the speakerphone ON/OFF key; then press the keyset RLS key.

NOTES: 1. Do not attempt to connect a conference while the speakerphone is in use; the speakerphone may be turned on only after the conference has been connected.

2. To place an outside call on hold while using the speakerphone, lift the handset, press the keyset HOLD key, and replace the handset. To return to the holding party, press the flashing line key.

To place a handsfree outside call (dialing on hook):

1. While on hook, press an unlit line key.

2. Press the speakerphone ON/OFF key.

3. Dial the telephone number.

4. To disconnect, press the speakerphone ON/OFF key; then press the keyset RLS key.

To answer an outside call handsfree:

1. When you hear repeating long ring tones, press the speakerphone ON/OFF key.

2. Press the flashing line key. You are connected to the incoming call.

3. To disconnect, press the speakerphone ON/OFF key; then press the keyset RLS key.

To answer an outside call transferred from another keyset:

1. While on hook, press the speakerphone ON/OFF key.

2. Press the flashing line key. You are connected to the transferred call.

3. To disconnect, press the speakerphone ON/OFF key; then press the keyset RLS key.

PLANTRONICS PHONEBEAM SPEAKERPHONE

A Plantronics PhoneBeam Speakerphone (model IR 101-01 or IR 101-03) can be connected to a keyset for handsfree operation on outside (C.O.) calls. The model 01 interface cable is terminated on a 50-pin connector; an IR-2 Adapter can be ordered from Plantronics to provide individual spade lug connectors. The model 03 interface cable is terminated on individual spade connectors. Installation and operation procedures appear below.

NOTES: 1. PhoneBeam Speakerphone model IR 101-02 is incompatible with the 824 System and should not be installed.

        2. PhoneBeam model numbers and configurations may be different after 6/86. Contact Plantronics before ordering the speakerphones specified above.

A. **Install the PhoneBeam Speakerphone**

1. Splice the speakerphone interface cable Black wire and White wire together.

2. Using two insulated wires or a cable, extend the speakerphone Red wire and Light Green wire from the keyset to the keyset's modular jack assembly. Connect them as follows:

Speakerphone Wire	Keyset Jack Assembly Terminal
Red	Tip (Green)
Light Green	Ring (Red)

3. If the keyset is plugged into the modular jack assembly, remove the line cord from the keyset. Open the keyset by removing the screws on the bottom. (If you have a Hitec keyset, you must use a slotted screwdriver to release the retaining tabs in order to separate the covers after removing the screws.)

4. On the keyset Control PCB, remove the Yellow wire from terminal S-1 and splice it with the speakerphone Slate wire.

5. Connect the speakerphone Light Blue wire to terminal S-1.

6. Tape and store the remaining speakerphone leads.

7. Reassemble the keyset and plug in the line cord.

8. Connect the AC adapter to the speakerphone and plug the adapter into an AC outlet.

B. Operate the Companion II Speakerphone

The speakerphone can be turned on or off at any time during a call. To transfer from the speakerphone to the handset, lift the handset and press the speakerphone OFF key. To disconnect, hang up. To transfer from the handset to the speakerphone, press the keyset HOLD key and replace the handset. Then press the speaker-phone ON key and the flashing line key. To disconnect, press the speakerphone OFF key; then press the keyset RLS key.

NOTES: 1. Do not attempt to connect a conference while the speakerphone is in use; the speakerphone may be turned on only after the conference has been connected.

2. To place an outside call on hold while using the speakerphone, lift the handset, press the keyset HOLD key, and replace the handset. To return to the holding party, press the flashing line key.

To place a handsfree outside call (dialing on hook):

1. While on hook, press an unlit line key.

2. Press the speakerphone ON key.

3. Dial the telephone number.

4. To disconnect, press the speakerphone OFF key; then press the keyset RLS key.

To answer an outside call handsfree:

1. When you hear repeating long ring tones, press the speaker-phone ON key.

2. Press the flashing line key. You are connected to the incoming call.

3. To disconnect, press the speakerphone OFF key; then press the keyset RLS key.

To answer an outside call transferred from another keyset:

1. While on hook, press the speakerphone ON key.

2. Press the flashing line key. You are connected to the transferred call.

3. To disconnect, press the speakerphone OFF key; then press the keyset RLS key.

PAGING FEATURES

Page 8-34, paragraphs 5.13 and 5.14.   Delete "double tone" and insert "three tones".

