

SYSTEM PRACTICE 01302 IMG

# TCX-128

## System Manual For B-CPU-D

Issue 3-0      September 1986

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

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# TCX-128

## REVISION CONTROL

REVISION	DATE	CHANGE
1-0	1 AUG 86	Manual written to incorporate B-CPU-D and B-TGU-C PCBs; also appendixes on Tie Lines, Remote Modem Access and Diagnostic Trace.
2-0	11 AUG 86	Manual typeset; information on DIL RING OPERATOR timer added; Binary to Hexadecimal Conversion Table added to Section 6.
3-0	19 SEPT 86	Minor changes/corrections based on Technical Training classes.

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**TCX-128**  
**COMPUTERIZED BRANCH EXCHANGE**  
**INTRODUCTION**

Section 1, **SYSTEM DESCRIPTION**, introduces the reader to the system. Section 1 contains general descriptive information about the system components, and details the telephone company, site and FCC requirements. It also includes a specification table.

Section 2, **HARDWARE CONFIGURATION**, allows the reader to develop the Required Equipment List. The Required Equipment List is used to record the equipment (hardware) requirements of the installation site.

Section 3, **INSTALLATION**, includes all the information required to successfully install the system.

Section 4, **INSTALLATION OF OPTIONAL EQUIPMENT**, contains description and installation data on each piece of optional equipment that can be used with the system.

Section 5, **FEATURES**, provides a detailed description of every feature available in the system. Additional data on key callouts, flash and signaling patterns, and display messages is also included.

Section 6, **SOFTWARE CONFIGURATION**, consists of an in-depth description of each of the system programmable options. For certain options, the data developed in this section is entered on the Program Record Forms. The codes on the Program Record Forms are entered into system memory during installation.

Section 7, **PROGRAM ENTRY**, tells the reader how to enter the data for each programmable option into system memory. All systems must be programmed to some degree before being operational.

Section 8, **THEORY OF OPERATION**, consists of the system and Printed Circuit Board (PCB) theory of operation for the system. This section is intended to be used with Section 9, **MAINTENANCE**, to allow service personnel to isolate system faults to the plug-replaceable unit.

Section 9, **MAINTENANCE**, is the final section of the manual and provides maintenance instructions for the system. The System Troubleshooting Flowchart, Operational Test Procedure, System Voltages table and the Replaceable Parts list are included in this section.

Appendixes A through D contain Operational Specifications (i.e., user instructions) for each telephone type.

Appendix E consists of information on the installation of tie lines.

Appendix F contains Diagnostic Trace information.

Appendix I explains Remote Modem Access.



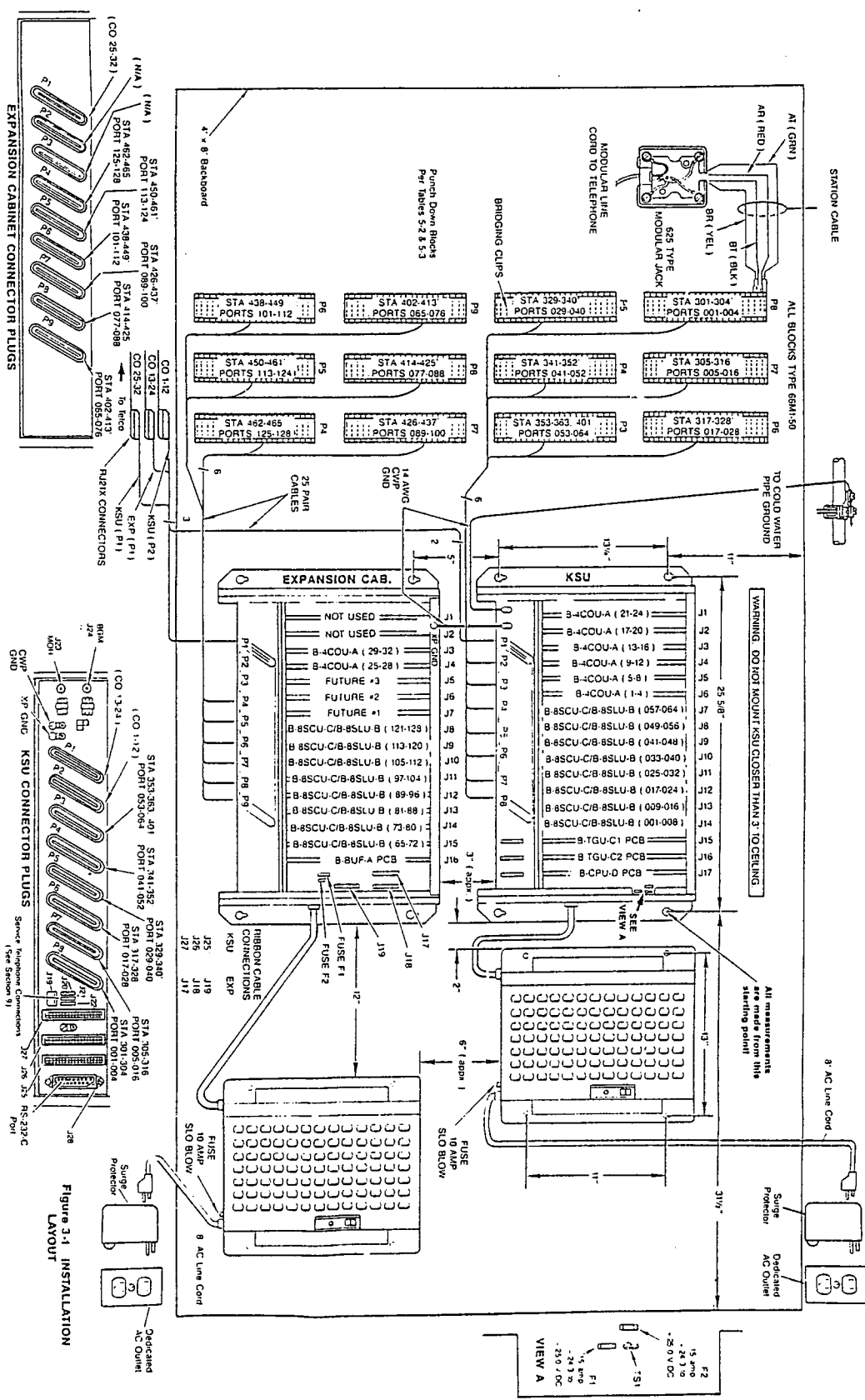


Figure 3-1. INSTALLATION LAYOUT

Default station assignment



## SECTION 1, SYSTEM DESCRIPTION

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### 1. INTRODUCTION

**1.01** The SYSTEM DESCRIPTION Section summarizes the various components of the TCX-128 Computerized Branch Exchange, available station instruments, specifications, site requirements and Federal Communications Commission (FCC)/telephone company requirements. This section also contains a list of the conventions and abbreviations used in this manual.

**1.02** Following is a list of related system documents:

<u>Description</u>	<u>Part Number</u>
Attendant Telephone Feature Handbook .....	01302AC
Multibutton Key Telephone Feature Handbook .....	01302MB
Four Button Key Telephone Feature Handbook .....	01302FB
Single Line Telephone Feature Handbook .....	01302SL
Special Loud Ringing Tone Board Instructions .....	01042
TIE Electronic Ringer Instructions .....	01084

## 2. SYSTEM DESCRIPTION

**2.01** The TCX-128 is a sophisticated and flexible electronic key telephone system that will provide you with an efficient, streamlined telecommunications network. Although the system employs some of the most high-tech advancements available in telecommunications today, the TCX-128 is a system that works *for you*—and doesn't make you work for it.

**2.02** The system has a maximum capacity of 32 lines and 128 stations (complete system specifications are detailed in Table 1-1, located at the end of the section). A full range of features is available, such as Conference, Handsfree, Last Number Redial, Paging and Speed Dialing. Both Central Office and Intercom calls can be processed quickly and efficiently on a variety of telephone models. Each extension can be programmed to access a different set of lines, and some of the extensions can be assigned their own private lines.

## 3. SYSTEM COMPONENTS

**3.01** Your system is composed of several components, each of which plays a vital part in the communications process. These components are:

- *The (KSU) and expansion cabinet, which house the Printed Circuit Boards, and whose backplanes provide a highway for telephone traffic*
- *The Power Supplies, which generate the electricity to keep the system running*
- *The telephones, which allow you the variety and freedom to choose a station instrument suitable for any situation*
- *The Printed Circuit Boards, which are installed in the KSU and expansion cabinet and control various areas of the system*

Following are short explanations of the pieces of equipment, and how each relates to the other components.

### KEY SERVICE UNIT AND EXPANSION CABINET

**3.02** The TCX-128 Key Service Unit (KSU) and Expansion Cabinet (Figure 1-1) are wall-mount units that house the system's Printed Circuit Boards. The backplanes of the KSU and the expansion cabinet control the circuitry which routes all calls in the system to their correct destinations.

**3.03** The KSU cabinet is equipped with standard phone jacks for connecting a customer-provided music source, a four-wire test jack, and an RS-232-C connector for connecting a programming terminal and/or Station Message Detail Recording (SMDR) equipment to the system.

### POWER SUPPLIES

**3.04** The power supplies provide the DC power requirements to the KSU and expansion cabinet, which, in turn, power the telephones.

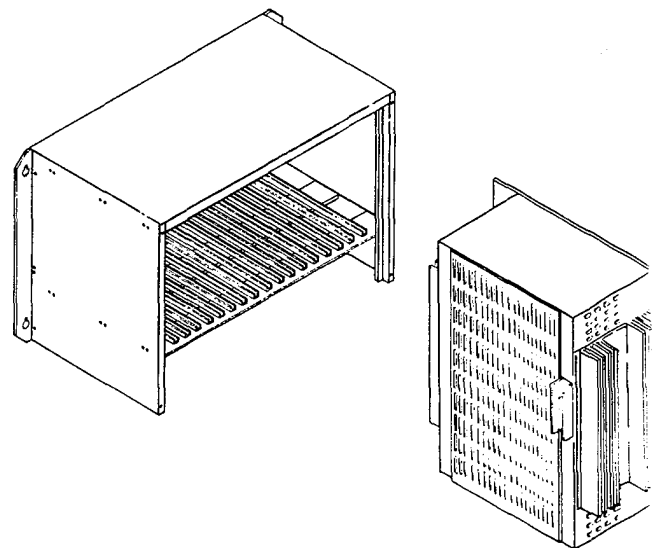


Figure 1-1 KSU AND POWER SUPPLY

## TELEPHONES

**3.05** The TCX-128 System uses the following instruments:

- Display Multibutton Key Telephone
- Four Button Telephone
- Single Line Telephone
- 2500 type single line telephone
- Direct Station Selection Console

A view of all telephones is presented in Figure 1-2.

### ***Display Multibutton Key Telephone***

**3.06** The Display Multibutton Key Telephone is the most versatile of all the station instruments in the TCX-128 System. This telephone provides you with access to outgoing lines on one row of keys, and access to incoming calls on a separate, clearly marked row. The display window provides you with visual messages, reminders and indications about your calls, as well as keeping you informed of the time and date, and, if you wish to see it, the duration and cost of your calls. The telephone can also be ordered without a display window.

**3.07** In addition, the Display Multibutton Key Telephone provides you with:

- *One-button access to almost all of the features*
- *One-button access to 14 other stations (which you select)*
- *Full Handsfree capabilities (allowing you to perform several features, including placing and answering calls, without lifting the handset)*
- *Ability to store and access 14 Speed Dial numbers of your selection*
- *Ability to Speed Dial 100 numbers stored for system-wide access*
- *Several quick and easy methods for redialing calls*
- *Adjustable Background Music*
- *Volume controls to adjust ringing or voice levels*

**3.08** The Display Multibutton Key Telephone should be used as the attendant's extension, along with a Direct Station Selection (DSS) Console. When a display telephone is programmed for use by an attendant, it receives several unique features not found at ordinary display telephone extensions, including the ability to busy-out lines, cancel all Call Forwarding requests, bypass Least Cost Routing (LCR) restrictions, and store Speed Dial numbers for system-wide use.

**3.09** The DSS Console streamlines communications by permitting the attendant to process a large amount of calls in a short period of time. The DSS Console provides one-button access to all telephones in the system, as well as a visual indication (i.e., idle, busy, in Do Not Disturb) of the status of any telephone. The DSS Console also allows the calls to be instantly transferred to any destination.

### ***Four Button Telephone***

**3.10** The Four Button Telephone is generally used in areas that do not receive a great deal of telephone traffic. The telephone offers one-button access to some commonly used features (including Transfer, Callback and Conference), while other features are available by dialing codes. The Four Button Telephone automatically provides you with dial tone with which to place internal calls when you lift the handset. In addition, the telephone can be used to answer Intercom calls Handsfree.

### ***Single Line Telephone***

**3.11** The Single Line Telephone allows many system features to be accessed by dialing access codes. The telephone is equipped with a HOLD/TRANSFER bar to facilitate the use of several features. The Single Line Telephone automatically provides you with dial tone with which to place internal calls when you lift the handset.

**3.12** In addition, 2500 type single line telephones can be installed as extensions. These telephones work in the same manner as the Single Line Telephones; however, the hookswitch must be used in place of the HOLD/TRANSFER bar.

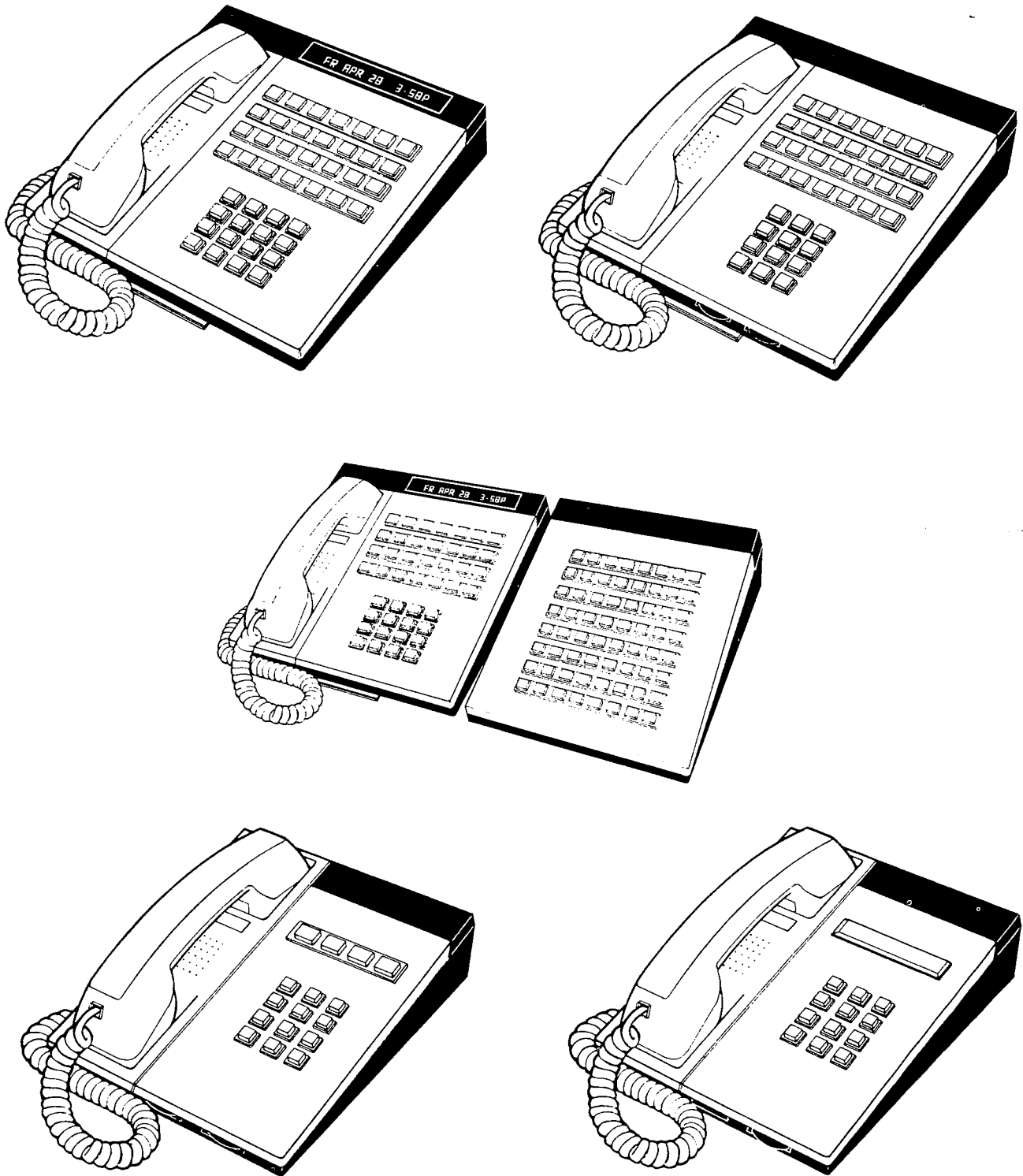


Figure 1-2 SYSTEM TELEPHONES

## PRINTED CIRCUIT BOARDS

**3.13** Each Printed Circuit Board (PCB) controls an area of the system. The PCBs are installed in the KSU. The amount of each type of PCB that you must order is dependent on the configuration of your system. The Printed Circuit Boards (including a very general description of their functions) are:

- *Central Processor Unit (B-CPU-D) PCB — Processes all calls and distributes the information to the other PCBs*
- *Tone Generator (B-TGU-C) PCBs — Generates the ringing tones for the telephones*
- *Station Control Unit (B-8SCU-C) PCBs — Controls the operation of a group of eight multibutton and/or four button telephones*
- *Single Line Unit (B-8SLU-B) PCBs — Controls the operation of a group of eight single line telephones*
- *Central Office Unit (B-4COU-A) PCBs — Controls the use of a group of four Central Office (CO) lines*
- *Buffer (B-BUF-A) PCB — Links the control signals from the KSU to the expansion cabinet*

## 4. BASIC SYSTEM OPERATION

**4.01** The TCX-128 (Figure 1-3) uses microprocessors in the KSU and key telephones for shared system control. The micro-processors allow digital commands to make the analog (voice) connections between the conversing parties. This design allows for sophisticated operation in a compact, economical system. The system is customized from a programming terminal without complex wiring or expensive hardware additions.

**4.02** The Central Processing Unit (B-CPU-D) PCB contains two microprocessors: a Z80 microprocessor and a 6502 traffic controller microprocessor. The Z80 microprocessor is the brain of the system. It constantly “talks” to the system memory (on the B-CPU-D PCB), the 6502 traffic control microprocessor and all PCBs to allow constant monitoring of the outside lines and internal stations. When the Z80 sees a change (such as a call ringing in), it analyzes the event and sends commands to the various PCBs for processing.

**4.03** The outside lines are connected to the Central Office Unit (B-4COU-A) PCBs, and the internal stations to the Station Control Unit (B-8SCU-C) PCBs (or B-8SLU-B PCBs if single line telephones are used). The various system tones are generated on the Tone Generator Unit (B-TGU-C) PCB. The system can use Least Cost Routing, which automatically selects the least expensive route for outgoing calls. The Least Cost Routing chip is located on the B-CPU-D PCB.

**4.04** When a call rings into a B-4COU-A PCB (Figure 1-3), the Z80 checks the system memory and tells the 6502 traffic controller to ring those stations programmed to receive ringing for the line. When a station answers the call, the microprocessors switch an analog path between the line and the station so the parties can converse. The opposite happens when a call is placed. If an Intercom call is made, the microprocessors switch an analog path between two stations.

**4.05** The analog and digital networks are actually more complicated. Most calls are directly linked between the line port on a B-4COU-A PCB and a station port on a B-8SCU-C PCB through a single digitally-controlled switch. Calls on lines 21-32 require an additional digitally-controlled switch on the B-TGU-C PCB.

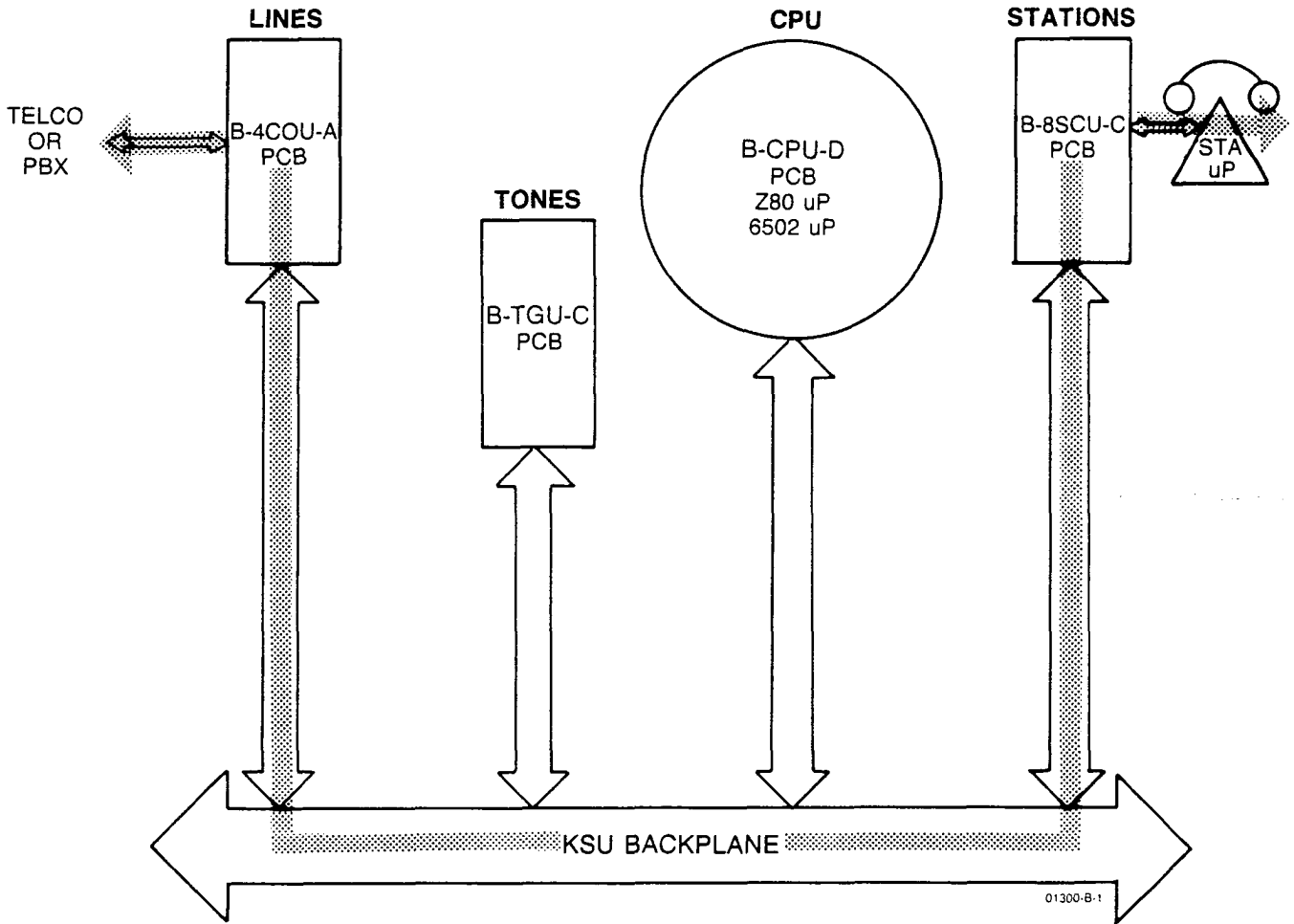


Figure 1-3 BASIC BLOCK DIAGRAM

## 5. SITE REQUIREMENTS

**5.01** The TCX-128 KSU should be installed in a clean, dry and secure location, accessible only to authorized personnel. This location, as detailed in Section 3 (paragraph 2.02), should comply with Bell Functional Product Class Criteria of September, 1978, in publication PUB 48002 as stated in 3.4.3.2, paragraph C-Indoors With Environmental Control. The room must have adequate ventilation, and a temperature range of 4 to 38 degrees C (40 to 100 degrees F) with 5% to 95% noncondensing relative humidity. Room temperature of 21 degrees C (70 degrees F) is recommended.

**NOTE:** To extend system life, maintain the same environmental conditions as would be maintained for any sophisticated computer system.

**5.02** Ample room must be provided at the installation site for mounting the KSU, power supply and related equipment. Maintain at least three feet between the room ceiling and the top of the power supply. Install the equipment in an area free from static electricity (dry copiers), excessive vibration (heavy machinery) or dampness.

**5.03** The customer must provide a dedicated three-wire 120 V AC, 60 Hz. 15 amp circuit for each power supply. A separate ground is required in addition to the third-wire ground on the AC circuit. Refer to Section 3 for grounding requirements. If an External Paging amplifier is installed, it should be connected to an AC circuit other than the dedicated AC line.

**CAUTION: THE EQUIPMENT GENERATES AND IS SUSCEPTIBLE TO RADIO FREQUENCY ENERGY.**

## 6. FCC AND TELCO REQUIREMENTS

**6.01** Rules and regulations for the operation and installation of privately-owned telephone equipment have been established by the Federal Communications Commission (FCC). According to Part 68 (Connection of Terminal Equipment to the Telephone Network) and its amendments, several actions are required before and during installation of customer-provided telephone equipment. These actions are outlined below.

### NOTIFICATION TO TELCO

**6.02** As owner of this telephone system, you may be required to give the following information to the operating telephone company before connecting or disconnecting it:

- (a) Sufficient notice of your intention to use privately owned telephone equipment.
- (b) The particular lines to be used (telephone numbers xxx-xxxx through xxx-xxxx).
- (c) Model: TCX-128  
Manufacturer: TIE/communications, Inc.  
FCC Registration Number: BJ286G-68925-MF-E  
Ringer Equivalence: 2.6B  
Registered Jack: RJ21X

### FCC APPROVED CONNECTORS

**6.03** Connection of this system to telephone company lines must be made with FCC approved plugs and jacks.

### INSTALLATION CLASSES

**6.04** Classes for installation are available through TIE/communications, Inc. and its regional offices.

## INCIDENCE OF HARM

**6.05** The FCC requires that when trouble is experienced, the customer shall disconnect the registered equipment from the telephone line to determine if the registered equipment is malfunctioning. If the registered equipment is malfunctioning, the use of such equipment shall be discontinued until the problem is corrected.

**6.06** When practical, the telephone company must notify the customer that service may be temporarily discontinued if customer-provided equipment is causing harm to the telephone network. The telephone company must attempt to inform the customer that service is to be discontinued before actually terminating service. The telephone company must also provide customers with an opportunity to correct the problem and must advise customers of their right to bring complaint procedures before the FCC.

## HEARING AID COMPATIBILITY

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

- (a) Any public or semipublic location where coin-operated or credit card telephones may be found.
- (b) Elevators, highways, and tunnels (automobile, subway, railroad, or pedestrian) where a person with impaired hearing might be isolated in an emergency.
- (c) Places where telephones are specifically installed to alert emergency authorities such as fire, police, or medical assistance personnel.
- (d) Hospital rooms, residential health care facilities, convalescent homes, and prisons, specifically where telephones are used for signaling life-threatening or emergency situations if alternative signaling methods are not available.

- (e) Workstations for hearing impaired personnel.
- (f) Hotel, motel, apartment lobbies; in stores where telephones are used by patrons to order merchandise; in public transportation terminals where telephones are used to call taxis, or to reserve lodging or rental automobiles.
- (g) Hotel and motel rooms. At least ten percent of the rooms must contain hearing aid compatible telephones; or contain jacks for plug-in hearing aid compatible telephones which will be provided to hearing impaired customers upon request.

## 7. CONVENTIONS AND ABBREVIATIONS

**7.01** The various conventions and abbreviations used in this manual are defined below.

### CONVENTIONS

- N** — One digit, any digit 2 through 9
- P** — One digit, any digit 0 or 1
- X (n)** — One digit, any digit 0 through 9

### ABBREVIATIONS

- ANA** — Assigned Night Answer
- BGM** — Background Music
- CO** — Central Office
- COS** — Class of Service
- CPU** — Central Processing Unit
- CTC** — Counter/Timer Circuit device
- CWP** — Cold Water Pipe
- DART** — Dual Asynchronous Receiver/  
Transmitter device
- DIL** — Direct Inward Line
- DDD** — Direct Distance Dialing



- 
- |              |  |             |   |
|--------------|--|-------------|---|
| <b>DND</b>   | — Do Not Disturb   | <b>OB</b>   | — Outbound Data Bit-(i.e., from KSU to telephone) |
| <b>DP</b>    | — Dial Pulse (Outpulse)  | <b>OCC</b>  | — Other Common Carrier                            |
| <b>DSS</b>   | — Direct Station Selection   | <b>OPX</b>  | — Off Premises Extension                          |
| <b>DTMF</b>  | — Dual Tone Multifrequency   |             | — Parallel Input/Output device                    |
| <b>EPROM</b> | — Erasable Programmable Read Only Memory   | <b>PBX</b>  | — Private Branch Exchange                         |
| <b>FX</b>    | — Foreign Exchange   | <b>PCB</b>  | — Printed Circuit Board                           |
| <b>IB</b>    | — Inbound Data Bit (i.e., from telephone to KSU)   | <b>RAM</b>  | — Random Access Memory                            |
| <b>KSU</b>   | — Key Service Unit   | <b>ROM</b>  | — Read Only Memory                                |
| <b>LCR</b>   | — Least Cost Routing   | <b>RX</b>   | — Receive Data                                    |
| <b>LED</b>   | — Light Emitting Diode   | <b>SMDR</b> | — Station Message Detail Recording                |
| <b>MOH</b>   | — Music On Hold  | <b>TX</b>   | — Transmit Data                                   |
| <b>MUX</b>   | — Multiplexer  | <b>UNA</b>  | — Universal Night Answer                          |
| <b>NNX</b>   | — Office Code (i.e., local exchange)   | <b>WATS</b> | — Wide Area Telephone Service                     |
| <b>nnnn</b>  | — Last four digits of a standard CO call. These digits are the "Terminal Digits" or "Local Address" for the call.  |             |   |
| <b>NPX</b>   | — Area Code, also sometimes referred to as Numbering Plan Area (NPA). Codes in the NPX format that can be either Area Codes or Office Codes are termed Conflict Codes. |             |   |

Table 1-1 TCX-128 SPECIFICATIONS (Page 1 of 2)

GENERAL SPECIFICATIONS		
System Capacity:		
	KSU	WITH EXPANSION CABINET
CO/PBX Lines	24	32
Extensions	64	128
CO Ring Links	20	20
Intercom Links	10	10
Page Links	1	1
BGM Links	1	1
Total System Talkpaths	32	32
Private Lines	24	32
Hotlines (programmable)	32	64
DSS/Intercom Keys	14 per multibutton telephone*	
Attendant Consoles	6 DSS	6 DSS
Internal Paging Zones	9 (8 zones and All Call)	
External Paging Zones	8	8

\*programmable for first 50 multibutton extensions.

---

**ELECTRICAL SPECIFICATIONS**

**Power Requirements:**

1 KSU & Power Supply:  
 Input: 95 - 130 V AC, (120 V AC nominal); 59-61 Hz, single phase. Requires 15 AMPS service.  
 DC Output: +24 V, -24 V, +5 V\*

1 Expansion Cabinet & Power Supply:  
 Input: 95 - 130 V AC, (120 V AC nominal); 59-61 Hz, single phase. Requires 15 AMPS service.  
 DC Output: +24 V, -24 V, +5 V\*

\*Power supply input and output current ratings are defined on the specifications label attached to the unit.

---

**Power Dissipation:**

1 KSU & Power Supply: 1150 BTUs/hr.\*  
 1 Expansion Cabinet & Power Supply: 1150 BTUs/hr.\*

Each Telephone: 10.0 BTUs/hr.  
 \*Assuming nominal 120 V AC input and fully loaded system.

---

**Fusing:**

Power Supply:  
 Input AC Fuse, 10 AMPS, Slow Blow

KSU and Expansion Cabinet:  
 F1, 15 AMPS, Fast Acting  
 F2, 15 AMPS, Fast Acting

---

**Switching Principle:**

Solid-state, space-division matrix with stored program control.

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Table 1-1 TCX-128 SPECIFICATIONS (Page 2 of 2)

<b>ELECTRICAL SPECIFICATIONS (cont.)</b>						
<b>Cable Requirements:</b>						
Four-conductor, twisted-pair or quad station wire, 24 gauge (or equivalent). Maximum cable run up to 800 (244 m) feet for display telephones, 2,000 (610 m) feet for keysets, and 10,000 (3050 m) feet for single line sets.						
<b>External Relay Contacts:</b>						
SPST NO.:						
Maximum Power: 50 V AC/30 WATTS						
Maximum Current: 1 A <sup>1</sup>						
Maximum Voltage: 125 V AC or 150 V DC						
Programmable for Night Ring and/or Page.						
<sup>1</sup> Maximum allowable current at 125 V AC is 400mA.						
<b>Background Music:</b>						
Input Impedance: 22 K OHM						
Input Level: -25 dBV						
Maximum Input: 0.5 VRMS						
<b>Music On Hold:</b>						
Input Impedance: 22 K OHM						
Input Level: -25 dBV						
Maximum Input: 0.5 VRMS						
<b>External Paging:</b>						
Output Impedance: 600 OHM						
Output Level: 20 dBm/600 OHM nominal						
Maximum Output: 6 VRMS						
<b>MECHANICAL SPECIFICATIONS</b>						
All components measured and weighed unpackaged.						
<b>Dimensions and Weights:</b>						
KSU &	27.75" W	×	17" H	×	13.5" D	55 lbs.
Exp. Cab.:	71 cm	×	44 cm	×	35 cm	25 kg.
Power	14" W	×	14.75" H	×	6.5" D	40.5 lbs.
Supply:	36 cm	×	38 cm	×	17 cm	18.5 kg.
<b>ENVIRONMENTAL SPECIFICATIONS</b>						
<b>Environmental Operating Conditions:</b>						
Temperature: 4° - 38° C (40° - 100° F)						
Humidity: 5-95% relative, noncondensing						
(Reference Bell Functional Product Class Criteria of September 1978 publication PUB 48002)						
<b>FCC REGISTRATION</b>						
Model: TCX-128						
FCC Registration Number: BJ286G-68925-MF-E						
Ringer Equivalence: 2.6B						
Registered Jack: RJ21X						

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## SECTION 2, HARDWARE CONFIGURATION

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### 1. INTRODUCTION

1.01 The HARDWARE CONFIGURATION Section provides the instructions on how to complete the Required Equipment List (Table 2-1) located at the end of this section.

### 2. COMPLETING THE REQUIRED EQUIPMENT LIST

#### ITEM 1 - KSU, EXPANSION CABINET AND POWER SUPPLIES

2.01 The KSU houses the Printed Circuit Boards that control the system. Each system requires a Key Service Unit (KSU). This is indicated for you on Table 2-1.

2.02 If the system is to be equipped with more than 64 stations or 24 outside lines, a second KSU, called an expansion cabinet must be installed.

On Table 2-1, indicate if an expansion cabinet is required.

2.03 The Power Supply provides the necessary electricity to the KSU (or expansion cabinet). The KSU requires a power supply. This has been indicated for you on Table 2-1. If an expansion cabinet is required, it will also require its own power supply.

On Table 2-1, indicate if a power supply is required for the expansion cabinet.



## ITEM 2 - TELEPHONES

**2.04** The system can accommodate up to 128 telephone instruments. The available telephones are:

- Multibutton Key Telephone (display or non-display model)
- Four Button Telephone
- Single Line Telephone
- 2500 type single line telephone

**2.05** On Table 2-1, indicate the quantity of each type of telephone required. Order at least one Display Multibutton Key Telephone (with a DSS Console) to be used as the attendant's extension. If any of the telephones are to be wall mounted, indicate on Table 2-1 the number of wall mounting kits required.

**2.06** If Single Line and 2500 type single line telephones are to be used, the available number of Multibutton Key Telephones and Four Button Telephones is decreased according to the following chart:

Number of Single Line and 2500 Type Single Line Telephones Required	Maximum Number of Multibutton and Four Button Telephones Allowed
1-8	120
9-16	112
17-24	104
25-32	96
33-40	88
41-48	80
49-56	72
57-64	64
65-72	56
73-80	48
81-88	40
89-96	32
97-104	24
105-112	16
113-120	8

**2.07** A Special Loud Ringing Tone Board or a TIE Electronic Ringer must be purchased and installed for each 2500 type single line telephone ordered. The Board or Ringer must replace the 90V ringer already located inside the telephone, in order to allow that telephone to generate a ring signal.

**2.08** Either the Special Loud Tone Ringing Board or the TIE Electronic Ringer are acceptable replacements for the 90V ringer; however, the Special Loud Ringing Tone board *must* be installed if a 2500 type single line telephone is equipped with a faceplate containing a HOLD button. The Special Loud Tone Ringing Board should also be ordered if the telephone is to be connected to an external ringer (i.e., the telephone is located in an area where normal ringing is not adequate).

**NOTE:** 2500 type single line telephones can be installed as Off Premises Extensions (OPXs). Refer to Appendix G of this manual.

On Table 2-1, indicate if any Special Loud Tone Ringer Boards or TIE Electronic Ringers are required.

## ITEM 3 - DSS CONSOLES

**2.09** One DSS Console should be ordered for each attendant.

Indicate on Table 2-1 the number of DSS Consoles required.

## ITEM 4 - LINES

**2.10** The system can accept up to 32 lines. These lines can include:

- Direct Distance Dialing (DDD) CO Lines
- Wide Area Telephone Service (WATS) CO Lines
- Foreign Exchange (FX) CO Lines
- Lines reserved for Other Common Carriers (e.g., MCI)
- Private Branch Exchange (PBX) Lines

**2.11** Lines can be either Dual Tone Multifrequency (DTMF) or Dial Pulse (DP), in any combination. Keep a record of the lines ordered and the configuration of the RJ21X connectors provided by the telco or PBX personnel.

Indicate on Table 2-1 how many of each type of line are required.

**NOTE:** Combining CO lines and PBX lines in the same system requires additional equipment and the services of a certified installer.

**WARNING: A DETAILED TRAFFIC STUDY SHOULD BE MADE WHEN MORE THAN 24 LINES ARE CONNECTED TO DETERMINE IF THE NUMBER OF SYSTEM TALKPATHS IS SUFFICIENT TO MANAGE THE INCREASED TRAFFIC.**

## ITEM 5 - PRINTED CIRCUIT BOARDS

### *Central Processor Unit (B-CPU-D) PCB*

**2.12** The Central Processor Unit (B-CPU-D) PCB acts as the "brain" of the TCX-128, directing all telephone traffic throughout the system. The B-CPU-D PCB contains:

- *Z80 and 6502 traffic control microprocessors*
- *System memory*
- *A clock/calendar used for time and date display settings and Station Message Detail Recording (SMDR)*

One Central Processor Unit (B-CPU-D) PCB is required in every system. This is indicated for you on Table 2-1.

### *Station Control Unit (B-8SCU-C) PCB*

**2.13** Each Station Control Unit (B-8SCU-C) PCB contains eight circuits for key and four button telephones. The B-8SCU-C PCB position in the KSU determines an extension's port number. Each B-8SCU-C PCB contains:

- *Required power and receive/transmit circuits for the stations*
- *Crosspoints for Intercom, CO and Conference calls*
- *A microprocessor*
- *A Read Only Memory (ROM) program*
- *Overload protection circuits*

**2.14** To determine the total number of B-8SCU-C PCBs required:

- (1) Add up the number of Multibutton Key Telephones and Four Button Telephones in the system.
- (2) To this figure, add the total number of DSS Consoles ordered.
- (3) After obtaining this total, consult the following chart to determine the number of B-8SCU-C PCBs required:

Number of Telephones and DSS Consoles Required	Number of B-8SCU-C PCBs Required
1-8	1
9-16	2
17-24	3
25-32	4
33-40	5
41-48	6
49-56	7
57-64	8
65-72	9
73-80	10
81-88	11
89-96	12
97-104	13
105-112	14
113-120	15
121-128	16

On Table 2-1, indicate the number of B-8SCU-C PCBs required.

**Single Line Instrument (B-8SLU-B) PCB**

**2.15** The Single Line Instrument Unit (B-8SLU-B) PCB contains circuits for eight Single Line and 2500 type single line telephones. To determine the total number of B-8SLU-B PCBs required:

- (1) Add up the number of Single Line and 2500 type single line telephones ordered.
- (2) After obtaining this total, consult the following chart to determine the number of B-8SLU-B PCBs required:

Number of Single Line Telephones Required	Number of B-8SLU-B PCBs Required
1-8	1
9-16	2
17-24	3
25-32	4
33-40	5
41-48	6
49-56	7
57-64	8
65-72	9
73-80	10
81-88	11
89-96	12
97-104	13
105-112	14
113-120	15

**CO Line Unit (B-4COU-A) PCB**

**2.16** Each CO Line Unit (B-4COU-A) PCB has circuits for four CO lines. Six B-4COU-A PCBs (24 lines) can be installed in the KSU, and two B-4COU-A PCBs (8 lines) in the expansion cabinet. This PCB contains, for each CO line:

- Ring detectors
- Conference-enabling circuits
- Loop relays
- MOH circuitry

**2.17** To determine the number of B-4COU-A PCBs required:

- (1) Add up the total number of CO lines required.
- (2) After obtaining the total, consult the following chart to determine the number of B-4COU-A PCBs required:

Number of CO Lines Required	Number of B-4COU-A PCBs Required
1-4	1
5-8	2
9-12	3
13-16	4
17-20	5
21-24	6
25-28	7
29-32	8

On Table 2-1, indicate how many B-4COU-A PCBs are required.

**Tone Generator Unit (B-TGU-C) PCB**

**2.18** The Tone Generator Unit (B-TGU-C) PCB generates dial, reorder, Dual Tone Multifrequency (DTMF) and signaling tones for the TCX-128 system. Each B-TGU-C PCB also contains:

- Two external output control relays used with External Paging equipment and loud ringers
- DTMF receivers for tone-to-data conversion (can accept two additional DTMF Receiver Daughter Boards)
- Volume controls for ringing volume, paging, Background Music, Music On Hold (MOH)
- Four External Paging Zone outputs

**2.19** For a single KSU system, one B-TGU-C PCB is always required. If the system has a KSU and an expansion cabinet, two B-TGU-C PCBs are required.



**2.20** Two additional DTMF Receiver Daughter Boards can be installed on each B-TGU-C PCB. As shown in the chart below, the number of DTMF Receiver Daughter Boards needed depends on system traffic. The chart explains when additional DTMF Receiver Daughter PCBs are required. It also indicates when two B-TGU-C PCBs are needed in a single KSU system.

**NOTE:** Sixteen-button dialpads do not use DTMF receivers on the B-TGU-C PCB. Do not count these telephones when determining DTMF receiver requirements.

On Table 2-1, indicate the number of B-TGU-C PCBs required. Also indicate if any DTMF Receiver Daughter Boards are required.

	Number of Stations	Number of Lines	B-TGU-C PCBs Required	Additional DTMF Daughter PCBs Req.
<b>Low / Med. dialing</b>	1-24	1-8	1	0
	25-40	9-12	1	1
	41-64	13-24	1	2
	65-80	13-24	2	1
	81-128	25-32	2	2
<b>Heavy dialing</b>	1-24	1-8	1	1
	25-40	9-12	1	2
	41-64	13-24	2	2
	81-128	25-32	2	4

### **Real Time Clock Daughter (B-RTC-A) PCB**

**2.21** A Real Time Clock Daughter (B-RTC-A) PCB can be installed on the first Tone Generator PCB to provide a more accurate and battery-backed time display. A fully-charged battery on the B-RTC-A backs up the time for approximately 100 hours during a power failure. Only one B-RTC-A PCB is required per system.

On Table 2-1, indicate if a B-RTC-A PCB is required.

### **Buffer (B-BUF-A) PCB**

**2.22** The B-BUF-A PCB is required when an expansion cabinet is installed.

On Table 2-1, indicate if the B-BUF-A PCB is necessary.

### **ITEM 6 - INSTALLATION HARDWARE**

**2.23** The number of station blocks required is determined by the number of stations (ports) used on the B-8SCU-C PCBs and B-8SLU-B PCBs. To determine the number of station blocks required:

- (1) Add up the number of ports used on the B-8SCU-C and B-8SLU-B PCBs in the system.
- (2) After obtaining the total, consult the following chart to determine the number of station blocks required:

PORTS 001-004	--	1 BLOCK
PORTS 005-016	--	2 BLOCKS
PORTS 017-028	--	3 BLOCKS
PORTS 029-040	--	4 BLOCKS
PORTS 041-052	--	5 BLOCKS
PORTS 053-064	--	6 BLOCKS
PORTS 065-076	--	7 BLOCKS
PORTS 077-088	--	8 BLOCKS
PORTS 089-100	--	9 BLOCKS
PORTS 101-112	--	10 BLOCKS
PORTS 113-124	--	11 BLOCKS
PORTS 125-128	--	12 BLOCKS

Indicate on Table 2-1 the number of station blocks required.

**2.24** One 25-pair cable, with a type 57 male connector on one end and a type 57 female connector on the other, must be ordered for each RJ21X provided by the telco. This cable is used to connect the telco lines to the KSU and the expansion cabinet. The cable cannot exceed 25 feet in length. Refer to the following chart when determining how many cables to order:

<u>Number of Telco Lines</u>	<u>Number of RJ21X Connecting Cables</u>
1-12	1
13-24	2
25-32	3

Indicate on Table 2-1 how many male-to-female 25-pair cables are required.

**2.25** Each station block requires a 25-pair cable to connect it to the KSU. This cable has a type 57 female connector on one end and is unterminated on the other.

On Table 2-1, indicate how many of these cables are required.

**2.26** Each telephone and DSS Console ordered requires a 625A or 625F modular station jack.

On Table 2-1, indicate the number of modular station jacks required.

**2.27** Quad telephone cable (or equivalent) is used to connect the modular jacks to the station connecting blocks.

On Table 2-1, estimate how much cable is required.

**2.28** Each power supply ordered in Item 1 must be plugged into a surge protector.

On Table 2-1, indicate whether one or two surge protectors are required.

## ITEM 7 – PROGRAMMING EQUIPMENT

**2.29** A programming terminal with an RS-232-C serial output is required for system configuration. This terminal must be plugged into the KSU every time programming is to be changed.

On Table 2-1, indicate if you need to order a programming terminal.

## ITEM 8 – OPTIONAL EQUIPMENT

**2.30** For a hard copy record of calls, an SMDR printer is required. Call accounting systems are compatible with the system and provide for a more comprehensive management of call records.

On Table 2-1, indicate if an SMDR printer or call accounting system is required.

**2.31** Background Music (BGM) and Music On Hold (MOH) require an external music source. BGM and MOH can share the same music source.

On Table 2-1, indicate if one or two music sources are desired.

**2.32** External speaker systems can be used to provide Paging announcements and Background Music to areas where no telephones are located, or where there is loud noise.

On Table 2-1, indicate if a speaker system is desired.

**Table 2-1 REQUIRED EQUIPMENT LIST**

<b>ITEM 1: CABINET AND POWER SUPPLIES (¶2.01)</b>	
KSU (P/N 86003)	1 required
Expansion Cabinet (P/N 86016)	___ required
B-PSU-B Power Supply (P/N 86007)	___ required
Ribbon Cable Set (P/N 86018)	___ required
<b>ITEM 2: TELEPHONES (¶2.04)</b>	
Display Multibutton Key Telephone (P/N 86073)	___ required
Multibutton Key Telephone (P/N 86070)	___ required
Four Button Telephone (P/N 86071)	___ required
Single Line Telephone (P/N 86057)	___ required
2500 type single line telephone (desk model) <sup>1</sup>	___ required
2500 type single line telephone (wall mount) <sup>1</sup>	___ required
Special Loud Ringing Tone Board (P/N 86185)	___ required
TIE Electronic Ringer (P/N 86187)	___ required
Multibutton Wall Mounting Kit (P/N 86076M)	___ required
Four Button/Single Line Wall Mounting Kit (P/N 86077M)	___ required
Replacement Wall Mount Hanger (P/N 86076A)	___ required
<b>ITEM 3: DSS CONSOLES (¶2.09)</b>	
DSS Console (P/N 86075)	___ required
<b>ITEM 4: LINES (¶2.10)</b>	
Direct Distance Dialing (DDD) CO lines <sup>1</sup>	___ required
Wide Area Telephone Service (WATS) CO lines <sup>1</sup>	___ required
Foreign Exchange (FX) CO lines <sup>1</sup>	___ required
Special Service (SPRINT, MCI, etc.) CO lines <sup>1</sup>	___ required
Private Branch Exchange (PBX) lines <sup>1</sup>	___ required
<b>ITEM 5: PRINTED CIRCUIT BOARDS (¶2.12)</b>	
B-CPU-D PCB (P/N 86051)	1 required
B-8SCU-C PCB (P/N 86023)	___ required
B-8SLU-B PCB (P/N 86027/86027A)	___ required
B-4COU-A PCB (P/N 86010)	___ required
B-TGU-C PCB (P/N 86031)	___ required
B-RTC-A PCB (P/N 86028)	___ required
B-BUF-A PCB (P/N 86017)	___ required
DTMF Receiver Daughter PCB (P/N 86015)	___ required
<b>ITEM 6: INSTALLATION HARDWARE (¶2.23)</b>	
Station connecting block <sup>1</sup>	___ required
25-pair cable, RJ21X to KSU <sup>1</sup>	___ required
25-pair cable, connecting block to KSU <sup>1</sup>	___ required
625A, 625F or equivalent modular station jack <sup>1</sup>	___ required
Station cable (in feet) <sup>1</sup>	___ required
Surge Protector <sup>1</sup>	___ required
<b>ITEM 7: PROGRAMMING EQUIPMENT (¶2.29)</b>	
Programming Printer/terminal <sup>1</sup>	___ required
<b>ITEM 8: OPTIONAL EQUIPMENT (¶2.30)</b>	
SMDR Printer <sup>1</sup>	___ required
External music source <sup>1</sup>	___ required
External Paging/BGM equipment <sup>1</sup>	Yes/No

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<sup>1</sup>Item not available from TIE/communications, Inc.



## SECTION 3, INSTALLATION

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### 1. INTRODUCTION

**1.01** The INSTALLATION Section provides detailed procedures for installing a TCX-128 Computerized Branch Exchange. Installation of optional equipment is presented in Section 4 of this manual.

### 2. PREPARATION

**2.01** Before beginning, be sure the installation site is suitable. The site should comply with the guidelines of the Bell Functional Product Class Criteria (PUB 48002—September 1978), section 3.4.3.2, paragraph C, Indoors With Environmental Control.

**2.02** The Key Service Unit (KSU), expansion cabinet and related control equipment mounting area should be clean, dry, temperature controlled and not accessible to unauthorized personnel. The site should be away from static electricity (dry copiers), caustic chemicals and heavy machinery. There should be ample room to mount and maintain the equipment.

**NOTE:** Standard quad station cable (or equivalent) is used to connect the station blocks to the telephone instruments. Two-pair twisted station cable may also be used. All station cable, including the cable for the DSS Console, must be home run to the connecting blocks. Consult the following chart for the lengths of the cable runs for each telephone:

<u>Telephone</u>	<u>Cable Run (w/24 AWG wire)</u>
Display Multibutton	800 feet (maximum)
Multibutton	2000 feet (maximum)
Four Button	2000 feet (maximum)
Single Line	10,000 feet (maximum)
2500 type	10,000 feet (maximum)

**2.03** The National Electrical Code (NEC) requires the local operating telephone company (telco) to provide primary protection devices on telephone lines terminated at customer sites. Check the entry point to see that a primary protection device has been installed. If no such device is present, notify the telco before proceeding with the installation.

**WARNING: THIS ELECTRICAL TELEPHONE SYSTEM REQUIRES A PRIMARY PROTECTION DEVICE ON THE TELCO SIDE OF THE DEMARCATION POINT.**

**2.04** A power line surge protector (such as a TII Model 428 Mark II, a TII Model 439 or equivalent) must be installed between the telephone system power supply and the AC outlet.

**2.05** Only cabling to an Off Premises Extension can be run from the KSU to extensions or stations in other buildings.

**WARNING: OPERATION OF THIS EQUIPMENT OUTSIDE OF THESE LIMITS WILL DECREASE ITS EXPECTED RELIABILITY AND WILL VOID ANY APPLICABLE WARRANTY.**

**2.06** There must be a dedicated three-wire 120 V AC (nominal), 60 Hz, 15 AMP circuit for each power supply. To prevent accidental shutdown, a lock clip on the service panel is recommended. The outlet must be a three-prong receptacle (NEMA 5-15R). The receptacle must be within eight feet (2.4m) of the power supply.

**CAUTION: DO NOT USE A THREE-PRONG TO TWO-PRONG ADAPTER.**

**2.07** An earth ground connection is required in addition to the third wire ground, must be within 25 feet (7.6m) of the installation. The grounding wire must be 14 AWG or larger insulated wire, no longer than 25 feet (7.6 m). A cold water pipe that is metallic throughout

(including all joints and sections) generally provides a suitable ground. Check the cold water pipe to ensure continuity. If a cold water piping system is found to be inadequate, an alternate grounding means must be used.

**2.08** The operating telephone company may ask to be notified of the proposed cut-over date and supplied with the information outlined in Section 1 of this manual. The telco lines, terminated in RJ21X connectors, must be within 25 feet (7.6m) of the KSU location.

**2.09** Read this entire section and prepare a KSU installation layout similar to Figure 3-1. Customize the layout for the particular site application.

#### Site Summary Check

- Location acceptable (para. 2.02)
- AC line(s) installed (para. 2.06)
- Provisions for ground (para. 2.07)
- Telco notified (para. 2.08)
- Telco lines available (para. 2.08)
- KSU installation layout prepared (para. 2.09)

#### Tools and Test Equipment

**2.10** The following tools are required:

- (a) Tape measure for equipment layout
- (b) Level for mounting equipment
- (c) Drill for mounting equipment on backboard
- (d) Screwdrivers (Straight and Phillips)
- (e) Punchdown tool for cross connecting wires
- (f) Wire stripper for wiring modular jacks
- (g) Wrist ground strap for removing and inserting PCBs
- (h) Needle-nose pliers for strapping PCBs
- (i) Digital voltmeter with a high input impedance and accuracy within 1% for testing
- (j) User-provided RS-232-C compatible programming terminal
- (k) Work light or flashlight for working in dark areas
- (l) AC power extension cords
- (m) Pens or pencils for marking backboard, 66M1-50 blocks and modular jacks
- (n) Electrical tape
- (o) "Snake" for running cables through walls
- (p) Sheathing tool for 25-pair cable
- (q) Alignment tool for adjusting volume controls on PCBs

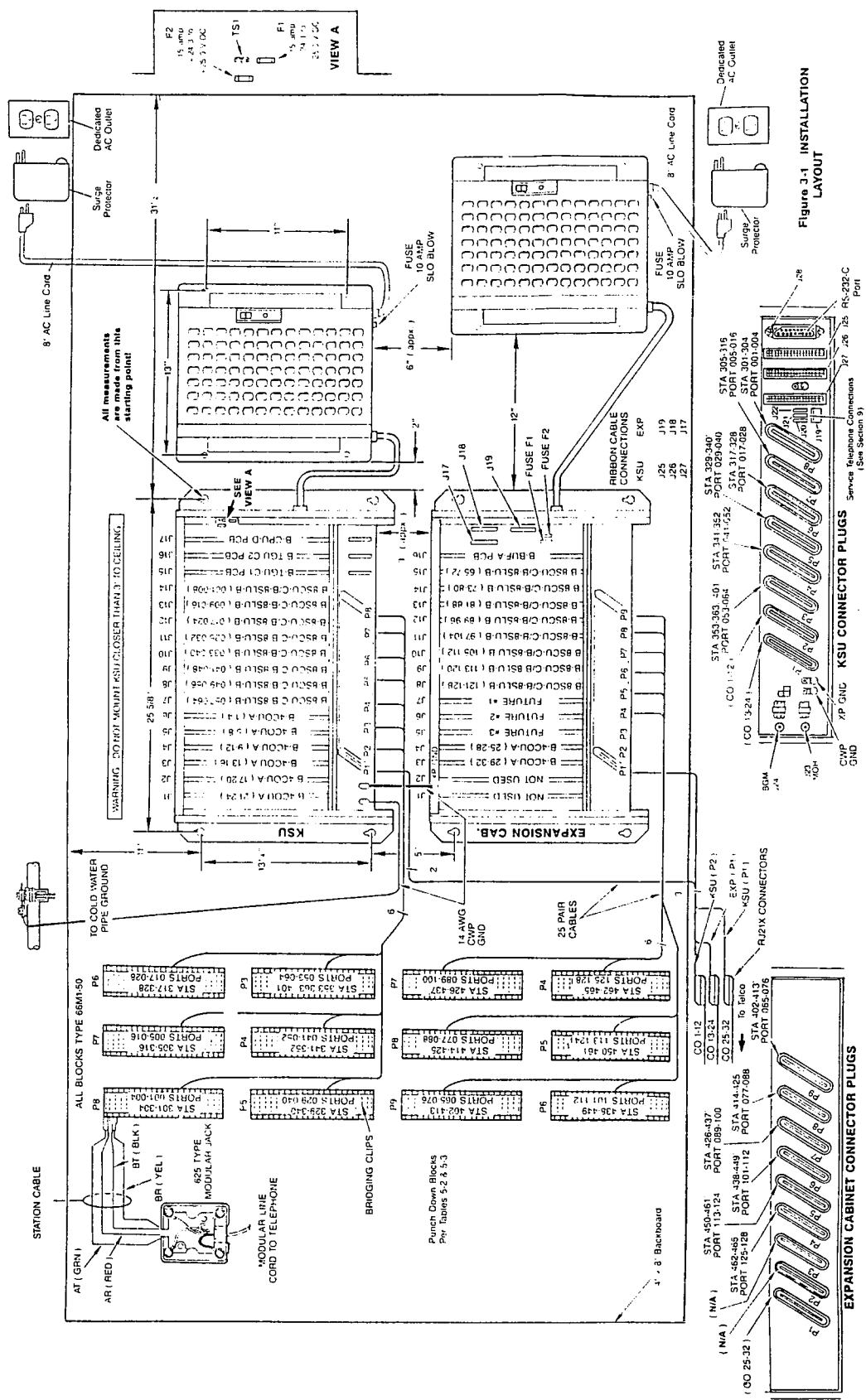


Figure 3-1 INSTALLATION LAYOUT

Default station assignment

**Table 3-1 INSTALLATION CHECKLIST**

<p><b>KSU, EXPANSION CABINET AND POWER SUPPLY INSTALLATION</b></p>	
<input type="checkbox"/>	<p>1. CHECK INSTALLATION SITE ( ¶2.01 )</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Adequately ventilated site</li> <li><input type="checkbox"/> Temperature range of 40° F ( 4°C ) to 100° F ( 38°C )</li> <li><input type="checkbox"/> Relative humidity of 5 to 95%, non-condensing</li> <li><input type="checkbox"/> Adequate lighting conditions</li> <li><input type="checkbox"/> Adequate space for servicing</li> <li><input type="checkbox"/> AC line dedicated exclusively for each power supply</li> <li><input type="checkbox"/> Lock-clip on service panel to prevent accidental shutdown</li> <li><input type="checkbox"/> AC receptacle is NEMA 5-15R</li> <li><input type="checkbox"/> Service capacity of 15 amps RMS</li> <li><input type="checkbox"/> Three-prong to two-prong adapter not used</li> <li><input type="checkbox"/> Earth ground connection within 25' of installation</li> </ul>
<input type="checkbox"/>	<p>2. MOUNT BACKBOARD ( ¶3.02 )</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Exterior grade plywood used on damp mounting surfaces</li> <li><input type="checkbox"/> Install surge protector</li> </ul>
<input type="checkbox"/>	<p>3. MOUNT KSU AND EXPANSION CABINET ( ¶3.05 )</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Ensure that hanger bolts are tightened</li> <li><input type="checkbox"/> Check KSU fuses for correct ratings</li> </ul>
<input type="checkbox"/>	<p>4. MOUNT POWER SUPPLIES ( ¶3.07 )</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Ensure that power supply hanger bolts are tightened</li> <li><input type="checkbox"/> Check AC input fuse for correct rating</li> </ul>
<input type="checkbox"/>	<p>5. GROUND KSU AND EXPANSION CABINET ( 3.10 )</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Use 14 AWG ground wire for connections</li> <li><input type="checkbox"/> Connect KSU XP GND to expansion cabinet XP GND</li> <li><input type="checkbox"/> Connect KSU CWP GND to earth ground</li> </ul>
<input type="checkbox"/>	<p>6. CONNECT KSU TO EXPANSION CABINET ( ¶3.11 )</p>
<input type="checkbox"/>	<p>7. CONNECT POWER SUPPLIES TO KSU &amp; EXP. CABINET ( ¶3.12 )</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Plug power supplies into AC service</li> </ul>
<input type="checkbox"/>	<p>8. MOUNT 66M1-50 BLOCKS ( ¶3.13 )</p>
<p><b>STATION CABLING</b></p>	
<input type="checkbox"/>	<p>9. CONNECT KSU TO BLOCKS ( ¶3.13 )</p>
<input type="checkbox"/>	<p>10. HOME RUN STATION CABLE ( ¶3.14 )</p>
<input type="checkbox"/>	<p>11. CONNECT STATION CABLE TO BLOCKS ( ¶3.14 )</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Install bridging clips</li> </ul>
<input type="checkbox"/>	<p>12. INSTALL MODULAR JACKS ( ¶3.15 )</p>
<p><b>INSTALLING PCBS, TELEPHONES AND LINES</b></p>	
<input type="checkbox"/>	<p>13. STRAP, SET SWITCHES AND INSTALL PCBS ( ¶3.16 )</p>
<input type="checkbox"/>	<p>14. INSTALL TELEPHONES ( ¶4.01 )</p>
<input type="checkbox"/>	<p>15. CHECK SYSTEM VOLTAGES ( ¶5.01 )</p>
<input type="checkbox"/>	<p>16. CONNECT TELCO LINES ( ¶6.01 )</p>



## Equipment Requirements

- 2.11** Unpack the telephone equipment and compare the equipment received to a list of equipment ordered to be sure that all components are on site. Check for any physical damage.
- 2.12** Have the necessary installation equipment available. This includes:
- (a) 4' x 8' sheet of exterior grade plywood, 3/4" recommended (for KSU, expansion cabinet and power supply mounting)
  - (b) 25-pair cable (female type 57 connector on one end and male on the other) to connect to the RJ21Xs from the telco
  - (c) 14 AWG ground wire
  - (d) 66M1-50 connecting blocks with bridging clips
  - (e) 25-pair cable (female type 57 connector on one end) for each 66M1-50 connecting block
  - (f) 625A, 625F or equivalent modular station jacks (screw type terminals only)
  - (g) Surge protector (1 required for each power supply)
  - (h) Miscellaneous mounting hardware and fasteners
- 2.13** Before starting the installation, verify that the following documents are complete and on the premises:
- (a) A building plan with station location and type marked
  - (b) The Required Equipment List (Table 2-1) detailing equipment requirements

### Equipment Summary Check

- Equipment present (para. 2.11)
- Hardware present (para. 2.12)
- Necessary documents on site (para. 2.13)

## 3. INSTALLATION

- 3.01** This part is divided into three major sub-sections:
- KSU, Expansion Cabinet and Power Supply Installation
  - Station Cabling
  - Installing PCBs

**WARNING: MODIFICATIONS OF THIS EQUIPMENT NOT EXPRESSLY SHOWN IN THIS INSTALLATION MANUAL VOID APPLICABLE WARRANTIES.**

### KSU, EXPANSION CABINET AND POWER SUPPLY INSTALLATION

- 3.02** Review the installation layout prepared for the specific site. Locate the area for the plywood backboard on the wall. It should be at a convenient working height and positioned so that the power supplies are within eight feet (2.4m) of the dedicated AC receptacles.
- 3.03** Mount the plywood in the designated location with appropriate fasteners. Mark the equipment layout on the board using the installation layout drawing (Figure 3-1).

**WARNING: DO NOT MOUNT THE POWER SUPPLY CLOSER THAN THREE FEET (0.9m) TO THE CEILING.**

**3.04** A surge protector *must* be installed at the dedicated AC receptacle for each power supply to minimize the effects from high static voltages, low level transients and line ripple. The protector should be a self-contained three-prong grounded device with 15-amp capacity. Connect this unit according to manufacturer's instructions.

### Backboard Installation Check

- Review site layout (para. 3.02)
- Mount backboard and mark equipment layout (para. 3.03)
- Install surge protector(s) (para. 3.04)

### KSU Installation

**3.05** Mount the KSU on the backboard as follows:

- (1) Locate the upper right KSU mounting screw, approximately 31.5 inches (80.6cm) from the right edge of the backboard and 10.5 inches (26.9cm) from the top, according to Figure 3-1.
- (2) Mark the remaining three points on the backboard that correspond to the mounting hole centers (Figure 3-1).
- (3) Drill pilot holes at these points and insert suitable fasteners having a ¼ inch shank diameter.
- (4) Screw in fasteners until the clearance between the fastener head and the mounting surface is ¼ inch.
- (5) Mount KSU on the four fasteners and tighten each fastener until the KSU is securely attached to the mounting surface.

**CAUTION: DO NOT INSTALL PCBS AT THIS POINT.**

### Expansion Cabinet Installation

**3.06** To mount the expansion cabinet:

- (1) Using Figure 3-1 as a guide, mark the expansion cabinet mounting hole centers.
- (2) Drill pilot holes, screw in fasteners and mount expansion cabinet identically to the KSU.

### Power Supply Installation

**3.07** Mount the power supplies on the backboard in the proper location. The power supplies are cooled by convection currents; therefore, they must be staggered (with the cables at the bottom of the unit).

- (1) Mark the points on the backboard that correspond to the mounting hole centers for each power supply (Figure 3-1).
- (2) Drill pilot holes at these points and insert suitable fasteners having a ¼ inch shank diameter.
- (3) Screw in fasteners until the clearance between the fastener head and the mounting surface is ¼ inch.
- (4) Mount the power supply on the four fasteners. Tighten each fastener until the power supply is securely attached to the mounting surface.

**3.08** A Thermal Protection Device is located on the power supply. When the maximum operating temperature for the system is exceeded, this device causes the reset button on the power supply to pop up, revealing a white band. This band indicates that the system is operating at high temperatures. The Thermal Protection Device does not shut down the power supply.

### Permanent Wiring Instructions

**3.09** Permanent wiring of the power supplies (if desired) must be completed by a qualified electrician in accordance with national codes, local codes, and the permanent wiring instructions located on the tag attached to the power supply.

**WARNING: DISCONNECT POWER SUPPLIES FROM AC POWER SOURCE BEFORE BEGINNING THE PERMANENT WIRING PROCEDURE.**

### Grounding the KSU and Expansion Cabinet

**3.10** Ground the KSU using a 14 AWG (or larger) ground wire to a known ground. Connect the ground wire to the grounding lug (CWP GND) on the KSU backplane and the grounding clamp on the ground (Figure 3-1). To ground the expansion cabinet, run a short 14 AWG ground wire from the XP GND lug on the KSU to the XP GND lug on the expansion cabinet.

### Connecting the KSU to the Expansion Cabinet

**3.11** The three multiconductor ribbon cables are used to connect the expansion cabinet to the KSU. The ribbon cable connections are as follows:

<u>KSU</u>	<u>EXPANSION CABINET</u>
J25.....	J19 (18")
J26.....	J18 (15")
J27.....	J17 (15")

### Connecting the Power Supplies and Mounting the Connecting Blocks

**CAUTION: DO NOT ALTER THE POWER SUPPLY CABLE. ALTERING COULD RESULT IN DAMAGE TO THE POWER SUPPLY.**

**3.12** Connect the power supplies to the KSU and expansion cabinet. The shorter, multiconductor cable has a connector that plugs into the connector on the right side of the cabinet. This connector is keyed to plug in only one way. Plug the power supplies into the surge protectors but do not turn the units on.

**3.13** Mount the connecting blocks to the left of the KSU (Figure 3-1). The number of blocks is dependent on the number of Station PCBs to be installed in the system (see Table 2-1). Connect each 25-pair cable (with type 57 female connector on one end) to the connecting blocks using Tables 3-2 and 3-3 for station assignments. The female connectors mate with the station plugs (P3-P8 in the KSU, P4-P9 in the expansion cabinet).

### Equipment Mounting Check

- Mount KSU (para. 3.05)
- Mount expansion cabinet (para. 3.06)
- Mount power supplies (para. 3.07)
- Ground KSU and expansion cabinet (para. 3.10)
- Connect KSU to expansion cabinet (para. 3.11)
- Connect power supplies and install surge protectors (para. 3.12)
- Mount connecting blocks (para. 3.13)
- Wire KSU to connecting blocks (para. 3.13)

**Table 3-2 BLOCK CONNECTIONS, KSU**

25-Pair Cable		66M1-50	P8	P7	P6	P5	P4	P3	STA. LEAD DESIG.	
Conn. Pin	Color Code	Block Term.								
26	WHT-BLU	1	Ext. Page Zone 1	AT (305)	AT (317)	AT (329)	AT (341)	AT (353)	GRN	
1	BLU-WHT	2		AR PORT	AR PORT	AR PORT	AR PORT	AR PORT	RED	
27	WHT-ORN	3		Ext. Page Zone 2	BT 005	BT 017	BT 029	BT 041	BT 053	BLK
2	ORN-WHT	4			BR J14	BR J12	BR J11	BR J9	BR J8	YEL
28	WHT-GRN	5	Ext. Page Zone 3	AT (306)	AT (318)	AT (330)	AT (342)	AT (354)	GRN	
3	GRN-WHT	6		AR PORT	AR PORT	AR PORT	AR PORT	AR PORT	RED	
29	WHT-BRN	7		Ext. Page Zone 4	BT 006	BT 018	BT 030	BT 042	BT 054	BLK
4	BRN-WHT	8			BR J14	BR J12	BR J11	BR J9	BR J8	YEL
30	WHT-SLT	9	Ext. Page Zone 5	AT (307)	AT (319)	AT (331)	AT (343)	AT (355)	GRN	
5	SLT-WHT	10		AR PORT	AR PORT	AR PORT	AR PORT	AR PORT	RED	
31	RED-BLU	11		Ext. Page Zone 6	BT 007	BT 019	BT 031	BT 043	BT 055	BLK
6	BLU-RED	12			BR J14	BR J12	BR J11	BR J9	BR J8	YEL
32	RED-ORN	13	Ext. Page Zone 7	AT (308)	AT (320)	AT (332)	AT (344)	AT (356)	GRN	
7	ORN-RED	14		AR PORT	AR PORT	AR PORT	AR PORT	AR PORT	RED	
33	RED-GRN	15		Ext. Page Zone 8	BT 008	BT 020	BT 032	BT 044	BT 056	BLK
8	GRN-RED	16			BR J14	BR J12	BR J11	BR J9	BR J8	YEL
34	RED-BRN	17	Relay #1	AT (309)	AT (321)	AT (333)	AT (345)	AT (357)	GRN	
9	BRN-RED	18		AR PORT	AR PORT	AR PORT	AR PORT	AR PORT	RED	
35	RED-SLT	19		Relay #3	BT 009	BT 021	BT 033	BT 045	BT 057	BLK
10	SLT-RED	20			BR J13	BR J12	BR J10	BR J9	BR J7	YEL
36	BLK-BLU	21	Relay #2	AT (310)	AT (322)	AT (334)	AT (346)	AT (358)	GRN	
11	BLU-BLK	22		AR PORT	AR PORT	AR PORT	AR PORT	AR PORT	RED	
37	BLK-ORN	23		Relay #4	BT 010	BT 022	BT 034	BT 046	BT 058	BLK
12	ORN-BLK	24			BR J13	BR J12	BR J10	BR J9	BR J7	YEL
38	BLK-GRN	25	NOT USED	AT (311)	AT (323)	AT (335)	AT (347)	AT (359)	GRN	
13	GRN-BLK	26		AR PORT	AR PORT	AR PORT	AR PORT	AR PORT	RED	
39	BLK-BRN	27		BT 011	BT 023	BT 035	BT 047	BT 059	BT 061	BLK
14	BRN-BLK	28			BR J13	BR J12	BR J10	BR J9	BR J7	YEL
40	BLK-SLT	29	NOT USED	AT (312)	AT (324)	AT (336)	AT (348)	AT (360)	GRN	
15	SLT-BLK	30		AR PORT	AR PORT	AR PORT	AR PORT	AR PORT	RED	
41	YEL-BLU	31		BT 012	BT 024	BT 036	BT 048	BT 060	BT 062	BLK
16	BLU-YEL	32			BR J13	BR J12	BR J10	BR J9	BR J7	YEL
42	YEL-ORN	33	AT (301)	AT (313)	AT (325)	AT (337)	AT (349)	AT (361)	GRN	
17	ORN-YEL	34		AR PORT	AR PORT	AR PORT	AR PORT	AR PORT	RED	
43	YEL-GRN	35		BT 001	BT 013	BT 025	BT 037	BT 049	BT 061	BLK
18	GRN-YEL	36			BR J14	BR J13	BR J11	BR J10	BR J8	BR J7
44	YEL-BRN	37	AT (302)	AT (314)	AT (326)	AT (338)	AT (350)	AT (362)	GRN	
19	BRN-YEL	38		AR PORT	AR PORT	AR PORT	AR PORT	AR PORT	AR PORT	RED
45	YEL-SLT	39		BT 002	BT 014	BT 026	BT 038	BT 050	BT 062	BLK
20	SLT-YEL	40			BR J14	BR J13	BR J11	BR J10	BR J8	BR J7
46	VIO-BLU	41	AT (303)	AT (315)	AT (327)	AT (339)	AT (351)	AT (363)	GRN	
21	BLU-VIO	42		AR PORT	AR PORT	AR PORT	AR PORT	AR PORT	AR PORT	RED
47	VIO-ORN	43		BT 003	BT 015	BT 027	BT 039	BT 051	BT 063	BLK
22	ORN-VIO	44			BR J14	BR J13	BR J11	BR J10	BR J8	BR J7
48	VIO-GRN	45	AT (304)	AT (316)	AT (328)	AT (340)	AT (352)	AT (401)	GRN	
23	GRN-VIO	46		AR PORT	AR PORT	AR PORT	AR PORT	AR PORT	AR PORT	RED
49	VIO-BRN	47		BT 004	BT 016	BT 028	BT 040	BT 052	BT 064	BLK
24	BRN-VIO	48			BR J14	BR J13	BR J11	BR J10	BR J8	BR J7
50	VIO-SLT	49								
25	SLT-VIO	50								

NOTE 1: Default station numbers are shown in parentheses.

NOTE 2: Ports 049-064 cannot be used if tie lines are installed in the system. For more information, see Appendix E (Tie Line Installation) of this manual.

**Table 3-3 BLOCK CONNECTIONS, EXPANSION CABINET**

25-Pair Cable		66M1-50	P9	P8	P7	P6	P5	P4	STA. LEAD DESIG.
Conn. Pin	Color Code	Block Term.							
26	WHT-BLU	1	AT (402)	AT (414)	AT (426)	AT (438)	AT (450)	AT (462)	GRN
1	BLU-WHT	2	AR PORT	AR PORT	AR PORT	AR PORT	AR PORT	AR PORT	RED
27	WHT-ORN	3	BT 065	BT 077	BT 089	BT 101	BT 113	BT 125	BLK
2	ORN-WHT	4	BR J15	BR J14	BR J12	BR J11	BR J9	BR J8	YEL
28	WHT-GRN	5	AT (403)	AT (415)	AT (427)	AT (439)	AT (451)	AT (463)	GRN
3	GRN-WHT	6	AR PORT	AR PORT	AR PORT	AR PORT	AR PORT	AR PORT	RED
29	WHT-BRN	7	BT 066	BT 078	BT 090	BT 102	BT 114	BT 126	BLK
4	BRN-WHT	8	BR J15	BR J14	BR J12	BR J11	BR J9	BR J8	YEL
30	WHT-SLT	9	AT (404)	AT (416)	AT (428)	AT (440)	AT (452)	AT (464)	GRN
5	SLT-WHT	10	AR PORT	AR PORT	AR PORT	AR PORT	AR PORT	AR PORT	RED
31	RED-BLU	11	BT 067	BT 079	BT 091	BT 103	BT 115	BT 127	BLK
6	BLU-RED	12	BR J15	BR J14	BR J12	BR J11	BR J9	BR J8	YEL
32	RED-ORN	13	AT (405)	AT (417)	AT (429)	AT (441)	AT (453)	AT (465)	GRN
7	ORN-RED	14	AR PORT	AR PORT	AR PORT	AR PORT	AR PORT	AR PORT	RED
33	RED-GRN	15	BT 068	BT 080	BT 092	BT 104	BT 116	BT 128	BLK
8	GRN-RED	16	BR J15	BR J14	BR J12	BR J11	BR J9	BR J8	YEL
34	RED-BRN	17	AT (406)	AT (418)	AT (430)	AT (442)	AT (454)	NOT USED	GRN
9	BRN-RED	18	AR PORT	AR PORT	AR PORT	AR PORT	AR PORT		RED
35	RED-SLT	19	BT 069	BT 081	BT 093	BT 105	BT 117		BLK
10	SLT-RED	20	BR J15	BR J13	BR J12	BR J10	BR J9		YEL
36	BLK-BLU	21	AT (407)	AT (419)	AT (431)	AT (443)	AT (455)	NOT USED	GRN
11	BLU-BLK	22	AR PORT	AR PORT	AR PORT	AR PORT	AR PORT		RED
37	BLK-ORN	23	BT 070	BT 082	BT 094	BT 106	BT 118		BLK
12	ORN-BLK	24	BR J15	BR J13	BR J12	BR J10	BR J9		YEL
38	BLK-GRN	25	AT (408)	AT (420)	AT (432)	AT (444)	AT (456)	NOT USED	GRN
13	GRN-BLK	26	AR PORT	AR PORT	AR PORT	AR PORT	AR PORT		RED
39	BLK-BRN	27	BT 071	BT 083	BT 095	BT 107	BT 119		BLK
14	BRN-BLK	28	BR J15	BR J13	BR J12	BR J10	BR J9		YEL
40	BLK-SLT	29	AT (409)	AT (421)	AT (433)	AT (445)	AT (457)	NOT USED	GRN
15	SLT-BLK	30	AR PORT	AR PORT	AR PORT	AR PORT	AR PORT		RED
41	YEL-BLU	31	BT 072	BT 084	BT 096	BT 108	BT 120		BLK
16	BLU-YEL	32	BR J15	BR J13	BR J12	BR J10	BR J9		YEL
42	YEL-ORN	33	AT (410)	AT (422)	AT (434)	AT (446)	AT (458)	NOT USED	GRN
17	ORN-YEL	34	AR PORT	AR PORT	AR PORT	AR PORT	AR PORT		RED
43	YEL-GRN	35	BT 073	BT 085	BT 097	BT 109	BT 121		BLK
18	GRN-YEL	36	BR J14	BR J13	BR J11	BR J10	BR J8		YEL
44	YEL-BRN	37	AT (411)	AT (423)	AT (435)	AT (447)	AT (459)	NOT USED	GRN
19	BRN-YEL	38	AR PORT	AR PORT	AR PORT	AR PORT	AR PORT		RED
45	YEL-SLT	39	BT 074	BT 086	BT 098	BT 110	BT 122		BLK
20	SLT-YEL	40	BR J14	BR J13	BR J11	BR J10	BR J8		YEL
46	VIO-BLU	41	AT (412)	AT (424)	AT (436)	AT (448)	AT (460)	NOT USED	GRN
21	BLU-VIO	42	AR PORT	AR PORT	AR PORT	AR PORT	AR PORT		RED
47	VIO-ORN	43	BT 075	BT 087	BT 099	BT 111	BT 123		BLK
22	ORN-VIO	44	BR J14	BR J13	BR J11	BR J10	BR J8		YEL
48	VIO-GRN	45	AT (413)	AT (425)	AT (437)	AT (449)	AT (461)	NOT USED	GRN
23	GRN-VIO	46	AR PORT	AR PORT	AR PORT	AR PORT	AR PORT		RED
49	VIO-BRN	47	BT 076	BT 088	BT 100	BT 112	BT 124		BLK
24	BRN-VIO	48	BR J14	BR J13	BR J11	BR J10	BR J8		YEL
50	VIO-SLT	49							
25	SLT-VIO	50							

NOTE: Default station numbers are shown in parentheses.

## STATION CABLING

3.14 Link the connecting blocks to the modular jacks using station cable. All station cable, including cable for the DSS Console, must be home run to the connecting blocks. Punch down the cable at the connecting blocks (see Tables 3-2, 3-3 and 3-4).

**Table 3-4 CABLING AND VOLTAGES**

KEY TELEPHONE VOLTAGES			
COLOR	DESIG-NATION	FUNCTION	VOLTAGE
GRN	AT	DATA / POWER -	-24 V DC
RED	AR	DATA / POWER +	+24 V DC
BLK	BT	AUDIO	N / A
YEL	BR	AUDIO	N / A
SINGLE LINE TELEPHONE VOLTAGES			
COLOR	DESIG-NATION	FUNCTION	VOLTAGE
GRN	AT	AUDIO / POWER +	+24 V DC
RED	AR	AUDIO / POWER -	-24 V DC
BLK	BT	GROUND	0 V DC
YEL	BR	RINGER POWER	+24 V DC

3.15 Terminate the cable at the station locations in screw type 625A or 625F (four-wire) modular jacks or equivalent (Figure 3-1). Connect the RED, GRN, BLK and YEL conductors to the matching terminals.

### System Cabling Check

- Home run all station cable (para. 3.14)
- Punch down cable at connecting blocks (para. 3.14)
- Terminate cable in modular jack at station locations (para. 3.15)

**CAUTION: ROUTE THE QUAD CABLE AWAY FROM ANY ELECTRO-MAGNETIC INTERFERENCE SOURCES SUCH AS ELECTRICAL MOTORS AND FLUORESCENT LIGHTS. ALL CABLE RUNS SHOULD BE AT LEAST TWO INCHES (5.1 cm) FROM CONDUCTORS OF ANY ELECTRIC LIGHT, POWER CIRCUIT OR CLASS 1 CIRCUITS (REFERENCE NATIONAL ELECTRICAL CODE, ARTICLE 800-COMMUNICATION CIRCUITS).**

## INSTALLING PCBs

**WARNING: ALL POWER SHOULD BE OFF WHEN INSERTING PCBs.**

### Static Precautions

3.16 The Printed Circuit Boards (PCBs) are sensitive to static electricity. Use the proper handling precautions to guard against static damage. The paragraphs below highlight safe handling techniques for static-sensitive equipment.

3.17 Handle all PCBs in the conductive black velostat bags in which they were shipped.

3.18 To minimize static charges, follow these three steps:

- Discharge any accumulated body static by touching a grounded object
- Wear a wrist ground strap attached to the CWP GND lug on the KSU
- Keep foot movement to a minimum

3.19 Only surfaces or items that are at ground potential should come in contact with PCBs.

**WARNING: WHEN INSTALLING, REMOVING OR MAINTAINING PCBs USE THE PROPER PRECAUTIONS TO GUARD AGAINST STATIC DAMAGE.**

3.20 Handle PCBs carefully while slowly inserting or removing them from the KSU or expansion cabinet.

### System Check

- System must be off
- Read static precautions (para. 3.16 through 3.20)

### PCB Location

**3.21** Use Figure 3-1 as reference for PCB location. Each PCB is keyed to fit only in its proper slot in the KSU or expansion cabinet. When inserting the PCBs, be sure that the connector edge goes into the slot with the component side of the PCB to your right. Use your thumbs to push the PCB until firmly seated. Do not use the heel of your hand or any tool to push a PCB into a connector.

### Central Processing Unit (B-CPU-D) PCB

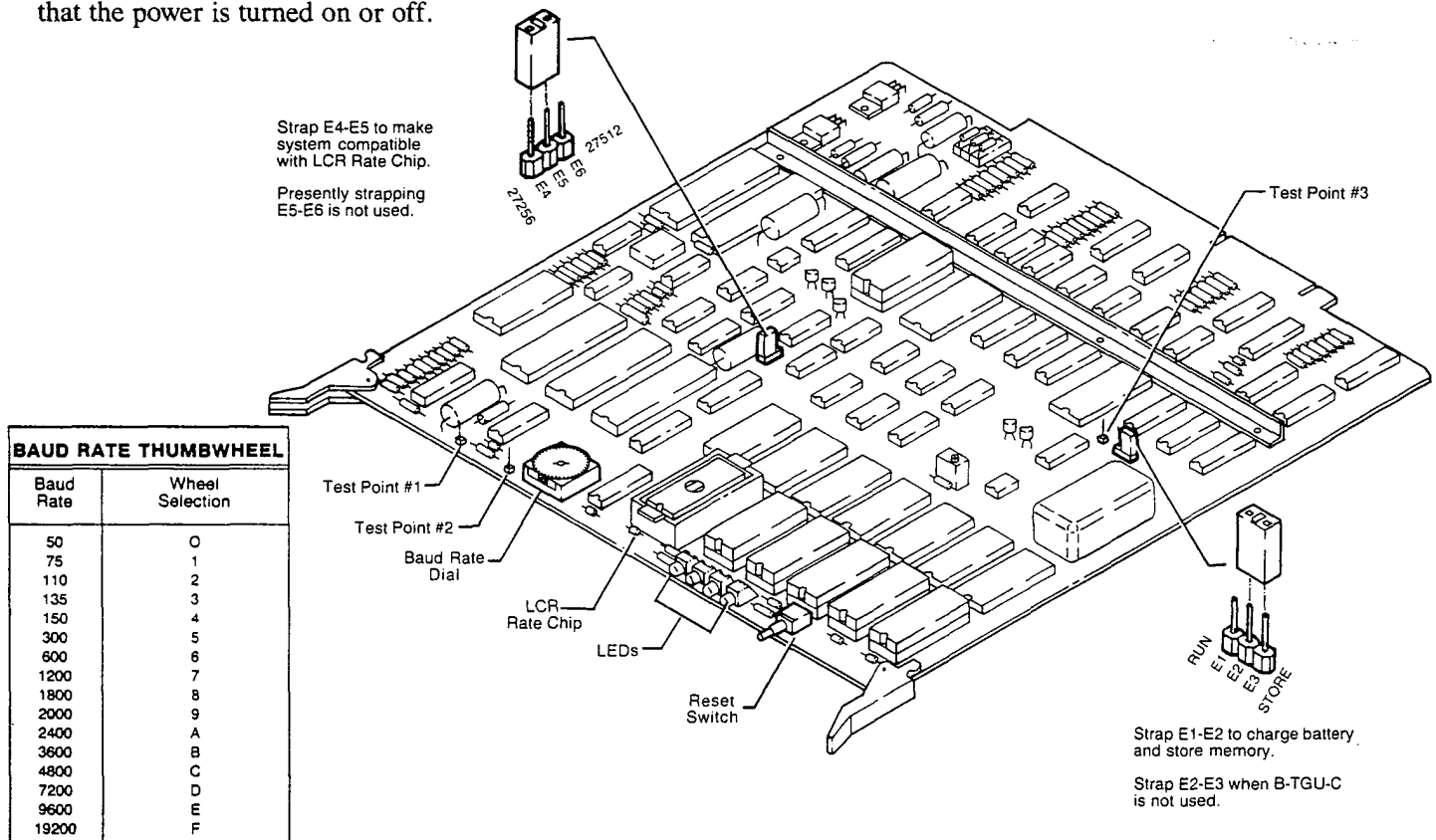
**3.22** Before the B-CPU-D PCB (Figure 3-2) is installed in the KSU (and before the system is programmed), set the Baud Rate Thumbwheel to match the requirements of the programming terminal.

(1) Strap the B-CPU-D PCB from E1 to E2 for battery backup. The battery will charge in 100 hours, and will retain the system memory for at least ten days. If the PCB is not strapped, the system will initialize each time that the power is turned on or off.

(2) If the system is equipped with Least Cost Routing, strap E4 to E5.

Consult Figure 3-1, Table 3-2 and Table 3-3 for PCB placement.

**3.23** A special clock/calendar is located on the B-CPU-D that allows the time and date to appear on all display telephones in the system. This clock may also be used for the SMDR. The clock/calendar may be set at the terminal during system programming or at the attendant's station. If a power outage occurs, the clock/calendar will stop, and must be reset when the power returns. If a more accurate accounting is required, an optional Real Time Clock Daughter Board (B-RTC-A) PCB should be installed on the B-TGU-C PCB (see paragraph 3.26).



**Figure 3-2 CENTRAL PROCESSING UNIT (B-CPU-D) PCB**

## Tone Generator (B-TGU-C) PCB

3.24 Two Tone Generator (B-TGU-C) PCBs (Figure 3-3) can be installed in the system. Refer to Figure 3-1, Table 3-2 and Table 3-3 for PCB placement. If additional DTMF Receiver Daughter Boards are required, install them on either B-TGU-C PCB and strap the PCB correctly. Strap the B-TGU-C PCB(s) according to the following chart:

Condition	Strapping Required
- B-TGU-C in KSU slot J15	Strap E1 to E2
- B-TGU-C in KSU slot J16	Strap E1 to E3
- Additional DTMF Receivers installed on B-TGU-C	Strap E4 to E5
- System to use Remote Modem Access	Strap E5 to E6

3.25 Volume controls for Music On Hold, Internal Paging, Background Music to Internal Page Zones, External Paging, Background Music to External Page zones and ringing to External Page zones are located along the edge of the PCB. These controls can be changed with a small flathead screwdriver.

3.26 A battery backed-up Real Time Clock Daughter Board (B-RTC-A) PCB can be installed on the B-TGU-C PCB. The NiCad battery on the B-RTC-A will fully charge in 100 hours (about four days). If there is a power failure, the B-RTC-A will keep accurate time for approximately 100 hours. If the B-RTC-A PCB is installed, the jumper located on it must be strapped to the "B" side of the connection.

**NOTE:** A B-TGU-B PCB is compatible with the B-CPU-D; however, if installed, some features (such as tie lines, External Paging, Remote Modem Access, and the volume controls on the B-TGU-C) are lost.

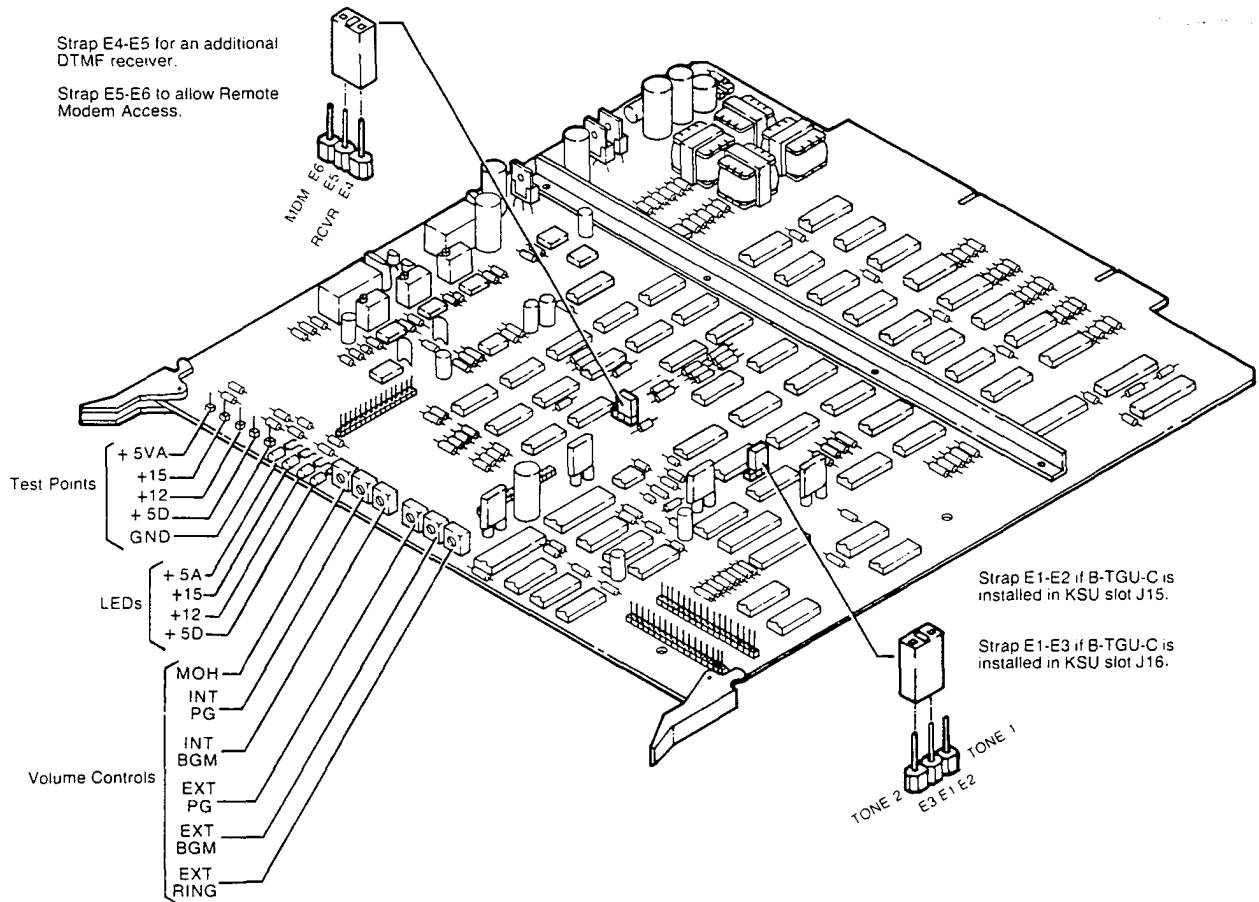
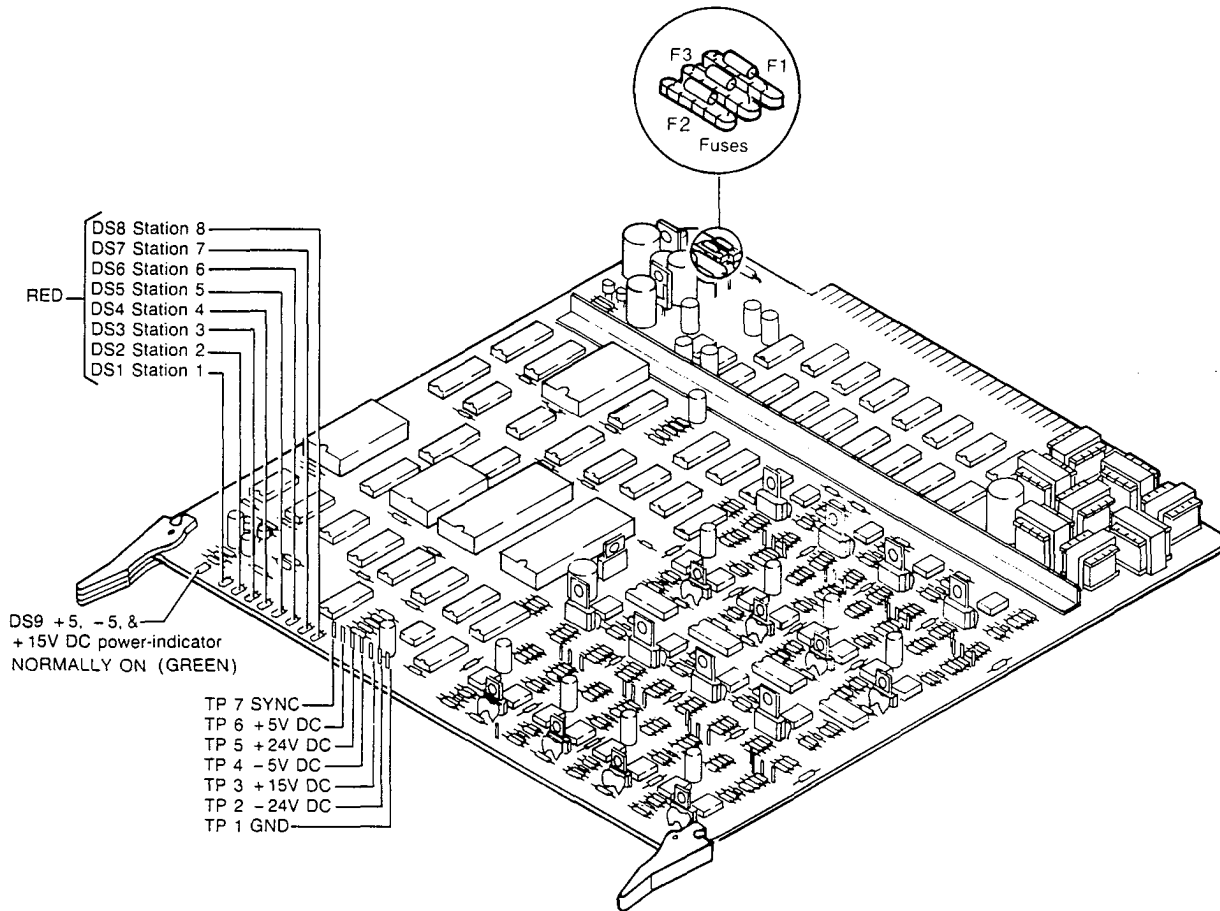


Figure 3-3 TONE GENERATOR (B-TGU-C) PCB.



### Station Control Unit (B-8SCU-C) PCB

3.27 The Station Control Unit (B-8SCU-C) PCBs (Figure 3-4) do not require any strapping. Each B-8SCU-C PCB has eight station circuits. Refer to Figure 3-1, Table 3-2 and Table 3-3 for PCB placement.



IF LED IS:	STATION STATUS IS:
'OFF'	- No telephone is connected.
'ON STEADY'	- Telephone is connected and idle.
'FLASHING'	- Station is busy.

NOTE: All voltages  $\pm 5\%$

Figure 3-4 STATION CONTROL UNIT (B-8SCU-C) PCB

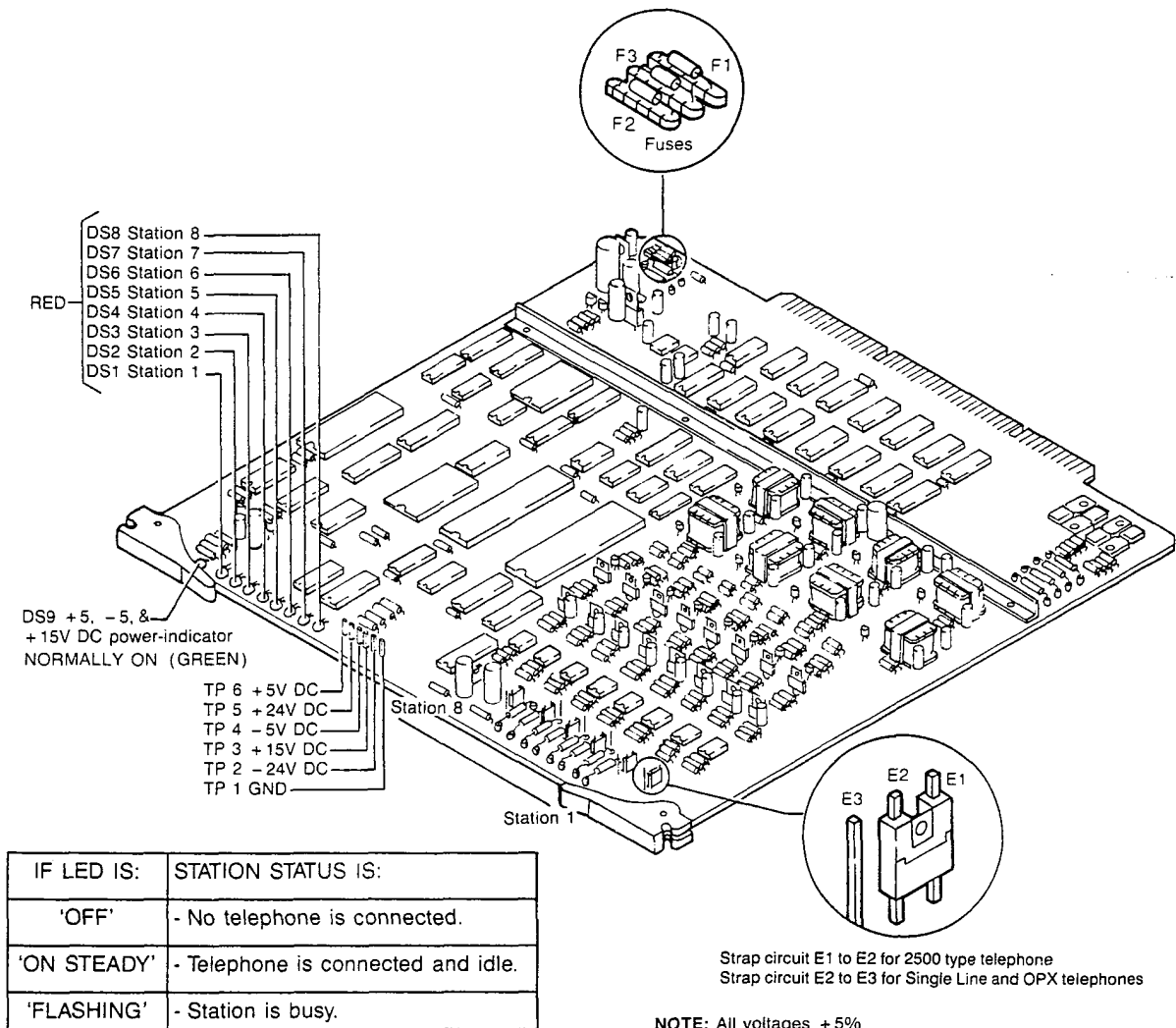
## Single Line Unit (B-8SLU-B) PCB

**3.28** Single Line Unit (B-8SLU-B) PCBs are required when Single Line and 2500 type telephones are used in the system. Each PCB contains eight single line circuits and occupies one station PCB slot in the KSU or expansion cabinet. Refer to Figure 3-1, Table 3-2 and Table 3-3 for PCB placement.

**3.29** Each circuit on the B-8SLU-B PCB must be strapped to indicate the type of telephone being used:

- For 2500 type telephones, strap each circuit in the E1-E2 position
- For Single Line Telephones and OPX stations, strap each circuit in the E2-E3 position

**NOTE:** Distinctive Ringing requires that the B-8SLU-B PCB have software version 177-114-02 or 177-114-03. The software level is indicated on the label attached to U13.



**Figure 3-5 SINGLE LINE UNIT (B-8SLU-B) PCB**

### Tie Line Unit (B-2TLU-A) PCB

**3.30** The Tie Line Unit (B-2TLU-A) PCB provides the interface for two tie line circuits. When used with the B-4TLU-A PCB (FUTURE), up to six tie lines can be installed in the system.

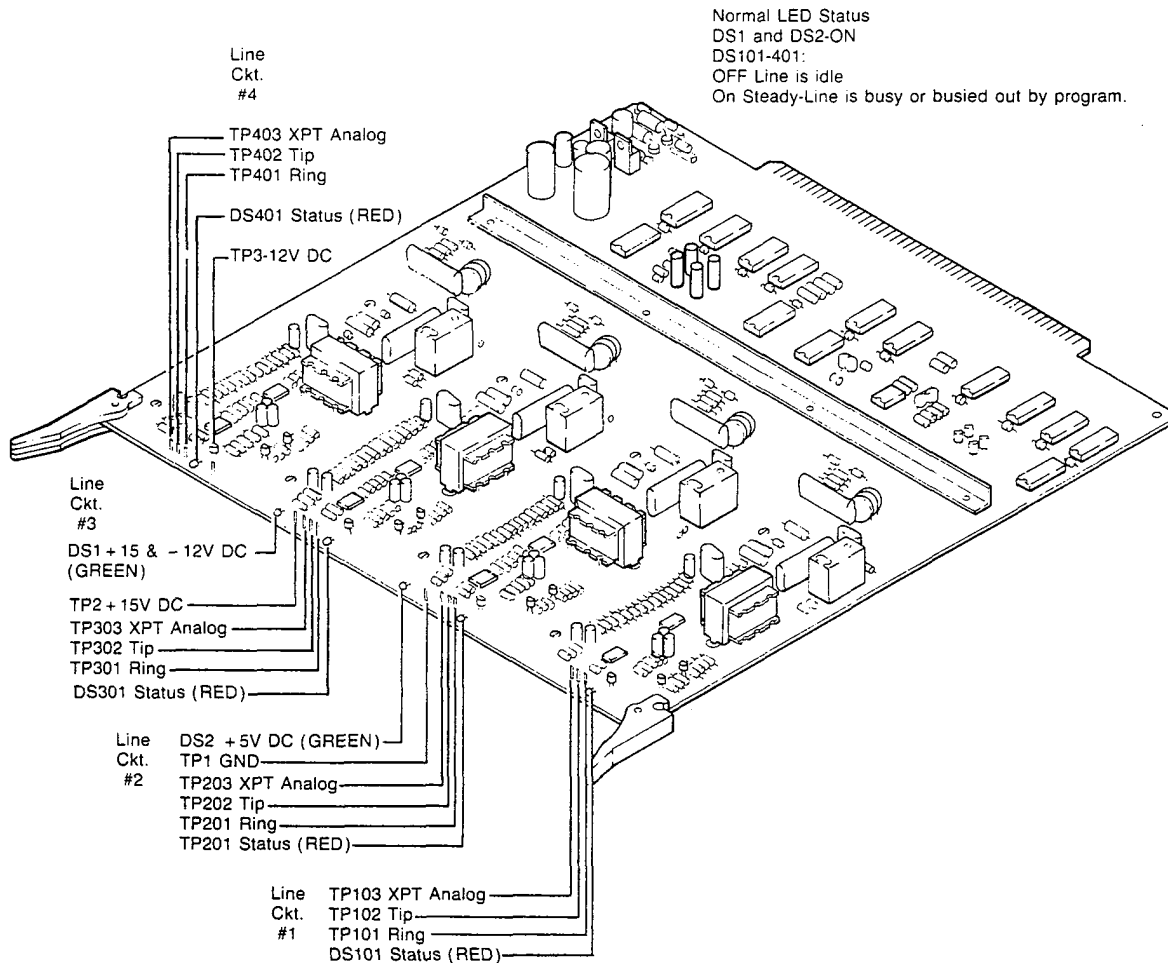
**3.31** Tie lines are installed in slots J7 and J8 in the KSU; therefore, Station (B-8SCU-C) or Single Line (B-8SLU-B) PCBs cannot be installed in these slots. Install the tie line PCBs as follows:

PCB	KSU Slot
B-2TLU-A PCB	J8
B-4TLU-A PCB (FUTURE)	J7

**NOTE:** If no B-4TLU-A PCB is used, slot J7 must be left open.

### Central Office Unit (B-4COU-A) PCB

**3.32** Central Office Unit (B-4COU-A) PCBs do not require strapping. Each PCB contains 4 CO line circuits. Refer to Figures 3-1, Table 3-2 and Table 3-3 for PCB placement.



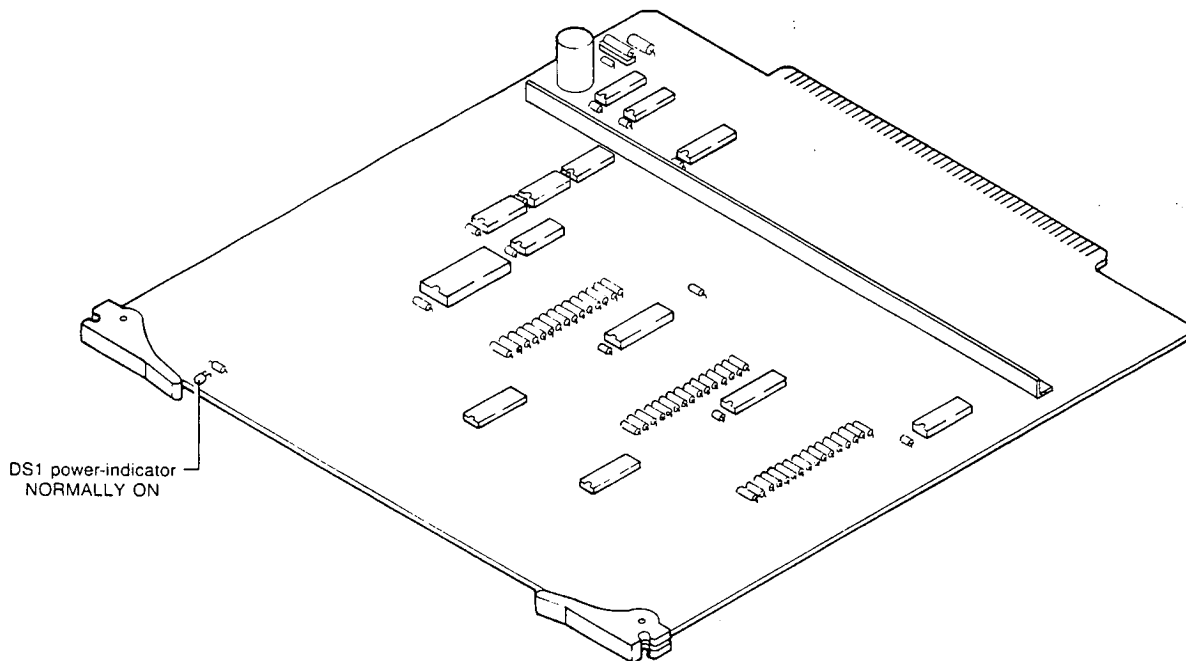
**Figure 3-6 CENTRAL OFFICE UNIT (B-4COU-A) PCB**

## Buffer (B-BUF-A) PCB

3.33 The Buffer (B-BUF-A) PCB (Figure 3-7) is required when an expansion cabinet is used. This PCB plugs into expansion cabinet slot J16 and does not require any strapping or switch settings.

## KSU PCB Check

- Set switches, strap and insert B-CPU-D PCB (para. 3.22)
- Strap and insert B-TGU-C PCBs (para. 3.24)
- Insert B-8SCU-C PCBs (para. 3.27)
- Strap and insert B-8SLU-B PCBs (para. 3.28)
- Insert B-4COU-A PCBs (para. 3.32)
- Insert B-BUF-A PCB (para. 3.33)



NOTE: The B-BUF-A PCB is only used if an expansion cabinet is installed.

Figure 3-7 BUFFER (B-BUF-A) PCB

#### **4. INSTALLING TELEPHONES**

- 4.01** To install a telephone or DSS Console, simply plug the unit into the modular jack.
- 4.02** If wall mounting is required, refer to the instructions shipped with the wall mounting kits.

#### **5. POWER-UP AND SYSTEM VOLTAGE CHECK**

- 5.01** System voltage levels can be tested and/or verified at test points and LEDs (Figure 3-8 and Table 3-5). This procedure should be completed prior to connecting to the telco lines (or programming) to insure that the system

is functioning properly. If the LEDs do not respond as indicated (or the voltage measurements are incorrect), refer to Section 9, MAINTENANCE for instructions on how to solve the problem.

#### **To verify system voltage levels:**

- (1) Turn on KSU power supply
- (2) Turn on expansion cabinet power supply
- (3) Verify voltages per Figures 3-2 through 3-7

**NOTE:** On some PCBs the LEDs may be a different color than indicated.

Table 3-5 SWITCHES AND LEDs

ITEM <sup>1</sup>	DESCRIPTION	NORMAL CONDITION
<b>B-CPU-D</b>		
S1	Reset Switch	N/A
S2	Baud Rate Switch	See Figure 3-2
DS1	Z80 Processor LED	Fast Flash ( RED )
DS2	6502 Processor LED	Slow Flash ( RED )
DS3	+ 5V, ±12V LED	ON ( RED )
<b>B-TGU-C</b>		
DS1	+ 5V LED	ON ( GREEN )
DS2	+ 15V LED	ON ( GREEN )
DS3	+ 12V LED	ON ( GREEN )
DS4	+ 5V LED	ON ( GREEN )
<b>B-8SCU-C</b>		
DS1	Station Circuit #1 Status LED	ON ( RED ) when station is functioning and is on hook. Flashes slowly when station is off hook. OFF when station is inoperable or not plugged in.
DS2	Station Circuit #2 Status LED	
DS3	Station Circuit #3 Status LED	
DS4	Station Circuit #4 Status LED	
DS5	Station Circuit #5 Status LED	
DS6	Station Circuit #6 Status LED	
DS7	Station Circuit #7 Status LED	
DS8	Station Circuit #8 Status LED	
DS9	± 5V, +15V LED	ON ( GREEN )
<b>B-8SLU-B</b>		
DS1	Station Circuit #1 Status LED	ON ( RED ) when station is functioning and is on hook. Flashes slowly when station is off hook. OFF when station is inoperable or not plugged in.
DS2	Station Circuit #2 Status LED	
DS3	Station Circuit #3 Status LED	
DS4	Station Circuit #4 Status LED	
DS5	Station Circuit #5 Status LED	
DS6	Station Circuit #6 Status LED	
DS7	Station Circuit #7 Status LED	
DS8	Station Circuit #8 Status LED	
DS9	± 5V, +15V LED	ON ( GREEN )
<b>B-4COU-A</b>		
DS1	+15V, -12V LED	ON ( GREEN )
DS2	+ 5V LED	ON ( GREEN )
DS101	Line Circuit #1 Status LED	ON ( RED ) when seized
DS201	Line Circuit #2 Status LED	ON ( RED ) when seized
DS301	Line Circuit #3 Status LED	ON ( RED ) when seized
DS401	Line Circuit #4 Status LED	ON ( RED ) when seized
<b>B-BUF-A</b>		
DS1	Power Indicator	ON

<sup>1</sup> Refer to figures 3-2 through 3-7 for device location.

**NOTE:** On some PCBs the LEDs may be a different color than indicated.

## 6. CONNECTING TELCO LINES

**6.01** The RJ21X connectors from the telco provide service for the CO lines (Table 3-6). Each RJ21X connector is joined to the system by using a 25-pair cable terminated with a type 57 connector, female on one end and male on the other. This cable cannot exceed 25 feet in length. Connect as follows:

- (1) Plug the male end of the 25-pair cable into the RJ21X connector from the telco (Figure 3-1).
- (2) Plug the female end of the 25-pair cable into the appropriate connector on the KSU or expansion cabinet (Figure 3-1).

## 7. INSTALLING OPTIONAL EQUIPMENT, PROGRAMMING AND TESTING THE SYSTEM

**7.01** Once the basic system is installed, the optional equipment (if required) can be installed. Section 4, INSTALLATION OF OPTIONAL EQUIPMENT, provides guidelines for connecting various optional components to the standard hardware. After all standard and optional components are installed, the system must be programmed.

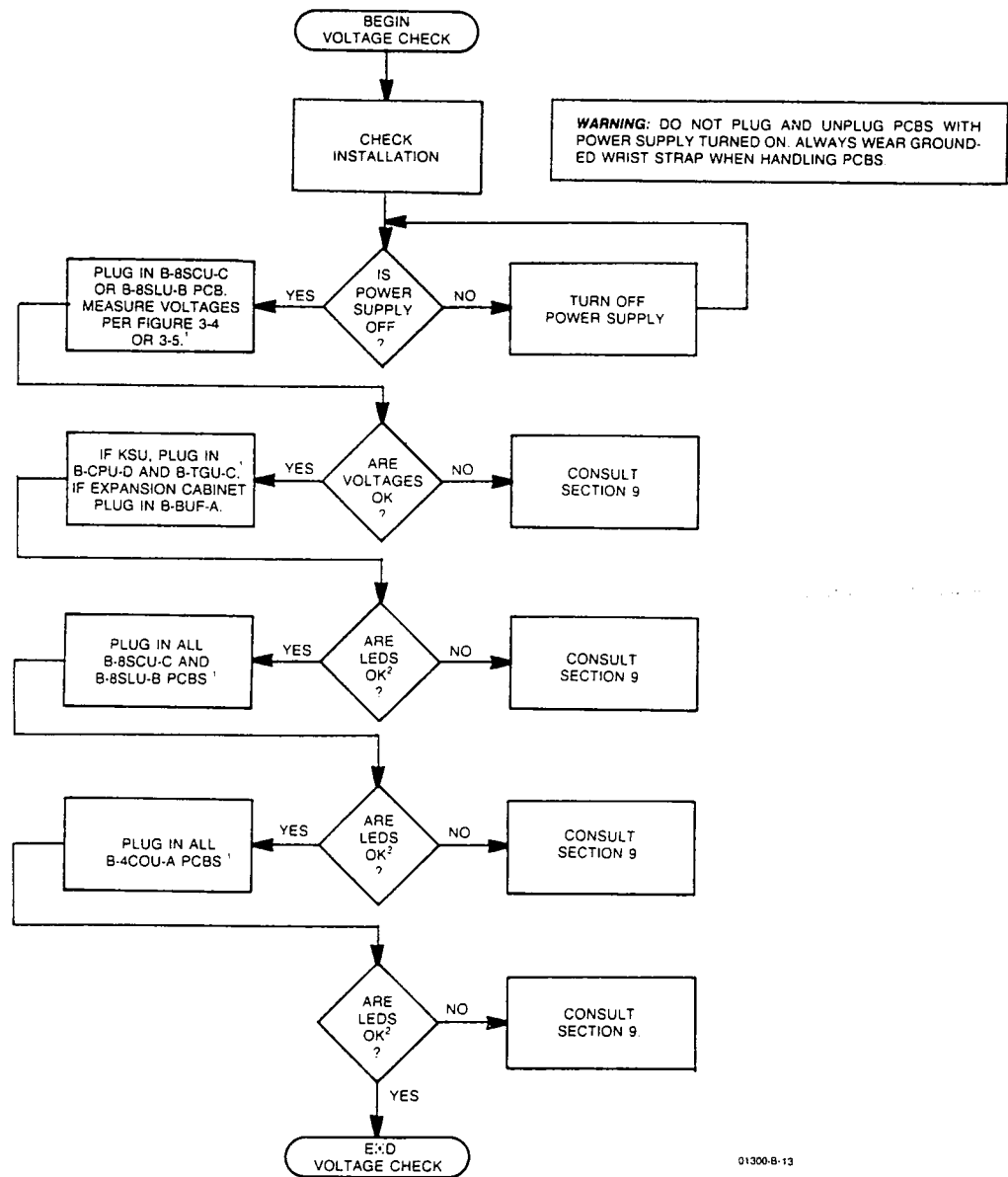
**WARNING: EACH SYSTEM MUST BE PROGRAMMED. DO NOT OPERATE THE SYSTEM WITHOUT FOLLOWING THE INSTRUCTIONS THAT ARE PROVIDED IN SECTION 7, PROGRAM ENTRY.**

**7.02** After programming, test the telephones. If a complete test of each station is required, the Operational Test Procedure (Table 9-1) should be used. Copies of this procedure can be used as an operational log for each station. Refer to Section 9, MAINTENANCE.

**Table 3-6 TELCO RJ21X CONNECTOR/  
CO LINE REFERENCES**

		CO LINES		
PIN	FUNCTION	P2 (KSU)	P1 (KSU)	P1 (Exp. Cab.)
26	TIP	1	13	25
1	RING			
27	TIP	2	14	26
2	RING			
28	TIP	3	15	27
3	RING			
29	TIP	4	16	28
4	RING			
30	TIP	5	17	29
5	RING			
31	TIP	6	18	30
6	RING			
32	TIP	7	19	31
7	RING			
33	TIP	8	20	32
8	RING			
34	TIP	9	21	
9	RING			
35	TIP	10	22	
10	RING			
36	TIP	11	23	
11	RING			
37	TIP	12	24	
12	RING			

T1302IM.3-6



<sup>1</sup> Turn power supply off before inserting PCB.  
 Turn power supply on after inserting PCB.  
<sup>2</sup> Verify LEDs per Table 3-5.

01300-B-13

Figure 3-8 VOLTAGE CHECK FLOWCHART



**8. RADIO FREQUENCY INTERFERENCE**

**8.01** The equipment generates and is susceptible to radio frequency energy. If the system is not installed and used according to the manufacturer's instructions, this equipment may interfere with radio and television reception. It has been typetested and found to comply with the limits for a Class A computing device, according to the specifications in FCC Rules covering protection against such interference in a commercial installation. However, there is no guarantee that interference will not occur in a particular installation. Interference caused by this equipment to radio or television reception can be determined by turning the equipment off and on. If an interference problem exists, the problem may be solved in one or more of the following ways:

- (a) Reorient the receiving antenna.
- (b) Relocate the receiver with respect to the equipment.
- (c) Plug the equipment and receiver into different outlets so that both are on different branch circuits.

**8.02** If necessary, consult your dealer for additional assistance. The following booklet, prepared by the FCC, may be helpful:

***How to Identify and Remove Radio-TV Interface Problems***

Order this booklet from:

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

**9. RADIO FREQUENCY SUSCEPTIBILITY**

**9.01** If the TCX-128 System is installed in a strong radio frequency (RF) field, proper system operation may be affected. The use of the proper installation and grounding procedures outlined in this manual will help minimize the RF susceptibility.

## SECTION 4, INSTALLATION OF OPTIONAL EQUIPMENT

CONTENTS	PAGE
1. INTRODUCTION .....	4-1
2. EQUIPMENT RELAYS .....	4-1
3. LOUD RINGING EQUIPMENT .....	4-2
4. EXTERNAL PAGING EQUIPMENT .....	4-3
5. CONNECTING THE PROGRAMMING/ SMDR TERMINAL .....	4-5
6. BACKGROUND MUSIC/MUSIC ON HOLD	4-6

### 1. INTRODUCTION

1.01 The INSTALLATION OF OPTIONAL EQUIPMENT Section provides information on the customer-provided optional equipment that can be used with the TCX-128 system. This equipment includes:

- (a) Equipment Relays
- (b) Loud Ringing Equipment
- (c) External Paging Equipment
- (d) Programming/SMDR Terminal
- (e) Background Music/Music On Hold Music Source

### 2. EQUIPMENT RELAYS

2.01 The system has two relays on each B-TGU-C PCB that are used with Paging or Loud Ringing equipment. Relays 1 and 2 are located on the B-TGU-C in slot J15. Relays 3 and 4 are located on the B-TGU-C PCB in slot J16. The connection(s) to the relays are at the P8 block.

2.02 The relays are rated as follows:

Maximum Power: 50 V AC/30 Watts

Maximum Current: 1 Amp @ 30 V DC

Maximum Voltage: 125 V AC/150 V DC @ 200 mA

If the device to be connected to the relays exceeds 30 Watts, an additional external relay must be provided. This additional external relay is controlled by the relay on the B-TGU-C PCB.

ACCEPTABLE: 1 Amp x 24 V DC = 24 Watts

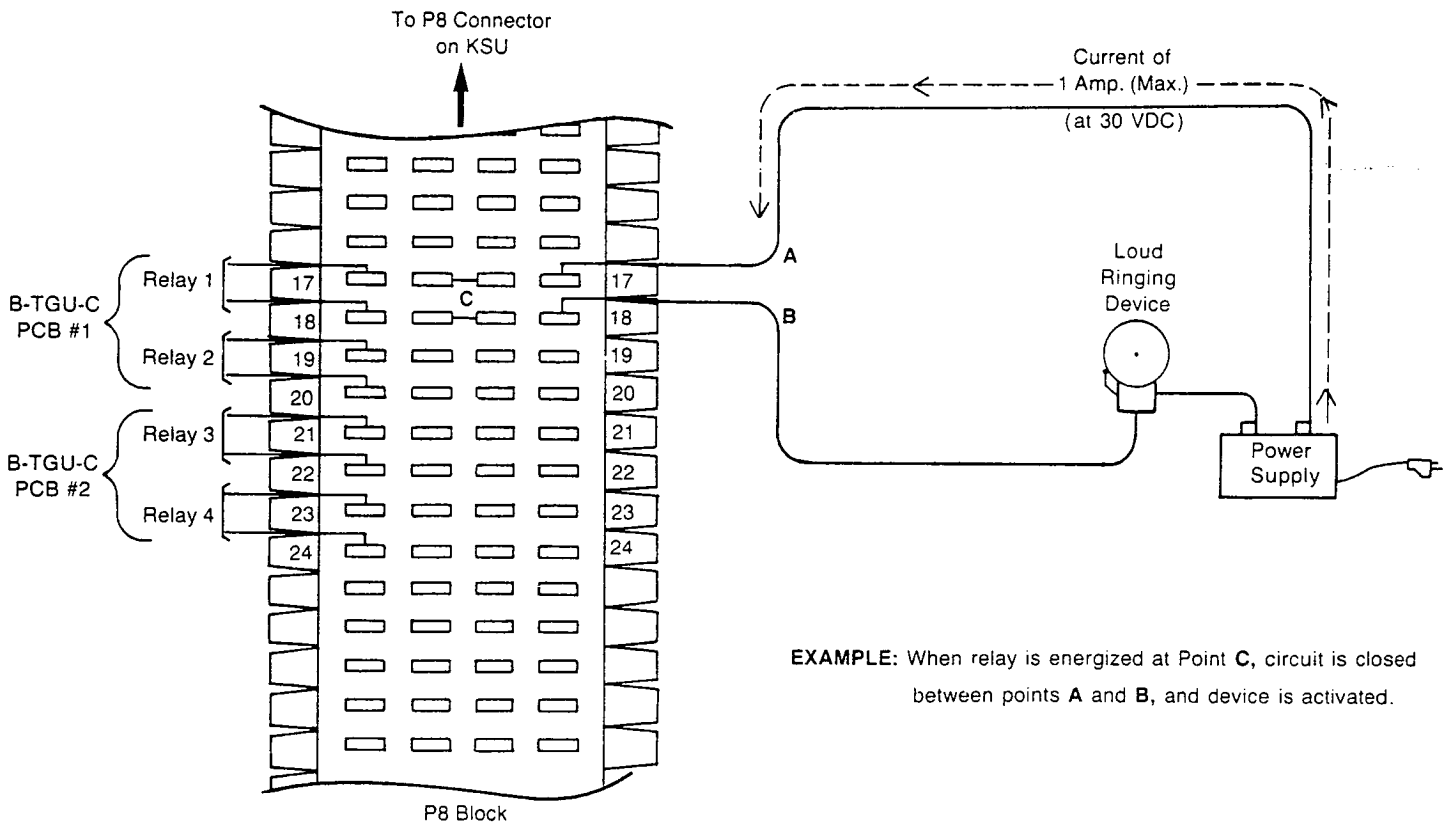
UNACCEPTABLE: 1 Amp x 90 V DC = 90 Watts  
(requires external relay)

### 3. LOUD RINGING EQUIPMENT

**3.01** Loud Ringing equipment (such as bells, buzzers or loudspeaker horns) is often used in loud or noisy areas to signal incoming calls when the system is in the night mode.

**3.02** The relays on the B-TGU-C can activate Loud Ringing equipment to signal incoming calls. Each relay is programmed to act as a switch that closes when a call rings in on a particular line to complete the circuit.

**3.03** The connections for the relays are located at the P8 block. The diagram below (Figure 4-1) illustrates a typical installation of Loud Ringing equipment.

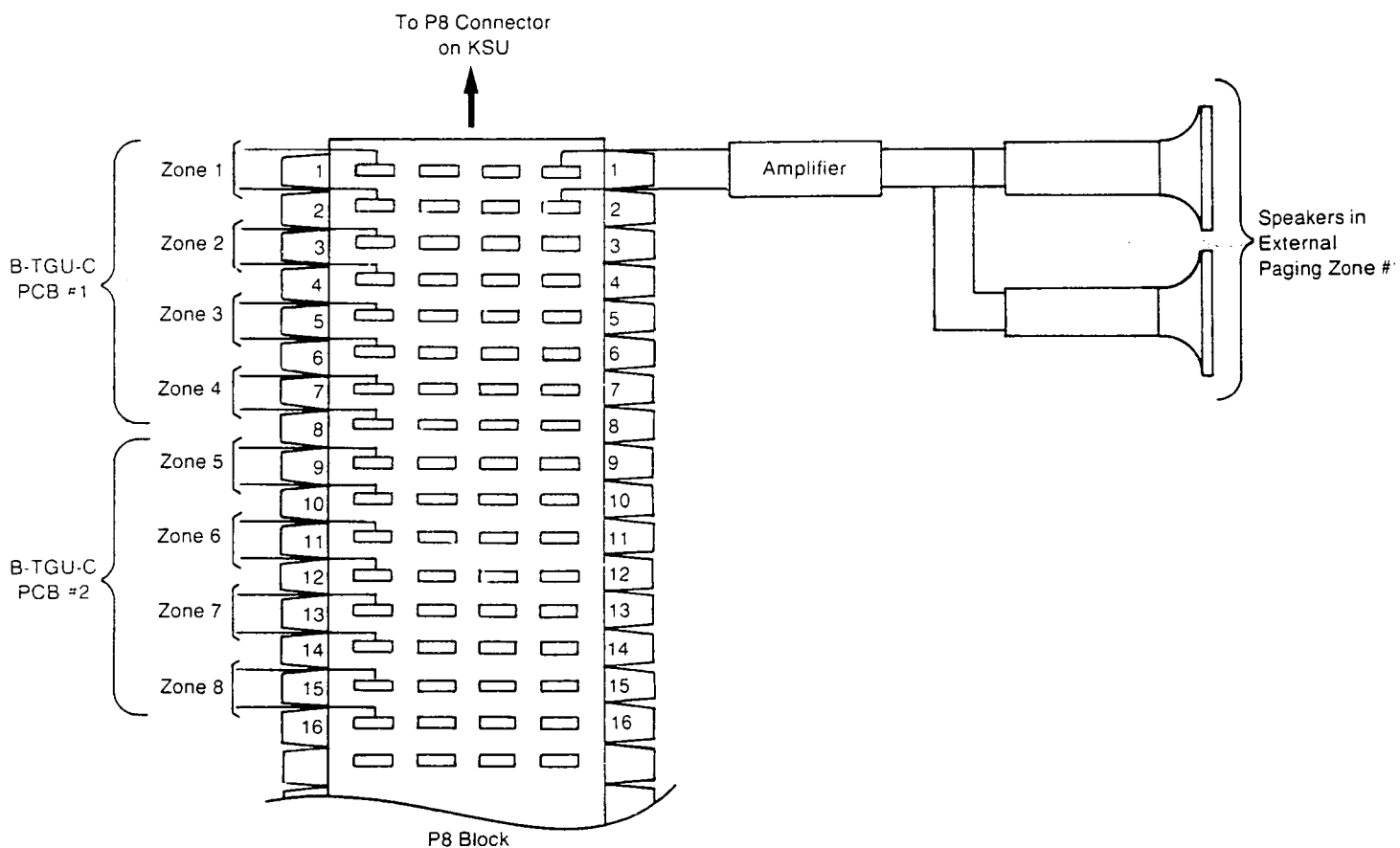


**Figure 4-1 TYPICAL LOUD RINGING EQUIPMENT INSTALLATION**

## 4. EXTERNAL PAGING EQUIPMENT

**4.01** Each B-TGU-C PCB provides four External Paging Zones. These External Paging Zones are used to connect amplifiers and loudspeakers to the system for Paging announcements to noisy areas, or areas without telephones.

**4.02** Connections for audio inputs to Paging amplifiers are located on the P8 block. The diagram below (Figure 4-2) illustrates a typical installation of External Paging equipment.



**Figure 4-2 TYPICAL INSTALLATION OF EXTERNAL PAGING EQUIPMENT**

**Table 4-1 FORMAT OF SMDR PRINTOUT**

CHARACTER	FIELD
1	Delimiter
2 - 9	Date (MM/DD/YY) MM = Month DD = Day YY = Year
10	Delimiter
11 - 13	Calling Station # (XXX) X = Digit
14	Delimiter
15 - 16	Line # (XX) X = Digit
17	Delimiter
18 - 33	Number Called, Right Justified in 16 Character Field
34	Delimiter
35 - 42	Start Time (HH:MM:SS) HH = Hour, MM = Min., SS = Sec.
43	Delimiter
44 - 51	Call Duration (HH:MM:SS) H = Hour, MM = Min., SS = Sec.
52	Delimiter
53 - 58	* Charge ( __DD.CC) DD = Dollars, CC = Cents, __ = Space
59	Delimiter
60 - 68	Account Code, Right Justified in 9 Character Field
69	Delimiter
70-76	Speed Dial bin no. (SSS/EEE) S = System Bin, E = Extension Bin
77	Delimiter
78	Carriage return
79	Line Feed

\* Charge Field only valid if system includes LCR.

**Table 4-2 TYPICAL SMDR PRINTER OUTPUT**

TIE COMMUNICATIONS INC. TCX-128							
DATE	EXT	LINE	NUMBER DIALED	START	ELAPSE	CHARGE	ACC. CODE
02/28/85	301	02	12039262000	06:10:26	00:00:09	00.24	
02/28/85	301	02	12039262000	06:10:52	00:00:13	00.24	
02/28/85	301	02	12039262000	06:11:21	00:00:16	00.24	
02/28/85	301	02	12038888000	06:12:15	00:00:16	00.24	
02/28/85	301	02	12039262129	06:13:13	00:00:09	00.24	
02/28/85	301	02	1203888800012039	06:13:45	00:00:18	00.24	

ERD  
 ESV  
 S00  
 E01  
 S00 E01

Enn = Station Speed Dial bin  
 ERD = Last Number Redial  
 ESV = Save redial  
 Snn = System Speed Dial bin

## 5. CONNECTING THE PROGRAMMING/SMDR TERMINAL

**5.01** The programming/SMDR terminal is connected to the KSU backplane at the RS-232-C connector (J28 in Figure 4-3). The Baud Rate Thumbwheel on the B-CPU-D PCB (Figure 4-4) must be set to match the terminal.

**5.02** A call accounting system can be used with the TCX-128. Call records are transmitted to the printer as they are completed. The output format is shown in Table 4-1; a sample printout is shown in Table 4-2. The heading repeats after every 22 lines of call data.

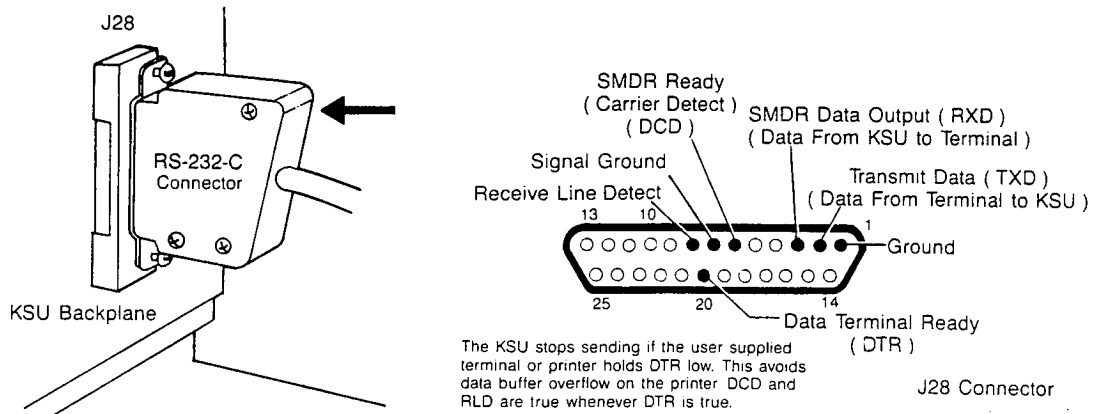


Figure 4-3 RS-232-C INTERFACE

*7 BITS  
NO PARITY  
1 STOP BIT  
ENABLE + ON*

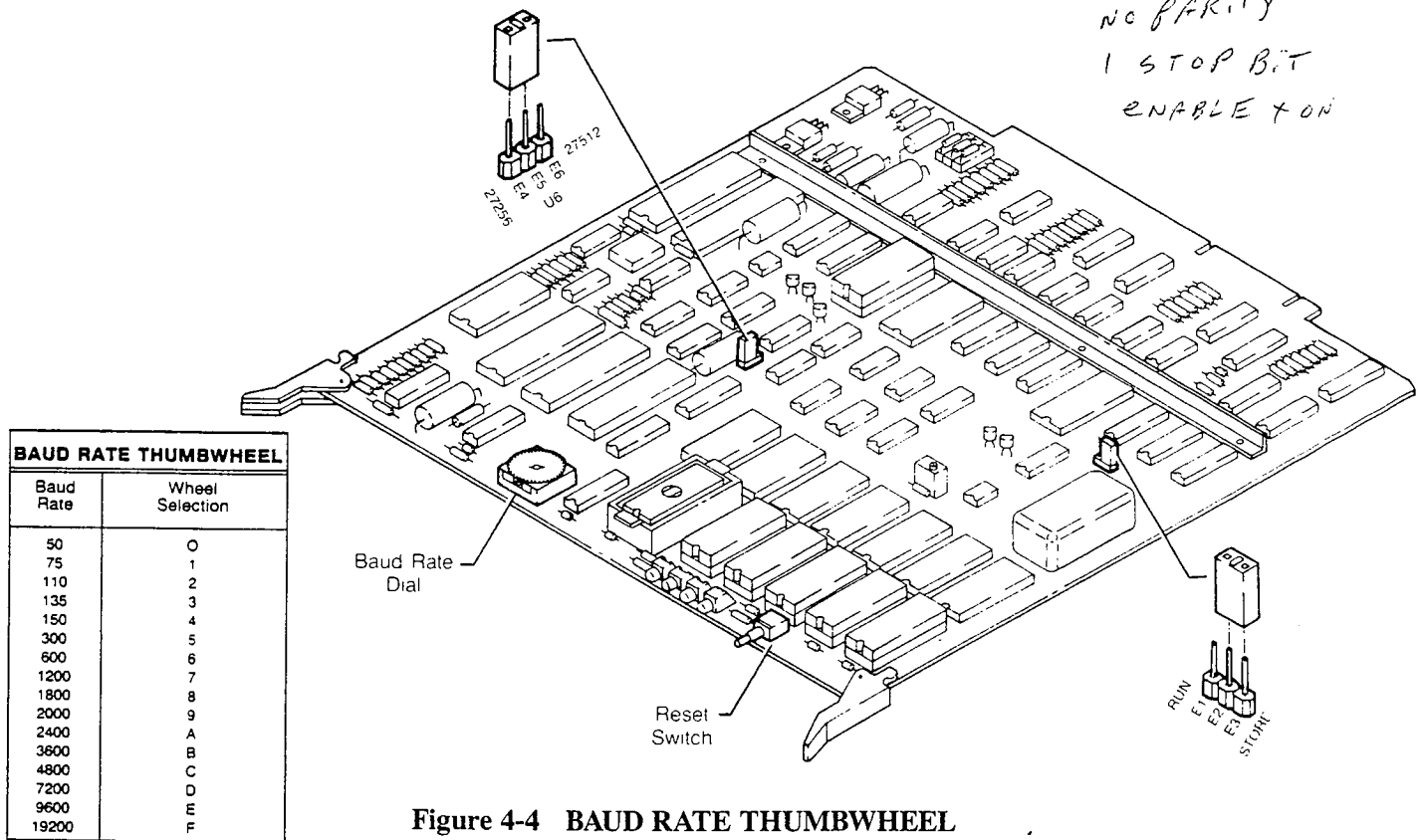


Figure 4-4 BAUD RATE THUMBWHEEL

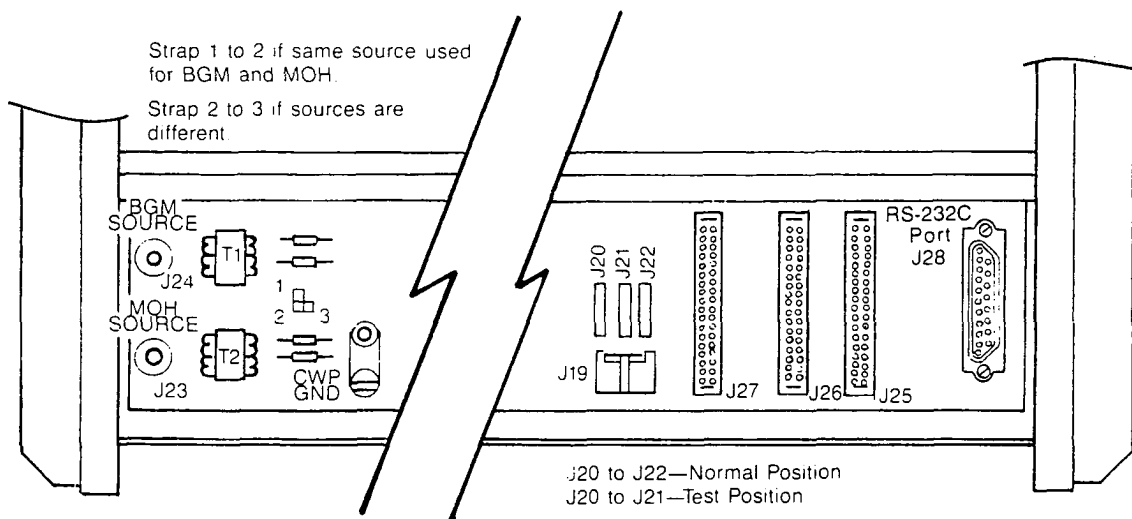
## 6. BACKGROUND MUSIC/MUSIC ON HOLD

**6.01** Any music source with an output impedance of 600 to 2000 ohms and an adjustable volume control can be used for Background Music (BGM) and/or Music On Hold (MOH). The music source can be an AM/FM radio, cassette tape deck, automatic turntable, etc. The source plugs into the KSU backplane using standard phono jacks. A matching transformer is required when the output impedance of the music source is greater or less than the stated range.

**6.02** To install Background Music or Music On Hold (Figure 4-5):

- (1) Connect the output from the music source to the BGM or MOH jack (J24 or J23).
- (2) If BGM and MOH use the same music source, strap the strapping bar from E1 to E2. If BGM and MOH are to use separate sources, strap from E2 to E3.
- (3) Listen to the volume level of BGM. If necessary, turn down the adjustable volume control on the music source to eliminate distortion.

**6.03** The B-TGU-C PCB contains volume controls to adjust Music On Hold and Background Music system-wide.



**Figure 4-5 KSU CONNECTIONS FOR OPTIONAL EQUIPMENT**

**SECTION 5, FEATURES**

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## 1. INTRODUCTION

**1.01** The FEATURES Section provides information on the features of the TCX-128 Computerized Branch Exchange. This section consists of detailed descriptions of each feature. Also included is reference information on LED and flash patterns (Figure 5-1), tone signaling patterns (Figures 5-2a and 5-2b), display messages (Table 5-1) and telephone key callouts (Figures 5-3 through 5-8).

## 2. FEATURES

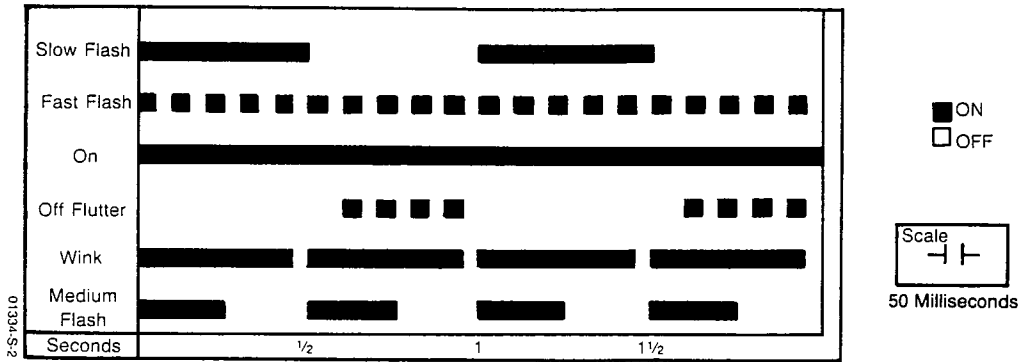
**2.01** Each feature is divided into the following subsections: Description, Conditions, Required Programming and Feature Reference. The subsections are defined as follows:

**Description** consists of a general feature definition, followed by an explanation of its application in the system.

**Conditions** provides the limits for the feature (e.g., maximum number of Message Waiting indications allowable at any one time). The Conditions also presents any qualifying information not covered in the Description, and any prerequisites that must be met before the feature can be used.

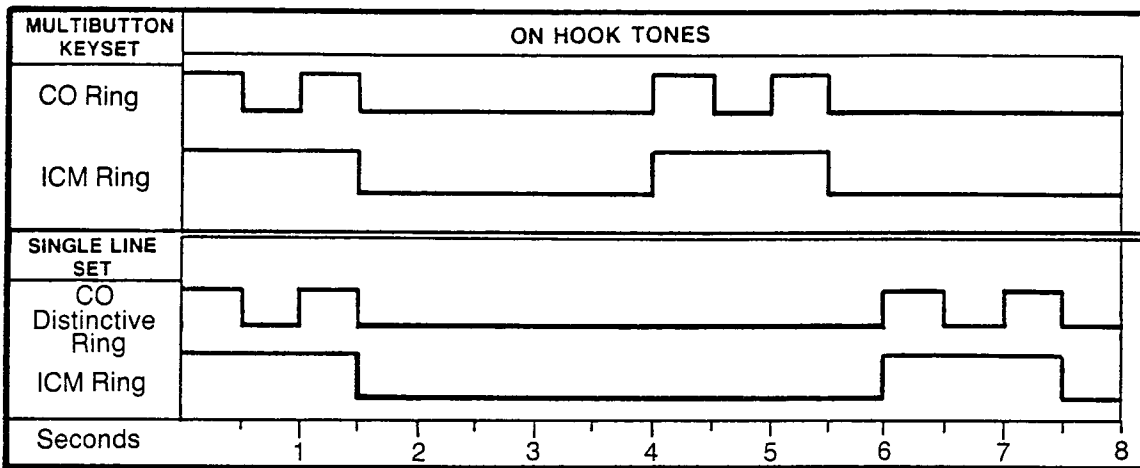
**Required Programming** includes any programming that must be done to provide for proper feature operation.

**Feature Reference** is a list of all features that may affect the feature being defined.



RATE	FUNCTION	KEY USED
1. LED ON	CALLBACK PLACED CO LINE CONFERENCE SET UP CO LINE IN USE DSS MODE ON HANDSFREE MODE ON HOTLINE CALL ORIGINATE LINE QUEUE ORIGINATE MEMORY DIAL IN USE OTHER PHONE IN DND OTHER PHONE IS BUSY PAGE RECEIVED	C.BACK KEY, INITIATING STATION CONF KEY CO LINE KEY INT KEY HF KEY HL KEY, INITIATING STATION C.BACK KEY OUT/MEM KEY HL KEY DSS KEY OR HL KEY PAGE KEY
2. SLOW FLASH	CALL FORWARDING MODE (SEND) CALLBACK RING CO INCOMING RING DND ACTIVATED INCOMING ICM RING MESSAGE WAITING NIGHT MODE ON OTHER PHONE IN DND OUTGOING PAGE	C.FWD KEY C.BACK KEY CO LINE KEY DND/M.MUTE KEY INT KEY M.WAIT KEY AT CALLED STATION NIGHT KEY ON ATTENDANT DSS CONSOLE KEY PAGE KEY, INITIATING STATION
3. MEDIUM FLASH	ALT MODE ON LINE QUEUE CALL BACK MEMORY DIAL IN USE MIC MUTE/CUTOFF ON	ALT KEY OF ATTENDANT C.BACK KEY MEMORY DIAL BIN KEY DND/M.MUTE KEY
4. FAST FLASH	CALL FORWARDING MODE CALLBACK WAITING DSS CALL ORIGINATE EXCLUSIVE HOLD MEMORY DIAL PROGRAMMING VOICE ANNOUNCE CALL RECEIVED	C.FWD KEY, RECEIVING STATION C.BACK KEY DSS KEY, INITIATING STATION CO LINE KEY ON HOLDING STATION OUT/MEM KEY AND BIN KEY HF KEY
5. OFF/ FLUTTER	CO LINE TRANSFER RECEIVED HOLD RECALL	CO LINE KEY CO LINE KEY
6. ON/ FLUTTER	PRIVACY RELEASED TRANSFER TO HL EXECUTIVE	CO LINE KEY (ON ADDED STATION) CO LINE KEY (HL SECRETARY STATION)

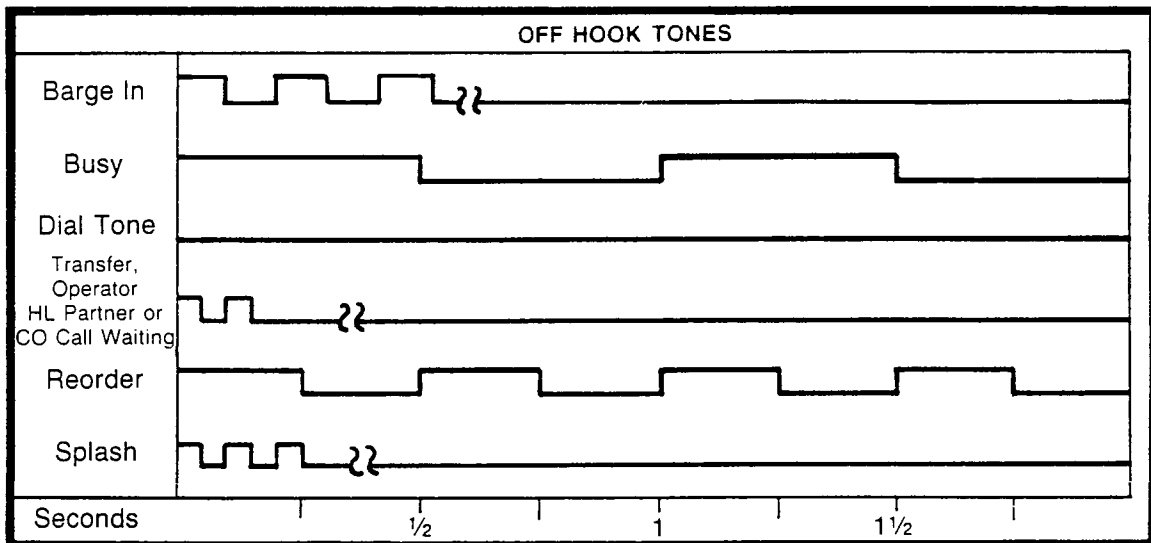
**Figure 5-1 FLASH PATTERNS**



01332-S-3

NOTE: Tone bursts occur during on periods.

Figure 5-2a ON HOOK TONE PATTERNS



01340-S-7

NOTE: Tone bursts occur during on periods.

Scale  
 ─┬─┬─  
 50 Milliseconds

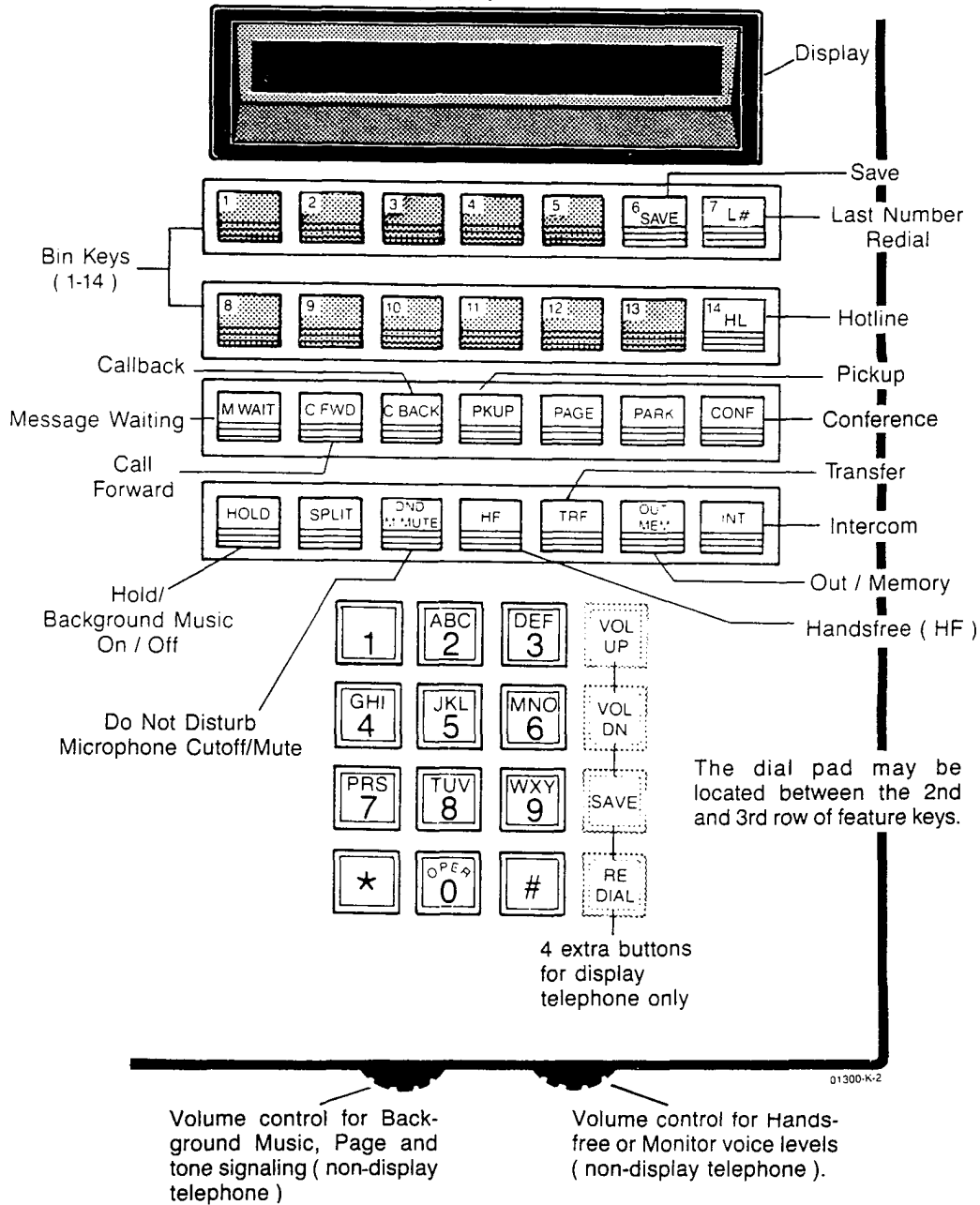
Figure 5-2b OFF HOOK TONE PATTERNS

**Table 5-1 DISPLAY MESSAGES**

DISPLAY MESSAGE	DEFINITION
CALL BACK CO XX	Message displayed for 15 seconds ( with ringing ) to indicate that a line in the line group queued on is now idle.
CALL BACK ST YYY	Message displayed for 30 seconds ( with ringing ) to indicate that the extension at which a Callback request was left is now idle.
CO FROM ORBIT ZZ	Displays when parked call is retrieved from a General Park orbit.
CO TO ORBIT ZZ	Displays when call is parked in a General Park orbit.
COST \$VV.VV	Display indicates the cost of the outgoing call. Least Cost Routing must be installed.
DIGITS	The digits dialed when placing an outside call are displayed, as they are dialed.
EXT YYY CALLING	Display indicates number of extension calling on Intercom.
EXTENSION YYY	Display of the extension called on the Intercom.
FORWARD TO YYY	This message is displayed once every 2 minutes ( with audible tone ) to indicate that calls are forwarded.
LINE XX	When selecting an outgoing line or answering an incoming line, the line number will appear in "XX."
MSG FROM EXT YYY	Displayed once every 2 minutes ( with audible tone ) at extension where message has been left.
NUMBER TO BIN WW	Displayed after pressing OUT/MEM key and one of the 14 storage location keys.
PICK-UP FROM YYY	Displayed when Directed Call Pick Up, Group Pick Up or Personal Park is used to answer a call.
PROGRAM COMPLETE	Displayed when DSS key or Speed Dial programming is complete.
PROGRAM MEMORY	Displayed when OUT/MEM key is pressed to program Speed Dial or extension DSS keys.
RECALL FROM YYY	Display indicates that an unanswered transferred call has been answered. The number of the extension to which the call was initially transferred is indicated.
TOLL RESTRICTED	Appears when dialing a restricted number.
WE DEC 12 7-56A	Day of Week / Month / Date / Time This display is shown constantly when telephone is idle.
YYY BUSY	Displayed when an Intercom call is made to a busy extension. A busy tone will also be heard.
YYY DND	Displayed when called extension is in Do Not Disturb.
YYY NOT EXIST	Displayed when an Intercom call is placed to a extension that is not installed or is not working.
XX = Line 01 - 32. YYY = extension 301 - 363, 401 - 465. ZZ = General Park Orbit 50 - 59. WW = Speed Dial/DSS Extension storage bin 1 - 14. VV.VV = Running cost of call in dollars and cents.	

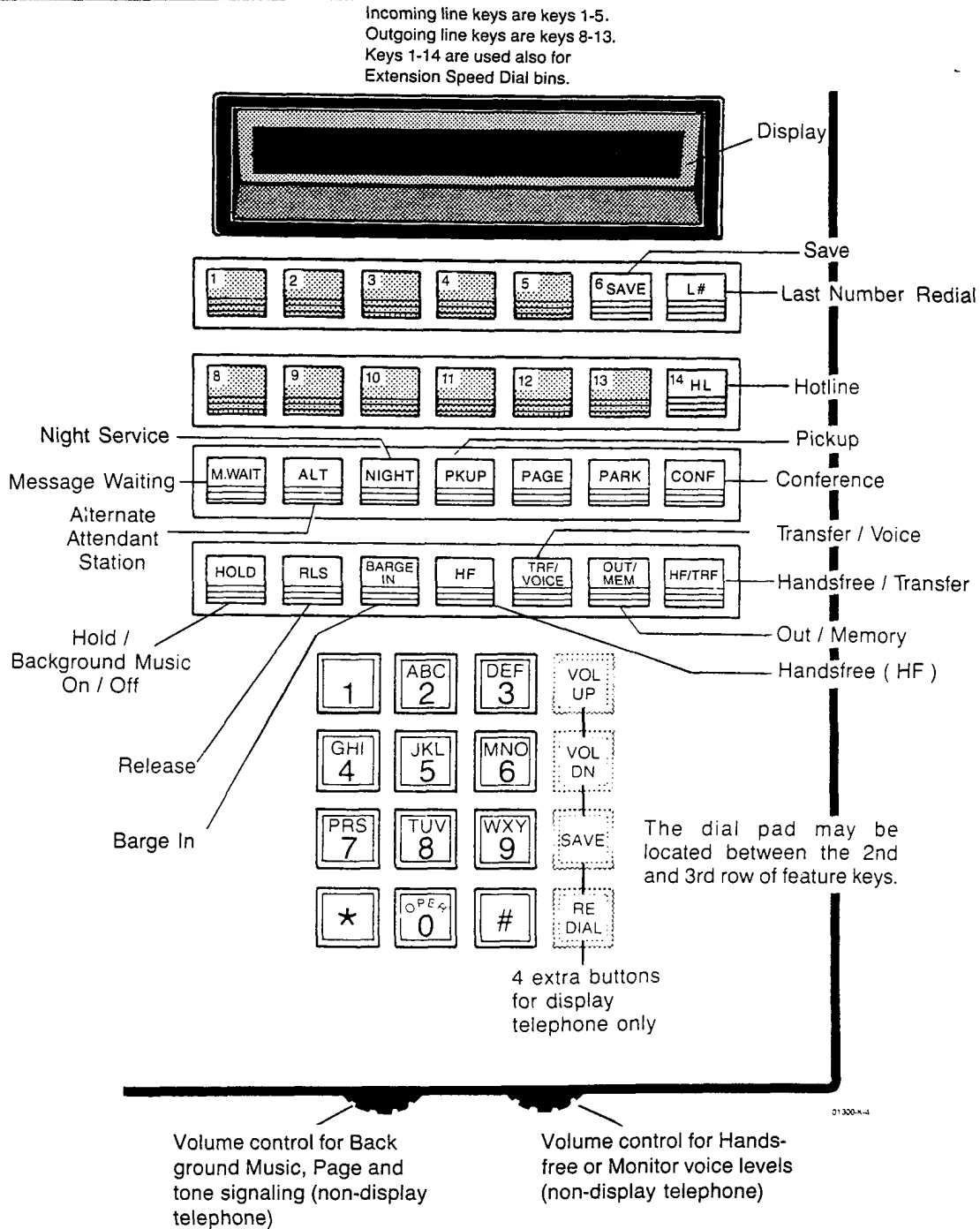
TJ3021M.5-1

Incoming line keys are keys 1-5  
 Outgoing line keys are keys 8-13  
 Keys 1-14 are used also for Extension  
 Speed Dial bins and as Direct Station  
 Selection (DSS) keys.



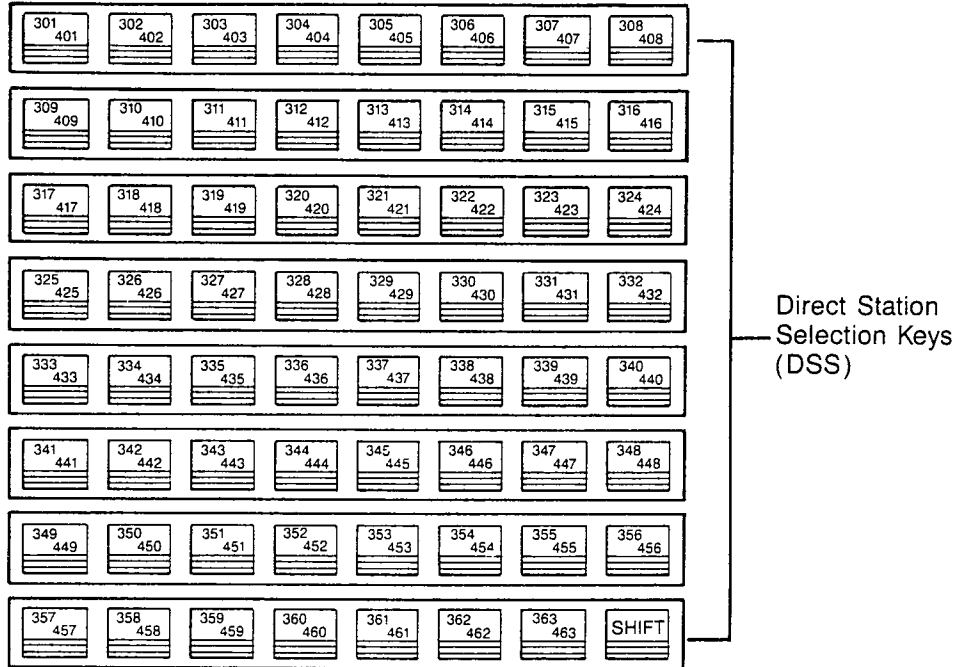
NOTE: (a) If Least Cost Routing ( LCR ) is installed, outgoing line keys 12 and 13 are used to place LCR calls.

**Figure 5-3 MULTIBUTTON TELEPHONE KEY CALLOUTS**

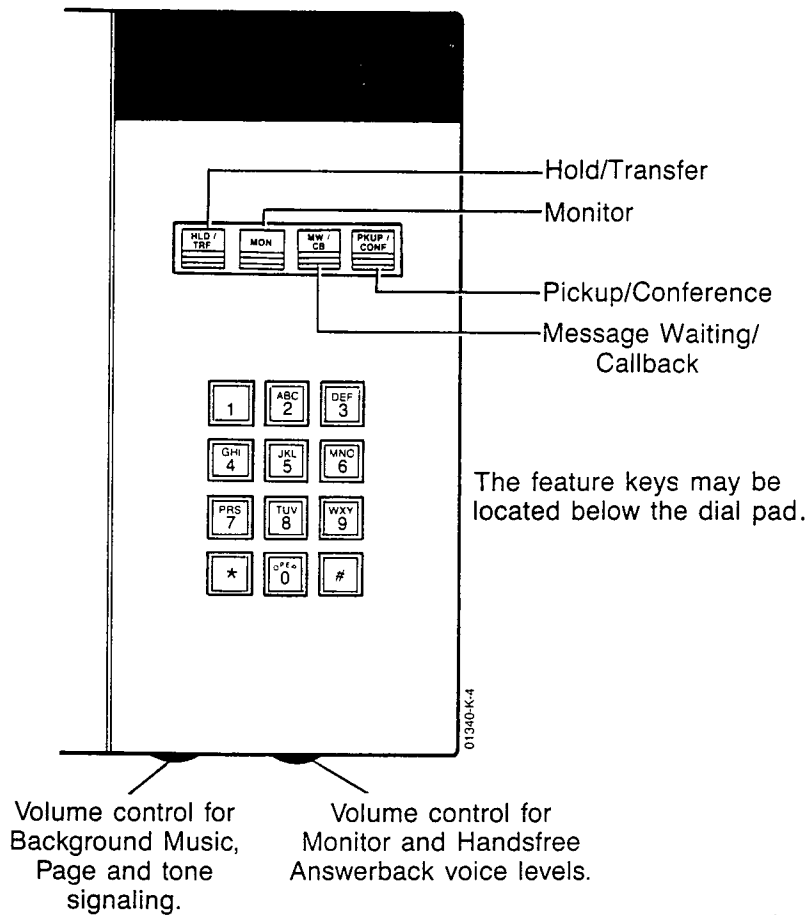


NOTE: (a) If a DSS Console is not assigned in programming, keys 1-14 function as Direct Station Selection ( DSS ) keys.  
(b) If Least Cost Routing ( LCR ) is installed, outgoing line keys 12 and 13 are used to place LCR calls.

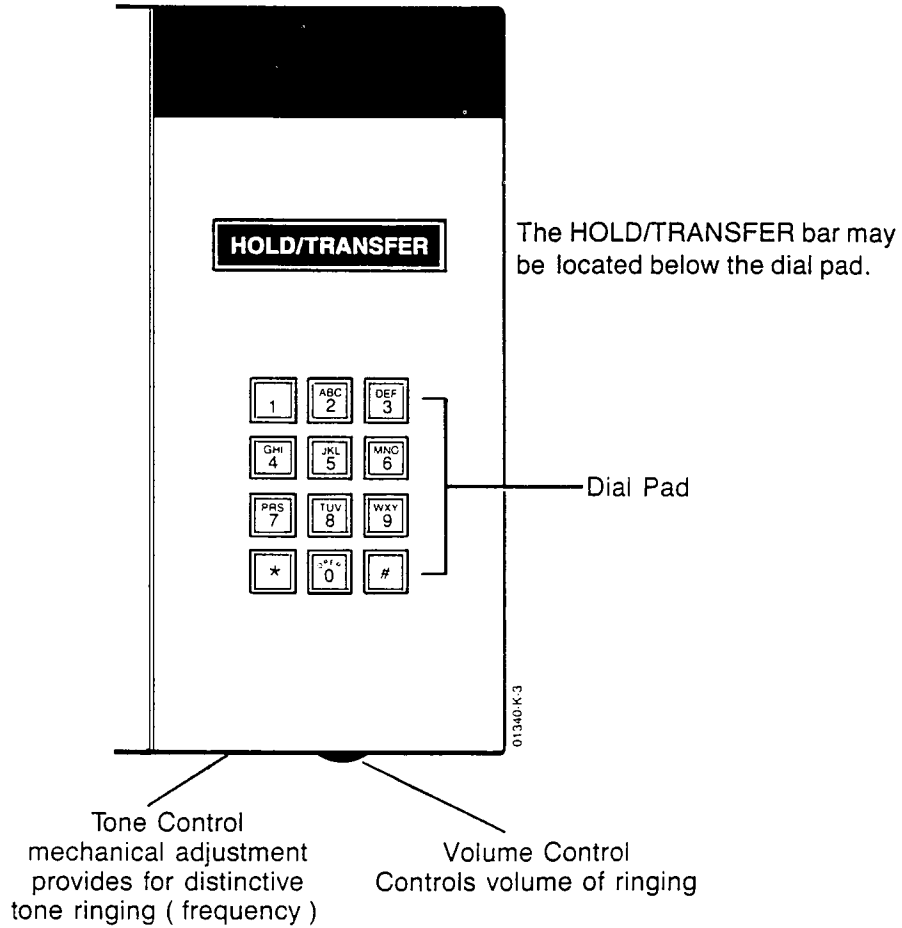
**Figure 5-4 ATTENDANT TELEPHONE KEY CALLOUTS**



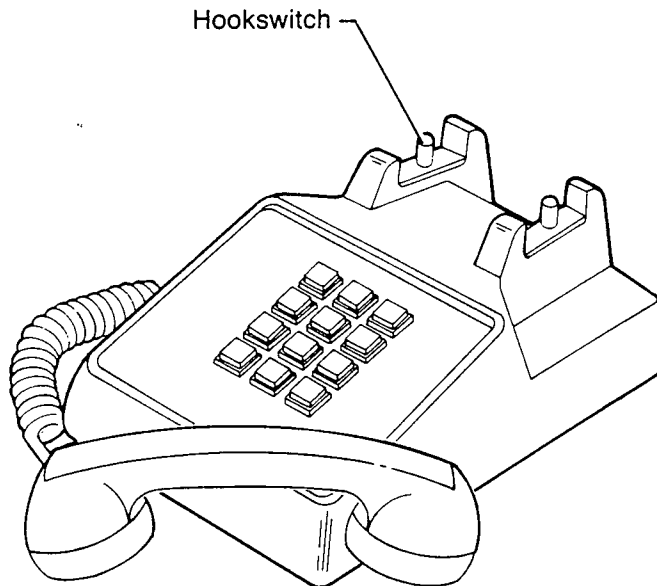
**Figure 5-5 DSS CONSOLE KEY CALLOUTS**



**Figure 5-6 FOUR BUTTON KEY CALLOUTS**



**Figure 5-7 SINGLE LINE TELEPHONE**



**Figure 5-8 2500 TYPE TELEPHONE**



**2.02** The following features are available with the TCX-128 system. The features are arranged in alphabetical order.

**NOTE:** When the system is used behind a Private Branch Exchange (PBX), some of the features may not function exactly as described.

## ACCOUNT CODE CAPABILITY

### Description:

The system permits Account Codes to be used to categorize all calls for Station Message Detail Recording (SMDR) purposes. An Account Code is a number, of up to nine digits, that is printed on the SMDR device to aid in identifying calls. This feature allows an accurate record of calls to be maintained for billing purposes.

Account Codes can be assigned to outgoing calls as they are being placed, or assigned *permanently*, so that they accompany all calls being placed from a telephone (or group of telephones).

An extension can be programmed so that an Account Code *must* be entered before a call from that phone can be completed.

### Conditions:

- (a) Account Codes can be assigned by any extension in the system. Account Codes must be entered manually from the telephone instrument.
- (b) Station Message Detail Recording requires a Call Accounting System or an SMDR printer.

### Required Programming:

- 'E' --> STATION FEATURES  
STORED ACC CODE to allow an extension to permanently store an Account Code to accompany all calls from that telephone.  
FORCED ACC CODE to force an extension to enter an Account Code before an outgoing call can be completed.
- 'S' --> SYSTEM FEATURES  
'F' --> SYSTEM OPTIONS (29: DISA FORCED ACCNT CODES) to force Account Codes to be entered for calls made on DISA lines.

### Feature Reference:

- Placing a Call
- Station Message Detail Recording (SMDR)

## ALTERNATE ATTENDANT

### Description:

Alternate Attendant allows the attendant to direct all calls, initially intended for the attendant, to the alternate attendant. The alternate attendant can be assigned in programming or selected at the attendant's telephone.

### Conditions:

- (a) All attendants can share the same alternate attendant.
- (b) In a system with more than one attendant, one attendant can be the alternate of another.
- (c) The alternate attendant should be a multibutton or display telephone. The alternate attendant does not require a DSS Console. If the alternate attendant does not have a DSS Console, the telephone functions as a multibutton telephone (i.e., without special attendant features).
- (d) When the attendant sends all calls to the alternate attendant, the alternate attendant cannot use Call Forwarding to pass transferred calls (intended for the attendant) to a third extension. In addition, the alternate attendant cannot forward the attendant's outgoing access ('E' --> STATIONS FEATURES [CO ACCESS]) assignments.

### Required Programming:

- 'S' --> SYSTEM FEATURES  
'O' --> OPERATORS & DSS to assign attendants and alternate attendants.
- 'E' --> STATIONS FEATURES  
TYPE OF PHONE.....to assign circuit type to DSS Consoles.
- 'T' --> SYSTEM INITIALIZATION  
Sub-Field #22 (OPERATORS & DSS) to initialize Operator and DSS Console assignments.

### Feature Reference:

- Answering a Call
- Direct Station Selection
- Intercom
- Transfer

## ANSWERING A CALL

### Description:

An incoming call can be answered at any extension programmed to receive audible (ringing) for the line. On a multibutton telephone, a ringing call also causes the first available incoming line key to flash. Calls can be answered with the handset, or Handsfree (if the telephone is a multibutton extension equipped with a speakerphone). On a display telephone, the line number of an incoming call can be displayed before the call is answered.

### Conditions:

- (a) CO ACCESS programming allows calls to be placed on specified lines, regardless of CO AUDIBLE programming. Lines assigned only CO ACCESS do not ring.
- (b) Night Service allows calls to be answered from any extension when the system is in the night mode, even if denied by CO AUDIBLE programming.

### Required Programming:

- 'E' --> STATIONS FEATURES  
CO AUDIBLE [NN..NN].to program ringing and incoming access for lines.
- 'S' --> SYSTEM FEATURES  
'P' --> CO TYPE to assign Universal Night Answer lines.

### Feature Reference:

Handsfree  
Night Service  
Split Ringing

## BARGE IN

### Description:

Barge In permits specified extensions to be used to intrude into a conversation in progress at another extension. Three splash tones precede a Barge In.

**CAUTION: UNAUTHORIZED MONITORING OF CALLS USING THE BARGE IN FEATURE MAY BE INTERPRETED AS AN INVASION OF PRIVACY.**

### Conditions:

- (a) Only multibutton telephones can Barge In. Single line 2500 type, and four button telephones cannot be programmed to Barge In, although they can be Barged In upon termination.
- (b) Barge In is blocked or enabled on a per-extension basis. If an extension is assigned to block Barge In, it can be overridden by any other extension.
- (c) If either party in the original call hangs up, the call is terminated. The party which Barged In cannot stay on the line with only one of the original callers.
- (d) A Barge In can be terminated only by the party which initiated Barge In, unless the original call is terminated.

### Required Programming:

- 'E' --> STATIONS FEATURES  
BARGE IN ENABLED....to permit extension to Barge In.
- BLOCK BARGE ENABLED....to allow extension to block Barge In.

### Feature Reference:

Privacy

## BUSY OUT LINES

### Description:

Busy Out Lines allows the attendant to take a CO line out of service. Busied out lines cannot be accessed by any extension in the system. Only the attendant can return a line to service.

### Conditions:

- (a) Lines can be taken out of service at the program terminal or busied out at the attendant's telephone. A line taken out of service at the terminal cannot be returned to service by the attendant. A line busied out by the attendant cannot be returned to service at the terminal.
- (b) Lines that are busied out *do not* show a busy indication at multibutton telephones.

### Required Programming:

- 'S' --> SYSTEM FEATURES  
'G' --> CO GROUPS to enter 77 for each line taken out of service.

### Feature Reference:

Placing a Call

## CALL FORWARDING

### Description:

Call Forwarding permits any telephone user to forward all calls to another extension or to the attendant. The user can also go to the extension to which the calls are forwarded, and forward them to yet another extension.

### Conditions:

- (a) An extension can receive forwarded calls that are normally inaccessible (i.e., E --> STATIONS FEATURES [CO AUDIBLE] assignments are transferred to the telephone receiving the forwarded calls).
- (b) The attendant can cancel all Call Forwarding in the system.
- (c) Call Forwarding can be canceled at the extension which initiated the forward and at the extension to which the calls were forwarded.
- (d) Call Forwarding can be "chained" (passed from extension to extension) up to four times. The Call Forwarding chain forwards both Intercom and transferred CO calls. Incoming CO calls are forwarded only to the second extension in the "chain." The "chain" should not loop back to the first extension (e.g., 302 to 303 to 304 to 302).
- (e) The extension to which calls are forwarded is the only one in the system that can call the extension which initiated the call forward. This relationship does not exist, however, in Call Forwarding "chains."
- (f) When a Multibutton or Four Button Telephone has initiated Call Forwarding (i.e., all calls have been forwarded to another extension), the speaker in the telephone broadcasts a short beep every 120 seconds. This beep serves as a reminder that calls have been forwarded. If desired, system programming allows this beep to be disabled.
- (g) If the attendant uses the ALT key to forward calls to the alternate, the alternate can use Call Forwarding to forward calls to a third party. The following occurs:
  - (1) All Intercom calls to the attendant go to the alternate.
  - (2) All calls transferred to the attendant go to the alternate.
  - (3) All outside calls which normally would ring the attendant ring the alternate.
  - (4) All Intercom and transferred calls to the alternate go the third party.
  - (5) All outside calls which would normally ring the alternate ring the third party.

### Required Programming:

'S' --> SYSTEM FEATURES  
'F' --> SYSTEM OPTIONS  
OPTION 19...to turn off the Call Forwarding reminder.  
OPTION 28...to allow calls to be forwarded onward from the original extension receiving the forwarded calls.

### Feature Reference:

Answering a Call  
Call Forwarding Cancel  
Transfer

## CALL FORWARDING CANCEL

### Description:

An extension can be used to cancel a Call Forwarding condition placed from it to another extension, or a Call Forwarding condition another extension has placed to it. The attendant can cancel all Call Forwarding conditions in the system.

**Conditions:** not applicable

### Required Programming:

'S' --> SYSTEM FEATURES  
'O' --> OPERATORS & DSS to assign system attendants.

### Feature Reference:

Call Forwarding.

## CALL PICKUP, DIRECTED

### Description:

Directed Call Pick Up allows an extension user to answer a call heard ringing at a nearby extension.

### Conditions:

This feature requires that the user know the number of the extension where the call is ringing.

### Required Programming:

'S' --> SYSTEM FEATURES

'M' --> TIMERS

TRANS RECALL.(SEC).....to program the length of time that a transferred call rings before it recalls the telephone from which it was transferred.

### Feature Reference:

Call Pickup, Group Transfer

## CALL PICKUP, GROUP

### Description:

Group Call Pick Up allows an extension user to answer a call ringing into his assigned Pick Up Group. The TCX-128 has a maximum of 16 Pick Up Groups.

### Conditions:

(a) The Multibutton or Four button telephone user can enable or disable ringing for a call into the Pick Up Group if:

(1) The call is a transferred call to another telephone in the Pick Up Group.

OR

(2) The call is an intra-group call that does not normally ring at his telephone (i.e., CO AUDIBLE denied).

(b) An extension can be assigned to only one Pick Up Group; however, any number of extensions can be assigned to one Pick Up Group.

(c) Any extension in the system can be used to answer a call ringing into its Pick Up Group using Group Call Pick Up. Pick Up Groups are assigned in 'E' --> STATIONS FEATURES programming.

### Required Programming:

'I' --> SYSTEM INITIALIZATION

Sub-Field # 10 (STATIONS 'PICK-UP GROUP') to initialize Pick Up group assignments.

'E' --> STATIONS FEATURES

CO AUDIBLE [NN..NN].. to assign audible for lines.  
PICK UP GROUP IS.....to assign extensions to Pick Up Groups.

### Feature Reference:

Answering a Call  
Call Pickup, Directed Transfer



## CALL WAITING

Call Waiting allows signals to be sent to an extension to indicate that a CO, attendant or Hotline partner call is waiting to be answered. An extension user must be busy on a call to receive Call Waiting signals.

### Call Waiting, CO Call

#### Description:

When busy on a call, an extension user can receive a signal that an outside (CO) call is waiting to be answered. This call may be a call ringing into that extension or may be a call transferred from another extension (or the attendant). The CO Call Waiting indication is a double beep.

#### Conditions:

- (a) If busy on an outside call, the call may be put on Hold before the Call Waiting is answered. If busy on an Intercom call, the Intercom call is terminated as the Call Waiting is answered.
- (b) Each telephone can be individually programmed to block CO Call Waiting tones for incoming calls, or send Call Waiting tones as calls are transferred.
- (c) If busy on a CO call (when the Call Waiting tones are received), the Split feature can be used to alternate between the initial CO call and the incoming CO call.
- (d) It may not be desirable to program Call Waiting for attendants, since the attendant (with a DSS Console) receives offhook signaling through the speaker in the DSS Console.
- (e) The DIL OFF HOOK SIGNAL.....and CO AUDIBLE [NN..NN] IS .. fields must be programmed to receive CO Call Waiting for incoming calls.

#### Required Programming:

'E' --> STATIONS FEATURES

CO AUDIBLE [NN..NN] IS....to grant audible for incoming CO calls. Call Waiting signals for incoming calls can occur only if AUDIBLE is granted for that line, at that extension.

DIL OFF HOOK SIGNAL....to program incoming calls to send Call Waiting signals to extensions that are busy on a call.

CAMP-ON ORIGINATE....to allow extensions to send Call Waiting signals for calls that they Transfer.

CAMP-ON RECEIVE....to allow extensions to receive Call Waiting signals from transferred calls.

#### Feature Reference:

Answering a Call  
Split  
Transfer

### Call Waiting, Attendant/Hotline Partner

#### Description:

When busy on another call, an extension can receive a signal that an Intercom call from the attendant or Hotline partner (if assigned) is waiting to be answered. The attendant/Hotline partner Call Waiting signal is a double beep.

#### Conditions:

- (a) If busy on an outside call, the call may be put on Hold before the Call Waiting is answered. If busy on an Intercom call, the Intercom call is terminated as the Call Waiting is answered.
- (b) Each extension in a Hotline pair can be individually programmed to send Hotline partner Call Waiting tones. Each attendant can be individually programmed to send Attendant Call Waiting tones. Any extension in the system can be programmed to block Attendant/Hotline partner Call Waiting tones.
- (c) Multibutton and four button telephones can use the Split feature to alternate between the attendant/Hotline partner and the initial call (if a CO call).
- (d) Call Waiting is not received from Intercom callers.

#### Required Programming:

'S' --> SYSTEM FEATURES

'O' --> OPERATORS & DSS to assign attendants.

'E' --> STATIONS FEATURES

HOT-LINE KEY....to program Hotline partners or groups.

CAMP-ON ORIGINATE....to allow extensions to send Call Waiting signals.

CAMP-ON RECEIVE....to allow extensions to receive Call Waiting signals.

#### Feature Reference:

Answering a Call  
Hotline  
Split

## CALLBACK

### Description:

Callback enables a telephone user to leave a Callback request at a busy extension. When the busy telephone becomes free, Callback automatically rings the telephone which placed the Callback request. Answering the Callback ring automatically calls the extension where the Callback request was initially left. If the Callback is interrupted (i.e., the called extension receives another call), the Callback procedure begins again.

### Conditions:

- (a) If the Callback ring is not answered within 30 seconds, the Callback is terminated.
- (b) A Callback cannot be left at a telephone in Do Not Disturb.
- (c) An individual extension can be used to leave only one Callback request; however, many Callbacks can be left at a single busy station. The Callbacks are queued and processed in the order in which they are placed.
- (d) A telephone user can place a Callback to a busy extension after a Callback from a third extension has been placed to him (i.e., as the C.BACK LED is flashing).
- (e) An extension user cannot leave a Callback to its Hotline partner.
- (f) If a telephone has a Callback or Line Queue active (i.e., waiting for a Callback ring from a busy extension or line group), initiating another Line Queue or Callback cancels the first.

**Required Programming:** None

### Feature Reference:

Direct Station Selection  
Do Not Disturb  
Intercom

## CLASS OF SERVICE

### Description:

The system uses Class of Service (COS) programming to help determine the dialing restrictions on outgoing calls. There are five restrictive Classes of Service (COSs 1-5), and a totally unrestricted Class of Service (COS 0). Additional Toll Restriction programming (for each area code and exchange that can be dialed) allows dialing restrictions to be customized for the requirements of each installation.

### Code:

N is one digit, any digit 2 through 9.

P is one digit, any digit 0 or 1.

X (n) is one digit, any digit 0 through 9.

### The Classes of Service are as follows:

#### COS 0

Unrestricted. Class of Service 0 is permitted to dial all System Speed Dial numbers and all area codes. This is the only COS permitted to dial (telco) operator ('0') calls. Intercom calls are permitted.

#### COS 1

Class of Service 1 is permitted to dial seven-digit (NNX + nnnn) and leading 1 seven-digit (1 + NNX + nnnn) numbers, all System Speed Dial numbers and allowed area codes (1 + NPX + NNX + nnnn). Intercom calls are permitted.

#### COS 2

Class of Service 2 is permitted to dial seven-digit (NNX + nnnn) numbers, leading 1 seven-digit (1 + NNX + nnnn) numbers, allowed area codes (1 + NPX + NNX + nnnn) and System Speed Dial numbers that do not contain a leading 1 or 0. Intercom calls are permitted.

**COS 4**

Class of Service 4 is permitted to dial seven-digit (NNX + nnnn) numbers, allowed area codes (1 + NPX + NNX + nnnn) and System Speed Dial numbers that do not contain a leading 1 or 0. Intercom calls are permitted.

**COS 5**

Class of Service 5 can dial Intercom calls and all System Speed Dial calls only.

**Conditions:**

Refer to Toll Restriction for additional dialing restriction information.

**Required Programming:**

- 'E' --> STATIONS FEATURES  
CLASS OF SERVICE....to assign Class of Service to each extension.
- 'I' --> SYSTEM INITIALIZATION  
Sub-Field # 7 (STATIONS 'CLASS OF SERVICE') to initialize Class of Service information.
- 'S' --> SYSTEM FEATURES
  - 'P' --> CO TYPE to program lines as incoming only (INC) or toll free (TOLLF).
  - 'K' --> COS ALLOWED AREA CODES to assign Class of Service to area codes.

**Feature Reference:**

Placing a Call  
Speed Dial  
Toll Restriction

**CONFERENCE**

Conference allows multiple parties to be connected for a Conference call. There are four types of Conference: Add-On Conference, Line Conference, Meet-Me Conference and Unsupervised Line Conference.

**Add-On Conference****Description:**

Add-On Conference permits a second internal party to be added to an existing call.

**Conditions:**

Any telephone in the system can join an Add-On Conference; however, single line and 2500 type telephones cannot initiate an Add-On Conference.

**Required Programming:**

Programming does not affect the ability of telephones to be used to initiate or join an Add-On Conference.

**Feature Reference:**

Answering a Call  
Placing a Call

## Line Conference

### Description:

Line Conference allows an internal party to add an additional outside party to an existing outside (CO) call. A Conference may be established between two incoming calls, two outgoing calls, or an incoming and outgoing call.

### Conditions:

- (a) Single Line and 2500 type telephones cannot be used to initiate a Line Conference.
- (b) When a Line Conference is to be established on two outgoing calls, enable CO ACCESS [NN..NN] IS .. for the lines. When a Line Conference is to be established on two incoming calls, enable CO AUDIBLE [NN..NN] IS.. for the lines.
- (c) If the Conference is not established within the Hold Recall interval, the initial call reverts to the attendant.
- (d) A Conference may be established between two outside lines in the same line group, using the same outgoing line key. This is especially useful if toll free lines or LCR is installed.

### Required Programming:

- 'S' --> SYSTEM FEATURES
- 'F' ---> SYSTEM OPTIONS
- OPTION 03..to allow two calls to be joined in Conference using the same outgoing line key.
- 'E' ---> STATIONS FEATURES
- CO AUDIBLE [NN..NN] IS..to allow a Line Conference to be established on incoming calls.
- CO ACCESS [NN..NN] IS..to allow a Line Conference to be established on outgoing calls.

### Feature Reference:

Answering a Call  
Hold Recall  
Placing a Call

## Meet-Me Conference

### Description:

Meet-Me Conference allows a group of extensions to be connected together (on an unused trunk position) for an internal Conference call.

### Conditions:

- (a) Any unused trunk can be used for a Meet-Me Conference if it is so programmed.
- (b) Only *one* unused trunk can be used for Meet-Me Conference.
- (c) Any number of extensions can join a Meet-Me Conference; however, if six or more telephones are joined together, the volume of the call decreases with each telephone added.

### Required Programming:

- 'S' --> SYSTEM FEATURES
- 'G' --> CO GROUPS to assign an unused trunk to be used for Meet-Me Conference (by assigning it to group 77).

### Feature Reference:

Intercom



## Unsupervised Line Conference

### Description:

A telephone user can conference two outside lines (on an unused station port) and then withdraw from the conversation, leaving the two outside parties connected. The party who originated the Conference call can rejoin the conversation, if he or she so desires.

### Conditions:

- (a) An Unsupervised Line Conference cannot be initiated from a Single Line or 2500 type telephone.
- (b) An Unsupervised Conference must be held on an unused port (on the B-8SCU-C PCB).

### Required Programming:

'E' --> STATIONS FEATURES  
CO ACCESS to assign a station access to lines to establish an Unsupervised Conference.

Feature Reference: None

## DATE AND TIME

### Description:

Date and Time information is used for SMDR and display telephone presentations. The date and time can be entered from the programming terminal or from the attendant's telephone. Data entered includes the hour, minutes past the hour, month, date and year. The SMDR includes date and time in its output. The display telephones show the day of the week, month, date and time (twelve hour clock).

### Conditions:

Date and Time must be reset if power fails.

### Required Programming:

'S' --> SYSTEM FEATURES  
'T' ---> TIME OF DAY to program time.  
'D' --> DATE to program date and year.

### Feature Reference:

Station Message Detail Recording

## DIAGNOSTIC TRACE

### Description:

The Diagnostic Trace allows a check to be made of some or all events (that occur at an extension [or extensions]). This information aids in the defining and solving of any system problem. The events can be programmed to print continuously, or to be stored in memory until requested. Diagnostic Trace information is presented in detail in Appendix F of this manual.

### Conditions:

The system can be equipped with an RS-232 compatible printer in order to receive a Diagnostic Trace printout.

### Required Programming:

'S' --> SYSTEM FEATURES  
1: SELECT TRACE OPTIONS  
2: PRINT TRACE MEMORY to set parameters of  
3: PRINT CONTINUOUSLY Diagnostic trace  
'T' --> SYSTEM INITIALIZATION  
Sub-Field # 36 (DIAGNOSTIC TRACE) to initialize  
Diagnostic Trace options.

Feature Reference: None

## DIRECT INWARD LINES

### Description:

Direct Inward Lines (DIL) allows the TCX-128 to be configured so that outside lines ring directly into designated extensions (or groups of extensions), without having to be transferred by the attendant. For multibutton telephones, DILs appear on the incoming line keys, in addition to ringing. A DIL call can be transferred to any station in the system. If a call ringing in on a DIL remains unanswered, it rings at the attendant's telephone until it is answered or abandoned.

### Conditions:

- (a) A line can ring directly into an extension as a Direct Inward Line if 'E' --> STATIONS FEATURES (CO AUDIBLE [NN..NN] IS..) assignments allow.
- (b) DILs are not excluded from Universal Night Answer ringing.
- (c) 'E' --> STATIONS FEATURES (CO ACCESS [NN..NN] IS..) programming allows calls to be placed on the lines programmed as DILs.
- (d) Direct Inward Lines do not have the same characteristics as Private Lines. Refer to the Private Line feature in this section.

### Required Programming:

'E' --> STATIONS FEATURES  
CO AUDIBLE [NN..NN] IS.. to assign lines as DILs.  
CO ACCESS [NN..NN] IS.. to allow lines designated as DILs to be used for outgoing calls.  
DIL OFF HOOK SIGNAL....to permit an extension user to receive Call Waiting tones as a call on a DIL line is ringing in.

### Feature Reference:

Answering a Call  
Night Service  
Placing a Call  
Private Line

## DIRECT INWARD SYSTEM ACCESS (DISA) (Internal Only)

### Description:

Direct Inward System Access (DISA) allows an outside caller the ability to dial into the system and directly call the modem located on the B-CPU-D PCB. Any line in the system can be programmed for DISA use.

### Conditions:

- (a) A DISA line can be used normally for outside calls.
- (b) Incoming calls on DISA lines must be generated from telephones that use the Dual Tone Multifrequency (DTMF) signaling.
- (c) DISA lines should not be ordered as members of inbound rotaries.
- (d) DISA lines should not be programmed into line groups with other types of lines.
- (e) A DISA Access Code must be stored in System Speed Dial bin 99.

### Required Programming:

'S' --> SYSTEM FEATURES  
'M' --> TIMERS  
DISA PAGE (Sec.)...to establish the interval after which a DISA page times out.  
DISA & TIE RNA (Sec.)...to establish the time period after which dial tone is returned to a DISA user who has attempted to call an extension and received no answer.  
DISA ANSWER (Sec.)...to establish the duration of time after which a DISA line automatically "answers" an incoming call.  
'P' --> CO TYPE  
LINE..XX..TYPE IS.....to program a line for DISA use.  
'F' --> SYSTEM OPTIONS  
OPTION 29.. to force callers to enter Account Codes when placing outgoing calls on DISA lines.  
OPTION 31...to allow Paging with DISA lines.  
OPTION 32...to enable all DISA lines in the day mode.  
OPTION 33...to enable all DISA lines in the night mode.

### Feature Reference:

Answering a Call  
Placing a Call  
Remote Modem Access

## DIRECT LINE ACCESS

### Description:

Direct Line Access allows the attendant to select a specific line to place a call. Direct Line Access can be used to bypass LCR and/or outgoing line key assignments.

### Conditions:

- (a) Toll Restriction applies to all calls placed using Direct Line Access.
- (b) Direct Line Access can be used to bypass outgoing restrictions imposed by 'E' --> STATIONS FEATURES (CO ACCESS [NN..NN] IS..) programming.
- (c) Direct Line Access cannot be used to answer incoming calls.
- (d) The attendant can use Direct Line Access to place a call for another extension. After the call is connected, the attendant can transfer the call to the waiting extension. Direct Line Access cannot be used to bypass Toll Restriction by passing dial tone to another telephone in the system. If dial tone is passed, dialing is prevented.

**Required Programming:** not applicable

### Feature Reference:

Placing a Call  
Toll Restriction  
Transfer

## DIRECT STATION SELECTION

### Description:

Direct Station Selection (DSS) allows users of multibutton telephones one button access to other extensions in the system. DSS permits multibutton telephone users to press a DSS key to access a desired extension, rather than by dialing a code. The DSS keys can also be used to provide a Busy Lamp Field (BLF) for the extensions to which the keys are assigned.

Multibutton telephones have 14 DSS keys; however, the telephone user can change the DSS assignments to meet individual needs.

System attendants have full system DSS and BLF capability (except for extensions 464 and 465) if they are installed with DSS Consoles.

### Conditions:

- (a) The multibutton telephone user must press the INT key to put the telephone in the DSS mode.
- (b) The attendant DSS Console provides DSS keys and a BLF for all extensions in the system (except for extensions 464 and 465), and is not programmed by the user. When an attendant telephone has a DSS Console assigned to it in programming, the DSS keys on the attendant's telephone do not function.
- (c) If an attendant does not have a DSS Console assigned to it in programming, the first 14 keys on the telephone are DSS keys. The attendant must press the TRF/VOICE key to put the telephone in the DSS mode.
- (d) The system allows up to six DSS Consoles to be programmed and installed, each assigned to its respective attendant.
- (e) Only the first 50 extensions in the system have programmable DSS keys. The DSS keys for the remaining multibutton telephones cannot be changed from the default assignments.

### Required Programming:

'S' --> SYSTEM FEATURES

'O' --> OPERATORS & DSS to assign attendants and DSS Consoles.

'T' --> SYSTEM INITIALIZATION

Sub-Field # 32 (STATIONS DSS KEYS) to initialize DSS key assignments.

'E' --> STATIONS FEATURES

TYPE OF PHONE..... to assign DSS Consoles with type DSS.

### Feature Reference:

Intercom  
Transfer

## DISTINCTIVE RINGING

### Description:

Distinctive Ringing provides different ringing patterns for Intercom and CO calls. Distinctive Ringing is available on all telephones, but must be programmed for single line and 2500 type telephones.

For Single Line and 2500 type telephones, Distinctive Ringing provides an Intercom ring signal (tone burst) of 1.5 seconds followed by a 4.5 second pause. CO line ring consists of two short ring bursts followed by a 4.5 second pause. If Distinctive Ringing for single line and 2500 type telephones is disabled, Intercom calls ring identically to CO calls (i.e., one ring burst followed by a pause).

Multibutton and Four Button telephones always have Distinctive Ringing enabled. The Intercom ring signal is a 1.5 second burst followed by a 2.5 second pause. The CO ring signal is two short bursts followed by a 2.5 second pause.

### Conditions:

- (a) Distinctive Ringing, if enabled, affects all Single Line and 2500 type telephones in the system.
- (b) Distinctive Ringing requires a B-8SLU-B PCB with software version 177-114-02 or 177-114-03.

### Required Programming:

- 'S' --> SYSTEM FEATURES
- 'F' --> SYSTEM OPTIONS
- OPTION 04... to enable Distinctive Ringing for Single Line and 2500 type telephones.

### Feature Reference:

Answering a Call  
Intercom

## DO NOT DISTURB

### Description:

Do Not Disturb allows multibutton telephone users to block all incoming Intercom calls and ringing for outside calls. If DND is enabled, callers attempting to reach an extension in Do Not Disturb receive a reorder tone. While in the Do Not Disturb mode, an extension can be used to place Intercom calls, and place and answer outside calls.

### Conditions:

- (a) The attendant can override DND, but only if the telephone which has activated DND is not busy on another call.
- (b) The attendant, Single Line, 2500 type, and Four Button telephones do not have DND capability.
- (c) The attendant can transfer calls to an extension in Do Not Disturb; however, the transferred call does not ring (although the incoming line key flashes).
- (d) The attendant's DSS Console indicates which telephones are in Do Not Disturb.
- (e) An incoming Private Line call to a multibutton extension in Do Not Disturb causes the Private Line LED to flash, but the line does not ring.

### Required Programming:

- 'S' --> SYSTEM FEATURES
- 'O' --> OPERATORS & DSS to assign attendants.
- 'E' --> STATIONS FEATURES
- PRIVATE LINE.....IS.. to assign Private Lines.

### Feature Reference:

Answering a Call  
DND Override  
Placing a Call  
Private Line  
Transfer

## DO NOT DISTURB OVERRIDE

### Description:

Do Not Disturb Override permits the attendant or a Hotline partner to override DND.

### Conditions:

Normally, DND Override is a voice announcement; however, if Forced Intercom Ringing is enabled, DND Override calls ring.

### Required Programming:

'E' --> STATION FEATURES  
HOT-LINE KEY...to assign Hotline partners.  
'S' --> SYSTEM FEATURES  
'O' ---> OPERATORS & DSS to assign attendants.  
'F'--> SYSTEM OPTIONS  
OPTION 06... to enable Forced Intercom Ringing. If Forced Intercom Ringing is enabled, DND Override calls ring.

### Feature Reference:

Do Not Disturb  
Forced Intercom Ringing

## EXTENSION HUNTING

### Description:

Extension Hunting allows extensions to be placed in Hunt Groups. A call which rings into a Hunt Group proceeds to each telephone in the group if the original destination is busy, until the call is answered.

There are two types of Hunt Groups—Terminal and Uniform Call Distribution (UCD). A call into a Terminal Hunt Group follows a predetermined route from telephone-to-telephone in the group. In a UCD Hunt Group, the ringing sequence is determined by the frequency of the use of the telephones in the group. The leastused telephone is the first rung; the most-used telephone is the last rung.

The system can contain a total of 16 Hunt Groups (any number of either type of group is permissible). Each extension may be placed in only one Hunt Group; however, a Hunt Group can contain as many extensions as desired (from 1 to 64 extensions).

### Conditions:

- Extension Hunting does not ring a telephone that is busy or in the Do Not Disturb mode.
- Activating Night Service normally disables Extension Hunting. Extension Hunting functions in the night mode only if the extension designated as the Master Extension in a UCD Hunt Group is **not** in the night mode.
- Tenant Service assignments do not prohibit Extension Hunting.
- If a Private Line of an extension is programmed for Extension Hunting, the calls ring on incoming line key 5 (or 4 and 5 if two Private Lines are installed) on the other extensions in the Hunt Group.

### Required Programming:

'S' --> SYSTEM FEATURES  
'U' --> GROUP HUNT to establish Hunt Groups for the system.  
'P' --> CO TYPE to designate lines for Extension Hunting.

### Feature Reference:

Answering a Call  
Do Not Disturb  
Night Service  
Transfer

## EXTERNAL LOUD RINGING CAPABILITY

### Description:

Customer-provided external loud ringing devices can be connected to provide loud night ringing in areas where normal signaling is inadequate or unavailable. The alerting devices are connected to relay contacts in the KSU. The relays can be programmed to close whenever a call rings into the system (on a Universal Night Answer line) when the system is in the night mode. Four relays are available for external loud ringing.

### Conditions:

- (a) Two relays are available on each B-TGU-C PCB plugged into the KSU.
- (b) The devices connected to the relays must conform to the specifications in Section 4, INSTALLATION OF OPTIONAL EQUIPMENT.
- (c) The relays in the KSU may be assigned for either loud night ringing or Page.

### Required Programming:

- 'S' --> SYSTEM FEATURES
- 'R' --> RELAYS CONTROL to program relays for night ringing or Page.

### Feature Reference:

External Paging Zones  
Night Service  
Paging

## EXTERNAL PAGING ZONES

### Description:

Each B-TGU-C PCB installed in the system provides access to four External Paging Zones. As many as two B-TGU-C PCBs can be installed; therefore, the system can have a maximum of eight External Paging Zones. The External Paging Zones can be programmed to receive ringing from any or all outside lines during the day and/or night, as well as Paging announcements from any or all Internal Paging Zones and Background Music.

### Conditions:

- (a) External Paging Zones are available with B-TGU-C PCBs only.
- (b) If two tone cards are required, they both must be B-TGU-C PCBs, or both B-TGU-B PCBs—they cannot be mixed.
- (c) The system must be programmed to accept the desired tone cards.
- (d) Entire zones can be disabled in programming.
- (e) Extensions can answer calls that ring over the External Paging speakers.

### Required Programming:

- 'S' --> SYSTEM FEATURES
- 'R' --> RELAYS CONTROL to program relays for use with Paging.

### Feature Reference:

Music On Hold/Background Music  
Night Service  
Paging

## FLASH

### Description:

Flash allows a telephone user to receive a new dial tone without releasing the CO line. If the system is installed behind a PBX, Flash allows certain PBX features (such as Transfer) to be accessed.

### Conditions:

- (a) Flash parameters must be set for compatibility with the CO or PBX.
- (b) Since Flash provides an interruption in loop current, it is compatible only with loop start lines.

### Required Programming:

- 'S' --> SYSTEM FEATURES
- 'M' --> TIMERS
- FLASH TIMER.(N \* 50MSEC)... to program the duration of Flash (i.e., the interruption of loop current).

### Feature Reference:

Placing a Call

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## FLEXIBLE NUMBERING PLAN

### Description:

Flexible Numbering Plan allows extension-to-port assignments to be changed from the programming terminal. This permits extensions to be relocated in a facility without having to reprogram or alter the cabling which connects the extensions to the KSU.

### Conditions:

- (a) Features are assigned to extension numbers, not ports. If a telephone is moved, reassigning the ports enables all of the features (including the extension number) at the new location.
- (b) A port is a fixed location in the KSU.

### Required Programming:

'E' --> STATIONS FEATURES  
PORT NUMBER..... to assign extensions to ports.

### Feature Reference:

Changing the extension-to-port assignment can affect all features that are altered through system or user programming.

## FORCED INTERCOM RINGING

### Description:

Forced Intercom Ringing causes all Intercom calls to multibutton and four button telephones to ring. When Forced Intercom Ringing is enabled, Handsfree Answerback is disabled. Forced Intercom Ringing can be initiated on a system-wide basis from the programming terminal, or individually by the extension user.

### Conditions:

- (a) If Forced Intercom Ringing is enabled on a system-wide basis, it can not be overridden on a per-extension basis.
- (b) A multibutton or four button telephone user can enable Forced Intercom Ringing for all incoming Intercom calls.
- (c) Any telephone user can enable Forced Intercom Ringing as an Intercom call is placed.
- (d) A multibutton extension with a speakerphone can use Handsfree to answer a ringing Intercom call. All other stations must lift the handset to answer the ringing call.

### Required Programming:

'S' --> SYSTEM FEATURES  
'F' --> SYSTEM OPTIONS  
OPTION 06... to enable Forced Intercom Ringing on a systemwide basis.

### Feature Reference:

Handsfree  
Handsfree Answerback  
Intercom

## HANDSFREE (SPEAKERPHONE)

### Description:

Handsfree permits Intercom and CO calls to be placed and answered using the microphone and speaker in the multibutton telephone, instead of the handset. All multibutton telephones equipped with speakerphones have Handsfree capability.

### Conditions:

- (a) Multibutton telephones equipped with speakerphone have an HF key.

**Required Programming:** not applicable

### Feature Reference:

Handsfree Answerback  
Monitor

## HANDSFREE ANSWERBACK

### Description:

Handsfree Answerback allows Intercom calls to be answered using the speaker and microphone in the telephone, instead of the handset. Intercom calls to four button and multibutton telephones are normally received in the Handsfree Answerback mode.

### Conditions:

- (a) All multibutton and four button telephones have Handsfree Answerback capability.
- (b) Handsfree Answerback cannot occur if Forced Intercom Ringing is enabled for the system, or if the call was placed using a leading 1.

### Required Programming:

'S' --> SYSTEM FEATURES  
'F' --> SYSTEM OPTIONS  
OPTION 06... to enable Forced Intercom Ringing on a systemwide basis.

### Feature Reference:

Forced Intercom Ringing  
Handsfree  
Intercom  
Monitor

## HEADSET COMPATIBILITY

### Description:

An electret type modular headset can be used with digital dial telephones in the system. The headset replaces the handset, and the telephone must be programmed for the headset mode. The Handsfree (HF) key acts as a hookswitch for the telephone.

### Conditions:

Headsets can be used *only* on digital dial telephones.

**Required Programming:** None

### Feature Reference:

Answering a Call  
Handsfree

## HOLD

Hold places a call in a temporary waiting condition. There are two types of Hold: Automatic Hold and Exclusive Hold.

### Automatic Hold

#### Description:

Automatic Hold allows the attendant to answer an outside call, place it on Exclusive Hold and answer another outside call without using the HOLD key. When the attendant presses another incoming or outgoing line key, the initial call is put on Exclusive Hold automatically.

#### Conditions:

- (a) Automatic Hold is available only to the attendant.
- (b) A call placed on Automatic Hold re-rings the attendant after the Hold Recall interval.
- (c) An attendant must have a DSS Console programmed to enable Automatic Hold.

#### Required Programming:

'S' --> SYSTEM FEATURES  
'O' --> OPERATORS & DSS to assign attendants and DSS Consoles.  
'M' --> TIMERS  
HOLD RECALL TIMER.(SEC).. to set the Hold Recall interval.

#### Feature Reference:

Answering a Call  
Placing a Call





## Exclusive Hold

### Description:

A call put on Exclusive Hold can be picked up only at the extension where the call was placed on Hold. The Exclusive Hold indication is a flashing line key LED at the extension which placed the call on Hold. If the call is left on Exclusive Hold longer than the Hold Recall interval, it re-rings the extension where it was placed on Hold. If still unanswered, it rings at the attendant's telephone.

### Conditions:

Hold Recall rings the extension which placed the call on Hold for one minute. If the call is not answered within one minute, it rings the attendant's telephone.

### Required Programming:

'S' --> SYSTEM FEATURES  
'M' --> TIMERS  
HOLD RECALL TIMER.(SEC).. to program the Hold Recall interval.

### Feature Reference:

Hold Recall

## HOLD RECALL

### Description:

Hold Recall prevents a call on Hold from being forgotten. The system automatically resignals the extension where the call was placed on Hold after a programmed period of time (the Hold Recall interval). If the call remains unanswered at the initiating extension, it rings the attendant's telephone.

### Conditions:

- (a) The Hold Recall interval is programmable.
- (b) Hold Recall rings the extension where the call was placed on Hold for a period of one minute. If the call is not answered within one minute, it rings at the attendant telephone.

### Required Programming:

'S' --> SYSTEM FEATURES  
'M' --> TIMERS  
HOLD RECALL TIMER.(SEC).. to program the Hold Recall interval.

### Feature Reference:

Hold

## HOTLINE

### Description:

Hotline directly connects two multibutton telephones for one button communication and call Transfer. The HL key serves as a DSS key and busy lamp for the Hotline partner. It also can be used to Transfer calls to the Hotline partner.

### Conditions:

- (a) Single line, 2500 type, and four button telephones should not have Hotline partners.
- (b) The Hotline partner can override Do Not Disturb.
- (c) The attendant can be programmed with a Hotline partner. The HL lamp indication at the attendant's telephone is prevented if the attendant also has a DSS Console programmed.
- (d) The system can accommodate 64 Hotline pairs. For standard Hotline operation, each extension can have only one Hotline partner.
- (e) The higher number in the Hotline pair is assigned as the secretary in an executive/secretary arrangement. The secretary/receptionist has a flashing line key for a call transferred to the executive. A call transferred to a busy executive telephone is automatically transferred to the secretary.
- (f) A call transferred to the secretary in a Hotline pair is indicated on the secretary's telephone as an "Off Fluttering" incoming line key. A call transferred to the executive in a Hotline pair is indicated on the secretary's telephone as an "On Fluttering" incoming line key.

(g) The system can be programmed so that extensions are part of Hotline groups, rather than assigned to a single Hotline partner. The extension assigned as the secretary/receptionist in the group must always have the highest extension number. Any calls transferred from any other extension in the group can be transferred to the secretary/receptionist by using the HL key. The extension reached when the secretary/receptionist presses the HL key is determined in programming.

### Required Programming:

'S' --> SYSTEM FEATURES  
'F' --> SYSTEM OPTIONS  
OPTION 23...to allow Hotline partners to override the partner extension's DND.  
'E' --> STATIONS FEATURES  
HOT-LINE KEY..... to assign Hotline partners.  
'T' --> SYSTEM INITIALIZATION  
Sub-Field # 8 (STATIONS 'HOT-LINE KEY') to initialize Hotline pairings.

### Feature Reference:

Do Not Disturb  
Intercom  
Transfer

## INTERCOM

### Description:

Intercom enables any extension user in the system to call any other extension in the system. Intercom calls to multibutton and four button telephones are normally answered using Handsfree Answerback. If Forced Intercom Ringing is enabled, all Intercom calls to telephones without speakerphones must be answered by lifting the handset.

### Conditions:

- (a) Intercom calls can be placed to other extensions in the system by dialing the extension number. Intercom calls can be placed to the primary attendant by dialing 0.
- (b) Only the attendant can place Intercom calls to multibutton telephones in Do Not Disturb.

### Required Programming:

'S' --> SYSTEM FEATURES  
'O' --> OPERATORS & DSS  
OPERATOR 1 IS..... to assign the primary attendant (i.e., the extension reached by dialing 0).  
'F' --> SYSTEM OPTIONS  
OPTION 06... to enable Forced Intercom Ringing on a systemwide basis.

### Feature Reference:

Direct Station Selection  
Handsfree Answerback  
Hotline  
Microphone Cutoff/Mute

## LAST NUMBER REDIAL

### Description:

At each extension, Last Number Redial stores the last number dialed (up to a maximum of 16 digits) so that it can be automatically redialed at a later time. The last number dialed is stored in memory regardless of whether the call was answered, unanswered or busy.

### Conditions:

- (a) Last Number Redial can redial manually dialed or Speed Dial calls.
- (b) Last Number Redial calls can be identified on the SMDR by the code ERD. System Option 16 must be enabled for this code to appear.
- (c) Calls placed using Last Number Redial are subject to the same Toll Restrictions as manually dialed calls.
- (d) The number stored in system memory for Last Number Redial is erased if commercial power should fail or the system is reset.

### Required Programming:

'S' --> SYSTEM FEATURES  
'F' --> SYSTEM OPTIONS  
OPTION 16...to allow the code ERD to print on the SMDR.

### Feature Reference:

Placing a Call  
Speed Dial  
Station Message Detail Recording

## LEAST COST ROUTING

### Description:

Least Cost Routing (LCR) automatically places outgoing calls on the least expensive route. LCR uses rate structure software, customized for each installation, to evaluate up to ten service types to determine the most economical service for the call being placed.

When LCR is installed, Multibutton telephones use outgoing line keys 12 and 13 to place calls. Outgoing calls from Single Line, 2500 type, and Four Button telephones, Speed Dial calls, Saved calls and Last Number Redial calls are automatically placed using Least Cost Routing.

### Conditions:

- (a) Least Cost Routing cannot be installed unless the Least Cost Routing Questionnaire has been completed. This questionnaire allows the customized software to be developed. The Least Cost Routing questionnaire is available from a sales representative.
- (b) Toll Restriction applies to all calls placed using LCR.
- (c) Least Cost Routing Bypass can be bypassed.

### Required Programming:

'S' --> SYSTEM FEATURES

'L' --> LEAST COST ROUTING to program LCR parameters.

'G' --> CO GROUPS to assign lines to line groups.

'K' --> COS ALLOWED AREA CODES to assign dialing restrictions to area codes.

'F' --> SYSTEM OPTIONS

OPTION 22.. to enable use of the NNN Table for LCR.

'T' --> SYSTEM INITIALIZATION

Sub-Field # 2 (LCR NNN BYPASS TABLE) to initialize the LCR NNN Bypass table.

Sub-Field # 21 (LEAST COST ROUTING) to initialize all LCR data.

'E' --> STATIONS FEATURES

CLASS OF SERVICE..... to program an extension's Class of Service.

### Feature Reference:

Class of Service  
Least Cost Routing Bypass  
Placing a Call  
Toll Restriction

## LEAST COST ROUTING BYPASS

### Description:

Least Cost Routing Bypass allows Least Cost Routing to be bypassed if an area code or exchange is dialed that was not included in the rate structure software. The call is automatically placed on a Direct Distance Dialing line. Additionally, Multibutton telephone users can bypass LCR by pressing outgoing line keys 8-11, or by dial-accessing a line group (if allowed). The system attendants may use keys 8-11, dial-accessing a line group, or Direct Line Access to bypass LCR.

### Conditions:

- (a) Least Cost Routing Bypass does not override Toll Restriction.
- (b) If a call is placed using an area code or exchange not recognized by the rate structure software, SMDR and telephone displays show the cost of the call at \$9.99 per minute. An excessive amount of calls placed using LCR Bypass indicates that a Least Cost Routing software update is required.
- (c) Single Line, 2500 type, and Four Button extensions cannot select an outgoing line group to bypass LCR.

### Required Programming:

'S' --> SYSTEM FEATURES

'L' --> LEAST COST ROUTING to program LCR.

### Feature Reference:

Least Cost Routing  
Placing a Call  
Toll Restriction

## LINE GROUPS, OUTGOING

### Description:

Lines are arranged into line groups to allow outgoing calls to be placed. Similar lines, such as Direct Distance Dialing (DDD) lines, WATS lines or Other Common Carrier (OCC) lines are generally programmed into the same line group to provide for efficient management of the cost of placing calls.

Multibutton telephone users access a line group by pressing an outgoing line key or dialing an access code. Single Line, 2500 type, and Four Button telephone users access a line group by dialing an access code.

### Conditions:

- (a) Up to ten line groups can be assigned. Any number of lines can be programmed into the same line group.
- (b) When a call is placed, the highest-numbered available line in a line group is seized.
- (c) When an extension queues on a line, the recall is from the first available line in the same line group as the line initially queued on.
- (d) Unless programmed otherwise, Speed Dial always dials on line group 1.
- (e) If Least Cost Routing is installed, correct line group assignments are essential.

### Required Programming:

- 'S' --> SYSTEM FEATURES
- 'L' --> LEAST COST ROUTING to program LCR.
- 'G' --> CO GROUPS to assign lines to line groups.
- 'P' --> CO TYPE to program line type.
- 'T' --> SYSTEM INITIALIZATION
- Sub-Field #3 (CO GROUPS) to initialize line group assignments.

### Feature Reference:

Least Cost Routing  
Line Queuing  
Placing a Call  
Speed Dial

## LINE QUEUING

### Description:

Line Queuing permits an extension user to queue (wait in line) for an outside line if all lines in the outgoing line group are busy. The extension is recalled when the first line in the line group becomes available. Any number of extensions can queue on a line. The system calls the extensions queued, in order, when a line in the line group becomes free. If the queue recall is not answered within 15 seconds (approx.), it passes to the next extension in the queue.

### Conditions:

- (a) An extension can be used to queue for a line only when all lines in a line group are busy.
- (b) Every time a line is queued on (Line Queuing), or a message is left (Message Waiting), a system memory element is consumed. The total number of elements consumed (i.e., the sum of lines queued and messages left) at any one time cannot exceed 128.
- (c) If Least Cost Routing is installed and the least expensive route is busy, Multibutton and Four Button telephone users can queue for a line.
- (d) System attendants cannot queue for a line.
- (e) A passed extension is removed from the queue; it is not recalled a second time.
- (f) If a telephone has a Callback or Line Queue active (i.e., waiting for a Callback ring from a busy extension or line group), initiating another Line Queue or Callback cancels the first.

### Required Programming:

- 'S' --> SYSTEM FEATURES
- 'G' --> CO GROUPS to assign lines to line groups.
- 'N' --> OUT KEYS GROUPS to assign line groups to a multibutton telephone's outgoing line keys.
- 'E' --> STATIONS FEATURES
- CO ACCESS [NN..NN] IS.. to permit extensions to place calls.

### Feature Reference:

Least Cost Routing  
Message Waiting  
Placing a Call



## MESSAGE WAITING

### Description:

Message Waiting enables a Multibutton or Four Button telephone user to leave a Message Waiting indication at a called Multibutton or Four Button telephone that is unattended or busy. The Message Waiting indication is a flashing M.WAIT key (HLD/TRF on Four Button) and a tone at the extension where the message was left. The tone is broadcast every two minutes to remind the user that a message has been left.

### Conditions:

- (a) Single Line and 2500 type telephones cannot use the Message Waiting facility.
- (b) An extension can leave or receive more than one Message Waiting.
- (c) Messages are queued in the order in which they are left.
- (d) Message Waiting indications can be canceled at the telephone where they were left (i.e., the telephone receiving the Message Waiting request), or at the extension which placed the message.
- (e) Every time a line is queued on (Line Queuing), or a message is left (Message Waiting), a system memory element is consumed. The total number of elements consumed (i.e., the sum of lines queued and messages left) at any one time cannot exceed 128.
- (f) The Message Waiting reminder can be disabled in programming.

### Required Programming:

'S' --> SYSTEM FEATURES  
'F' --> SYSTEM OPTIONS  
OPTION 19... to disable the Message Waiting reminder.

### Feature Reference:

Callback  
Direct Station Selection  
Hotline  
Intercom  
Line Queuing

## MICROPHONE CUTOFF/MUTE

### Description:

Microphone Cutoff/Mute allows a Multibutton telephone user to turn off the microphone in the telephone at any time. This prevents the calling party from hearing conversations in the user's office or work area. The microphone can be turned off before the call comes in (Microphone Cutoff), or while it is in progress (Microphone Mute).

### Conditions:

- (a) Single Line, 2500 type, and Four Button telephones do not have Microphone Cutoff/Mute.
- (b) The attendant does not have access to Microphone Cutoff/Mute.

### Required Programming:

'E' --> STATIONS FEATURES  
TYPE OF PHONE..... to program the extension as KEY.

### Feature Reference:

Handsfree  
Handsfree Answerback

## MONITOR

### Description:

Monitor permits Four Button telephone users to dial and monitor the progress of an outside call without lifting the handset. The handset must be lifted to speak.

### Conditions:

- (a) Single Line and 2500 type telephones do not have Monitor capability.

### Required Programming:

'E' --> STATIONS FEATURES  
TYPE OF PHONE..... to SLI to Four Button telephones.

### Feature Reference:

Answering a Call  
Handsfree  
Placing a Call

## MUSIC ON HOLD/BACKGROUND MUSIC

### Description:

Music On Hold (MOH) and Background Music (BGM) can be connected to the system. Background Music is broadcast through the speaker in the telephone and is controlled by the left volume control thumbwheel. The HOLD key is pressed to turn BGM on and off. BGM can also be broadcast over External Paging equipment. On display telephones, the VOL UP and VOL DN keys are used to control the volume of BGM.

Music On Hold provides music to outside calls that have been placed on Hold.

### Conditions:

- (a) BGM and MOH require the installation of optional music sources. BGM and MOH can share the same music source.
- (b) If BGM is to be broadcast over External Paging equipment, optional Paging equipment must be installed. BGM is turned off when Paging announcements are made and when calls ring into the system.
- (c) Single Line and 2500 type telephones cannot broadcast BGM.

### Required Programming:

'S' --> SYSTEM FEATURES  
 'F' --> SYSTEM OPTIONS  
 OPTION 02...to enable MOH for the system.

### Feature Reference:

Hold  
 Night Service  
 Paging

## NIGHT SERVICE

### Description:

#### Assigned Night Answer

Assigned Night Answer (ANA) automatically transfers incoming ringing to specific extensions when Night Service is enabled. Extensions that do not receive line ringing and incoming access during day hours can be programmed for Assigned Night Answer. Assigned Night Answer must be individually programmed for each extension.

### Universal Night Answer

When the system is enabled for Night Service, Universal Night Answer (UNA) allows calls which ring over the External Paging equipment or alerting device to be answered at designated extensions. Extensions which do not receive line ringing and incoming access during day hours can answer Universal Night Answer lines when the system is in the night mode. UNA must be individually programmed for each line.

### Conditions:

- (a) Only system attendants can place the system in the night mode.
- (b) When more than one incoming CO line call is ringing while the system is in the night mode, Single Line, 2500 type, and Four Button telephones can automatically access the first incoming call when the handset is lifted.
- (c) If an extension has CO AUDIBLE [NN..NN] IS... granted for a line, it can always answer an incoming call on that line. The night mode requires UNA procedures.
- (d) Universal Night Answer and Assigned Night Answer do not allow extensions to be used to place outgoing night mode calls on lines not allowed by CO ACCESS [NN..NN] IS... assignments.
- (e) Private Lines cannot be used for UNA and ANA.
- (f) If a power failure occurs when the system is enabled for Night Service, the system returns to the night mode when the power is restored.

### Required Programming:

'S' --> SYSTEM FEATURES  
 'P' --> CO TYPE to program lines for UNA.  
 'T' --> SYSTEM INITIALIZATION  
 Sub-Field # 27 (STATIONS 'NT AUDIBLE') to initialize night audible assignments.  
 'E' --> STATIONS FEATURES  
 PRIVATE LINE.....IS... to assign a line as a Private Line.

### Feature Reference:

Answering a Call  
 External Loud Ringing Capability  
 External Paging Zones



## OFF PREMISES EXTENSION (OPX) COMPATIBILITY

### Description:

In the TCX-128, 2500 type telephones can be installed as Off Premises Extensions (OPXs). Off Premises Extensions have access to all the features available to on premises 2500 type telephones.

### Conditions:

- (a) Additional OPX equipment must be installed before OPX telephones can be connected to the system. This equipment consists of a separate KSU with power supply, and a ring generator. In addition, one B-OPX-A Adapter Printed Circuit Board (P/N 86043) must be purchased for each OPX to be installed. Refer to publication P/N 00251 for additional details.
- (b) An OPX circuit must be ordered from the telco.

### Required Programming:

'E' --> STATIONS FEATURES  
TYPE OF PHONE..... to program OPXs as type 500.

### Feature Reference:

OPX telephones can access all the features of 2500 type telephones.

## PAGING

### Description:

Paging allows the user to page selected areas (Zone Page), or throughout the entire system (All Call Page). Extensions can be individually assigned to receive Paging announcements from any combination of All Call Page and the eight internal Paging Zones.

### Conditions:

- (a) Single line and 2500 type telephones cannot receive Paging announcements. They can, however, initiate Paging announcements.
- (b) A second B-TGU-C PCB must be installed if Paging should be broadcast to stations connected to expansion cabinet (ports 065-128).

### Required Programming:

'E' --> STATIONS FEATURES  
RECEIVE ALL-PAGE.....to program each extension to receive All Call Page announcements.  
PAGE ZONE RECEIVED..... to program which Page zones each extension receives.  
'T' --> SYSTEM INITIALIZATION  
Sub-Field # 17 (STATIONS 'PAGE ZONE RECEIVED') to initialize Page Zone assignments.

### Feature Reference:

External Paging Zone

## PARK

### Description:

Park allows an extension user to place an outside call in a Park (waiting) condition, page a third party and have that party pick up the Parked call from any telephone in the system. There are two types of Park: General Park and Personal Park.

A call in a General Park Orbit can be picked up by any extension in the system by dialing a General Park Orbit Code. The code must be announced when the call is placed in orbit.

Personal Park allows the user to Park a call at a specific extension. Once parked at the extension, any extension in the system can be used to pick up the call. The extension at which the call is parked must be announced.

## Conditions:

- (a) The system has ten General Park Orbits.
- (b) There is no limit to the number of Personal Park conditions that can be active in the system at any one time.
- (c) If more than one call was parked at an extension (Personal Park), the first call parked is the first call picked up.
- (d) Every extension in the system can use the General Park and Personal Park facilities.
- (e) A call placed in General Park Orbit that is not picked up recalls the extension where it was placed in orbit after the ORBIT RECALL TIMER.(SEC)..... interval. The call rings at the extension which placed it in orbit for 60 seconds, and is then automatically passed to the primary attendant.
- (f) A call placed in Personal Park Orbit that is not picked up recalls the extension where it was placed in orbit after the TRANS RECALL.(SEC)..... interval. The call rings at the extension where it was placed in orbit for 30 seconds, and is then automatically passed to the primary attendant.

## Required Programming:

'S' --> SYSTEM FEATURES

'M' --> TIMERS

ORBIT RECALL TIMER.(SEC). to program the General Park Orbit recall time.

TRANS RECALL.(SEC)..... to program the Personal Park recall time.

## Feature Reference:

Answering a Call  
Paging  
Transfer

## PLACING A CALL

### Description:

Any extension user has the capability to place any call on any line, unless restrictions have been imposed by system programming. Toll Restriction may impose dialing limitations, and outgoing access to specific lines may be denied.

Multibutton telephone users place outgoing calls by using the outgoing line keys (keys 8-13) or by dialing access codes. Single Line, 2500 type, and Four Button telephone users place outgoing calls by dialing access codes. If Least Cost Routing is installed, Multibutton telephone users place LCR calls by using outgoing line keys 12 and 13. Outgoing calls from Single Line, 2500 type and Four Button telephones are routed via LCR automatically.

### Conditions:

- (a) Extension users may be required to dial a PBX access code if the system is installed behind a PBX.
- (b) Extension users place calls by accessing line groups, rather than specific lines. The attendant may also access line groups, or may use Direct Line Access to seize a particular line.
- (c) If LCR is installed, the cost of outgoing calls is displayed on the SMDR and on the telephone display.
- (d) Lines may be designated as incoming only. These lines cannot be used to place outgoing calls.

### Required Programming:

'S' --> SYSTEM FEATURES

'L' --> LEAST COST ROUTING to program LCR.

'P' --> CO TYPE to program line type.

'A' --> OFFICE CODE TYPES to program office and area code type.

'K' --> COS ALLOWED AREA CODES to assign Class of Service to all area codes.

'E' --> STATIONS FEATURES

CLASS OF SERVICE..... to assign Class of Service for each extension.

CO ACCESS [NN..NN] IS.. to program outgoing access to lines on a per-extension basis.

### Feature Reference:

Class of Service  
Least Cost Routing  
Toll Restriction





## POWER FAILURE RESTART

### Description:

Power Failure Restart ensures that system memory is retained in the event of a commercial AC power failure. When the AC source is restored, the system automatically restarts and returns all stations to service. This is accomplished in two ways:

- (a) Non-volatile (permanent) Erasable Programmable Read Only Memory (EPROM) integrated circuits are used to store the system operating software. The software is permanently "burned" into each EPROM device and is retained even when no power is applied.
- (b) The volatile (non-permanent) Random Access Memory (RAM) devices that are used to store the system programmable options and Speed Dial numbers are battery backed up. The battery is a rechargeable Nickel Cadmium (NICAD) cell which is continually charged when the system is powered up. If power should fail, the programmable options and Speed Dial numbers are retained for up to ten days.

### Conditions:

- (a) Any active conditions in the system (such as Line Queuing, Callback, etc.) are canceled if power fails.
- (b) Save and Last Number Redial numbers are erased when power fails.
- (c) All calls are dropped when AC power fails.
- (d) The B-CPU-D PCB must be correctly strapped for the NICAD battery to protect the RAM memory. Refer to Section 3, INSTALLATION for additional details.
- (e) After commercial power is restored, Single Line and 2500 type telephones must be cycled off hook, then on hook to return them to service.
- (f) Power failure cut-through requires the installation of customer provided equipment. The TCX-128 does not accommodate automatic cut-through.

**Required Programming:** not applicable

### Feature Reference:

Answering a Call  
Last Number Redial  
Placing a Call  
Save  
Speed Dial

## PRIVACY

### Description:

Privacy is assured on all Intercom and outside calls. Privacy can only be overridden by the Barge In facility.

### Conditions:

- (a) Only Multibutton telephones can Barge In.
- (b) Each extension in the system can be programmed to block Barge In (thereby assuring complete Privacy).

### Required Programming:

'E' --> STATIONS FEATURES  
BARGE IN ENABLED...to allow Multibutton telephones to Barge In.  
BLOCK BARGE ENABLED... to allow any extension to block (prevent) Barge In.

### Feature Reference:

Answering a Call  
Barge In  
Intercom  
Placing a Call

## PRIVATE BRANCH EXCHANGE (PBX) COMPATIBILITY

### Description:

The system may be installed behind a Private Branch Exchange (PBX). The line inputs into the KSU are then 500/2500 compatible PBX extensions, rather than CO lines. When a line is assigned in system programming as a PBX line, the first digit dialed (which is normally the PBX access code) is ignored in the outgoing Toll Restriction check.

### Conditions:

CO and PBX lines can be arranged in any combination; however, additional customer-provided installation hardware (an "A" block) and the services of a certified installer are required.

### Required Programming:

'S' --> SYSTEM FEATURES

'P' --> CO TYPE to assign lines as PBX lines.

'T' --> SYSTEM INITIALIZATION

Sub-Field # 25 (PBX OUT ACCS CODES AND C.O.S.) to initialize PBX access code assignments.

### Feature Reference:

Placing a Call  
Toll Restriction

## PRIVATE LINE

### Description:

Any Multibutton extension in the system can have two Private Lines assigned to it, reserved exclusively for use when placing outgoing calls. If desired, the Private Lines can also be dedicated to the extension for incoming calls. The Private Lines are accessed and answered using incoming line keys 4 and 5. If a call ringing in on a Private Line remains unanswered, it rings at the attendant's telephone until it is answered or abandoned.

### Conditions:

- (a) The system can accommodate up to 32 Private Lines.
- (b) A Private Line cannot be used by any other extension in the system to place calls.
- (c) A Private Line can be programmed to ring at other extensions in the system, or may be fully restricted for both incoming and outgoing access.
- (d) Once answered, a Private Line can be transferred to any other extension in the system.
- (e) When the system is put in the night mode, a Private Line cannot be accessed from a Single Line, 2500 type, or Four Button telephone by dialing 69. Private Lines do not activate the night ring relay, they should not be assigned as Universal Night Answer lines.
- (f) A Multibutton or Four Button telephone user cannot use Group Call Pickup to answer a call ringing in on another extension's Private Line(s).
- (g) Private Lines can be shared by more than one extension.
- (h) Toll Restriction always applies to calls made on Private Lines.

### Required Programming:

'S' --> SYSTEM FEATURES

'P' --> CO TYPE to exclude Private Lines for UNA.

'E' --> STATIONS FEATURES

CO AUDIBLE [NN..NN] IS.. to restrict or allow other extensions in the system to answer a Private Line. In addition, an extension must have CO AUDIBLE granted for its Private Line. This enables incoming line key 5 to flash when a Private Line call is ringing into the system.

PRIVATE LINE.....IS... to assign Private Lines.

'T' --> SYSTEM INITIALIZATION

Sub-Field # 16 (STATION 'PRIVATE LINES') to initialize Private Line assignments.

### Feature Reference:

Answering a Call  
Placing a Call  
Toll Restriction

## RELEASE

### Description:

Release allows the attendant to terminate a call, without replacing the handset, by pressing the RLS key. The Release feature is useful if the attendant is using a customer-provided headset or the Handsfree mode to answer and place calls.

### Conditions:

- (a) Release is a feature reserved for the system attendants.
- (b) The attendant telephone must be a multibutton or display telephone.
- (c) Release disconnects the line.

### Required Programming:

'S' --> SYSTEM FEATURES  
'O' --> OPERATORS & DSS to assign operators and alternate attendants.

### Feature Reference:

Placing a Call

## REMOTE MODEM ACCESS

### Description:

A modem is located on the B-CPU-D PCB which can be accessed from a remote terminal. This terminal can then access system programming, or obtain diagnostic information. Details on Remote Modem Access are located in Appendix I, REMOTE MODEM ACCESS.

### Conditions:

The system must be equipped with B-TGU-C PCBs (see Appendix I).

**Required Programming:** See Appendix I for details.

**Feature Reference:** See Appendix I for details.

## REMOTE RESET

### Description:

The system can be reset remotely using a customer-provided external modem, which is connected to the RS-232-C port in the KSU.

**Conditions:** None

### Required Programming:

'I' --> SYSTEM INITIALIZATION  
Sub-Field #33 to reset the system from a programming terminal.

### Feature Reference:

Selective Initialization

## SAVE

### Description:

The Save feature permits a Multibutton telephone user to store a frequently called number for automatic dialing at a later time. A saved number remains stored until a new number is saved in its place.

### Conditions:

- (a) Save is available to Multibutton telephones only.
- (b) Save has no effect on Last Number Redial.
- (c) System and Extension Speed Dial numbers can be saved.
- (d) Display telephones have a SAVE key on the dialpad which can be used instead of the SAVE feature key, if desired.
- (e) The number stored in system memory for Save is erased if commercial power fails or the system is reset.

**Required Programming:** not applicable

### Feature Reference:

Last Number Redial  
Placing a Call  
Speed Dial

## SELECTIVE INITIALIZATION

### Description:

All or designated portions of system programming can be returned to default values, if desired.

**Conditions:** None

### Required Programming:

'I' --> SYSTEM INITIALIZATION (any desired sub-field).

### Feature Reference:

All features that are affected by programming.

## SIGNAL BUSY OPERATOR

### Description:

When an extension user attempts to call the attendant, and the attendant is busy, the extension user hears a Camp-On tone, then ringing. The attendant is alerted to the call from the extension by a flashing RELEASE key, and a flashing DSS key assigned to the extension (if a DSS Console is installed).

**Conditions:** not applicable

### Required Programming:

'S' --> SYSTEM FEATURES  
'O' --> OPERATORS AND DSS to assign the attendant telephones and DSS Consoles.

**Feature Reference:** None

## SPEED DIAL

Speed Dial permits extensions to dial stored telephone numbers. There are two types of Speed Dial: Extension Speed Dial and System Speed Dial. Extension Speed Dial allows 14 Speed Dial numbers to be stored at a Multibutton telephone, and 10 Speed Dial numbers to be stored at a Single Line, 2500 type, or Four Button telephone. These numbers are exclusively for the use of the extension where they are stored. System Speed Dial provides 100 stored numbers that are available to every telephone in the system by dialing designated System Speed Dial codes.

Unlike Save and Last Number Redial, Speed Dial numbers are stored in battery backed-up system memory and remain until they are erased or replaced.

## Extension Speed Dial

### Description:

Extension Speed Dial permits the first 50 extensions (301 to 350) in the system to store telephone numbers for automatic dialing. Extension Speed Dial numbers are stored in "bins." Each bin can accommodate up to 16 digits. Bins can be chained (linked together) to allow automatic dialing of numbers longer than 16 digits. "Chaining" is useful for services such as MCI or Sprint.

### Conditions:

- (a) Multibutton telephones have access to 14 dedicated Extension Speed Dial bins. Each Four Button, Single Line and 2500 type telephone has access to 10 dedicated Extension Speed Dial bins.
- (b) The system usually uses line group 1 to place Speed Dial calls; however, the line on which the call is to be placed can be pre-selected, and entered into the Extension Speed Dial bin. If Least Cost Routing is installed, the route for the Speed Dial call is automatically selected.
- (c) A pause may be entered into an Extension Speed Dial bin by entering the character #. The length of the pause is programmed during system installation. Refer to Speed Dial Options.
- (d) Multibutton telephone users can manually chain two Extension Speed Dial bins. All telephone users can chain up to three Extension Speed Dial numbers to a System Speed Dial number.
- (e) All telephone users can manually dial after an Extension Speed Dial bin has dialed out, if Class of Service restrictions permit.
- (f) Station Message Detail Recording can be programmed to print the Speed Dial bin number as part of the call record. If bins are chained, the first and the last bin number print.

### Required Programming:

'E' --> STATIONS FEATURES  
 CLASS OF SERVICE..... to program outgoing dialing restrictions on a per-extension basis.  
 CO ACCESS [NN..NN] IS.. to give stations outgoing access to lines in group 1.

'S' --> SYSTEM FEATURES  
 'M' --> TIMERS  
 PAUSE TIME-OUT.(SEC)..... to program the duration of the pause encountered when # is entered into the bin.

'L' --> LEAST COST ROUTING to enable LCR.  
 'G' --> CO GROUPS to assign lines to group 1 (line group normally used for Speed Dial calls).  
 'K' --> COS ALLOWED AREA CODES to assign a Class of Service to each area code.  
 'F' --> SYSTEM OPTIONS  
 OPTION 16...to allow bin numbers to print as part of the SMDR call record.

### Feature Reference:

Placing a Call  
 Speed Dial Options

### System Speed Dial

#### Description:

System Speed Dial permits every extension in the system to access 100 telephone numbers stored by the attendant in System Speed Dial bins. These numbers can be automatically dialed from any extension in the system using a three-digit code. Each bin can accommodate 16 digits; however, Speed Dial System bins may be automatically chained (linked together) to allow automatic dialing of numbers longer than 16 digits. Chaining is useful for services such as MCI or Sprint. In addition, special Speed Dial Options can be entered into the bins to provide for unique Speed Dial features.

### Conditions:

- (a) Extension Class of Service programming can impose dialing restrictions on System Speed Dial numbers.
- (b) The attendant can program System Speed Dial bins so that they will always dial out together. There is no limit to the number of bins that can be chained in this manner.
- (c) All extensions can manually dial after a System Speed Dial number has dialed out, if Class of Service restrictions or Speed Dial Options permit.
- (d) Any user in the system can select up to four System Speed Dial bins to be chained. Any user can also select up to three Extension Speed Dial bins to be chained to a System Speed Dial bin.
- (e) The attendant can program a System Speed Dial bin so that Multibutton telephone users can chain it to an Extension Speed Dial bin just by pressing the extension bin key. Refer to Speed Dial Options (Simplified Manual Chaining Option).
- (f) If LCR is installed, System Speed Dial calls are automatically placed on the least expensive route.
- (g) If the system is equipped with DISA lines, the DISA Access Code *must* be stored in the *last* System Speed Dial bin (bin 99) preceded by the directive \*1.

### Required Programming:

'E' --> STATIONS FEATURES  
 CLASS OF SERVICE..... to program outgoing dialing restrictions on a per-extension basis.  
 CO ACCESS [NN..NN] IS.. to give extensions outgoing access to lines in group 1.

'S' --> SYSTEM FEATURES  
 'L' --> LEAST COST ROUTING to program LCR.  
 'G' --> CO GROUPS to assign lines to group 1 (line group normally used for Speed Dial calls).  
 'K' --> COS ALLOWED AREA CODES to assign a Class of Service to each area code.

### Feature Reference:

Placing a Call  
 Speed Dial Options

**SPEED DIAL OPTIONS**

Speed Dial Options can be entered into Speed Dial bins to increase the flexibility of Speed Dialing. Each character in the option is counted as a digit.

**Pause Option — #****Description:**

The # key allows a pause to be entered into a System or Extension Speed Dial bin. The duration of the pause is programmed during system installation. More than one pause can be programmed into a bin and each # counts as a digit.

Pauses are typically entered into Speed Dial bins when the system is installed behind a PBX. For example, if the PBX access code for an outside line is 9, and the number to be Speed Dialed on the outside line is 12039262000, the bin would be programmed as 9#12039262000.

**Conditions:**

A # can be entered anywhere in a System or Extension Speed Dial bin.

**Required Programming:**

'S' --> SYSTEM FEATURES

'M' --> TIMERS

PAUSE TIME-OUT.(SEC). to program the duration of the pause that occurs when # is entered into a bin.

**Feature Reference:**

Placing a Call  
Speed Dial

**Automatic Chaining Option — \*1****Description:**

The command \*1 allows System Speed Dial bins to be automatically chained. A System Speed Dial bin ending in \*1 is automatically chained to the next consecutive System Speed Dial bin. This is useful if an OCC access or security code is longer than 16 digits. The \*1 counts as two digits. More than one bin can be automatically chained using the \*1 directive.

For example, if the OCC access and security code 213444858512129999 is to be programmed into System Speed Bins 01 and 02, enter 213444\*1 into bin 01 and 858512129999 into bin 02. The bins consecutively dial out when 801 is dialed.

**Conditions:**

There is no limit to the number of bins that can be chained using the \*1 directive.

**Required Programming:** not applicable

**Feature Reference:**

Placing a Call  
Speed Dial

**Simplified Manual Chaining Option — \*2\*****Description:**

The directive \*2\* simplifies the way an Extension Speed Dial bin is chained to a System Speed Dial bin. If \*2\* is entered at the end of the System Speed Dial bin, Multibutton telephone user only has to press the Extension Speed Dial bin key to chain the System Speed Dial bin to the Extension Speed Dial bin. The \*2\* command counts three digits.

**Conditions:**

The \*2\* directive has no effect on the way Single Line 2500 type and Four Button telephones use the System Speed Dial bin.

**Required Programming:** not applicable

**Feature Reference:**

Placing a Call  
Speed Dial

**Bypass Toll Restriction Option — \*3****Description:**

When entered at the beginning of a System Speed Dial bin, the \*3 command prevents the number stored in the bin from displaying at display telephones and printing on the SMDR. This is used to prevent unauthorized use of OCC access and security codes. For example, if a System Speed Dial bin is programmed with \*38882000, the SMDR and display suppress 8882000, but the digits are still dialed.

If \*3 is entered at the beginning of a bin that uses \*1 to automatically chain, none of the digits in the chained sequence will print. If \*3 is entered in a \*2\* manually chained bin, the Extension Speed Dial bin prints; the system bin does not. The Extension Speed Dial bins are not Toll Restricted.

The command \*3 also is used to bypass Toll Restriction. Any extension can use a bin in which \*3 was used to turn off the SMDR and display. For example, if a System Speed Dial bin containing 12039262000 should be accessible to every Class of Service, program a System Speed Dial bin with 1\*32039262000. The digits 2039262000 are also suppressed on the displays and the SMDR. When used to bypass Toll Restriction, the directive \*3 cannot be the first entry in the system bin.

**Conditions:**

The \*3 directive can be used to bypass Toll Restriction for any extension, including Four Button, Single Line and 2500 type telephones.

**Required Programming:**

- 'S' --> SYSTEM FEATURES
  - 'K' --> COS ALLOWED AREA CODES to assign allowed Class of Service to each area code.
- 'E' --> STATIONS FEATURES
  - CLASS OF SERVICE..... to program Class of Service on a per-extension basis.

**Feature Reference:**

Class of Service  
Placing a Call  
Speed Dial  
Toll Restriction

**Extension Toll Restriction On Option — \*4****Description:**

The \*4 command, entered at the beginning or end of a System Speed Dial bin, restricts the call according to the Class of Service (COS) of the extension which is using the bin. For example, this prevents an extension with COS 5 from using a System Speed Dial bin which contains a leading 0. The \*4 command counts as two digits.

**Conditions:**

Class of Service programming determines the restrictions imposed by the \*4 directive.

**Required Programming:**

- 'S' --> SYSTEM FEATURES
  - 'K' --> COS ALLOWED AREA CODES to assign allowed Class of Service to each area code.
- 'I' --> SYSTEM INITIALIZATION
  - Sub-Field # 9 (HUNT GROUPS) to initialize Hunt Group assignments.
- 'E' --> STATIONS FEATURES
  - CLASS OF SERVICE..... to program Class of Service on a per-extension basis.

**Feature Reference:**

Class of Service  
Placing a Call  
Speed Dial  
Toll Restriction

## Extension Toll Restriction Off Option — \*5

### Description:

The \*5 command, entered at the beginning or end of a System Speed Dial bin, assures that all extensions in the system can use the bin. For example, the \*5 directive allows a telephone with Class of Service 4 to dial a leading 1 10-digit call (i.e., 1 + NPX + NNX + nnn) which would normally be prevented. The \*5 directive counts as two digits.

The \*5 command, entered at the beginning or end of a System Speed Dial bin, assures that all extensions in the system can use the bin. For example, the \*5 option allows a telephone with Class of Service 4 to dial a leading 1 10-digit call (i.e., 1 + NPX + NNX + nnnn) which would normally be prevented. The \*5 option counts as two digits.

The \*5 command can also be used to enable Toll Restricted extensions to manually dial after a System Speed Dial bin has dialed out. For example, assume that COS 1 is allowed to dial area code 203, and that System Speed Dial bin 50 is programmed with an OCC access number of 12039262000. When an extension with COS 1 accesses bin 50 (dials 850), OCC dial tone is returned but the extension cannot dial into the service. If the command \*5 is entered at the beginning or the end of the bin (\*512039262000), the extension can manually dial into the service after the OCC dial tone is returned.

### Conditions:

Class of Service programming determines the restrictions bypassed by the \*5 directive.

### Required Programming:

'S' --> SYSTEM FEATURES

'K' --> COS ALLOWED AREA CODES to assign allowed Class of Service to each area code.

'E' --> STATIONS FEATURES

CLASS OF SERVICE..... to program Class of Service on a pre-extension basis.

### Feature Reference:

Class of Service  
Placing a Call  
Speed Dial  
Toll Restriction

## Suppressing the Leading 1 Option — \*6

### Description:

When placed at the end of a System Speed Dial bin, the \*6 command automatically removes the leading 1 from any succeeding chained Speed Dial bin. This option is helpful if a System Speed Dial bin contains the access and security code for an OCC located in a non-leading 1 dialing area, and the bin to be chained to this System Speed Dial bin contains a leading 1. If the \*6 option is implemented, the leading 1 from any chained bin is ignored. If the \*6 option was not used in this situation, the chained bins could be incompatible with the non-leading 1 dialing service.

For example, if System Speed Dial bin 50 contains 1203888200\*6 and System Speed Dial bin 61 contains 15551212, bin 51 dials out as 5551212 if it is chained to bin 50.

### Conditions:

- (a) This option is used when the system is located in an area where both leading 1 (1 + NPX/NNX) and non-leading 1 (NPX/NNX) dialing services are provided. Speed Dial bins do not have to be reprogrammed if the service changes.
- (b) Dialing services are determined by the telco.

### Required Programming:

'S' --> SYSTEM FEATURES

'A' --> OFFICE CODE TYPES to designate Conflict Codes.

### Feature Reference:

Placing a Call  
Speed Dial



## SPLIT

### Description:

Split allows an extension user to alternate (Split) between two calls. Split will alternate between the current call and the last call placed on Hold.

### Conditions:

- (a) The attendant cannot use the Split feature.
- (b) If a Split call is left on Hold longer than the Hold Recall interval, it re-rings the telephone which placed it on Hold.
- (c) Multibutton telephone users can use the SPLIT key to answer attendant/Hotline partner Call Waiting signals.

**Required Programming:** not applicable

### Feature Reference:

Answering a Call  
Hold

## SPLIT RINGING

### Description:

Split Ringing allows a CO line ringing and incoming access assignments to be tailored to the requirements of each extension. Any combination of lines can ring and be answered at an extension. Split Ringing is applicable to the day mode (i.e., Assigned Night Answer and Universal Night Answer not activated).

### Conditions:

- (a) On a Multibutton telephone, only those calls programmed to ring will appear on an incoming line key.
- (b) Split Ringing is applicable to all telephones in the system.
- (c) If CO AUDIBLE is granted for a line, it rings in the day and night mode. Night Service may be configured to allow additional lines to ring when the system is in the night mode.

### Required Programming:

'S' --> SYSTEM FEATURES

'P' --> CO TYPE to program Universal Night Answer lines.

'E' --> STATIONS FEATURES

CO AUDIBLE [NN..NN] IS.. to program Split Ringing assignments.

NIGHT RING ENABLED... to program Assigned Night Answer.

### Feature Reference:

Answering a Call  
Night Service

## STATION MESSAGE DETAIL RECORDING (SMDR)

### Description:

Station Message Detail Recording can provide a hard copy record of incoming and outgoing calls (both those attempted, and those actually completed). SMDR records the date, extension number, line used, number dialed, start time of call, duration of call, cost of call and account code (if entered). The Speed Dial bin number may also print, if enabled in system programming.

### Conditions:

- (a) If LCR is installed in the system, the cost of the call also prints.
- (b) SMDR requires that an optional customer-provided printer or call accounting device be connected to the KSU.
- (c) The minimum duration of calls that can be printed on the SMDR is determined in system programming.
- (d) The SMDR can be selectively enabled to print any combination of long distance calls, local (seven-digit) calls, Speed Dial bin numbers and '0' calls to an outside operator. Enabling the SMDR to record Speed Dial bin numbers also allows Last Number Redial and Save designations to print.

## Required Programming:

- 'S' --> SYSTEM FEATURES
  - 'M' --> TIMERS
  - SMDR TIMER..(SEC) ....to program the minimum duration of outgoing calls that are printed.
  - 'F' --> SYSTEM OPTIONS
  - OPTION 11...to enable SMDR for '1+' seven-digits or '0+' seven-digit numbers.
  - OPTION 13.. to enable SMDR for long distance calls. (These can be 1 + NPX + NNX + nnnn, 0 + NPX + NNX + nnnn, 1 + NNX + nnnn or 0 + NNX + nnnn calls).
  - OPTION 15...to enable SMDR for 'O' calls to an outside operator.
  - OPTION 16...to enable SMDR to print Speed Dial bin numbers and Save and Last Number Redial designations.
  - OPTION 17...to enable SMDR to print local (seven-digit) calls in the format of NNX + nnnn.
  - OPTION 18...to enable SMDR for incoming calls.
  - OPTION 20...to enable SMDR for calls dropped due to Toll Restriction.
  - OPTION 21...to enable SMDR for calls dropped because no Account Code was entered.
  - OPTION 24...to enable SMDR for all calls.

## Feature Reference:

Account Code Capability  
Least Cost Routing  
Placing a Call  
Toll Restriction

## TENANT SERVICE

### Description:

The TCX-128 can be configured to allow up to six tenants to share the same system. Each tenant (i.e., user group) can be programmed with incoming and outgoing lines dedicated exclusively for its own use. An attendant with a DSS Console can be assigned to each tenant group.

### Conditions:

When the system is divided between tenants, the following occurs:

- (a) Each extension is connected to the primary attendant when a 0 Intercom call is dialed. A tenant is connected to its own attendant by dialing the attendant's extension number. Each DSS Console in the system provides one

button access and a Busy Lamp Field for all telephones (regardless of tenant group).

- (b) All attendant recalls (e.g., Hold, Transfer, etc.) for all tenant groups go to the primary attendant.
- (c) All Call Page is broadcast to all tenant groups.
- (d) Any extension in a tenant group can place an Intercom call to any extension in another tenant group.
- (e) Any extension (regardless of tenant group) can use any System Speed Dial number unless prevented by Class of Service and Toll Restriction.
- (f) Least Cost Routing (LCR) applies to all tenants. LCR routes an outgoing call from one tenant the same way as an outgoing call from another tenant, using the same line services.
- (g) In the night mode, Universal Night Answer is in force globally (i.e., for the entire system). Universal Night Answer lines cannot be split between tenant groups.

## Required Programming:

- 'S' --> SYSTEM FEATURES
  - 'O' --> OPERATORS & DSS to assign the primary attendant (shared by all tenants), tenant attendants, tenant alternate attendants and DSS Consoles.
  - 'G' --> CO GROUPS to program lines into line groups (to be used in conjunction with OUT KEYS GROUPS and CO ACCESS programming.
  - 'N' --> OUT KEYS GROUPS to assign line groups to outgoing line keys.
- 'T' --> SYSTEM INITIALIZATION
  - Sub-Field # 11 (STATIONS 'TENANT GROUP') to initialize tenant group assignments.
- 'E' --> STATIONS FEATURES
  - CO AUDIBLE [NN..NN] IS.. to program which lines should ring in for each tenant group.
  - CO ACCESS [NN..NN] IS.. to program which lines are available for outgoing calls for each tenant.

## Feature Reference:

Answering a Call  
Least Cost Routing  
Night Service  
Paging  
Placing a Call  
Speed Dial



## TERMINATING A CALL

### Description:

Any extension user in the system can terminate an active call by hanging up the handset. Multibutton telephone users (other than the attendants with DSS Consoles) can also terminate a call by pressing a line key. Multibutton telephone users can terminate a Handsfree call by pressing the HF key. Monitored calls can be terminated by pressing the MON key. The attendant can terminate a call by pressing the RLS key.

**Conditions:** not applicable

**Required Programming:** not applicable

### Feature Reference:

Answering a Call  
Placing a Call

## TIE LINE COMPATIBILITY

### Description:

The system can be equipped with one or two tie lines. The tie lines can be two-or four-wire, with either type I or type II signaling. For more information on tie lines, see Appendix E of this manual.

### Conditions:

B-TGU-C and B-2TLU-A PCBs must be installed if the system is to be equipped with tie lines.

### Required Programming:

'S' --> SYSTEM FEATURES  
'S' --> TIE LINE TYPE to establish tie line parameters.  
'F' --> SYSTEM OPTIONS  
OPTION 30.. to enable tie lines to be used for Paging.  
'T' --> SYSTEM INITIALIZATION  
Sub-Field # 35 (TIE LINE TYPES) to initialize tie line assignments.

### Feature Reference:

Answering a Call  
Placing a Call

## TOLL RESTRICTION

### Description:

Toll Restriction uses an extension's programmable Class of Service to impose dialing restrictions on outgoing calls. In addition, each area code in the system is programmed to be available only to those telephones with the proper Class of Service. This allows a Toll Restriction scheme to be tailored to the specific site dialing requirements.

**NOTE:** Refer to the Class of Service feature for the Class of Service assignments.

### Conditions:

- (a) When the system is initialized, only Class of Service 0 can dial area codes (i.e., there are no allowed area codes).
- (b) When the system is initialized, all extensions are unrestricted (i.e., assigned with Class of Service 0).

### Required Programming:

'S' --> SYSTEM FEATURES  
'K' --> COS ALLOWED AREA CODES to assign allowed Class of Service to each area code.  
'F' --> SYSTEM OPTIONS  
OPTION 12.. to restrict calls due to an insufficient number of digits dialed.  
'T' --> SYSTEM INITIALIZATION  
Sub-Fields 23 & 24 (TOLL RESTRICTION TABLES) to initialize all Toll Restriction data.  
'E' --> STATIONS FEATURES  
CLASS OF SERVICE..... to assign a Class of Service on a per-extension basis.

### Feature Reference:

Class of Service  
Placing a Call

## TRANSFER

### Description

Transfer allows an extension user to transfer a call to another extension user in the system. There are three types of Transfer: *Screened Transfer*, *Unscreened Transfer* and *Handsfree Transfer*.

*Screened Transfer* allows the extension user to announce a call before it is transferred.

*Unscreened Transfer* transfers the calls unannounced. Unanswered transferred calls re-ring the extension which initiated the Transfer. If the returned call is not answered within 30 seconds, it rings the attendant.

*Handsfree Transfer*, which can be initiated only by the attendant and Hotline partners, sends a call to the speakerphone of a multibutton telephone.

### Conditions:

- (a) All extensions in the system can initiate and receive Transfers.
- (b) The Transfer Recall interval is programmable. This is the interval before an unanswered transferred call returns to the telephone from which it was initially transferred.
- (c) Multibutton telephones can use the Direct Station Selection (DSS) keys or the Hotline key to Transfer calls.
- (d) An extension can answer a call and Transfer it to another extension only if it has audible for the line. An extension can, however, receive a transferred call to which it is normally denied access.

### Required Programming:

'S' --> SYSTEM FEATURES  
'M' --> TIMERS  
TRANS RECALL.(SEC)..... to set the Transfer Recall interval.

### Feature Reference:

Answering a Call  
Direct Station Selection  
Hotline

## VOLUME CONTROLS

### Description:

Two volume control thumbwheels are located on the front edge of the Multibutton and Four Button telephones. The left thumbwheel is used to adjust the volume of the Page receive, splash tone, ring tone and BGM. The right thumbwheel controls the volume of incoming Handsfree, Handsfree Answerback and Monitor conversations. To increase volume, turn the thumbwheel counterclockwise.

On display telephones, volume is controlled by the VOP UP and VOL DN keys.

On the Single Line telephone, the single volume control regulates the volume of ringing. To increase volume, turn the thumbwheel counterclockwise.

**Conditions:** not applicable

**Required Programming:** not applicable

### Feature Reference:

Answering a Call  
Music On Hold/Background Music  
Handsfree  
Handsfree Answerback  
Monitor  
Paging



## SECTION 6, SOFTWARE CONFIGURATION

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### 1. INTRODUCTION

**1.01** The SOFTWARE CONFIGURATION Section presents an in-depth description of each of the programmable options in the TCX-128 Computerized Branch Exchange. Each option is represented by a programming field. As each field is examined, the requirements of the installation are determined and entries are made on the Program Record Forms. These forms are included at the end of this section. The data base compiled on the Program Record Forms is later entered into system memory during program entry.

### 2. SOFTWARE CONFIGURATION

**2.01** Each option is explained by subsections for Field, Access, Description, Instructions, Example, Default Value, Conditions, Related Programming and Feature Reference. The subsections are defined as follows:

**Field (Sub-Field)** presents the prompt for the option exactly as it is shown on the printer or terminal.

**Access** defines the key strokes necessary to access the field.

**Description** explains how programming the field affects system operation.

**Instructions** defines how to determine the correct entry and how to enter it on the Program Record Form.

**Example** presents a complete sample entry for the field.

**Default Value** provides the initialized entry for the field.

**Conditions** establishes the limits of the field, as defined by the system software.

**Related Programming** lists other fields that interact with the field presented.

**Feature Reference** lists the features that are affected when the field is programmed.

**2.02** Each field requires a decimal, hexadecimal or Y(yes)/N(no) entry. For certain fields, 1 and 0 are used to construct binary numbers. These binary numbers must be converted to hexadecimal numbers. Use Table 6-1 at the end of this section for this conversion.



**2.03** The TCX-128 system uses menu-driven software (i.e., all the system-programmable options appear on a menu at the programming terminal). The chart below lists all the system options that can be programmed.

ACCESS KEY	FIELD	DESCRIPTION
E:	STATIONS FEATURES	Set individual extension options
S:	SYSTEM FEATURES	
T:	TIME OF DAY	Program time of day
D:	DATE	Program date
O:	OPERATORS & DSS	Assign attendants and consoles
U:	GROUP HUNT	Program Extension Hunting
M:	TIMERS	Set various system timers
L:	LEAST COST ROUTING	Program Least Cost Routing
R:	RELAYS CONTROL	Program night ring relays, etc.
G:	CO GROUPS	Assign lines to line groups
P:	CO TYPE	Program line type
S:	TIE LINE TYPE	Program tie line type
C:	MEET-ME CONFERENCE	Assign line circuit for Meet-Me Conference
A:	OFFICE CODE TYPES	Assign area/office code type
K:	COS ALLOWED AREA CODES	Assign COS to area codes
E:	EXTERNAL OUTPUTS	Program alternate audio ports
N:	OUT KEYS GROUPS	Assign line groups to outgoing line keys
V:	ODEM PASSWORD	Assign password for modem access
F:	SYSTEM OPTIONS	Program miscellaneous options
J:	DOWNLOAD, UPLOAD AND VERIFY (FUTURE)	Off line programming (FUTURE)
1:	SELECT TRACE OPTIONS	
2:	PRINT TRACE MEMORY	
3:	PRINT CONTINUOUSLY	

I:	SYSTEM INITIALIZATION	Loads factory installed program
Q:	EXIT PROGRAMMING MODE	Press key to exit programming
D:	DISPLAY SYSTEM STATUS	Maintenance diagnostic

**2.04** The menus and prompts in this section are shown exactly as they appear during programming; however, an additional explanation may be shown in parentheses.

### 3. DEVELOPING THE PROGRAM RECORD FORMS

#### PROGRAM E: STATIONS FEATURES

**Field:** E: STATIONS FEATURES  
ENTER STATION NUMBER..

**Access:**

Press the M key to enter the programming mode. Once the main menu is displayed, press the E key. The system prompts:

ENTER STATION NUMBER..

Enter the number of the extension to be programmed and press the the RETURN key, or press the the RETURN key again to program extension 301. The following prompt is displayed:

PROGRAMMING STATION.....

Each of the fields shown below can be accessed, one at a time, as the previous field is programmed.

PORT NUMBER ..... nnn\_\*  
TYPE OF PHONE ..... KEY  
HOT-LINE KEY ..... nnn\_\*  
CLASS OF SERVICE ..... 00  
CO AUDIBLE [01..08] IS ... nn\_\*  
CO AUDIBLE [09..16] IS ... nn\_\*  
CO AUDIBLE [17..24] IS ... nn\_\*  
CO AUDIBLE [25..32] IS ... nn\_\*  
NT AUDIBLE [01..08] IS ... FF\_\_  
NT AUDIBLE [09..16] IS ... FF\_\_  
NT AUDIBLE [17..24] IS ... FF\_\_  
NT AUDIBLE [25..32] IS ... FF\_\_  
CO ACCESS [01..08] IS ... FF\_\_  
CO ACCESS [09..16] IS ... FF\_\_  
CO ACCESS [17..24] IS ... FF\_\_  
CO ACCESS [25..32] IS ... FF\_\_  
RECEIVE ALL-PAGE ..... YES\_\_  
BARGE IN ENABLED ..... NO\_\_  
BLOCK BARGE ENABLED . NO  
PERMANENT ACC CODE . YES\_\_  
FORCED ACC CODE ..... NO\_\_  
DIL OFF HOOK SIGNAL ... NO\_\_  
CAMP-ON ORIGINATE .... YES\_\_  
CAMP-ON RECEIVE ..... YES\_\_  
PAGE ZONE RECEIVED ... nn\_\*  
PICK UP GROUP IS ..... 00\_\_  
TENANT GROUP IS ..... 01\_\_  
PRIVATE LINE 1...IS ..... NONE\_\_  
PRIVATE LINE 2...IS ..... NONE\_\_  
PRV 1 RNG OPERATOR... NO\_\_  
PRV 2 RNG OPERATOR... NO\_\_

\* Default assignment depends on extension number. Refer to the individual sub-fields for default value.

## Description:

Each extension in the system is individually programmed for various options. These options are assigned in the E: STATIONS FEATURES program.

**Instructions:** Refer to the fields that follow.

**Example:** Refer to the fields that follow.

**Default Value:** Refer to the fields that follow.

**Conditions:** Refer to the fields that follow.

**Related Programming:** Refer to the fields that follow.

**Feature Reference:** Refer to the fields that follow.





**Field:** PORT NUMBER.....

**Access:**

The PORT NUMBER..... field is displayed after the ENTER STATION NUMBER.. field is programmed.

**Description:**

Each extension in the system is assigned to a port. A port is a fixed location (position) in the KSU, although the extension number assigned to each port can be changed. This facility allows for a Flexible Numbering Plan, eliminating the need to reconfigure the installation if extensions are moved. Extension programming follows the extension numbers, not the port numbers.

**Instructions:**

On Table 6-2, enter the number of the port (001 through 128) to which each extension is to be assigned, if different from the default value.

**Example:**

In general, this field is programmed on an individual basis as the installation changes. To swap the port assignments for extensions 301 and 332, on Table 6-2 enter PORT NUMBER.....032 for extension 301 and PORT NUMBER..... 001 for extension 332. Extension 301 is now assigned to port 032; extension 332 is assigned to port 001.

**Default Value:**

KSU

EXTENSION	PORT	EXTENSION	PORT
301	001	317	017
302	002	318	018
303	003	319	019
304	004	320	020
305	005	321	021
306	006	322	022
307	007	323	023
308	008	324	024
309	009	325	025
310	010	326	026
311	011	327	027
312	012	328	028
313	013	329	029
314	014	330	030
315	015	331	031
316	016	332	032

333	033	349	049
334	034	350	050
335	035	351	051
336	036	352	052
337	037	353	053
338	038	354	054
339	039	355	055
340	040	356	056
341	041	357	057
342	042	358	058
343	043	359	059
344	044	360	060
345	045	361	061
346	046	362	062
347	047	363	063
348	048	401	064

Expansion Cabinet

402	065	434	097
403	066	435	098
404	067	436	099
405	068	437	100
406	069	438	101
407	070	439	102
408	071	440	103
409	072	441	104
410	073	442	105
411	074	443	106
412	075	444	107
413	076	445	108
414	077	446	109
415	078	447	110
416	079	448	111
417	080	449	112
418	081	450	113
419	082	451	114
420	083	452	115
421	084	453	116
422	085	454	117
423	086	455	118
424	087	456	119
425	088	457	120
426	089	458	121
427	090	459	122
428	091	460	123
429	092	461	124
430	093	462	125
431	094	463	126
432	095	464	127
433	096	465	128

**Conditions:**

- (a) Do not assign two extensions to the same port.
- (b) E: STATIONS FEATURES programming correlates to the extension number, not the port number. If the port/extension designation is changed, all of the programmed options are retained with the extension.

**Related Programming:** not applicable

**Feature Reference:**

Flexible Numbering Plan

**Field:** TYPE OF PHONE.....

**Access:**

The TYPE OF PHONE..... field is displayed after the PORT NUMBER..... field is programmed.

**Description:**

The TYPE OF PHONE field is used to designate the type of telephone instrument installed at the extension. The available types are:

KEY for a Multibutton Key Telephone  
DSS for a Direct Station Selection (DSS) Console  
SLI for a Four Button Telephone  
500 for a Single Line or 2500 type Telephone

**NOTE:** Single Line and 2500 type telephones require B-8SLU-B PCBs to be installed.

**Instructions:**

On Table 6-2, enter the type of extension instrument required.

**Example:**

If the extension being programmed is a Four Button Telephone, enter SLI.

**Default Value:** KEY

**Conditions:**

The TYPE OF PHONE..... entry must match the telephone instrument installed.

**Related Programming:**

- E: STATIONS FEATURES  
PORT NUMBER..... to determine the port assignment for the instrument installed.
- S: SYSTEM FEATURES  
O: OPERATORS & DSS to assign operators and DSS Consoles.

**Feature Reference:** not applicable



**Field:** HOT-LINE KEY.....

**Access:**

The HOT-LINE KEY..... field is displayed after the TYPE OF PHONE..... field is programmed.

**Description:**

Extension pairs can be configured as Hotline partners. This provides for one button communication, a Busy Lamp Field and call Transfer between the partners.

**Instructions:**

On Table 6-2, enter the number of the extension that is to be the Hotline partner for the extension being programmed. The Hotline partner must be programmed in a similar manner.

**Example:**

If extensions 314 and 315 are to be Hotline partners, enter 315 as the Hotline partner for extension 314. Enter 314 as the Hotline partner for extension 315.

**Default Value:**

not assigned (i.e., each extension assigned to itself)

**Conditions:**

- (a) For standard Hotline operation, each extension can have only one Hotline partner.
- (b) The total number of Hotline combinations in the system cannot exceed 64.
- (c) Only Multibutton telephones should be assigned as Hotline partners.
- (d) The higher number in the Hotline pair is generally assigned as the secretary/receptionist in an executive/secretary arrangement. A call transferred to a busy executive extension is automatically transferred to the secretary/receptionist. If a call is transferred to an executive who is not busy, the Transfer rings at both the secretary/receptionist and the executive.
- (e) As shown below, special applications may require Hotline groups, rather than Hotline pairs. The extension assigned as the secretary/receptionist assigned as their Hotline partner.

SEC/RECP	EXT. 310	EXT. 309	EXT. 308
EXTENSION 311	HL=311	HL=311	HL=311
HL=310			

All the partners in a Hotline group receive a LED indication when the secretary/receptionist goes off hook. The secretary/ receptionist extension receives a LED indication only when the Hotline extension to which it is assigned goes off hook. In the above example, 311 receives HL LED only from 310. Extensions 308, 309 and 310 receive HL LED from 311.

When transferring calls, calls from 308, 309 and 310 are transferred to 311 when the HL key is pressed. A call transferred from 311, using just the HL key, will go to extension 310.

- (f) An extension can override its Hotline partner's Do Not Disturb only if Option 23 is enabled.

**Related Programming:**

- E: STATIONS FEATURES  
TYPE OF PHONE.....to assure that only multibutton telephones are assigned as Hotline partners.
- S: SYSTEM FEATURES  
OPTION ENABLED...23.. to allow an extension to override its Hotline partner's Do Not Disturb.

**Feature Reference:**

- Do Not Disturb
- Hotline
- Transfer

**Field:** CLASS OF SERVICE.....

**Access:**

This field is accessed after the HOT-LINE KEY..... field is programmed.

**Description:**

The CLASS OF SERVICE..... field assigns Class of Service to an extension. An extension's Class of Service (COS) determines the dialing restrictions imposed on that extension. The system has six Classes of Service (COS), as follows:

**COS 0**

Unrestricted. Class of Service 0 is permitted to dial all System Speed Dial numbers and all area codes. This is the only COS permitted to dial (telco) operator (0) calls. Intercom calls are permitted.

**COS 1**

Class of Service 1 is permitted to dial seven-digit (NNX + nnnn) and leading 1 seven-digit (1 + NNX + nnnn) numbers, all System Speed Dial numbers and allowed area codes (1 + NPX + NNX + nnnn). Intercom calls are permitted.

**COS 2**

Class of Service 2 is permitted to dial seven-digit (NNX + nnnn) numbers, leading 1 seven-digit (1 + NNX + nnnn) numbers, allowed area codes (1 + NPX + NNX + nnnn) and System Speed Dial numbers that do not contain a leading 1 or 0. Intercom calls are permitted.

**COS 3**

Class of Service 3 is permitted to dial seven-digit (NNX + nnnn) numbers, all System Speed Dial numbers and allowed area codes (1 + NPX + NNX + nnnn). Intercom calls are permitted.

**COS 4**

Class of Service 4 is permitted to dial seven-digit (NNX + nnnn) numbers, allowed area codes (1 + NPX + NNX + nnnn) and System Speed Dial numbers that do not contain a leading 1 or 0. Intercom calls are permitted.

**COS 5**

Class of Service 5 can dial Intercom calls and all System Speed Dial calls only.

**Instructions:**

On Table 6-2, indicate the Class of Service for the extension being programmed.

**Example:**

If the extension is to be restricted to dialing seven-digit numbers, allowed area codes, System Speed Dial numbers (that do not contain a leading 1 or 0) and Intercom calls, enter 04 for the extension being programmed on Table 6-2.

**Default Value:** 00 (unrestricted)

**Conditions:**

Class of Service 0 is the only COS permitted to dial leading 0 calls.

**Related Programming:**

S: SYSTEM FEATURES

L: LEAST COST ROUTING

LOCAL/TOLL LAST CHOICE FOR C.O.S. to program Class of Service restrictions for the second preferred LCR route for a call.

K: COS ALLOWED AREA CODES to assign the Class of Service that can dial each area code.

**Feature Reference:**

Class of Service  
Least Cost Routing  
Placing a Call  
Toll Restriction



**Field:** CO AUDIBLE [01..08] IS..  
CO AUDIBLE [09..16] IS..  
CO AUDIBLE [17..24] IS..  
CO AUDIBLE [25..32] IS..

**Access:**

The CO AUDIBLE [01..08] IS.. field is accessed after the CLASS OF SERVICE..... field is programmed. After the first CO AUDIBLE sub-field is programmed, the next CO AUDIBLE sub-field is accessed.

**Description:**

Extensions can be programmed to receive ringing and answer calls on specified lines. The CO AUDIBLE fields determine which lines ring at each extension when the system is in the day mode. Any line that rings can be answered.

**Instructions:**

On the CO Audible bit graph, place a 1 below each line that should ring at the extension during the day. Place a 0 below all other lines. The assignment of 1s and 0s creates an eight bit binary number. Use Table 6-1 to convert the eight bit binary number to a two bit hexadecimal number. Enter the hex number on Table 6-2.

**Example:**

If extension 301 should receive day ringing for all 32 lines, enter a 1 beneath each line on the CO Audible bit graphs. The binary numbers 11111111 are converted to hex FF and entered on Table 6-2.

**Default Value:**

Extensions 301 and 302: CO AUDIBLE [01..08]IS..FF  
CO AUDIBLE [09..16]IS..FF  
CO AUDIBLE [17..24]IS..FF  
CO AUDIBLE [25..32]IS..FF

Extension 303: CO AUDIBLE [01..08]IS..FF  
CO AUDIBLE [09..16]IS..FF  
CO AUDIBLE [17..24] IS..00  
CO AUDIBLE [25..32] IS..00

Extensions 304-363 &  
401-465: CO AUDIBLE [01..08] IS..00  
CO AUDIBLE [09..16] IS..00  
CO AUDIBLE [17..24] IS..00  
CO AUDIBLE [25..32] IS..00

**Conditions:**

Outgoing calls cannot be placed unless CO ACCESS is granted or LCR is permitted to override CO ACCESS assignments. The outgoing call may be restricted by an extension's Class of Service.

**Related Programming:**

- E: STATIONS FEATURES  
CO ACCESS [NN..NN] IS.. to allow outgoing calls to be placed on specified lines.
- S: SYSTEM FEATURES  
G: CO GROUPS to program lines into groups.  
P: CO TYPE to assign type to lines.  
F: SYSTEM OPTIONS  
OPTION ENABLED..01.. to enable LCR to bypass CO access assignments when placing a call.

**Feature Reference:**

- Answering a Call
- Least Cost Routing
- Night Service
- Placing a Call
- Split Ringing

**CO AUDIBLE - LINES 01-08 ( Page 1 of 2 )**

BIT NUMBER	7	6	5	4	3	2	1	0	
CO LINES	08	07	06	05	04	03	02	01	HEX
DEFAULT	1	1	1	1	1	1	1	1	FF
STA 301									
STA 302									
STA 303									
DEFAULT	0	0	0	0	0	0	0	0	00
STA 304									
STA 305									
STA 306									
STA 307									
STA 308									
STA 309									
STA 310									
STA 311									
STA 312									
STA 313									
STA 314									
STA 315									
STA 316									
STA 317									
STA 318									
STA 319									
STA 320									
STA 321									
STA 322									
STA 323									
STA 324									
STA 325									
STA 326									
STA 327									
STA 328									
STA 329									
STA 330									
STA 331									
STA 332									

BIT NUMBER	7	6	5	4	3	2	1	0	
CO LINES	08	07	06	05	04	03	02	01	HEX
DEFAULT	0	0	0	0	0	0	0	0	00
STA 333									
STA 334									
STA 335									
STA 336									
STA 337									
STA 338									
STA 339									
STA 340									
STA 341									
STA 342									
STA 343									
STA 344									
STA 345									
STA 346									
STA 347									
STA 348									
STA 349									
STA 350									
STA 351									
STA 352									
STA 353									
STA 354									
STA 355									
STA 356									
STA 357									
STA 358									
STA 359									
STA 360									
STA 361									
STA 362									
STA 363									
STA 401									

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CO AUDIBLE - LINES 01-08 ( Page 2 of 2 )

BIT NUMBER	7	6	5	4	3	2	1	0	
CO LINES	08	07	06	05	04	03	02	01	HEX
DEFAULT	0	0	0	0	0	0	0	0	00
STA 402									
STA 403									
STA 404									
STA 405									
STA 406									
STA 407									
STA 408									
STA 409									
STA 410									
STA 411									
STA 412									
STA 413									
STA 414									
STA 415									
STA 416									
STA 417									
STA 418									
STA 419									
STA 420									
STA 421									
STA 422									
STA 423									
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STA 430									
STA 431									
STA 432									
STA 433									

BIT NUMBER	7	6	5	4	3	2	1	0	
CO LINES	08	07	06	05	04	03	02	01	HEX
DEFAULT	0	0	0	0	0	0	0	0	00
STA 434									
STA 435									
STA 436									
STA 437									
STA 438									
STA 439									
STA 440									
STA 441									
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STA 460									
STA 461									
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STA 463									
STA 464									
STA 465									

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## CO AUDIBLE - LINES 09-16 ( Page 1 of 2 )

BIT NUMBER	7	6	5	4	3	2	1	0	
CO LINES	16	15	14	13	12	11	10	09	HEX
DEFAULT	1	1	1	1	1	1	1	1	FF
STA 301									
STA 302									
STA 303									
DEFAULT	0	0	0	0	0	0	0	0	00
STA 304									
STA 305									
STA 306									
STA 307									
STA 308									
STA 309									
STA 310									
STA 311									
STA 312									
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STA 326									
STA 327									
STA 328									
STA 329									
STA 330									
STA 331									
STA 332									

BIT NUMBER	7	6	5	4	3	2	1	0	
CO LINES	16	15	14	13	12	11	10	09	HEX
DEFAULT	0	0	0	0	0	0	0	0	00
STA 333									
STA 334									
STA 335									
STA 336									
STA 337									
STA 338									
STA 339									
STA 340									
STA 341									
STA 342									
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STA 361									
STA 362									
STA 363									
STA 401									

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CO AUDIBLE - LINES 09-16 ( Page 2 of 2 )

BIT NUMBER	7	6	5	4	3	2	1	0	
CO LINES	16	15	14	13	12	11	10	09	HEX
DEFAULT	0	0	0	0	0	0	0	0	00
STA 402									
STA 403									
STA 404									
STA 405									
STA 406									
STA 407									
STA 408									
STA 409									
STA 410									
STA 411									
STA 412									
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STA 427									
STA 428									
STA 429									
STA 430									
STA 431									
STA 432									
STA 433									

BIT NUMBER	7	6	5	4	3	2	1	0	
CO LINES	16	15	14	13	12	11	10	09	HEX
DEFAULT	0	0	0	0	0	0	0	0	00
STA 434									
STA 435									
STA 436									
STA 437									
STA 438									
STA 439									
STA 440									
STA 441									
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STA 465									

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## CO AUDIBLE - LINES 17-24 ( Page 1 of 2 )

BIT NUMBER	7	6	5	4	3	2	1	0	
CO LINES	24	23	22	21	20	19	18	17	HEX
DEFAULT	1	1	1	1	1	1	1	1	FF
STA 301									
STA 302									
DEFAULT	0	0	0	0	0	0	0	0	00
STA 303									
STA 304									
STA 305									
STA 306									
STA 307									
STA 308									
STA 309									
STA 310									
STA 311									
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STA 324									
STA 325									
STA 326									
STA 327									
STA 328									
STA 329									
STA 330									
STA 331									
STA 332									

BIT NUMBER	7	6	5	4	3	2	1	0	
CO LINES	24	23	22	21	20	19	18	17	HEX
DEFAULT	0	0	0	0	0	0	0	0	00
STA 333									
STA 334									
STA 335									
STA 336									
STA 337									
STA 338									
STA 339									
STA 340									
STA 341									
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STA 362									
STA 363									
STA 401									

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CO AUDIBLE - LINES 17-24 ( Page 2 of 2 )

BIT NUMBER	7	6	5	4	3	2	1	0	
CO LINES	24	23	22	21	20	19	18	17	HEX
DEFAULT	0	0	0	0	0	0	0	0	00
STA 402									
STA 403									
STA 404									
STA 405									
STA 406									
STA 407									
STA 408									
STA 409									
STA 410									
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STA 427									
STA 428									
STA 429									
STA 430									
STA 431									
STA 432									
STA 433									

BIT NUMBER	7	6	5	4	3	2	1	0	
CO LINES	24	23	22	21	20	19	18	17	HEX
DEFAULT	0	0	0	0	0	0	0	0	00
STA 434									
STA 435									
STA 436									
STA 437									
STA 438									
STA 439									
STA 440									
STA 441									
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STA 465									

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## CO AUDIBLE - LINES 25-32( Page 1 of 2 )

BIT NUMBER	7	6	5	4	3	2	1	0	
CO LINES	32	31	30	29	28	27	26	25	HEX
DEFAULT	1	1	1	1	1	1	1	1	FF
STA 301									
STA 302									
DEFAULT	0	0	0	0	0	0	0	0	00
STA 303									
STA 304									
STA 305									
STA 306									
STA 307									
STA 308									
STA 309									
STA 310									
STA 311									
STA 312									
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STA 324									
STA 325									
STA 326									
STA 327									
STA 328									
STA 329									
STA 330									
STA 331									
STA 332									

BIT NUMBER	7	6	5	4	3	2	1	0	
CO LINES	32	31	30	29	28	27	26	25	HEX
DEFAULT	0	0	0	0	0	0	0	0	00
STA 333									
STA 334									
STA 335									
STA 336									
STA 337									
STA 338									
STA 339									
STA 340									
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STA 362									
STA 363									
STA 401									

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CO AUDIBLE - LINES 25-32 ( Page 2 of 2 )

BIT NUMBER	7	6	5	4	3	2	1	0	
CO LINES	32	31	30	29	28	27	26	25	HEX
DEFAULT	0	0	0	0	0	0	0	0	00
STA 402									
STA 403									
STA 404									
STA 405									
STA 406									
STA 407									
STA 408									
STA 409									
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STA 429									
STA 430									
STA 431									
STA 432									
STA 433									

BIT NUMBER	7	6	5	4	3	2	1	0	
CO LINES	32	31	30	29	28	27	26	25	HEX
DEFAULT	0	0	0	0	0	0	0	0	00
STA 434									
STA 435									
STA 436									
STA 437									
STA 438									
STA 439									
STA 440									
STA 441									
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**Field:** NT AUDIBLE [01..08] IS..  
NT AUDIBLE [09..16] IS..  
NT AUDIBLE [17..24] IS..  
NT AUDIBLE [25..32] IS..

**Access:**

The NT AUDIBLE [01..08] IS.. field is accessed after the CO AUDIBLE [25..32] IS.. field is programmed. After the first NT AUDIBLE sub-field is programmed, the next NT AUDIBLE sub-field is accessed.

**Description:**

The NT AUDIBLE [nn..nn] IS.. sub-fields determine which lines ring the extension when the system is in the night mode. This allows Assigned Night Answer to be programmed on an extension-by-extension, line-by-line basis. Multibutton telephone users can answer the ringing call by lifting the handset and pressing the flashing line key. Single Line, 2500 type, and Four Button telephone users can answer the ringing call by lifting the handset. NT AUDIBLE [nn..nn] IS.. has no effect on how lines ring when the system is in the day mode.

**Instructions:**

On the NT Audible bit graph, place a 1 below each line that should ring at the extension when the system is in the night mode. Place a 0 below all other lines. The assignment of 1s and 0s creates an eight bit binary number. Use Table 6-1 to convert the eight bit binary number to a two bit hexadecimal number. Enter the hex number on Table 6-2.

**Example:**

If extension 301 should receive night ringing for line 1, enter a 1 beneath bit 0 on the NT AUDIBLE—LINES 01-08 bit graph for extension 301. The resultant binary number 00000001 is converted to hex 01 and entered on Table 6-2.

**Default Value:** FF

**Conditions:**

- (a) If NT AUDIBLE [nn..nn] IS.. is denied, only night mode calls on UNA lines can be answered. These calls can be answered from Single Line, 2500 type, or Four Button telephones by lifting the handset and dialing an access code (69). Multibutton users can answer the night mode UNA call by lifting the handset and pressing the flashing line key. UNA calls ring the external alerting device only, unless the line is also programmed for Assigned Night Answer at other extensions.
- (b) Day mode access assignments are also in force at night.

**Related Programming:**

- E: STATIONS FEATURES  
CO ACCESS [nn..nn] IS.. to allow calls to be placed.
- S: SYSTEM FEATURES  
P: CO TYPE to program lines for Universal Night Answer.

**Feature Reference:**

- Answering a Call
- Night Service
- Placing a Call



NT AUDIBLE—LINES 01-08 (Page 1 of 2)

BIT NUMBER	7	6	5	4	3	2	1	0	
CO LINES	08	07	06	05	04	03	02	01	HEX
DEFAULT	1	1	1	1	1	1	1	1	FF
STA 301									
STA 302									
STA 303									
STA 304									
STA 305									
STA 306									
STA 307									
STA 308									
STA 309									
STA 310									
STA 311									
STA 312									
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STA 327									
STA 328									
STA 329									
STA 330									
STA 331									
STA 332									

BIT NUMBER	7	6	5	4	3	2	1	0	
CO LINES	08	07	06	05	04	03	02	01	HEX
DEFAULT	1	1	1	1	1	1	1	1	FF
STA 333									
STA 334									
STA 335									
STA 336									
STA 337									
STA 338									
STA 339									
STA 340									
STA 341									
STA 342									
STA 343									
STA 344									
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STA 359									
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STA 361									
STA 362									
STA 363									
STA 401									

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## NT AUDIBLE—LINES 01-08 (Page 2 of 2)

BIT NUMBER	7	6	5	4	3	2	1	0	HEX
CO LINES	08	07	06	05	04	03	02	01	
DEFAULT	1	1	1	1	1	1	1	1	FF
STA 402									
STA 403									
STA 404									
STA 405									
STA 406									
STA 407									
STA 408									
STA 409									
STA 410									
STA 411									
STA 412									
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STA 426									
STA 427									
STA 428									
STA 429									
STA 430									
STA 431									
STA 432									
STA 433									

BIT NUMBER	7	6	5	4	3	2	1	0	
CO LINES	08	07	06	05	04	03	02	01	HI
DEFAULT	1	1	1	1	1	1	1	1	F
STA 434									
STA 435									
STA 436									
STA 437									
STA 438									
STA 439									
STA 440									
STA 441									
STA 442									
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NT AUDIBLE—LINES 09-16 (Page 1 of 2)

BIT NUMBER	7	6	5	4	3	2	1	0	
CO LINES	16	15	14	13	12	11	10	09	HEX
DEFAULT	1	1	1	1	1	1	1	1	FF
STA 301									
STA 302									
STA 303									
STA 304									
STA 305									
STA 306									
STA 307									
STA 308									
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STA 329									
STA 330									
STA 331									
STA 332									

BIT NUMBER	7	6	5	4	3	2	1	0	
CO LINES	16	15	14	13	12	11	10	09	HEX
DEFAULT	1	1	1	1	1	1	1	1	FF
STA 333									
STA 334									
STA 335									
STA 336									
STA 337									
STA 338									
STA 339									
STA 340									
STA 341									
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## NT AUDIBLE—LINES 09-16 (Page 2 of 2)

BIT NUMBER	7	6	5	4	3	2	1	0	
CO LINES	16	15	14	13	12	11	10	09	HEX
DEFAULT	1	1	1	1	1	1	1	1	FF
STA 402									
STA 403									
STA 404									
STA 405									
STA 406									
STA 407									
STA 408									
STA 409									
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STA 431									
STA 432									
STA 433									

BIT NUMBER	7	6	5	4	3	2	1	0	
CO LINES	16	15	14	13	12	11	10	09	HEX
DEFAULT	1	1	1	1	1	1	1	1	FF
STA 434									
STA 435									
STA 436									
STA 437									
STA 438									
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NT AUDIBLE—LINES 17-24 (Page 1 of 2)

BIT NUMBER	7	6	5	4	3	2	1	0	
CO LINES	24	23	22	21	20	19	18	17	HEX
DEFAULT	1	1	1	1	1	1	1	1	FF
STA 301									
STA 302									
STA 303									
STA 304									
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STA 329									
STA 330									
STA 331									
STA 332									

BIT NUMBER	7	6	5	4	3	2	1	0	
CO LINES	24	23	22	21	20	19	18	17	HEX
DEFAULT	1	1	1	1	1	1	1	1	FF
STA 333									
STA 334									
STA 335									
STA 336									
STA 337									
STA 338									
STA 339									
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## NT AUDIBLE—LINES 17-24 (Page 2 of 2)

BIT NUMBER	7	6	5	4	3	2	1	0	
CO LINES	24	23	22	21	20	19	18	17	HEX
DEFAULT	1	1	1	1	1	1	1	1	FF
STA 402									
STA 403									
STA 404									
STA 405									
STA 406									
STA 407									
STA 408									
STA 409									
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STA 430									
STA 431									
STA 432									
STA 433									

BIT NUMBER	7	6	5	4	3	2	1	0	
CO LINES	24	23	22	21	20	19	18	17	HEX
DEFAULT	1	1	1	1	1	1	1	1	FF
STA 434									
STA 435									
STA 436									
STA 437									
STA 438									
STA 439									
STA 440									
STA 441									
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STA 465									

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NT AUDIBLE—LINES 25-32 (Page 1 of 2)

BIT NUMBER	7	6	5	4	3	2	1	0	
CO LINES	32	31	30	29	28	27	26	25	HEX
DEFAULT	1	1	1	1	1	1	1	1	FF
STA 301									
STA 302									
STA 303									
STA 304									
STA 305									
STA 306									
STA 307									
STA 308									
STA 309									
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STA 325									
STA 326									
STA 327									
STA 328									
STA 329									
STA 330									
STA 331									
STA 332									

BIT NUMBER	7	6	5	4	3	2	1	0	
CO LINES	32	31	30	29	28	27	26	25	HEX
DEFAULT	1	1	1	1	1	1	1	1	FF
STA 333									
STA 334									
STA 335									
STA 336									
STA 337									
STA 338									
STA 339									
STA 340									
STA 341									
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STA 361									
STA 362									
STA 363									
STA 401									

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## NT AUDIBLE—LINES 25-32 (Page 2 of 2)

BIT NUMBER	7	6	5	4	3	2	1	0	
CO LINES	32	31	30	29	28	27	26	25	HEX
DEFAULT	1	1	1	1	1	1	1	1	FF
STA 402									
STA 403									
STA 404									
STA 405									
STA 406									
STA 407									
STA 408									
STA 409									
STA 410									
STA 411									
STA 412									
STA 413									
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STA 425									
STA 426									
STA 427									
STA 428									
STA 429									
STA 430									
STA 431									
STA 432									
STA 433									

BIT NUMBER	7	6	5	4	3	2	1	0	
CO LINES	32	31	30	29	28	27	26	25	HEX
DEFAULT	1	1	1	1	1	1	1	1	FF
STA 434									
STA 435									
STA 436									
STA 437									
STA 438									
STA 439									
STA 440									
STA 441									
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STA 463									
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STA 465									

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**Field:** CO ACCESS [01..08] IS..  
 CO ACCESS [09..16] IS..  
 CO ACCESS [17..24] IS..  
 CO ACCESS [25..32] IS..

**Access:**

The CO ACCESS [01..08] IS.. field is accessed after the NT AUDIBLE [25..32] IS.. field is programmed. After the first CO ACCESS sub-field is programmed, the next sub-field is accessed.

**Description:**

In this field, extensions can be programmed to allow outgoing calls to be placed on specified lines. CO ACCESS [nn..nn] IS.. is in force in the day and the night mode.

**Instructions:**

On the CO Access bit graph, place a 1 below each line that the extension can dial out on. Place a 0 below all other lines. The 1s and 0s entered create an eight bit binary number. Using Table 6-1, convert this binary number to its two-digit hexadecimal equivalent. Enter the hex number on Table 6-2.

**Example:**

If extension 314 should be able to place a call on every outside line in the system, place a 1 beneath each line on the bit graphs. The resultant binary number (11111111) is converted to hex (FF) and entered on Table 6-2.

**Default Value:** FF

**Conditions:**

- (a) An extension's Class of Service may impose dialing restrictions on outgoing calls.
- (b) An extension receives a flashing line key LED and CO audible for a line only if granted in CO AUDIBLE or NT AUDIBLE programming.
- (c) LCR can place calls on lines restricted by CO Access programming if Option 1 is enabled.

**Related Programming:**

- E: STATIONS FEATURES
  - CLASS OF SERVICE..... to program an extension's Class of Service.
  - CO AUDIBLE [NN..NN] IS.. to program lines to ring.
- S: SYSTEM FEATURES
  - L: LEAST COST ROUTING to enable LCR, if available.
  - G: CO GROUPS to program lines into line groups.
  - N: OUT KEYS GROUPS to assign line groups to outgoing line keys.
  - F: SYSTEM OPTIONS
    - OPTION ENABLED..01...to allow LCR to override CO ACCESS assignments, if desired.

**Feature Reference:**

- Answering a Call
- Class of Service
- Least Cost Routing
- Placing a Call
- Toll Restriction

## CO ACCESS - LINES 01-08 ( Page 1 of 2 )

BIT NUMBER	7	6	5	4	3	2	1	0	
CO LINES	08	07	06	05	04	03	02	01	HEX
DEFAULT	1	1	1	1	1	1	1	1	FF
STA 301									
STA 302									
STA 303									
STA 304									
STA 305									
STA 306									
STA 307									
STA 308									
STA 309									
STA 310									
STA 311									
STA 312									
STA 313									
STA 314									
STA 315									
STA 316									
STA 317									
STA 318									
STA 319									
STA 320									
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STA 324									
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STA 326									
STA 327									
STA 328									
STA 329									
STA 330									
STA 331									
STA 332									

BIT NUMBER	7	6	5	4	3	2	1	0	
CO LINES	08	07	06	05	04	03	02	01	HEX
DEFAULT	1	1	1	1	1	1	1	1	FF
STA 333									
STA 334									
STA 335									
STA 336									
STA 337									
STA 338									
STA 339									
STA 340									
STA 341									
STA 342									
STA 343									
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STA 361									
STA 362									
STA 363									
STA 401									

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CO ACCESS - LINES 01-08 ( Page 2 of 2 )

BIT NUMBER	7	6	5	4	3	2	1	0	
CO LINES	08	07	06	05	04	03	02	01	HEX
DEFAULT	1	1	1	1	1	1	1	1	FF
STA 402									
STA 403									
STA 404									
STA 405									
STA 406									
STA 407									
STA 408									
STA 409									
STA 410									
STA 411									
STA 412									
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STA 427									
STA 428									
STA 429									
STA 430									
STA 431									
STA 432									
STA 433									

BIT NUMBER	7	6	5	4	3	2	1	0	
CO LINES	08	07	06	05	04	03	02	01	HEX
DEFAULT	1	1	1	1	1	1	1	1	FF
STA 434									
STA 435									
STA 436									
STA 437									
STA 438									
STA 439									
STA 440									
STA 441									
STA 442									
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STA 465									

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## CO ACCESS - LINES 09-16 ( Page 1 of 2 )

BIT NUMBER	7	6	5	4	3	2	1	0	
CO LINES	16	15	14	13	12	11	10	09	HEX
DEFAULT	1	1	1	1	1	1	1	1	FF
STA 301									
STA 302									
STA 303									
STA 304									
STA 305									
STA 306									
STA 307									
STA 308									
STA 309									
STA 310									
STA 311									
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STA 329									
STA 330									
STA 331									
STA 332									

BIT NUMBER	7	6	5	4	3	2	1	0	
CO LINES	16	15	14	13	12	11	10	09	HEX
DEFAULT	1	1	1	1	1	1	1	1	FF
STA 333									
STA 334									
STA 335									
STA 336									
STA 337									
STA 338									
STA 339									
STA 340									
STA 341									
STA 342									
STA 343									
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STA 361									
STA 362									
STA 363									
STA 401									

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CO ACCESS - LINES 09-16 ( Page 2 of 2 )

BIT NUMBER	7	6	5	4	3	2	1	0	
CO LINES	16	15	14	13	12	11	10	09	HEX
DEFAULT	1	1	1	1	1	1	1	1	FF
STA 402									
STA 403									
STA 404									
STA 405									
STA 406									
STA 407									
STA 408									
STA 409									
STA 410									
STA 411									
STA 412									
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STA 431									
STA 432									
STA 433									

BIT NUMBER	7	6	5	4	3	2	1	0	
CO LINES	16	15	14	13	12	11	10	09	HEX
DEFAULT	1	1	1	1	1	1	1	1	FF
STA 434									
STA 435									
STA 436									
STA 437									
STA 438									
STA 439									
STA 440									
STA 441									
STA 442									
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STA 463									
STA 464									
STA 465									

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## CO ACCESS - LINES 17-24 ( Page 1 of 2 )

BIT NUMBER	7	6	5	4	3	2	1	0	
CO LINES	24	23	22	21	20	19	18	17	HEX
DEFAULT	1	1	1	1	1	1	1	1	FF
STA 301									
STA 302									
STA 303									
STA 304									
STA 305									
STA 306									
STA 307									
STA 308									
STA 309									
STA 310									
STA 311									
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STA 326									
STA 327									
STA 328									
STA 329									
STA 330									
STA 331									
STA 332									

BIT NUMBER	7	6	5	4	3	2	1	0	
CO LINES	24	23	22	21	20	19	18	17	HEX
DEFAULT	1	1	1	1	1	1	1	1	FF
STA 333									
STA 334									
STA 335									
STA 336									
STA 337									
STA 338									
STA 339									
STA 340									
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STA 359									
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STA 361									
STA 362									
STA 363									
STA 401									

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CO ACCESS - LINES 17-24 ( Page 2 of 2 )

BIT NUMBER	7	6	5	4	3	2	1	0	
CO LINES	24	23	22	21	20	19	18	17	HEX
DEFAULT	1	1	1	1	1	1	1	1	FF
STA 402									
STA 403									
STA 404									
STA 405									
STA 406									
STA 407									
STA 408									
STA 409									
STA 410									
STA 411									
STA 412									
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STA 428									
STA 429									
STA 430									
STA 431									
STA 432									
STA 433									

BIT NUMBER	7	6	5	4	3	2	1	0	
CO LINES	24	23	22	21	20	19	18	17	HEX
DEFAULT	1	1	1	1	1	1	1	1	FF
STA 434									
STA 435									
STA 436									
STA 437									
STA 438									
STA 439									
STA 440									
STA 441									
STA 442									
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STA 463									
STA 464									
STA 465									

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## CO ACCESS - LINES 25-32 ( Page 1 of 2 )

BIT NUMBER	7	6	5	4	3	2	1	0	
CO LINES	32	31	30	29	28	27	26	25	HEX
DEFAULT	1	1	1	1	1	1	1	1	FF
STA 301									
STA 302									
STA 303									
STA 304									
STA 305									
STA 306									
STA 307									
STA 308									
STA 309									
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STA 311									
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STA 326									
STA 327									
STA 328									
STA 329									
STA 330									
STA 331									
STA 332									

BIT NUMBER	7	6	5	4	3	2	1	0	
CO LINES	32	31	30	29	28	27	26	25	HEX
DEFAULT	1	1	1	1	1	1	1	1	FF
STA 333									
STA 334									
STA 335									
STA 336									
STA 337									
STA 338									
STA 339									
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STA 359									
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STA 361									
STA 362									
STA 363									
STA 401									

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CO ACCESS - LINES 25-32 ( Page 2 of 2 )

BIT NUMBER	7	6	5	4	3	2	1	0	
CO LINES	32	31	30	29	28	27	26	25	HEX
DEFAULT	1	1	1	1	1	1	1	1	FF
STA 402									
STA 403									
STA 404									
STA 405									
STA 406									
STA 407									
STA 408									
STA 409									
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STA 429									
STA 430									
STA 431									
STA 432									
STA 433									

BIT NUMBER	7	6	5	4	3	2	1	0	
CO LINES	32	31	30	29	28	27	26	25	HEX
DEFAULT	1	1	1	1	1	1	1	1	FF
STA 434									
STA 435									
STA 436									
STA 437									
STA 438									
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STA 465									

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**Field: RECEIVE ALL PAGE.....****Access:**

The RECEIVE ALL PAGE..... field is accessed after the CO ACCESS [25..32] IS.. field is programmed.

**Description:**

Each key telephone can be individually programmed to receive All Page. RECEIVE ALL PAGE..... allows the All Page announcement to be broadcast through the telephone speaker.

**Instructions:**

To allow the extension to receive All Page announcements, enter Y for this field on Table 6-2. Enter N if All Page announcements should not be received.

**Example:** not applicable

**Default Value:** YES (All Page allowed)

**Conditions:**

The telephone instrument must have a speaker to be able to receive paging announcements. Single Line and 2500 type telephones cannot receive Paging announcements.

**Related Programming:**

S: SYSTEM FEATURES

R: RELAYS CONTROL to program the relays to activate for All Page announcements.

E: EXTERNAL OUTPUTS to program the external outputs for All Page announcements if B-TGU-B PCBs are installed.

**Feature Reference:**

External Paging Zones  
Paging

**Field: BARGE IN ENABLED.....****Access:**

The BARGE IN ENABLED..... field is accessed after the RECEIVE ALL-PAGE..... field is programmed.

**Description:**

Extensions may be programmed to Barge In on (intrude into) conversations in progress.

**Instructions:**

On Table 6-2, enter Y if the extension should be able to Barge In to conversations in progress; N if not.

**Example:** not applicable

**Default Value:** NO (Barge In cannot be initiated)

**Conditions:**

- (a) Barge In may be blocked at an extension in BLOCK BARGE ENABLED..... programming.
- (b) The attendant and Hotline partner cannot override a BLOCK BARGE ENABLED..... condition at an extension.
- (c) Single Line, 2500 type, and Four Button telephones cannot initiate Barge In.

**Related Programming:**

E: STATIONS FEATURES

BLOCK BARGE ENABLED..... to block Barge In.

**Feature Reference:**

Barge In



**Field:** BLOCK BARGE ENABLED.....

**Access:**

The BLOCK BARGE ENABLED..... field is accessed after the BARGE IN ENABLED..... field is programmed.

**Description:**

The BLOCK BARGE ENABLED..... field allows Barge In attempts to be blocked.

**Instructions:**

On Table 6-2, enter Y if the extension should be able to block Barge In attempts; N if not.

**Example:** not applicable

**Default Value:** NO (Barge In is not blocked)

**Conditions:**

- (a) The attendant and Hotline partner cannot override a BLOCK BARGE ENABLED..... condition at an extension.
- (b) All extensions in the system can be programmed to block Barge In.

**Related Programming:**

E: STATIONS FEATURES  
BARGE IN ENABLED..... to allow extensions to Barge In.

**Feature Reference:**

Barge In

**Field:** PERMANENT ACC CODE.....

**Access:**

The PERMANENT ACC CODE.....field is displayed after the BLOCK BARGE ENABLED field is programmed.

**Description:**

The PERMANENT ACC CODE.....field allows extensions to store permanent Account Code (up to nine digits) which accompany all calls made from that telephone on an SMDR printout.

**Instructions:**

On Table 6-2, enter Y if the extension being programmed should have the capability of storing a permanent Account Code, or N if it should not.

**Example:** not applicable

**Default Value:** YES (Permanent Account Codes can be stored)

**Conditions:**

- (a) The Account Code may be up to nine digits.

**Related Programming:**

E: STATIONS FEATURES  
FORCED ACC CODE..... to require that an Account Code be entered at an extension before a call is completed.

**Feature Reference:**

Account Code Capability

**Field:** FORCED ACC CODE.....

**Access:**

After the PERMANENT ACC CODE..... field is programmed, press the RETURN key to access the FORCED ACC CODE..... field.

**Description:**

The FORCED ACC CODE..... field forces an extension so programmed, to enter an Account Code (up to nine digits) before or after dialing an outside call.

**Instructions:**

On Table 6-2, enter Y if an extension should be forced to enter an Account Code before completing an outside call; N if not.

**Example:** not applicable

**Default Value:** NO (Forced Account Codes are not required)

**Conditions:**

Emergency numbers (i.e., N11 numbers) and calls to the operator (0) are always allowed, no matter how an extension is programmed.

**Related Programming:**

E: STATIONS FEATURES  
PERMANENT ACC CODE..... to enable an extension user to store an Account Code to accompany all calls on an SMDR printout.

**Feature Reference:**

Account Code Capability

**Field:** DIL OFF HOOK SIGNAL..... (Call Waiting for Incoming CO Calls)

**Access:**

After the FORCED ACC CODE.... field is programmed, press the RETURN key to access the DIL OFF HOOK SIGNAL..... field.

**Description:**

The DIL OFF HOOK SIGNAL..... field allows extensions, busy on a call, to receive two Call Waiting beeps when a call rings into the system. The call must be on a line for which the extension is normally granted CO audible.

**Instructions:**

On Table 6-2, enter Y if the extension is to receive CO Call Waiting beeps from an incoming call; N if not.

**Example:** not applicable

**Default Value:** NO (Call Waiting for incoming CO calls disabled)

**Conditions:**

The extension must have CO audible granted for the line before CO Call Waiting beeps can be received.

**Related Programming:**

E: STATIONS FEATURES  
CO AUDIBLE [NN..NN] to grant audible for incoming calls.  
CAMP-ON ORIGINATE..... to allow an extension to send Call Waiting tones for transferred calls.  
CAMP-ON RECEIVE..... to allow an extension to receive Call Waiting tones for transferred calls.

**Feature Reference:**

Answering a Call  
Call Waiting

**Field:** CAMP-ON ORIGINATE..... (Send Call Waiting for Transferred Calls)

**Access:**

After the DIL OFF HOOK SIGNAL..... field is programmed, press the RETURN key to access the CAMP-ON ORIGINATE..... field.

**Description:**

An extension can be individually programmed to send CO Call Waiting tones when it transfers a call. The extension receiving the Transfer must be programmed to receive CO Call Waiting for transferred calls or the tones are not heard.

**Instructions:**

On Table 6-2, enter Y if the extension should send CO Call Waiting tones when it transfers a call; N if not.

**Example:** not applicable

**Default Value:** YES (Call Waiting tones will be sent)

**Conditions:**

- (a) The extension receiving the Transfer must be programmed to receive CO Call Waiting for transferred calls or the tones are not heard.
- (b) An extension can receive a transferred call on a line which it normally would be prevented from answering.
- (c) This field also enables Attendant/Hotline Partner Call Waiting.
- (d) An attendant with a DSS Console also hears Call Waiting tones. If the call is transferred while the attendant is still busy on a call, the call rings as off-hook signaling in the DSS Console speaker.

**Related Programming:**

E: STATIONS FEATURES  
CAMP-ON RECEIVE..... to allow extensions to receive CO Call Waiting tones for transferred calls.

**Feature Reference:**

Answering a Call  
Call Waiting  
Hotline  
Transfer

**Field:** CAMP-ON RECEIVE..... (Receive Call Waiting for Transferred Calls)

**Access:**

The CAMP-ON RECEIVE..... field is accessed after the CAMP-ON ORIGINATE..... field is programmed.

**Description:**

An extension can be individually programmed to receive Call Waiting tones from calls transferred to it. If this field is not enabled, the extension receiving the Transfer does not hear Call Waiting tones, even if the extension which transferred the call was programmed to send them.

**Instructions:**

On Table 6-2, enter Y if the extension should receive Call Waiting tones from Transferred calls; N if not.

**Example:** not applicable

**Default Value:** YES (Call Waiting tones are received)

**Conditions:**

- (a) The extension transferring the call must have CAMP-ON ORIGINATE..... enabled in order to send the Call Waiting tones.
- (b) An extension can answer a transferred call on a line to which it normally would be denied access.
- (c) This field also applies to Attendant/Hotline Partner Call Waiting.

**Related Programming:**

E: STATIONS FEATURES  
CAMP-ON ORIGINATE..... to allow an extension which transferred the call to send CO Call Waiting tones.  
DIL OFF HOOK SIGNAL..... to permit extensions to hear Call Waiting tones for incoming calls.

**Feature Reference:**

Answering a Call  
Call Waiting  
Hotline  
Transfer

**Field:** PAGE ZONE RECEIVED.....

**Access:**

The PAGE ZONE RECEIVED..... field is accessed after the CAMP-ON RECEIVE..... field is programmed.

**Description:**

The system has eight Page zones (61-68) and All Call Paging. Each extension can be individually assigned to receive paging for any combination of Page zones.

**Instructions:**

On the Page Zone Received bit graph, place a 1 below each Page zone that the extension can receive. Place a 0 below all other zones. The 1s and 0s create an eight bit binary number. This binary number is converted to its two digit hexadecimal equivalent using Table 6-1. The hex resultant is entered on Table 6-2.

**Example:**

If extension 318 should receive paging for zones 5 through 8, place a 1 beneath zone 5 through 8 on the bit graph. The binary number 11110000 is converted to hexadecimal F0 and entered on Table 6-2.

**Default Value:**

Extensions 301 - 316: Page zone 1 (Default = 01).  
Extensions 317 - 332: Page zone 2 (Default = 02).  
Extensions 333 - 348: Page zone 3 (Default = 04).  
Extensions 349 - 401: Page zone 4 (Default = 08).  
Extensions 402 - 417: Page zone 5 (Default = 10).  
Extensions 418 - 433: Page zone 6 (Default = 20).  
Extensions 434 - 449: Page zone 7 (Default = 40).  
Extensions 450 - 465: Page zone 8 (Default = 80).

**Conditions:**

(a) An extension can be in any combination of Page zones.

**Related Programming:**

E: STATIONS FEATURES  
RECEIVE ALL-PAGE..... to program extensions to receive All Call Paging.  
S: SYSTEM FEATURES  
R: RELAYS CONTROL to program the relays to activate for Zone Page announcements.  
E: EXTERNAL OUTPUTS to program external outputs for Zone Page announcements if B-TGU-B PCBs are installed.

**Feature Reference:**

External Paging Zones  
Paging

PAGE ZONE RECEIVE BIT GRAPH

BIT No.	7	6	5	4	3	2	1	0	
ZONE	08	07	06	05	04	03	02	01	HEX
DEFAULT	0	0	0	0	0	0	0	1	01
STA 301									
STA 302									
STA 303									
STA 304									
STA 305									
STA 306									
STA 307									
STA 308									
STA 309									
STA 310									
STA 311									
STA 312									
STA 313									
STA 314									
STA 315									
STA 316									
DEFAULT	0	0	0	0	0	0	1	0	02
STA 317									
STA 318									
STA 319									
STA 320									
STA 321									
STA 322									
STA 323									
STA 324									
STA 325									
STA 326									
STA 327									
STA 328									
STA 329									
STA 330									
STA 331									
STA 332									

PAGE ZONE RECEIVE BIT GRAPH

BIT No.	7	6	5	4	3	2	1	0	
ZONE	08	07	06	05	04	03	02	01	HEX
DEFAULT	0	0	0	0	0	1	0	0	04
STA 333									
STA 334									
STA 335									
STA 336									
STA 337									
STA 338									
STA 339									
STA 340									
STA 341									
STA 342									
STA 343									
STA 344									
STA 345									
STA 346									
STA 347									
STA 348									
DEFAULT	0	0	0	0	1	0	0	0	08
STA 349									
STA 350									
STA 351									
STA 352									
STA 353									
STA 354									
STA 355									
STA 356									
STA 357									
STA 358									
STA 359									
STA 360									
STA 361									
STA 362									
STA 363									
STA 401									

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## PAGE ZONE RECEIVE BIT GRAPH

BIT No.	7	6	5	4	3	2	1	0	
ZONE	08	07	06	05	04	03	02	01	HEX
DEFAULT	0	0	0	1	0	0	0	0	10
STA 402									
STA 403									
STA 404									
STA 405									
STA 406									
STA 407									
STA 408									
STA 409									
STA 410									
STA 411									
STA 412									
STA 413									
STA 414									
STA 415									
STA 416									
STA 417									
STA 418									
DEFAULT	0	0	1	0	0	0	0	1	20
STA 419									
STA 420									
STA 421									
STA 422									
STA 423									
STA 424									
STA 425									
STA 426									
STA 427									
STA 428									
STA 429									
STA 430									
STA 431									
STA 432									
STA 433									

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## PAGE ZONE RECEIVE BIT GRAPH

BIT No.	7	6	5	4	3	2	1	0	
ZONE	08	07	06	05	04	03	02	01	HEX
DEFAULT	0	1	0	0	0	0	0	0	80
STA 434									
STA 435									
STA 436									
STA 437									
STA 438									
STA 439									
STA 440									
STA 441									
STA 442									
STA 443									
STA 444									
STA 445									
STA 446									
STA 447									
STA 448									
STA 449									
DEFAULT	0	0	0	1	0	0	0	0	10
STA 450									
STA 451									
STA 452									
STA 453									
STA 454									
STA 455									
STA 456									
STA 457									
STA 458									
STA 459									
STA 460									
STA 461									
STA 462									
STA 463									
STA 464									
STA 465									

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**Field:** PICK UP GROUP IS.....

**Access:**

The PICK UP GROUP IS..... field is accessed after the PAGE ZONE RECEIVED..... field is programmed.

**Description:**

Extensions may be grouped into Pick Up groups. A call ringing into a Pick Up group can be answered from any extension in the group, regardless of CO audible assignments. The system has a maximum of 16 Pick Up groups.

Multibutton and Four Button telephone users can turn ringing on and off for calls coming into the Pick Up group. These users can turn incoming CO audible on and off if:

- (a) A call is transferred to another extension in the Pick Up group.
- (b) The call is an intra-group call that does not normally ring at the user's extension (i.e., CO audible denied).
- (c) Any incoming call that rings can be answered at any station in the group.

**Instructions:**

On Table 6-2, indicate the number (01-16) of the Pick Up group to which the extension is assigned.

**Example:** not applicable

**Default Value:** 00

**Conditions:**

- (a) An extension can be assigned to only one Pick Up group. Any number of extensions can be assigned to one Pick Up group.
- (b) Incoming CO audible cannot be turned on and off for calls that normally ring at an extension (i.e., allowed by CO AUDIBLE [NN..NN] IS..). In addition, ringing for a call transferred to an extension cannot be turned on and off by that extension.
- (c) Single Line and 2500 type telephone users cannot turn ringing on and off for calls transferred to other extensions in the Pick Up group. Ringing also cannot be turned on and off for intra-group calls that normally do not ring at these extensions.

- (d) Four Button, Single Line and 2500 type telephone must be assigned to a Pick Up group if they are also part of an Extension Hunting group. This allows transferred or direct incoming calls that cycle through the hunt group to be answered (using Group Call Pickup).

**Related Programming:**

- E: STATIONS FEATURES  
CO AUDIBLE [NN..NN] IS.. to assign audible and incoming access for lines.
- S: SYSTEM FEATURES  
U: GROUP HUNT to program Extension Hunting.

**Feature Reference:**

Answering a Call  
Call Pickup, Group  
Extension Hunting  
Transfer

**Field:** TENANT GROUP IS.....

**Access:**

The TENANT GROUP IS..... field is accessed after the PICK UP GROUP IS..... field is programmed.

**Description:**

TENANT GROUP IS..... allows up to six tenants to share a single TCX-128 system. Each tenant (i.e., user group) can be programmed with incoming and outgoing lines dedicated exclusively for its own use. An attendant with a DSS Console can be assigned to each tenant group.

**Instructions:**

For the TENANT GROUP IS..... field on Table 6-2, enter the number of the tenant group (01-06) to which the extension belongs. If Tenant Service is not required, leave all extensions assigned to tenant 1 (01).

**Example:**

If extension 305 is to be a member of tenant group 3, enter 03 for the TENANT GROUP IS..... field on Table 6-2.

**Default Value:** 01 (all extensions in tenant group 1)

**Conditions:**

- (a) When the system is divided between tenants, the following occurs:
- (1) Each extension is connected to the attendant in its own tenant group when a 0 Intercom call is dialed. Each DSS Console in the system provides one button access and a Busy Lamp Field for all extensions (regardless of tenant group).
  - (2) All attendant recalls (e.g., Hold Recall, Transfer Recall and Orbit Recall) go to the attendant in the same tenant group as the extension which originally handled the call.
  - (3) All Call Page is broadcast to all extensions programmed to receive All Call Page, regardless of tenant assignment.
  - (4) Any extension in a tenant group can place an Intercom call to any extension in another tenant group.
  - (5) Any extension (regardless of tenant group) can use any System Speed Dial number unless prevented by Class of Service restrictions.

- (6) Least Cost Routing applies to all tenants. LCR routes an outgoing call from one tenant the same way as an outgoing call from another tenant, using the same line services. If Option 1 is disabled, CO access programming can be used to restrict each tenant to the lines within the tenant group.
- (7) Night Service can be activated separately for each tenant; however, the external alerting device activates for all UNA lines and cannot be split between tenant groups. (If the system is reset when a tenant group is in the night mode, the tenant group is still in the night mode when the system reboots.)

**Related Programming:**

- E: STATIONS FEATURES  
CO AUDIBLE [nn..nn] IS.. to program which lines should ring into each tenant group.  
NT AUDIBLE [nn..nn] IS.. to program Assigned Night Answer for each tenant group.  
CO ACCESS [nn..nn] IS.. to determine which lines are available for outgoing calls for each tenant.
- S: SYSTEM FEATURES  
O: OPERATORS & DSS to program attendants and DSS Consoles for the tenant groups.  
U: GROUP HUNT to program extensions within a tenant group into hunt groups.  
R: RELAYS CONTROL to assign the external control relays that may affect equipment shared by both tenants.  
G: CO GROUPS to program lines into line groups (to be used in conjunction with N: OUT KEYS GROUPS and CO ACCESS [nn..nn] IS.. programming).  
P: CO TYPE to assign lines as UNA lines. UNA lines will activate the external alerting devices.  
N: OUT KEYS GROUPS to assign line groups to outgoing line keys.

**Feature Reference:**

Answering a Call  
External Loud Ringing Zones  
External Paging Capability  
Least Cost Routing  
Night Service  
Paging  
Placing a Call  
Speed Dial



**Field:** PRIVATE LINE 1.....IS...  
PRIVATE LINE 2.....IS...

**Access:**

The PRIVATE LINE.....IS... field is accessed after the TENANT GROUP IS..... field is programmed.

**Description:**

A multibutton extension can have two lines designated in PRIVATE LINE 1.....IS... (or PRIVATE LINE 2.....IS...) programming as Private Lines. The TCX-128 can accommodate up to 32 Private Lines. A line designated in a PRIVATE LINE.....IS... field has the following characteristics:

- (a) Multibutton users place and answer calls on the Private Line using incoming line key 4 or 5.
- (b) A Private Line cannot be used by any other extension in the system to place calls. The CO ACCESS [NN..NN] IS.. field is automatically changed for every other extension in the system as soon as a Private Line is assigned.
- (c) The line rings and can be answered at any other extension in the system if CO AUDIBLE [NN..NN] IS.. programming permits it. It can also be transferred after it has been answered. If the line should ring only as a Private Line, CO AUDIBLE [NN..NN] IS.. should be denied for that line at all other extensions in the system.

**Instructions:**

If the extension is to have a Private Line, enter the number of the line (01-32) on Table 6-2.

**Example:**

If extension 316 is to have line 6 as a Private Line, enter 06 for the PRIVATE LINE..... IS... field on Table 6-2.

**Default Value:** NONE

**Conditions:**

- (a) A line assigned in one of the PRIVATE LINE..... IS... fields will ring and can be answered by any other extension in the system if CO AUDIBLE [NN..NN] IS .. programming permits it.
- (b) If an extension with a Private Line (or lines) is part of a Pick Up group, the other extensions in the group cannot use the PKUP (PKUP/CONF on four button) key to answer the call.

- (c) When the system is put in the night mode, Private Lines cannot be accessed from a Single Line, 2500 type, or Four Button telephone by dialing 69; cannot send audio to Alternate Audio Ports or external audio ports; and cannot activate a night ring relay. Assigned Night Answer can be programmed for Private Lines, however.
- (d) Since Private Lines do not activate the loud ring relay, they should not be assigned as Universal Night Answer lines in P: CO TYPE.
- (e) Private Lines can be shared by more than one extension. To assign Private Lines to a group of extensions:
  - (1) In PRIVATE LINE..... IS... programming, assign the same Private Line (or lines) to each extension.
  - (2) In CO AUDIBLE [nn..nn] IS.. programming, grant CO audible for the Private Lines to each extension in the group. If this is not done, incoming line key five is steadily illuminated as the Private Lines are ringing in.
  - (3) In CO ACCESS [nn..nn] IS.. programming, grant each extension in the group access to the Private Line(s).

Each extension in the group sharing the Private Line(s) have a Busy Lamp indication (on incoming line key five) any time a Private Line is being used.
- (f) Toll Restriction always applies to calls made on Private Lines.
- (g) The PRIVATE LINE 2...IS... field does not appear unless the PRIVATE LINE 1...IS... field is programmed (enabled).

**Related Programming:**

E: STATIONS FEATURES

CO AUDIBLE [nn..nn] IS.. to prevent other extensions in the system from answering incoming calls on the Private Line(s).

CO ACCESS [nn..nn] IS.. is automatically denied for the Private Line(s) for all other extensions in the system.

S: SYSTEM FEATURES

P: CO TYPE to assure that Private Lines are not programmed for Universal Night Answer.

**Feature Reference:**

Answering a Call  
Night Service  
Placing a Call  
Private Line

**Field:** PRV 1 RNG OPERATOR.....  
PRV 2 RNG OPERATOR.....

**Access:**

The PRV 1 RNG OPERATOR..... and PRV 2 RNG OPERATOR..... fields are accessed after the PRIVATE LINE.....IS... fields are programmed.

**Description:**

A multibutton extension can be assigned two Private Lines. A call that rings on one of these lines and remains unanswered may ring the attendant if so programmed in these fields. If these fields are not enabled, incoming calls on Private Lines only ring at the extension where the line is assigned; the call never rings the attendant's telephone.

**Instructions:**

If an extension's Private Line(s) should recall the attendant if unanswered, enter Y for yes on Table 6-2; N if not.

**Example:** not applicable

**Default Value:** NO

**Conditions:**

(a) If the Private Line begins to ring the operator, it also continues to ring the extension assigned the Private Line.

**Related Programming:**

E: STATIONS FEATURES  
PRIVATE LINE 1 (2).....IS... to assign Private Lines to extensions.  
Timer: DIL Ring Operator

**Feature Reference:**

Private Line

## PROGRAM S: SYSTEM FEATURES.

**Field:** T: TIME OF DAY

**Access:**

Press the M key to enter the programming mode. Press the S key to access the S: SYSTEM FEATURES program. Press the T key to program T: TIME OF DAY. T: TIME OF DAY has the following sub-fields:

R.T.C. (displayed only when the B-RTC-A PCB is installed)

ENTER HOURS HH.....

ENTER MINUTES MM...

After the ENTER HOURS HH..... sub-field is programmed, the ENTER MINUTES MM... sub-field is accessed.

**Description:**

This field allows the correct time to be set. Time information is displayed on display telephones and printed by the SMDR.

**Instructions:**

The time is entered at the time of installation and does not require an entry on a Program Record Form.

To program ENTER HOURS HH....., enter 00-23 (where 01 is 1:00 A.M.; 23 is 11:00 P.M.).

To program ENTER MINUTES MM..., enter 00-59 for minutes past the hour.

**Example:**

To set the time at 4:15 P.M.: for ENTER HOURS HH....., enter 16; for ENTER MINUTES MM..., enter 15.

**Default Value:** not applicable



**Conditions:**

- (a) The prompt R.T.C. displays only when the B-RTC-A PCB is installed on the B-TGU-C PCB.
- (b) The B-RTC-A PCB provides a battery backed-up system clock. The system recognizes this PCB as soon as it is installed. Once fully charged, the B-RTC-A PCB keeps accurate time for 100 hours during a power failure. In a properly operating system, the B-RTC-A PCB fully charges in 100 hours.

**Related Programming:**

S: SYSTEM FEATURES

D: DATE to program the day of the week, month and year.

**Feature Reference:**

Date and Time  
SMDR

**Field:** D: DATE

**Access:**

While in the S: SYSTEM FEATURES program, press the D key. The D: DATE field has the following sub-fields:

- ENTER MONTH .....
- ENTER DATE.....
- ENTER YEAR .....
- DAY OF WEEK (1-7)..

After the ENTER MONTH..... sub-field is programmed, the ENTER DATE..... sub-field is accessed. After the ENTER DATE..... sub-field is programmed, the ENTER YEAR..... sub-field is accessed. After the ENTER YEAR..... sub-field is programmed, the DAY OF WEEK (1-7)... sub-field is accessed.

**Description:**

The D: DATE field allows the correct date to be set. Date information is displayed on display telephones and printed by the SMDR.

**Instructions:**

Date information is entered at the time of installation and does not require an entry on a Program Record Form.

To program ENTER MONTH....., enter 01-12 (where 01 is January; 12 is December).

To program ENTER DATE....., enter 01-31 to designate the day of the month.

To program ENTER YEAR....., enter the last two digits of the year (86 for 1986).

To program DAY OF WEEK (1-7)..., enter 01-07 to indicate the day of the week (where 01 is Sunday; 07 is Saturday).

**Example:**

To set the date at Wednesday, June 19, 1986:

For ENTER MONTH . . . . ., enter 06.

For ENTER DATE . . . . ., enter 19.

For ENTER YEAR . . . . ., enter 86.

For DAY OF WEEK (1-7) . . ., enter 04.

**Default Value:** not applicable

**Conditions:**

Date information is battery backed-up by the B-RTC-A PCB.

**Related Programming:**

S: SYSTEM FEATURES

T: TIME of day to program the time of day.

**Feature Reference:**

Date and Time  
SMDR

**Field: O: OPERATORS & DSS****Access:**

While in the S: SYSTEM FEATURES program, press the O key. The following sub-fields may be programmed:

OPERATOR #..... 01...IS...301\_\_  
DSS OPERATOR 01...IS...NONE\_\_  
ALT OPERATOR 01...IS...NONE\_\_  
OPERATOR #..... 02...IS...NONE\_\_  
DSS OPERATOR 02...IS...NONE\_\_  
ALT OPERATOR 02...IS...NONE\_\_  
OPERATOR #..... 03...IS...NONE\_\_  
DSS OPERATOR 03...IS...NONE\_\_  
ALT OPERATOR 03...IS...NONE\_\_  
OPERATOR #..... 04...IS...NONE\_\_  
DSS OPERATOR 04...IS...NONE\_\_  
ALT OPERATOR 04...IS...NONE\_\_  
OPERATOR #..... 05...IS...NONE\_\_  
DSS OPERATOR 05...IS...NONE\_\_  
ALT OPERATOR 05...IS...NONE\_\_  
OPERATOR #..... 06...IS...NONE\_\_  
DSS OPERATOR 06...IS...NONE\_\_  
ALT OPERATOR 06...IS...NONE\_\_

After the first sub-field is programmed, the next sub-field is accessed. Refer to the specific sub-field for access instructions.

**Description:**

The system can accommodate six operators (attendants), six alternate operators and six DSS Consoles. The entries in O: OPERATORS & DSS determine the extension numbers for the operators, alternate operators and DSS Consoles.

**Instructions:** Refer to the specific sub-field.

**Example:** Refer to the specific sub-field.

**Default Value:** Refer to the specific sub-field.

**Conditions:** Refer to the specific sub-field.

**Related Programming:**

E: STATIONS FEATURES  
TYPE OF PHONE to assign DSS Consoles with type  
DSS.

**Feature Reference:**

All attendant features:  
Alternate Attendant  
Busy Out Lines  
Call Forwarding Cancel  
Call Waiting  
Date and Time  
Direct Line Access  
Do Not Disturb Override  
Night Service  
Speed Dial  
Speed Dial Options  
Transfer (Handsfree Transfer)

**Sub-Field:** OPERATOR #.. 01...IS...

**Access:**

While in the S: SYSTEM FEATURES program, press the  
O key. The OPERATOR #.. 01...IS... sub-field is accessed.

**Description:**

The OPERATOR #.. 01...IS... sub-field determines which  
extension is the primary operator (attendant). The primary  
operator is the extension reached when a user dials 0.

**Instructions:**

On Table 6-3, enter the extension number (301-363,  
401-465) for the primary operator.

**Example:**

If extension 306 is to be the primary operator, enter 306 for  
this sub-field on Table 6-3.

**Default Value:** 301

**Conditions:**

- (a) The primary operator extension must be a multibutton  
key telephone.
- (b) If an operator is not assigned (i.e., entry is N),  
transferred calls, calls placed on Hold and calls placed  
into orbit recall the initiating extension only. These  
calls, if still unanswered, continue to ring the initiating  
extension and never ring a third extension. Additionally,  
System Speed Dial cannot be programmed and Night  
Service cannot be activated.
- (c) If the system is configured for Tenant Service in E:  
STATIONS FEATURES (TENANT GROUP IS.....),  
an operator can activate Night Service only for the  
tenant group to which it is assigned.
- (d) If the OPERATOR #... 01...IS... sub-field is not  
programmed, the extension assigned in the  
OPERATOR #... 02...IS... sub-field becomes the  
primary operator. If operator 2 is not programmed,  
operator 3 becomes the primary operator, etc.
- (e) Any operator can program System Speed Dial  
numbers.

**Related Programming:**

S: SYSTEM FEATURES

O: OPERATORS & DSS

DSS OPERATOR 01...IS... to program the primary operator with a DSS Console. This enables the Automatic Hold and Direct Station Selection (DSS Console) features for the primary operator.

ALT OPERATOR 01...IS... to enable the Alternate Attendant feature for the primary operator.

**Feature Reference:**

All attendant features.

**Sub-Field:** DSS OPERATOR 01...IS...

**Access:**

The DSS OPERATOR 01...IS... sub-field is accessed after the OPERATOR #... 01...IS... sub-field is programmed.

**Description:**

This sub-field assigns the extension number to the DSS Console for operator 1.

**Instructions:**

On Table 6-3, enter the extension number (301-363, 401-465) for the DSS Console assigned to operator 1. Enter N (for NONE) if not assigned.

**Example:**

If extension 307 is the DSS Console for the primary operator, enter 307 for this sub-field on Table 6-3.

**Default Value:** NONE (not assigned)

**Conditions:**

A DSS Console must be programmed to enable Automatic Hold for the primary attendant. A DSS Console must be programmed and installed to enable Direct Station Selection (DSS Console) for the primary attendant.

**Related Programming:**

S: SYSTEM FEATURES

O: OPERATORS & DSS

OPERATOR # 01...IS... to be certain that an extension is assigned as the primary operator.

E: STATIONS FEATURES

TYPE OF PHONE..... to program the DSS Console with telephone type DSS.

**Feature Reference:**

Direct Station Selection

Hold



**Sub-Field:** ALT OPERATOR 01...IS...

**Access:**

The ALT OPERATOR 01...IS... sub-field is accessed after the DSS OPERATOR 01...IS... sub-field is programmed.

**Description:**

Operator 1 can have another extension in the system assigned as its alternate operator. If the operator's extension is unattended and Alternate Attendant is activated, all operator calls can be routed to the alternate.

**Instructions:**

On Table 6-3, enter the extension number (301-363, 401-465) for the alternate operator assigned to operator 1. If an alternate operator is not required, enter N (for NONE).

**Example:**

If extension 302 is to be the alternate operator for operator 1, enter 302 for this sub-field on Table 6-3.

**Default Value:** NONE (not assigned)

**Conditions:**

- (a) The alternate operator should be a multibutton telephone.
- (b) The alternate for the primary operator can be another operator (2-6).

**Related Programming:**

S: SYSTEM FEATURES  
O: OPERATORS & DSS  
OPERATOR #... 01... IS..... to be certain that a primary operator (operator 1) is programmed.

**Feature Reference:**

Alternate Attendant

**Sub-Field:** OPERATOR #... 02...IS...

**Access:**

The OPERATOR #... 02...IS... sub-field is accessed after the ALT OPERATOR 01...IS... sub-field is programmed.

**Description:**

The OPERATOR #... 02...IS... sub-field determines which extension will be the second operator (attendant) in the system.

**Instructions:**

On Table 6-3, enter the extension number (301-363, 401-465) for the second operator. Enter N (for NONE) if not assigned.

**Example:**

If extension 324 is to be the second operator, enter 324 for this sub-field on Table 6-3.

**Default Value:** NONE (not assigned)

**Conditions:**

- (a) The second operator extension must be a multibutton key telephone.
- (b) Transferred calls, calls placed on Hold and calls placed into orbit recall the primary operator only. If the primary operator is busy on a call, the call rings at the speaker in the primary operator's DSS Console, not at another operator's telephone.

**Related Programming:**

S: SYSTEM FEATURES  
O: OPERATORS & DSS  
DSS OPERATOR 02...IS... to enable the Automatic Hold and Direct Station Selection (DSS Console) features for the second operator.  
ALT OPERATOR 02...IS... to enable the Alternate Attendant feature for the second operator.

**Feature Reference:**

All attendant features.

**Sub-Field:** DSS OPERATOR 02...IS...**Access:**

The DSS OPERATOR 02...IS... sub-field is accessed after the OPERATOR #.. 02...IS... sub-field is programmed.

**Description:**

This sub-field assigns the extension number to the DSS Console for operator 2.

**Instructions:**

On Table 6-3, enter the extension number (301-363, 401-465) for the DSS Console assigned to operator 2. Enter N (for NONE) if not assigned.

**Example:**

If extension 307 is the DSS Console for operator 2, enter 307 for this sub-field on Table 6-3.

**Default Value:** NONE (not assigned)

**Conditions:**

- (a) A DSS Console must be programmed to enable Automatic Hold for the second attendant. A DSS Console must be programmed and installed to enable Direct Station Selection (DSS Console) for the second attendant.

**Related Programming:**

- S: SYSTEM FEATURES  
O: OPERATORS & DSS  
OPERATOR #.. 01...IS... to be certain that an extension is assigned as the primary operator.  
E: STATIONS FEATURES  
TYPE OF PHONE..... to program the DSS Console with telephone type DSS.

**Feature Reference:**

Direct Station Selection  
Hold

**Sub-Field:** ALT OPERATOR 02...IS...**Access:**

The ALT OPERATOR 02...IS... sub-field is accessed after the DSS OPERATOR 02...IS... sub-field is programmed.

**Description:**

Operator 2 can have another extension in the system assigned as its alternate operator. If the second operator's extension is unattended, all calls to the second operator can be routed to its alternate.

**Instructions:**

On Table 6-3, enter the extension number (301-363, 401-465) for the alternate operator assigned to operator 2. If an alternate operator is not required, enter N (for NONE).

**Example:**

If extension 302 is to be the alternate operator for operator 2, enter 302 for this sub-field on Table 6-3.

**Default Value:** NONE (not assigned)

**Conditions:**

- (a) The alternate operator should be a multibutton telephone.  
(b) The alternate for operator 2 can be operator 1.

**Related Programming:**

- S: SYSTEM FEATURES  
O: OPERATORS & DSS  
OPERATOR #... 02...IS... to be certain that a second operator (operator 2) is programmed.

**Feature Reference:**

Alternate Attendant



**Sub-Field:**

OPERATOR #.....03...IS...  
 DSS OPERATOR 03...IS...  
 ALT OPERATOR 03...IS...  
 OPERATOR #.....04...IS...  
 DSS OPERATOR 04...IS...  
 ALT OPERATOR 04...IS...  
 OPERATOR #.....05...IS...  
 DSS OPERATOR 05...IS...  
 ALT OPERATOR 05...IS...  
 OPERATOR #.....06...IS...  
 DSS OPERATOR 06...IS...  
 ALT OPERATOR 06...IS...

**Access:**

The OPERATOR #... 03...IS... sub-field is accessed after the ALT OPERATOR 02...IS... sub-field is programmed. Each remaining sub-field is accessed after the preceding sub-field is programmed.

**Description:** Refer to the sub-fields for operator 2.

**Instructions:** Refer to the sub-fields for operator 2.

**Example:** Refer to the sub-fields for operator 2.

**Default Value:** NONE (not assigned)

**Conditions:** Refer to the sub-fields for operator 2.

**Related Programming:** Refer to sub-fields for operator 2.

**Feature Reference:** Refer to the sub-fields for operator 2.

**Field:** U: GROUP HUNT

**Access:**

When in the S: SYSTEM FEATURES program, press the U key. The following sub-fields are available for programming:

GROUP HUNT

HUNT\_\_GRP\_\_01  
 HUNT\_\_MOD\_\_00  
 HUNT\_\_TIME\_\_000\_\_  
 HUNT\_\_MSTR\_\_NONE\_\_  
 OVRFL EXT\_\_NONE\_\_  
 HUNT\_\_FROM\_\_  
 HUNT\_\_TO\_\_

through

HUNT\_\_GRP\_\_16  
 HUNT\_\_MOD\_\_00  
 HUNT\_\_TIME\_\_000\_\_  
 HUNT\_\_MSTR\_\_NONE\_\_  
 OVRFL EXT\_\_NONE\_\_  
 HUNT\_\_FROM\_\_  
 HUNT\_\_TO\_\_

**Description:**

The U: GROUP HUNT field allows selected extensions to be grouped together for Extension Hunting. As many as sixteen hunt groups can be configured. Incoming and transferred calls ring in sequence through an Extension Hunting group until they are answered. There are two types of Extension Hunting: Uniform Call Distribution (UCD) and Terminal Hunting. With UCD Hunting, the ringing sequence is determined by the frequency of use of the extensions in the group. The least used extension is the first extension rung and the most used extension is the last extension rung. With Terminal Hunting, the ringing sequence is in a predetermined order.

**Instructions:** Refer to the sub-fields that follow.

**Example:** Refer to the sub-fields that follow.

**Default Value:** Refer to the sub-fields that follow.

**Conditions:**

- (a) Extension Hunting does not ring a telephone that is busy or in Do Not Disturb.
- (b) Activating Night Service normally disables Extension Hunting. Extension Hunting functions in the night mode only if the hunt master designated in U: GROUP HUNT (HUNT\_\_MSTR\_\_NONE\_\_) is not in the night mode. In this instance, Tenant Service assignments may affect Extension Hunting.
- (c) If an extension's Private Line is programmed for Extension Hunting, it rings on incoming line key 4 or 5.

**Related Programming:**

S: SYSTEM FEATURES

P: CO TYPE to designate lines for Extension Hunting.

**Feature Reference:**

Answering a Call  
Do Not Disturb  
Night Service  
Extension Hunting  
Transfer

**Sub-Field:** HUNT\_\_GRP \_\_01

**Access:**

When in the S: SYSTEM FEATURES program, press the U key. The HUNT\_\_GRP \_\_01 sub-field is the first sub-field accessed. The HUNT\_\_GRP \_\_02 sub-field is accessed after all the sub-fields for HUNT\_\_GRP \_\_01 are programmed. To go directly from the HUNT\_\_GRP \_\_01 sub-field to another HUNT\_\_GRP \_\_ sub-field, enter the number of the group to be programmed and press the RETURN key.

**Description:**

HUNT\_\_GRP \_\_ designates the Extension Hunting group number. Up to 16 Hunt Groups can be configured for Extension Hunting; there is no limit to the number of extensions that can be in each Hunt Group. A Hunt Group can consist of any combination of Multibutton, Four Button, Single Line or 2500 type telephones.

**Instructions:**

HUNT\_\_GRP \_\_ does not require an entry on Table 6-3.

**Example:** not applicable

**Default Value:** not applicable

**Conditions:**

- (a) Four Button, Single Line and 2500 type telephones must be assigned to a Pick Up group if they are to be part of an Extension Hunting group. These extensions can share the same Pick Up group, or can be programmed into dedicated Pick Up groups. Incoming calls cycling through the Extension Hunting group can be answered at these extensions by lifting the handset; however, transferred calls cycling through the Extension Hunting group can be answered only with Group Call Pick Up.
- (b) An extension can be programmed into only one Hunt Group.
- (c) Any amount of extensions can be programmed into one Hunt Group.

**Related Programming:**

**E: STATIONS FEATURES**

PICK UP GROUP IS..... to program Four Button, Single Line and 2500 type telephones into Pick Up groups if they are to be used for Extension Hunting.

**S: SYSTEM FEATURES**

**U: GROUP HUNT**

HUNT\_\_MOD \_\_ to program the Extension Hunting group for UCD or Terminal hunting.

HUNT\_\_TIME\_\_ to determine how long a call sequencing through a Hunt Group rings at each extension.

HUNT\_\_MSTR\_\_ to assign an extension as a master extension for group hunting.

OVRFL EXT\_\_ to designate an extension as the overflow destination.

HUNT\_\_FROM\_\_HUNT\_\_TO\_\_ to program extensions into a Hunt Group.

**P: CO TYPE** to designate lines for Extension Hunting.

**Feature Reference:**

Answering a Call  
Call Pickup, Group  
Extension Hunting  
Transfer

**Sub-Field: HUNT\_\_MOD \_\_**

**Access:**

After the HUNT\_\_GRP \_\_ prompt is displayed, press the RETURN key to access the HUNT\_\_MOD \_\_ sub-field.

**Description:**

HUNT\_\_MOD \_\_ determines the type of Extension Hunting that the Hunt Group is to use: Uniform Call Distribution (UCD)—type 01, or Terminal—type 02.

**Uniform Call Distribution Extension Hunting—Type 01**

In a UCD Extension Hunting group, an unanswered call rings through the group in a sequence determined by how long each extension has been busy. When the system is initially set up, the extensions are rung in the order that they are entered into the program. As soon as an extension is busy on an outside call for more than four seconds, it is taken out of the hunting sequence. When the busy extension becomes idle for more than four seconds, it is placed back in the sequence as the last extension to be rung for the next call. When another busy extension becomes idle for more than four seconds, it is placed at the end of the sequence and the extension that was previously at the end moves up toward the top. The UCD sequence is constantly adjusted for each new call, dependent on the traffic within the Extension Hunting group.

**Terminal Hunting—Type 02**

If a Hunt Group is programmed for Terminal Hunting, an unanswered call rings through the Hunt Group in the order in which the extensions were programmed in U: GROUP HUNT (HUNT\_\_FROM\_\_ HUNT\_\_TO\_\_). All extensions that are in Do Not Disturb or are busy on a call are bypassed until they become idle.

**Instructions:**

For the HUNT\_\_MOD \_\_ sub-field on Table 6-3, enter 01 if UCD Hunting is required; 02 if Terminal Hunting is required.

**Example:**

If Hunt Group 01 should be programmed for Uniform Call Distribution, enter 01 for the HUNT\_\_MOD \_\_ sub-field on Table 6-3 for Hunt Group 01.

**Default Value:** 00 (hunting disabled)

**Conditions:** not applicable

**Related Programming:**

S: SYSTEM FEATURES

U: GROUP HUNT

HUNT\_\_GRP \_\_ to designate the Hunt Group.

HUNT\_\_TIME\_\_ to determine how long a call sequencing through a Hunt Group rings at each extension.

HUNT\_\_MSTR\_\_ to assign an extension as a master extension for group hunting.

OVRFL EXT\_\_ to designate an extension as the overflow destination.

HUNT\_\_FROM\_\_HUNT\_\_TO\_\_ to program extensions into a Hunt Group.

P: CO TYPE to designate lines for Extension Hunting.

**Feature Reference:**

Answering a Call  
Do Not Disturb  
Extension Hunting  
Transfer

**Sub-Field:** HUNT\_\_TIME\_\_

**Access:**

This sub-field is displayed after the HUNT\_\_MOD \_\_ sub-field is programmed.

**Description:**

The HUNT\_\_TIME\_\_ sub-field sets the maximum length of time that an unanswered call hunting through an Extension Hunting group rings an idle extension. If the call is not answered within the HUNT\_\_TIME\_\_ interval, it rings the next extension in the cycle.

**Instructions:**

For the HUNT\_\_TIME\_\_ sub-field on Table 6-3, enter the time (in seconds) that an unanswered call sequencing through a Hunt Group rings an idle extension.

**Example:**

If an unanswered call cycling through a Hunt Group should ring an idle extension for 1 minute, enter 060 for this sub-field on Table 6-3.

**Default Value:** 000 (not defined)

**Conditions:**

If the HUNT\_\_TIME\_\_ interval is set too short, calls pass to the next extension in the hunting cycle before they can be answered. If the interval is set too long, hunting is defeated since the ring cycling is too slow.

**Related Programming:**

S: SYSTEM FEATURES

U: GROUP HUNT

HUNT\_\_GRP \_\_ to designate the Hunt Group.

HUNT\_\_MOD \_\_ to program the Hunt Group for UCD or Terminal Hunting.

HUNT\_\_MSTR\_\_ to assign an extension as a master extension for group hunting.

OVRFL EXT\_\_ to designate an extension as the overflow destination.

HUNT\_\_FROM\_\_HUNT\_\_TO\_\_ to program extensions into a Hunt Group.

P: CO TYPE to designate lines for Extension Hunting.

**Feature Reference:**

Answering a Call  
Extension Hunting

**Sub-Field:** HUNT\_\_MSTR\_\_**Access:**

This sub-field is accessed after the HUNT\_\_TIME\_\_ sub-field is programmed.

**Description:**

The HUNT\_\_MSTR\_\_ sub-field designates the extension assigned as the Extension Hunt Group master extension. A master extension must be programmed for each Hunt Group or Extension Hunting does not function. For UCD Hunting, the master must be a non-installed extension (i.e., an extension port that is not connected to a telephone). The UCD Hunting master is only a software assignment that enables the UCD Hunting facility. For Terminal Hunting, the master extension must be an installed extension and is the first extension in the Hunt Group.

**Instructions:**

For HUNT\_\_MSTR\_\_ sub-field on Table 6-3, enter the number of the master extension. For UCD Hunting, the extension must not be installed. For Terminal Hunting, the extension must be installed.

**Example:**

If extension 401 should be the master extension for the Hunt Group being programmed, enter 401 for the HUNT\_\_MSTR\_\_ sub-field on Table 6-3.

**Default Value:** NONE (not assigned)

**Conditions:**

- (a) A call ringing into a Terminal Hunt Group rings the master extension first. The master extension must have CO audible programmed for the line.
- (b) The UCD master extension must have CO audible enabled for each incoming line that should ring through the Hunt Group.

**Related Programming:****E:** STATIONS FEATURES

CO AUDIBLE (nn..nn) IS.. to program CO audible at the master extension for each line to ring into a Hunt Group.

**S:** SYSTEM FEATURES**U:** GROUP HUNT

HUNT\_\_GRP \_\_ to designate the Hunt Group.

HUNT\_\_MOD \_\_ to program the Hunt Group for UCD or Terminal Hunting.

HUNT\_\_TIME\_\_ to set the interval that an unanswered call rings each extension in a Hunt Group.

OVRFL EXT\_\_ to designate an extension as the overflow destination.

HUNT\_\_FROM\_\_HUNT\_\_TO\_\_ to program extensions into a Hunt Group.

**P:** CO TYPE to designate lines for Extension Hunting.

**Feature Reference:**

Answering a Call  
Extension Hunting

## Sub-Field: OVRFL EXT\_\_

### Access:

This sub-field is accessed after the HUNT\_\_MSTR\_\_ sub-field is programmed.

### Description:

OVRFL EXT\_\_ defines the overflow extension for an Extension Hunt Group. A call that sequences through an Extension Hunt Group and remains unanswered rings the overflow extension. If an overflow extension is not programmed for a UCD Hunt Group, an unanswered call continues to cycle through the group as determined by Uniform Call Distribution. If an overflow extension is not programmed for a Terminal Hunt Group, the call cycles once through the group and ends up ringing the last extension in the sequence. In neither case does an unanswered call ring the attendant.

### Instructions:

For the OVRFL EXT\_\_ sub-field on Table 6-3, enter the overflow extension number.

### Example:

If extension 301 should be the overflow extension for the Hunt Group, enter 301 for the OVRFL EXT\_\_ sub-field on Table 6-3.

**Default Value:** NONE (not assigned)

### Conditions:

- (a) A call transferred into a Terminal Hunt Group does not recall the extension which transferred the call. If not picked up, the unanswered transferred call rings the attendant only if the attendant is programmed as the overflow extension.
- (b) A transferred call ringing into a Terminal Hunt Group rings the extension to which it was transferred first. If unanswered, the call rings at remaining extensions in the Hunt Group but does not cycle back to the top of the list. This is true in the day or night mode, as long as the hunt master is not in the night mode.
- (c) A call transferred into a UCD Hunt Group only rings at the extension to which it was transferred. If the call is not picked up, it recalls the extension which initially transferred the call. If the recall is not answered, the call rings at the attendant's extension. This is true in the day or night mode, as long as the hunt master is not in the night mode.

## Related Programming:

S: SYSTEM FEATURES

U: GROUP HUNT

HUNT\_\_GRP \_\_ to designate the Hunt Group.  
HUNT\_\_MOD \_\_ to program the Hunt Group for UCD or Terminal Hunting.

HUNT\_\_TIME\_\_ to set the interval that an unanswered call rings each extension in a Hunt Group.

HUNT\_\_MSTR\_\_ to assign a master extension number.

HUNT\_\_FROM\_\_HUNT\_\_TO\_\_ to program extensions into a Hunt Group.

P: CO TYPE to designate lines for Extension Hunting.

## Feature Reference:

Answering a Call  
Extension Hunting  
Transfer

**Sub-Field:** HUNT\_\_FROM\_\_  
HUNT\_\_TO\_\_

**Access:**

The HUNT\_\_FROM\_\_ sub-field is accessed after the OVRFL EXT\_\_ subfield is programmed. The HUNT\_\_TO\_\_ sub-field is accessed after the HUNT\_\_FROM\_\_ sub-field is programmed.

The first HUNT\_\_FROM\_\_ sub-field displays the number of the master extension. Press the RETURN key to access the first HUNT\_\_TO\_\_ subfield. Do not change the first HUNT\_\_FROM\_\_ entry. Once an entry is made for the first HUNT\_\_TO\_\_ sub-field, press the RETURN key twice to access the next HUNT\_\_TO\_\_ sub-field. The HUNT\_\_FROM\_\_ sub-fields display the previous HUNT\_\_TO\_\_ entries and should not be changed. A Hunt Group of any size can be programmed in this manner.

**Description:**

The HUNT\_\_FROM\_\_ and HUNT\_\_TO\_\_ sub-fields are used to configure the Hunt Groups. Up to 16 Extension Hunt Groups can be programmed, and there is no limit to the number of extensions that can be in each group; however, an extension can be assigned to only one Hunt Group.

If the Hunt Group being programmed is a UCD Hunt Group, the extensions entered for the HUNT\_\_FROM\_\_ and HUNT\_\_TO\_\_ sub-fields determine only which extensions are assigned to the group. Uniform Call Distribution determines the order in which the extensions are rung. If Terminal Hunting is programmed, the extensions are rung in the exact sequence they are programmed.

**Instructions:**

On Table 6-3, enter the Extension Hunt Group number for each extension.

**Example:** not applicable

**Default Value:** NONE (not assigned)

**Conditions:**

- (a) When setting up the initial installation, it is easier to arrange the Hunt Groups so that the extension numbers are consecutive. As the installation changes and the assignments become more complex, it is imperative that the extension-to-hunt group record on Table 6-3 be updated.
- (b) For each extension programmed into a Hunt Group (except for the master), CO audible should be denied for each line marked for hunting.

**Related Programming:**

E: STATIONS FEATURES

CO AUDIBLE (nn..nn) IS.. to deny CO audible for each line marked for hunting. This does not apply to the master extension.

S: SYSTEM FEATURES

U: GROUP HUNT

HUNT\_\_GRP \_\_ to designate the Hunt Group.

HUNT\_\_MOD \_\_ to program the Hunt Group for UCD or Terminal Hunting.

HUNT\_\_TIME\_\_ to set the interval that an unanswered call rings each extension in a Hunt Group.

HUNT\_\_MSTR\_\_ to assign a master extensic number.

OVRFL EXT\_\_ to program an overflow extension for the Hunt Group.

P: CO TYPE to designate lines for Extension Hunting.

**Feature Reference:**

Answering a Call  
Extension Hunting

**Field: M: TIMERS**

**Access:**

When in the S: SYSTEM FEATURES program, press the M key. The following sub-fields may be programmed:

- HOLD RECALL TIMER.(SEC) ..060\_\_
- ORBIT RECALL TIMER.(SEC) ..060\_\_
- PAUSE TIME-OUT.(SEC).....006\_\_
- FLASH TIMER.(N\*50MSEC) ...020\_\_
- DIAL TONE TIME-OUT.(SEC) ..002\_\_
- SMDR TIMER..(SEC).....030\_\_
- TRANS RECALL.(SEC) .....120\_\_
- DIL RNG OPERATOR (SEC) ....012\_\_
- SMDR RNA TIMER..(SEC) .....012\_\_
- PRVC TONE....(SEC) .....001\_\_
- DISA PAGE...(SEC).....015\_\_
- DISA & TIE RNA...(SEC) .....012\_\_
- DISA ANSWER..(SEC).....006\_\_
- DCD START...(SEC) .....060\_\_
- DCD END.(N\*50MSEC) .....015\_\_
- FIRST DIGIT..(SEC) .....010\_\_
- INTER DIGIT..(SEC) .....005\_\_
- MIN RNG BRST. N\*0.1 SEC ....004\_\_
- MAX RNG IDLE. N\*0.1 SEC ....060\_\_
- MIN DRP PULS. N\*0.1 SEC ....006\_\_
- OP BREAK....(MSEC) .....061\_\_
- OP MAKE.....(MSEC) .....039\_\_
- INTER OP..N\*(M+B) .....010\_\_

After the first sub-field is programmed, the next sub-field is accessed. Refer to the specific sub-field for access instructions.

**Description:**

Various timers are used in the system. Each of these timers is presented as a sub-field in the M: TIMERS field.

**Instructions:** Refer to the specific sub-field.

**Example:** Refer to the specific sub-field.

**Default Value:** Refer to the specific sub-field.

**Conditions:** Refer to the specific sub-field.

**Related Programming:** Refer to the specific sub-field.

**Feature Reference:** Refer to the specific sub-field.

**Sub-Field: HOLD RECALL TIMER.(SEC)..**

**Access:**

When in the S: SYSTEM FEATURES program, press the M key. The HOLD RECALL TIMER.(SEC).. sub-field is the first sub-field accessed.

**Description:**

HOLD RECALL TIMER.(SEC).. is the elapsed time before a call placed on Hold by an extension re-rings that extension. If the recall remains unanswered for longer than 60 seconds, the call rings the attendant.

**Instructions:**

For this sub-field on Table 6-3, enter the required time in seconds. The range is 001 (1 second) to 999 (999 seconds).

**Example:**

If the HOLD RECALL TIMER.(SEC).. interval is to be 30 seconds, enter 030 for this sub-field on Table 6-3.

**Default Value:** 060 (60 seconds)

**Conditions:**

- (a) HOLD RECALL TIMER.(SEC).. cannot be set for 000 seconds.
- (b) To disable this timer for troubleshooting purposes (i.e., set it at its maximum duration), enter 999.
- (c) When in the night mode, a call on Hold longer than the HOLD RECALL TIMER. (SEC).. interval recalls the extension that placed it on Hold. If the recall remains unanswered for longer than 60 seconds, the call rings all extensions in the system assigned to ring at night for that line. The call may also ring over an external alerting device.



**Related Programming:**

- E: STATIONS FEATURES  
NT AUDIBLE [nn..nn] IS.. to program the night mode ringing assignments.
- S: SYSTEM FEATURES
  - R: RELAYS CONTROL to program the external control relays.
  - E: EXTERNAL OUTPUTS to assign night mode audible to the external outputs.

**Feature Reference:**

External Loud Ringing Capability  
Hold  
Hold Recall  
Night Service

**Sub-Field:** ORBIT RECALL TIMER.(SEC).

**Access:**

The ORBIT RECALL TIMER.(SEC). sub-field is accessed after the HOLD RECALL TIMER.(SEC).. is programmed.

**Description:**

ORBIT RECALL TIMER.(SEC). is the elapsed time before a call placed in General Park Orbit by an extension re-rings that extension. If the recall remains unanswered for longer than 60 seconds, the call rings the attendant.

**Instructions:**

For this sub-field on Table 6-3, enter the required time in seconds. The range is 001 (1 second) to 999 (999 seconds).

**Example:**

If a call placed in General Park Orbit should recall the extension which placed it in orbit after 30 seconds, enter 030 for this sub-field on Table 6-3.

**Default Value:** 060 (60 seconds)

**Conditions:**

- (a) The ORBIT RECALL TIMER.(SEC). cannot be set for 000.
- (b) To disable this timer for troubleshooting purposes (i.e., set it at its maximum duration), enter 999.
- (c) When the system is in the night mode, a call left in General Park Orbit longer than the ORBIT RECALL TIMER.(SEC). interval recalls the extension that placed it in orbit. If the recall remains unanswered for longer than 60 seconds, the call rings all extensions in the system assigned to ring at night for that line. The call may also ring over an external alerting device.

**Related Programming:**

- E: STATIONS FEATURES  
NT AUDIBLE [nn..nn] IS.. to program the night mode ringing assignments.
- S: SYSTEM FEATURES
  - R: RELAYS CONTROL to program the external control relays.
  - E: EXTERNAL OUTPUTS to assign night mode audible to the external outputs.

**Feature Reference:**

Park

**Sub-Field: PAUSE TIME-OUT.(SEC).....****Access:**

The PAUSE TIME-OUT.(SEC)..... sub-field is accessed after the ORBIT RECALL TIMER.(SEC)..... sub-field is programmed.

**Description:**

The PAUSE TIME-OUT.(SEC)..... interval is the length of the pause inserted into a Speed Dial number when a # is entered into a bin. Pauses are frequently required by special dialing services or when the system is installed behind a PBX.

**Instructions:**

Enter the PAUSE TIME-OUT.(SEC)..... interval, in seconds, on Table 6-3. The range is 001 (1 second) to 999 (999 seconds).

**Example:**

If the length of the pause in a Speed Dial number should be three seconds, enter 003 for this sub-field on Table 6-3.

**Default Value:** 006 (6 seconds)

**Conditions:**

- (a) This sub-field should be set for compatibility with the line or Other Common Carriers (e.g., MCI or Sprint) to be accessed.
- (b) A pause may be inserted at the end of a System Speed Dial number. This prevents a display telephone from manually dialing (after the bin dials out) for the length of the pause. After the pause interval, manual dialing can begin. The display telephone must be programmed in E: STATIONS FEATURES (CLASS OF SERVICE ..... ) with Class of Service 0. Non-display multibutton telephones with Class of Service 0 can dial during the pause, but conversation is prevented.
- (c) The PAUSE TIME-OUT.(SEC)..... cannot be set for 000.

**Related Programming:**

- S: SYSTEM FEATURES
- P: CO TYPE to assign line type.
- E: STATIONS FEATURES
- CLASS OF SERVICE ..... to program display telephones with Class of Service 0 if manual dialing after a System Speed Dial number is to be allowed.

**Feature Reference:**

Class of Service  
PBX Compatibility  
Placing a Call  
Speed Dial  
Speed Dial Options  
Toll Restriction

**Sub-Field: FLASH TIMER.(N\*50MSEC)...****Access:**

This sub-field is accessed after the PAUSE TIME-OUT.(SEC)..... sub-field is programmed.

**Description:**

The FLASH TIMER.(N\*50MSEC)... sub-field is used to set the duration of loop current interruption that occurs when the Flash feature is used. If the line is a CO line, the loop current interruption allows a new dial tone to be obtained without the line being dropped. If the line is a PBX line, certain features (such as Transfer) can be initiated.

**Instructions:**

On Table 6-3, enter the time (in multiples of 50 milliseconds) that corresponds to the loop current interruption that occurs when the Flash feature is used. The range is 001 (50mS) to 999 (approximately 50 seconds).

**Example:**

If a PBX line requires an interruption of two seconds in order to initiate a call Transfer, enter 040 on Table 6-3.

**Default Value:** 020 (1 second)

**Conditions:**

- (a) The FLASH TIMER.(N\*50MSEC)... interval must be compatible with the PBX/Centrex or the Central Office.
- (b) The FLASH TIMER.(N\*50MSEC)... interval cannot be set for 000.

**Related Programming:**

S: SYSTEM FEATURES

P: CO TYPE to program line types.

**Feature Reference:**

Flash

PBX Compatibility

**Sub-Field: DIAL TONE TIME-OUT.(SEC).****Access:**

The DIAL TONE TIME-OUT.(SEC). sub-field is accessed after the FLASH TIMER.(N\*50MSEC)... sub-field is programmed.

**Description:**

DIAL TONE TIME-OUT.(SEC). specifies the interval between line seizure and the receipt of dial tone for toll restricted telephones. After a line is seized, toll restricted telephones are prevented from manually dialing until the DIAL TONE TIME-OUT.(SEC). interval elapses.

For a Dial Pulse (DP) line, this timer controls the delay from the time the line is accessed until the system provides internal dial tone for the DP line. Since the telephone is isolated from the DP line until dialing is complete, there is no audio connection between the line and the telephone. Internal dial tone must be provided by the system after the line is initially seized. DP digits cannot be dialed until dial tone is heard.

When using Speed Dial, this timer controls the interval between the time of bin selection and the time when the digits are sent out. When using Last Number Redial and Save, this timer determines the interval between the time the feature key is pressed and the time the digits are sent out.

If a number is manually dialed using LCR, the system waits for the DIAL TONE TIME-OUT.(SEC). interval before redialing the number.

**Instructions:**

On Table 6-3, enter the DIAL TONE TIME-OUT.(SEC). time in seconds. The range is 001 (1 second) to 999 (999 seconds).

**Example:**

If the DIAL TONE TIME-OUT.(SEC). interval should be one second, enter 001 for this sub-field on Table 6-3.

**Default Value:** 002 (2 seconds)

**Conditions:**

- (a) The DIAL TONE TIME-OUT.(SEC). interval should be set for compatibility with the PBX/Centrex or Central Office.

**Related Programming:**

S: SYSTEM FEATURES

P: CO TYPE to indicate if the line is DP or DTMF.

**Feature Reference:**

PBX Compatibility  
Toll Restriction

**Sub-Field:** SMDR TIMER..(SEC).....

**Access:**

The SMDR TIMER..(SEC)..... sub-field is accessed after the DIAL TONE TIME-OUT.(SEC). sub-field is programmed.

**Description:**

The SMDR TIMER.(SEC)..... sub-field determines the minimum duration of outgoing calls that are printed on the SMDR. Outgoing calls of a duration equal to or longer than the SMDR TIMER.(SEC)..... interval are recorded.

**Instructions:**

Enter the SMDR TIMER..(SEC). time in seconds on Table 6-3. The range is 001 (1 second) to 999 (999 seconds).

**Example:**

If outgoing calls lasting at least one minute should be recorded on the SMDR device, enter 060 for this sub-field on Table 6-3.

**Default Value:** 030 (30 seconds)

**Conditions:**

- (a) The SMDR TIMER.(SEC)..... cannot be set for 000.  
(b) To disable this timer for troubleshooting purposes, enter 999. This sets the timer at its maximum interval.  
(c) The SMDR can print local (seven-digit) calls, long distance (1 + NPX + NNX + nnnn, 0 + NPX + NNX + nnnn, 1 + NNX + nnnn and 0 + NNX + nnnn) calls, calls to an outside operator, incoming calls, and calls dropped due to Toll Restriction. The SMDR can also print all calls.

**Related Programming:**

**S: SYSTEM FEATURES**

**F: SYSTEM OPTIONS**

OPTION 13... to enable SMDR for 1 + NPX + NNX + nnnn, 0 + NPX + NNX + nnnn, 1 + NNX + nnnn and 0 + NNX + nnnn long distance calls.

OPTION 15... to enable 0 calls to an outside operator to print.

OPTION 16... to show Speed Dial bin numbers and Last Number Redial and Save designations on the SMDR.

OPTION 17... to enable SMDR for local (NNX + nnnn) calls.

OPTION 18... to allow the SMDR to print incoming calls.

OPTION 20... to enable calls blocked due to Toll Restriction to be printed on the SMDR.

OPTION 24... to enable SMDR for all calls.

**Feature Reference:**

- Answering a Call
- Last Number Redial
- Placing a Call
- Save
- SMDR
- Speed Dial
- Toll Restriction

**Sub-Field: TRANS RECALL.(SEC).....**

**Access:**

The TRANS RECALL.(SEC)..... sub-field is accessed after the SMDR TIMER.(SEC)..... sub-field is programmed.

**Description:**

TRANS RECALL.(SEC)..... is the interval before an unanswered transferred call returns to the extension from which it was initially transferred. If the extension which initially transferred the call does not retrieve the returned call within 30 seconds, it rings the attendant.

**Instructions:**

On Table 6-3, enter the TRANS RECALL.(SEC)..... interval in seconds. The range is 001 (1 second) to 999 (999 seconds).

**Example:**

If unanswered transferred calls should ring the transferring extension within one minute, enter 060 for this sub-field on Table 6-3.

**Default Value:** 120 (120 seconds)

**Conditions:**

- (a) The TRANS RECALL.(SEC) ..... interval cannot be set for 000.
- (b) To disable this timer for troubleshooting purposes, enter 999. This sets the timer at its maximum interval.
- (c) Calls placed in Personal Park Orbit recall the extension which placed the call in orbit after the TRANS RECALL.(SEC)..... interval.
- (d) When the system is in the night mode, a transferred call (or a call parked at an extension) that is not picked up within the TRANS RECALL.(SEC) interval recalls the extension which initially transferred the call. If the recall remains unanswered for longer than 30 seconds, the call rings all extensions in the system assigned to ring at night for that line. The call may also ring over an external alerting device.

**Related Programming:**

- E: STATIONS FEATURES  
NT AUDIBLE [nn..nn] IS.. to program the night mode ringing assignments.
- S: SYSTEM FEATURES  
R: RELAYS CONTROL to program the external control relays.
- E: EXTERNAL OUTPUTS to assign night mode audible to the external outputs.

**Feature Reference:**

External Loud Ringing Capability  
Night Service  
Park  
Transfer

**Sub-Field:** DIL RING OPERATOR..(SEC)....

**Access:**

This sub-field is accessed after the TRANS RECALL (SEC)..... sub-field is programmed.

**Description:**

Incoming calls on a Private Line or Direct Inward Line (DIL) ring only at the extension granted access to that line. If the call is not answered, it reverts to the attendant after the amount of time set with this timer.

**Instructions:**

On Table 6-3, enter the interval (in seconds) after which a call, ringing in on a DIL at an extension, rings at the attendant's telephone.

**Example:**

If unanswered DIL calls to an extension should ring at the attendant after 15 seconds, enter 15 for the DIL RING OPERATOR..(SEC)..... sub-field on Table 6-3.

**Default Value:** 012 (12 seconds)

**Conditions:** not applicable

**Related Programming:** not applicable

**Feature Reference:**

Direct Inward Lines  
Private Line, Ring Operator

**Sub-Field: SMDR RNA TIMER..(SEC)....****Access:**

This sub-field is accessed after the DIL RING OPERATOR..(SEC)..... sub-field is programmed.

**Description:**

Incoming calls ringing for a duration equal to or longer than the SMDR RNA TIMER..(SEC)..... interval are recorded on the SMDR device as Ring No Answer (RNA) calls. The printout occurs after the ringing stops.

**Instructions:**

On Table 6-3, enter the time interval in seconds that determines which unanswered incoming calls should be recorded as RNA calls. The range is 001 (1 second) to 999 (999 seconds).

**Example:**

If all unanswered calls that ring for five seconds or longer should be recorded as Ring No Answer calls, enter 5 for the SMDR RNA TIMER..(SEC)..... sub-field on Table 6-3.

**Default Value:** 012 (12 seconds)

**Conditions:**

- (a) Incoming calls (answered or unanswered) print on the SMDR only if System Option 18 is enabled.
- (b) This sub-field applies only to calls that are not answered.

**Related Programming:**

E: STATIONS FEATURES

CO AUDIBLE [nn..nn] IS.. to assign ringing for incoming calls.

S: SYSTEM FEATURES

F: SYSTEM OPTIONS

OPTION 18... to enable SMDR for incoming calls.

**Feature Reference:**

Answering a Call  
SMDR

**Sub-Field: PRVC TONE.... (SEC).....****Access:**

This sub-field is accessed after the SMDR RNA TIMER..(SEC).... sub-field is programmed.

**Description:**

The PRVC TONE....(SEC)..... sub-field determines the interval (in seconds) between Privacy Tones. The Privacy Tone signal is broadcast at an extension when a Barge In is active or an Intercom call has been answered (by either party) using Handsfree Answerback. The Handsfree Answerback Privacy Tone is a single tone. The Barge In Privacy Tone is three short tones. The Privacy Tone is repeated every PRVC TONE....(SEC)..... interval as long as the Handsfree Answerback or Barge In condition exists.

**Instructions:**

On Table 6-3, enter the interval (in seconds) that separates the Privacy Tones. The range is 002 (2 seconds) to 999 (999 seconds).

**Example:**

If Privacy Tones should be broadcast every minute while a Barge In or Handsfree Answerback condition exists, enter 060 for this sub-field on Table 6-3.

**Default Value:** 001 (disabled)

**Conditions:**

- (a) Entering 001 for this sub-field disables the Privacy Tone.
- (b) If a Barge In and Handsfree Answerback condition exist simultaneously:
  - (1) The Barge In Privacy Tone reoccurs at the PRVC TONE....(SEC)..... interval.
  - (2) The Handsfree Answerback Privacy Tone reoccurs at the PRVC TONE....(SEC)..... interval.
  - (3) The interval between the Handsfree Answerback Privacy Tone and the Barge In Privacy Tone is determined when the Barge In occurs. The tones can occur close together or widely separated.

**Sub-Field:** DCD END.(N\*50MSEC).....**Access:**

This sub-field is accessed after the DCD START... (SEC)..... sub-field is programmed.

**Description:**

The DCD END.(N\*50MSEC)..... sub-field establishes the duration of an "open" in the connection between a remote terminal and the modem that causes the connection to be dropped.

**Instructions:**

On Table 6-3, enter the duration (in milliseconds) of an "open" that causes the connection between a remote terminal and the CPU to be dropped. The interval is recorded as a multiple of 50 milliseconds. The range is 001 (x50 msec = 50 msec) to 999 (x 50 msec = 49,950 msec).

**Example:** not applicable

**Default Value:** 015 (x50 msec = 750 msec)

**Conditions:** not applicable

**Related Programming:** not applicable

S: SYSTEM FEATURES

M: TIMERS

DCD START....(SEC)..... to determine the interval within which transmission between a remote terminal and the modem must be established.

**Feature Reference:**

Direct Inward System Access (DISA)  
Remote Modem Access

**Sub-Field:** FIRST DIGIT..(SEC).....**Access:**

This sub-field is accessed after the DCD END. (N\*50MSEC)..... sub-field is programmed.

**Description:**

The FIRST DIGIT..(SEC)..... sub-field sets the maximum allowable interval between line seizure and the first digit dialed when placing a call. After a line is accessed, the system assigns a DTMF receiver to the line and waits a specified time for the first digit to be dialed. This is the FIRST DIGIT..(SEC)..... interval. If the first digit is not dialed within the specified interval, the DTMF receiver is disconnected from the line and is made available to other extensions. In addition, the dial pad on a toll restricted telephone is turned off.

**Instructions:**

On Table 6-3, enter the time (in seconds) that the system should wait for the first digit to be dialed, once the line is seized. The range is 001 (1 second) to 999 (999 seconds).

**Example:**

If the first digit should be dialed within three seconds, enter 003 on Table 6-3.

**Default Value:** 010 (10 seconds)

**Conditions:**

- (a) The DTMF receiver is used for SMDR, Last Number Redial, Toll Restriction and Dial Pulse (DP) dialing. When the FIRST DIGIT..(SEC)..... interval is exceeded, these facilities are disabled.
- (b) If the FIRST DIGIT..(SEC)..... interval is set too short, the DTMF receiver is disconnected from the line right after the line is seized, before the first digit can be dialed. The dial pad on a toll restricted telephone is turned off almost immediately. If the FIRST DIGIT..(SEC)..... interval is set too long, a DTMF receiver is attached when a line is seized and remains attached until time-out occurs (or the first digit is eventually dialed). Since there are a fixed number of DTMF receivers in the system, attaching one inadvertently is undesirable.



- (c) Since the DTMF Central Office (or PBX) is responsible for providing dial tone, the system assigns a DTMF receiver as soon as the line is seized, even if dial tone is not received.
- (d) If the DIAL TONE TIME-OUT.(SEC).interval is set longer than the FIRST DIGIT.(SEC)..... interval, dialing is prevented from toll restricted telephones.

**Related Programming:**

S: SYSTEM FEATURES

M: TIMERS

DIAL TONE TIME-OUT.(SEC).. to assure that the DIAL TONE TIME-OUT .(SEC). interval is shorter than the FIRST DIGIT.(SEC)..... interval.

INTER DIGIT.(SEC)..... to program the interval allowed between each of the succeeding digits.

**Feature Reference:**

- Last Number Redial
- Placing a Call
- SMDR
- Toll Restriction

**Sub-Field:** INTER DIGIT.(SEC).....

**Access:**

This sub-field is accessed after the FIRST DIGIT.(SEC)..... sub-field is programmed.

**Description:**

The INTER DIGIT.(SEC)..... sub-field sets the maximum allowable interval between each of the numbers dialed when placing a call. After a digit is dialed, the system waits a specified interval for the next digit to be dialed. If the next digit is not dialed within this interval, the DTMF receiver is removed from the line and made available to other extensions in the system. The dial pad on a toll restricted telephone is cut off and the call must be placed again. The INTER DIGIT.(SEC)..... interval applies to all of the subsequent digits in a dialed number.

**Instructions:**

On Table 6-3, enter the INTER DIGIT.(SEC)..... interval in seconds. The range is 001 (1 second) to 999 (999 seconds).

**Example:**

If the system should wait three seconds between each digit dialed (before disconnecting the DTMF receiver from the call), enter 003 on Table 6-3.

**Default Value:** 005 (5 seconds)

**Conditions:**

- (a) The DTMF receiver is used for SMDR, Last Number Redial, Toll Restriction and Dial Pulse (DP) dialing. When the interval is exceeded, these facilities are disabled.
- (b) If the INTER DIGIT.(SEC)..... interval is set too short, the DTMF receiver is disconnected from the line right after the first digit is dialed. The dial pad on a toll restricted telephone is turned off almost immediately. If the INTER DIGIT.(SEC)..... interval is set too long, a DTMF receiver is attached when the second digit is dialed and remains attached until time-out occurs (or another digit is eventually dialed). Since there are a fixed number of DTMF receivers in the system, attaching one inadvertently is undesirable.

**Sub-Field:** DISA PAGE....(SEC).....

**Access:**

This sub-field is accessed after the PRVC TONE....(SEC) ..... sub-field is programmed.

**Description:**

The DISA PAGE....(SEC)..... sub-field determines the interval before a DISA, seized for Paging purposes, times. The Paging announcement must be made within this interval.

**Instructions:**

On Table 6-3, enter the interval (in seconds) before a DISA times out when seized for Paging. The range is 001 (1 second) to 999 (999 seconds).

**Example:**

If a DISA should timeout 20 seconds after it is seized, enter 020 for this sub-field on Table 6-3.

**Default Value:** 015

**Conditions:** not applicable

**Related Programming:**

S: SYSTEM FEATURES  
F: SYSTEM OPTIONS  
    OPTION 31... to allow Paging over DISA lines.

**Feature Reference:**

Direct Inward System Access (DISA)  
Paging

**Related Programming:**

E: STATIONS FEATURES  
    BARGE IN ENABLED.... to allow Multibutton extensions to initiate Barge In.  
    BLOCK BARGE ENABLED.... to permit extensions to block incoming Barge In attempts.

**Feature Reference:**

Barge In  
Handsfree Answerback  
Intercom  
Privacy

**Sub-Field:** DISA & TIE RNA....(SEC)..

**Access:**

This sub-field is accessed after the DISA PAGE.... (SEC)..... sub-field is programmed.

**Description:**

The DISA & TIE RNA....(SEC).. sub-field determines the interval of time before dial tone is returned to the user of a DISA or tie line after attempting to call an extension where there is no answer.

**Instructions:**

On Table 6-3, enter the interval (in seconds) before a dial tone should be returned to a DISA or tie line user who attempts to call an extension and receives no answer. The range is 001 (1 second) to 999 (999 seconds).

**Example:**

If six seconds should elapse before dial tone is returned, enter 006 on Table 6-3.

**Default Value:** 012

**Conditions:** not applicable

**Related Programming:** not applicable

**Feature Reference:**

Direct Inward System Access (DISA)  
Tie Line Compatibility

---

**Sub-Field: DISA ANSWER..(SEC).....****Access:**

This sub-field is accessed after the DISA & TIE RNA..(SEC)..... sub-field is programmed.

**Description:**

The DISA ANSWER..(SEC)..... sub-field determines the amount of time that an incoming call on a DISA rings before the system automatically "answers" that call.

**Instructions:**

On Table 6-3, enter the interval (in seconds) that an incoming call on a DISA rings before it is automatically "answered" by the system. The range is 001 (1 second) to 999 (999 seconds).

**Example:**

If an incoming DISA should ring for 20 seconds before being automatically "answered" by the system, enter 020 on Table 6-3.

**Default Value:** 006

**Conditions:**

(a) This sub-field must be programmed to allow calls to the modem on the B-CPU-D PCB to be answered.

**Related Programming:** not applicable

**Feature Reference:**

Direct Inward System Access (DISA)  
Remote Modem Access

**Sub-Field: DCD START....(SEC).....****Access:**

This sub-field is accessed after the DISA ANSWER..(SEC)..... sub-field is programmed.

**Description:**

The DCD START....(SEC)..... sub-field determines the interval before a connection between a remote terminal and the modem on the CPU is dropped. Transmission between the terminal and the modem must occur during this interval or the connection is dropped.

**Instructions:**

On Table 6-3, enter the interval (in seconds) within which transmission between a remote terminal and the modem must take place. The range is 001 (1 second) to 999 (999 seconds).

**Example:** not applicable

**Default Value:** 060

**Conditions:** not applicable

**Related Programming:**

S: SYSTEM FEATURES

M: TIMERS

DCD END (N\*50MSEC) to determine the duration of an open that drops the connection between a remote terminal and the modem on the CPU.

**Feature Reference:**

Direct Inward System Access (DISA)  
Remote Modem Access

**Related Programming:**

S: SYSTEM FEATURES

M: TIMERS

FIRST DIGIT..(SEC)..... to program the first digit interval.

**Feature Reference:**

Last Number Redial

Placing a Call

SMDR

Toll Restriction

**Sub-Field:** MIN RNG BRST. N\*0.1 SEC..

**Access:**

This sub-field is accessed after the INTER DIGIT.. (SEC)..... interval is programmed.

**Description:**

MIN RNG BRST. N\*0.1 SEC.. is the minimum incoming call ring burst required in order to cause a ring detect. Ring bursts of a duration less than the time programmed in this sub-field are not be detected (i.e., the call is prevented from ringing into the system).

**Instructions:**

For this sub-field on Table 6-3, enter the value required. The entry is multiplied by 100 milliseconds (e.g., 1=100 mS). Entries can be from 1 (100 mS) to 999 (99.5 seconds).

**Example:**

If the incoming lines provide a ring burst of at least 600 mS, enter 6 to insure that the system is compatible with the lines connected to it.

**Default Value:** 004 (400mS)

**Conditions:**

- (a) The system should be set to match the parameters of the lines to which it is connected. If the MIN RNG BRST. N\*0.1 SEC.. interval is set too short, transients on the incoming lines could cause ring to be detected. If the MIN RNG BRST. N\*0.1 SEC.. interval is set too long, incoming ring bursts are never detected. This sub-field pertains to all lines.

**Related Programming:**

S: SYSTEM FEATURES

M: TIMERS

MAX RNG IDLE. N\*0.1 SEC.. to program the maximum interval between ring bursts.

P: CO TYPE to program various CO line parameters.

**Feature Reference:**

Answering a Call

**Sub-Field: MAX RNG IDLE. N\*0.1 SEC..**

**Access:**

This sub-field is accessed after the MIN RNG BRST. N\*0.1 SEC.. sub-field is programmed.

**Description:**

MAX RNG IDLE. N\*0.1 SEC.. is the maximum interval between ring bursts. If the next ring burst occurs before the MAX RNG IDLE. N\*0.1 SEC.. time, the call continues to ring into the system. If the ring burst does not occur before the time set by this sub-field, the system knows that the calling party has hung up.

**Instructions:**

On Table 6-3, enter the interval required for compatibility with the incoming lines. The entry is in multiples of 100 mS (e.g., 1=100 mS). Entries can be from 001 (100 mS) to 999 (99.5 seconds).

**Example:**

If calls should be dropped after a ring idle time of 8 seconds, enter 080 for this sub-field on Table 6-3.

**Default Value:** 060 (6 seconds)

**Conditions:**

- (a) The system must match the parameters of the lines to which it is connected. If the MAX RNG IDLE. N\*0.1 SEC.. time is set too short, calls are disconnected after the first ring. If the interval is set too long, the call continues to ring after the outside calling party has hung up.

**Related Programming:**

S: SYSTEM FEATURES

M: TIMERS

MIN RNG BRST. N\*0.1 SEC.. to program the minimum incoming call ring burst.

P: CO TYPE to program various CO line parameters.

**Feature Reference:**

Answering a Call

**Sub-Field: MIN DRP PULS. N\*0.1 SEC..**

**Access:**

This sub-field is accessed after the MAX RNG IDLE. N\*0.1 SEC.. sub-field is programmed.

**Description:**

The Central Office sends an interruption in loop current to the system to indicate that a call placed on Hold has been abandoned by the outside party. This sub-field matches the requirements of the system to the duration of the pulse sent by the CO.

**Instructions:**

On Table 6-3, enter the value of the drop pulse that is compatible with the Central Office. This entry is a multiple of 100 mS (e.g., 004=400 mS). Entries are 1 (100 mS) to 999 (99.5 seconds).

**Example:**

If the CO provides a drop pulse of 400 mS to indicate that a call on Hold has been abandoned, enter 004 on Table 6-3.

**Default Value:** 006 (600 mS)

**Conditions:**

The system must be matched to the requirements of the Central Office. If the MIN DRP PULS. N\*0.1 SEC.. interval is set too short, momentary interruptions in Central Office loop current cause calls on Hold to be dropped. If the interval is set too long, the drop pulse will never be detected.

**Related Programming:**

S: SYSTEM FEATURES

F: SYSTEM OPTIONS

OPTION ENABLED..08... (Drop Pulse Supervision) to allow the system to detect the drop pulse sent from the Central Office.

**Feature Reference:**

Hold

**Sub-Field:** OP BREAK....(MSEC).....

**Access:**

This sub-field is accessed after the MIN DRP PULS. N\*0.1 SEC.. sub-field is programmed.

**Description:**

Each digit dialed during Dial Pulsing consists of a specific make (loop relay closed) and break (loop relay open) time. The OP BREAK....(MSEC)..... sub-field determines the time in milliseconds that the relay remains open during the dial pulsing of a digit. If the system is connected to a 10 Pulse Per Second (PPS) Central Office, the sum of the break and make intervals must equal 100 mS. If the system is connected to a 20 PPS Central Office, the sum of these intervals must equal 50 mS. The length of the OP BREAK....(MSEC)..... interval depends on the requirements of the Central Office.

**Instructions:**

On Table 6-3, enter the value for this sub-field in milliseconds. Entries are 001 (1 mS) to 999 (999 mS).

**Example:**

If the break time required by the CO is 30 mS, enter 030 on Table 6-3.

**Default Value:**

061 (61 mS)—typical DP break interval for a 10 PPS Central Office.

**Conditions:**

- (a) The value entered for this sub-field must be compatible with the requirements of the Central Office. For example, if the system dial pulses at a rate of 10 PPS, each digit in the pulse string occupies 100 mS (the sum of the make and the break time). If the OP BREAK.... (MSEC)..... value is too long, the pulse period of the dialed digit is greater than 100 mS and could cause misdialing. If the OP BREAK....(MSEC)..... value is too short, the pulse period of the dialed digit is less than 100 mS and could cause misdialing.

**Related Programming:**

S: SYSTEM FEATURES

M: TIMERS

OP MAKE.....(MSEC)..... to set the dial pulse make interval to be compatible with the CO requirements.

INTER OP..N\*(M+B)..... to set the interdigit time between dial pulse digits.

P: CO TYPE to program various line parameters.

**Feature Reference:**

Placing a Call

**Sub-Field:** OP MAKE.....(MSEC).....

**Access:**

This sub-field is accessed after the OP BREAK...(MSEC)..... sub-field is programmed.

**Description:**

Each digit dialed during dial pulsing consists of a specific make (loop relay closed) and break (loop relay open) time. The OP MAKE.....(MSEC)..... sub-field determines the time in milliseconds that the relay closes during dial pulsing of a digit. If the system is connected to a 10 Pulse Per Second (PPS) Central Office, the sum of the break and make intervals must equal 100 mS. If the system is connected to a 20 PPS Central Office, the sum of these intervals must equal 50 mS. The length of the OP MAKE.....(MSEC)..... interval depends on the requirements of the Central Office.

**Instructions:**

On Table 6-3, enter the OP MAKE.....(MSEC)..... interval required by the Central Office. The entry, in milliseconds, is from 001 (1 mS) to 999 (999 mS).

**Example:**

If the CO expects to receive a DP digit with a make (loop relay closed) time of 20 mS, enter 020 for this sub-field on Table 6-3.

**Default Value:**

039 (39 mS)—typical DP make interval for a 10 PPS Central Office.

**Conditions:**

- (a) This sub-field must be programmed for compatibility with the Central Office. For example, if the system dial pulses at a rate of 10 PPS, each digit in the pulse string occupies 100 mS (the sum of the make and the break time). If the OP MAKE.....(MSEC)..... value is too long, the pulse period of the dialed digit is greater than 100 mS and could cause misdialing. If the OP MAKE.....(MSEC)..... value is too short, the pulse period of the dialed digit is less than 100 mS and could cause misdialing.

**Related Programming:**

S: SYSTEM FEATURES

M: TIMERS

OP BREAK....(MSEC)..... to set the dial pulse break interval to be compatible with the CO requirements.

INTER OP.N\*(M+B)..... to set the interdigit time between dial pulse digits.

P: CO TYPE to program various line parameters.

**Feature Reference:**

Placing a Call

**Sub-Field:** INTER OP..N\*(M+B).....

**Access:**

This sub-field is accessed after the OP MAKE.....(MSEC)..... sub-field is programmed.

**Description:**

Each digit in dial pulsing is separated by a quiet (waiting) interval. This interval tells the Central Office that a digit has been dialed and another is about to be transmitted. The INTER OP..N\*(M+B)..... sub-field determines the duration of the quiet interval between dialed digits.

**Instructions:**

Each pulse in a dial pulse digit consists of a make and break time. The sum of the make and break time is the pulse period. The INTER OP..N\*(M+B)..... interval (i.e., the quiet time) between the dial pulse digits is a specified number of pulse periods. On Table 6-3, enter the number of pulse periods required by the Central Office between dial pulse digits. This entry is in pulse periods, and the range is from 001 (1 pulse period) to 999 (999 pulse periods).

**Example:**

If the Central Office requires eight pulse periods between digits, enter 008 for this sub-field on Table 6-3.

**Default Value:** 010 (10 pulse periods)

**Conditions:**

- (a) The entry for this sub-field is determined by the requirements of the Central Office. If the INTER OP..N\*(M+B)..... interval is too short, the Central Office may not be able to receive the digits as fast as the system is sending them. If the interval is set too long, the Central Office may assume that dialing is complete after the system pulses out the first digit.

**Related Programming:**

S: SYSTEM FEATURES

M: TIMERS

OP BREAK....(MSEC)..... to set the dial pulse break interval.

OP MAKE....(MSEC)..... to set the dial pulse make interval.

P: CO TYPE to program various line parameters.

**Feature Reference:**

Placing a Call

**Field:** L: LEAST COST ROUTING  
LCR SERVICE #

**Access:**

When in the S: SYSTEM FEATURES program, press the L key. The system prompts:

LCR ENABLED...NO\_\_

Enter Y and press the RETURN key. A message identifying the LCR package will be displayed. This information is used when programming L: LEAST COST ROUTING (LCR SERVICE #), and can be in either of two formats shown below (i.e., LCR I.D. Message Format 1 or LCR I.D. Message Format 2).

**LCR I.D. MESSAGE FORMAT 1**

04-May-84, 374	(line 1)
39,TIECOMM,21367	(line 2)
6,L1=LCL/DDD,L2=	(line 3)
RSL-D2,L3=W5,END	(line 4)

**LCR I.D. MESSAGE FORMAT 2**

ORDER #—11396X	(line 1)
CUSTOMER—TIE COMM	(line 2)
DATE OF DATABASE—03Jun85	(line 3)
DATE CONFIGURED—04Jun85	(line 4)
HOME NPACOC—213676 405A	(line 5)
SERVICE 1 ATTD213676 406D	(line 6)
SERVICE 2 RSL-D 213676 406D	(line 7)
SERVICE 3 ATTFX 516976 407A	(line 8)
SERVICE 4 4087	(line 9)
SERVICE 5 4094	(line 10)
SERVICE 6 40A1	(line 11)
SERVICE 7 40AE	(line 12)
SERVICE 8 40BB	(line 13)
SERVICE 9 40CB	(line 14)
SERVICE10 40D5	(line 15)





After the LCR I.D. message is displayed the following sub-fields may be programmed.

```
LCR ENABLED...
  LCR SERVICE # 01
  LINE GROUP .....77__
  OCC DIALUP BIN .....00__
  FX / OTHER..1/0 .....00__
  LOCAL/TOLL LAST CHOICE FOR C.O.S. 11__
```

through

```
LCR SERVICE # 10
  LINE GROUP .....77__
  OCC DIALUP BIN .....00__
  FX / OTHER..1/0 .....00__
  LOCAL/TOLL LAST CHOICE FOR C.O.S. 11__
  LCR SELF TEST..Y/N.
```

After the first sub-field is programmed, the next sub-field is accessed. Refer to the specific sub-field for access instructions.

**Description:**

**WARNING: REINITIALIZE WHEN INSTALLING LCR IN AN EXISTING SYSTEM. REFER TO I: SYSTEM INITIALIZATION.**

Least Cost Routing (LCR) uses rate structure software, customized for each installation, to automatically place outgoing calls on the least expensive available route (line service type). There are a total of 18 line service types, any 10 of which can be incorporated into the LCR package. The LCR facility in the TCX-128 examines the 10 line service

types selected and seizes the most economical line group for the call, based on the relative cost of each service. The line service types (and their respective identifying codes) are defined as follows:

LINE SERVICE TYPE	IDENTIFYING CODE
DDD	.01
FX 1	.02
FX 2	.03
FX 3	.04
RESELLER	.05
TIE LINE (not used)	.06
WATS BAND 0 or 9	.07
WATS BAND 1	.08
WATS BAND 2	.09
WATS BAND 3	.0A
WATS BAND 4	.0B
WATS BAND 5	.0C
WATS BAND 6	.0D
WATS BAND 7	.0E
WATS BAND 8	.0F
DIAL-UP OCC, ON NET	.10
DIAL-UP OCC, OFF NET	.11
DEDICATED OCC, OFF NET	.12

The LCR SERVICE # sub-field is used to record the LCR Line Service Types assigned to the LCR service groups (1-10).

**Instructions:**

While in the S: SYSTEM FEATURES program, enter L to display the LCR ENABLED...NO\_\_ sub-field. Enter Y and press the RETURN key to display the LCR I.D. message which defines the types of services. Use the instructions that follow to determine which line service types are programmed into the LCR rate structure software. On Table 6-3, record the line service types next to the LCR SERVICE # sub-fields. Indicate also which LCR SERVICE # sub-fields are not used. The number and types of line services can also be obtained from the Least Cost Routing Questionnaire (available from a sales representative).

## Determining Line Service Types from LCR I.D. Message Format 1

### LCR I.D. MESSAGE FORMAT 1

```

04-May-84, 374                (line 1)
39,TIECOMM,21367             (line 2)
6,L1=LCL/DDD,L2=            (line 3)
RSL-D2,L3=W5,END            (line 4)
    
```

The I.D. message is identified as follows:

```

04-May-84    - Date of LCR software.
37439        - TIE/communications LCR sales
              order number.
TIECOMM      - TIE/communications.
213676       - Area code (NPX) and exchange
              (NNX) where the system is
              installed. NPX = 213. NNX = 676.
L1=LCL/DDD   - Line service 1 (DDD-ATT Direct
              Distance Dialing).
L2=RSL-D2    - Line service 2 (RSL- Reseller).
L3=W5        - Line service 3 (W5-WATS band 5).
END          - End of message.
    
```

**NOTE:** Use the chart on page 6-76 to identify the line service types.

If the LCR software displays I.D. Message Format 1 and has more than six line service types, all of the line services installed will not display in the message. It is necessary to run an LCR diagnostic to identify the remaining services. Use the information provided by the diagnostic to identify the line services on Table 6-3 that are not identified in the LCR I.D. Message Format 1.

To run the LCR diagnostic:

- (1) Verify that the system has been properly installed and initialized, using this manual as a guide.
- (2) Press the M key to enter the programming mode.
- (3) Press the S key to display the System Commands menu.

(4) Press the H key; the following prompt appears:

```

DISPLAY/CHECKSUM
0=D0 1=D1 2=D_AX 3=C_0 4=C_1
5=C_AX...03_
    
```

(5) Enter 02 and press the RETURN key; the following prompt appears:

```
ADDR...408F_
```

(6) Press the RETURN key; the following prompt appears:

```
UP-TO...409E_
```

(7) Press the RETURN key; the following prompt appears:

```
<408F> nn nn nn nn nn nn nn nn nn nn nn nn nn nn nn nn
where nn represents the identifying code (i.e., a
hexadecimal number between 01 and 12, defined on page
6-76).
```

The bytes of the prompt are defined as follows:

```

/--line service # 01
/
    
```

```

<408F> nn nn nn nn nn nn nn nn nn nn nn nn nn nn nn nn
line service # 10 --      --not used-
    
```

If LCR is installed, the first 10 2-bit bytes identify the line services programmed into the rate chip, based on the codes shown on page 6-76. Byte 1 is for line service # 01, byte 10 is for line service # 10. Byte 1 is for the LCR SERVICE # 01 sub-field; byte 10 is for the LCR SERVICE # 10 sub-field.

For example:

```

<408F> 01 05 0C 00 00 00 00 00 00 00 shows that line
service # 01 is DDD, line service # 02 is WATS band 0 or
9 and line service # 03 is WATS band 1. The LCR software
used for this example does not use line services # 04-10, so
they are designated as 00. If LCR software was not
installed, all the two-bit bytes would show FF.
    
```



**Determining Line Service Types from LCR I.D. Message Format 2**

**LCR I.D. MESSAGE FORMAT 2**

ORDER # - 11396X (line 1)  
 CUSTOMER- TIE COMM (line 2)  
 DATE OF DATABASE- 03Jun85 (line 3)  
 DATE CONFIGURED - 04Jun85 (line 4)  
 HOME NPACOC - 213676 405A (line 5)  
 SERVICE 1 ATDDDD213676 406D (line 6)  
 SERVICE 2 RSL-D 213676 406D (line 7)  
 SERVICE 3 ATTFX 516976 407A (line 8)  
 SERVICE 4 4087 (line 9)  
 SERVICE 5 4094 (line 10)  
 SERVICE 6 40A1 (line 11)  
 SERVICE 7 40AE (line 12)  
 SERVICE 8 40BB (line 13)  
 SERVICE 9 40CB (line 14)  
 SERVICE 10 40D5 (line 15)

The I.D. message is identified as follows:

ORDER # - TIE/communications LCR sales order number (1396X)  
 CUSTOMER - Always displays TIE/communications.  
 DATE OF DATABASE - Date the LCR database was programmed (03Jun85).  
 DATE CONFIGURED - Date the LCR rate structure software was programmed.  
 HOME NPACOC - Shows the area code (NPX) and the exchange where the system is installed. NPX = 213. NNX = 676.  
 SERVICE 1 - Identifies line service 01 (ATT DDD service in NPX 213 and NNX 676).  
 SERVICE 2 - Identifies line service 02 (Reseller in NPX 213 and NNX 676).  
 SERVICE 3 - Identifies line service 03 (ATT FX service in NPX 516 and NNX 976).  
 SERVICE 4-10 - not installed.

If FX services are installed, the type of FX service may be indicated in the display by a special code (0-4), as shown below:

SERVICE # ATnFX NPACOC 407A

----FX code.

The code digits (0-4) are defined as follows:

- 0 - FX can be used for local calls only.
- 1 - FX can be used for intra-Lata calls.
- 2 - FX can be used for calls within the area code in which it resides.
- 3 - FX can be used within the state only.
- 4 - FX can be used in the continental U.S. (48 states).

Indicate the type of FX service along with the LCR line service type on Table 6-3.

**Example:**

If the LCR I.D. message displays:

04-May-84, 374 (line 1)  
 39,TIECOMM,21367 (line 2)  
 6,L1=LCL/DDD,L2= (line 3)  
 RSL-D2,L3=W5,END (line 4)

OR

ORDER # - 11396X (line 1)  
 CUSTOMER - TIE COMM (line 2)  
 DATE OF DATABASE - 03Jun85 (line 3)  
 DATE CONFIGURED - 04Jun85 (line 4)  
 HOME NPACOC - 213676 405A (line 5)  
 SERVICE 1 ATDDDD213676 406D (line 6)  
 SERVICE 2 RSL-D 213676 406D (line 7)  
 SERVICE 3 ATTW5 213676 407A (line 8)  
 SERVICE 4 4087 (line 9)  
 SERVICE 5 4094 (line 10)  
 SERVICE 6 40A1 (line 11)  
 SERVICE 7 40AE (line 12)  
 SERVICE 8 40BB (line 13)  
 SERVICE 9 40CB (line 14)  
 SERVICE 10 40D5 (line 15)

On Table 6-3 indicate that LCR SERVICE # 01 is DDD (01), LCR SERVICE # 02 is reseller (05) and LCR SERVICE # 03 is WATS band 5 (0C). Indicate also that LCR services 4 through 10 are not used.

**Default Value:** NO (LCR not enabled)

**Conditions:**

- (a) Toll Restriction, determined by Class of Service programming, applies to all calls placed using Least Cost Routing. Without special programming, an outgoing LCR call cannot bypass an extension's Toll Restriction.
- (b) Class of Service programming also determines what takes place when LCR attempts to place a call if all lines in the least expensive route are busy. For extensions with Class of Service 0, the system attempts to place the call on the next cheapest route. If that line group is also busy, the system hunts through the remaining services for the most economical route. If all other services are busy, the call is placed on a line in the Direct Distance Dialing (DDD) group.  
If the extension is assigned Class of Service 01-05, LOCAL/TOLL LAST CHOICE FOR C.O.S. will determine if the next least expensive route can be used if the least expensive route is busy. In addition, LCR does not place the call on a DDD line unless DDD is the cheapest route for the call. Key telephone users can queue for the LCR line group.
- (c) Multibutton telephone users can press another outgoing line key (8-11) to bypass LCR. The attendant can also use Direct Line access to bypass LCR. Four Button, Single Line and 2500 type telephone users can dial line groups (90-99) to bypass LCR.
- (d) If LCR is enabled for the system, Speed Dial, Last Number Redial and Saved numbers will always be routed to the least expensive route.
- (e) LCR always places emergency assistance calls (e.g., 911, 1911), WATS calls (i.e., 1 + 800 + NNX + nnnn) and directory assistance calls (i.e., 1 + NPX + 555 + 1212) on Direct Distance Dialing (DDD) lines.

**Related Programming:**

S: SYSTEM FEATURES

L: LEAST COST ROUTING

LINE GROUP..... to assign the LCR services to line groups.

OCC DIALUP BIN.. to designate the System Speed Dial bins that are automatically dialed if the service is accessed.

FX / OTHER..1/0.. to identify FX lines.

LOCAL/TOLL LAST CHOICE FOR C.O.S. to place Class of Service restrictions on the second preferred route for a call.

K: COS ALLOWED AREA CODES to assign Class of Service to area codes.

E: STATIONS FEATURES

CLASS OF SERVICE..... to assign Class of Service to an extension.

**Feature Reference:**

Class of Service

Last Number Redial

Least Cost Routing

Least Cost Routing Bypass

Placing a Call

Save

Speed Dial

Speed Dial Options

Toll Restriction

**Sub-Field:** LINE GROUP.....

**Access:**

When in the S: SYSTEM FEATURES program, press the L key. When the prompt LCR ENABLED..... appears, enter Y and RETURN. The LINE GROUP..... sub-field for LCR service # 1 is displayed. After all the fields for LCR service # 1 are programmed, LINE GROUP..... for LCR service # 2 is accessed. Continue this sequence to access LINE GROUP..... for LCR services 3 through 10.

**Description:**

Each LCR service must be assigned to a line group. This allows the system to locate the specified lines after searching the rate tables for the least expensive route. When making entries for this sub-field, the physical location of each line in the RJ21X telco connector must be known.

**Instructions:**

On Table 6-3, enter the line group assigned to the LCR service.

**WARNING: DIRECT DISTANCE DIALING (DDD) LINES MUST ALWAYS BE ASSIGNED TO GROUP 1.**

**Example:**

For the example shown on page 6-78, assign line service # 1 to group 1, line service # 2 to group 2 and line service # 3 to group 3. All the DDD lines are in group 1 (which is a requirement), all the reseller lines are in group 2 and all the WATS band 5 lines are in group 3.

**Default Value:** 77 (not installed)

**Conditions:**

- (a) LCR SERVICE # 01 *must* always be used for Direct Distance Dialing (DDD) lines.
- (b) All lines in a service group must be the same type (DDD vs. WATS 5, etc.).
- (c) The assignments made in LINE GROUP..... must consider the assignments made in G: CO GROUPS.

**Related Programming:**

S: SYSTEM FEATURES

L: LEAST COST ROUTING

LCR SERVICE # to identify the LCR services.  
OCC DIALUP BIN.. to designate the System Speed Dial bins that are automatically dialed if the service is accessed.

FX / OTHER..1/0.. to identify FX lines.

LOCAL/TOLL LAST CHOICE FOR C.O.S. to place Class of Service restrictions on the second preferred route for a call.

G: CO GROUPS to assign lines to line groups.

P: CO TYPE to program line type.

F: SYSTEM OPTIONS

OPTION ENABLED..01... to allow LCR to place calls for Single Line, 2500 type, and Four Button telephones on lines normally denied because of E: STATIONS FEATURES (CO ACCESS [NN..NN] IS..) programming.

**Feature Reference:**

Least Cost Routing  
Line Groups, Outgoing  
Placing a Call

## Sub-Field: OCC DIALUP BIN..

### Access:

The OCC DIALUP BIN.. sub-field is accessed after the LINE GROUP..... sub-field is programmed.

### Description:

The OCC DIALUP BIN.. sub-field allows OCC access and security codes to be automatically dialed by the system if LCR selects the OCC as the least costly route for a call. The OCC must be LCR line service type Dial-Up OCC On Net (code 10) or Dial-Up OCC Off Net (code 11).

### Using Bin + 3 Programming for an OCC

Least Cost Routing has the ability to recognize intrastate (and intra-Lata) calls when using an OCC dial-up System Speed Dial Bin. For calls which LCR recognizes as interstate, OCC DIALUP BIN.. is programmed in the normal manner. For intrastate calls, the system dials the System Speed Dial bin that is three numbers higher ("bin + 3") than the bin assigned in OCC DIALUP BIN.... programming. To facilitate intrastate dialing, the "bin + 3" bin should be programmed with the same OCC number as the lower numbered bin to which it is paired, and should contain the local ("home") area code (NPX). In addition, the \*6 Speed Dial Option (Suppressing the Leading 1) should be entered at the end of the "bin + 3" bin. This automatically strips out the leading 1 from the manually dialed number as LCR redials the call.

For example, if OCC DIALUP BIN.. is programmed as bin 20, the system dials bin 23 when an intrastate call is recognized. In operation, LCR:

- (1) Determines that the call is intrastate
- (2) Jumps to the "bin + 3" bin (23 in the example)
- (3) Dials the OCC number
- (4) Inserts the "home" NPX
- (5) Strips the leading 1 from the dialed number (if the \*6 option is programmed into the "bin + 3" bin)
- (6) Redials the remaining digits

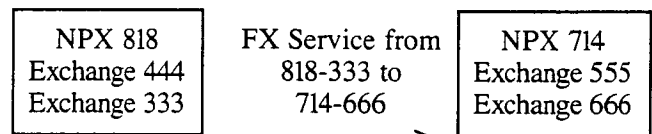
### Using Bin + 3 Programming with an FX

FX services can also use OCC DIALUP BIN.. programming. In the intrastate FX application shown below (Figure 6-1), area code 818 serves exchanges 444 and 333. Area code 714 serves exchanges 555 and 666. The 818-333-nnnn dialing area has an FX terminated in the 714-666-nnnn dialing area. When this FX line is seized, dial tone from 714-666 is returned. The FX has OCC DIALUP BIN.. programmed as System Speed Dial bin 20 (which should not have a number programmed into it). System Speed Dial bin 23 is the "bin + 3" bin.

When a caller in NPX 818 (exchange 333) calls 1-444-nnnn, the shortest and least expensive route for the call is from 818-333-nnnn, over the FX into 714-666, and back over a different route as 1-818-444-nnnn. When the call is placed, LCR:

- (1) Recognizes the call as intrastate
- (2) Routes the call to the FX
- (3) Dials the contents of the "bin + 3" bin (bin 23) to insert the "home" NPX (1-818) and strips out the leading 1 from the manually dialed number (using the \*6 option)
- (4) Redials 444-nnnn

**NOTE:** In a non-leading 1 dialing area, the 1 is not dialed and the \*6 option is not used.



FX SERVICE FROM 818-333 TO 714-666  
 OCC DIALUP BIN: 20 (do not program a number into this bin)  
 BIN + 3: 23 (programmed with "home" NPX + \*6)

### Figure 6-1 APPLICATION OF BIN + 3 LCR PROGRAMMING

#### Instructions:

On Table 6-3, enter the number of the System Speed Dial bin containing the intrastate "home" NPX programming or the access and security code for the designated OCC. Do not enter the contents of the bin, just the bin number.

**Example:**

If LCR SERVICE # 02 is a Dial-Up OCC On Net (code 10), and the access and security codes for this OCC are stored in System Speed Dial bin 97, enter 97 for this prompt for LCR SERVICE # 02 on Table 6-3. If the system determines that service # 02 is the least expensive route for the call, it automatically dials out the number stored in System Speed Dial bin 97. It will then dial the number entered by the user.

**Default Value:** 00 (not assigned)

**Conditions:**

- (a) Leave this field at the default value (00) if the OCC is line service type Dedicated Off Net (code 12). This type of OCC does not require an access or security code.
- (b) The flexibility of the System Speed Dial bin selected can be increased by the use of Speed Dial Options.
- (c) The contents of a System Speed Dial bin designated in OCC DIALUP BIN.. is suppressed on the multibutton telephone display and the SMDR if the bin is automatically accessed by LCR.

**Related Programming:**

S: SYSTEM FEATURES

L: LEAST COST ROUTING

LCR SERVICE # to identify the LCR services.  
 LINE GROUP..... to assign the LCR services to line groups.

FX / OTHER..1/0.. to identify FX lines.

LOCAL/TOLL LAST CHOICE FOR C.O.S. to place Class of Service restrictions on the second preferred route for the call.

G: CO GROUPS to assign the OCC service to a line group.

P: CO TYPE to program type, if required.

F: SYSTEM OPTIONS

OPTION 16... to print the number of the bin (not the contents) on the SMDR.

**Feature Reference:**

- Least Cost Routing
- Placing a Call
- Speed Dial
- Speed Dial Options
- Station Message Detail Recording

**Sub-Field:** FX / OTHER..1/0..

**Access:**

The FX / OTHER..1/0.. sub-field is accessed after the OCC DIALUP BIN.. is programmed.

**Description:**

The line group containing the FX (Foreign Exchange) lines must be identified to the system. FX lines are line service types FX 1 (code 02), FX 2 (code 03) and FX 3 (code 04). Use the data entered for the LCR SERVICE # sub-field in conjunction with the RJ21X configuration data to determine which lines are FX lines.

**Instructions:**

If the LCR service contains FX lines, enter 01 for the LCR SERVICE # (FX / OTHER..1/0..) sub-field on Table 6-3. If the service does not contain FX lines, enter 0. If the LCR service contains FX lines, and the leading 1 should automatically be stripped from any calls routed to those lines, enter 02.

**Example:**

If LCR SERVICE # 03 contains FX 3 lines (code 04), enter 01 for this service number on Table 6-3. If the leading 1 should be stripped from all calls placed on the FX lines comprising LCR SERVICE # 03, enter 02.

**Default Value:** 00 (no FX lines)

**Conditions:**

FX lines require dedicated circuits from the telco. The telco can identify the position of these circuits in the RJ21X connector(s).

**Related Programming:****S: SYSTEM FEATURES****L: LEAST COST ROUTING**

LCR SERVICE # to identify the LCR services.  
LINE GROUP..... to assign the LCR services to line groups.

OCC DIALUP BIN.. to designate the System Speed Dial bins that are automatically dialed if the service is accessed.

LOCAL/TOLL LAST CHOICE FOR C.O.S. to place Class of Service restrictions on the second preferred route for the call.

G: CO GROUPS to group FX lines in the same line group.

P: CO TYPE to program line type, if required.

**Feature Reference:**

Least Cost Routing  
Placing a Call

**Sub-Field: LOCAL/TOLL LAST CHOICE FOR C.O.S.****Access:**

The LOCAL/TOLL LAST CHOICE FOR C.O.S. sub-field is accessed after the FX / OTHER..1/0.. sub-field is programmed.

**Description:**

LOCAL/TOLL LAST CHOICE FOR C.O.S. allows Class of Service restrictions to be placed on the second preferred route for a call if the most preferred route is busy. This sub-field is used to restrict certain Classes of Service to the most preferred LCR route only. If the preferred route is busy, and LCR selects the restricted service as the next preferred route, the call does not go through. All extensions with a Class of Service lower than the COS programmed can use the line service type. Extensions with a COS equal to or higher than that indicated in LOCAL/TOLL LAST CHOICE FOR C.O.S. cannot.

**Instructions:**

For each LCR line service type on Table 6-3, indicate the Class of Service where second choice restrictions should begin.

**Example:**

If Classes of Service 00 and 01 are the only COS that should be able to use the line service type, enter 02 on Table 6-3.

**Default Value:** 11 (not restricted)

**Conditions:**

(a) Extension users hear busy tone when a call cannot go through due to LOCAL/TOLL LAST CHOICE FOR C.O.S. restrictions.



**Related Programming:**

- E: STATIONS FEATURES (CLASS OF SERVICE.....)  
to assign Class of Service to each extension.
- S: SYSTEM FEATURES
  - L: LEAST COST ROUTING  
LCR SERVICE # to identify the LCR services.  
LINE GROUP..... to assign the LCR services to line groups.
  - OCC DIALUP BIN.. to designate the System Speed Dial bins that are automatically dialed if the service is accessed.
  - FX / OTHER..1/0.. to identify FX lines.

**Feature Reference:**

- Class of Service
- Least Cost Routing
- Placing a Call

**Field: R: RELAYS CONTROL**

**Access:**

While in the S: SYSTEM FEATURES program, press the R key. The following sub-fields are available for programming:

BIT NUMBER	7	6	5	4	3	2	1	0
FUNCTION	NIGHT	ALL-P	ANY-P			NRNGR	ZPAGE	RINGR

- RELAY #1 CONTROL...00
- RELAY #2 CONTROL...00
- RELAY #3 CONTROL...00
- RELAY #4 CONTROL...00

The RELAY #1 CONTROL..... sub-field is the first sub-field displayed. After this sub-field is programmed, the remaining sub-fields can be displayed and programmed one at a time.

**Description:**

This field allows the four external relays to be programmed to close for night ringing, Pages and testing.

**Instructions:**

For each relay on the Relays Control bit graph below, place a 1 beneath a bit to enable its assigned function. Bits 0 through 7 in each sub-field control the relays as follows:

**Bit 0 - Test**

Enter 1 to cause the relay to toggle for test purposes. The relay toggles closed (500 mS), open (500 mS), closed (500 mS) and open (2.5 sec.) until the bit is reset to 0.

**Bit 1 - One Page Only**

Enter 1 to cause the relay to close every time a Zone Page is initiated. The relay stays closed until the Zone Page is terminated.

**Bit 2 - Interrupted Night Ring**

Enter 1 to cause the relay to close coincidentally with CO audible on UNA lines when the system is in the night mode. The closure pattern is identical to the CO audible ring pattern.

**Bit 3 - not used**

**Bit 4 - not used**

**Bit 5 - Any Page**

Enter 1 to cause the relay to close every time a Zone or All Call Page is initiated. The relay stays closed until the Page is terminated.

**Bit 6 - All Page**

Enter 1 to cause the relay to close every time an All Call Page is initiated. The relay stays closed until the Page is terminated.

**Bit 7 - Continuous Night Ring**

Enter 1 to cause the relay to close whenever a CO call rings in on a UNA line when the system is in the night mode. The relay stays closed until the call is answered or the caller hangs up.

**Default Value:** 00 (all relays disabled - continuously open)

**Conditions:**

- (a) Relays 1 and 2 are located on the first B-TGU-C PCB. Relays 3 and 4 are located on the second B-TGU PCB.
- (b) The devices connected to the relays must be compatible with the relay specifications.

**Related Programming:**

S: SYSTEM FEATURES

P: CO TYPE to assign lines for Universal Night Answer

**Feature Reference:**

- External Loud Ringing Capability
- External Paging Zones
- Night Service

**RELAYS CONTROL BIT GRAPH**

BIT NUMBER	7	6	5	4	3	2	1	0	
FUNCTION	NIGHT	ALL-P	ANY-P			NRNGR	ZPAGE	RINGR	
HEX	0	0	0	0	0	0	0	0	00
RELAY 1				0	0				
RELAY 2				0	0				
RELAY 3				0	0				
RELAY 4				0	0				

**Example:**

If relay #1 should close any time an All Call Page is made, enter a 1 below bit 6 (for relay #1) on the Relays Control bit graph. The binary number 01000000 is created. Use Table 6-1 to convert the binary number 01000000 to hexadecimal 40. Enter this value in the RELAY #1 CONTROL..... sub-field on Table 6-3.

**Field: G: CO GROUPS**

**Access:**

While in the S: SYSTEM FEATURES program, press the G key. The following sub-fields are available for programming.

LINE..01..GROUP IS	.....01
LINE..02..GROUP IS	.....01
LINE..03..GROUP IS	.....01
LINE..04..GROUP IS	.....01
LINE..05..GROUP IS	.....01
LINE..06..GROUP IS	.....01
LINE..07..GROUP IS	.....01
LINE..08..GROUP IS	.....01
LINE..09..GROUP IS	.....02
LINE..10..GROUP IS	.....02
LINE..11..GROUP IS	.....02
LINE..12..GROUP IS	.....02
LINE..13..GROUP IS	.....02
LINE..14..GROUP IS	.....02
LINE..15..GROUP IS	.....02
LINE..16..GROUP IS	.....02
LINE..17..GROUP IS	.....03
LINE..18..GROUP IS	.....03
LINE..19..GROUP IS	.....03
LINE..20..GROUP IS	.....03
LINE..21..GROUP IS	.....03
LINE..22..GROUP IS	.....03
LINE..23..GROUP IS	.....03
LINE..24..GROUP IS	.....03
LINE..25..GROUP IS	.....77
LINE..26..GROUP IS	.....77
LINE..27..GROUP IS	.....77
LINE..28..GROUP IS	.....77
LINE..29..GROUP IS	.....77
LINE..30..GROUP IS	.....77
LINE..31..GROUP IS	.....77
LINE..32..GROUP IS	.....77

The LINE..01..GROUP IS..... sub-field is the first sub-field displayed. After this sub-field is programmed, the remaining sub-fields can be displayed and programmed one at a time.

**Description:**

Lines can be arranged into a maximum of ten line groups to provide for more efficient management of outgoing calls. A line can be assigned to only one of the ten groups. Similar lines, such as Direct Distance Dialing (DDD) lines, WATS lines or Other Common Carrier (OCC) lines should be programmed into the same line group. This would assure, for example, that the rate structure (cost of a call) for all lines within a group would be the same.

If Least Cost Routing is installed, lines of a similar type (line service type) *must* be programmed into the same group. This is essential because LCR locates a line based on line group assignments made in G: CO GROUPS and L: LEAST COST ROUTING (LINE GROUP.....).

**Instructions:**

For each LINE..nn..GROUP IS..... sub-field on Table 6-3, enter the line group number (01-10) for each line. Lines that are not installed should be assigned to group 77.

**Example:**

If line 1 should be assigned to group 1, enter 01 for the LINE..01..GROUP IS..... sub-field on Table 6-3.

**Default Value:**

Lines 1 through 8 default into group 1 (01).  
 Lines 9 through 16 default into group 2 (02).  
 Lines 17 through 24 default into group 3 (03).  
 Lines 25 through 32 default as not installed (77).

**Conditions:**

- (a) Up to ten groups can be programmed. Any number of lines can be programmed into the same group.
- (b) All telephones use line groups to place outside calls. The call is placed on the highest numbered available line in the group.
- (c) When an extension queues for a line, the recall is from the first available line in the group.
- (d) Unless programmed otherwise or unless LCR is installed, Speed Dial always dials out on line group 1.

**Related Programming:**

S: SYSTEM FEATURES

P: CO TYPE to program line type.

L: LEAST COST ROUTING

LINE GROUP..... to correlate line service type to line group.

**Feature Reference:**

- Least Cost Routing
- Line Groups, Outgoing
- Line Queuing
- Placing a Call
- Speed Dial

**Field:** P: CO TYPE

**Access:**

While in the S: SYSTEM FEATURES program, press the P key. The following sub-fields are available to be programmed:

BIT NUMBER	7	6	5	4	3	2	1	0
FUNCTION	IN	PBX	P/T	G/F	DISA	RHUNT	TOLLF	UNA

- LINE..01..TYPE IS .....01
- LINE..02..TYPE IS .....01
- LINE..03..TYPE IS .....01
- LINE..04..TYPE IS .....01
- LINE..05..TYPE IS .....01
- LINE..06..TYPE IS .....01
- LINE..07..TYPE IS .....01
- LINE..08..TYPE IS .....01
- LINE..09..TYPE IS .....01
- LINE..10..TYPE IS .....01
- LINE..11..TYPE IS .....01
- LINE..12..TYPE IS .....01
- LINE..13..TYPE IS .....01
- LINE..14..TYPE IS .....01
- LINE..15..TYPE IS .....01
- LINE..16..TYPE IS .....01
- LINE..17..TYPE IS .....01
- LINE..18..TYPE IS .....01
- LINE..19..TYPE IS .....01
- LINE..20..TYPE IS .....01
- LINE..21..TYPE IS .....01
- LINE..22..TYPE IS .....01
- LINE..23..TYPE IS .....01
- LINE..24..TYPE IS .....01
- LINE..25..TYPE IS .....01
- LINE..26..TYPE IS .....01
- LINE..27..TYPE IS .....01
- LINE..28..TYPE IS .....01
- LINE..29..TYPE IS .....01
- LINE..30..TYPE IS .....01
- LINE..31..TYPE IS .....01
- LINE..32..TYPE IS .....01



**Description:**

The P: CO TYPE field allows various parameters for Central Office/Private Branch Exchange or tie lines to be programmed. CO/PBX lines can be designated for:

- Universal Night Answer (UNA)
- Toll Free (TOLLF)
- Extension Hunting (RHUNT)
- DISA line (DISA)
- Dial Pulse or DTMF (P/T)
- Central Office or installed behind a PBX (PBX)
- Incoming calls only (IN)

**Instructions:**

Refer to the sub-fields that follow, fill out the appropriate bit graphs, and make entries on Table 6-3.

**Example:** Refer to the sub-fields that follow.

**Default Value:** Refer to the sub-fields that follow.

**Conditions:** Refer to the sub-fields that follow.

**Related Programming:** Refer to the sub-fields that follow.

**Feature Reference:**

- Answering a Call
- Night Service
- Placing a Call
- Private Branch Exchange Compatibility
- Extension Hunting
- Toll Restriction

**Sub-Field: LINE..nn..TYPE IS.....**

**Access:**

While in the S: SYSTEM FEATURES program, press the P key. The following sub-fields are available to be programmed:

BIT NUMBER FUNCTION	7 IN	6 PBX	5 P/T	4 G/F	3 DISA	2 RHUNT	1 TOLLF	0 UNA
------------------------	---------	----------	----------	----------	-----------	------------	------------	----------

- LINE..01..TYPE IS .....01
- LINE..02..TYPE IS .....01
- LINE..03..TYPE IS .....01
- LINE..04..TYPE IS .....01
- LINE..05..TYPE IS .....01
- LINE..06..TYPE IS .....01
- LINE..07..TYPE IS .....01
- LINE..08..TYPE IS .....01
- LINE..09..TYPE IS .....01
- LINE..10..TYPE IS .....01
- LINE..11..TYPE IS .....01
- LINE..12..TYPE IS .....01
- LINE..13..TYPE IS .....01
- LINE..14..TYPE IS .....01
- LINE..15..TYPE IS .....01
- LINE..16..TYPE IS .....01
- LINE..17..TYPE IS .....01
- LINE..18..TYPE IS .....01
- LINE..19..TYPE IS .....01
- LINE..20..TYPE IS .....01
- LINE..21..TYPE IS .....01
- LINE..22..TYPE IS .....01
- LINE..23..TYPE IS .....01
- LINE..24..TYPE IS .....01
- LINE..25..TYPE IS .....01
- LINE..26..TYPE IS .....01
- LINE..27..TYPE IS .....01
- LINE..28..TYPE IS .....01
- LINE..29..TYPE IS .....01
- LINE..30..TYPE IS .....01
- LINE..31..TYPE IS .....01
- LINE..32..TYPE IS .....01

The LINE..01..TYPE IS..... prompt is the first prompt displayed. After this prompt is programmed, the remaining prompts can be displayed and programmed one at a time.

**Description:**

The LINE..nn..TYPE IS..... sub-field allows line type to be individually programmed for each line. A line may be programmed as incoming only, behind a PBX, Dial Pulse (DP) or Dual Tone Multifrequency (DTMF), toll free or Universal Night Answer.

**Instructions:**

For each line on the CO Type bit graph below, place a 1 beneath a bit to enable its assigned function. Bits 0 through 7 in each sub-field assign line type as follows:

**Bit 0 - Universal Night Answer (UNA)**

Enter 1 to enable the line for Universal Night Answer. These lines can be answered when the system is in the night mode from any extension in the system, regardless of E: STATIONS FEATURES assignments.

**Bit 1 - Toll Free (TOLLF)**

Enter 1 to assign the line as a toll free line. A toll free line can be used to place any call, regardless of the extension or area code Class of Service. Lines programmed as toll free are not recognized by Least Cost Routing. LCR continues to place calls on the least expensive route as dictated by the LCR rate tables.

**Bit 2 - Extension Hunting (RHUNT)**

Enter 1 to designate the line for Extension Hunting. Lines assigned for Extension Hunting cycle through hunt groups according to the hunting mode selected (i.e., Terminal or UCD). Lines programmed for Extension Hunting can also be programmed for any other P: CO TYPE parameters.

**Bit 3 - DISA (DISA)**

Enter 1 to assign the line for DISA use.

**Bit 4 - not used (G/F)**

Enter 0

**Bit 5 -Dial Pulse Line (P/T)**

Enter 1 to assign the line as a Dial Pulse line. The default value of 0 assigns the line as a DTMF line.

**Bit 6 - PBX Line (PBX)**

Enter 1 to assign the line as a Private Branch Exchange (PBX) line. Toll Restriction ignores the first digit dialed on PBX lines. The Toll Restriction check begins with the second dialed digit, for manually dialed and Speed Dial calls.

**Bit 7 - Incoming Only (IN)**

Enter 1 to assign the line as incoming only. Outgoing calls cannot be placed on an incoming only line, regardless of an extension's Class of Service and E: STATIONS FEATURES (CO ACCESS) programming. Programming lines as incoming only assures that a specified number of lines will always be reserved for incoming calls. Least Cost Routing cannot place calls on incoming only lines.

**CO TYPE BIT GRAPH**

BIT NUMBER	7	6	5	4	3	2	1	0	
FUNCTION	IN	PBX	P/T	G/F	DISA	RHUNT	TOLLF	UNA	
HEX	0	0	0	0	0	0	0	1	01
LINE 01									
LINE 02									
LINE 03									
LINE 04									
LINE 05									
LINE 06									
LINE 07									
LINE 08									
LINE 09									
LINE 10									
LINE 11									
LINE 12									
LINE 13									
LINE 14									
LINE 15									
LINE 16									
LINE 17									
LINE 18									
LINE 19									
LINE 20									
LINE 21									
LINE 22									
LINE 23									
LINE 24									
LINE 25									
LINE 26									
LINE 27									
LINE 28									
LINE 29									
LINE 30									
LINE 31									
LINE 32									



**Example:**

If line 1 is to be reserved for incoming calls only, enter 1 below bit seven and 0 below all other bits. The binary number 10000000 is created. Use Table 6-1 to convert this binary number to hexadecimal 80. Enter 80 for the LINE..01..TYPE IS..... sub-field on Table 6-3.

**Default Value:** 01 (all lines are UNA, DTMF lines)

**Conditions:**

- (a) A line may be programmed for any number of variables.
- (b) A line programmed as a Private Line should not also be programmed for Universal Night Answer.
- (c) Extension Hunting is normally defeated when the system is in the night mode. A line designated for hunting and UNA can activate the loud ringer and can be answered (by dialing 69) from any extension in the system.

**Related Programming:**

- S: SYSTEM FEATURES
  - U: GROUP HUNT to program Extension Hunting.
  - G: CO GROUPS to make sure that lines of the same type are in the same group.
- E: STATIONS FEATURES
  - PRIVATE LINE.....IS... to assure that lines programmed as Private Lines are not also designated for UNA.

**Feature Reference:**

- Answering a Call
- Line Groups, Outgoing
- Placing a Call
- Private Line
- Toll Restriction
- Night Service
- Extension Hunting

**Field:** S: TIE LINE TYPE

**Access:**

While in the S: SYSTEM FEATURES program, press the S key. The following sub-fields are available to be programmed.

BIT NUMBER FUNCTION	7	6	5	4	3	2	1	0
	IN-DD	4S-RA	OT-DD	WINK	4/ZWR	P/T	INSTL	

TIE LINE..01..TYPE IS .....00\_\_  
 TIE LINE..02..TYPE IS .....00\_\_  
 TIE LINE..03..TYPE IS .....00\_\_  
 TIE LINE..04..TYPE IS .....00\_\_  
 TIE LINE..05..TYPE IS .....00\_\_  
 TIE LINE..06..TYPE IS .....00\_\_  
 ...NO\_\_

} For future use

**Description:**

One or two tie lines can be installed to allow the TCX-128 to be directly connected to a remote off premises system, bypassing the Central Office switching. The TIE LINE TYPE field allows the system to be made compatible with the parameters of each tie line circuit connected to it. The TCX-128 meets the tie line timing parameters specified in Bell Publications 62116 and 62118. Timing parameters not specified in these publications are compatible with EIA Specification RS-464-1. Tie lines require a special Printed Circuit Board in the KSU.

**Instructions:**

For each line on the tie line bit graph below, place a 1 beneath a bit to enable its assigned function. Bits 0 through 7 in each sub-field assign tie line parameters as follows:

**Bit 0 - Tie Line Installed (INSTL)**

Enter 1 on the tie line bit graph below for each tie line that is installed. If the line is not installed, leave the bit at its default setting.

**Bit 1 - Dial Pulse or DTMF Line (P/T)**

Enter 1 on the tie line bit graph below if the tie line utilizes Dial Pulse (DP) signaling; 0 if the line uses DTMF signaling.

## Bit 2 - Four Wire or Two Wire Analog (4/2WR)

If the tie line uses a two-wire analog circuit, enter 0 under bit 2 on the tie line bit graph below. If the tie line uses a four-wire analog circuit, enter 1 on the bit graph below.

## Bit 3 - Wink Start (WINK)

If the system to which the TCX-128 is connected requires a wink start to connect to an incoming call, enter 1 for this bit on the bit graph below. If the TCX-128 is not required to send a wink start to the remote system, leave this bit at its default value. A wink start is a 140 mS-350 mS pulse that occurs within 150 mS of line seizure.

## Bit 4 - Delay Dial, Outgoing (OT-DD)

If the system to which the TCX-128 is connected requires a delay dial to connect to an incoming call, enter 1 for this bit on the bit graph below. If the TCX-128 is not required to send a delay dial, leave this bit at its default value. A delay dial (outgoing) is similar to a wink start, except that the pulse duration is longer. The delay dial pulse is a pulse of 140 mS-5 sec. that occurs within 150 mS of line seizure.

## Bit 5 - Four Second Remote Answer

When the system places a call on a tie line, it expects to see a steady signal (on its E lead) from the remote system indicating that the call has been connected. If bit 5 is programmed as 1, the signal on the TCX-128 E lead (from the remote system M lead) must be maintained for four seconds. If the signal is not maintained for four seconds, the call is not connected. If bit 5 is set to 0, the call is considered connected as soon as the signal is received. Under certain conditions this may be undesirable, since transients on the E lead could be interpreted as a remote answer condition. Refer to EIA Specification RS-464-1.

## Bit 6 - Delay Dial, Incoming

Enter 1 on the tie line bit graph below if the TCX-128 should require a wink start or delay dial from the remote system for an incoming call. The incoming wink/delay dial signal provided by the remote system must be a 200 mS pulse beginning 100 mS after the TCX-128 receives the incoming call. If the TCX-128 should not require a delay dial signal from the remote system for incoming calls, enter 0.

## Bit 7 - not used

## TIE LINE BIT GRAPH

BIT NUMBER	7	6	5	4	3	2	1	0	
FUNCTION		IN-DD	4S-RA	OT-DD	WINK	4/2WR	F/T	INSTL	
HEX	0	0	0	0	0	0	0	0	00
TIE LINE 1	0								
TIE LINE 2	0								

### Example:

If the TCX-128 should provide a wink start to allow the remote system to answer the call, enter 1 for bit 3 on the tie line bit graph below. Enter 1 for bit 0 to indicate that the line is installed. All other bits should be 0. The resultant binary number 00001001 is converted to hexadecimal 09 using Table 6-1. Hex 09 is entered for the tie line being programmed on Table 6-3.

**Default Value:** 00 (no tie lines installed)

### Conditions:

See TIE LINES Section.

### Related Programming:

S: SYSTEM FEATURES

G: CO GROUPS to program all tie lines into the same line group.

### Feature Reference:

Answering a Call  
Placing a Call





**Field: C: MEET-ME CONFERENCE**

**Access:**

While in S: SYSTEM FEATURES program, press the C key. The following sub-field is displayed:

MEET-ME CONFERENCE LINE ..IS...NONE\_\_

**Description:**

A Meet-Me Conference allows a group of extensions to be connected together on an internal conference call. This conference is held on an unused trunk position. This program identifies the unused trunk.

**Instructions:**

On Table 6-3, enter the two-digit number of the line on which a Meet-Me Conference is held. For best quality on a Meet-Me Conference, select a line number divisible by 4 (that is, lines 04, 08, 12, 16, 20, 24, 28 and 32).

**Example:** not applicable

**Default Value:** NONE

**Conditions:**

- (a) Any unused trunk to be used for Meet-Me Conferences must be assigned as '77' under G: CO GROUPS programming.
- (b) Only one unused trunk can be used for Meet-Me Conferences per system.
- (c) Any unused trunk may be programmed for the conference; however, every fourth CO position has additional gain circuitry (lines 04, 08, 12, 16, 20, 24, 28 and 32).
- (d) Any number of extensions may join a Meet-Me Conference; however, as six or more extensions are joined together, volume decreases.

**Related Programming:**

G: CO GROUPS to assign the unused trunk to group 77.

**Feature Reference:**

Conference, Meet-Me  
Intercom

**Field: A: OFFICE CODE TYPES**

**Access:**

While in the S: SYSTEM FEATURES program, press the A key. The following sub-field is displayed:

OFFICE CODE TYPE.

- 0 : 10-11 DIGITS TOLL
- 1 : TOLL IF 1-NNN..., OTHERWISE LOCAL
- 2 : LOCAL 3-4 DIGITS
- 3 : LOCAL 7-8 DIGITS
- 4 : SPECIAL INN PREFIX (not used)

ENTER EXCHANGE...(NNN).

Press the RETURN key repeatedly to scroll through the entire field.

**Description:**

This field is used to assign type to all office codes (NNX), area codes (NPX) and Emergency Assistance (N11) numbers. Office codes in the United States are numbers from 200-999. Area codes are numbers from 200-219 through 900-919. Emergency Assistance numbers are numbers such as 411, 911 and 811.

**Instructions:**

For each entry on Table 6-3, assign office code type (defined as follows):

**Type 00 - Office and Area Codes**

Office and area codes in the United States are numbers between 200 and 999. If the code is not an Emergency Assistance number (N11), a conflict code or an office code only, it should be assigned as 00. Codes designated as type 00 may be dialed with or without a leading 1 (1 + NPX + NNX + nnnn or NPX + NNX + nnnn), depending on the type of service where the system is installed.

## Type 01 - Conflict Codes

In certain areas, a code may be an office code and an area code. These "conflict codes" should always be identified as type 01. If a leading 1 is dialed, the code is treated as an area code (i.e., a 1 + NPX + NNX + nnnn long distance call was dialed). If a leading 1 is not dialed, the code is treated as an office code (i.e., a NNX + nnnn non-toll local call was dialed). In this instance, there is no limit imposed on the number of digits that can be dialed from a toll restricted telephone, unless F: SYSTEM OPTIONS (OPTION ENABLED...14...) is enabled to restrict the maximum digits that can be dialed to 16.

In addition, all codes between 100-199 must be assigned as type 01.

## Type 02 - Emergency Assistance (N11) Numbers

All Emergency Assistance numbers (911, 411, 811, etc.) must be identified as type 02. This allows these numbers to be dialed with or without a leading 1 (1 + N11 or N11) from any extension in the system with Class of Service 0 through 4. Extensions with Class of Service 5 cannot directly dial these numbers.

## Type 03 - Office Code Only

If a code is to be used as an office code only (NNX), assign it type 03. For Classes of Service 1 and 2, the system assumes that these are non-toll calls, and allows 1 + NNX + nnnn and NNX + nnnn dialing without restriction. Whatever restrictions that may have been made in the "K Table" (i.e., in K: COS ALLOWED AREA CODES programming) are ignored. There is no limit imposed on the number of digits that can be dialed, unless F: SYSTEM OPTIONS (OPTION ENABLED...14...) is enabled to restrict the maximum digits dialed to 16.

For Classes of Service 3 and 4, 1 + NNX + nnnn dialing is not permitted; NNX + nnnn dialing (without restriction) is. "K Table" restrictions (i.e., in K: COS ALLOWED AREA CODES programming) are ignored. For NXX + nnnn dialing, there is no limit imposed on the number of digits that can be dialed unless F: SYSTEM OPTIONS (OPTION ENABLED...14...) is enabled. This option restricts the maximum digits dialed to 16.

Extensions with Class of Service 5 cannot directly dial outside calls.

## Type 04 - not used

It may be helpful to develop Table 6-3 in a non-consecutive order. For example:

- (1) Identify all Office Codes (exchanges) as type 03.
- (2) Identify all Area Codes as type 00.
- (3) Identify all Conflict Codes as type 01.
- (4) Identify all Emergency Assistance Numbers as type 02.

Programming is done for each individual code, in ranges, or globally for all codes.

## Programming Individual Codes

When the system prompts:

**ENTER EXCHANGE...(NNN)\_\_\_**

enter code to be programmed and press the RETURN key.

When the system prompts:

**UP TO AND INCLUDE.....\_\_\_**

enter the same exchange again and press the RETURN key.

When the system returns:

**EXCHANGE TYPE IS.....\_\_\_**

enter code type from Table 6-3 and press return.

## Programming in Ranges

When the system prompts:

**ENTER EXCHANGE...(NNN)\_\_\_**

enter the lowest numbered code in the range to be programmed and press the RETURN key.

When the system prompts:

**UP TO AND INCLUDE.....**\_\_

enter the highest numbered code in the range to be programmed and press the RETURN key.

When the system prompts:

**EXCHANGE TYPE IS....**\_\_

enter code type from Table 6-3 and press the RETURN key. The entire range is now assigned that code type.

### Global Programming

When the system prompts:

**ENTER EXCHANGE..(NNN).**\_\_

enter 000 and press the RETURN key.

When the system prompts:

**UP TO AND INCLUDE.....**\_\_

enter 999 and press the RETURN key.

When the system returns:

**EXCHANGE TYPE IS.....**\_\_

enter code from Table 6-3 and press the RETURN key. The \* character displays indicating that the entire table is now assigned that code.

### Checking an Entry

To check the assignment for a code, when the system prompts:

**ENTER EXCHANGE...(NNN)**\_\_

enter code to be checked and press the RETURN key.

When the system prompts:

**UP TO AND INCLUDE.....**\_\_

press the RETURN key.

When the system prompts:

**The EXCHANGE TYPE IS....**\_\_

prompt displays the assignment for the code checked.

### Example:

If code 212 can be an office code and an area code, enter 01 for this code on Table 6-3.

### Default Value:

All codes between 000 and 199 initialize as type 00. All area codes (200-219, 300-319 etc.) also initialize as type 00. All exchanges (220-299, 320-399 etc.) initialize as type 03.

### Conditions:

- (a) Conflict codes are determined by the local telephone company.
- (b) International calls can only be dialed from extensions with Class of Service 0.
- (c) Emergency Assistance numbers are determined by the local telephone company.
- (d) If Least Cost Routing is installed, type 01 (Conflict Code) should only be used for codes 100-199. LCR automatically accommodates Conflict Codes, without the need for special programming.

### Related Programming:

- E: STATIONS FEATURES  
CLASS OF SERVICE..... to assign Class of Service to extensions.
- S: SYSTEM FEATURES  
K: COS ALLOWED AREA CODES to program which Classes of Service can use each area code.

### Feature Reference:

Class of Service  
Least Cost Routing  
Placing a Call  
Toll Restriction

## Field: K: COS ALLOWED AREA CODES

### Access:

While in the S: SYSTEM FEATURES program, press the K key. The following prompt is displayed:

BIT	7	6	5	4	3	2	1	0
COS	X	X	C-5	C-4	C-3	C-2	C-1	ON

### ENTER EXCHANGE...(NNN).\_\_

Press the RETURN key repeatedly to scroll through the entire field.

### Description:

Area codes (200-219 through 900-919) can be assigned a specific Class of Service. This allows an extension with that Class of Service to dial the area code. Extensions with a Class of Service not specifically permitted in K: COS ALLOWED AREA CODES cannot dial the area code.

The system has six Classes of Service (COS), as follows:

#### COS 0

Unrestricted. Class of Service 0 is permitted to dial all System Speed Dial numbers and all area codes. This is the only COS permitted to dial (telco) operator (0) calls. Intercom calls are permitted.

#### COS 1

Class of Service 1 is permitted to dial seven-digit (NNX + nnnn) and leading 1 seven-digit (1 + NNX + nnnn) numbers, all System Speed Dial numbers and allowed area codes (1 + NPX + NNX + nnnn). Intercom calls are permitted.

#### COS 2

Class of Service 2 is permitted to dial seven-digit (NNX + nnnn) numbers, leading 1 seven-digit (1 + NNX + nnnn) numbers, allowed area codes (1 + NPX + NNX + nnnn) and System Speed Dial numbers that do not contain a leading 1 or 0. Intercom calls are permitted.

#### COS 3

Class of Service 3 is permitted to dial seven-digit (NNX + nnnn) numbers, all System Speed Dial numbers and allowed area codes (1 + NPX + NNX + nnnn). Intercom calls are permitted.

#### COS 4

Class of Service 4 is permitted to dial seven-digit (NNX + nnnn) numbers, allowed area codes (1 + NPX + NNX + nnnn) and System Speed Dial numbers that do not contain a leading 1 or 0. Intercom calls are permitted.

#### COS 5

Class of Service 5 can dial Intercom calls and all System Speed Dial calls only.

### Instructions:

For each area code on Table 6-3, place a 1 beneath each Class of Service that will be able to dial the code. Place a 0 beneath each Class of Service that will be prevented from dialing the area code. The bits are assigned as follows:

- Bit 0: On (always leave at 1)
- Bit 1: C-1 (COS 1)
- Bit 2: C-2 (COS 2)
- Bit 3: C-3 (COS 3)
- Bit 4: C-4 (COS 4)
- Bit 5: C-5 (COS 5, always leave at 0)
- Bits 6 and 7: not used (always leave at 0)

Use Table 6-1 to convert the resultant eight bit binary number to hexadecimal and enter the number in the HEX column on Table 6-3.

Programming is done for each individual area code, in ranges, or globally for all codes.

### Programming Individual Area Codes

When the system prompts:

**ENTER EXCHANGE...(nnn).\_\_**

enter code to be programmed and press the RETURN key.

When the system prompts:

**UP TO AND INCLUDE.....\_\_**

enter the same code and press the RETURN key.

When the system returns:

**COS RECORDED/NEW....\_\_01**

enter data from Table 6-3 and press the RETURN key. Prompts continue until the Q key is pressed.



### Programming in Ranges

When the system prompts:

**ENTER EXCHANGE...(NNN)\_\_\_**

enter the lowest numbered code in the range to be programmed and press the RETURN key.

When the system prompts:

**UP TO AND INCLUDE.....\_\_**

enter the highest numbered code in the range to be programmed and press the RETURN key.

When the system returns:

**ENTER NEW COS.....\_\_**

enter data from Table 6-3 and press the RETURN key. The entire range is now assigned that code type. Prompts continue until the Q key is pressed.

### Global Programming

When the system prompts:

**ENTER EXCHANGE...(NNN)\_\_\_**

enter 200 and press the RETURN key.

When the system prompts:

**UP TO AND INCLUDE.....\_\_**

enter 999 and press the RETURN key.

When the system returns:

**ENTER NEW COS.....\_\_**

enter data from Table 6-3 and press the RETURN key. The entire table is now assigned that code. The \* prompt displays, indicating that the entire table has been programmed.

### Checking an Entry

To check the Class of Service for an area code, when the system prompts:

**ENTER EXCHANGE...(NNN)\_\_\_**

enter area code to be checked and press the RETURN key.

When the system prompts:

**UP TO AND INCLUDE.....\_\_**

press the RETURN key.

The COS RECORDED/NEW.... prompt displays the Class of Service data for the area code.

### Example:

If area code 212 should be accessible only to extensions with Class of Service 1, enter 1 beneath bit 1 on Table 6-3. The resultant binary number 00000011 is converted to hexadecimal 03 and entered in the "HEX" column.

**Default Value:** 01 (fully restricted for COS 1 through 5)

### Conditions:

- (a) Emergency Assistance numbers should always be accessible to every extension in the system that can dial outside calls (entry 1F).
- (b) K: COS ALLOWED AREA CODES programming may be used to allow extensions with Classes of Service 3 and 4 to dial 1 + seven-digit (1 + NNX + nnnn) numbers to which they normally would be denied access. To accomplish this:
  - (1) Designate the exchange to be allowed as type 01 (in A: OFFICE CODE TYPES). Indicate on Table 6-3 that this exchange has special programming.
  - (2) In K: COS ALLOWED AREA CODES, enter 09 (hex) for the exchange if COS 3 should be able to dial it; enter 19 (hex) for COS 3 and 4. Record this programming in the margin of Table 6-3.
  - (3) If the call is placed without a leading 1, the system assumes that the code is a local exchange (office code) and allows any seven-digit dialing. If the call is placed with a leading 1, the office code is Toll Restricted as if an area code. Dialing 1 + NNX + nnnn and 1 + NPX + NNX + nnnn is allowed.
  - (4) Use this type of programming only for those codes which require special treatment.

### Related Programming:

- E: STATIONS FEATURES  
CLASS OF SERVICE to program Class of Service for extensions.
- S: SYSTEM FEATURES  
A: OFFICE CODE TYPES to assign a type to each area code.

### Feature Reference:

- Class of Service
- Placing a Call
- Toll Restriction

## Field: E: EXTERNAL OUTPUTS

### Access:

While in the S: SYSTEM FEATURES program, press the E key. The following sub-fields are available to be programmed:

BIT NUMBER FUNCTION	7 NIGHT	6 BGM	5 PAGE	4	3	2 PG-DZ	1 ON	0 C-OFF
------------------------	------------	----------	-----------	---	---	------------	---------	------------

OUTPUT..01..CONTROL IS .....20  
 ALTERNATE AUDIO PORT IS ..... NONE  
 OUTPUT..02..CONTROL IS .....20  
 ALTERNATE AUDIO PORT IS ..... NONE  
 OUTPUT..03..CONTROL IS .....20  
 ALTERNATE AUDIO PORT IS ..... NONE  
 OUTPUT..04..CONTROL IS .....20  
 ALTERNATE AUDIO PORT IS ..... NONE  
 OUTPUT..05..CONTROL IS .....20  
 ALTERNATE AUDIO PORT IS ..... NONE  
 OUTPUT..06..CONTROL IS .....20  
 ALTERNATE AUDIO PORT IS ..... NONE  
 OUTPUT..07..CONTROL IS .....20  
 ALTERNATE AUDIO PORT IS ..... NONE  
 OUTPUT..08..CONTROL IS .....20  
 ALTERNATE AUDIO PORT IS ..... NONE

The OUTPUT..01..CONTROL IS.../ALTERNATE AUDIO PORT IS... sub-field is the first sub-field accessed. Each successive sub-field is accessed after the previous sub-field is programmed.

### Description:

External Page, Background Music and night mode ringing are output from the system at the Alternate Audio Ports if B-TGU-B Tone Generator Unit PCBs are installed. Unused extension positions on a B-8SCU-C PCB may be used as Alternate Audio Ports. The E: EXTERNAL OUTPUTS field assigns which unused extension ports receive External Page, Background Music and night ringing.

**CAUTION: THIS FIELD IS EFFECTIVE ONLY IF B-TGU-B PCBs ARE INSTALLED. SYSTEM OPTION 27 MUST BE SET TO NO. ALTERNATE AUDIO PORTS CANNOT BE USED IF B-TGU-C PCBs ARE INSTALLED (AND OPTION 27 IS SET TO YES).**

### Instructions:

The E: EXTERNAL OUTPUTS field uses eight control bits, shown on the External Outputs bit graph, defined as follows:

#### Bits 0 through 4 - not used

#### Bit 5 - Page (PAGE)

On the External Outputs bit graph, a 1 below bit 5 indicates that Page audio will be output from the designated Alternate Audio Port. A 0 indicates that paging is not broadcast. All Call Page and one Zone Page are broadcast from each Alternate Audio Port. The Zone Page assignments are as follows:

OUTPUT	ZONE PAGE
01	01 (dial 61)
02	02 (dial 62)
03	03 (dial 63)
04	04 (dial 64)
05	05 (dial 65)
06	06 (dial 66)
07	07 (dial 67)
08	08 (dial 68)

#### Bit 6 - Background Music (BGM)

On the External Outputs bit graph, a 1 below bit 6 indicates that BGM is output from the designated Alternate Audio Port. A 0 indicates that BGM will not be broadcast.

#### Bit 7 - Night Ringing (NIGHT)

On the External Outputs bit graph, a 1 below bit 7 indicates that night ringing is output from the designated Alternate Audio Port. A 0 indicates that night ringing will not be broadcast.

Enter 1s and 0s on the External Outputs bit graph to determine the parameters of each Alternate Audio Port to be used. Eight bit binary numbers are created. Use Table 6-1 to convert each of these numbers to hexadecimal, and record the hex equivalent for each sub-field on Table 6-3.



## EXTERNAL OUTPUTS BIT GRAPH

BIT NUMBER	7	6	5	4	3	2	1	0	
FUNCTION	NIGHT	BGM	PAGE			PG-DZ	ON	C-OFF	
HEX	0	0	1	0	0	0	0	0	20
OUTPUT 1				0	0	0	0	0	
OUTPUT 2				0	0	0	0	0	
OUTPUT 3				0	0	0	0	0	
OUTPUT 4				0	0	0	0	0	
OUTPUT 5				0	0	0	0	0	
OUTPUT 6				0	0	0	0	0	
OUTPUT 7				0	0	0	0	0	
OUTPUT 8				0	0	0	0	0	

### Example:

Unused extension position 32 (port 032) is to be used as an Alternate Audio Port to broadcast Background Music. On the External Outputs bit graph, enter 1 below bit 6 (for output 01) and a 0 for all other bits. The binary number 0100000 is created. Using Table 6-1, convert this binary number to hexadecimal 40. Enter 40 for the Output 01 sub-field on Table 6-3.

To assign Output 01 to extension position (port) 32, enter 032 as the Alternate Audio Port for output 01.

### Default Value:

All OUTPUT..NN..CONTROL IS... sub-fields default to 20 (Page bit set to 1).

All ALTERNATE AUDIO PORT IS.. sub-fields default to NONE.

### Conditions:

- To avoid Page volume fluctuations in the system, leave the OUTPUT..NN..CONTROL IS... sub-fields defaulted to 20 if the alternate outputs are not going to be used.
- Alternate Audio Ports require a B-8SCU-C PCB.
- CO audible from Private Lines and non-UNA lines are not sent to the Alternate Audio Ports.
- The system ignores any E: STATIONS FEATURES programming made for an Alternate Audio Port.
- If B-TGU-C Tone Generator Unit PCBs are used (and System Option 27 is enabled), Page, BGM and night audible are broadcast from audio outputs. Four audio outputs are located on each B-TGU-C PCB, for a system total of eight.

### Related Programming:

#### E: STATIONS FEATURES

PAGE ZONE RECEIVED..... so that extensions which should hear the Alternate Audio Port Zone Page are in the same Page zone as the Alternate Audio Port.

PRIVATE LINE.....IS... to assign lines as Private Lines. Private lines are not output to the Alternate Audio Ports.

#### S: SYSTEM FEATURES

P: CO TYPE to assign lines as UNA lines. Lines not assigned as UNA lines do not activate the Alternate Audio Ports. Private Lines should not be programmed for UNA.

#### S: SYSTEM FEATURES

OPTION ENABLED...27.. to disable option 27 if B-TGU-B PCBs are used.

### Feature Reference:

Answering a Call  
 External Paging Zones  
 Music on Hold/Background Music  
 Paging  
 Private Line  
 Night Service

## Field: N: OUT KEYS GROUPS

### Access:

While in the S: SYSTEM FEATURES program, press the N key. The following fields may be programmed:

### OUTGOING KEYS FORMAT

OUT\_\_KEY # 01 SELECT GROUP # \_\_01\_\_  
OUT\_\_KEY # 02 SELECT GROUP # \_\_01\_\_  
OUT\_\_KEY # 03 SELECT GROUP # \_\_02\_\_  
OUT\_\_KEY # 04 SELECT GROUP # \_\_02\_\_  
OUT\_\_KEY # 05 SELECT GROUP # \_\_03\_\_  
OUT\_\_KEY # 06 SELECT GROUP # \_\_03\_\_

### Description:

The N: OUT KEYS GROUPS field selects the line groups accessed by each of the outgoing line keys (keys 8-13) on multibutton telephones. When an outgoing line key is pressed, the highest numbered available line in the assigned line group is seized. More than one key may be assigned to the same line group.

### Instructions:

On Table 6-3, enter the line group number that should be accessed by each of the six outgoing line keys (keys 8-13). Refer to G: CO GROUPS programming for line group assignments.

### Example:

If outgoing line key 1 (key 8) should access line group 3, enter 03 for the OUT\_\_KEY # 01 SELECT GROUP # \_\_ sub-field on Table 6-3.

### Default Value:

The default key assignments are as follows:

KEY	GROUP
OUTGOING KEY 1 (KEY 8)	01
OUTGOING KEY 2 (KEY 9)	01
OUTGOING KEY 3 (KEY 10)	02
OUTGOING KEY 4 (KEY 11)	02
OUTGOING KEY 5 (KEY 12)	03
OUTGOING KEY 6 (KEY 13)	03

### Conditions:

- (a) If LCR is installed, outgoing keys 12 and 13 access LCR, not the line groups assigned in N: OUT KEYS GROUPS programming.
- (b) Outgoing line keys cannot access Private Lines designated in E: STATIONS FEATURES (PRIVATE LINE.....IS...) programming.
- (c) A multibutton extension user cannot use an outgoing line key to seize a line if access is not also granted in E: STATIONS FEATURES (CO ACCESS [NN..NN] IS..) programming.
- (d) When all of the lines assigned to an outgoing line key are unavailable (i.e., either busy or ringing in), the outgoing line key LED illuminates on all the multibutton telephones. If this happens frequently, it can be used as an indication that more lines need to be added to the line group.

### Related Programming:

- S: SYSTEM FEATURES
  - G: CO GROUPS to assign lines to line groups.
  - P: CO TYPE to designate line type.
- E: STATIONS FEATURES
  - CO ACCESS [NN..NN] IS.. to grant outgoing access for lines on an extension-by-extension basis.
  - PRIVATE LINE.....IS... to assign a Private Line to an extension.

### Feature Reference:

Least Cost Routing  
Placing a Call



**Field: V: MODEM PASSWORD****Access:**

While in the S: SYSTEM FEATURES program, press the V key. The following sub-fields are available for programming:

CURRENT PASSWORD IS  
ENTER NEW PASSWORD. (UP TO 20 CHARACTERS)...

**Description:**

This field allows a password to be programmed to restrict access of remote terminals to the modem on the B-CPU-D PCB.

**Instructions:**

When the ENTER NEW PASSWORD, etc. prompt appears, enter the desired password (up to 20 characters).

**Example:** not applicable

**Default Value:** M

**Conditions:** not applicable

**Related Programming:** not applicable

**Feature Reference:**

Remote Modem Access

**Field: F: SYSTEM OPTIONS**

The options available are as follows:

- 1: BYPASS CO ACCESS FOR LCR SEARCH
- 2: MOH ENABLED
- 3: CONF KEY TO MOVE UP GREEN LED
- 4: DISTINCTIVE CO RING FOR 2500 SLI
- 5: AUTO DISCONNECT BAD TRUNK
- 6: FORCED RINGDOWN INT CALLS
- 7: FULL SPEED DTMF (60 ON 60 OFF)
- 8: IGNORE CO TERMINATION ON HELD LINE
- 9: LINK 0 DEDICATED FOR RING
- 10: TOLL RESTRICT NO DIGITS ENTERED
- 11: SMDR FOR '1'+7, '0'+7 DIGITS
- 12: TOLL RESTRICT INSUFFICIENT DIGITS
- 13: SMDR FOR LONG DISTANCE CALLS
- 14: 16 DIGITS LIMIT ON MANUAL DIAL
- 15: SMDR FOR LEADING 0 CALLS
- 16: SMDR INCLUDE SPEED DIAL BIN NUMBER
- 17: SMDR FOR LOCAL 7 DIGIT CALLS
- 18: SMDR FOR INCOMING CALLS
- 19: MSG WAIT CALL FWD BEEPER
- 20: SMDR FOR TOLL RESTRICT DROPPED CALLS
- 21: SMDR FOR NO ACCOUNT CODE DROPPED CALLS
- 22: USE NNN BYPASS TABLE FOR LCR
- 23: HL PARTNER OVERRIDE DND
- 24: SMDR FOR ALL CALLS
- 25: DNY RECALL FROM OPR 1
- 26: DNY RECALL FROM OPR 2-6
- 27: TONE CARD (TGU-C)
- 28: CALL FWD FOLLOW ME
- 29: DISA FORCED ACCNT CODES
- 30: TIE PAGE
- 31: DISA PAGE
- 32: ENABLE DISA DAY
- 33: ENABLE DISA NIGHT
- 34: ENABLE MODEM

**Access:**

While in the S: SYSTEM FEATURES program, press the F key. The following prompt is displayed:

SYS OPTION EDIT

ENTER OPTION#..\_\_

OPTION ENABLED...01..YES\_\_

The prompt for option 01 is displayed first. Press the RETURN key repeatedly to scroll down through the prompts for options 2 through 34, or enter the option number to be programmed and press the RETURN key.

**Description:**

The F: SYSTEM OPTIONS field allows miscellaneous system options to be programmed.

**Instructions:**

Refer to the specific sub-fields that follow.

**Example:**

Refer to the specific sub-fields that follow.

**Default Value:**

Refer to the specific sub-fields that follow.

**Conditions:**

Refer to the specific sub-fields that follow.

**Related Programming:**

Refer to the specific sub-fields that follow.

**Feature Reference:**

Refer to the specific sub-fields that follow.

**Sub-Field: OPTION 01.. (BYPASS CQ ACCESS FOR LCR SEARCH)****Access:**

While in the S: SYSTEM FEATURES program, press the F key. When the system prompts: ENTER OPTION #..., press the RETURN key.

**Description:**

This option allows LCR to override E: STATIONS FEATURES (CO ACCESS [nn..nn] IS..) programming when routing a call. When option 01 is enabled, the least expensive route (line) for the call is selected and CO ACCESS programming is ignored. If option 01 is disabled and LCR selects a line for which access is denied, the call will not go through.

**Instructions:**

On Table 6-3, enter Y if LCR should be able to override CO access assignments; N if not.

**Example:** not applicable

**Default Value:** YES (override enabled)

**Conditions:**

- (a) Option 01 has no affect on how calls are placed using outgoing line keys 8-11.
- (b) If the system is configured for Tenant Service, it may be desirable to disable option 01. This would prevent LCR from routing a call placed by one tenant onto a line assigned to another.

**Related Programming:**

- E: STATIONS FEATURES  
CO ACCESS [NN..NN] IS.. to configure CO access on an extension-by-extension basis.
- S: SYSTEM FEATURES
  - L: LEAST COST ROUTING to program LCR.
  - G: CO GROUPS to assign lines to groups.
  - N: OUT KEYS GROUPS to assign line groups to the outgoing line keys.

**Feature Reference:**

Class of Service  
Least Cost Routing  
Placing a Call  
Tenant Service  
Toll Restriction

**Sub-Field:** OPTION 02.. (MOH ENABLED)**Access:**

While in the S: SYSTEM FEATURES program, press the F key. When the system prompts: ENTER OPTION #..., enter 02 and press the RETURN key.

**Description:**

If the system is equipped with an optional music source, this option allows callers on Hold to receive Music On Hold.

**CAUTION: THIS OPTION SHOULD ALWAYS BE ENABLED. DISABLING THIS OPTION REMOVES THE AC TERMINATION FOR ALL LINES ON HOLD.**

**Instructions:**

On Table 6-3, enter Y.

**Example:** not applicable

**Default Value:** YES (MOH enabled)

**Conditions:**

An external music source must be installed.

**Related Programming:** not applicable

**Feature Reference:**

Music On Hold/Background Music

**Sub-Field:** OPTION 03..(CONF KEY TO MOVE UI GREEN LED)**Access:**

While in the S: SYSTEM FEATURES program, press the F key. When the system prompts: ENTER OPTION #..., enter 03 and press the RETURN key.

**Description:**

Enabling option 03 allows a Multibutton telephone user to place and join in conference two outside calls using the same outgoing line key. If option 03 is disabled, this feature is not allowed. This option is used when each outgoing line key is assigned to a line group, and the user wishes to place and join in conference two calls using the same line group. It is also useful for placing and conferencing two calls using the same LCR key.

**Instructions:**

On Table 6-3, enter Y if a multi-line conference should be allowed using the same outgoing line key; N if not.

**Example:** not applicable

**Default Value:** YES (Conference enabled)

**Conditions:**

- (a) For option 03 to function, the line group accessed by pressing the outgoing line key must contain at least two lines. If only one line is available, the facility is denied.
- (b) If placing the initial call uses the last available line in the line group, the facility is denied.

**Related Programming:**

- E: STATIONS FEATURES  
CO ACCESS [NN..NN] IS.. to configure CO access for the lines in each line group, on an extension-by-extension basis.
- S: SYSTEM FEATURES
  - L: LEAST COST ROUTING to enable LCR.
  - G: CO GROUPS to assign at least two lines to each line group.
  - N: OUT KEYS GROUPS to assign line groups to outgoing line keys.
  - F: SYSTEM OPTIONS  
OPTION 01.. to allow LCR to bypass CO access programming.

**Feature Reference:**

Conference  
Least Cost Routing  
Line Groups, Outgoing  
Placing a Call

**Sub-Field:** OPTION 04.. (DISTINCTIVE CO RING FOR 2500 SLI)

**Access:**

While in the S: SYSTEM FEATURES program, press the F key. When the system prompts: ENTER OPTION #..., enter 04 and press the RETURN key.

**Description:**

Distinctive ringing allows users of Single Line and 2500 type telephones to differentiate between Intercom and outside calls. If this option is enabled, outside calls ring with two short ring bursts followed by a 4.5 second pause; Intercom calls ring with a 1.5 second burst followed by a 4.5 second pause. If this option is disabled, all calls ring with a 1.5 second burst followed by a 4.5 second pause.

**Instructions:**

On Table 6-3, enter Y for option 04 if distinctive ringing for Single Line and 2500 type telephones is desired; N if not.

**Example:** not applicable

**Default Value:** NO (Distinctive Ringing disabled)

**Conditions:**

- (a) This option pertains only to Single Line and 2500 type telephones.

**Related Programming:**

- E: STATIONS FEATURES  
TYPE OF PHONE..... assigned as 500 for all Single Line and 2500 type telephones.

**Feature Reference:**

Answering a Call  
Distinctive Ringing  
Intercom



**Sub-Field:** OPTION 05.. (AUTO DISCONNECT BAD TRUNK)

**Access:**

While in the S: SYSTEM FEATURES program, press the F key. When the system prompts: OPTION ENABLED #.., enter 05 and press the RETURN key.

**Description:**

When a line is seized, the system supervises that line for loop current provided option 05 is enabled. If the system does not detect loop current within two seconds, it assumes that the line is defective and automatically routes the call to the next lowest numbered line in the same line group as the initial call. If the next lowest numbered line is also defective, the call will be routed through the remaining lines in the group (from highest to lowest) until a good line is found.

If option 05 is disabled, the line is not supervised for loop current and the system will not automatically disconnect from a bad CO circuit.

**Instructions:**

On Table 6-3, enter Y if the system should supervise lines for loop current; N if not.

**Example:** not applicable

**Default Value:** NO (Line supervision disabled)

**Conditions:**

- (a) Line supervision does not apply for systems with Least Cost Routing.
- (b) If option 05 is enabled (YES), the display on the primary attendant's telephone shows CHECK LINE nn every time another extension in the system accesses a line and loop current is not detected.

**Related Programming:**

- S: SYSTEM FEATURES
  - O: OPERATORS & DSS to program the primary attendant.
  - G: CO GROUPS to program lines into groups.

**Feature Reference:**

Placing a Call

**Sub-Field:** OPTION 06.. (FORCED RINGDOWN IN CALLS)

**Access:**

While in the S: SYSTEM FEATURES program, press the F key. When the system prompts: ENTER OPTION #.., enter 06 and press the RETURN key.

**Description:**

If enabled, option 06 forces all Intercom calls to ring, rather than be voice announced.

**Instructions:**

On Table 6-3, enter Y if all Intercom calls should ring; N if voice-announced calls are permitted.

**Example:** not applicable

**Default Value:** NO (Forced Intercom Ringing disabled)

**Conditions:**

- (a) If this option is disabled, each key telephone user can select the mode (ring vs. voice announced) of each Intercom call placed.

**Related Programming:** not applicable

**Feature Reference:**

Forced Intercom Ringing  
Intercom  
Handsfree Answerback

**Sub-Field:** OPTION 07.. (FULL SPEED DTMF [60 ON 60 OFF])

**Access:**

While in the S: SYSTEM FEATURES program, press the F key. When the system prompts: ENTER OPTION #..., enter 07 and press the RETURN key.

**Description:**

Option 07 determines the speed at which the system dials DTMF digits when using Speed Dial, Last Number Redial and Save. When option 07 is enabled, the dialed digits are 60 mS on, 60 mS off (i.e., full speed). When option 07 is disabled, the dialed digits are 120 mS on, 120 mS off (i.e., half speed).

**Instructions:**

For option 07 on Table 6-3, indicate if DTMF dialing of stored numbers should be full speed (Y) or half speed (N).

**Example:** not applicable

**Default Value:** YES (full speed)

**Conditions:**

(a) The speed at which stored numbers dial is set for compatibility with the telco or PBX.

**Related Programming:** not applicable

**Feature Reference:**

Last Number Redial  
Placing a Call  
Save  
Speed Dial

**Sub-Field:** OPTION 08... (IGNORE CO TERMINATION ON HELD LINE)

**Access:**

While in the S: SYSTEM FEATURES program, press the F key. When the system prompts: ENTER OPTION #..., enter 08 and press the RETURN key.

**Description:**

The system has the ability to drop a call that has been placed on Hold and abandoned by the outside party. If Option 08 is enabled, the system does not drop an abandoned call on Hold. If Option 08 is disabled, the system disconnects from an abandoned call on Hold.

**Instructions:**

If the system should be able to drop abandoned calls on Hold, enter N on Table 6-3; Y if not.

**Example:** not applicable

**Default Value:** YES (Drop Pulse is not detected)

**Conditions:**

(a) This sub-field is meaningful for both DTMF and Dial Pulse lines, and only for calls on Hold.

**Related Programming:**

S: SYSTEM FEATURES

M: TIMERS

MIN DRP PULS. N\*0.1 SEC.. to program the duration of the drop pulse that the system detects.

**Feature Reference:**

Hold

**Sub-Field:** OPTION 09.. (LINK 0 DEDICATED FOR RING)

**Access:**

While in the S: SYSTEM FEATURES program, press the F key. When the system prompts: ENTER OPTION #..., enter 09 and press the RETURN key.

**Description:**

If option 09 is enabled, an Intercom link is exclusively reserved for incoming CO line ringing (incoming CO Audible). This assures that an incoming call rings as soon as the LED for that line starts to flash (i.e., as soon as ring detect occurs). If this option is disabled, ringing for incoming calls uses one of the links shared for Intercom functions.

**Instructions:**

For this option on Table 6-3, enter Y if a dedicated CO audible link is required; N if not.

**Example:** not applicable

**Default Value:** YES (Link reserved)

**Conditions:**

- (a) If a high volume of Intercom traffic is not anticipated (blockage is unlikely), enabling this option is not required; however, this option should generally be enabled (YES).

**Related Programming:**

E: STATIONS FEATURES  
CO AUDIBLE [NN..NN] IS.. to assign ringing and incoming access to lines.

**Feature Reference:**

Answering a Call

**Sub-Field:** OPTION 10.. (TOLL RESTRICT NO DIGITS ENTERED)

**Access:**

While in the S: SYSTEM FEATURES program, press the F key. When the system prompts: ENTER OPTION #..., enter 10 and press the RETURN key.

**Description:**

If a telephone is taken off hook and a line is seized, the line remains seized until the telephone is returned to an on hook state. This prompt, if enabled, drops a seized line if dialing is not begun within a programmed time of the telephone being taken off hook.

**Instructions:**

On Table 6-3, enter Y if a line should be dropped after six seconds if digits are not dialed; N if not.

**Example:** not applicable

**Default Value:** NO (No toll restriction when no digits are entered)

**Conditions:** none

**Related Programming:**

S: SYSTEM FEATURES  
M: TIMERS  
DIAL TONE TIME-OUT..(SEC).. to specify the interval between line seizure and the receipt of dial tone for toll restricted telephones.  
FIRST DIGIT...(SEC)..... to set the maximum allowable interval between line seizure and the first digit dialed.  
F: SYSTEM OPTIONS  
OPTION 12.. to drop a line when an insufficient number of digits is dialed.

**Feature Reference:**

Toll Restriction

**Sub-Field:** OPTION 11.. (SMDR FOR '1'+7, '0'+7 DIGITS Calls)

**Access:**

While in the S: SYSTEM FEATURES program, press the F key. When the system prompts: ENTER OPTION #.., enter 11 and press the RETURN key.

**Description:**

The OPTION ENABLED...11.. sub-field permits the SMDR to identify all outgoing calls prefaced by a leading "1" or "0".

**Instructions:**

On Table 6-3, enter Y for option 11 if all leading 0 or 1 calls should print; N if not.

**Example:** not applicable

**Default Value:** YES (SMDR prints leading 0 or 1 calls)

**Conditions:** none

**Related Programming:**

S: SYSTEM FEATURES

F: SYSTEM OPTIONS

OPTION 13.. to enable the SMDR to print 1 + NPX + NNX + nnn and 1 + NNX + nnn calls.

OPTION 15.. to enable the SMDR to print 0 + calls and 0 calls to an outside operator.

OPTION 16.. to enable the SMDR to print Speed Dial bin numbers.

OPTION 17.. to enable the SMDR for seven-digit calls.

OPTION 18.. to enable the SMDR for incoming calls.

OPTION 20.. to enable the SMDR for calls blocked because of Toll Restriction.

OPTION 24.. to enable the SMDR for any outside call.

**Feature Reference:**

Class of Service  
Placing a Call  
Toll Restriction

**Sub-Field:** OPTION 12.. (TOLL RESTRICT INSUFFICIENT DIGITS)

**Access:**

While in the S: SYSTEM FEATURES program, press the F key. When the system prompts: ENTER OPTION #.., enter 12 and press the RETURN key.

**Description:**

The OPTION ENABLED...12.. sub-field, when enabled, drops any call, (and subsequently, the line of that call) attempted from any extension, when an insufficient amount of digits (normally, less than seven digits) is dialed in an attempt to place an outgoing call within a programmed time of seizing the line.

**Instructions:**

On Table 6-3, enter Y if a line should be dropped if an insufficient number of digits is dialed; N if not.

**Example:** not applicable

**Default Value:** NO (No toll restriction when insufficient digits are entered for exchange type)

**Conditions:** COS 00 is not affected.

**Related Programming:**

S: SYSTEM FEATURES

F: SYSTEM OPTIONS

OPTION 10.. to drop a line when no digits are dialed after a programmed time period.

M: TIMERS

INTER DIGIT..(SEC)....sets the interval before the line is dropped.

**Feature Reference:**

Toll Restriction





**Sub-Field:** OPTION 13.. (SMDR LONG DISTANCE CALLS)

**Access:**

While in the S: SYSTEM FEATURES program, press the F key. When the system prompts: ENTER OPTION #..., enter 13 and press the RETURN key.

**Description:**

Enabling option 13 allows the SMDR to print 1 + NNX + nnnn and 1 + NPX + NNX + nnnn outgoing calls, where NNX is an office code (exchange), NPX is an area code and nnnn represents any local address dialed. The duration of the call must exceed the SMDR timer interval programmed in the M: TIMERS (SMDR TIMER ..[SEC].....) sub-field.

**Instructions:**

For option 13 on Table 6-3, enter Y to turn on the SMDR for 1 + NNX + nnnn and 1 + NPX + NNX + nnnn calls; N to turn it off.

**Example:** not applicable

**Default Value:** YES (SMDR enabled for long distance calls)

**Conditions:**

- (a) Seven-digit (NNX + nnnn) calls are only printed if option 17 is enabled. 0 + NNX + nnnn and 0 + NPX + NNX + nnnn calls only print if option 15 is enabled.

**Related Programming:**

S: SYSTEM FEATURES

M: TIMERS

SMDR TIMER..(SEC)..... to set the minimum duration of outgoing calls that print on the SMDR.

F: SYSTEM OPTIONS

OPTION 15.. to enable the SMDR to print 0 + calls and calls to an outside operator.

OPTION 16.. to enable the SMDR to print Speed Dial bin numbers.

OPTION 17.. to enable the SMDR for seven-digit calls.

OPTION 18.. to enable the SMDR for incoming calls.

OPTION 20.. to enable the SMDR for calls blocked due to Toll Restriction.

OPTION 24.. to enable the SMDR for any outside call.

**Feature Reference:**

Answering a Call

Placing a Call

SMDR

Toll Restriction

**Sub-Field:** OPTION 14... (16 DIGITS LIMIT ON MANUAL DIAL)

**Access:**

While in the S: SYSTEM FEATURES program, press the F key. When the system prompts: ENTER OPTION #..., enter 14 and press the RETURN key.

**Description:**

Manually dialed outgoing calls from Toll Restricted telephones can be restricted to 16 digits, if desired. This prevents a user from manually dialing an OCC access or security code, and then dialing a 10 or 11 digit long distance call. The dial pad is cut off after the 16th digit. Enabling option 14 will cause the dial pad to be cut off after 16 manually dialed digits. If option 14 is disabled, the dial pad is never cut off.

**Instructions:**

For option 14 on Table 6-3, enter Y if the dial pad is to be cut off after 16 digits; N if it should not be cut off.

**Example:** not applicable

**Default Value:** NO (no limit imposed)

**Conditions:**

(a) The first digit dialed is not counted for option 14 restrictions. The total number of digits that can be dialed if option 14 is enabled is 17.

**Related Programming:** not applicable

**Feature Reference:**

Placing a Call

**Sub-Field:** OPTION 15.. (SMDR FOR LEADING 0 CALLS)

**Access:**

When in the S: SYSTEM FEATURES program, press the F key. When the system prompts: ENTER OPTION #..., enter 15 and press the RETURN key.

**Description:**

All 0 + (i.e., leading 0) calls and calls to an outside operator are printed on the SMDR if option 15 is enabled. If option 15 is disabled, 0 + calls and calls to an outside operator do not print. Only extensions with Class of Service 0 are permitted to dial 0 + calls.

**Instructions:**

On Table 6-3, enter Y for option 15 if calls to an outside operator should print; N if not.

**Example:** not applicable

**Default Value:** YES (0 + calls print)

**Conditions:**

The duration of the call must exceed the M: TIMERS (SMDR RNA TIMER..[SEC]....) interval to be printed on the SMDR.

**Related Programming:**

S: SYSTEM FEATURES

F: SYSTEM OPTIONS

OPTION 13.. to enable the SMDR to print 1 + NPX + NNX + nnnn and 1 + NNX + nnnn calls.

OPTION 16.. to enable the SMDR to print Speed Dial bin numbers.

OPTION 17.. to enable the SMDR for seven-digit calls.

OPTION 18.. to enable the SMDR for incoming calls.

OPTION 20.. to enable the SMDR for calls blocked due to Toll Restriction.

OPTION 24.. to enable the SMDR for any outside call.

**Feature Reference:**

Class of Service

Placing a Call

SMDR

**Sub-Field:** OPTION 16... (SMDR INCLUDES SMDR SPEED DIAL BIN NUMBER)

**Access:**

While in the S: SYSTEM FEATURES program, press the F key. When the system prompts: ENTER OPTION #..., enter 16 and press the RETURN key.

**Description:**

When option 16 is enabled, the bin number of every Speed Dial number dialed is printed along with the number on the SMDR. Extension Speed Dial bins are printed on the SMDR as E01 through E14. System Speed Dial bins are printed as S00 through S99. If two Speed Dial bins are chained, both bin designations are printed. If more than two Speed Dial bins are chained, the first and the last bin numbers are printed.

Option 16 also indicates if a call has been placed using Save and Last Number Redial. Saved numbers are designated by ESV; Last Number Redialed numbers are designated by ERD.

**Instructions:**

For option 16 on Table 6-3, enter Y if Speed Dial bin, Save and Last Number Redial designations should be printed on the SMDR; N if not.

**Example:** not applicable

**Default Value:** NO (SMDR does not print bin numbers)

**Conditions:**

- (a) Options 13, 15, 17 and 24 determine which outgoing calls print on the SMDR. Speed Dial bin, Last Number Redial and Save designations will print only if options 13, 15, 17 and 24 allow the dialed number to print.

**Related Programming:**

S: SYSTEM FEATURES

F: SYSTEM OPTIONS

OPTION 13.. to enable the SMDR to print 1 + NPX + NNX + nnnn and 1 + NNX + nnnn calls.

OPTION 15.. to enable the SMDR to print 0 + calls and 0 calls to an outside operator.

OPTION 17.. to enable the SMDR for seven-digit calls.

OPTION 18.. to enable the SMDR for incoming calls.

OPTION 20.. to enable the SMDR for calls blocked due to Toll Restriction.

OPTION 24.. to enable the SMDR for any outside call.

**Feature Reference:**

Last Number Redial

Placing a Call

Save

SMDR

Speed Dial

**Sub-Field:** OPTION 17.. (SMDR FOR LOCAL 7 DIGIT CALLS)

**Access:**

While in the S: SYSTEM FEATURES program, press the F key. When the system prompts: ENTER OPTION #.., enter 17 and press the RETURN key.

**Description:**

If option 17 is enabled, all local (seven-digit) calls are printed on the SMDR. If option 17 is disabled, local calls (NNX + nnnn) do not print.

**Instructions:**

For option 17 on Table 6-3, enter Y if seven-digit calls should print on the SMDR; N if not.

**Example:** not applicable

**Default Value:** YES (local calls print)

**Conditions:**

- (a) The duration of the local call must exceed the M: TIMERS (SMDR TIMER..[SEC].....) interval.
- (b) If options 13, 15, 18, 20, and 24 are disabled, only local calls will print on the SMDR.

**Related Programming:**

S: SYSTEM FEATURES

M: TIMERS

SMDR TIMER..(SEC)..... to set the minimum duration of outgoing calls that print on the SMDR.

F: SYSTEM OPTIONS

OPTION 13.. to enable the SMDR to print 1 + NPX + NNX + nnnn and 1 + NNX + nnnn calls.

OPTION 15.. to enable the SMDR to print 0 + calls and 0 calls to an outside operator.

OPTION 16.. to enable the SMDR to print Speed Dial bin numbers.

OPTION 18.. to enable the SMDR for incoming calls.

OPTION 20.. to enable the SMDR for calls blocked due to Toll Restriction.

OPTION 24.. to enable the SMDR for any outside call.

**Feature Reference:**

Placing a Call  
SMDR

**Sub-Field:** OPTION 18.. (SMDR FOR INCOMING CALLS)

**Access:**

While in the S: SYSTEM FEATURES program, press the F key. When the system prompts: ENTER OPTION #.., enter 18 and press the RETURN key.

**Description:**

All answered incoming calls print on the SMDR if option 18 is enabled. Unanswered incoming calls print on the SMDR (after the calling party hangs up) if option 18 is enabled and the unanswered call rings for longer than the Ring No Answer (RNA) interval. This interval is programmed in the M: TIMERS (SMDR RNA TIMER.[SEC].....) sub-field. If option 18 is disabled, neither answered nor unanswered incoming calls print.

**Instructions:**

For the OPTION ENABLED...18.. sub-field on Table 6-3, enter Y if incoming calls should print on the SMDR; N if not.

**Example:** not applicable

**Default Value:** NO (Incoming calls do not print)

**Conditions:**

(a) Ring No Answer calls are designated by the characters RNA in the right most column on the SMDR report.

**Related Programming:**

S: SYSTEM FEATURES

F: SYSTEM OPTIONS

OPTION 13.. to enable the SMDR to print 1 + NPX + NNX + nnnn and 1 + NNX + nnnn calls.

OPTION 15.. to enable the SMDR to print 0 + calls and 0 calls to an outside operator.

OPTION 16.. to enable the SMDR to print Speed Dial bin numbers.

OPTION 17.. to enable the SMDR for seven-digit calls.

OPTION 20.. to enable the SMDR for calls blocked due to Toll Restriction.

OPTION 24.. to enable the SMDR for any outside call.

**Feature Reference:**

Answering a Call

SMDR

**Sub-Field:** OPTION 19.. (MSG WAIT CALL FWD BEEPER)

**Access:**

While in the S: SYSTEM FEATURES program, press the F key. When the system prompts: ENTER OPTION #..., enter 19 and press the RETURN key.

**Description:**

When an extension is in the Call Forwarding mode (i.e., all calls have been forwarded to another extension), the speaker broadcasts a short beep every 120 seconds. This beep serves as a reminder that calls have been forwarded. If this option is disabled, the Call Forwarding beeps do not occur. Disabling option 19 also cancels the Message Waiting beep.

**Instructions:**

For option 19 on Table 6-3, enter Y if the Call Forwarding reminder beep is desired; N if not.

**Example:** not applicable

**Default Value:** YES (Beep enabled)

**Conditions:**

(a) The attendant cannot initiate Call Forwarding.

**Related Programming:** none

**Feature Reference:**

Call Forwarding

**Sub-Field:** OPTION 20.. (SMDR FOR TOLL RESTRICT DROPPED CALLS)

**Access:**

While in the S: SYSTEM FEATURES program, press the F key. When the system prompts: ENTER OPTION #..., enter 20 and press the RETURN key.

**Description:**

The OPTION ENABLED...20.. sub-field permits the SMDR to identify all outgoing calls that were denied due to Toll Restriction violations. If a user attempts to place a call that is not permitted by his extension's Class of Service, the SMDR prints the call and marks it with BRD (in the right most column of the report) as soon as the violation is detected.

**Instructions:**

For the OPTION ENABLED...20.. sub-field on Table 6-3, enter Y if the SMDR should identify calls that were blocked due to Toll Restriction violations; N if not.

**Example:** not applicable

**Default Value:** NO (Toll Restricted calls do not print)

**Conditions:**

(a) If option 20 is enabled, the SMDR will show the date, the extension number which placed the denied call, the digits that were dialed before further dialing was prevented, the start time of the call and the BRD designation.

**Related Programming:**

S: SYSTEM FEATURES

F: SYSTEM OPTIONS

OPTION 13.. to enable the SMDR to print 1 + NPX + NNX + nnnn and 1 + NNX + nnnn calls.

OPTION 15.. to enable the SMDR to print 0 + calls and 0 calls to an outside operator.

OPTION 16.. to enable the SMDR to print Speed Dial bin numbers.

OPTION 17.. to enable the SMDR for seven-digit calls.

OPTION 18.. to enable the SMDR for incoming calls.

OPTION 24.. to enable the SMDR for any outside call.

**Feature Reference:**

Class of Service

Placing a Call

Toll Restriction

**Sub-Field:** OPTION 21.. (SMDR FOR NO ACCOUNT CODE DROPPED CALLS)**Access:**

While in the S: SYSTEM FEATURES program, press the F key. When the system prompts: ENTER OPTION #.., enter 21 and press the RETURN key.

**Description:**

The OPTION ENABLED...21.. sub-field permits the SMDR to identify all attempted outgoing calls that were denied because a required Account Code was not entered. If this sub-field is disabled, extensions which require forced Account Codes still must have the Account Code entered before the call is completed; however, calls blocked because of no Account Code do not appear on an SMDR printout.

**Instructions:**

For the OPTION ENABLED...21.. sub-field on Table 6-3, enter Y if the SMDR should identify calls that were blocked because no Account Code was entered; N if not.

**Example:** not applicable**Default Value:** YES (Blocked calls print)**Conditions:**

(a) A call blocked because no Account Code was entered are designated by the characters NAC in the TYP column on the SMDR report.

**Related Programming:**

S: SYSTEM FEATURES

F: SYSTEM OPTIONS

OPTION 13.. to enable the SMDR to print 1 + NPX + NNX + nnnn and 1 + NNX + nnnn calls.

OPTION 15.. to enable the SMDR to print 0 + calls and 0 calls to an outside operator.

OPTION 16.. to enable the SMDR to print Speed Dial bin numbers.

OPTION 17.. to enable the SMDR for seven-digit calls.

OPTION 18.. to enable the SMDR for incoming calls.

OPTION 20.. to enable the SMDR for calls blocked because of Toll Restriction.

OPTION 24.. to enable the SMDR for any outside call.

**Sub-Field:** OPTION 22.. (USE NNN BYPASS TABLE FOR LCR)

Not Used

**Feature Reference:**

Account Code Capability

Placing a Call



**Sub-Field: OPTION 23.. (OVERRIDE DND HL PARTNER)****Access:**

While in the S: SYSTEM FEATURES program, press the F key. When the system prompts: ENTER OPTION #..., enter 23 and press the RETURN key.

**Description:**

Option 23 allows an extension user to place an Intercom call to his Hotline partner while his Hotline partner is in Do Not Disturb. Normally, the DND Override Intercom call is received using Handsfree Answerback. If Forced Intercom Ringing is enabled, the call rings and must be answered by lifting the handset. If option 23 is disabled, DND Override for Hotline partners is not permitted. A caller attempting to override DND hears reorder tone.

**Instructions:**

For the OPTION ENABLED...23.. sub-field on Table 6-3, enter Y if Hotline Partner DND Override should be permitted; N if not.

**Example:** not applicable

**Default Value:** YES (DND Override permitted)

**Conditions:**

(a) Option 23 has no affect on the attendant's ability to override any extension's Do Not Disturb.

**Related Programming:**

E: STATION FEATURES  
HOT-LINE KEY..... to assign Hotline partners.

**Feature Reference:**

Do Not Disturb  
Do Not Disturb Override  
Hotline  
Intercom

**Sub-Field: OPTION 24.. (SMDR FOR ALL CALLS)****Access:**

While in the S: SYSTEM FEATURES program, press the F key. When the system prompts: ENTER OPTION #..., enter 24 and press the RETURN key.

**Description:**

Option 24 allows all outgoing calls to be printed on the SMDR. If this option is enabled, all long distance calls (option 13), 0 + calls and calls to an outside operator (option 15), and local calls (option 17) are printed. Options 13, 15, and 17 do not have to be enabled individually. In addition, any other call from one to six digits is printed. If the system is installed behind a PBX, this means that calls to PBX extensions print. The outgoing call must last longer than the SMDR Timer interval set in the M: TIMERS (SMDR TIMER..[SEC]...) sub-field.

Speed Dial, Last Number Redial and Save designations (option 16), incoming and Ring No Answer calls (option 18), and calls denied due to Toll Restriction (option 20) are not enabled by option 24. Options 16, 18, and 20 must be enabled individually.

**Instructions:**

For the OPTION ENABLED...24.. sub-field on Table 6-3, enter Y if all outgoing calls should print on the SMDR: N if not.

**Example:** not applicable

**Default Value:** NO

**Conditions:**

(a) Outgoing calls to PBX extensions (i.e., a non-0 call less than seven digits long) print on the SMDR only if option 24 is enabled.

## Related Programming:

S: SYSTEM FEATURES

F: SYSTEM OPTIONS

OPTION 13.. to enable the SMDR to print 1 + NPX + NNX + nnnn and 1 + NNX + nnnn calls.

OPTION 15.. to enable the SMDR to print 0 + calls and 0 calls to an outside operator.

OPTION 16.. to enable the SMDR to print Speed Dial bin numbers.

OPTION 17.. to enable the SMDR for seven-digit calls.

OPTION 18.. to enable the SMDR for incoming calls.

OPTION 20.. to enable the SMDR for calls blocked due to Toll Restriction.

## Feature Reference:

PBX Compatibility  
Placing a Call  
SMDR

**Sub-Field:** OPTION 25.. (DNY RECALL FROM OPR 1)

## Access:

While in the S: SYSTEM FEATURES program, press the F key. When the system prompts: ENTER OPTION #.., enter 25 and press the RETURN key.

## Description:

Option 25 permits calls transferred to the primary attendant (operator 1) to recall the extension which initially transferred the call. The recall occurs after the Transfer Recall interval set in the M: TIMERS (TRANS RECALL.[SEC].....) sub-field. When option 25 is disabled, the recall is allowed. When option 25 is enabled, the recall is denied.

## Instructions:

For the OPTION ENABLED...25.. sub-field on Table 6-3, enter Y if the recall from the primary attendant should be denied; N if recall should be allowed.

**Example:** not applicable

**Default Value:** YES (recall denied)

## Conditions:

- (a) If the call recalls the extension from which it was initially transferred for more than 30 seconds, it rings again at the primary attendant. The call continues to ring the attendant until it is answered or the calling party hangs up.
- (b) If the system is in the night mode, a call transferred to the primary attendant rings all extensions in the system assigned to ring at night for that line (i.e., extensions for which Assigned Night Answer is activated). It does not recall the extension which transferred the call. The call may also activate the external alerting device.

**Related Programming:**

- E: STATIONS FEATURES  
NT AUDIBLE [nn..nn] IS.. to configure Assigned Night Answer
- S: SYSTEM FEATURES  
O: OPERATORS & DSS to assign attendants.  
M: TIMERS  
TRANS RECALL..(SEC)..... to set the Transfer recall interval.
- R: RELAYS CONTROL to program the control relays to activate the external alerting device.
- P: CO TYPE to program lines for Universal Night Answer.
- E: EXTERNAL OUTPUTS to program audible for the external alerting device if B-TGU-B PCBs are used.
- F: SYSTEM OPTIONS  
OPTION 26.. to allow Transfer recall for calls transferred to operators 2-6.

**Feature Reference:**

Answering a Call  
Night Service  
Transfer

**Sub-Field:** OPTION 26.. (DNY RECALL FROM OPR 2-6)

**Access:**

While in the S: SYSTEM FEATURES program, press the F key. When the system prompts: ENTER OPTION #.., enter 26 and press the RETURN key.

**Description:**

Option 26 permits calls transferred to attendants (operators 2-6) to recall the extension which initially transferred the call. The recall occurs after the Transfer Recall interval set in the M: TIMERS (TRANS RECALL.[SEC].....) sub-field. When option 26 is disabled, the recall is allowed. When option 26 is enabled, the recall is denied.

**Instructions:**

For the OPTION ENABLED..26.. sub-field on Table 6-3, enter Y if the recall from the attendants (2-6) should be denied; N if recall should be allowed.

**Example:** not applicable

**Default Value:** NO (recall allowed)

**Conditions:**

- (a) If the call recalls the extension from which it was initially transferred for more than 30 seconds, it rings at the primary attendant. The call continues to ring at the primary attendant until it is answered or the calling party hangs up.
- (b) If the system is in the night mode, a call transferred to any attendant (2-6) rings all extensions in the system assigned to ring at night for that line (i.e., Assigned Night Answer activated). It does not recall the extension which transferred the call. The call may also activate an external alerting device.

**Related Programming:**

- E: STATIONS FEATURES
  - NT AUDIBLE [nn..nn] IS.. to configure Assigned Night Answer
- S: SYSTEM FEATURES
  - O: OPERATORS & DSS to assign attendants.
  - M: TIMERS
    - TRANS RECALL..(SEC)..... to set the Transfer Recall interval.
  - R: RELAYS CONTROL to program the control relays to activate the external alerting device.
  - P: CO TYPE to program lines for Universal Night Answer.
  - E: EXTERNAL OUTPUTS to program audible for the external alerting device if B-TGU-B PCBs are used.
  - F SYSTEM OPTIONS
    - OPTION 25.. to allow recall for calls transferred to the primary attendant (operator 1).

**Feature Reference:**

Answering a Call  
Night Service  
Transfer

**Sub-Field: OPTION 27.. (TONE CARD [TGU-C])****Access:**

While in the S: SYSTEM FEATURES program, press the F key. When the system prompts: ENTER OPTION #.., enter 27 and press the RETURN key.

**Description:**

The version of the Tone Generator Unit PCBs installed must be identified to the system. If B-TGU-C PCBs are installed, option 27 must be enabled (YES). If B-TGU-B PCBs are installed, option 27 must be disabled (NO).

**Instructions:**

For the OPTION ENABLED...27.. sub-field on Table 6-3, enter Y if B-TGU-C PCBs are installed; N if B-TGU-B PCBs are installed.

**Example:** not applicable

**Default Value:** YES (B-TGU-C PCBs installed)

**Conditions:**

- (a) B-TGU-B PCBs and B-TGU-C PCBs cannot be mixed in the same system.

**Related Programming:**

- S: SYSTEM FEATURES
  - E: EXTERNAL OUTPUTS to enable Alternate Audio Ports if B-TGU-B PCBs are installed. If B-TGU-C PCBs are installed, Alternate Audio Ports cannot be used. External audio is output from audio ports on the B-TGU-C PCBs.

**Feature Reference:**

External Paging Zones  
Night Service

**Sub-Field:** OPTION 28.. (CALL FWD FOLLOW ME)**Access:**

While in the S: SYSTEM FEATURES program, press the F key. When the system prompts: ENTER OPTION #..., enter 28 and press the RETURN key.

**Description:**

The destination of an extension's Call Forward can be changed from another extension. If extensions should be allowed to alter another extension's Call Forward, enable option 28 must be enabled (YES). If Call Forward With Follow Me is not required, disable option 28 (NO).

**Instructions:**

For the OPTION ENABLED...28.. sub-field on Table 6-3, enter Y if Call Forward With Follow Me is allowed; N if Call Forward With Follow Me is not allowed.

**Example:** not applicable

**Default Value:** YES (Call Forward With Follow Me allowed)

**Conditions:** none

**Related Programming:** none

**Feature Reference:**

Call Forwarding

**Sub-Field:** OPTION 29.. (DISA FORCED ACCN. CODES)**Access:**

While in the S: SYSTEM FEATURES program, press the F key. When the system prompts: ENTER OPTION #..., enter 29 and press the RETURN key.

**Description:**

Enabling option 29 forces all users of DISA lines to enter an Account Code before a call is completed.

**Instructions:**

For the OPTION ENABLED...29.. sub-field on Table 6-3, enter Y if all DISA calls should be accompanied by a forced Account Code; N if not.

**Example:** not applicable

**Default Value:** NO

**Conditions:** none

**Related Programming:**

E: STATIONS FEATURES  
PERMANENT ACC CODE to force an extension user to enter Account Codes in order to complete outgoing calls.

**Feature Reference:**

Account Code Capability

**Sub-Field: OPTION 30.. (TIE PAGE)****Access:**

While in the S: SYSTEM FEATURES program, press the F key. When the system prompts: ENTER OPTION #..., enter 30 and press the RETURN key.

**Description:**

If this option is enabled, Paging announcements can be made using tie lines.

**Instructions:**

For the OPTION ENABLED...30.. sub-field on Table 6-3, enter Y if tie lines should be used for Paging; N if not.

**Example:** not applicable

**Default Value:** NO

**Conditions:** none

**Related Programming:** none

**Feature Reference:**

Paging  
Tie Line Compatibility

**Sub-Field: OPTION 31.. (DISA PAGE)****Access:**

While in the S: SYSTEM FEATURES program, press the F key. When the system prompts: ENTER OPTION #..., enter 31 and press the RETURN key.

**Description:**

If this option is enabled, DISA lines can be used for Paging.

**Instructions:**

For the OPTION ENABLED...31.. sub-field on Table 6-3, enter Y if DISAs can be used for Paging; N if not.

**Example:** not applicable

**Default Value:** NO

**Conditions:** none

**Related Programming:** none

**Feature Reference:**

Direct Inward System Access (DISA)  
Paging



**Sub-Field:** OPTION 32.. (ENABLE DISA DAY)

**Access:**

While in the S: SYSTEM FEATURES program, press the F key. When the system prompts: ENTER OPTION #..., enter 32 and press the RETURN key.

**Description:**

If this option is enabled, incoming DISA line calls ring and are automatically answered by the system. If the option is disabled, the line functions as a normal line during the day.

**Instructions:**

For the OPTION ENABLED...32.. sub-field on Table 6-3, enter Y if DISA calls should ring during the day; N if not.

**Example:** not applicable

**Default Value:** YES

**Conditions:** none

**Related Programming:**

All DISA line programming

**Feature Reference:**

Direct Inward System Access (DISA)  
Remote Modem Access

**Sub-Field:** OPTION 33.. (ENABLE DISA NIGHT)

**Access:**

While in the S: SYSTEM FEATURES program, press the F key. When the system prompts: ENTER OPTION #..., enter 33 and press the RETURN key.

**Description:**

If this option is enabled, incoming DISA line calls ring and are automatically answered by the system. If the option is disabled, the line functions as a normal line when the system is in the night mode.

**Instructions:**

For the OPTION ENABLED...33.. sub-field on Table 6-3, enter Y if DISA calls should ring when the system is in the night mode; N if not.

**Example:** not applicable

**Default Value:** YES

**Conditions:** none

**Related Programming:**

All DISA line programming

**Feature Reference:**

Direct Inward System Access (DISA)  
Remote Modem Access

**Sub-Field:** OPTION 34.. (ENABLE MODEM)

**Access:**

While in the S: SYSTEM FEATURES program, press the F key. When the system prompts: ENTER OPTION #..., enter 34 and press the RETURN key.

**Description:**

If this option is enabled, the modem on the B-CPU-D PCB can be accessed by a remote terminal.

**Instructions:**

For the OPTION ENABLED...34.. sub-field on Table 6-3, enter Y if the modem should be available for access; N if not.

**Example:** not applicable

**Default Value:** YES

**Conditions:**

(a) The system must be equipped with DISA lines for modem access.

**Related Programming:**

All DISA line programming

**Feature Reference:**

Direct Inward System Access (DISA)  
Remote Modem Access

**Field:** J: DOWNLOAD, UPLOAD AND VERIFY

**Access:**

This field is currently not used, but will be available at a future date.



- Field:** 1: SELECT TRACE OPTIONS  
 2: PRINT TRACE MEMORY  
 3: PRINT CONTINUOUSLY

**Access:**

While in the S: SYSTEM FEATURES program, press the 1, 2 or 3 key. The 1: SELECT TRACE OPTIONS field must be programmed before '2' or '3' are accessed for those fields to provide you with meaningful information.

**Description:**

The three fields described above are used in conjunction with the feature Diagnostic Trace. The Diagnostic Trace provides a set of tools with which to determine the cause of problems within a TCX system. A trace of the activities occurring in the system over a given time period is provided. This information can be useful in obtaining an exact history of the events leading up to a reported failure in the system, and show probable cause for the failure.

**Instructions:** See Diagnostics section

**Example:** See Diagnostics section

**Default Value:** All Trace Options default to NO

**Conditions:** See Diagnostics section

**Related Programming:** All TCX programming

**Feature Reference:** All TCX features

**PROGRAM I: SYSTEM INITIALIZATION**

**Field: I: SYSTEM INITIALIZATION**

The options available are as follows:

- 0: INITIALIZE ALL
- 1: INITIALIZE ALL
- 2: LCR NNN BYPASS TABLE
- 3: CO GROUPS
- 4: CO LINE TYPES TO TONE
- 5: CO LINE TYPES TO PULSE
- 6: EXTERNAL RELAYS
- 7: STATIONS 'CLASS OF SERVICE'
- 8: STATIONS 'HOT-LINE KEY'
- 9: HUNT GROUPS
- 10: STATIONS 'PICK-UP GROUP'
- 11: STATIONS 'TENANT GROUP'
- 12: STATIONS 'TYPE OF PHONE'
- 13: STATIONS YES/NO OPTIONS
- 14: STATIONS YES/NO OPTIONS
- 15: STATIONS 'PORT NUMBER'
- 16: STATIONS 'PRIVATE LINES'
- 17: STATIONS 'PAGE ZONE RECEIVED'
- 18: SYSTEM YES/NO OPTIONS
- 19: SYSTEM YES/NO OPTIONS
- 20: EXTERNAL OUTPUTS
- 21: LEAST COST ROUTING
- 22: OPERATORS & DSS
- 23: TOLL RESTRICTION TABLES
- 24: TOLL RESTRICTION TABLES
- 25: PBX OUT ACCS CODES AND C.O.S
- 26: STATIONS 'CO AUDIBLE'
- 27: STATIONS 'NT AUDIBLE'
- 28: STATIONS 'CO ACCESS'
- 29: OUTGOING KEYS FORMAT
- 30: TIMERS
- 31: TIMERS
- 32: STATIONS DSS KEYS
- 33: !!!!! SYSTEM RESET !!!!!
- 34: ALL CROSS POINTS OFF
- 35: TIE LINE TYPES
- 36: DIAGNOSTIC TRACE

**Access:**

**CAUTION: INITIALIZATION RETURNS PROGRAMMED FIELDS TO DEFAULT ENTRIES. PREVIOUS PROGRAMMING IS ERASED.**

Press the M key. When the main menu is displayed, press the I key. The system prompts:

ENTER ? FOR MENU  
SECTION #.\_\_\_\_

Enter Y. The menu (above) appears.

Initialize the desired sub-fields by entering the number of the field, then Y for yes. The system prompts:

SECTION #.\_\_\_\_

Enter the appropriate initialization code (see the following) and press the RETURN key.

**Description:**

Following installation, the system must be initialized (see 0 or 1 below) to set the default (factory-installed) program. All fields can be initialized simultaneously, or 33 selected fields can be initialized individually. Before selectively initializing a field, read the appropriate instructions in this section. The initialization codes are as follows:

- 0 - Initialize all fields simultaneously.
- 1 - Same as code 0.

**CAUTION: USING THE 0 OR 1 INITIALIZATION CODES WILL RETURN ALL FIELDS TO THEIR DEFAULT SETTINGS. ALL PREVIOUSLY ENTERED PROGRAMMING WILL BE ERASED.**

- 2 - not used
- 3 - Initialize line groups. All entries for G: CO GROUPS programming are initialized. Lines 1-8 in group 1 (01), lines 9-16 in group 2 (02), lines 17-24 in group 3 (03), and lines 25-32 are not installed (77).
- 4 - Initialize all CO line types to DTMF. All sub-fields in the P: CO TYPE field are initialized as type 01 (DTMF and UNA).

- 5 - Initialize all CO line types to Dial Pulse. All sub-fields in the P: CO TYPE field are initialized as type 21 (Dial Pulse and UNA).
- 6 - Initialize external relays. All R: RELAYS CONTROL programming is initialized as 00 (all relays inactive).
- 7 - Initialize Class of Service. E: STATIONS FEATURES (CLASS OF SERVICE.....) programming is initialized as 00 (i.e., all extensions have Class of Service 0).
- 8 - Initialize Hotlines. All E: STATIONS FEATURES (HOT-LINE KEY.....) programming is erased. All extensions will be Hotlined to themselves.
- 9 - Initialize Extension Hunting groups. All Extension Hunting groups assigned in U: GROUP HUNT programming are erased. No Extension Hunting groups remain.
- 10 - Initialize Pick Up groups. Pick Up groups assigned in the E: STATIONS FEATURES (PICK UP GROUP IS.....) sub-field are erased. No Pick Up groups remain.
- 11 - Initialize Tenant Service assignments. All tenant group assignments made in E: STATIONS FEATURES (TENANT GROUP IS.....) programming are erased. All extensions in the system are in tenant group 1 (entry 01).
- 12 - Initialize telephone types. The E: STATIONS FEATURES (TYPE OF PHONE.....) sub-fields are initialized as type KEY for all extensions in the system.
- 13 - Initialize YES/NO extension options. The E: STATIONS FEATURES sub-fields that are programmed with YES or NO are initialized as follows:

SUB-FIELD	DEFAULT
RECEIVE ALL-PAGE .....	YES__
BARGE IN ENABLED .....	NO__
BLOCK BARGE ENABLED .....	NO__
PERMANENT ACC CODE .....	YES__
FORCED ACC CODE .....	NO__
DIL OFF HOOK SIGNAL .....	NO__
CAMP-ON ORIGINATE .....	YES__
CAMP-ON RECEIVE .....	YES__

- 14 - Same as code 13.
- 15 - Initialize port numbers. E: STATIONS FEATURES (PORT NUMBER.....) are initialized for all extensions. Port number assignments for extensions 301-363 and 401-465 are consecutive from 001-128.

16 - Initialize Private Lines. All Private Line assignments made in E: STATIONS FEATURES (PRIVATE LINE.....) programming are erased. No Private Lines assigned.

17 - Initialize Page Zones. All Zone Page assignments made in E: STATIONS FEATURES (PAGE ZONE RECEIVED.....) programming are returned to their default values. The default values are:

EXTENSION	PAGE ZONE	DEFAULT ASSIGNMENT
301-316	1	01
317-332	2	02
333-348	3	04
349-401	4	08
402-417	5	10
418-433	6	20
434-449	7	40
450-465	8	80

18 - Initialize system options. The system options programmed in S: SYSTEM FEATURES (F: SYSTEM OPTIONS) are returned to their default values, as follows:

OPTION #	DEFAULT	OPTION #	DEFAULT
1	YES	18	NO
2	YES	19	YES
3	YES	20	NO
4	NO	21	YES
5	NO	22	NO
6	NO	23	YES
7	YES	24	NO
8	YES	25	YES
9	YES	26	NO
10	NO	27	YES
11	YES	28	YES
12	NO	29	NO
13	YES	30	NO
14	NO	31	NO
15	YES	32	YES
16	NO	33	YES
17	YES	34	YES

19- Same as code 18.

20 - Initialize External Paging Zones. All sub-fields in S: SYSTEM FEATURES (E: EXTERNAL OUTPUTS) programming are initialized as follows:

OUTPUT..nn...CONTROL IS...20\_\_  
ALTERNATE AUDIO PORT IS..NONE\_\_

21 - Initialize LCR. The S: SYSTEM FEATURES (L: LEAST COST ROUTING) sub-fields are initialized with the following values:

SUB-FIELD	DEFAULT
LCR SERVICE # nn	
LINE GROUP .....	77__
OCC DIALUP BIN .....	00__
FX / OTHER..1/0 .....	00__
LOCAL/TOLL	
LAST CHOICE FOR C.O.S. ....	11__

22 - Initialize operators. The S: SYSTEM FEATURES (O: OPERATORS & DSS) fields are initialized. The initialized default values are:

SUB-FIELD	DEFAULT
OPERATOR #01 .....	IS ....301__
DSS OPERATOR 01 .....	IS ...NONE__
ALT OPERATOR 01 .....	IS ...NONE__
OPERATOR # (02-06) .....	IS ...NONE__
DSS OPERATOR (02-06) ..	IS ...NONE__
ALT OPERATOR (02-06) ..	IS ...NONE__

23 - Initialize Toll Restriction. The S: SYSTEM FEATURES (A: OFFICE CODE TYPES and K: COS ALLOWED AREA CODES) fields are initialized. On the "A" Table (i.e., A: OFFICE CODE TYPES), all codes between 000 and 199 initialize as type 00. All area codes (200-219, 300-319 etc.) initialize as type 00. All exchanges (220-299, 320-399, etc.) initialize as type 03. The "K" Table (i.e., K: COS ALLOWED AREA CODES) initializes as 01 (fully restricted).

24 - Same as code 23.

25 - Not used.

26 - Initialize CO audible for extensions. The assignments made in the E: STATIONS FEATURES (CO AUDIBLE [nn..nn] IS..) field are returned to their default values. The CO audible default values are:

SUB-FIELD	DEFAULT
STATIONS 301 AND 302:	
CO AUDIBLE [01..08] IS	.....FF
CO AUDIBLE [09..16] IS	.....FF
CO AUDIBLE [17..24] IS	.....FF
CO AUDIBLE [25..32] IS	.....FF
EXTENSION 303:	
CO AUDIBLE [01..08] IS	.....FF
CO AUDIBLE [09..16] IS	.....FF
CO AUDIBLE [17..24] IS	.....00
CO AUDIBLE [25..32] IS	.....00
EXTENSIONS 304-363, 401-465:	
CO AUDIBLE [01..08] IS	.....00
CO AUDIBLE [09..16] IS	.....00
CO AUDIBLE [17..24] IS	.....00
CO AUDIBLE [25..32] IS	.....00

- 27 - Initialize night mode CO audible for extensions. All E: STATIONS FEATURES (NT AUDIBLE [nn..nn] IS..) programming is set at default (FF).
- 28 - Initialize CO access assignments. All E: STATIONS FEATURES (CO ACCESS [nn..nn] IS..) programming is returned to default (FF).
- 29 - Initialize outgoing line key assignments. S: STATIONS FEATURES (N: OUT KEYS GROUPS) are initialized as follows:

SUB-FIELD	DEFAULT
OUT__KEY # 01 SELECT GROUP #	__01__
OUT__KEY # 02 SELECT GROUP #	__01__
OUT__KEY # 03 SELECT GROUP #	__02__
OUT__KEY # 04 SELECT GROUP #	__02__
OUT__KEY # 05 SELECT GROUP #	__03__
OUT__KEY # 06 SELECT GROUP #	__03__

- 30 - Initialize system timers. The S: SYSTEM FEATURES (M: TIMERS) fields are initialized. The initialized values for each sub-field are:

SUB-FIELD	DEFAULT
HOLD RECALL TIMER.(SEC)	.....060__
ORBIT RECALL TIMER.(SEC)	.....060__
PAUSE TIME-OUT.(SEC)	.....006__
FLASH TIMER.(N*50MSEC)	.....020__
DIAL TONE TIME-OUT.(SEC)	.....002__
SMDR TIMER..(SEC)	.....030__
TRANS RECALL.(SEC)	.....120__
DIL RNG OPERATOR (SEC)	.....012__
SMDR RNA TIMER..(SEC)	.....012__
PRVC TONE.....(SEC)	.....001__
DISA PAGE.....(SEC)	.....015__
DISA & TIE RNA.....(SEC)	.....012__
DISA ANSWER.....(SEC)	.....006__
DCD START.....(SEC)	.....060__
DCD END.....(SEC)	.....015__
FIRST DIGIT..(SEC)	.....010__
INTER DIGIT..(SEC)	.....005__
MIN RNG BRST. N*0.1 SEC	.....004__
MAX RNG IDLE. N*0.1 SEC	.....060__
MIN DRP PULS. N*0.1 SEC	.....006__
OP BREAK.....(MSEC)	.....061__
OP MAKE.....(MSEC)	.....039__
INTER OP..N*(M+B)	.....010__

- 31 - Same as code 30.
- 32 - Initialize extension DSS keys. The user programmable DSS keys for the first 50 extensions are returned to their default settings. Keys 1-14 represent extensions 301-314.
- 33 - System reset. The system is reset without having to press the reset switch (S1) on the B-CPU-D PCB.

**WARNING: ALWAYS RESET THE SYSTEM AFTER PROGRAMMING OR REPROGRAMMING. AFTER THE SYSTEM IS RESET, THE HANDSET ON EACH SINGLE LINE AND 2500 TYPE TELEPHONE MUST BE CYCLED (OFF HOOK, THEN ON HOOK).**

- 34 - Initialize all crosspoints. All crosspoints that have become inadvertently busied out (but are not active on a call) are cleared. Conversations in progress are not affected.
- 35 - Initialize tie line types. Each tie line returns to its default value (00), which is uninstalled.
- 36 - Initialize Diagnostic Trace. All Trace options default to NO.



**Instructions:**

Initialization *does not* require an entry on a Program Record Form.

**Example:** not applicable

**Default Value:**

If the system has already been programmed, initialization returns the fields to their default values. Global initialization (using code 0) returns all the fields to their default values. For convenience, the default values for the system are repeated on the Program Record Forms at the end of this section.

**Conditions:** not applicable

**Related Programming:**

E: STATIONS FEATURES (all sub-fields).

S: SYSTEM FEATURES (all sub-fields).

**Feature Reference:**

All features that are affected by programming.

**Table 6-1 BINARY TO HEXADECIMAL CONVERSION CHART**

TO CONVERT	ENTER	TO CONVERT	ENTER	TO CONVERT	ENTER	TO CONVERT	ENTER
0000 0000	00	0100 0000	40	1000 0000	80	1100 0000	C0
0000 0001	01	0100 0001	41	1000 0001	81	1100 0001	C1
0000 0010	02	0100 0010	42	1000 0010	82	1100 0010	C2
0000 0011	03	0100 0011	43	1000 0011	83	1100 0011	C3
0000 0100	04	0100 0100	44	1000 0100	84	1100 0100	C4
0000 0101	05	0100 0101	45	1000 0101	85	1100 0101	C5
0000 0110	06	0100 0110	46	1000 0110	86	1100 0110	C6
0000 0111	07	0100 0111	47	1000 0111	87	1100 0111	C7
0000 1000	08	0100 1000	48	1000 1000	88	1100 1000	C8
0000 1001	09	0100 1001	49	1000 1001	89	1100 1001	C9
0000 1010	0A	0100 1010	4A	1000 1010	8A	1100 1010	CA
0000 1011	0B	0100 1011	4B	1000 1011	8B	1100 1011	CB
0000 1100	0C	0100 1100	4C	1000 1100	8C	1100 1100	CC
0000 1101	0D	0100 1101	4D	1000 1101	8D	1100 1101	CD
0000 1110	0E	0100 1110	4E	1000 1110	8E	1100 1110	CE
0000 1111	0F	0100 1111	4F	1000 1111	8F	1100 1111	CF
0001 0000	10	0101 0000	50	1001 0000	90	1101 0000	D0
0001 0001	11	0101 0001	51	1001 0001	91	1101 0001	D1
0001 0010	12	0101 0010	52	1001 0010	92	1101 0010	D2
0001 0011	13	0101 0011	53	1001 0011	93	1101 0011	D3
0001 0100	14	0101 0100	54	1001 0100	94	1101 0100	D4
0001 0101	15	0101 0101	55	1001 0101	95	1101 0101	D5
0001 0110	16	0101 0110	56	1001 0110	96	1101 0110	D6
0001 0111	17	0101 0111	57	1001 0111	97	1101 0111	D7
0001 1000	18	0101 1000	58	1001 1000	98	1101 1000	D8
0001 1001	19	0101 1001	59	1001 1001	99	1101 1001	D9
0001 1010	1A	0101 1010	5A	1001 1010	9A	1101 1010	DA
0001 1011	1B	0101 1011	5B	1001 1011	9B	1101 1011	DB
0001 1100	1C	0101 1100	5C	1001 1100	9C	1101 1100	DC
0001 1101	1D	0101 1101	5D	1001 1101	9D	1101 1101	DD
0001 1110	1E	0101 1110	5E	1001 1110	9E	1101 1110	DE
0001 1111	1F	0101 1111	5F	1001 1111	9F	1101 1111	DF
0010 0000	20	0110 0000	60	1010 0000	A0	1110 0000	E0
0010 0001	21	0110 0001	61	1010 0001	A1	1110 0001	E1
0010 0010	22	0110 0010	62	1010 0010	A2	1110 0010	E2
0010 0011	23	0110 0011	63	1010 0011	A3	1110 0011	E3
0010 0100	24	0110 0100	64	1010 0100	A4	1110 0100	E4
0010 0101	25	0110 0101	65	1010 0101	A5	1110 0101	E5
0010 0110	26	0110 0110	66	1010 0110	A6	1110 0110	E6
0010 0111	27	0110 0111	67	1010 0111	A7	1110 0111	E7
0010 1000	28	0110 1000	68	1010 1000	A8	1110 1000	E8
0010 1001	29	0110 1001	69	1010 1001	A9	1110 1001	E9
0010 1010	2A	0110 1010	6A	1010 1010	AA	1110 1010	EA
0010 1011	2B	0110 1011	6B	1010 1011	AB	1110 1011	EB
0010 1100	2C	0110 1100	6C	1010 1100	AC	1110 1100	EC
0010 1101	2D	0110 1101	6D	1010 1101	AD	1110 1101	ED
0010 1110	2E	0110 1110	6E	1010 1110	AE	1110 1110	EE
0010 1111	2F	0110 1111	6F	1010 1111	AF	1110 1111	EF
0011 0000	30	0111 0000	70	1011 0000	B0	1111 0000	FO
0011 0001	31	0111 0001	71	1011 0001	B1	1111 0001	F1
0011 0010	32	0111 0010	72	1011 0010	B2	1111 0010	F2
0011 0011	33	0111 0011	73	1011 0011	B3	1111 0011	F3
0011 0100	34	0111 0100	74	1011 0100	B4	1111 0100	F4
0011 0101	35	0111 0101	75	1011 0101	B5	1111 0101	F5
0011 0110	36	0111 0110	76	1011 0110	B6	1111 0110	F6
0011 0111	37	0111 0111	77	1011 0111	B7	1111 0111	F7
0011 1000	38	0111 1000	78	1011 1000	B8	1111 1000	F8
0011 1001	39	0111 1001	79	1011 1001	B9	1111 1001	F9
0011 1010	3A	0111 1010	7A	1011 1010	BA	1111 1010	FA
0011 1011	3B	0111 1011	7B	1011 1011	BB	1111 1011	FB
0011 1100	3C	0111 1100	7C	1011 1100	BC	1111 1100	FC
0011 1101	3D	0111 1101	7D	1011 1101	BD	1111 1101	FD
0011 1110	3E	0111 1110	7E	1011 1110	BE	1111 1110	FE
0011 1111	3F	0111 1111	7F	1011 1111	BF	1111 1111	FF

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**Table 6-2 EXTENSION PROGRAM RECORD FORM**

EXT. NO.	PORT NO. <sup>1</sup>	TYPE OF PHONE	HOT-LINE KEY	CLASS OF SERVICE	CO AUD. 1-8 <sup>2</sup>	CO AUD. 9-16 <sup>2</sup>	CO AUD. 17-24 <sup>2</sup>	CO AUD. 25-32 <sup>2</sup>	NT AUD. 1-8	NT AUD. 9-16	NT AUD. 17-24	NT AUD. 25-32	CO ACC. 1-8	CO ACC. 9-16	CO ACC. 17-24	CO ACC. 25-32
INITIALIZED		KEY		00					FF	FF	FF	FF	FF	FF	FF	FF
301	001															
302	002															
303	003															
304	004															
305	005															
306	006															
307	007															
308	008															
309	009															
310	010															
311	011															
312	012															
313	013															
314	014															
315	015															
316	016															
317	017															
318	018															
319	019															
320	020															
321	021															
322	022															
323	023															
324	024															
325	025															
326	026															
327	027															
328	028															
329	029															
330	030															
331	031															
332	032															
333	033															
334	034															
335	035															
336	036															
337	037															
338	038															
339	039															
340	040															
341	041															
342	042															
343	043															

<sup>1</sup> Enter the port number to which the extension is assigned if different from the initialized assignment.  
<sup>2</sup> For default assignment, refer to page 6-8

**Table 6-2 EXTENSION PROGRAM RECORD FORM**

EXT. NO.	PORT NO. <sup>1</sup>	RECEIVE ALL-PAGE	BARGE IN ENABLED	BLOCK BARGE ENABLED	PERM. ACC. CODE	FORCED ACC. CODE	DIL OFF HOOK SIGNAL	CAMP-ON ORIG.	CAMP-ON RECEIVE	PAGE ZONE REC'D <sup>3</sup>	PICK UP GROUP	TENANT GROUP	PRIVATE LINE 1	PRIVATE LINE 2	PRV. 1 RING OPR.	PRV. 2 RING OPR.
INITIALIZED		YES	NO	NO	YES	NO	NO	YES	YES		00	01	NONE	NONE	NO	NO
301	001									01						
302	002									01						
303	003									01						
304	004									01						
305	005									01						
306	006									01						
307	007									01						
308	008									01						
309	009									01						
310	010									01						
311	011									01						
312	012									01						
313	013									01						
314	014									01						
315	015									01						
316	016									01						
317	017									02						
318	018									02						
319	019									02						
320	020									02						
321	021									02						
322	022									02						
323	023									02						
324	024									02						
325	025									02						
326	026									02						
327	027									02						
328	028									02						
329	029									02						
330	030									02						
331	031									02						
332	032									02						
333	033									04						
334	034									04						
335	035									04						
336	036									04						
337	037									04						
338	038									04						
339	039									04						
340	040									04						
341	041									04						
342	042									04						
343	043									04						

<sup>1</sup> Enter the port number to which the extension is assigned if different from the initialized assignment.  
<sup>2</sup> For default assignment, refer to page 6-8  
<sup>3</sup> Default assignments indicated in left side of each block.





**Table 6-2 EXTENSION PROGRAM RECORD FORM**

EXT. NO.	PORT NO. <sup>1</sup>	TYPE OF PHONE	HOT-LINE KEY	CLASS OF SERVICE	CO AUD. 1-8 <sup>2</sup>	CO AUD. 9-16 <sup>2</sup>	CO AUD. 17-24 <sup>2</sup>	CO AUD. 25-32 <sup>2</sup>	NT AUD. 1-8	NT AUD. 9-16	NT AUD. 17-24	NT AUD. 25-32	CO ACC. 1-8	CO ACC. 9-16	CO ACC. 17-24	CO ACC. 25-32
	INITIALIZED		KEY	00					FF	FF	FF	FF	FF	FF	FF	FF
344	044															
345	045															
346	046															
347	047															
348	048															
349	049															
350	050															
351	051															
352	052															
353	053															
354	054															
355	055															
356	056															
357	057															
358	058															
359	059															
360	060															
361	061															
362	062															
363	063															
401	064															
402	065															
403	066															
404	067															
405	068															
406	069															
407	070															
408	071															
409	072															
410	073															
411	074															
412	075															
413	076															
414	077															
415	078															
416	079															
417	080															
418	081															
419	082															
420	083															
421	084															
422	085															
423	086															

<sup>1</sup> Enter the port number to which the extension is assigned if different from the initialized assignment.  
<sup>2</sup> For default assignment, refer to page 6-8

**Table 6-2 EXTENSION PROGRAM RECORD FORM**

EXT. NO.	PORT NO. <sup>1</sup>	RECEIVE ALL-PAGE	BARGE IN ENABLED	BLOCK BARGE ENABLED	PERM. ACC. CODE	FORCED ACC. CODE	DIL OFF HOOK SIGNAL	CAMP-ON ORIG.	CAMP-ON RECEIVE	PAGE ZONE REC'D <sup>2</sup>	PICK UP GROUP	TENANT GROUP	PRIVATE LINE 1	PRIVATE LINE 2	PRV. 1 RING OPR.	PRV. 2 RING OPR.
INITIALIZED		YES	NO	NO	YES	NO	NO	YES	YES		00	01	NONE	NONE	NO	NO
344	044									04						
345	045									04						
346	046									04						
347	047									04						
348	048									04						
349	049									08						
350	050									08						
351	051									08						
352	052									08						
353	053									08						
354	054									08						
355	055									08						
356	056									08						
357	057									08						
358	058									08						
359	059									08						
360	060									08						
361	061									08						
362	062									08						
363	063									08						
401	064									08						
402	065									10						
403	066									10						
404	067									10						
405	068									10						
406	069									10						
407	070									10						
408	071									10						
409	072									10						
410	073									10						
411	074									10						
412	075									10						
413	076									10						
414	077									10						
415	078									10						
416	079									10						
417	080									10						
418	081									20						
419	082									20						
420	083									20						
421	084									20						
422	085									20						
423	086									20						

<sup>1</sup> Enter the port number to which the extension is assigned if different from the initialized assignment.  
<sup>2</sup> For default assignment, refer to page 6-8  
<sup>3</sup> Default assignments indicated in left side of each block.



Table 6-2 EXTENSION PROGRAM RECORD FORM

EXT. NO.	PORT NO. <sup>1</sup>	TYPE OF PHONE	HOT-LINE KEY	CLASS OF SERVICE	CO AUD. 1-8 <sup>2</sup>	CO AUD. 9-16 <sup>2</sup>	CO AUD. 17-24 <sup>2</sup>	CO AUD. 25-32 <sup>2</sup>	NT AUD. 1-8	NT AUD. 9-16	NT AUD. 17-24	NT AUD. 25-32	CO ACC. 1-8	CO ACC. 9-16	CO ACC. 17-24	CO ACC. 25-32
INITIALIZED		KEY		00					FF	FF	FF	FF	FF	FF	FF	FF
424	087															
425	088															
426	089															
427	090															
428	091															
429	092															
430	093															
431	094															
432	095															
433	096															
434	097															
435	098															
436	099															
437	100															
438	101															
439	102															
440	103															
441	104															
442	105															
443	106															
444	107															
445	108															
446	109															
447	110															
448	111															
449	112															
450	113															
451	114															
452	115															
453	116															
454	117															
455	118															
456	119															
457	120															
458	121															
459	122															
460	123															
461	124															
462	125															
463	126															
464	127															
465	128															

<sup>1</sup> Enter the port number to which the extension is assigned if different from the initialized assignment.  
<sup>2</sup> For default assignment, refer to page 6-8

Table 6-2 EXTENSION PROGRAM RECORD FORM

EXT. NO.	PORT NO. <sup>1</sup>	RECEIVE ALL-PAGE	BARGE IN ENABLED	BLOCK BARGE ENABLED	PERM. ACC. CODE	FORCED ACC. CODE	DIL OFF HOOK SIGNAL	CAMP-ON ORIG.	CAMP-ON RECEIVE	PAGE ZONE REC'D <sup>2</sup>	PICK UP GROUP	TENANT GROUP	PRIVATE LINE 1	PRIVATE LINE 2	PRV. 1 RING OPR.	PRV. 2 RING OPR.
INITIALIZED		YES	NO	NO	YES	NO	NO	YES	YES		00	01	NONE	NONE	NO	NO
424	087									20						
425	088									20						
426	089									20						
427	090									20						
428	091									20						
429	092									20						
430	093									20						
431	094									20						
432	095									20						
433	096									20						
434	097									40						
435	098									40						
436	099									40						
437	100									40						
438	101									40						
439	102									40						
440	103									40						
441	104									40						
442	105									40						
443	106									40						
444	107									40						
445	108									40						
446	109									40						
447	110									40						
448	111									40						
449	112									40						
450	113									80						
451	114									80						
452	115									80						
453	116									80						
454	117									80						
455	118									80						
456	119									80						
457	120									80						
458	121									80						
459	122									80						
460	123									80						
461	124									80						
462	125									80						
463	126									80						
464	127									80						
465	128									80						

<sup>1</sup> Enter the port number to which the extension is assigned if different from the initialized assignment.  
<sup>2</sup> For default assignment, refer to page 6-8.  
<sup>3</sup> Default assignments indicated in left side of each block.

**Table 6-3 SYSTEM PROGRAM RECORD FORM**

FIELD DESCRIPTION	DEFAULT ENTRY	PROGRAM ENTRY	FIELD DESCRIPTION	DEFAULT ENTRY	PROGRAM ENTRY
<b>Operators &amp; DSS</b>					
OPERATOR #01 IS	301	_____	HUNT GRP	07	_____
DSS OPERATOR 01 IS	NONE	_____	HUNT MOD	00	_____
OPERATOR 01 IS	NONE	_____	HUNT TIME	000	_____
OPERATOR #02 IS	NONE	_____	HUNT MSTR	NONE	_____
DSS OPERATOR 02 IS	NONE	_____	OVRFL EXT	NONE	_____
OPERATOR 02 IS	NONE	_____			
OPERATOR #03 IS	NONE	_____	HUNT GRP	08	_____
DSS OPERATOR 03 IS	NONE	_____	HUNT MOD	00	_____
OPERATOR 03 IS	NONE	_____	HUNT TIME	000	_____
OPERATOR #04 IS	NONE	_____	HUNT MSTR	NONE	_____
DSS OPERATOR 04 IS	NONE	_____	OVRFL EXT	NONE	_____
OPERATOR 04 IS	NONE	_____			
OPERATOR #05 IS	NONE	_____	HUNT GRP	09	_____
DSS OPERATOR 05 IS	NONE	_____	HUNT MOD	00	_____
OPERATOR 05 IS	NONE	_____	HUNT TIME	000	_____
OPERATOR #06 IS	NONE	_____	HUNT MSTR	NONE	_____
DSS OPERATOR 06 IS	NONE	_____	OVRFL EXT	NONE	_____
OPERATOR 06 IS	NONE	_____			
			HUNT GRP	10	_____
			HUNT MOD	00	_____
			HUNT TIME	000	_____
			HUNT MSTR	NONE	_____
			OVRFL EXT	NONE	_____
<b>Group Hunt</b>					
<b>NOTE: HUNT FROM and HUNT TO prompts not included.</b>					
HUNT GRP	01	_____	HUNT GRP	11	_____
HUNT MOD	00	_____	HUNT MOD	00	_____
HUNT TIME	000	_____	HUNT TIME	000	_____
HUNT MSTR	NONE	_____	HUNT MSTR	NONE	_____
OVRFL EXT	NONE	_____	OVRFL EXT	NONE	_____
HUNT GRP	02	_____	HUNT GRP	12	_____
HUNT MOD	00	_____	HUNT MOD	00	_____
HUNT TIME	000	_____	HUNT TIME	000	_____
HUNT MSTR	NONE	_____	HUNT MSTR	NONE	_____
OVRFL EXT	NONE	_____	OVRFL EXT	NONE	_____
HUNT GRP	03	_____	HUNT GRP	13	_____
HUNT MOD	00	_____	HUNT MOD	00	_____
HUNT TIME	000	_____	HUNT TIME	000	_____
HUNT MSTR	NONE	_____	HUNT MSTR	NONE	_____
OVRFL EXT	NONE	_____	OVRFL EXT	NONE	_____
HUNT GRP	04	_____	HUNT GRP	14	_____
HUNT MOD	00	_____	HUNT MOD	00	_____
HUNT TIME	000	_____	HUNT TIME	000	_____
HUNT MSTR	NONE	_____	HUNT MSTR	NONE	_____
OVRFL EXT	NONE	_____	OVRFL EXT	NONE	_____
HUNT GRP	05	_____	HUNT GRP	15	_____
HUNT MOD	00	_____	HUNT MOD	00	_____
HUNT TIME	000	_____	HUNT TIME	000	_____
HUNT MSTR	NONE	_____	HUNT MSTR	NONE	_____
OVRFL EXT	NONE	_____	OVRFL EXT	NONE	_____
HUNT GRP	06	_____	HUNT GRP		
HUNT MOD	00	_____	HUNT MOD		
HUNT TIME	000	_____	HUNT TIME		
HUNT MSTR	NONE	_____	HUNT MSTR		
OVRFL EXT	NONE	_____	OVRFL EXT		

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Table 6-3 SYSTEM PROGRAM RECORD FORM

FIELD DESCRIPTION	DEFAULT ENTRY	PROGRAM ENTRY	FIELD DESCRIPTION	DEFAULT ENTRY	PROGRAM ENTRY
<b>Group Hunt</b>			350		
HUNT GRP	16	---	351		---
HUNT MOD	00	---	352		---
HUNT TIME	000	---	353		---
HUNT MSTR	NONE	---	354		---
OVFL EXT	NONE	---	355		---
			356		---
<b>Extension Hunt Group</b>			357		---
301		---	358		---
302		---	359		---
303		---	360		---
304		---	361		---
305		---	362		---
306		---	363		---
307		---	401		---
308		---	402		---
309		---	403		---
310		---	404		---
311		---	405		---
312		---	406		---
313		---	407		---
314		---	408		---
315		---	409		---
316		---	410		---
317		---	411		---
318		---	412		---
319		---	413		---
320		---	414		---
321		---	415		---
322		---	416		---
323		---	417		---
324		---	418		---
325		---	419		---
326		---	420		---
327		---	421		---
328		---	422		---
329		---	423		---
330		---	424		---
331		---	425		---
332		---	426		---
333		---	427		---
334		---	428		---
335		---	429		---
336		---	430		---
337		---	431		---
338		---	432		---
339		---	433		---
340		---	434		---
341		---	435		---
342		---	436		---
343		---	437		---
344		---	438		---
345		---	439		---
346		---	440		---
347		---	441		---
348		---	442		---
349		---	443		---

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**Table 6-3 SYSTEM PROGRAM RECORD FORM**

FIELD DESCRIPTION	DEFAULT ENTRY	PROGRAM ENTRY	FIELD DESCRIPTION	DEFAULT ENTRY	PROGRAM ENTRY
444		----	LCR SERVICE #02		
445		----	LINE GROUP	77	----
446		----	OCC DIALUP BIN	00	----
447		----	FX/OTHER 1/0	00	----
448		----	LOCAL/TOLL LAST CHOICE FOR		
449		----	C.O.S.	11	
450		----	LCR SERVICE #03		
451		----	LINE GROUP	77	----
452		----	OCC DIALUP BIN	00	----
453		----	FX/OTHER 1/0	00	----
454		----	LOCAL/TOLL LAST CHOICE FOR		
455		----	C.O.S.	11	
456		----	LCR SERVICE #04		
457		----	LINE GROUP	77	----
458		----	OCC DIALUP BIN	00	----
459		----	FX/OTHER 1/0	00	----
460		----	LOCAL/TOLL LAST CHOICE FOR		
461		----	C.O.S.	11	
462		----	LCR SERVICE #05		
463		----	LINE GROUP	77	----
464		----	OCC DIALUP BIN	00	----
465		----	FX/OTHER 1/0	00	----
		----	LOCAL/TOLL LAST CHOICE FOR		
		----	C.O.S.	11	
<b>Timers</b>			LCR SERVICE #06		
HOLD RECALL TIMER (SEC)	060	----	LINE GROUP	77	----
ORBIT RECALL TIMER (SEC)	060	----	OCC DIALUP BIN	00	----
PAUSE TIME-OUT (SEC)	006	----	FX/OTHER 1/0	00	----
FLASH TIMER (N * 50MSEC)	020	----	LOCAL/TOLL LAST CHOICE FOR		
DIAL TONE TIME-OUT (SEC)	002	----	C.O.S.	11	
SMOR TIMER (SEC)	030	----	LCR SERVICE #07		
TRANS RECALL (SEC)	120	----	LINE GROUP	77	----
DIL RNG OPERATOR (SEC)	012	----	OCC DIALUP BIN	00	----
SMOR RNA TIMER (SEC)	012	----	FX/OTHER 1/0	00	----
PRVC TONE (SEC)	001	----	LLOCAL/TOLL LAST CHOICE FOR		
DISA PAGE (SEC)	015	----	C.O.S.	11	
DISA & TIE RNA (SEC)	012	----	LCR SERVICE #08		
DISA ANSWER (SEC)	006	----	LINE GROUP	77	----
DCD START (SEC)	060	----	OCC DIALUP BIN	00	----
DCD END (N * 50 MSEC)	015	----	FX/OTHER 1/0	00	----
FIRST DIGIT (SEC)	010	----	LOCAL/TOLL LAST CHOICE FOR		
INTER DIGIT (SEC)	005	----	C.O.S.	11	
MIN RNG BRST N * 0.1 SEC	004	----	LCR SERVICE #09		
MAX RNG IDLE N * 0.1 SEC	060	----	LINE GROUP	77	----
MIN DRP PULS N * 0.1 SEC	006	----	OCC DIALUP BIN	00	----
OP BREAK (MSEC)	061	----	FX/OTHER 1/0	00	----
OP MAKE (MSEC)	039	----	LOCAL/TOLL LAST CHOICE FOR		
INTER OP N* (M + B)	010	----	C.O.S.	11	
<b>Least Cost Routing</b>			LCR SERVICE #10		
LCR ENABLED	NO	---	LINE GROUP	77	----
LCR SERVICE #01			OCC DIALUP BIN	00	----
LINE GROUP	77	----	FX/OTHER 1/0	00	----
OCC DIALUP BIN	00	----	LOCAL/TOLL LAST CHOICE FOR		
FX/OTHER 1/0	00	----	C.O.S.	11	
LOCAL/TOLL LAST CHOICE FOR					
C.O.S.	11				

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**Table 6-3 SYSTEM PROGRAM RECORD FORM**

FIELD DESCRIPTION	DEFAULT ENTRY	PROGRAM ENTRY	FIELD DESCRIPTION	DEFAULT ENTRY	PROGRAM ENTRY
<b>Relays Control</b>			LINE 16 TYPE IS	01	_____
RELAY 01 CONTROL IS	00	_____	LINE 17 TYPE IS	01	_____
RELAY 02 CONTROL IS	00	_____	LINE 18 TYPE IS	01	_____
RELAY 03 CONTROL IS	00	_____	LINE 19 TYPE IS	01	_____
RELAY 04 CONTROL IS	00	_____	LINE 20 TYPE IS	01	_____
			LINE 21 TYPE IS	01	_____
<b>CO Groups</b>			LINE 22 TYPE IS	01	_____
LINE 01 GROUP IS	01	_____	LINE 23 TYPE IS	01	_____
LINE 02 GROUP IS	01	_____	LINE 24 TYPE IS	01	_____
LINE 03 GROUP IS	01	_____	LINE 25 TYPE IS	01	_____
LINE 04 GROUP IS	01	_____	LINE 26 TYPE IS	01	_____
LINE 05 GROUP IS	01	_____	LINE 27 TYPE IS	01	_____
LINE 06 GROUP IS	01	_____	LINE 28 TYPE IS	01	_____
LINE 07 GROUP IS	01	_____	LINE 29 TYPE IS	01	_____
LINE 08 GROUP IS	01	_____	LINE 30 TYPE IS	01	_____
LINE 09 GROUP IS	02	_____	LINE 31 TYPE IS	01	_____
LINE 10 GROUP IS	02	_____	LINE 32 TYPE IS	01	_____
LINE 11 GROUP IS	02	_____			
LINE 12 GROUP IS	02	_____	<b>Tie Line Type</b>		
LINE 13 GROUP IS	02	_____	TIE LINE 01 TYPE IS	00	_____
LINE 14 GROUP IS	02	_____	TIE LINE 02 TYPE IS	00	_____
LINE 15 GROUP IS	02	_____	TIE LINE 03 TYPE IS	00	_____
LINE 16 GROUP IS	02	_____	TIE LINE 04 TYPE IS	00	_____
LINE 17 GROUP IS	03	_____	TIE LINE 05 TYPE IS	00	_____
LINE 18 GROUP IS	03	_____	TIE LINE 06 TYPE IS	00	_____
LINE 19 GROUP IS	03	_____			
LINE 20 GROUP IS	03	_____	<b>Meet-Me Conference</b>		
LINE 21 GROUP IS	03	_____	MEET-ME CONFERENCE LINE IS	NONE	_____
LINE 22 GROUP IS	03	_____			
LINE 23 GROUP IS	03	_____	<b>Office Code Types</b>		
LINE 24 GROUP IS	03	_____	<b>COS Allowed Area Codes</b>		
LINE 25 GROUP IS	77	_____	Located on tables directly following		
LINE 26 GROUP IS	77	_____	<b>System Options.</b>		
LINE 27 GROUP IS	77	_____			
LINE 28 GROUP IS	77	_____	<b>External Outputs</b>		
LINE 29 GROUP IS	77	_____	OUTPUT 01 CONTROL IS	20	_____
LINE 30 GROUP IS	77	_____	ALTERNATE AUDIO PORT IS	NONE	_____
LINE 31 GROUP IS	77	_____	OUTPUT 02 CONTROL IS	20	_____
LINE 32 GROUP IS	77	_____	ALTERNATE AUDIO PORT IS	NONE	_____
			OUTPUT 03 CONTROL IS	20	_____
<b>CO Type</b>			ALTERNATE AUDIO PORT IS	NONE	_____
LINE 01 TYPE IS	01	_____	OUTPUT 04 CONTROL IS	20	_____
LINE 02 TYPE IS	01	_____	ALTERNATE AUDIO PORT IS	NONE	_____
LINE 03 TYPE IS	01	_____	OUTPUT 05 CONTROL IS	20	_____
LINE 04 TYPE IS	01	_____	ALTERNATE AUDIO PORT IS	NONE	_____
LINE 05 TYPE IS	01	_____	OUTPUT 06 CONTROL IS	20	_____
LINE 06 TYPE IS	01	_____	ALTERNATE AUDIO PORT IS	NONE	_____
LINE 07 TYPE IS	01	_____	OUTPUT 07 CONTROL IS	20	_____
LINE 08 TYPE IS	01	_____	ALTERNATE AUDIO PORT IS	NONE	_____
LINE 09 TYPE IS	01	_____	OUTPUT 08 CONTROL IS	20	_____
LINE 10 TYPE IS	01	_____	ALTERNATE AUDIO PORT IS	NONE	_____
LINE 11 TYPE IS	01	_____			
LINE 12 TYPE IS	01	_____			
LINE 13 TYPE IS	01	_____			
LINE 14 TYPE IS	01	_____			
LINE 15 TYPE IS	01	_____			

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**Table 6-3 SYSTEM PROGRAM RECORD FORM**

FIELD DESCRIPTION	DEFAULT ENTRY	PROGRAM ENTRY	FIELD DESCRIPTION	DEFAULT ENTRY	PROGRAM ENTRY
<b>Out Key Groups</b>			OPTION ENABLED 22 Not Used	NO	
OUT KEY #01 SELECT GROUP #	01	_____	OPTION ENABLED 23 HL Partner Override ON/O	YES	
OUT KEY #02 SELECT GROUP #	01	_____	OPTION ENABLED 24 SMDR For All Calls	NO	
OUT KEY #03 SELECT GROUP #	02	_____	OPTION ENABLED 25 Dny Recall From Opr 1	YES	
OUT KEY #04 SELECT GROUP #	02	_____	OPTION ENABLED 26 Dny Recall From Opr 2-5	NO	
OUT KEY #05 SELECT GROUP #	03	_____	OPTION ENABLED 27 Tone Card (TGU-C)	YES	
OUT KEY #06 SELECT GROUP #	03	_____	OPTION ENABLED 28 Call Fwd Follow Me	YES	
<b>System Options</b>			OPTION ENABLED 29 DISA Forced Acct Access	NO	
ENTER OPTION #			OPTION ENABLED 30 Tie Page	NO	
OPTION ENABLED 01 Bypass CO Access for LCR Search	YES	_____	OPTION ENABLED 31 DISA Page	YES	
OPTION ENABLED 02 MOH Enabled	YES	_____	OPTION ENABLED 32 Enable DISA Day	YES	
OPTION ENABLED 03 CONF Key to Move Up Green LED	YES	_____	OPTION ENABLED 33 Enable DISA Night	YES	
OPTION ENABLED 04 Distinctive CO Ring for 2500 SLI	NO	_____	OPTION ENABLED 34 Enable Modem	YES	
OPTION ENABLED 05 Auto Disconnect Bad Trunk	NO	_____			
OPTION ENABLED 06 Forced Ringdown INT Calls	NO	_____			
OPTION ENABLED 07 Full Speed DTMF (60 ON, 60 OFF)	YES	_____			
OPTION ENABLED 08 Ignore CO Termination on Held Line	YES	_____			
OPTION ENABLED 09 Link 0 Dedicated for Ring	YES	_____			
OPTION ENABLED 10 Toll Restrict No Digits Entered	NO	_____			
OPTION ENABLED 11 SMDR FOR '1' + 7, '0' + 7 Digits	YES	_____			
OPTION ENABLED 12 Toll Restrict Insufficient Digits	NO	_____			
OPTION ENABLED 13 SMDR For Long Distance Calls	YES	_____			
OPTION ENABLED 14 16 Digits Limit on Manual Dial	NO	_____			
OPTION ENABLED 15 SMDR For Leading 0 Calls	YES	_____			
OPTION ENABLED 16 SMDR Includes Speed Dial Bin Number	NO	_____			
OPTION ENABLED 17 SMDR For Local 7 Digit Calls	YES	_____			
OPTION ENABLED 18 SMDR For Incoming Calls	NO	_____			
OPTION ENABLED 19 MSG Wait Call Fwd Beeper	YES	_____			
OPTION ENABLED 20 SMDR For Toll Restrict Dropped Calls	NO	_____			
OPTION ENABLED 21 SMDR For No Account Code Dropped Calls	NO	_____			

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**Table 6-3 SYSTEM PROGRAM RECORD FORM**

3-DIGIT EXCHANGE	OFFICE CODE TYPE					3-DIGIT EXCHANGE	OFFICE CODE TYPE					3-DIGIT EXCHANGE	OFFICE CODE TYPE				
	00	01	02	03	04		00	01	02	03	04		00	01	02	03	04
100		X				150		X				200					
101		X				151		X				201					
102		X				152		X				202					
103		X				153		X				203					
104		X				154		X				204					
105		X				155		X				205					
106		X				156		X				206					
107		X				157		X				207					
108		X				158		X				208					
109		X				159		X				209					
110		X				160		X				210					
111		X				161		X				211					
112		X				162		X				212					
113		X				163		X				213					
114		X				164		X				214					
115		X				165		X				215					
116		X				166		X				216					
117		X				167		X				217					
118		X				168		X				218					
119		X				169		X				219					
120		X				170		X				220					
121		X				171		X				221					
122		X				172		X				222					
123		X				173		X				223					
124		X				174		X				224					
125		X				175		X				225					
126		X				176		X				226					
127		X				177		X				227					
128		X				178		X				228					
129		X				179		X				229					
130		X				180		X				230					
131		X				181		X				231					
132		X				182		X				232					
133		X				183		X				233					
134		X				184		X				234					
135		X				185		X				235					
136		X				186		X				236					
137		X				187		X				237					
138		X				188		X				238					
139		X				189		X				239					
140		X				190		X				240					
141		X				191		X				241					
142		X				192		X				242					
143		X				193		X				243					
144		X				194		X				244					
145		X				195		X				245					
146		X				196		X				246					
147		X				197		X				247					
148		X				198		X				248					
149		X				199		X				249					



**Table 6-3 SYSTEM PROGRAM RECORD FORM**

3-DIGIT EXCHANGE	OFFICE CODE TYPE					3-DIGIT EXCHANGE	OFFICE CODE TYPE					3-DIGIT EXCHANGE	OFFICE CODE TYPE				
	00	01	02	03	04		00	01	02	03	04		00	01	02	03	04
250						300						350					
251						301						351					
252						302						352					
253						303						353					
254						304						354					
255						305						355					
256						306						356					
257						307						357					
258						308						358					
259						309						359					
260						310						360					
261						311						361					
262						312						362					
263						313						363					
264						314						364					
265						315						365					
266						316						366					
267						317						367					
268						318						368					
269						319						369					
270						320						370					
271						321						371					
272						322						372					
273						323						373					
274						324						374					
275						325						375					
276						326						376					
277						327						377					
278						328						378					
279						329						379					
280						330						380					
281						331						381					
282						332						382					
283						333						383					
284						334						384					
285						335						385					
286						336						386					
287						337						387					
288						338						388					
289						339						389					
290						340						390					
291						341						391					
292						342						392					
293						343						393					
294						344						394					
295						345						395					
296						346						396					
297						347						397					
298						348						398					
299						349						399					

**Table 6-3 SYSTEM PROGRAM RECORD FORM**

3-DIGIT EXCHANGE	OFFICE CODE TYPE					3-DIGIT EXCHANGE	OFFICE CODE TYPE					3-DIGIT EXCHANGE	OFFICE CODE TYPE				
	00	01	02	03	04		00	01	02	03	04		00	01	02	03	04
400						450						500					
401						451						501					
402						452						502					
403						453						503					
404						454						504					
405						455						505					
406						456						506					
407						457						507					
408						458						508					
409						459						509					
410						460						510					
411						461						241					
412						462						512					
413						463						513					
414						464						514					
415						465						515					
416						466						516					
417						467						517					
418						468						518					
419						469						519					
420						470						520					
421						471						521					
422						472						552					
423						473						523					
424						474						524					
425						475						525					
426						476						526					
427						477						527					
428						478						528					
429						479						529					
430						480						530					
431						481						531					
432						482						532					
433						483						533					
434						484						534					
435						485						535					
436						486						536					
437						487						537					
438						488						538					
439						489						539					
440						490						540					
441						491						541					
442						492						542					
443						493						543					
444						494						544					
445						495						545					
446						496						546					
447						497						547					
448						498						548					
449						499						549					



Table 6-3 SYSTEM PROGRAM RECORD FORM

3-DIGIT EXCHANGE	OFFICE CODE TYPE					3-DIGIT EXCHANGE	OFFICE CODE TYPE					3-DIGIT EXCHANGE	OFFICE CODE TYPE				
	00	01	02	03	04		00	01	02	03	04		00	01	02	03	04
550						600						650					
551						601						651					
552						602						652					
553						603						653					
554						604						654					
555						605						655					
556						606						656					
557						607						657					
558						608						658					
559						609						659					
560						610						660					
561						611						661					
562						612						662					
563						613						663					
564						614						664					
565						615						665					
566						616						666					
567						617						667					
568						618						668					
569						619						669					
570						620						670					
571						621						671					
572						622						672					
573						623						673					
574						624						674					
575						625						675					
576						626						676					
577						627						677					
578						628						678					
579						629						679					
580						630						680					
581						631						681					
582						632						682					
583						633						683					
584						634						684					
585						635						685					
586						636						686					
587						637						687					
588						638						688					
589						639						689					
590						640						690					
591						641						691					
592						642						692					
593						643						693					
594						644						694					
595						645						695					
596						646						696					
597						647						697					
598						648						698					
599						649						699					

**Table 6-3 SYSTEM PROGRAM RECORD FORM**

3-DIGIT EXCHANGE	OFFICE CODE TYPE					3-DIGIT EXCHANGE	OFFICE CODE TYPE					3-DIGIT EXCHANGE	OFFICE CODE TYPE				
	00	01	02	03	04		00	01	02	03	04		00	01	02	03	04
700						750						800					
701						751						801					
702						752						802					
703						753						803					
704						754						804					
705						755						805					
706						756						806					
707						757						807					
708						758						808					
709						759						809					
710						760						810					
711						761						811					
712						762						812					
713						763						813					
714						764						814					
715						765						815					
716						766						816					
717						767						817					
718						768						818					
719						769						819					
720						770						820					
721						771						821					
722						772						822					
723						773						823					
724						774						824					
725						775						825					
726						776						826					
727						777						827					
728						778						828					
729						779						829					
730						780						830					
731						781						831					
732						782						832					
733						783						833					
734						784						834					
735						785						835					
736						786						836					
737						787						837					
738						788						838					
739						789						839					
740						790						840					
741						791						841					
742						792						842					
743						793						843					
744						794						844					
745						795						845					
746						796						846					
747						797						847					
748						798						848					
749						799						849					



**Table 6-3 SYSTEM PROGRAM RECORD FORM**

3-DIGIT EXCHANGE	OFFICE CODE TYPE					3-DIGIT EXCHANGE	OFFICE CODE TYPE					3-DIGIT EXCHANGE	OFFICE CODE TYPE				
	00	01	02	03	04		00	01	02	03	04		00	01	02	03	04
850						900						950					
851						901						951					
852						902						952					
853						903						953					
854						904						954					
855						905						955					
856						906						956					
857						907						957					
858						908						958					
859						909						959					
860						910						960					
861						911						961					
862						912						962					
863						913						963					
864						914						964					
865						915						965					
866						916						966					
867						917						967					
868						918						968					
869						919						969					
870						920						970					
871						921						971					
872						922						972					
873						923						973					
874						924						974					
875						925						975					
876						926						976					
877						927						977					
878						928						978					
879						929						979					
880						930						980					
881						931						981					
882						932						982					
883						933						983					
884						934						984					
885						935						985					
886						936						986					
887						937						987					
888						938						988					
889						939						989					
890						940						990					
891						941						991					
892						942						992					
893						943						993					
894						944						994					
895						945						995					
896						946						996					
897						947						997					
898						948						998					
899						949						999					

**Table 6-3 SYSTEM PROGRAM RECORD FORM**

**CLASS OF SERVICE**

BIT	7	6	5	4	3	2	1	0		BIT	7	6	5	4	3	2	1	0	
COS	X	X	C-5	C-4	C-3	C-2	C-1	ON	HEX	COS	X	X	C-5	C-4	C-3	C-2	C-1	ON	HEX
200	0	0	0					1		400	0	0	0					1	
201	0	0	0					1		401	0	0	0					1	
202	0	0	0					1		402	0	0	0					1	
203	0	0	0					1		403	0	0	0					1	
204	0	0	0					1		404	0	0	0					1	
205	0	0	0					1		405	0	0	0					1	
206	0	0	0					1		406	0	0	0					1	
207	0	0	0					1		407	0	0	0					1	
208	0	0	0					1		408	0	0	0					1	
209	0	0	0					1		409	0	0	0					1	
210	0	0	0					1		410	0	0	0					1	
211	0	0	0					1		411	0	0	0					1	
212	0	0	0					1		412	0	0	0					1	
213	0	0	0					1		413	0	0	0					1	
214	0	0	0					1		414	0	0	0					1	
215	0	0	0					1		415	0	0	0					1	
216	0	0	0					1		416	0	0	0					1	
217	0	0	0					1		417	0	0	0					1	
218	0	0	0					1		418	0	0	0					1	
219	0	0	0					1		419	0	0	0					1	
300	0	0	0					1		500	0	0	0					1	
301	0	0	0					1		501	0	0	0					1	
302	0	0	0					1		502	0	0	0					1	
303	0	0	0					1		503	0	0	0					1	
304	0	0	0					1		504	0	0	0					1	
305	0	0	0					1		505	0	0	0					1	
306	0	0	0					1		506	0	0	0					1	
307	0	0	0					1		507	0	0	0					1	
308	0	0	0					1		508	0	0	0					1	
309	0	0	0					1		509	0	0	0					1	
310	0	0	0					1		510	0	0	0					1	
311	0	0	0					1		511	0	0	0					1	
312	0	0	0					1		512	0	0	0					1	
313	0	0	0					1		513	0	0	0					1	
314	0	0	0					1		514	0	0	0					1	
315	0	0	0					1		515	0	0	0					1	
316	0	0	0					1		516	0	0	0					1	
317	0	0	0					1		517	0	0	0					1	
318	0	0	0					1		518	0	0	0					1	
319	0	0	0					1		519	0	0	0					1	





**Table 6-3 SYSTEM PROGRAM RECORD FORM**

**CLASS OF SERVICE**

BIT	7	6	5	4	3	2	1	0		BIT	7	6	5	4	3	2	1	0	
COS	X	X	C-5	C-4	C-3	C-2	C-1	ON	HEX	COS	X	X	C-5	C-4	C-3	C-2	C-1	ON	HEX
600	0	0	0					1		800	0	0	0					1	
601	0	0	0					1		801	0	0	0					1	
602	0	0	0					1		802	0	0	0					1	
603	0	0	0					1		803	0	0	0					1	
604	0	0	0					1		804	0	0	0					1	
605	0	0	0					1		805	0	0	0					1	
606	0	0	0					1		806	0	0	0					1	
607	0	0	0					1		807	0	0	0					1	
608	0	0	0					1		808	0	0	0					1	
609	0	0	0					1		809	0	0	0					1	
610	0	0	0					1		810	0	0	0					1	
611	0	0	0					1		811	0	0	0					1	
612	0	0	0					1		812	0	0	0					1	
613	0	0	0					1		813	0	0	0					1	
614	0	0	0					1		814	0	0	0					1	
615	0	0	0					1		815	0	0	0					1	
616	0	0	0					1		816	0	0	0					1	
617	0	0	0					1		817	0	0	0					1	
618	0	0	0					1		818	0	0	0					1	
619	0	0	0					1		819	0	0	0					1	
700	0	0	0					1		900	0	0	0					1	
701	0	0	0					1		901	0	0	0					1	
702	0	0	0					1		902	0	0	0					1	
703	0	0	0					1		903	0	0	0					1	
704	0	0	0					1		904	0	0	0					1	
705	0	0	0					1		905	0	0	0					1	
706	0	0	0					1		906	0	0	0					1	
707	0	0	0					1		907	0	0	0					1	
708	0	0	0					1		908	0	0	0					1	
709	0	0	0					1		909	0	0	0					1	
710	0	0	0					1		910	0	0	0					1	
711	0	0	0					1		911	0	0	0					1	
712	0	0	0					1		912	0	0	0					1	
713	0	0	0					1		913	0	0	0					1	
714	0	0	0					1		914	0	0	0					1	
715	0	0	0					1		915	0	0	0					1	
716	0	0	0					1		916	0	0	0					1	
717	0	0	0					1		917	0	0	0					1	
718	0	0	0					1		918	0	0	0					1	
719	0	0	0					1		919	0	0	0					1	

## SECTION 7, PROGRAM ENTRY

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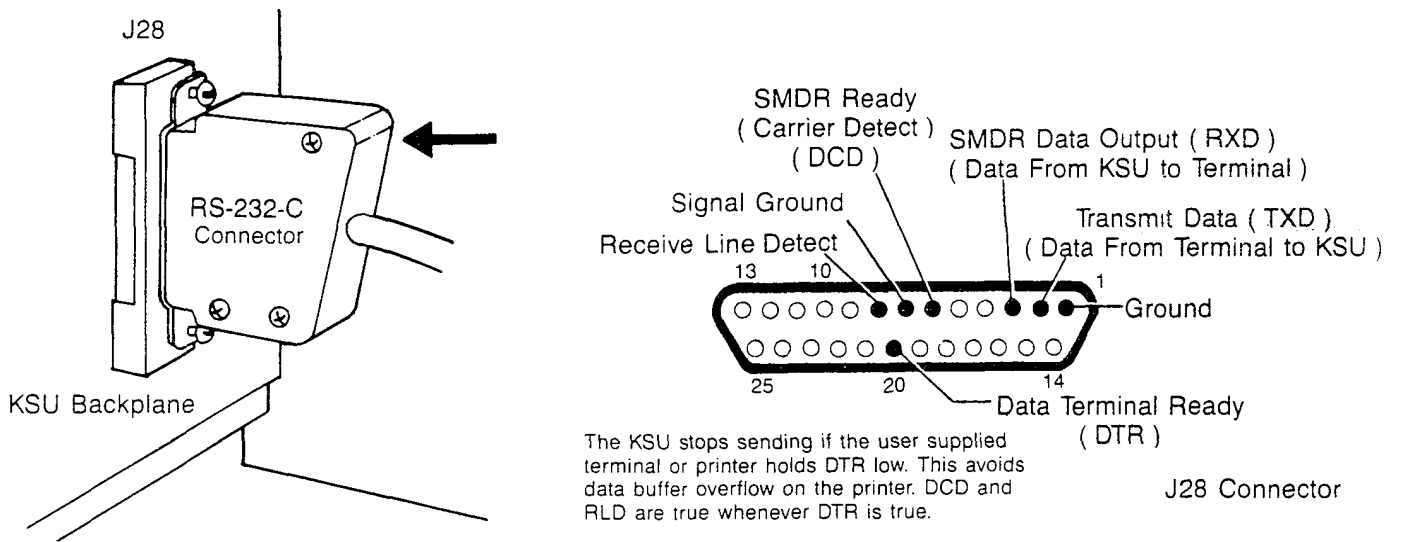
### 1. INTRODUCTION

**1.01** The PROGRAM ENTRY Section describes the procedures for programming the system. During programming, the data recorded on the Program Record Forms (PRFs) in Section 6, SOFTWARE CONFIGURATION, is entered into system memory. This section is divided into three parts: PREPARATION, SYSTEM INITIALIZATION and PROGRAM ENTRY.

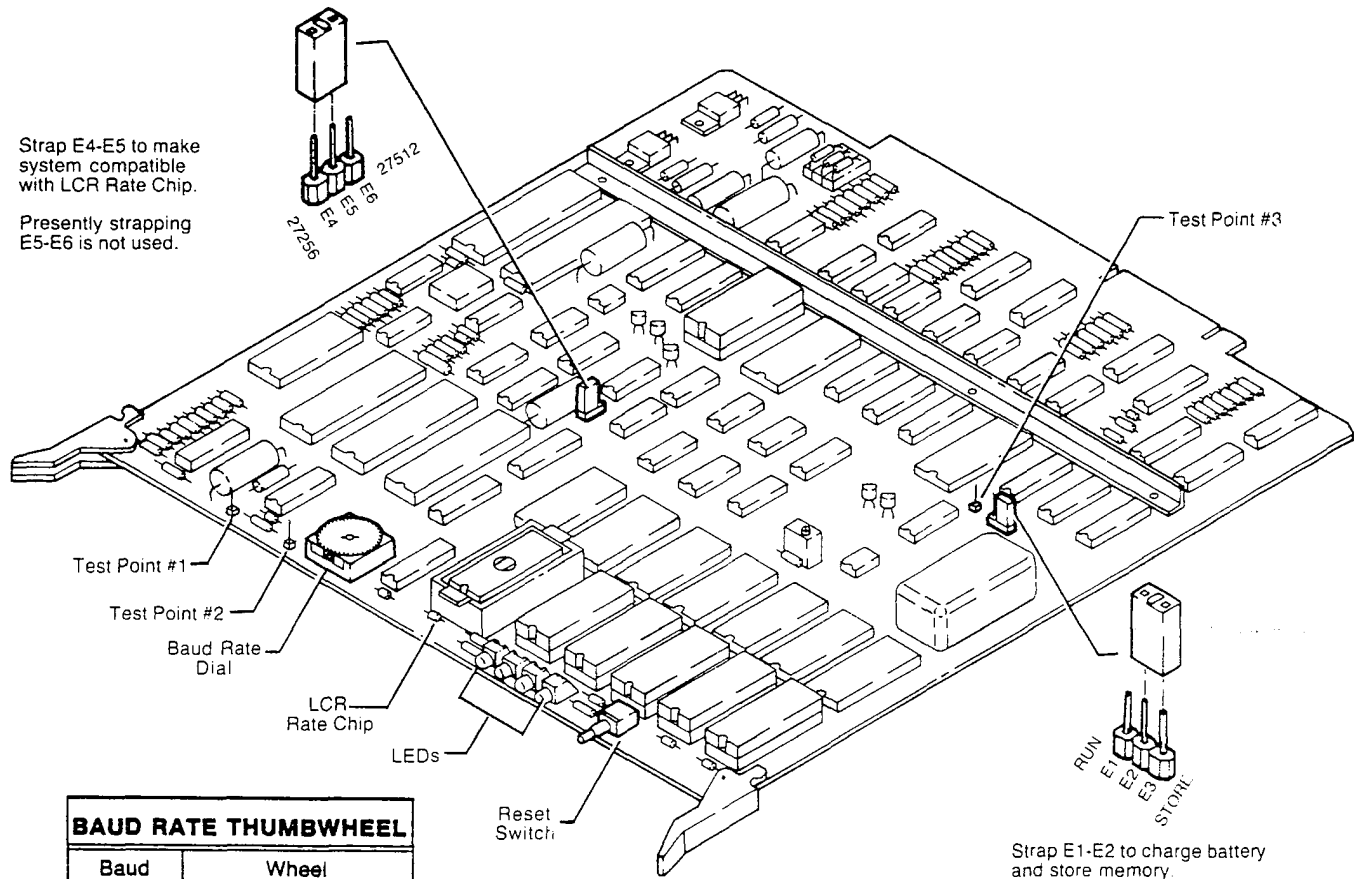
### 2. PREPARATION

**2.01** Complete the following before programming the system:

- (1) Record programming information on the PRFs.
- (2) Plug an ASCII terminal having an RS-232-C interface into the J28 connector (Figure 7-1).
- (3) Set the Baud Rate Thumbwheel on the B-CPU-D PCB to match the terminal (Figure 7-2).



**Figure 7-1 RS-232-C INTERFACE CONNECTOR AND PIN ASSIGNMENT (J28)**



Strap E4-E5 to make system compatible with LCR Rate Chip.  
Presently strapping E5-E6 is not used.

Strap E1-E2 to charge battery and store memory.  
Strap E2-E3 when B-TGU-C is not used.

BAUD RATE THUMBWHEEL	
Baud Rate	Wheel Selection
50	O
75	1
110	2
135	3
150	4
300	5
600	6
1200	7
1800	8
2000	9
2400	A
3600	B
4800	C
7200	D
9600	E
19200	F

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Figure 7-2 BAUD RATE THUMBWHEEL LOCATION

*B-CPU-D C D E*

### 3. SYSTEM INITIALIZATION

3.01 The system must be initialized, before programming, to clear the system of any previously set data, and to return all fields to default entries. Initialization erases all previously selected options.

**CAUTION: SYSTEM INITIALIZATION SETS ALL FIELDS TO DEFAULT ENTRIES. SELECTIVE INITIALIZATION SETS ONLY SECTIONS OF MEMORY TO DEFAULT VALUES.**

3.02 To initialize a TCX-128 system:

(1) Turn on the power. The system prints:

WELCOME TO CX 128  
M

(2) Press the M key. The system prints:

#### TCX-128 SYSTEM CONFIGURATION PROGRAM

E: STATIONS FEATURES  
S: SYSTEM FEATURES  
I: SYSTEM INITIALIZATION  
Q: EXIT PROGRAMMING MODE  
D: DISPLAY SYSTEM STATUS

(3) Press the I key. The Initialization menu appears. Press 0 to initialize the system. The system prompts:

SECTION #..\_\_0  
INITIALIZER  
ARE YOU SURE..

(4) Enter Y and press the RETURN key. The system must then be reset (either by pressing the reset switch on the B-CPU-D [Figure 7-2], or by enabling Initialization subfield # 33). The system prints:

#### WELCOME TO CX-128.

- (5) Press the M key to return to the main menu to begin program entry.
- (6) Selected areas of the program can be initialized from the Initialization menu. For more information, refer to Section 6, SOFTWARE CONFIGURATION.

**CAUTION: INITIALIZATION RETURNS ALL FIELDS TO DEFAULT ENTRIES.**

### 4. PROGRAM ENTRY

4.01 This part is arranged in order of the Program Record Forms in Section 6; however, the data can be entered in any order. To access a program, type the corresponding letter on the main menu.

4.02 Programming system and extension features is outlined in the following paragraphs. The system prompts, in order, as each entry is made. If no entry for a prompt is required, press the RETURN key; the system advances to the next prompt.

4.03 To modify a specific field at a later date, follow the programming procedures in this section but do not initialize the system again.

4.04 To exit from a program:  
(1) Press the Q key once.

**NOTE:** If you do not exit the program after pressing the Q key, press it again.

4.05 To exit from the programming mode:  
(1) Press the Q key twice. The system prints:

#### CPU-D 002

**NOTE:** If you do not exit programming after pressing the Q key twice, press it again.

**S: SYSTEM FEATURES**

**4.06** To program S: SYSTEM FEATURES:

- (1) Press the M key for the main menu.
- (2) Press the S key for the S: SYSTEM FEATURES menu.  
The following appears:

**ENTER ? FOR HELP**

- (3) Press the ? key. The system prints:

- T: TIME OF DAY**
- D: DATE**
- O: OPERATORS & DSS**
- U: GROUP HUNT**
- M: TIMERS**
- L: LEAST COST ROUTING**
- R: RELAYS CONTROL**
- G: CO GROUPS**
- P: CO TYPE**
- S: TIE LINE TYPE**
- C: MEET-ME CONFERENCE**
- A: OFFICE CODE TYPES**
- K: COS ALLOWED AREA CODES**
- E: EXTERNAL OUTPUTS**
- N: OUT KEYS GROUPS**
- V: MODEM PASSWORD**
- F: SYSTEM OPTIONS**
- J: DOWNLOAD, UPLOAD AND VERIFY**
- 1: SELECT TRACE OPTIONS**
- 2: PRINT TRACE MEMORY**
- 3: PRINT CONTINUOUSLY**

**NOTE:** At any point after the S: SYSTEM FEATURES program has been entered, the System Features menu may be displayed.

**4.07** To recall the menu:

- (1) Press the Q key.
- (2) Press ? while holding the SHIFT key.

**WARNING: ALWAYS PRESS THE RESET SWITCH (S1) ON THE B-CPU-D PCB AFTER PROGRAMMING.**

**T: TIME OF DAY**

**4.08** To program T: TIME OF DAY, press the T key. The system prompts:

**ENTER HOURS HH.....**

- (1) Enter two digits for the hour (00-23).
- (2) Press the RETURN key. The system prompts:

**ENTER MINUTES MM...**

- (1) Enter two digits for the minutes past the hour (00-59).
- (2) Press the RETURN key.

**D: DATE**

**4.09** To program D: DATE, press the D key. The system prompts:

**ENTER MONTH.....**

- (1) Enter two digits for the month (01-12).
- (2) Press the RETURN key. The system prompts:

**ENTER DATE.....**

- (1) Enter two digits for the day of the month (01-31).
- (2) Press the RETURN key. The system prompts:

**ENTER YEAR.....**

- (1) Enter two digits for the year (i.e., 1986, enter 86).



## O: OPERATORS & DSS

**4.10** To program O: OPERATORS & DSS, press the O key. For each prompt:

- (1) Enter data from Table 6-3.
- (2) Press the RETURN key.

**4.11** The prompts and default values for O: OPERATORS & DSS are:

```
OPERATOR #..01...IS...301__
DSS OPERATOR 01...IS...NONE__
ALT OPERATOR 01...IS...NONE__
OPERATOR #..02...IS...NONE__
DSS OPERATOR 02...IS...NONE__
ALT OPERATOR 02...IS...NONE__
OPERATOR #..03...IS...NONE__
DSS OPERATOR 03...IS...NONE__
ALT OPERATOR 03...IS...NONE__
OPERATOR #..04...IS...NONE__
DSS OPERATOR 04...IS...NONE__
ALT OPERATOR 04...IS...NONE__
OPERATOR #..05...IS...NONE__
DSS OPERATOR 05...IS...NONE__
ALT OPERATOR 05...IS...NONE__
OPERATOR #..06...IS...NONE__
DSS OPERATOR 06...IS...NONE__
ALT OPERATOR 06...IS...NONE__
```

## U: GROUP HUNT

**4.12** To program U: HUNT GROUP, press the U key. For each prompt:

- (1) Enter data from Table 6-3.
- (2) Press the RETURN key.

**4.13** The prompts and default values for U: GROUP HUNT are:

```
HUNT_GRP_01
HUNT_MOD_00
HUNT_TIME_000__
HUNT_MSTR_NONE__
OVRFL EXT_NONE__
HUNT_GRP_02
HUNT_MOD_00
HUNT_TIME_000__
HUNT_MSTR_NONE__
OVRFL EXT_NONE__
HUNT_GRP_03
HUNT_MOD_00
HUNT_TIME_000__
HUNT_MSTR_NONE__
OVRFL EXT_NONE__
HUNT_GRP_04
HUNT_MOD_00
HUNT_TIME_000__
HUNT_MSTR_NONE__
OVRFL EXT_NONE__
HUNT_GRP_05
HUNT_MOD_00
HUNT_TIME_000__
HUNT_MSTR_NONE__
OVRFL EXT_NONE__
HUNT_GRP_06
HUNT_MOD_00
HUNT_TIME_000__
HUNT_MSTR_NONE__
OVRFL EXT_NONE__
HUNT_GRP_07
HUNT_MOD_00
HUNT_TIME_000__
HUNT_MSTR_NONE__
OVRFL EXT_NONE__
```

**HUNT\_GRP\_08**  
 HUNT\_MOD\_00  
 HUNT\_TIME\_000\_\_  
 HUNT\_MSTR\_NONE\_\_  
 OVRFL EXT\_NONE\_\_  
**HUNT\_GRP\_09**  
 HUNT\_MOD\_00  
 HUNT\_TIME\_000\_\_  
 HUNT\_MSTR\_NONE\_\_  
 OVRFL EXT\_NONE\_\_  
**HUNT\_GRP\_10**  
 HUNT\_MOD\_00  
 HUNT\_TIME\_000\_\_  
 HUNT\_MSTR\_NONE\_\_  
 OVRFL EXT\_NONE\_\_  
**HUNT\_GRP\_11**  
 HUNT\_MOD\_00  
 HUNT\_TIME\_000\_\_  
 HUNT\_MSTR\_NONE\_\_  
 OVRFL EXT\_NONE\_\_  
**HUNT\_GRP\_12**  
 HUNT\_MOD\_00  
 HUNT\_TIME\_000\_\_  
 HUNT\_MSTR\_NONE\_\_  
 OVRFL EXT\_NONE\_\_  
**HUNT\_GRP\_13**  
 HUNT\_MOD\_00  
 HUNT\_TIME\_000\_\_  
 HUNT\_MSTR\_NONE\_\_  
 OVRFL EXT\_NONE\_\_  
**HUNT\_GRP\_14**  
 HUNT\_MOD\_00  
 HUNT\_TIME\_000\_\_  
 HUNT\_MSTR\_NONE\_\_  
 OVRFL EXT\_NONE\_\_  
**HUNT\_GRP\_15**  
 HUNT\_MOD\_00  
 HUNT\_TIME\_000\_\_  
 HUNT\_MSTR\_NONE\_\_  
 OVRFL EXT\_NONE\_\_  
**HUNT\_GRP\_16**  
 HUNT\_MOD\_00  
 HUNT\_TIME\_000\_\_  
 HUNT\_MSTR\_NONE\_\_  
 OVRFL EXT\_NONE\_\_

**M: TIMERS**

**4.14** To program M: TIMERS, press the M key. For each prompt:

- (1) Enter data from Table 6-3.
- (2) Press the RETURN key.

**4.15** The prompts and default values for M: TIMERS are:

HOLD RECALL TIMER.(SEC).. 060\_\_  
 ORBIT RECALL TIMER.(SEC) . 060\_\_  
 PAUSE TIME-OUT.(SEC)..... 006\_\_  
 FLASH TIMER.(N\*50MSEC) ... 020\_\_  
 DIAL TONE TIME-OUT.(SEC).. 002\_\_  
 SMDR TIMER..(SEC) ..... 030\_\_  
 TRANS RECALL.(SEC) ..... 120\_\_  
 DIL RNG OPERATOR.(SEC) ... 012\_\_  
 SMDR RNA TIMER..(SEC)..... 012\_\_  
 PRVC TONE....(SEC) ..... 001\_\_  
 DISA PAGE....(SEC) ..... 015\_\_  
 DISA & TIE RNA....(SEC) ..... 012\_\_  
 DISA ANSWER..(SEC)..... 006\_\_  
 DCD START....(SEC)..... 060\_\_  
 DCD END.(N\*50MSEC)..... 015\_\_  
 FIRST DIGIT..(SEC)..... 010\_\_  
 INTER DIGIT..(SEC) ..... 005\_\_  
 MIN RNG BRST. N\*0.1 SEC.... 004\_\_  
 MAX RNG IDLE. N\*0.1 SEC ... 060\_\_  
 MIN DRP PULS. N\*0.1 SEC .... 006\_\_  
 OP BREAK....(MSEC) ..... 061\_\_  
 OP MAKE....(MSEC) ..... 039\_\_  
 INTER OP..N\*(M+B) ..... 010\_\_





**L: LEAST COST ROUTING**

**4.16** Refer to Appendix H.

**R: RELAYS CONTROL**

**4.17** To program R: RELAYS CONTROL, press the R key. For each prompt:

- (1) Enter data from Table 6-3.
- (2) Press the RETURN key.

**4.18** The prompts and default values for R: RELAYS CONTROL are:

BIT NUMBER	7	6	5	4	3	2	1	0
FUNCTION	NIGHT	ALL-P	ANY-P			NRNGR	ZPAGE	RINGR

- RELAY 01..CONTROL IS...00\_\_
- RELAY 02..CONTROL IS...00\_\_
- RELAY 03..CONTROL IS...00\_\_
- RELAY 04..CONTROL IS...00\_\_

**G: CO GROUPS**

**4.19** To program G: CO GROUPS, press the G key. For each prompt:

- (1) Enter data from Table 6-3.
- (2) Press the RETURN key.

**4.20** The prompts and default values for G: CO GROUPS are:

- LINE..01..GROUP IS.....01\_\_
- LINE..02..GROUP IS.....01\_\_
- LINE..03..GROUP IS.....01\_\_
- LINE..04..GROUP IS.....01\_\_
- LINE..05..GROUP IS.....01\_\_
- LINE..06..GROUP IS.....01\_\_
- LINE..07..GROUP IS.....01\_\_
- LINE..08..GROUP IS.....01\_\_
- LINE..09..GROUP IS.....02\_\_
- LINE..10..GROUP IS.....02\_\_
- LINE..11..GROUP IS.....02\_\_
- LINE..12..GROUP IS.....02\_\_
- LINE..13..GROUP IS.....02\_\_
- LINE..14..GROUP IS.....02\_\_
- LINE..15..GROUP IS.....02\_\_
- LINE..16..GROUP IS.....02\_\_
- LINE..17..GROUP IS.....03\_\_
- LINE..18..GROUP IS.....03\_\_
- LINE..19..GROUP IS.....03\_\_
- LINE..20..GROUP IS.....03\_\_
- LINE..21..GROUP IS.....03\_\_
- LINE..22..GROUP IS.....03\_\_
- LINE..23..GROUP IS.....03\_\_
- LINE..24..GROUP IS.....03\_\_
- LINE..25..GROUP IS.....77\_\_
- LINE..26..GROUP IS.....77\_\_
- LINE..27..GROUP IS.....77\_\_
- LINE..28..GROUP IS.....77\_\_
- LINE..29..GROUP IS.....77\_\_
- LINE..30..GROUP IS.....77\_\_
- LINE..31..GROUP IS.....77\_\_
- LINE..32..GROUP IS.....77\_\_

NOTE: Enter 77 for all unused lines.

**P: CO TYPE**

**4.21** To program P: CO TYPE, press the P key. For each prompt:

- (1) Enter data from Table 6-3.
- (2) Press the RETURN key.

**4.22** The prompts and default values for P: CO TYPE are:

BIT NUMBER	7	6	5	4	3	2	1	0
FUNCTION	IN	PBX	P/T	G.F	DISA	RHUNT	TOLLF	UNA

- LINE..01..TYPE IS.....01\_\_
- LINE..02..TYPE IS.....01\_\_
- LINE..03..TYPE IS.....01\_\_
- LINE..04..TYPE IS.....01\_\_
- LINE..05..TYPE IS.....01\_\_
- LINE..06..TYPE IS.....01\_\_
- LINE..07..TYPE IS.....01\_\_
- LINE..08..TYPE IS.....01\_\_
- LINE..09..TYPE IS.....01\_\_
- LINE..10..TYPE IS.....01\_\_
- LINE..11..TYPE IS.....01\_\_
- LINE..12..TYPE IS.....01\_\_
- LINE..13..TYPE IS.....01\_\_
- LINE..14..TYPE IS.....01\_\_
- LINE..15..TYPE IS.....01\_\_
- LINE..16..TYPE IS.....01\_\_
- LINE..17..TYPE IS.....01\_\_
- LINE..18..TYPE IS.....01\_\_
- LINE..19..TYPE IS.....01\_\_
- LINE..20..TYPE IS.....01\_\_
- LINE..21..TYPE IS.....01\_\_
- LINE..22..TYPE IS.....01\_\_
- LINE..23..TYPE IS.....01\_\_
- LINE..24..TYPE IS.....01\_\_
- LINE..25..TYPE IS.....01\_\_
- LINE..26..TYPE IS.....01\_\_
- LINE..27..TYPE IS.....01\_\_
- LINE..28..TYPE IS.....01\_\_
- LINE..29..TYPE IS.....01\_\_
- LINE..30..TYPE IS.....01\_\_
- LINE..31..TYPE IS.....01\_\_
- LINE..32..TYPE IS.....01\_\_

**S: TIE LINE TYPE**

**4.23** To program S: TIE LINE TYPE, press the S key. For each prompt:

- (1) Enter data from Table 6-3.
- (2) Press the RETURN key.

**4.24** The prompts and default values for S: TIE LINE TYPE are:

BIT NUMBER	7	6	5	4	3	2	1	0
FUNCTION	IN-DD	4S-RA	OT-DD	WINK	4/2WR	P/T	INSTL	

- TIE LINE..01..TYPE.....00\_\_
- TIE LINE..02..TYPE.....00\_\_
- TIE LINE..03..TYPE.....00\_\_
- TIE LINE..04..TYPE.....00\_\_
- TIE LINE..05..TYPE.....00\_\_
- TIE LINE..06..TYPE.....00\_\_

Tie lines 3-6 are currently not used.

**C: MEET-ME CONFERENCE**

**4.25** To program C: MEET-ME CONFERENCE, press the C key. For the prompt:

- (1) Enter data from Table 6-3.
- (2) Press the RETURN key.

**4.26** The prompt and default value for C: MEET-ME CONFERENCE is:

MEET-ME CONFERENCE LINE..IS...NONE\_\_



**A: OFFICE CODE TYPES**

**4.27** To program A: OFFICE CODE TYPES, press the A key. The system prompts:

**OFFICE CODE TYPE.**

- 0 : 10-11 DIGITS TOLL (Area Codes)**
- 1 : TOLL IF 1-NNN..., OTHERWISE LOCAL (Conflict Codes)**
- 2 : LOCAL 3-4 DIGITS (Emergency Assistance Numbers)**
- 3 : LOCAL 7-8 DIGITS (Office Code Only)**
- 4 : SPECIAL INN PREFIX (not used)**

**ENTER EXCHANGE...(NNN).\_\_**

**000\_\_**  
**UP TO AND INCLUDE.....\_\_**

**NOTE:** Programming is done for each individual code, in ranges, or globally for all codes.

**(a) Programming Individual Codes**

**4.28** When the system prompts:

**ENTER EXCHANGE...(NNN).**

enter code to be programmed and press the RETURN key.  
When the system prompts:

**UP TO AND INCLUDE.....**

enter the same exchange again and press the RETURN key.  
When the system returns:

**EXCHANGE TYPE IS.....**

enter code type from Table 6-3 and press the RETURN key.

**4.29** When the system prompts:

**ENTER EXCHANGE...(NNN).**

enter the lowest numbered code in the range to be programmed and press the RETURN key.

When the system prompts:

**UP TO AND INCLUDE.....**

enter the highest numbered code in the range to be programmed and press the RETURN key.

When the system prompts:

**EXCHANGE TYPE IS.....**

enter code type from Table 6-3 and press the RETURN key.  
The entire range is now assigned that code type.

**(c) Global Programming**

**4.30** When the system prompts:

**ENTER EXCHANGE..(NNN)**

enter 100 and press the RETURN key. When the system prompts:

**UP TO AND INCLUDE.....**

enter 999 and press the RETURN key. When the system prompts:

**EXCHANGE TYPE IS.....**

enter code from Table 6-3 and press the RETURN key. The entire table is now assigned that code.

**4.31** To check the assignment for a code, when the system prompts:

**ENTER EXCHANGE...(NNN)\_\_**

enter code to be checked and press the RETURN key.  
When the system prompts:

**UP TO AND INCLUDE.....**

press the RETURN key.

The EXCHANGE TYPE IS..... prompt displays the assignment for the code checked.

**K: COS ALLOWED AREA CODES**

**4.32** To program K: COS ALLOWED AREA CODES, press the K key. The system prompts:

**ALLOWED COS FOR OFFICE CODE.**

BIT COS	7 X	6 X	5 C-5	4 C-4	3 C-3	2 C-2	1 C-1	0 ON
------------	--------	--------	----------	----------	----------	----------	----------	---------

**ENTER EXCHANGE...(NNN).\_\_**  
**000\_\_**

**4.33** Programming is done for each individual area code, in ranges, or globally for all codes.

**(a) Programming Individual Area Codes**

**4.34** When the system prompts:

**ENTER EXCHANGE...(nnn).**

enter code to be programmed and press the RETURN key. When the system prompts:

**UP TO AND INCLUDE.....**

enter the same exchange and press the RETURN key. When the system prompts:

**COS RECORDED/NEW.....\_\_01**

enter data from Table 6-3 and press the RETURN key. Prompts continue until the Q key is pressed.

**(b) Programming in Ranges**

**4.35** When the system prompts:

**ENTER EXCHANGE...(NNN).**

enter the lowest numbered code in the range to be programmed and press the RETURN key. When the system prompts:

**UP TO AND INCLUDE.....**

enter the highest numbered code in the range to be programmed and press the RETURN key. When the system prompts:

**ENTER NEW COS.....\_\_**

enter data from Table 6-3 and press the RETURN key. The entire range is now assigned that code type. Prompts continue until the Q key is pressed.

**(c) Global Programming**

**4.36** When the system prompts:

**ENTER EXCHANGE...(NNN)**

enter 200 and press the RETURN key. When the system prompts:

**UP TO AND INCLUDE.....**

enter 999 and press the RETURN key. When the system prompts:

**ENTER NEW COS.....\_\_**

enter data from Table 6-3 and press RETURN. The entire table is now assigned that code. The \* prompt displays, indicating that the entire table has been programmed.

**4.37** To check the Class of Service for an area code, when the system prompts:

**ENTER EXCHANGE...(NNN)\_\_**

enter area code to be checked and press the RETURN key. When the system prompts:

**UP TO AND INCLUDE.....**

press the RETURN key.

The COS RECORDED/NEW..... prompt displays the Class of Service data for the area code.



**E: EXTERNAL OUTPUTS**

**4.38** To program E: EXTERNAL OUTPUTS, press the E key. For each prompt:

- (1) Enter data from Table 6-3.
- (2) Press the RETURN key.

**4.39** The prompts and default values for E: EXTERNAL OUTPUTS are:

BIT NUMBER FUNCTION	7 NIGHT	6 BGM	5 PAGE	4	3	2 PG-DZ	1 ON	0 C-OFF
------------------------	------------	----------	-----------	---	---	------------	---------	------------

- OUTPUT..01..CONTROL IS...20\_\_
- ALTERNATE AUDIO PORT IS..NONE\_\_
- OUTPUT..02..CONTROL IS...20\_\_
- ALTERNATE AUDIO PORT IS..NONE\_\_
- OUTPUT..03..CONTROL IS...20\_\_
- ALTERNATE AUDIO PORT IS..NONE\_\_
- OUTPUT..04..CONTROL IS...20\_\_
- ALTERNATE AUDIO PORT IS..NONE\_\_
- OUTPUT..05..CONTROL IS...20\_\_
- ALTERNATE AUDIO PORT IS..NONE\_\_
- OUTPUT..06..CONTROL IS...20\_\_
- ALTERNATE AUDIO PORT IS..NONE\_\_
- OUTPUT..07..CONTROL IS...20\_\_
- ALTERNATE AUDIO PORT IS..NONE\_\_
- OUTPUT..08..CONTROL IS...20\_\_
- ALTERNATE AUDIO PORT IS..NONE\_\_

**NOTE:** Program Alternate Audio Ports *only* when the system is equipped with B-TGU-B PCBs.

**N: OUT KEYS GROUPS**

**4.40** To program N: OUT KEYS GROUPS, press the N key. For each prompt:

- (1) Enter data from Table 6-3.
- (2) Press the RETURN key.

**4.41** The prompts and default values for N: OUT KEYS GROUPS are:

- OUT\_\_KEY # 01 SELECT GROUP # \_\_01\_\_
- OUT\_\_KEY # 02 SELECT GROUP # \_\_01\_\_
- OUT\_\_KEY # 03 SELECT GROUP # \_\_02\_\_
- OUT\_\_KEY # 04 SELECT GROUP # \_\_02\_\_
- OUT\_\_KEY # 05 SELECT GROUP # \_\_03\_\_
- OUT\_\_KEY # 06 SELECT GROUP # \_\_03\_\_

## **F: SYSTEM OPTIONS**

**4.42** To program F: SYSTEM OPTIONS, press the F key. The system prompts:

### **SYS OPTION EDIT**

#### **ENTER ? FOR MENU**

If ? is pressed, the Options menu prints. Otherwise, the system prompts:

#### **ENTER OPTION #..\_\_**

**4.43** To program an option:

- (1) To obtain a menu of System Options, press ?; otherwise, enter the option number. The options are explained in Section 6.
- (2) Press the RETURN key. The system prompts:

#### **OPTION ENABLED...nn..**

- (3) Refer to Table 6-3 and enter Y (for YES) or N (for NO).
- 4) Press the RETURN key. The system prompts:

#### **ENTER OPTION #..\_\_**

- (5) Enter another option number or press the Q key to leave the field.

## **E: STATIONS FEATURES**

### **How to Program Station Features**

**4.44** To program features for each extension:

- (1) Press the M key for the main menu.
- (2) Press the E key, the system prompts:

#### **ENTER STATION NUMBER..**

- (3) Press the RETURN key to program extension 301 or enter the number of the extension to be programmed (and press RETURN).
- (4) Enter data from Table 6-2 for each field pertaining to the extension being programmed.
- (5) Repeat procedure until all extensions are programmed.

**4.45** To program another extension:

- (1) Press the Q key to access another extension number without stepping through all the fields.

### **How to Program Extensions for a Selected Field**

**4.46** To program only a selected field for each extension:

- (1) Enter data from Table 6-2 for first field to be programmed.
- (2) Press the X key instead of the RETURN key.

**4.47** The entry is recorded for the extension being programmed. The same field for the next consecutive extension number automatically appears. (Note that when using the X key to program selected fields, the system treats CO AUDIBLE [01..08] IS.. through CO ACCESS [25..32] IS.. as one block. The X key should only be pressed after the entry for CO ACCESS [25..32] IS.. is made. The X key cannot be used to sequence through one of these fields individually.)

**4.48** For each additional extension to be programmed:

- (1) Enter data from Table 6-2.
- (2) Press RETURN key.

**4.49** The same field for the next consecutive extension number automatically appears.

4.50 The prompts and default assignments (where applicable) for E: STATIONS FEATURES are:

```

PROGRAMMING STATION .....__
PORT NUMBER.....__
TYPE OF PHONE .....KEY
HOT-LINE KEY .....
CLASS OF SERVICE.....00
CO AUDIBLE [01..08] IS .....*
CO AUDIBLE [09..16] IS .....*
CO AUDIBLE [17..24] IS .....*
CO AUDIBLE [25..32] IS .....*
NT AUDIBLE [01..08] IS .....FF_*
NT AUDIBLE [09..16] IS .....FF_*
NT AUDIBLE [17..24] IS .....FF_*
NT AUDIBLE [25..32] IS .....FF_*
CO ACCESS [01..08] IS .....FF_*
CO ACCESS [09..16] IS .....FF_*
CO ACCESS [17..24] IS .....FF_*
CO ACCESS [25..32] IS .....FF_*
RECEIVE ALL-PAGE ..... YES
BARGE IN ENABLED ..... NO
BLOCK BARGE ENABLED ..... NO
PERMANENT ACC CODE ..... YES
FORCED ACC CODE ..... NO
DIL OFF HOOK SIGNAL ..... NO
CAMP-ON ORIGINATE ..... YES
CAMP-ON RECEIVE ..... YES
PAGE ZONE RECEIVED .....__*
PICK UP GROUP IS .....00__
PRIVATE LINE 1 ....IS ....NONE__**
PRIVATE LINE 2 ....IS ....NONE__**
PRV 1 RNG OPERATOR ..... NO__
PRV 2 RNG OPERATOR ..... NO__

```

## PROGRAMMING COMPLETE

4.51 When all data for system and extension features has been entered:

- (1) Press the Q key twice to exit the programming mode.
- (2) Press the reset switch (S1) on the CPU PCB to set the program (Figure 7-2).
- (3) The system prints:

### CPU-D 002

**NOTE:** After programming is complete, the SMDR printer (if installed) is enabled.

\* These are hexadecimal entries. Refer to Tables 6-1 and 6-2 for assignment.

\*\* These prompts only appear if **PRIVATE LINE 1** has been programmed.

## SECTION 8, THEORY OF OPERATION

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## 1. INTRODUCTION

**1.01** The THEORY OF OPERATION Section presents the module (plug-replaceable unit) level theory of operation for the TCX-128 telephone system. It is to be used with Section 9, MAINTENANCE, to allow the service technician to isolate system troubles to the plug-replaceable unit. This section is divided into five parts: Introduction, System Description, Printed Circuit Boards, Telephones and Analysis of Signal Flow.

**1.02** Part 1, Introduction, is what you are reading now. Part 2, System Description, provides the Hardware and Software Overview. This part also contains the System Summary, which is a general discussion of how the components of the system function together. Part 3, Printed Circuit Boards, consists of an explanation and block diagram for each Printed Circuit Board (PCB) in the system. An evaluation of each telephone instrument is presented in Part 4, Telephones. Part 5 is the Analysis of Signal Flow. This part is used to explain what happens when a user receives an outside call, places an outside call, or places an Intercom call.

## 2. SYSTEM DESCRIPTION

### HARDWARE OVERVIEW

**2.01** The TCX-128 Key Service Unit (KSU) contains the plug-in Printed Circuit Boards (PCBs) that serve as the common equipment between the 128 system telephones, 32 incoming telephone company (telco) or PBX lines, and the optional equipment. A network of microprocessors in the KSU work with the system software and microprocessors in each telephone. This allows internal and external traffic to be processed on a real time basis (i.e., without delay).

### Printed Circuit Boards

**2.02** The TCX-128 system (Figure 8-1) uses the following common equipment Printed Circuit Boards:

### B-CPU-D (Central Processing Unit) PCB

**2.03** The B-CPU-D PCB contains the Z80 executive microprocessor, the 6502 traffic control microprocessor, and the system operating software and memory. The B-CPU-D also contains the Common RAM (Random Access Memory) circuits which interface the Z80 executive microprocessor to the 6502 traffic controller.

### B-TGU-C (Tone Generator Unit) PCB

**2.04** This board provides system tones, Dual Tone Multifrequency (DTMF) generators and receivers for processing telephone dial commands, and amplifiers for Background Music (BGM), Music On Hold (MOH) and Page. The B-TGU-C PCB also contains an analog switch matrix (crosspoints) to connect the tones and amplifiers to the stations and the incoming lines.

### B-8SCU-C (Station Control Unit) PCB

**2.05** The Station Control Unit (B-8SCU-C) PCB is used to connect key telephones to the system. Each B-8SCU-C PCB has the data and power circuits for eight stations, as well as the crosspoints to link the system analog (speech) paths to each station.

### B-8SLU-B (Single Line Unit) PCB

**2.06** The B-8SLU-B PCB connects eight 2500 type telephones with special ringers to the system.

### B-4COU-A (Central Office Unit) PCB

**2.07** This Printed Circuit Board is used to interface four Central Office (CO) or Private Branch Exchange (PBX) lines to the system. This PCB also contains circuitry for ring detection, DC loop supervision, and multi-line conferencing.

## B-2TLU-A (Tie Line Unit) PCB

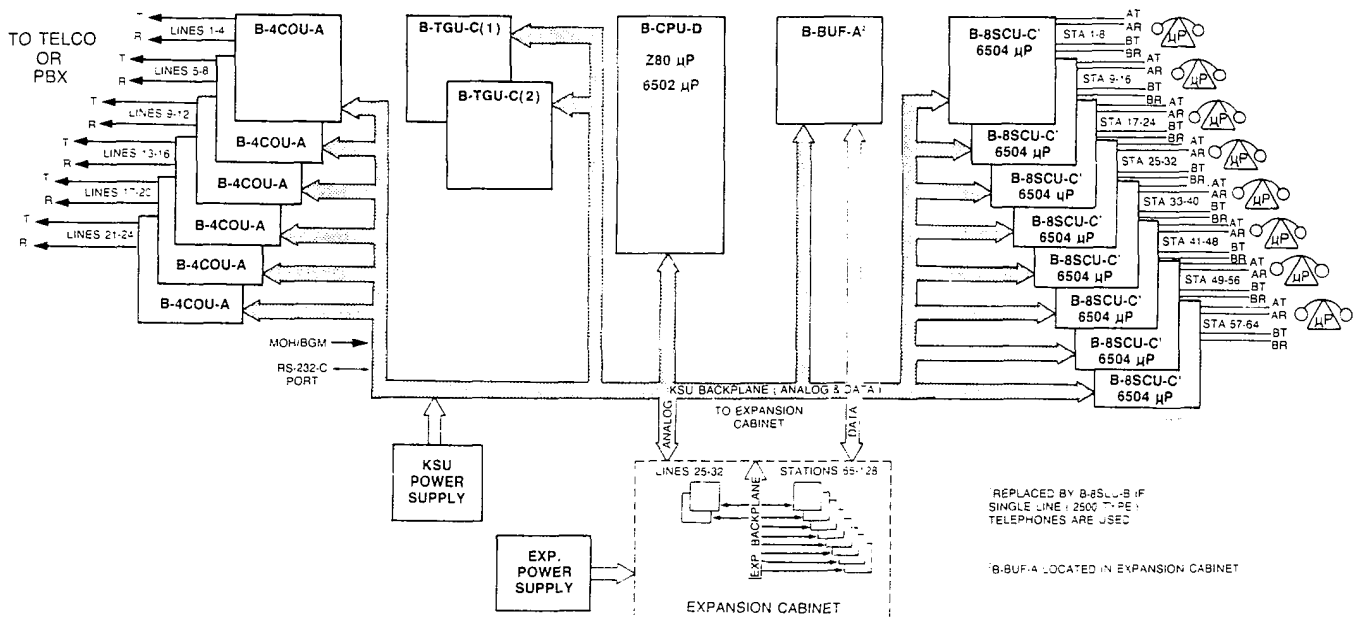
**2.08** This PCB provides access to two tie lines.

## B-BUF-A (Buffer) PCB

**2.09** The B-BUF-A PCB is installed in systems with an expansion cabinet (i.e., systems that require more than 24 lines and/or 64 stations). The B-BUF-A PCB connects the data from the 6502 Traffic Controller in the B-CPU-D PCB to the expansion cabinet backplane. This PCB plugs into the expansion cabinet.

## System Capacity

**2.10** A typical single KSU TCX-128 system can contain up to eight B-8SCU-C or B-8SLU-B PCBs (for station ports 001-064), and up to six B-4COU-A PCBs (for lines 1-24). If an expansion cabinet is added, the system can accommodate an additional eight B-8SCU-C or B-8SLU-B PCBs (for station ports 065-128), and two more B-4COU-A PCBs (for lines 25-32). A single B-TGU-C PCB (B-TGU-C1) can support a fully loaded KSU. If an expansion cabinet is used, an additional B-TGU-C PCB (B-TGU-C2) must be used to provide the Page, MOH and BGM amplifiers for the expansion components. The extra PCB is usually added as standard equipment anyway, to provide for additional DTMF receivers and/or generators.



**FIGURE 8-1 SYSTEM BLOCK DIAGRAM**



## System Summary

**2.11** The B-CPU-D PCB is the Central Processing Unit for the TCX-128 Telephone System. It uses a Z80 executive microprocessor and stored programs to make system traffic processing decisions. The Z80 communicates with a 6502 traffic control microprocessor to monitor the status of all stations and lines. The user can program selected configuration options by using a programming terminal, connected to the Z80 through the KSU RS-232-C data port.

**2.12** The 6502, under Z80 control, sends commands and receives interrupts from the B-4COU-A, B-8SCU-C and B-8SLU-B PCBs in the system. It provides, through the 6502 Data Bus, the signals that control the voice connections (analog crosspoints) between the telephones and the telephone company network.

**2.13** Dual Tone Multifrequency (DTMF) circuits in the B-TGU-C PCB(s) process dial commands from every station. In addition, the B-TGU-C provides tone generators for system supervisory tones, and amplifiers for Background Music, Music On Hold and Page. Analog crosspoints for lines 20 through 32 are also resident on the B-TGU-C.

**2.14** The B-8SCU-C PCB carries both voice band and digital control information to the system key telephones. Communication between the KSU and the telephones is over four conductor cable. The audio is connected to the telephone over the 'B' conductor pair. Control data, with DC power for the telephones simplex over it, is connected to the telephone 'A' conductor pair.

**2.15** The 2500 type telephones with special electronic ringers are connected to the system by B-8SLU-B PCBs. The special electronic ringers are DC powered and must be approved by TIE/communications, Inc. The single line telephone 'A' conductor pair carries audio, the DC loop current, and the "battery voltage" required by the single line set. The 'B' conductor pair supplies DC power and/or ringer control, depending on the special electronic ringer used.

**2.16** The single KSU system has the capacity of 64 stations and 24 outside lines. When used in conjunction with an expansion cabinet, a B-BUF-A interface PCB and additional B-4COU-A and B-8SCU-C/B-8SLU-B PCBs, the system capacity is extended to 128 stations and 32 lines.

**2.17** DC circuit power is derived from a separate power supply. The KSU and the expansion cabinet each have their own power supply.

### Analog (Audio) Connections

**2.18** The TCX-128 analog network (Figure 8-2) connects the audio (speech) circuits of 128 telephones to each other, to the tone generators and DTMF circuits in the B-TGU-C PCBs, and to the 32 outside lines. There are 32 talkpaths (audio paths) in the system. Twenty talkpaths are for the Direct Access Lines (lines 1-20). The remaining 12 are for the 10 Intercom links, Page and Background Music. The audio connections in the KSU backplane are formed into three busses: the Direct Access Line Bus, the Link Bus, and the Dial-Up Line Bus.

#### Direct Access Line Bus

**2.19** The first twenty lines in the system are the Direct Access Lines, connected to the first five B-4COU-A PCBs in the KSU. The audio circuits for each line (1-20) are connected to discrete paths in the Direct Access Bus. The bus presents audio for the Direct Access Lines to each of the eight B-8SCU-C PCBs. These lines are termed Direct Access Lines since they can be connected to any station through a single crosspoint (digitally controlled analog switch) closure on a B-8SCU-C or B-8SLU-B PCB.

**2.20** The Direct Access Bus also connects the Direct Access Lines to the B-TGU-C PCB(s). These PCBs interact with the lines to process dial commands and send supervisory tones back to the telephone.

## Link Bus

**2.21** The Link Bus is principally used to carry the Intercom traffic. It is comprised of 10 Intercom links (analog paths), a Page link and a Background Music (BGM) link. The KSU backplane circuitry connects the Link Bus to the eight B-8SCU-C and/or B-8SLU-B PCBs. One Intercom link is used when two stations are connected on an Intercom call. Key telephone voice information is connected to the B-8SCU-C PCBs over the station cable B-pair. Voice information from a 2500 type telephone is connected to the B-8SLU-B PCBs over the station cable A-pair.

**2.22** The B-TGU-C PCB(s) are also connected to the Link Bus. This allows for dial command processing (as with the Direct Access Lines) and provides supervisory tones for each station using the Intercom. In addition, the B-TGU-C PCBs contain the Page and Background Music amplifiers. Amplified Page and BGM signals are sent throughout the system on the dedicated Page and BGM links.

## Dial-up Line Bus

**2.23** Lines 21-32 are not Direct Access Lines, but can be used through the Dial-up Line Bus. The audio circuits for these dial-up lines are routed in the KSU backplane to a crosspoint matrix on the B-TGU-C PCB. The audio path to these lines is from the station, through an Intercom link, through the matrix to a dial-up line circuit, terminating at the selected line. Lines 21-32 are not Direct Access Lines since they require two crosspoint closures for a connection: one in the B-8SCU-C/B-8SLU-B PCB and one in the B-TGU-C PCB.

## Connection to the Expansion Cabinet

**2.24** The KSU audio paths are connected to the expansion cabinet through two ribbon cables. The Direct Access Line Bus and the Link Bus are extended to the expansion cabinet B-8SCU-C/B-8SLU-C PCBs. The stations connected to the expansion cabinet have full access to the Direct Access Lines (1-20) and the links. The Dial-up Line bus is extended to the two B-4COU-A PCBs assigned to lines 25-32.

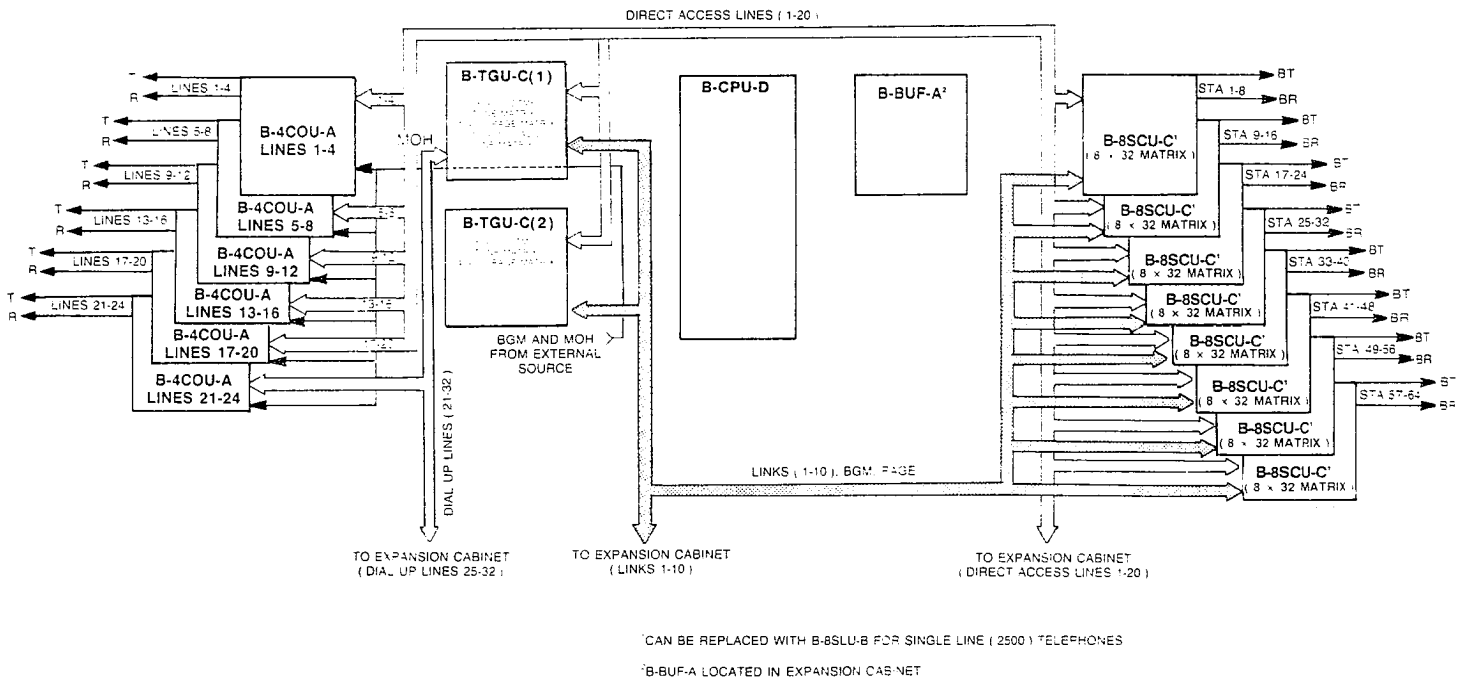


FIGURE 8-2 ANALOG (AUDIO) CONNECTIONS

## Data Connections

**2.25** Data communication between the PCBs in the KSU is over two backplane data busses (Figure 8-3): the Z80 Data Bus and the 6502 Data Bus.

### Z80 Data Bus

**2.26** The Z80 Data Bus is connected to the Z80 microprocessor and the Z80 family of components (called the Z80 chip set). The system memory and the B-TGU-C PCB(s) are also on the Z80 Bus. The Z80 Data Bus permits the Z80 executive microprocessor to communicate (through data buffers) to these system elements without interference from other components in the system.

### 6502 Data Bus

**2.27** The 6502 Data Bus is driven by the 6502 traffic control microprocessor and its chip set. It establishes a network of buffered handshake and control signals that link the 6502 traffic control microprocessor to the six B-4COU-A PCBs and the eight B-8SLU-B/B-8SCU-C PCBs. This structure allows the status of these circuit boards to be supervised independently of the Z80 executive. The 6502 traffic control microprocessor and the Z80 executive microprocessor communicate with each other through common interface circuitry called the

Common RAM (Common Random Access Memory). The Common RAM will be discussed later on.

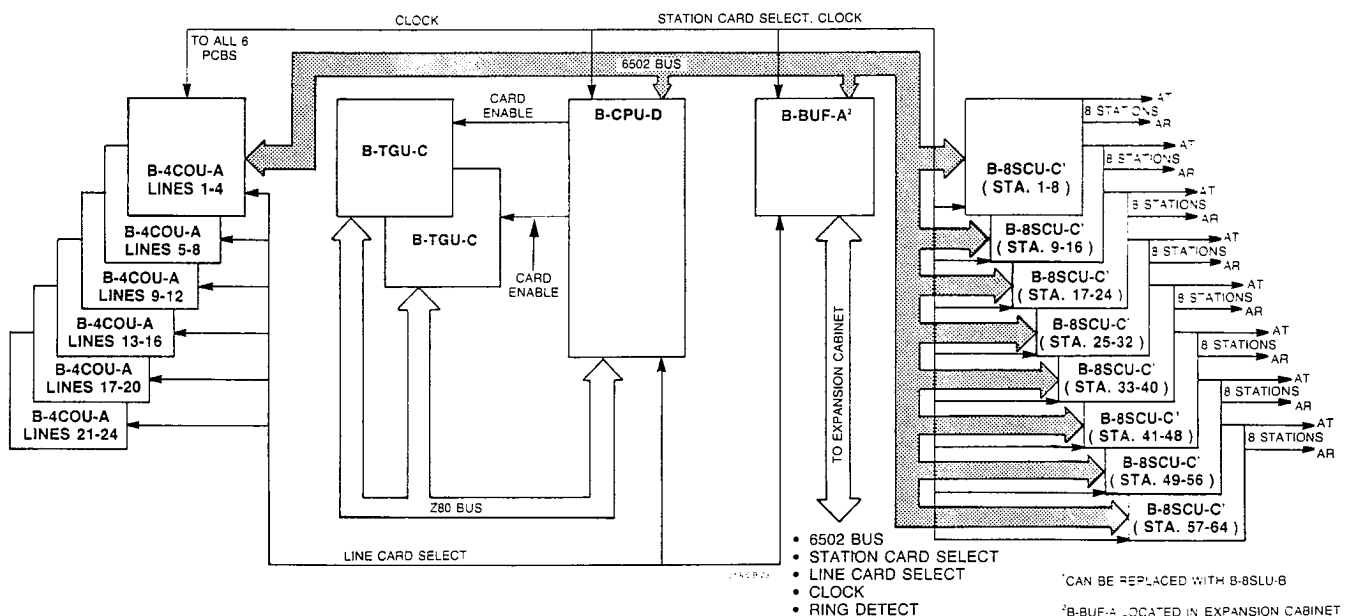
### Other Digital Signals

**2.28** There are other important digital (data) signals in the KSU, in addition to the main data busses. Each B-8SCU-C and B-8SLU-B PCB is controlled by an individual Station Card Select signal from the 6502 microprocessor. The B-4COU-A PCBs are similarly controlled by individual Line Card Select signals.

**2.29** To assure synchronous operation, a system clock signal is shared by the 6502 circuits, the B-4COU-A PCBs and the B-8SLU-B/B-8SCU-C PCBs.

### Data Connections to the Expansion Cabinet

**2.30** The ribbon cables that connect the KSU to the expansion cabinet contain the expansion data signals, as well as the analog signals previously discussed. The 6502 Data Bus, Station Card Select, Line Card Select and system clock pass through the B-BUF-A PCB before being routed in the expansion cabinet. The distribution of these signals in the expansion cabinet backplane is identical to the KSU, except that the expansion cabinet contains only two B-4COU-A PCBs. The Z80 data bus does not go to the expansion cabinet.



**FIGURE 8-3 DATA CONNECTIONS**

## DC Power Distribution

**2.31** DC power for the common equipment PCBs (Figure 8-4) is provided by a separate convection cooled power supply. The power supply produces regulated voltages of +5 V DC, +24 V DC and -24 V DC. These voltages are connected in the KSU backplane to all the PCBs, excluding the B-BUF-A PCB. The B-BUF-A PCB is connected to the +5 V DC line only. Each PCB in the system uses additional on-board DC regulation to maximize circuit stability and reliability.

**2.32** The DC power for the expansion cabinet PCBs is from a separate power supply connected only to the expansion cabinet. The expansion cabinet power supply is identical to the KSU power supply. Connection from the power supply to the KSU or expansion cabinet is through the power supply multiconductor cable.

**2.33** A temperature sensing device in the KSU works with circuitry in the power supply to monitor the temperature inside the KSU. When the maximum allowable temperature inside the KSU is exceeded (greater than 120 degrees F), these circuits cause the reset switch on the front of the power supply to pop up, revealing a white band. The power supply does not shut down.

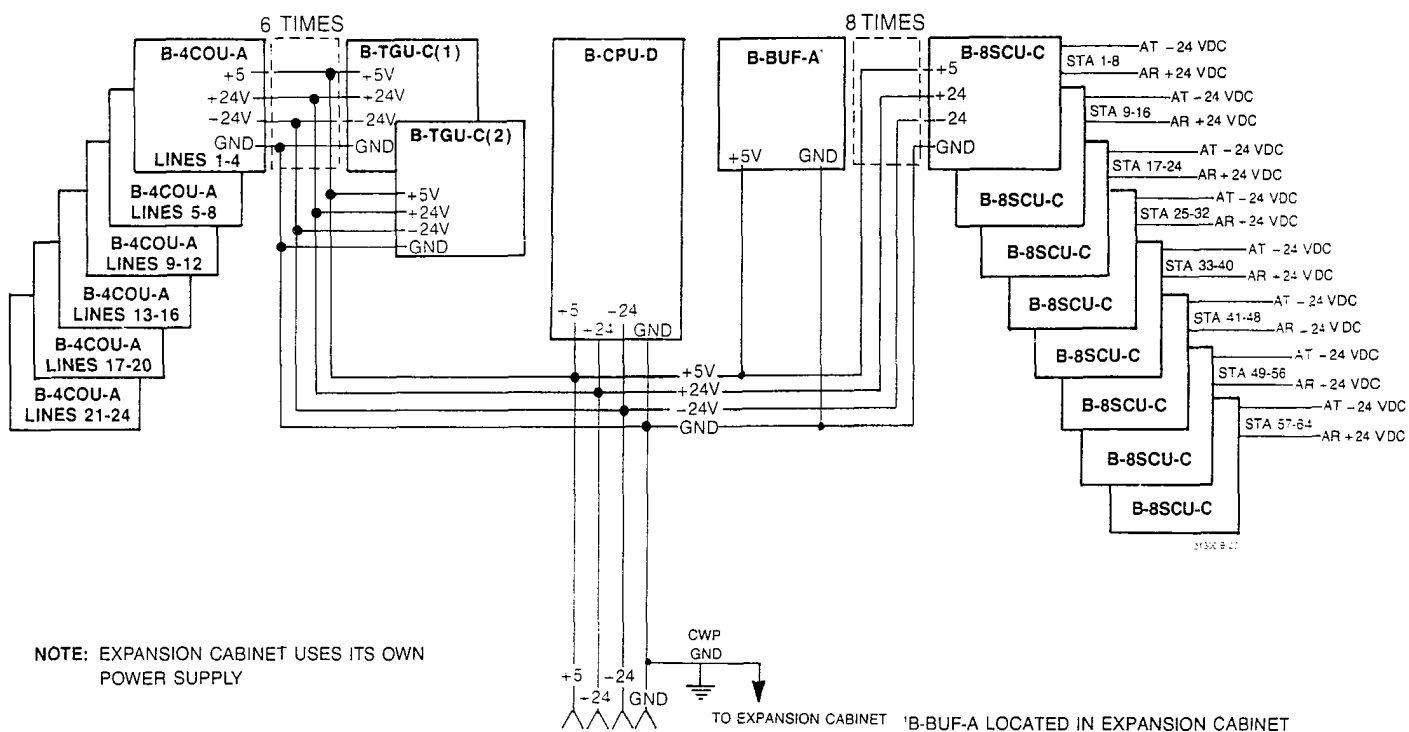


FIGURE 8-4 DC POWER DISTRIBUTION

## SOFTWARE OVERVIEW

**2.34** The TCX-128 software is structured in a three-tier hierarchy. This maximizes the efficiency of the Z80 executive microprocessor, the 6502 traffic control microprocessor and the 6504 station processors.

### 6504 Station Processor

**2.35** The 6504 station processor is the first tier in the hierarchy. Each B-8SCU-C PCB has a 6504 station processor that uses eight serial output ports to communicate with eight key telephones simultaneously. A complete update of telephone status requires two data frames (Figure 8-5). Each frame consumes approximately 25mS, allowing a complete update of telephone status every 50mS.

**2.36** A frame consists of 32 outbound data bits (OB0-OB31) and 64 inbound data bits (IB0-IB64). Outbound data bits are sent from the KSU to the telephone, and tell the telephone what to do (e.g., disable the dial pad, light a key LED). Inbound data bits are sent from the telephone to the KSU, and tell the KSU what the telephone user wants to do (e.g., seize a line, dial a digit). Each frame is preceded by a frame sync pulse, which synchronizes the 6504 processor in the B-8SCU-C PCB to the processor in the telephone.

**2.37** A data bit is assigned a unique function. The status of the data bit determines the status of the function to which it is assigned. The assignments never change, and are the same for all key telephones. For example, outbound bit OB0 is reserved for microphone mute. If the telephone microprocessor sees the bit set (on), it will mute the microphone. If the bit is cleared (off), the telephone microphone will not be muted.

**2.38** To begin the serial signaling, the KSU sends a frame sync pulse (T1) to the telephone. The telephone responds by sending back to the KSU bits IB0 and IB1 (T2). Once this data settles, the KSU transmits bit OB0 (T3). The sequence continues until the entire frame has been sent (T7). The second frame is sent in the same format (T8-T9). The inbound data bits are half as long as the outbound data bits, allowing incoming status information to be sent to the KSU twice as often. Data for all eight telephones is loaded into the processor simultaneously. All eight ports send frame sync pulses at the same time, receive incoming bits IB0 and IB1 at the same time, etc.

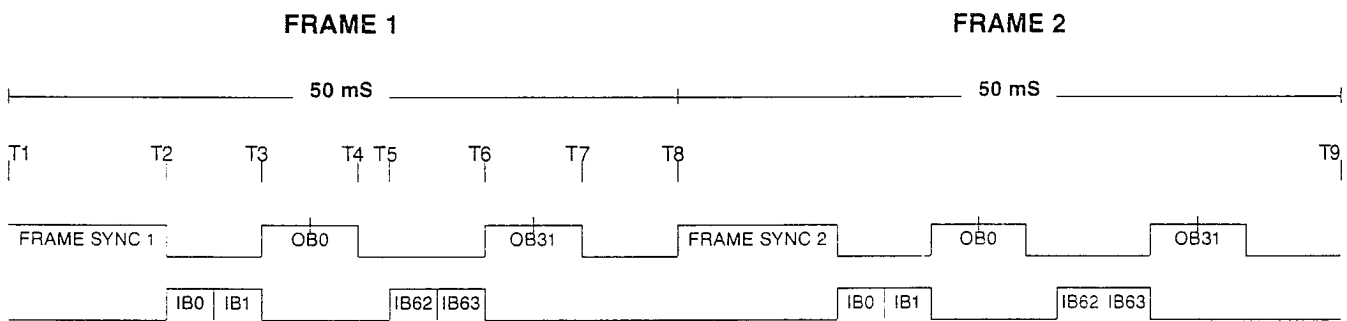


FIGURE 8-5 DATA FORMAT

## 6502 Traffic Control Processor

**2.39** The 6502 traffic control processor is the second tier. It monitors the 6504 for telephone status changes, and is in turn monitored by the Z80 executive. The 6504 station processor sets a status flag if there is any change of state in the telephone (for example, if a user tries to place a call). The 6502 traffic controller polls each B-8SCU-C PCB and looks for these status flags. If it finds one set, it pulls the data from the appropriate 6504 in parallel across the 6502 Data Bus and sets its own status flag. The Z80 executive continually polls the 6502 traffic controller, looking for a set status flag. If it finds one, it takes the data in parallel from the 6502 and processes it. Commands from the Z80 executive to the telephone use the inverse of this relationship. The 6502 also polls the B-4COU-A PCBs, looking for line status (Ring Detect, etc.).

**2.40** To communicate with the B-4COU-A, B-8SCU-C and B-8SLU-B PCBs, the 6502 uses card enable signals (interrupts) in conjunction with system address and read/write controls. In other words, before the 6502 can look at a PCB two conditions must be met: the PCB must be receiving a card enable signal (Line Card Enable or Station Card Enable) and the PCB must be correctly addressed (i.e., have the correct combination of bus address signals). The read/write controls determine whether the 6502 is writing (sending data) into the card or reading (receiving data) from it.

## Z80 Executive Microprocessor

**2.41** The Z80 executive microprocessor is the third tier, and makes virtually all the traffic processing decisions for the system. The three-tier scheme dramatically increases the efficiency and speed with which the Z80 makes these decisions. If the system is idle, the Z80 does nothing more than poll for status changes. When the Z80 has to process a call, it processes only the call indicated. This is a tremendous advantage over systems that require the executive microprocessor to Time Division Multiplex every bit for every telephone.

## 3. PRINTED CIRCUIT BOARDS

### B-CPU-D CENTRAL PROCESSING UNIT PCB

**3.01** The B-CPU-D PCB (Figure 8-6) contains the microprocessors, memory elements and control circuits that allow all system traffic to be under direct executive program control. The B-CPU-D is structured around the Z80 executive microprocessor and the 6502 traffic control microprocessor, communicating with each other through common interface circuitry (the Common RAM).

### The Z80 Chip Set and System Memory

**3.02** The Z80 is a full featured, eight bit microprocessor. It is directly connected to the Z80 chip set: the Z80 Parallel Input/Output (PIO) circuit, the Z80 Counter/Timer (CTC) circuit, and the Z80 Dual Asynchronous Receiver/Transmitter (DART) circuit. The outputs of the Z80 and the Z80 chip set provide the signals for the Z80 Data Bus.

**3.03** The Z80 PIO is a dual port input/output device. Channel A of the PIO looks at the settings of the 8-bit data option switch, and sends the switch status to the Z80. This switch is used to match the output of the RS-232-C port to the requirements of the programming/SMDR terminal. The B channel of the PIO generates the system reset signal (to the B-8SLU-B and B-8SCU-C PCBs) and the 6502 traffic reset signal. It also selects the block (map) of system memory that the Z80 will address. (The TCX-128 uses a three map memory mapping technique to extend the memory capacity of the Z80 past its normal limits.) The PIO B channel and reset switch S1 provide the inputs to the watchdog timer. If the PIO stops outputting data, or S1 is pressed, a reset signal is sent to the Z80. Additionally, the PIO drives Z80 status LED DS1. This LED flashes 250mS on and 250mS off to indicate that the Z80 executive microprocessor is running. The PIO also can control the Z80-6502 common interface circuitry (the Common RAM).





**3.06** The Z80 executive is connected over the Z80 Data Bus to the system memory. This memory consists of 68K of Erasable Programmable Read Only Memory (EPROM), 16K of battery backed-up Random Access Memory (RAM), and 8K of scratch pad RAM. The EPROM contains the system operating software. This software is factory installed and cannot be erased or altered. The 16K of battery backed-up RAM is used to store the programmable system options and Speed Dial numbers. The scratch pad RAM is used by the B-CPU-D for temporary storage of data during traffic processing.

**The 6502 Chip Set**

**3.07** The 6502 is a sophisticated eight bit micro-processor, with somewhat less the capabilities of the Z80. Its main function is to monitor the 6504 station processors (in the B-8SCU-C/B-8SLU-B PCBs) for call activity. The traffic control microprocessor also is responsible for display telephone message generation, Dial Pulse control, ring detection, and loop current detection. It also generates time and date for the system. The 6502 works with its own chip set: the 8K traffic control EPROM, the 4K traffic control scratch pad RAM, and the 6502 PIO.

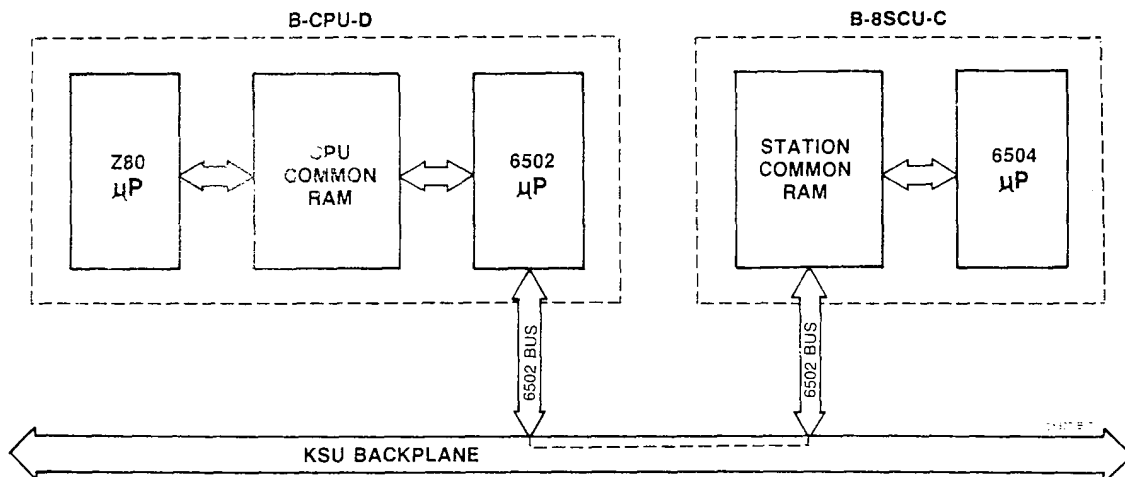
**3.08** The 8K traffic control EPROM stores the 6502 factory-installed operating software. The 4K RAM is used during traffic processing, and is not battery backed-up. The 6502 PIO is similar to the Z80 PIO, and is used to control the common interface circuitry (the Common RAM). The PIO also flashes the 6502 status LED DS2 approximately 500mS on and 500mS off. The 6502 chip set outputs to the 6502 Data Bus, which is extended throughout the KSU backplane to the system PCBs.

**3.09** Control interrupts are sent to the B-4COU-A PCBs and the B-8SCU-C/B-8SLU-B PCBs. The interrupts sent to the B-4COU-A PCBs are the Line Card Select signals. The interrupts sent to the B-8SCU-C/B-8SLU-B PCBs are the Station Card Select signals. The system uses these control interrupts to attach a PCB to the 6502 Data Bus for processing.

**CPU Common RAM**

**3.10** The CPU Common RAM is the interface between the Z80 and 6502 microprocessors (Figure 8-7). The Common RAM frees the Z80 executive from the burden of repetitive polling of all the stations in the system. This structure increases the efficiency of both the Z80 executive and 6502 traffic controller since the two processors do not have to run in synchronization.

**3.11** The CPU Common RAM functions as a dual directional, interrupt driven data buffer. For example, if the 6502 sees the status flag for a 6504 station processor set, it pulls the data from the 6504 and loads it into the common RAM. The 6502 then notifies the Z80 that information is waiting to be acted on. The Z80 then reads the data from Common RAM and processes it. Similarly, data output from the Z80 is buffered in the Common RAM until pulled out by the 6502. Access to the CPU Common RAM is controlled by the Z80 and 6502 PIO circuits. The Station Common RAM is discussed below in paragraph 3.31.



**FIGURE 8-7 CPU COMMON RAM**

## System Clocks

**3.12** All synchronous system timing is based on the 4MHz crystal controlled clock. The clock circuitry outputs a stable 4MHz to the Z80. It also generates a 2MHz timing clock and a 1MHz system clock. These latter signals are connected to the 6502, the B-BUF-A PCB and all the B-8SCU-C/B-8SLU-B PCBs in the system.

## DC Power Distribution

**3.13** The B-CPU-D uses the +24 V DC, -24 V DC and +5 V DC from the backplane to drive on-board regulators for circuit power. The +24 V is regulated down to +12 V; the -24 V is regulated to -12 V. The +5 V from the backplane passes through additional filters and is output (TPI) to the B-CPU-D components.

## Summary

**3.14** The B-CPU-D PCB contains the Z80 executive microprocessor, the 6502 traffic control processor, and the interface circuits that allow these devices to control the system. The processors communicate with each other through the Common RAM. This PCB also contains the system stored operating software, memory and clock circuits. The B-CPU-D PCB is connected to the system over two data busses: the Z80 Data Bus and the 6502 Data Bus.

## B-TGU-C TONE GENERATOR UNIT PCB

**3.15** The B-TGU-C PCB (Figure 8-8) consists of Dual Tone Multifrequency (DTMF) generators and receivers; system tone generators; amplifiers for Background Music (BGM), Music On Hold (MOH) and internal Page Zones; and relay contacts to control external ringers and audio equipment. The B-TGU-C is connected directly to the Z80 Data Bus, and is addressed by the Z80 as if it were memory.

## DTMF Generators

**3.16** DTMF generators accept digital signals from the Z80 Data Bus and convert them to DTMF tones. For telephones with data dialers (such as the multibutton display set), these generators allow dial commands to be sent as part of the telephone serial data stream, processed by the Z80, and then converted to tones by the DTMF generators. The Z80 time shares (multiplexes) the DTMF generators, which allows many calls to be manually dialed without delay. Generators are only seized for an entire dialing sequence when using Speed Dial numbers and Last Number Redial. Input to the DTMF generators is from the Z80 Data Bus. Output is to the DTMF/Tone Matrix (crosspoints). Each B-TGU-C PCB has two DTMF generators. If two B-TGU-C PCBs are installed, the position of an on-board address jumper identifies each PCB to the Z80 Data Bus.

## DTMF Receivers

**3.17** DTMF receivers accept DTMF tones from the telephones (via the DTMF/Tone Matrix) and convert them to digital signals. These signals are sent out on the Z80 Data Bus and received by the Z80 for processing. Single line, 2500 type, four button and multibutton telephones (without displays) have DTMF dialers. When one of these telephones places a call, a DTMF Receiver is attached (through a crosspoint in the DTMF Tone Matrix) until the dialing is completed, or until a six-second timeout occurs. Although the dialed tones are coupled to the telco via the station audio pair, the digital equivalent of the tones is used by the Z80 for Toll Restriction and SMDR purposes. Each B-TGU-C PCB has two on-board DTMF receivers. Two more DTMF receiver daughter boards can be plugged into each B-TGU-C PCB, for a system total of eight.

### Tone Generators

3.18 Tone generators produce the various tones used by the system. Tone 1 is a combination of 350Hz and 440Hz, and is used for Intercom dial tone. Tone 2 is a combination of 440Hz and 550Hz, and is used for incoming ring, busy and other supervisory tones. The output from the tone generators is constant. The tone switching is all done in the DTMF/Tone Matrix.

### External Relays

3.19 The B-TGU-C PCB contains two dry relay contacts, under program control, that can be used to control external paging and loud ring equipment. The relays (designated 1 and 2) receive control signals from the Z80 Data Bus. The relay contacts are connected, through the KSU backplane and a Type 57 'P' connector, to a designated 66M1-50 connecting block on the installation backboard.

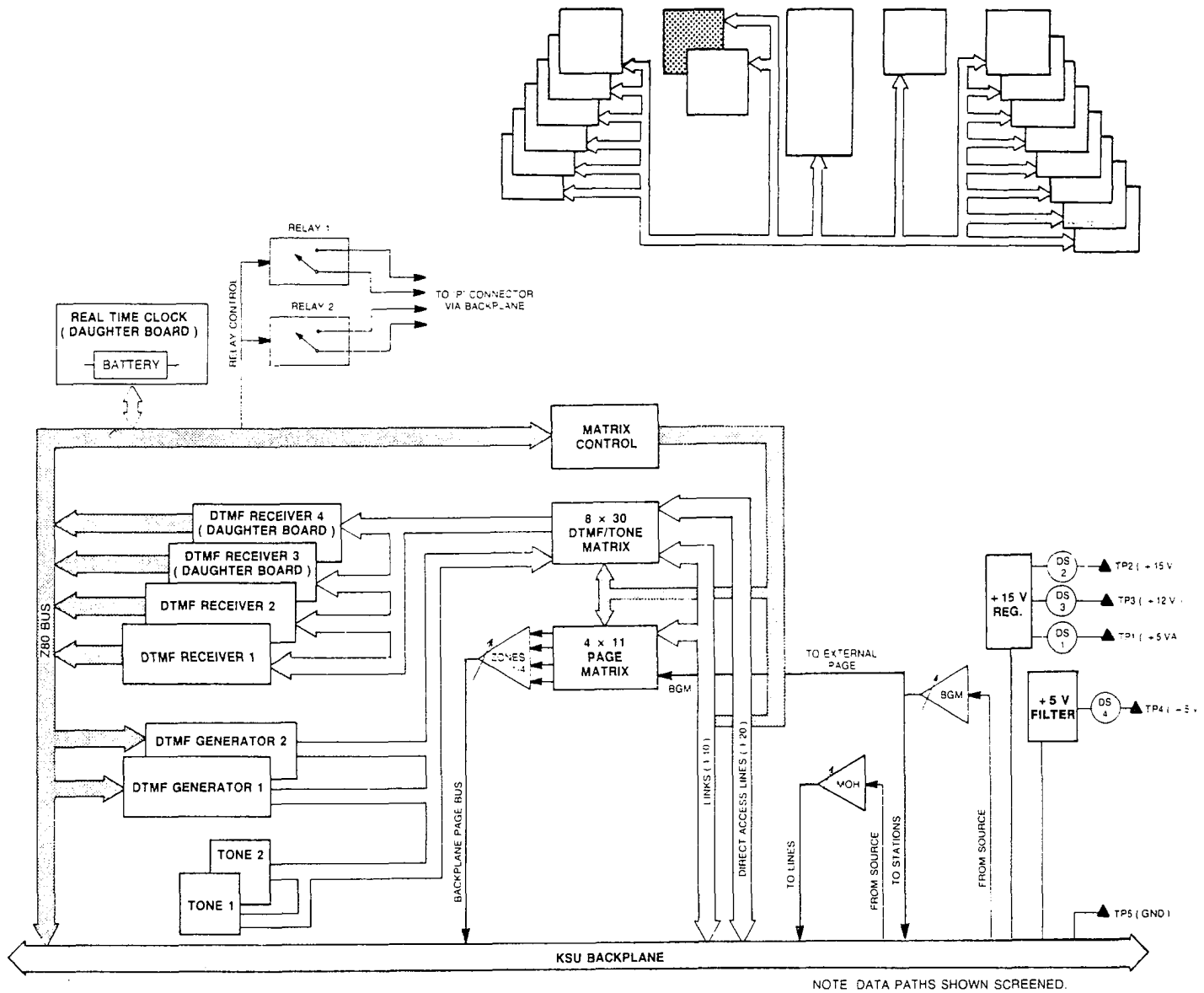


FIGURE 8-8 B-TGU-C TONE GENERATOR UNIT PCB BLOCK DIAGRAM

### Crosspoint Matrixes

3.20 All analog (voice) switching is done in crosspoint matrixes, which are electronic switching circuits controlled by digital signals. Depending on the state of the digital control signals, any input can be connected to any output. A typical crosspoint arrangement is shown in Figure

8-9. The crosspoint matrixes on the B-TGU-C PCB are controlled by the Matrix Control decoder, which is in turn controlled by the Z80 Data Bus. There are three crosspoint matrixes: the DTMF/Tone Matrix, the Page Matrix and the Dial-up Line Matrix.

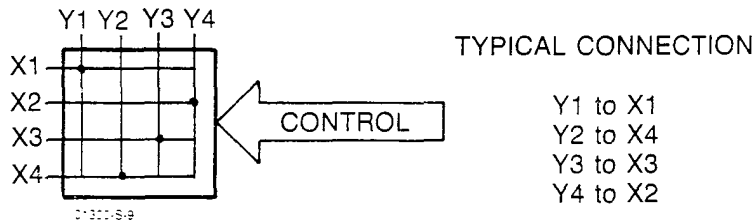


FIGURE 8-9 CROSSPOINT MATRIX

## DTMF/Tone Matrix

3.21 The DTMF/Tone Matrix is an 8 X 30 crosspoint array that can connect any combination of the 20 direct access lines or 10 Intercom links (30) to the four DTMF receivers, two DTMF generators or two tone generators (8). The links and direct access lines connect to the matrix through the KSU backplane. Any 8 X 8 connection can be made at any one time.

## Page Matrix

3.22 The 4 X 11 Page Matrix is used to connect the 10 Intercom links and Background Music to the four Page amplifiers. As shown in Figure 8-10, a Paging announcement comes from a telephone into the B-TGU-C on an Intercom link. The matrix in the B-TGU-C connects the link to all of the Page amplifiers. Each amplifier sends the Paging signal to 16 stations (two B-8SCU-C PCBs) on the dedicated Page link. The first B-TGU-C PCB in the system provides four amplifiers to drive the Page links for the KSU. The second B-TGU-C PCB provides four amplifiers to drive the Page links for the expansion cabinet.

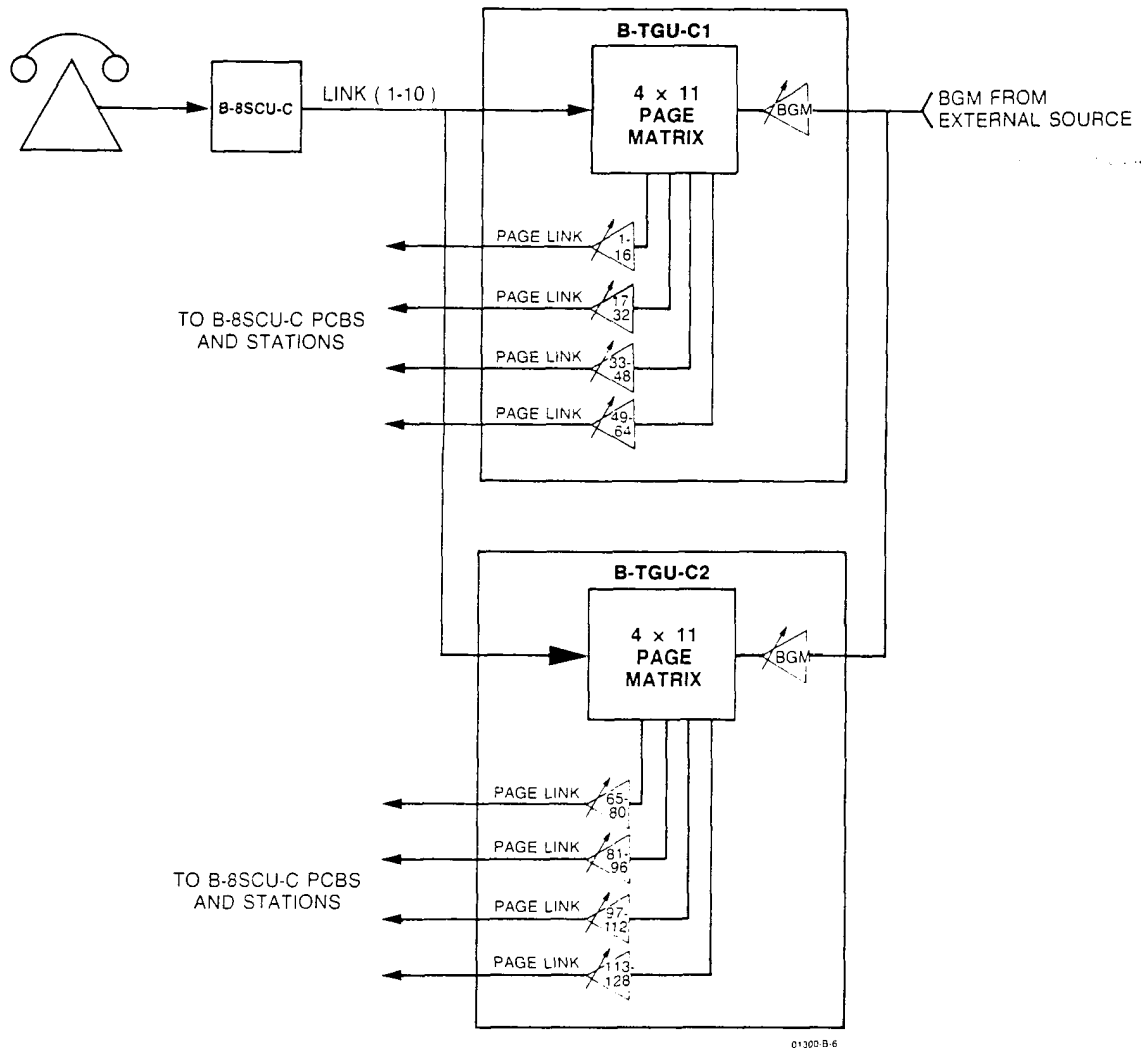


FIGURE 8-10 PAGING



**3.23** The Paging announcements a station receives are determined by the hardware Page Zone and the software Page Zone to which it is assigned. There are four hardware Page Zones on each B-TGU-C PCB, with one Page amplifier in each zone. Each Page amplifier on the B-TGU-C PCB drives the Page link for 16 consecutive station ports (i.e., one hardware Page Zone is served by two B-8SCU-C PCBs). The hardware Page Zone for a station is derived from the KSU slot its B-8SCU-C PCB is plugged into. (Note that the level of the signal on the Page link is regulated by its dedicated potentiometer, located on the front edge the B-TGU-C PCB.) For example, the first Page amplifier drives the Page link for the B-8-SCU-C PCBs plugged into slots J13 and J14 (ports 001 through 016).

**3.24** The software Page Zone for a station is determined by how the system software controls the crosspoint matrix on the B-8SCU-C PCB. When a Page is made, all the crosspoints in the B-TGU-C PCB Page matrix close, enabling all the Page links in the system. While the first Page is being made, another Page (either zone or All Call) cannot be made. The Z80 interprets the Page programming, and works with the 6502 traffic controller and the 6504 station processors to cause the crosspoints on each B-8SCU-C PCB to send the announcement to the appropriate key telephones. Since the actual Page switching is done in the B-8SCU-C PCB crosspoint matrix, complete flexibility in Page Zone assignments is obtained. For example, assume that station 301 (port 001) is the only station assigned to Page Zone 4 in station programming. When another user dials 64 to initiate a zone Page, the announcement is amplified in all the B-TGU-C PCB Page amplifiers and sent out on all the Page links. The Page link crosspoint in the B-8SCU-C PCB for port 001 (hardware zone 1) closes, sending the announcement only to station 301. The hardware Page Zones and the software Page Zones are the same only if the Page programming is not altered from the default values.

### Dial-Up Line Matrix

**3.25** Lines 21-32 are accessible through the Dial-Up Line Matrix. This crosspoint matrix (10 X 12) allows selection between the 10 Intercom links and the 12 non-direct access lines. Connection to lines 21-32 is from the telephone, through an Intercom link, and out to the line through a crosspoint in the Dial-Up Line Matrix. Access to the high numbered lines always requires two crosspoint closures: one on the B-8SCU-C/B-8SLU-B PCB to a link, and the other on the B-TGU-C PCB to the line circuit.

### Music On Hold and Background Music Amplifiers

**3.26** Music On Hold and Background Music from the external music source(s) is connected to the components through the amplifiers on the B-TGU-C PCB. The Background Music signal from the external source is amplified in the BGM amplifier and sent out to all key stations. It is also sent to the Page amplifiers through the Page Matrix. Music On Hold, from the same or a separate source, is amplified and sent to each line circuit.

### On-Board DC Regulation

**3.27** The B-TGU-C pulls +24 V and +5 V from the KSU backplane. The +24 V line is input into a regulator that produces +15 V (DS2 and TP2), +12 V (DS3 and TP3) and +5 VA (DS1 and TP1). The +5 V line is additionally conditioned by the +5 V filter (DS4 and TP4).

### Summary

**3.28** One B-TGU-C PCB (B-TGU-C1) provides two DTMF generators, up to four DTMF receivers, system tones, Page link and music drivers (amplifiers) for the KSU and two sets of dry external relay contacts. The addition of the second B-TGU-C (B-TGU-C2) provides two more DTMF generators (system total of 4), up to four more DTMF receivers (system total of 8), system tones for the expansion cabinet, and Page link and music drivers (amplifiers) for the expansion cabinet.

### B-8SCU-C STATION CONTROL UNIT PCB

**3.29** The B-8SCU-C PCB (Figure 8-11) is the control unit for eight multibutton and/or four button key stations. The heart of the B-8SCU-C PCB is the 6504 station processor. This processor works with the 6502 traffic controller in the B-CPU-D to monitor the data flow to and from the telephone, and connect the telephone audio path to the outside lines and other stations in the system.

### 6504 Station Processor Chip Set

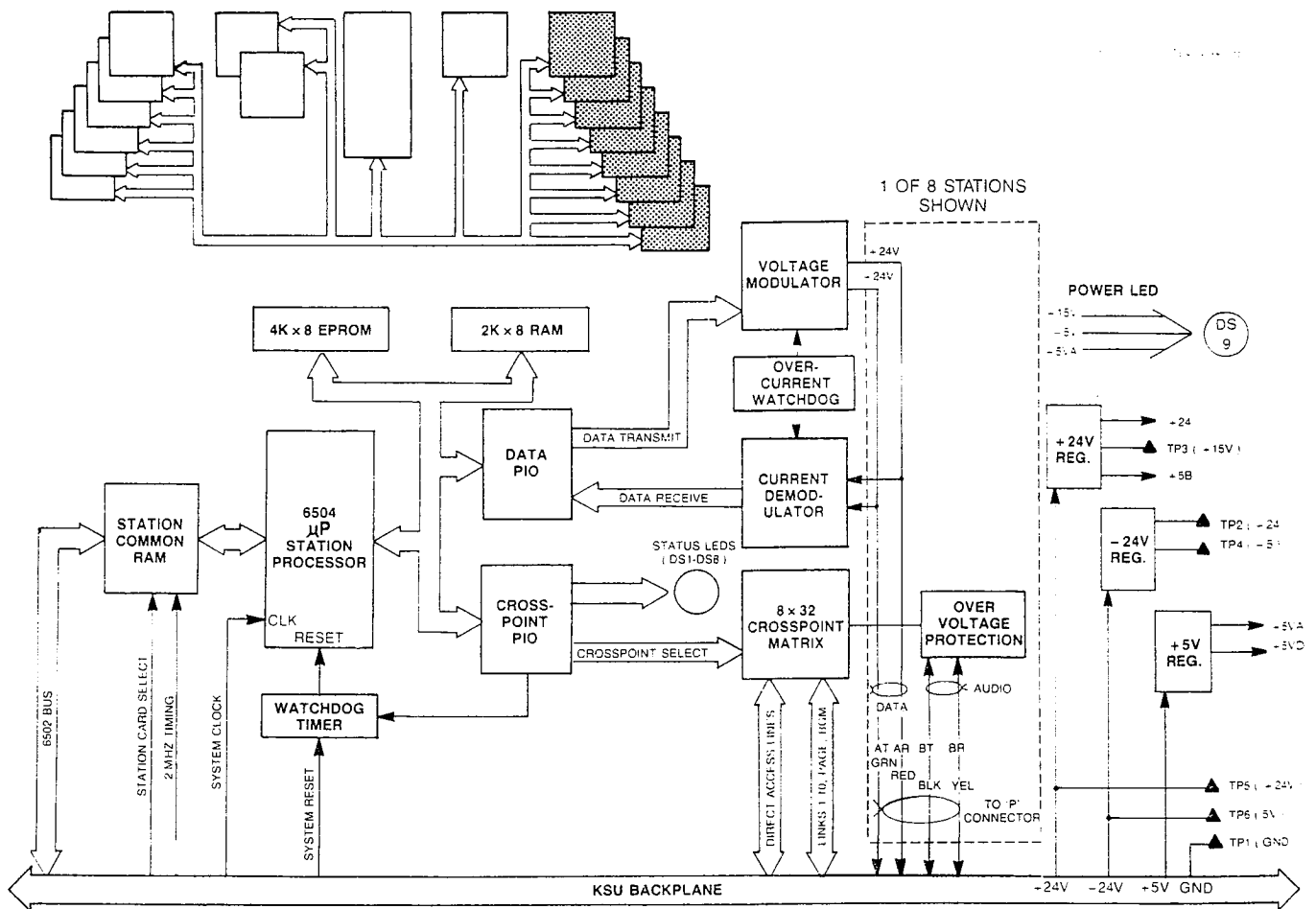
**3.30** The 6504 station processor is an eight bit microprocessor, with somewhat fewer capabilities than the 6502 traffic control microprocessor. It communicates with the B-CPU-D PCB through the Station Common RAM, and with the key stations via the Data and Crosspoint PIOs. The 6504 is supported by 4K X 8 EPROM (containing the station processor operating program) and 2K X 8 RAM.

**3.31** The 6504 has two "sides," the 6502 (CPU) side and the station side. The Station Common RAM is on the 6502 side. If there is a change of state in the data from any of the eight telephones, the change is loaded into the Station Common RAM by the 6504. A change of state flag is also set. The 6502, using its data bus, periodically polls the Station Common RAM. When it sees the change of state flag set, it pulls the data from the Common RAM and works with the Z80 to process it. When data is to be sent to the telephone, the 6502 sends the Station Card Select interrupt to the Station Common RAM and loads in the data. The next time the 6504 polls the Common RAM, it accepts the data and sends the change to the telephone.

**3.32** The Data PIO and the Crosspoint PIO are on the station side of the 6504. The Crosspoint PIO accepts control data from the 6504 and generates, through

its A channel, crosspoint select signals for the station crosspoint matrix. The Crosspoint PIO B channel controls the station status LEDs (DS1 through DS8). The Data PIO is configured for bidirectional operation. The Data PIO sends eight channels of station transmit data to the Voltage Modulator, and receives eight channels of station receive data from the Current Demodulator.

**3.33** The 6504 is monitored by the Watchdog Timer. The watchdog receives input from the Crosspoint PIO and the system power-on reset signal. If the Crosspoint PIO stops sending data to the telephones, or a master reset command is received from the B-CPU-D PCB, the 6504 will be reset. If neither of these conditions occur, the watchdog will be continually refreshed.



**FIGURE 8-11 B-8SCU-C STATION CONTROL UNIT PCB BLOCK DIAGRAM**





## Data Receive and Transmit Circuits

**3.34** The Data PIO sends and receives eight channels of telephone status data from eight discrete station data circuits. Each station data circuit consists of a Voltage Modulator and a Current Demodulator. Transmit data voltage (from the KSU to the telephone) is input into the Voltage Modulator circuit, which superimposes (simplexes) the data onto the station wire A-pair carrying the DC power for the telephone. The green wire carries -24 V and the red wire carries +24 V. The amplitude of the transmitted data is slightly less than 1 volt (250-750 mV). Data detectors in the telephone interpret the B-8SCU-C PCB transmit data.

**3.35** Inbound data (current) is received on the green and red wires by the Current Demodulator. (Remember that OB data bits are voltage, and IB data bits are current.) The steady state current on the red and green wires is about 77mA. A set data bit will momentarily increase the current by 3-7mA. The receive data (i.e., a set data bit) is current detected by the demodulator and sent to the receive channel on the Data PIO, which in turn sends the data to the 6504. The Current Demodulator inputs a sample into the Over-Current Watchdog. If excessive current is detected, indicating a problem with the telephone, the Voltage Modulator for that telephone is shut down and the station is taken off line. Periodically the station is sampled for corrected current levels. If the problem has gone away, the station is brought back on line.

## Station Crosspoint Matrix

**3.36** The 8 X 32 Crosspoint Matrix switches audio from the eight telephones onto the 10 Intercom links, the Page link, the BGM link and the 20 Direct Access Lines. The matrix is controlled by the Crosspoint PIO. The telephone audio is on the two B-pair station wires (black and yellow). The audio wire pair does not carry DC voltage. The B-pair is connected to the Overvoltage Protection network before going to the crosspoint matrix.

## On-Board DC Regulation

**3.37** The B-8SCU-C PCB contains on-board regulators for the +24 V, -24 V and +5 V lines. The +24 V line (TP5) from the backplane is input into the +24 V regulator. This regulator generates +24 V, +15 V (TP3) and +5B. The -24 V regulator outputs -24 V (TP2) and -5 (TP4). The +5 V (TP6) regulator produces +5 VA and +5 VD. Power LED DS9 senses +15 V, -5 V and +5 VA. If these voltages are present, DS9 is on. If any of the voltages is incorrect, DS9 is out.

## Summary

**3.38** The B-8SCU-C PCB is structured around the 6504 station processor and supports eight key stations. The Station Common RAM allows the 6504 to carry on its tasks efficiently, communicating with the 6502 traffic control processor only when a change of state is sent or received from the telephone. Data transmission between the KSU and telephone, made possible by the Voltage Modulator and Current Demodulator, is over the station A-pair. Station audio, switched in the crosspoint matrix, is on the station B-pair.

**3.39** Stations communicate with the B-8SCU-C over four conductor station cable, with the wires defined as follows:

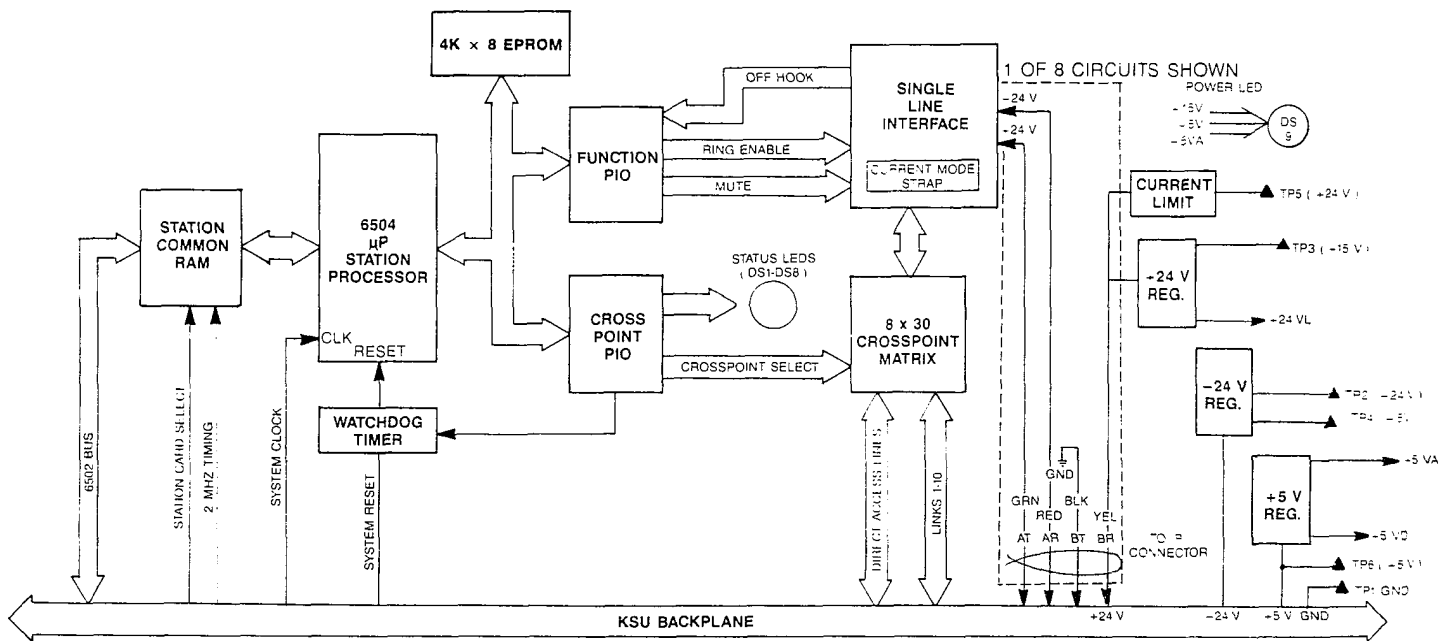
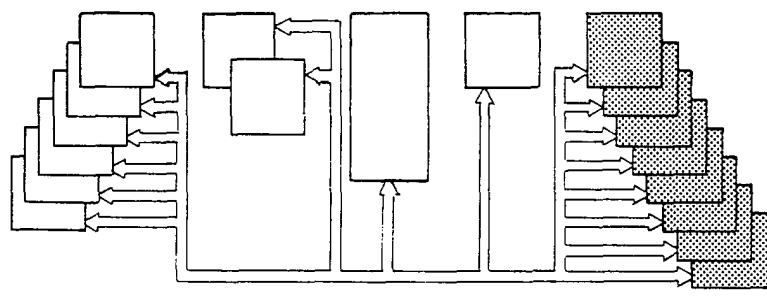
DESIGNATION	COLOR	FUNCTION
AT	GRN (green)	-24 V and data
AR	RED (red)	+24 V and data
BT	BLK (black)	Audio
BR	YEL (yellow)	Audio

**B-8SLU-B SINGLE LINE UNIT PCB**

**3.40** The B-8SLU-B PCB (Figure 8-12) is installed in place of the B-8SCU-C PCB if 2500 type telephones are to be used. The B-8SLU-B PCB uses the same 6504 station processor, PIOs, Common RAM and crosspoint matrix as the B-8SCU-C PCB. The single line interface replaces the data receive/transmit circuits used for the key telephones. The B-8SLU-B PCB supports eight 2500 type telephones. Since the single line telephone is not a data telephone, there is no requirement for repetitive polling of the stations.

**6504 Station Processor Chip Set**

**3.41** The 6504 station processor works with the station Common RAM and the 6502 traffic control processor to control the single line telephones. As in the B-8SCU-C PCB, interrupts from the 6502 tell the 6504 to change the status of the telephones. The 6504 in turn can set a status bit to indicate to the 6502 that the telephone user is placing a call. The Watchdog Timer, Station Card Select signal and the system clock serve the same functions as in the B-8SCU-C PCB. The operating software for the single line station processor is contained in the 4K X 8 EPROM.



**FIGURE 8-12 B-8SLU-B SINGLE LINE UNIT PCB BLOCK DIAGRAM**

**3.42** The B-8SLU-B Crosspoint PIO performs the same functions as the Crosspoint PIO in the B-8SCU-C PCB. It receives control data from the 6504 and provides crosspoint addresses to the 8 X 30 Crosspoint Matrix. The Crosspoint PIO also drives the station status LEDs (DS1-DS8), and refreshes the Watchdog Timer (along with system reset).

**3.43** The Function PIO is required to monitor only three control signals for each telephone, not a constant stream of incoming and outgoing data as in the B-8SCU-C PCB. These signals are: off hook from the telephone, ring enable to the telephone ringer circuit, and mute to the telephone handset. The Single Line Interface circuits for each station connect the Function PIO to these signals.

### Single Line Interface

**3.44** The B-8SLU-B PCB contains a Single Line Interface circuit for each of the eight telephones it supports. The Single Line Interface provides the 48 V DC, necessary to power the single line telephone, that is normally provided by the telco Central Office battery. The green wire in the A-pair sends +24 V DC; the red wire sends -24 V DC. The black wire in the B-pair provides ground; the yellow wire provides a current limited +24 V for certain special ringers.

**3.45** When the 2500 type telephone is idle, no significant current flows in the A-pair. When the user lifts the handset, and the telephone hookswitch contacts close, off hook current flows in the A-pair and is sensed by a current detector in the Single Line Interface. The detector sends an off hook digital signal to the Function PIO, which connects to the 6504.

**3.46** The command to ring a single line telephone comes from the 6502 traffic controller in the B-CPU-D. It is interpreted by the 6504 and is sent to the Single Line Interface by the Function PIO. The Single Line Interface then grounds the +24 V line (the green wire in the A-pair). This condition is monitored by the components on the Special Loud Ringer Board, which then excites the ringer in the telephone.

**3.47** The third Function PIO control signal is for handset muting. During Speed Dialing, the mute circuit in the Single Line Interface is enabled so that the Speed Dial digits are muted in the telephone handset receiver.

**3.48** The current mode strap in the Single Line Interface is used to match the current capacity of the A-pair to the type of telephone used. The low current mode (strap E2 to E3) is used for the Single Line Telephone and Off Premise Extensions. The high current mode (strap E1 to E2) is for standard 2500 type single line telephones.

### Crosspoint Matrix

**3.49** The B-8SLU-B PCB switches telephone audio in the 8 X 30 crosspoint matrix. Audio from eight telephones can be connected to any of the 20 Direct Access Lines or the 10 Intercom links. The matrix does not use crosspoints for BGM and Page, since single line telephones do not have speakers to receive these signals. The outputs of the crosspoints are connected to the telephone through the A-pair.

## On-Board DC Regulation

**3.50** On-board DC regulators use the +24 V, -24 V and +5 V from the KSU backplane. The Current Limit outputs +24V (TP5) for the B-pair yellow wire. The +24V regulator generates +24 VL for the A-pair green wire and +15 V (TP3). The -24 V regulator outputs -24 V (TP2) for the A-pair red wire and -5 V (TP4). The +5 V line (TP6) is regulated to +5 VA and +5 VD. If +15 V, -5 V and +5 VA are present, DS9 is on. If any of these voltages is incorrect, DS9 is out.

## Summary

**3.51** The B-8SLU-B PCB connects eight single line or 2500 type telephones to the system. This PCB is similar in most respects to the B-8SCU-C PCB used for the key telephones, except that the Single Line Interface is used in place of the receive and transmit data circuits. The B-8SLU-B PCB provides each telephone with power (+/-24 V DC), off hook loop current detection, an audio path and circuits to excite the special ringers.

## B-4COU-A CENTRAL OFFICE UNIT PCB

**3.52** Each B-4COU-A PCB (Figure 8-13) contains the circuits to connect four Central Office or PBX lines to the system. This circuit board provides incoming ring detection, loop supervision, loop relay enable (line seize), Conference balancing, Music On Hold and audio amplifier circuits for each of the four lines. The B-4COU-A PCB is controlled by the 6502 traffic control processor, over the 6502 Data Bus.

## Front End and Ring Detection

**3.53** Tip (TP102) and Ring (TP101) are connected from the RJ21X connector, through the KSU backplane, to the input protection network in the B-4COU-A PCB. This network prevents excessively high input voltages (high voltage transients from lightning, etc.) from damaging the circuits on the PCB. Voltages in excess of 260 V DC are shunted to the system cold water pipe ground.

**3.54** An AC ring signal from the line, typically 90 V AC, is detected in the supervision circuits. The ring signal is rectified (changed to DC) and converted to a digital line status signal by the Ring Pulse Stretcher. The line status signal from each of the four line circuits is presented to the Ring Detect Multiplexer. This multiplexer sends line status (ring detect) data to the B-CPU-D when addressed by the 6502.

**3.55** When a line is to be seized for answering or placing a call, the seize command is sent by the 6502, down its data bus, to the Loop Relay Enable Decoder. The decoder then sends an enable signal to the loop relay for the line to be seized. When the line is seized, an LED (DS101 for line 1) is illuminated.

**3.56** The Loop Relay and Supervision Circuits are also used when a line is on Hold and when Dial Pulse dialing is required. When a line is placed on Hold, the audio connection between the line and the system is dropped, while DC holding current is maintained in the loop relay. During Dial Pulse dialing, the 6502 sends pulsed enable signals to the line loop relay that correspond to the digits to be dialed. The supervision circuits are also used to detect a far-end disconnect pulse, which occurs when an outside party placed on Hold hangs up, if this facility is provided by the PBX or telco switching equipment that the TCX-128 is hooked up to.

## Audio Circuits

**3.57** Line audio is AC coupled from Tip and Ring to a bidirectional audio amplifier. This circuit is designed to ensure that the level of incoming audio is correctly balanced against the level of outgoing audio. For the first five B-4COU-A PCBs in the KSU (lines 1-20), audio is connected to the backplane as a Direct Access Line signal. For the last B-4COU-A PCB in the KSU and the two B-4COU-A PCBs in the expansion cabinet, audio is connected to the backplane as a Dial-Up Line Signal.

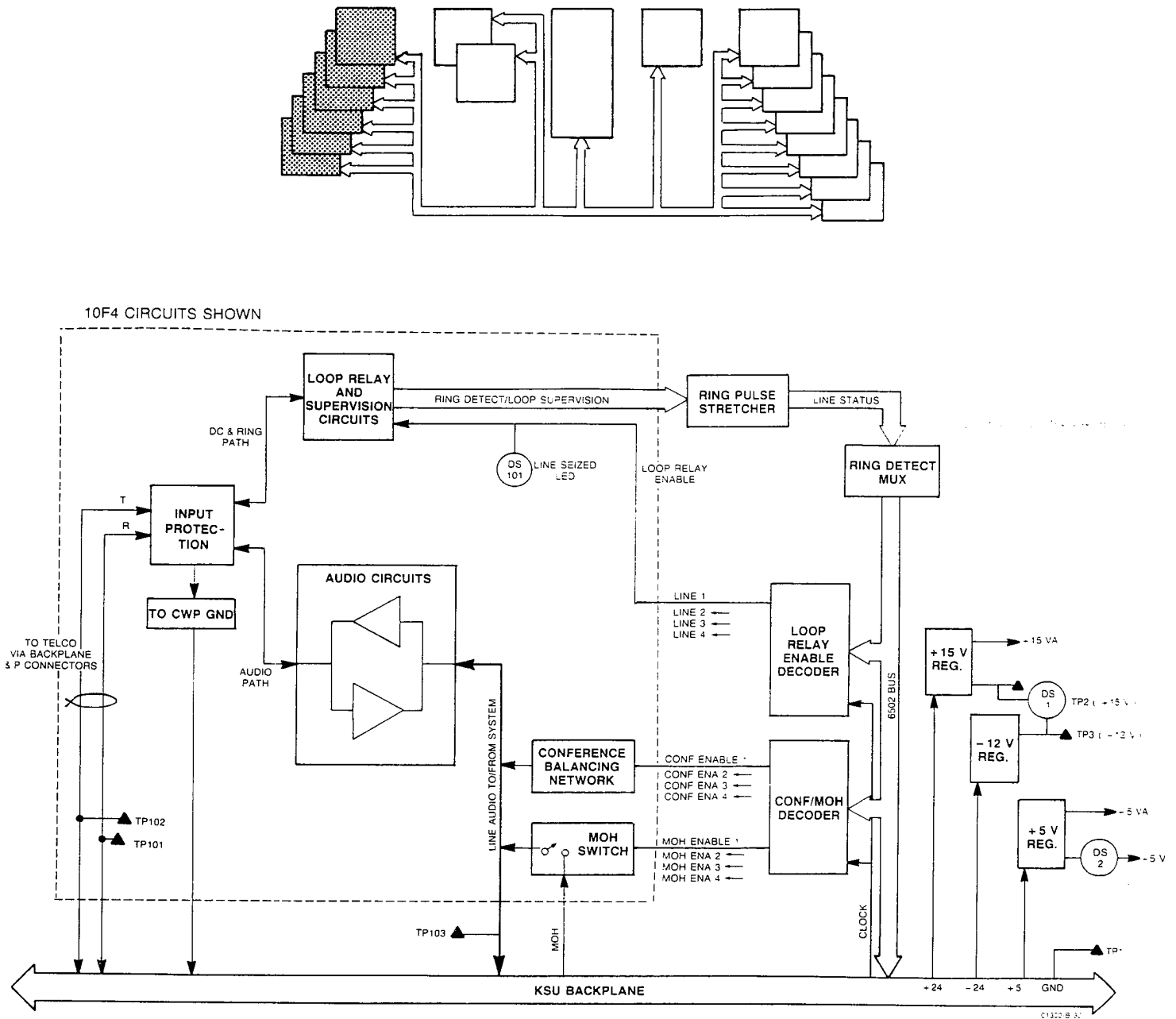


FIGURE 8-13 B-4COU-A CENTRAL OFFICE UNIT PCB BLOCK DIAGRAM

## Conference and Music On Hold

**3.58** The Conference Balancing Network is enabled if a line is to be joined in Conference with another line and a station. The network introduces impedance adjusting circuits that maintain the correct level and balance of the voice from all three parties in the Conference. This circuit is not used when a Conference is established between two inside parties and one outside party. Control signals from the B-CPU-D PCB via the 6502 Data Bus, into the Conference/MOH Decoder, determine when the Conference Balancing Network will be switched onto a line.

**3.59** Music On Hold, if provided by an external music source, is sent to a line on Hold by the MOH Switch. The MOH switch is controlled by Conference/MOH Decoder, which is in turn controlled by the 6502 Data Bus commands.

**3.60** On-board circuits post regulate the +24 V, -24 V and +5 V lines from the KSU backplane. The +24 V is connected to the +15 V Regulator, which outputs +15 VA and +15 V (TP2). The -24 V is input to the -12 V regulator. This circuit generates -12 V (TP3). The +15 V and -12 V potentials illuminate LED DS1. The +5 V regulator accepts +5 V from the backplane and outputs +5 VA and +5 V (DS1).

## Summary

**3.61** The B-4COU-A PCB contains the circuitry to connect four CO or PBX lines to the system. It provides for Hold, ring detection, DC loop supervision, Dial Pulsing, multi-line Conference and Music On Hold. It also contains a balanced differential amplifier to receive and transmit voice band signals.

## B-2TLU-A TIE LINE PCB

**3.62** This explanation will be available in future revisions of the manual.

## B-BUF-A BUFFER PCB

**3.63** The B-BUF-A PCB (Figure 8-14), located in the expansion cabinet, functions as a buffer between the 6502 KSU Data Bus and the 6502 expansion cabinet Data Bus. If the expansion cabinet is not installed, the B-BUF-A-PCB is not required.

**3.64** All interconnection between the KSU and the expansion cabinet is through the two ribbon cables. The 6502 Data Bus passes through the B-BUF-A PCB before being extended to the expansion cabinet PCBs. The B-BUF-A PCB separately buffers the 6502 high order address signals, to obtain Station Card Select signals for

stations 65-128, as well as the address and data signals that comprise the 6502 Expansion Data Bus.

**3.65** The links (Intercom, BGM and Page), Direct Access Lines and Dial-up Lines are connected unbuffered from the KSU backplane to the expansion cabinet backplane. The Z80 Data Bus is not used in the expansion cabinet.

**3.66** The B-BUF-A PCB has on-board filters for the +5 V line from the expansion cabinet backplane and power supply. LED DS1 will illuminate whenever +5 V is present.

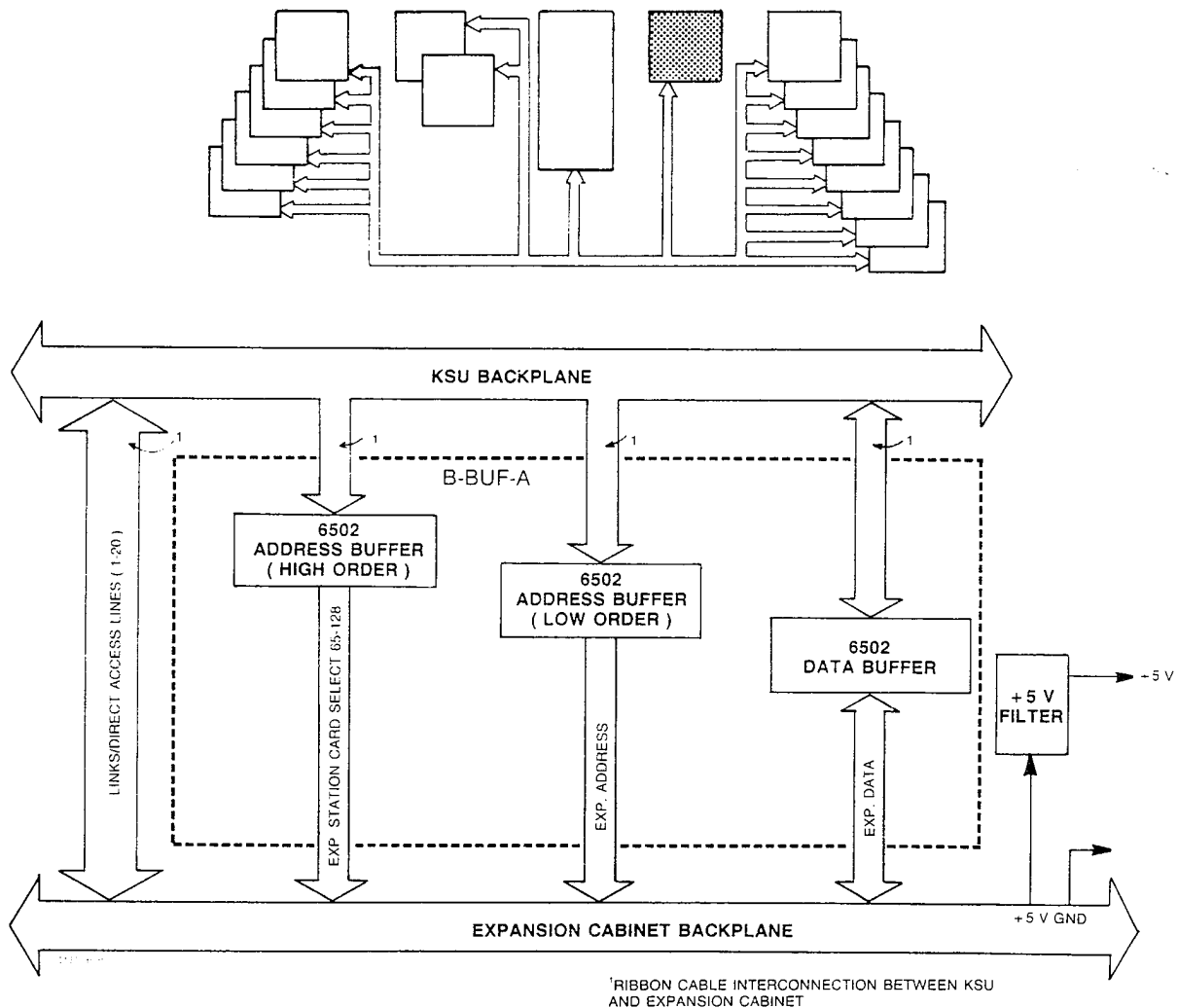


FIGURE 8-14 B-BUF-A BUFFER PCB BLOCK DIAGRAM

## 4. TELEPHONES

### MULTIBUTTON KEY TELEPHONE

**4.01** The Multibutton Key Telephone (Figure 8-15) is the most sophisticated station instrument in the TCX-128. It contains an internal microprocessor (with memory) that communicates with the 6504 microprocessor in the B-8SCU-C PCB. This provides for real time response to call activity. The telephone microprocessor also manages the keyboard, dialer, and display (optional), as well as the analog handset/speakerphone switching. The telephone is connected over four-conductor cable to a dedicated port on its assigned B-8SCU-C PCB in the KSU.

#### Data and Power

**4.02** Control data is simplex over the DC voltages in the station A-pair wires. The green wire carries  $-24$  V; the red wire carries  $+24$  V. The Voltage Network uses these two potentials to generate  $-12.4$  V,  $-6.8$  V, a ground reference,  $+7.5$  V and  $+15$  V for telephone circuit power. Receive data (voltage) from the KSU is detected in the Receive Data (RX) circuits and input into the telephone microprocessor (TP202). Transmit data (current) from the telephone microprocessor (TP203) is current amplified in the Transmit Data (TX) circuits and sent to the KSU.

#### Watchdog Timer and Processor Clock

**4.03** The watchdog timer continually monitors the receive data port and one of the data output ports on the telephone microprocessor. As long as data from both sources continues, the timer is refreshed. If either source should fail (i.e., if either the 6504 or the telephone microprocessor stops functioning), the watchdog times out and the processor is reset.

**4.04** The internal operations of the microprocessor in the display telephone are synchronized by a 4MHz crystal. The microprocessor in the non-display telephone runs off a solid state oscillator. Synchronization between the telephone microprocessor and the 6504 station processor is assured by the frame sync pulse that precedes each data exchange.

#### Keyboard, Dial Pad, and Display Functions

**4.05** The telephone microprocessor continually scans the 28 button keyboard for a key depression. When a key depression is sensed, the bit that corresponds to the key in the transmit data stream is set. This set bit is detected and acted on by the 6504 station processor in the B-8SCU-C PCB. If appropriate, the 6504 returns a command in the receive data stream that causes the telephone microprocessor to light the LED under the key.



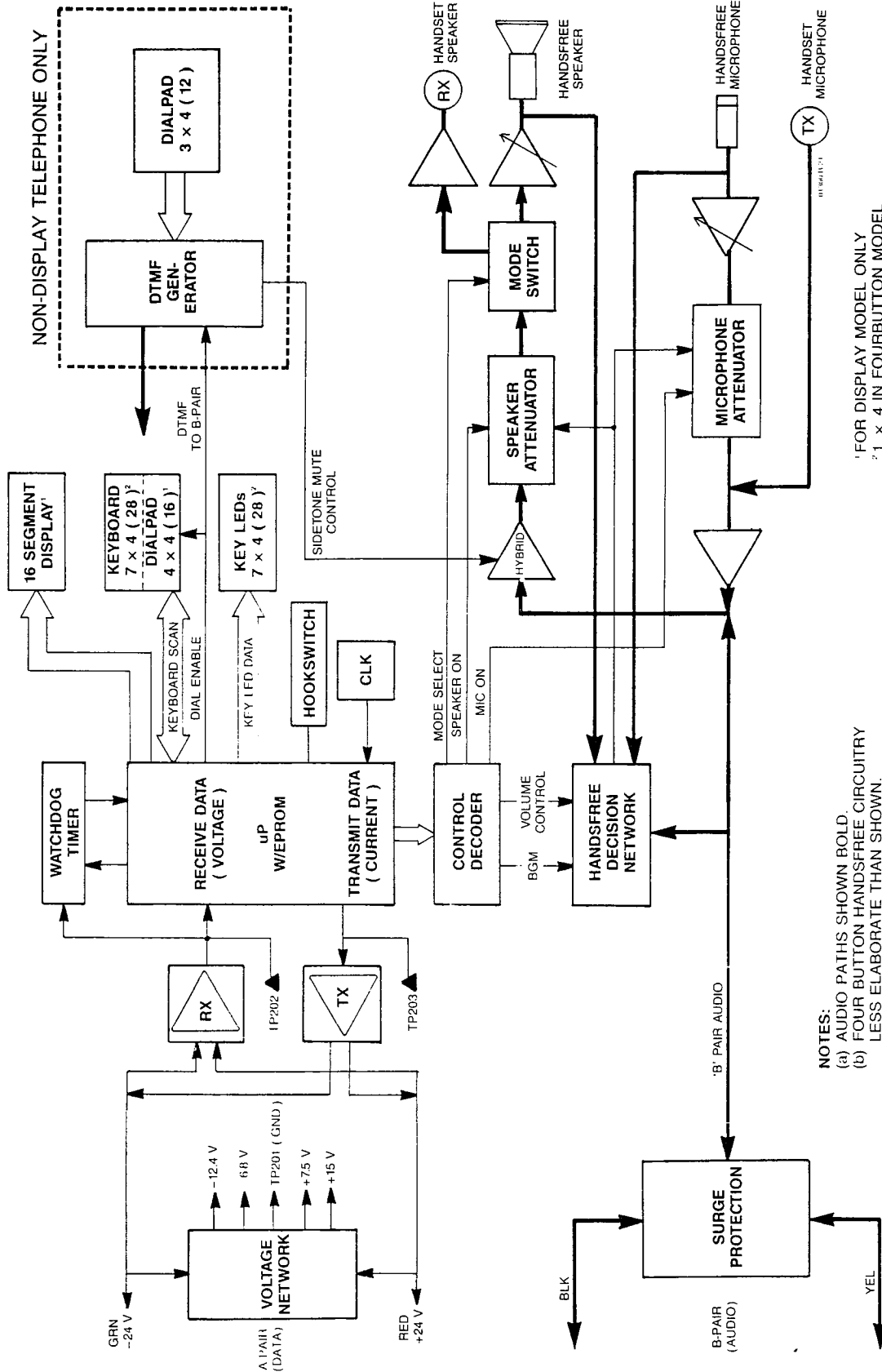


FIGURE 8-15 MULTIBUTTON KEY TELEPHONE BLOCK DIAGRAM

**4.06** The dial pad in the display telephone is scanned as if it were an additional 16 button key matrix. Key depressions are included in the data stream transmitted to the KSU. The dial pad in the non-display is treated differently since it contains an internal DTMF generator. This type of dial pad sends out the actual DTMF tone cluster (that corresponds to the key depression) on the telephone audio (B) wire pair. The non-display telephone dialer attaches a DTMF receiver in the KSU; the display telephone dialer does not. Either type of dial pad can be shut down by the dial enable interrupt from the microprocessor. This typically occurs during Toll Restriction or if too many digits are dialed.

**4.07** The telephone microprocessor also scans the optical hookswitch for handset position. Hookswitch status is included in the data sent to the KSU.

**4.08** The 16 segment fluorescent display in the display telephone is also controlled by the telephone microprocessor. The processor sends control data to display decoders and drivers. The display messages are initially formed in the 6502 traffic control processor in the B-CPU-D PCB.

### **Audio Section**

**4.09** Audio is connected to the telephone over the B-pair (black and yellow wires). A Surge Protection network is connected across the B-pair to keep high voltage transients away from the audio components. Incoming audio is sampled by the Handsfree Decision Network and fed to the hybrid amplifier (which eliminates excessive Handsfree sidetone). The signal is then connected to the speaker attenuator, the mode switch (handset or Handsfree), and to either the handset receiver or to the speaker. Audio from the telephone originates at either the Handsfree microphone, which is passed through an additional Microphone Attenuator stage, or the handset microphone. The signal is then amplified, sampled by the Handsfree Decision Network and sent out on the B-pair.

### **Control Decoder**

**4.10** The Control Decoder allows digital outputs from the microprocessor to determine the mode of the telephone analog section. This decoder has discrete outputs for Mode Select (handset or Handsfree), Speaker (on or off), Microphone (on or off) and Background Music (on or off). The BGM signal from the Control Decoder is used to put the speakerphone in a high impedance mode. This mode is required when many speakerphones are connected to the same common signal, such as occurs when Background Music is on or a call is ringing in. The Control Decoder also drives a step decoder which provides varying voltage levels for the Speakerphone volume control.

### **The Handsfree Decision Network**

**4.11** The telephone operates in three basic modes: transmit, receive and idle. Transmit can be either with the handset or Handsfree (using the microphone). Receive can also be with the handset or Handsfree (using the speaker). When the telephone is neither transmitting or receiving, it is in the idle mode. The idle mode can automatically dampen background noise if the telephone is in an environment where that noise is at a consistent level (such as from a fan, etc).

**4.12** The operation of the Handsfree speakerphone (speaker and microphone) is determined by a combination of signals from the Control Decoder, the B-pair audio, the microphone and the speaker. As shown in the bottom half of Figure 8-15, the microphone and speaker signals loop back to the Handsfree Decision Network. This network compares the audio levels at the speaker to levels on the microphone and the B-pair to determine if the telephone is transmitting or receiving.

**4.13** As a result of this comparison, control voltages are sent by the Handsfree Decision Network to the Microphone and Speaker Attenuators. These attenuators are also controlled by the Control Decoder, which receives its input directly from the station microprocessor, independent of the audio levels present. What is happening in the telephone is determined on the one hand by the type of call, and on the other hand by the relative levels of transmit and receive. For example, if a call is transferred Handsfree, the control decoder turns both the Handsfree microphone and speaker on, the handset off, and the BGM high impedance mode off. Whether the telephone is transmitting to or receiving from the calling party is determined by how loud the incoming audio is, compared against the volume of the outgoing reply.

### Summary

**4.14** The Multibutton Key Telephone is a microprocessor based key telephone. It is connected to the B-8SCU-C PCB by four conductor station wire: two conductors carrying power and simplex data, two conductors carrying the audio. The data exchange between the KSU and the telephone controls the telephone. The status of the audio section is also controlled by the Handsfree Decision Network, working in conjunction with the microprocessor controller.

### FOUR BUTTON KEY TELEPHONE

**4.15** The Four Button Key Telephone is essentially the same telephone as the multibutton, except that:

- The Handsfree Decision and speakerphone circuitry is less elaborate than in Figure 8-15.
- All four button telephones use DTMF dialers (like the non-display multibutton telephones).
- The four button microprocessor only has to scan four keys and illuminate four key LEDs.
- Four button telephones do not have displays.

### DIRECT STATION SELECTION (DSS) CONSOLE

**4.16** The Direct Station Selection (DSS) Console (Figure 8-16) is comprised of a 64 button keyboard, with each key containing an LED. The microprocessor in the DSS, communicating with the 6504 station processor in the B-8SCU-C PCB, functions like the microprocessor in the multibutton telephone to scan the keys and light the LEDs. The DSS Console also contains a speaker for off hook signaling.

### Keyboard Scan and Data Flow

**4.17** Data is simplex on the A-pair wires. The green wire carries -24 V from the B-8SCU-C PCB; the red wire carries +24 V. These levels are connected to a voltage network that produces the -12.6 V, -7.5 V, a ground reference and +7.5 V potentials used for circuit power. Data from the KSU (voltage) is detected in the Receive Data (RX) circuits and sent to the DSS microprocessor (at TP3). Data from the DSS microprocessor to the KSU (current) is sent out (at TP2) by the Transmit Data (TX) circuits.

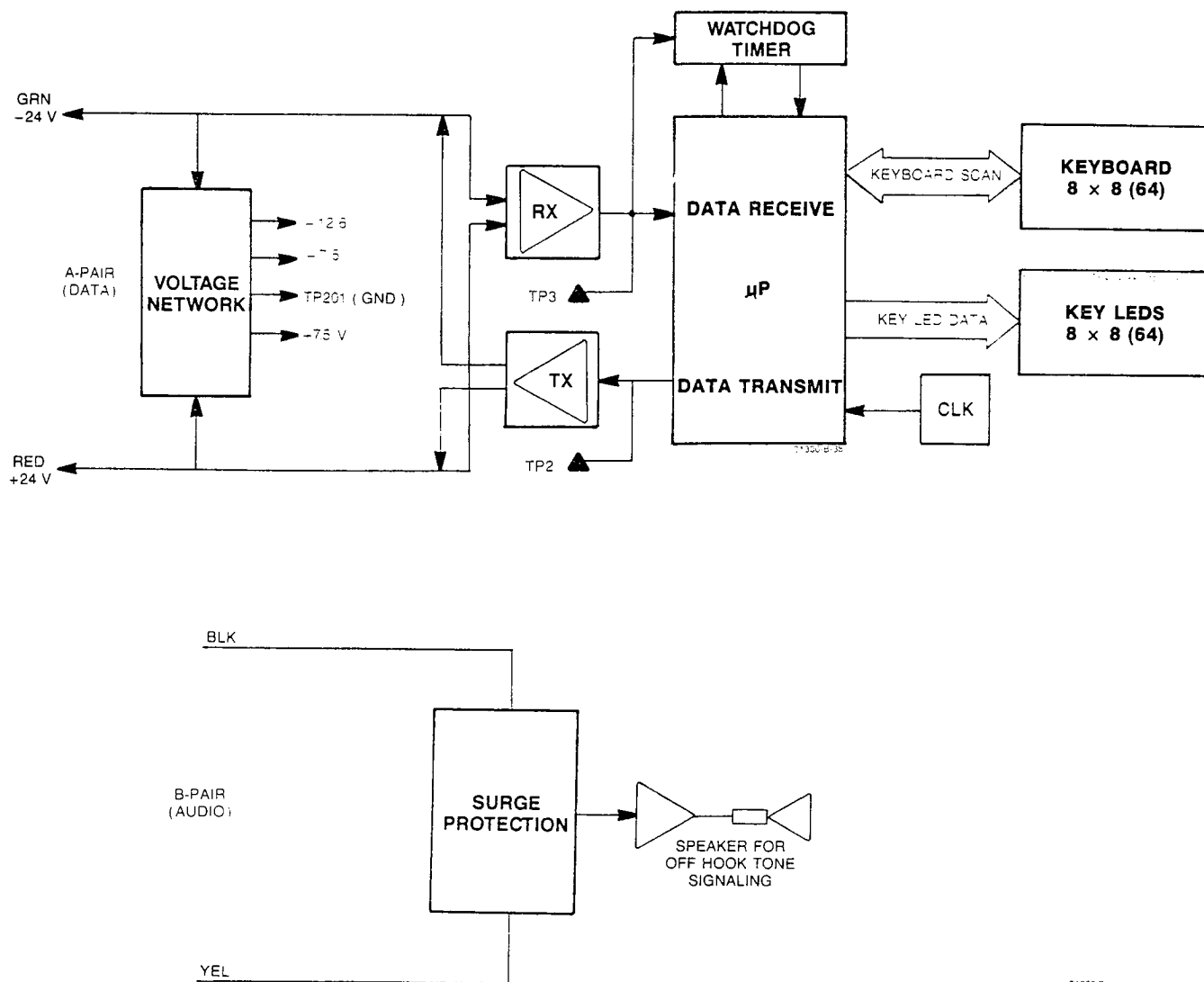
**4.18** The DSS microprocessor continually scans the 64 DSS keys. When a key depression is sensed, the data bit corresponding to that depression is sent in the TX data to the 6504 station processor. If appropriate, the Receive Data from the KSU will instruct the DSS processor to illuminate the LED under that key.

**4.19** The Watchdog Timer is refreshed by the receive data from the B-8SCU-C PCB. If that PCB should stop sending data, the watchdog times out and resets the DSS microprocessor.

**4.20** The internal operation of the DSS microprocessor is synchronized by the 4MHz crystal. Synchronization between the DSS and the B-8SCU-C PCB is ensured by the frame sync pulse transmitted from the 6504 station processor at the beginning of every data exchange.

**Off Hook Signaling Speaker**

**4.21** The DSS Console B-pair wires (black and yellow) carry incoming ring audible for attendant off hook signaling. The incoming ring passes through the Surge Protection Network and is sent to an audio amplifier. This amplifier drives the speaker in the DSS Console. The switching of the incoming ring is done in the KSU, not in the DSS Console.



01329 B  
01350 B

**FIGURE 8-16 DIRECT STATION SELECTION (DSS) CONSOLE BLOCK DIAGRAM**

## 2500 TYPE AND SINGLE LINE TELEPHONES

### 2500 Type Telephone

**4.22** The TCX-128 system may be equipped with 2500 type telephones. These telephones must be equipped with special ringers and must be connected to a port on a B-8SLU-B PCB in the KSU.

**4.23** The 2500 type telephone green and red wires (A-pair tip and ring) carry the 48 V DC required to power the telephone. The green wire carries +24 V; the red wire carries -24 V. Audio from the B-8SLU-B PCB is also on the A-pair.

**4.24** The hookswitch, 2500 network, DTMF dial pad and the telephone handset function as they do in a standard single line telco circuit. The only difference is the method by which incoming ring is detected. To make the telephone ring, the B-8SLU-B PCB grounds the green (+24 V) wire. The Special Loud Ringer detects this as a ring enable interrupt and turns on its ringer. When the call is answered, the B-8SLU-B responds by releasing the

ground on the +24 V line, and ringing stops. An optional Hold button may be connected to the Special Loud Ringer, if desired. Pressing the Hold button interrupts the A-pair loop current to simulate the “hookflash” operation required to put calls on Hold, Transfer calls, etc. The Special Loud Ringer also contains a set of dry relay contacts that can be used to turn on external devices for loud ringing.

**4.25** The station B-pair wires provide ground and a current limited +24 V for alternate ringing schemes.

### Single Line Telephone

**4.26** The Single Line Telephone functions the same as the 2500 type telephone, except that it requires less A-pair loop current. The adjustment for this is made in the current mode strap on the B-8SLU-B PCB.

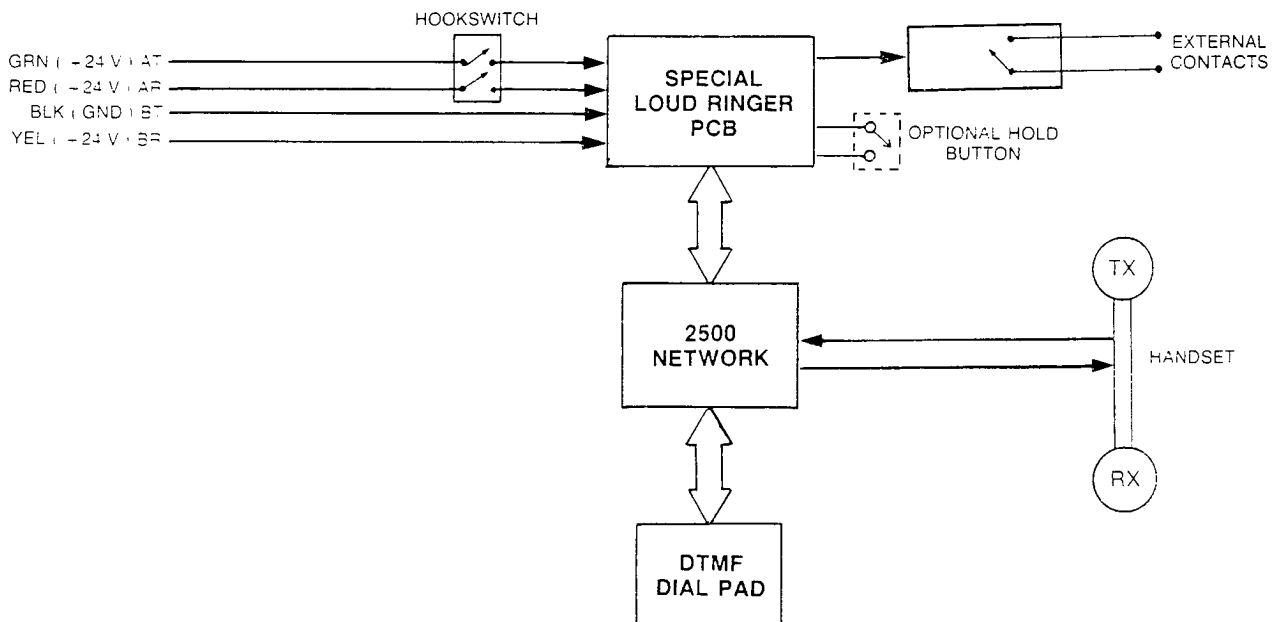


FIGURE 8-17 2500 TYPE AND SINGLE LINE TELEPHONE BLOCK DIAGRAM

## 5. ANALYSIS OF SIGNAL FLOW

### RECEIVING AN OUTSIDE CALL

#### Detecting the Incoming Call

**5.01** An incoming call from the Central Office or PBX will send ringing into the system. This ringing is detected in the B-4COU-A PCB to which the line is connected (Figure 8-18, signal 1). As the B-CPU-D polls the B-4COU-A PCBs, it sees the ring detect, processes it, and sends a flashing LED to all the stations in the system programmed to receive ringing for that line (Figure 8-18, signal 2). On a multibutton telephone, the incoming call will flash the lowest numbered available incoming line key (keys 1 through 5). If the first incoming line key is already flashing with another call, the call will ring on the second key, and so on.

**5.02** The B-CPU-D PCB has the responsibility of sending audible ringing onto the station B-pairs. The tone used for CO audible is generated on the B-TGU-C PCB, and connected to an on-board DTMF/Tone Matrix. The Z80 executive, through the Matrix Control, tells the DTMF/Tone Matrix to connect CO audible to an Intercom link (Figure 8-18, signal 3). The B-8SCU-C PCB connects the station B-pair to the ringing link. The Z80 also controls the timing (on/off) of the CO audible tone bursts. As long as the multibutton station is idle, ringing will be broadcast from the speaker.

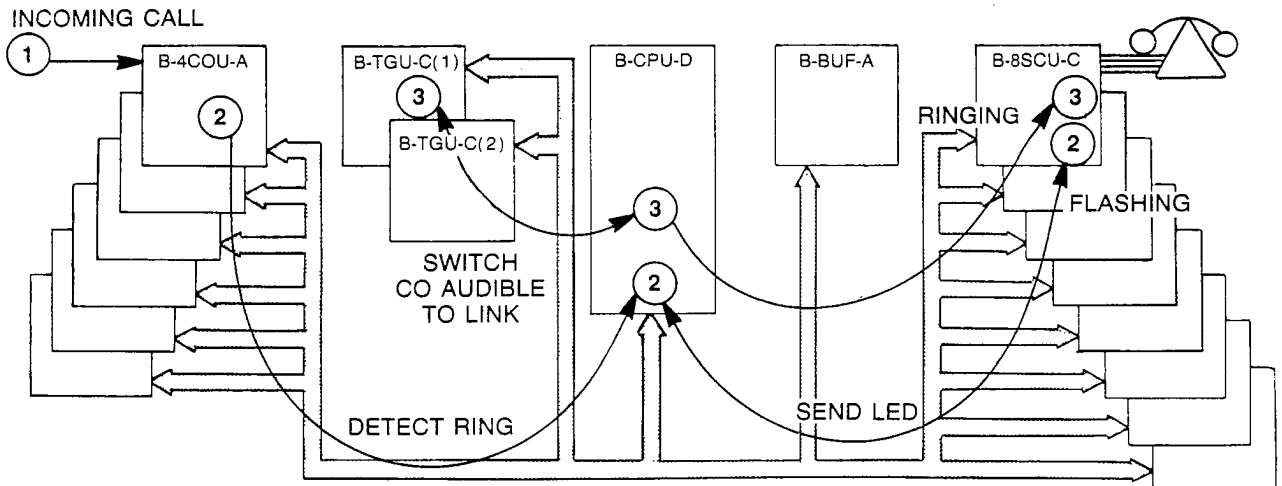


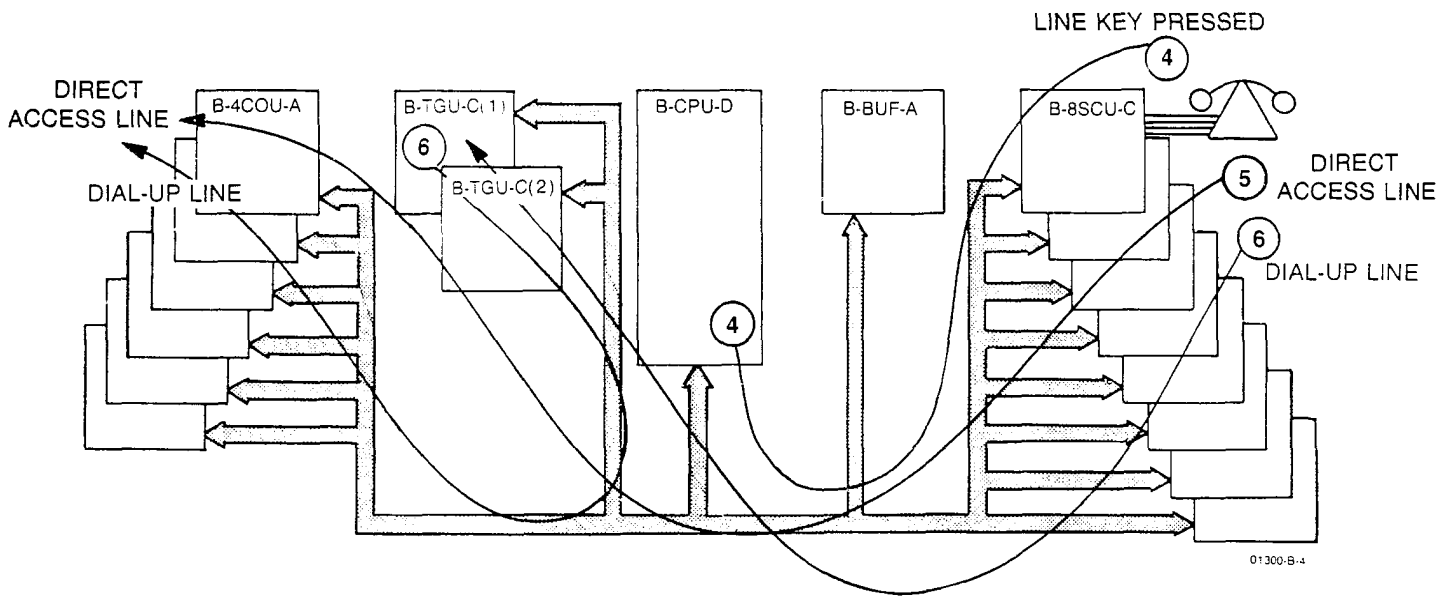
FIGURE 8-18 RECEIVING AN OUTSIDE CALL (Page 1 of 2)

**5.03** On a four button telephone, ringing will occur in the telephone speaker unless another call is already ringing in. Only the first incoming call will ring. On a single line telephone, the B-8SLU-B PCB will enable the telephone ringer, provided another call was not previously ringing.

**Answering the Incoming Call**

**5.04** To answer the incoming call, the multibutton telephone user presses the flashing line key. The 6504 station processor in the B-8SCU-C PCB picks up this key depression within 100mS, and begins processing the request (Figure 8-18, signal 4). The line key on the telephone that answered the call will be steadily illuminated. The incoming line key on all other telephones will go out and be made available to another call.

**5.05** If the incoming call is on a Direct Access Line (lines 1-20), the audio output from the B-4COU-A PCB is connected directly to the station B-pair through a single crosspoint closure in the B-8SCU-C PCB (Figure 8-18, signal 5). If the incoming call is on a Dial-Up Line (lines 21-32), audio connection is from the telephone, through a link crosspoint closure in the B-8SCU-C, through another link crosspoint closure in the B-TGU-C PCB to the line audio circuit on the B-4COU-A PCB (Figure 8-18, signal 6).



**FIGURE 8-18 RECEIVING AN OUTSIDE CALL (Page 2 of 2)**

5.12 Four button telephones must dial codes to access outside lines. An Intercom link is connected as soon as the user lifts the handset. Once the access code is dialed over the link, the call is placed as it is for a non-display multibutton telephone. Single line and 2500 type telephones must also use access codes; however, there is no data flow between the telephone and the KSU.

5.13 Since the front end of the B-4COU-A PCB is not current sensitive, answer detection is not required.

5.14 To summarize how an outgoing call is placed:

- (1) Request for line is processed by B-CPU-D PCB.
- (2) Line seized and talkpath established (Direct Access vs. Dial-Up.)
- (3) Dialed digits sent out by B-TGU-C PCB (display telephone) or on-board DTMF generator in dialer (non-display telephone).
- (4) Dialed digits checked for Toll Restriction and SMDR.

## PLACING AN INTERCOM CALL

### Initiating the Call

5.15 When the multibutton telephone user lifts the handset and presses the INT key, the change of state is sent in the data stream to the 6504 station processor. The 6502 traffic controller in the B-CPU-D PCB sees the change and sends it to the Z80 for processing (Figure 8-20, signal 1). The Z80 in the B-CPU-D PCB interprets the change and assigns an Intercom link to the station. It signals the B-TGU-C PCB to put Intercom dial tone on the selected link, and instructs the B-8SCU-C PCB to connect the link to the telephone audio (B) pair (Figure 8-20, signal 2). The system waits for digits to be dialed.

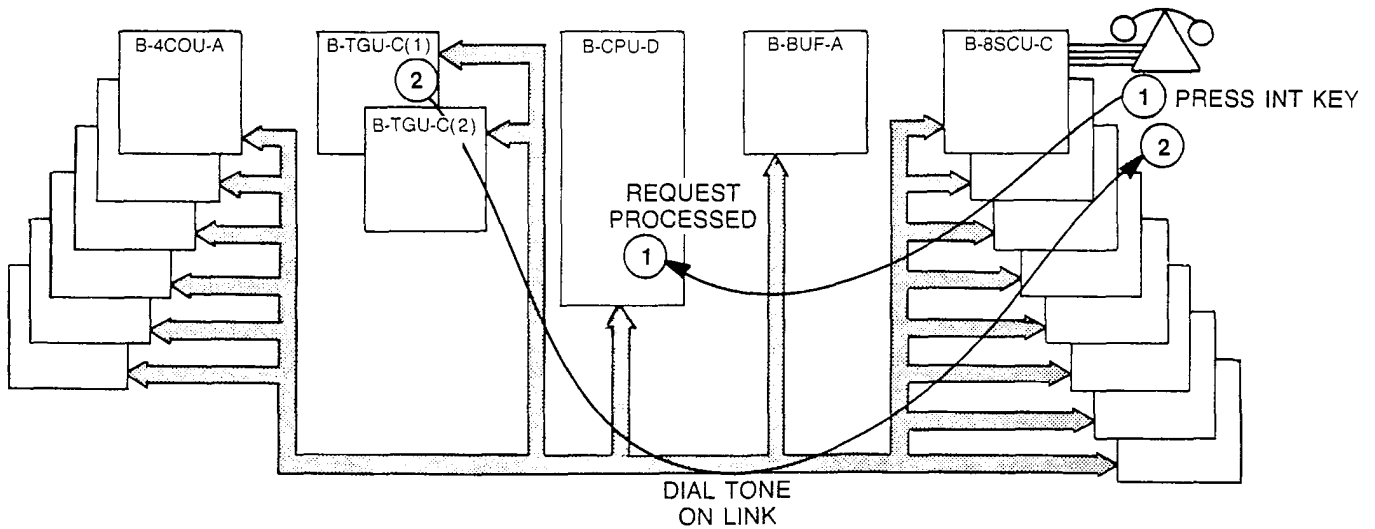


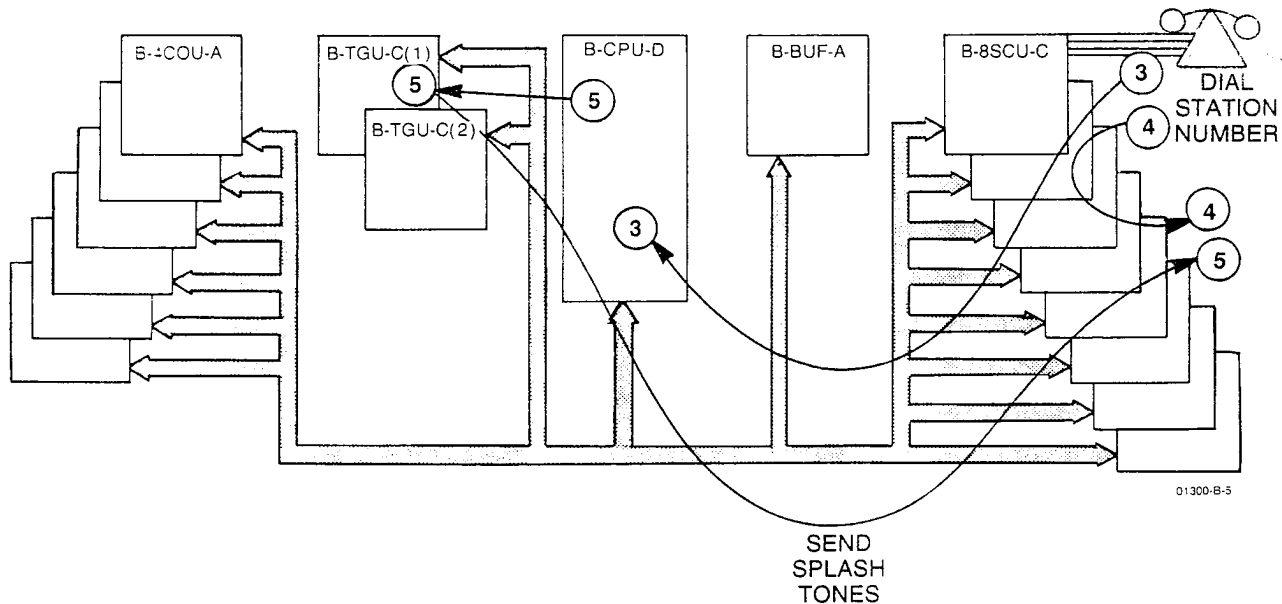
FIGURE 8-20 PLACING AN INTERCOM CALL (Page 1 of 2)



### Dialing the Intercom Call

**5.16** Once Intercom dial tone is returned to the calling station, the user can dial the destination station (Figure 8-20, signal 3). If a display telephone is being used to place the call, the dial pad digits are included in the data exchange from the telephone to the B-8SCU-C PCB. The 6504 station processor reads the dialed digits and sends them to the B-CPU-D PCB. If the called extension is busy,

the Z80 tells the B-TGU-C PCB to attach busy tone to the calling link. If the called station is idle (and Handsfree Answerback is enabled), the Z80 connects the B-pair of the called station to the Intercom link and enables the called station's speakerphone (Figure 8-20, signal 4). The Z80 instructs the B-TGU-C PCB to send splash tones to the called station, indicating that an Intercom conversation has been established (Figure 8-20, signal 5).



**FIGURE 8-20 PLACING AN INTERCOM CALL (Page 2 of 2)**

**5.06** The B-CPU-D PCB sends a Loop Relay Enable signal to the line circuit on which the call rang in. When the loop relay is seized, a DC current path is established between the front end of the line circuit and the Central Office or PBX. This is required so the calling circuit knows the call has been answered. Both requirements for answering the call have been met: the DC path for holding the line had been established, and the audio path for carrying the conversation had been completed.

**5.07** To summarize how an incoming call is processed:

- (1) The incoming ring is detected in the B-4COU-A PCB.
- (2) Flashing LED and audible ring are sent to designated stations.
- (3) Answering party presses flashing line key.
- (4) Audio link between station and line is established.
- (5) Loop relay is seized and DC loop current flows.

## PLACING AN OUTSIDE CALL

### Seizing the Line

**5.08** The 6504 station processor in the B-8SCU-C PCB continually scans the key telephone for change of state. When the user lifts the handset and presses

a line key, the change is sent in the data stream to the 6504, to the 6502 traffic controller in the B-CPU-D PCB, and to the Z80 for the processing decision (Figure 8-19, signal 1). The Z80 assigns a talkpath for the call and sends a Loop Relay Enable command to the line circuit being used to seize the line. If the call is being made on a Dial Pulse line, the Z80 attaches a tone generator to the talkpath to give dial tone to the party placing the call (Figure 8-19, signal 2). If the call is being placed on a DTMF line, dial tone is returned from the outside line. The data transmitted to the telephone lights the LED under the outgoing line key that was pressed. This key lights only at the station placing the call.

**5.09** If the Z80 determines that the call should be placed on a Direct Access Line (lines 1-20), the audio connection is from the telephone, through a crosspoint on the B-8SCU-C PCB, to the Direct Access Line path in the KSU backplane, and finally to the audio circuit on the appropriate B-4COU-A PCB (Figure 8-19, signal 3). If the Z80 selects a Dial-Up Line to place the call (lines 21-32), connection is from the telephone, through a crosspoint on the B-8SCU-C PCB to an Intercom link, through an additional crosspoint on the B-TGU-C PCB, to the Dial-Up Line path in the KSU backplane, and finally to the audio circuit on the B-4COU-A PCB for the Dial-Up Line.

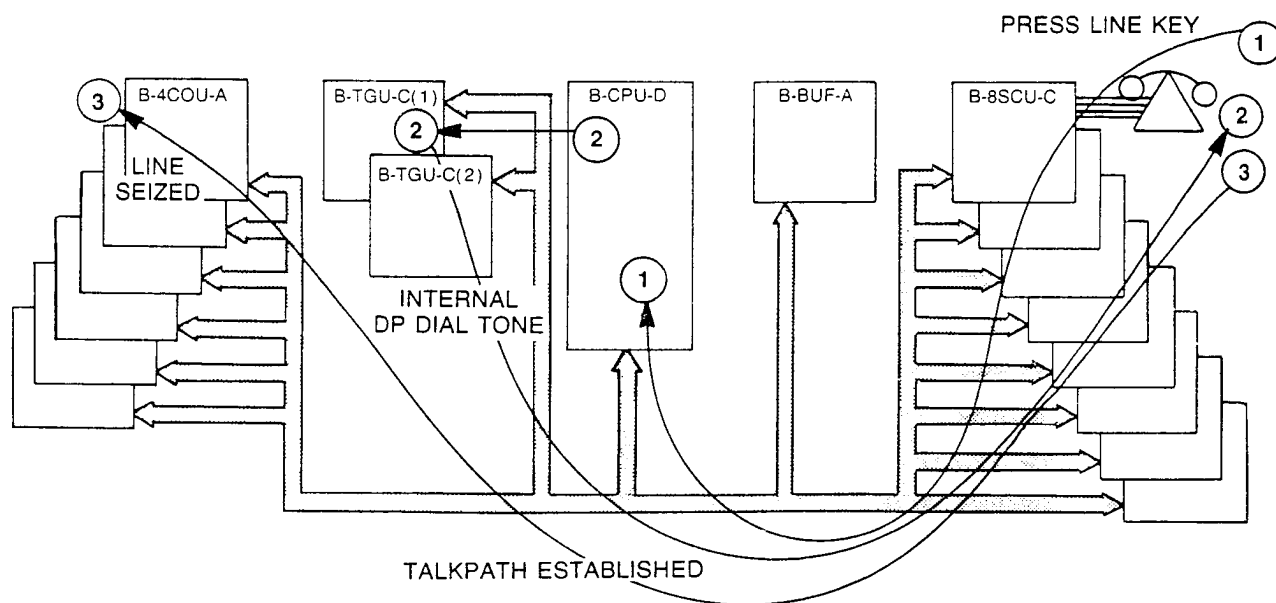


FIGURE 8-19 PLACING AN OUTSIDE CALL (Page 1 of 2)

## Dialing

**5.10** Once the user hears dial tone, dialing can be begun. If the call is being made from a display telephone into a DTMF line, dial pad key depressions (dialed digits) are inserted into the data stream to the 6504 station processor. The B-CPU-D PCB pulls the dial pad data out of the data stream and sends it to the time-shared DTMF generator that it has attached to the call talkpath (Figure 8-19, signal 4). The DTMF generator sends the tones out to the line, and mirrors the tone bursts back to the telephone for dial confirmation. If the call is being placed into a Dial Pulse line, the B-CPU-D PCB receives the dial pad digits and pulses the line loop relay accordingly. In either case, Toll Restriction checks are made as the digits are dialed.

**5.11** If the call is being placed from a non-display or four button telephone, the dial pad digits are not part of the A-pair data stream. These telephones use dialers with integral DTMF generators, and place DTMF tone bursts onto the audio (B) pair (Figure 8-19, signal 5). These DTMF digits go out on tip and ring of the seized line. The Z80 attaches a DTMF receiver (on the B-TGU-C PCB) to the call talkpath to interpret the digits. This is done so that Toll Restriction checks and SMDR records can be made. The DTMF receiver is attached until dialing is completed. If the call is being placed on a Dial Pulse line, the DTMF receiver encodes the dialed digits for the Z80, which then tells the 6502 traffic controller to pulse the loop relay.

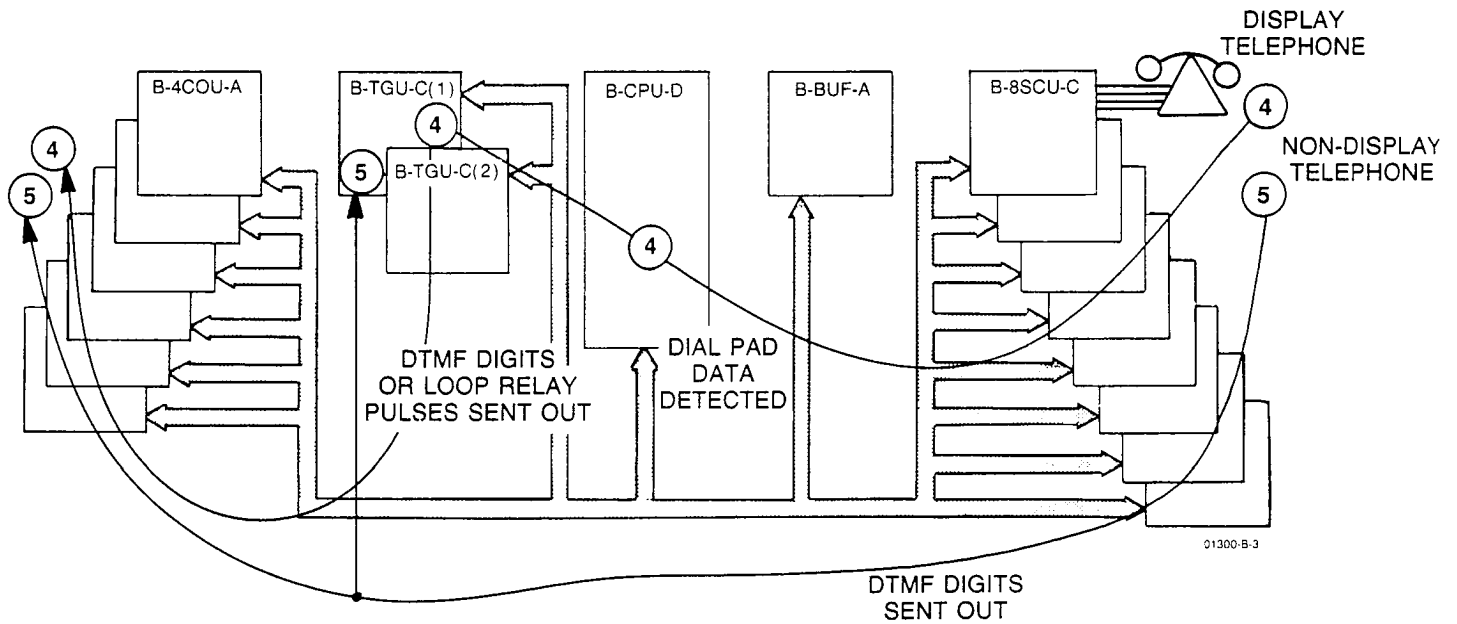


FIGURE 8-19 PLACING AN OUTSIDE CALL (Page 2 of 2)

**5.17** If a non-display telephone is being used to place the call, the dial pad key closures are encoded into DTMF tone bursts in the telephone. These DTMF tones are sent down the station B-pair (on the seized Intercom link) to the B-TGU-C PCB, where they must be decoded in a DTMF receiver. The Z80 looks at the output of the DTMF receiver to determine which station was called. All other functions are identical to the display telephone.

**5.18** If Forced Intercom Ringing is enabled, the Z80 will command the B-TGU-C PCB to ring the called station. The Intercom link is connected between the two stations only when the called party lifts the handset.

**5.19** Four button, single line and 2500-type telephones are automatically connected to an Intercom link when the handset is lifted. Except for this difference, an Intercom call is processed exactly as it is for a non-display multibutton telephone.

**5.20** To summarize how an Intercom call is placed:

- (1) When the B-CPU-D PCB detects that the INT key has been pressed, an Intercom link is seized.
- (2) Intercom dial tone is returned to calling station.
- (3) Dialed digits are sent to the KSU.
- (4) Intercom link connected to called party.



## SECTION 9, MAINTENANCE

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


### 1. INTRODUCTION

**1.01** The MAINTENANCE Section is used in conjunction with the TCX-128 THEORY OF OPERATION (Section 8). It allows service personnel to isolate and repair system troubles to the module (plug-replaceable unit) level. This section is divided into three parts: Troubleshooting (Part 2), and Display System Status Diagnostic (Part 3).

**1.02** Operational Specifications for each telephone are included in Appendices A through D of this manual. These specifications provide instructions on how to access each feature.



## 2. TROUBLESHOOTING

**2.01** This part uses the System Troubleshooting Flowchart (Figure 9-1) to guide the technician in testing and fault location. The flowchart is supported by the Operational Test Procedure (Table 9-1), System Voltages (Table 9-2), the Replaceable Parts List (Table 9-3), and the illustrations on the various LEDs and testpoints (Figures 9-2 and 9-3). A list of some common system faults, and their solutions, is provided in Table 9-4. Figure 9-4, How to Evaluate a System Problem, is a guide the technician can use when questioning a user about a system trouble.

- diamond  : Indicates that a decision must be made.
- circle  : Instructs the technician to go (branch) to the indicated area of the flowchart (i.e., B to B, C to C, etc.).
- arrow  : Indicates the order in which events and decisions are executed.

### TROUBLESHOOTING FLOWCHARTS

**2.02** The System Troubleshooting Flowchart (Figure 9-1) provides service personnel with a logical framework for system checking and fault isolation. The flowchart is divided into six parts: System Check (Page 1 of 6), LED Check (Page 2 of 6), Power Supply/Service Check (Page 3 of 6), Voltage/PCB Check (Page 4 of 6), Cable Check (Page 5 of 6) and Features/Programming Check (Page 6 of 6). The System Check provides the outline for a correct installation, as well as a sequence for fault isolation and repair. The LED, Power Supply/Service, Voltage/PCB and Cable Checks allow the basic parameters of the system to be verified. The Features and Programming Check shows the interrelationship between feature operation and system programming.

- oval  : Denotes the beginning or end of the flowchart.
- rectangle  : Indicates an action to be carried out (event).

**CAUTION: THE PRINTED CIRCUIT BOARDS CONTAIN STATIC SENSITIVE CMOS COMPONENTS. WEAR AN ANTISTATIC GROUND WRIST STRAP, TERMINATED AT EARTH GROUND IF PCBs ARE TO BE HANDLED. STORE PCBs IN THEIR VELOSTAT BAGS.**

**CAUTION: A THERMAL PROTECTION DEVICE IS LOCATED ON THE KSU. WHEN THE MAXIMUM OPERATING TEMPERATURE IS EXCEEDED, THE RESET BUTTON ON THE POWER SUPPLY POPS UP, REVEALING A WHITE BAND. THIS BAND INDICATES THAT THE SYSTEM IS OPERATING AT HIGH TEMPERATURES. THE THERMAL PROTECTION DEVICE DOES NOT SHUT DOWN THE POWER ON THE POWER SUPPLY.**

## OPERATIONAL TEST PROCEDURE

**2.03** The Operational Test Procedure (Table 9-1) provides a checklist for evaluating the system features. The features are divided into three groups: Internal, External, and Optional. The table presents the features in the order they should be checked. The AVAILABLE column indicates the telephones that access the feature. The VERIFIED column is used to provide a checklist for feature status based on the Operational Specification. The PROGRAMMABLE column indicates whether the feature is affected by system programming. If a feature does not operate correctly, the symptom is entered in the SYMPTOM column. The PROBABLE CAUSE column lists components that can cause failure. The components are presented in the order of the probability of failure.

**NOTE:** Since all features are accessed by the telephone, the telephone could cause any feature to fail. Before replacing a PCB, verify proper operation of the telephone at a known good station location, or at the Port 016 test location on the KSU (Figure 9-3).

## OPERATING VOLTAGE CHECK

**2.04** Operating voltages can be checked using Table 9-2. This table permits KSU and station voltages to be measured. The voltages are identified, the acceptable range stated, and the test condition defined. The test point location for each voltage is explained.

**2.05** The LEDs and test points for the TCX-128 are shown in Figure 9-2. The KSU power supply fuses and test jack are shown in Figure 9-3.

**2.06** Two types of handset microphones are used with the key telephones in the TCX-128 system. A carbon microphone can be used in all multibutton key telephones. The Display Multibutton Key Telephones use an electret microphone that provides higher quality transmission and lower power consumption. These handsets result in poor audio quality if they are connected to the wrong phone. The type of transmitter can be identified by looking into the holes of the handset. The carbon microphone is black and the electret microphone is silver.

## REPLACEABLE PARTS LIST

**2.07** Table 9-3 provides a replaceable parts list. Unless otherwise indicated, the items listed are available from:

TIE/communications, Inc.

Items not available from TIE/communications can be purchased from local telephone equipment supply houses.

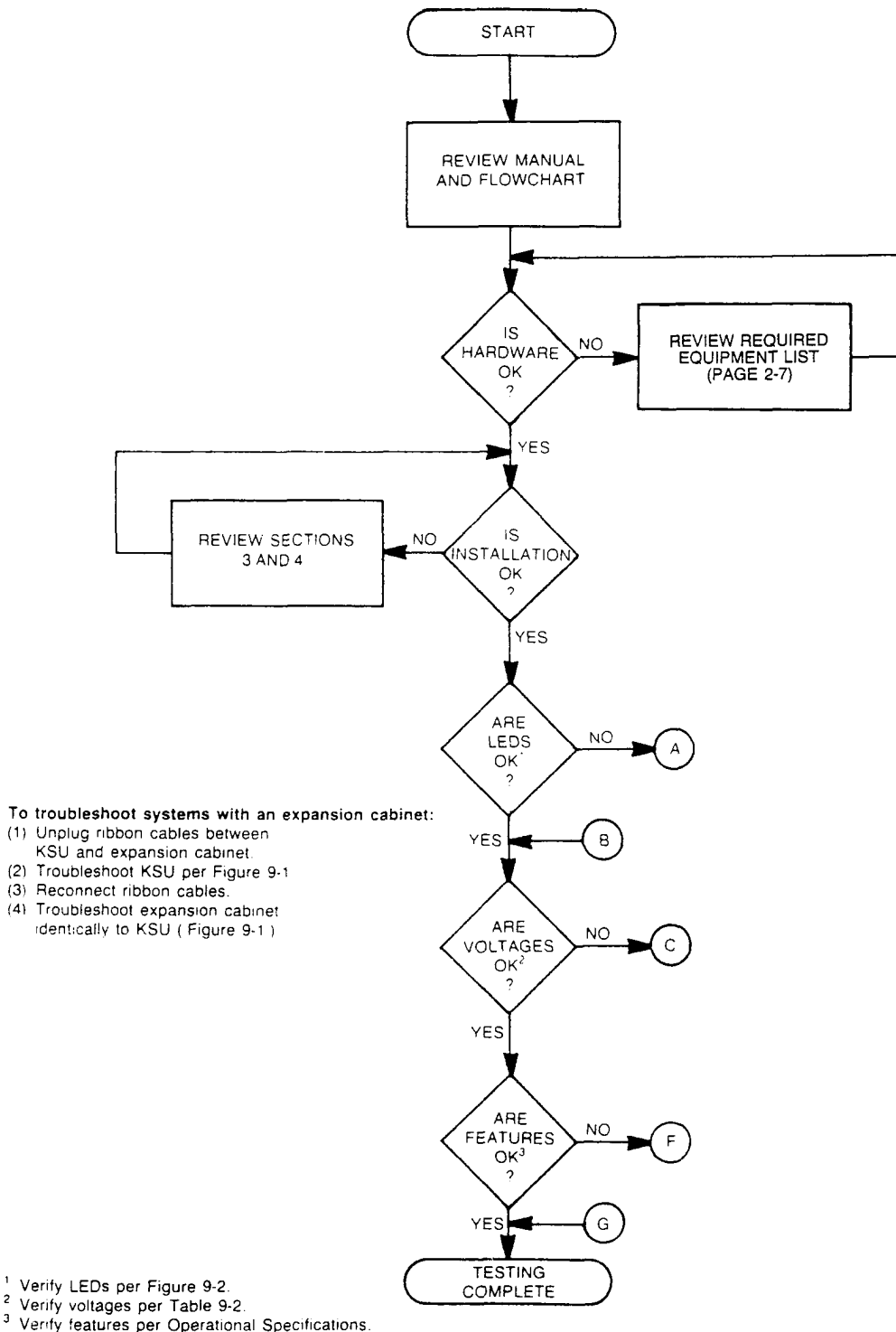
## TOOLS AND TEST EQUIPMENT

**2.08** The following tools and test equipment items are recommended:

- Standard punch down tool
- Digital (high impedance) voltmeter
- Continuity checker
- Antistatic wrist strap
- Spare bridging clips
- Needle nose pliers
- Small diagonal pliers
- Medium size Phillips-head screwdriver
- Butt set (for checking CO lines)
- Wire cutters
- Wire strippers

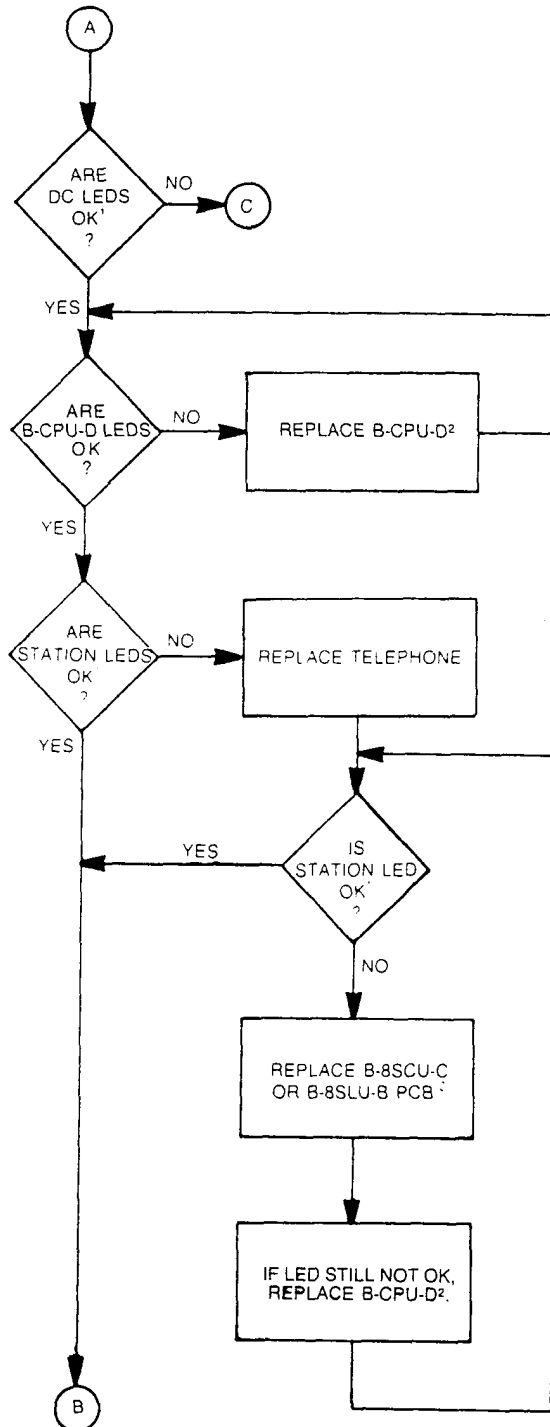


### SYSTEM CHECK



**FIGURE 9-1 SYSTEM TROUBLESHOOTING FLOWCHART (Page 1 of 6)**

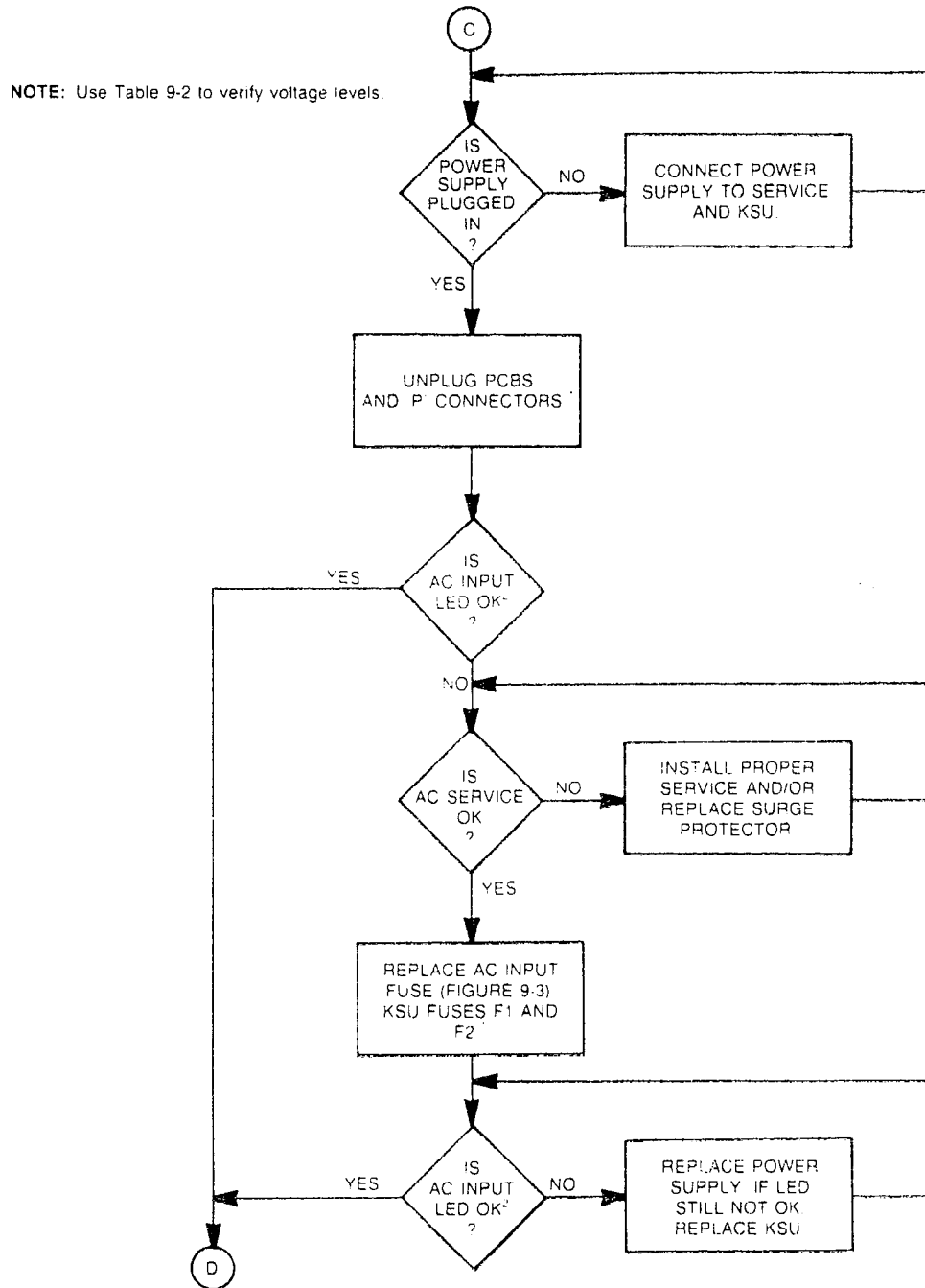
### LED CHECK



<sup>1</sup> Check LEDs per Figure 9-2.  
<sup>2</sup> Turn power supply off before replacing PCB.  
Turn power supply on after replacing PCB.

FIGURE 9-1 FLOWCHART (Page 2 of 6)

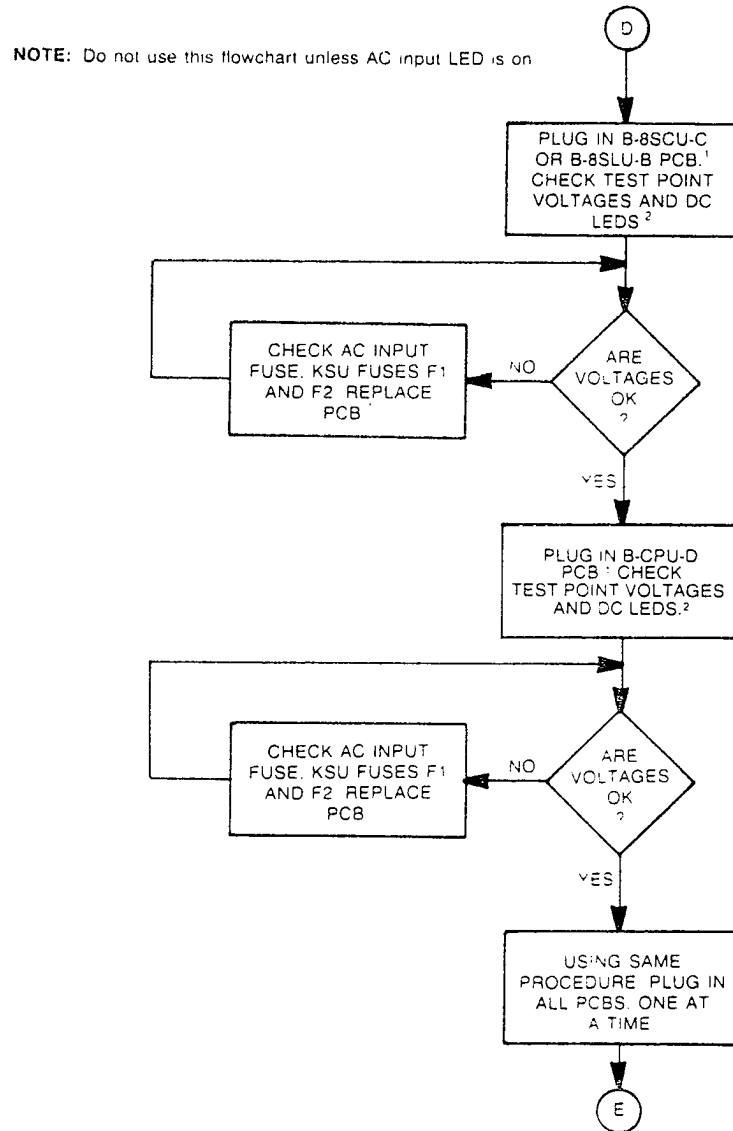
## POWER SUPPLY / SERVICE CHECK



- <sup>1</sup> Turn power supply off before removing fuse or PCB  
Turn power supply on after replacing fuse or PCB
- <sup>2</sup> AC input LED is inside power supply on / off switch

**FIGURE 9-1 FLOWCHART (Page 3 of 6)**