ADDITIONS TO 824 MANUAL

NORTHERN TELECOM COMPANION II SPEAKERPHONE

A Northern Telecomm Companion II Speakerphone can be connected to a keyset for handsfree operation on outside (C.O.) calls.   Installation and operation procedures appear below.

A.   Install the Companion II Speakerphone

1.   Connect the speakerphone Brown/White wire to one side of an NE-2012B transformer or equivalent. Connect the White/Brown wire to the other side of the transformer.

2.   Splice the speakerphone Slate/Red and Blue/Black wires together.

3.   Using two insulated wires or a cable, extend the speakerphone White/Blue and Blue/White wires from the keyset to the keyset's modular jack assembly. Connect them as follows:

Speakerphone Wire	Keyset Jack Assembly Terminal
White/Blue	Tip (Green)
Blue/White	Ring (Red)

4.   If the keyset is plugged into the modular jack assembly, remove the line cord from the keyset. Open the keyset by removing the screws on the bottom. (If you have a Hitec keyset, you must use a slotted screwdriver to release the retaining tabs in order to separate the covers after removing the screws.)

5.   On the Keyset Control PCB, remove the Yellow wire from terminal S-1 and splice it with the speakerphone Orange/Violet wire.

6.   Connect the speakerphone Violet/Orange wire to terminal S-1.

7.   Tape and store the remaining speakerphone leads.

8.   Reassemble the keyset.

9.   Plug the transformer into an AC power outlet.

BATTERY BACK-UP

Page 3-47, paragraph 8.01 (6). Correct text to read as follows:
"If external batteries are installed, they must be fully charged
at the time of installation. Because they are not charged by the
system, they must be disconnected and recharged after use. Con-
sult your back-up power representative for assistance in choosing
the proper charger and batteries.

NOTE: This completes the installation procedure for external
batteries.   The following instructions apply to internal bat-
teries only.

If internal batteries are installed, wait approximately 6 hours
for the battery pack to partially charge. Since charging time
depends on the amp/hour rating, this may vary. The system
charges at a low rate to protect against battery damage."

FIGURE 5-2. STATION (STN) MONITOR DISPLAY DATA (CONT'D)

Page 5-7, LCD Display Data Buffer. Correct column 6 to show
letters M, N, and O as m, n, and o.

FIGURE 8-4. LED INDICATIONS

Page 8-12. Insert "Queued line available" under "Incoming call".

RING TONES

Page 8-13, paragraph 2.07 (2) b. and d. Insert "double" between
"One" and "tone".

SYSTEM SPEED DIALING

Page 8-24, paragraph 4.40 (4). Correct text to read as follows:
"Press the pound (#) key, press the MEM key, and hang up."

REVERSE TRANSFER

Page 8-29, paragraph 4.67. Delete "and press the DSS key of the
station where the intercom call is waiting."

C.O. CALL WAITING

Page 8-31, paragraph 4.79 (2) a. After the last sentence, insert
the following: "If your keyset is programmed for system hold and
you want to place a call on I-Hold, press your own DSS key in-
stead."

CHANGES AND ADDITIONS
TO THE 824 INSTALLATION & FIELD MAINTENANCE MANUAL
Part No. 247.8002

This addendum updates the current issue of the 824 Installation &
Field Maintenance Manual and provides additional information that
previously did not appear in the manual. Make changes to your
manual as indicated on pages 1 through 3 and insert pages 3
through 7 in your manual for future reference.

CHANGES TO THE 824 MANUAL

KTI-4 CARD

KTI-4 cards are no longer available. Only KTI-8 cards (Part No.
247.2300) are available.

KTI PCB FUSES

Page 2-6, paragraph 5.17. Correct text to read as follows: "The
power fuse (F0) is a 1A, 125V, fast-acting fuse that protects the
KSU from shorts at the stations. The station speech path fuse
(F1) is a 0.3A, 125V, fast-acting fuse that protects the KSU from
shorts on the tip and ring wires. These fuses are not industry
standard and can be ordered from Inter-Tel (Part No. 802.1010
[F0] or 802.1018 [F1])."

BATTERY BACK-UP

Page 2-9, paragraph 8.03. Renumber paragraph to 8.04. Correct
text to read as follows: "Internal batteries are trickle-charged
by a float voltage of 27.3VDC. Calculation is made by multiply-
ing the number of cells (12) by the charge per cell (2.27V).
External batteries are not charged by the system and must be
fully charged at the time of installation. After they have been
used, they should be disconnected from the system and recharged.
Consult your back-up power representative for assistance in
choosing the proper charger and batteries."

Page 2-9, paragraph 8.04. Renumber paragraph to 8.03.

FIGURE 3-5. STATION CABLE TERMINATIONS ON THE KTI BLOCK

Page 3-10. Delete "+38V" and insert "+27V".

3-8   8-8   "ADD1" Interdigital Time-Out:
                Default = 15 seconds
                Variable Range 01-99

        4-8   Program # 16   Name: Add-1 Timer
                Data LED A: 0-9   Data LED B: 1-9
                Initialized: Preset to 15

        4-13   Between F and G:

                Program Number 16 - Add-1 Timer: This sets the
                time delay (plus 30 seconds if SMDR option 2 or 3
                is selected) before the SMDR starts timing a call
                after the last digit is dialed. The timer resets
                for every digit dialed. Digits dialed will not be
                monitored after the "Add-1" timer elapses. It is
                preset to 15 and the range is 01-99 seconds.   Data
                fields A and B are used to enter the selection
                (0 and 1 = 01; 9 and 9 = 99).

        4-16   Z.   Program Number 96 - SMDR Printout:

                1   All calls -- After the last digit is dialed,
                     the SMDR begins monitoring after the   "Add-1"
                     timer elapses.

                2   Outgoing calls when 7 or more digits are dialed
                     -- After the seventh digit is dialed, the SMDR
                     begins monitoring 30 seconds after the "Add-1"
                     timer elapses.

                3   Outgoing calls when 8 or more digits are dialed
                     -- after the eighth digit is dialed, the SMDR
                     begins monitoring 30 seconds after the "Add-1"
                     timer elapses.

        4-25   Between Program Numbers 15 and 50, add:

                Program Number 16   ADD-1 TIMER (01-99) - _____

3. PROGRAMMABLE "ADD-1" INTERDIGITAL TIMER

For the System Message Detail Recording, the type of call to monitor and the time to begin monitoring a call are both programmable. After the last digit of a telephone number is dialed, the "Add-1" Interdigital Timer is the time delay before the SMDR starts timing a call. It was set at 15 seconds in the previous software version, but it can now be programmed as desired, with a range from 1-99 seconds.

The flexibility in the "Add-1" timer also affects special applications, such as telebanking and calling computers directly. The user needs the 12 buttons on the keypad (0-9, *, #) to use these machines. Consequently, on this system certain combinations of digits dialed will not be sent out over the line after the "Add-1" timer elapses. The user must have enough time to gain entry to the machines before the time elapses. This can be programmed up to a maximum of 99 seconds.

ADDENDUM TO THE

824 OWNER'S GUIDE -- Part Number 247.8001
and the
824 INSTALLATION & FIELD MAINTENANCE MANUAL
-- Part Number 247.8002

The 824 systems now ship from Inter-Tel headquarters with software version 1.2, which has three enhancements.

1. NEW MAINTENANCE ROUTINE

The software now provides an error recovery routine, which monitors data received from keysets. For those rare instances when a data interruption occurs on any keyset, a reset is performed on all keysets (up to eight) connected to the affected KTI printed circuit board. The reset is accomplished by removing keyset power to the board for five seconds. This reset will almost go unnoticed. C.O. line conversations or off-hook intercom calls in progress will not be interrupted by a reset. However, handsfree intercom calls will be disconnected for five seconds and then will be reconnected.

2. AUTO FEATURE KEY CHANGED

The keyset AUTO feature key no longer automatically seizes the lowest numbered available C.O. line for outgoing calls. However, it still automatically accesses incoming C.O. calls, transferred calls, and calls placed on hold at that station.

The major advantage of this change is that you are allowed to connect less expensive business "lines" rather than "trunks," which saves hundreds of dollars annually. To explain, whenever a system has automatic access to a group of outgoing lines, the system is registered with an "MF" (multi-feature) rating. This MF rating receives the higher trunk charges instead of line charges from the operating companies. We were able to re-register the 824 system with the Federal Communications Commission (FCC) and give it a "KF" rating, meaning lower rates. The new registration number is BE287V-14624-KF-E.

Be sure to note this change in your 824 User Guide. Also, in the 824 Installation and Field Maintenance Manual and the 824 Owner's Guide, make changes on the following pages: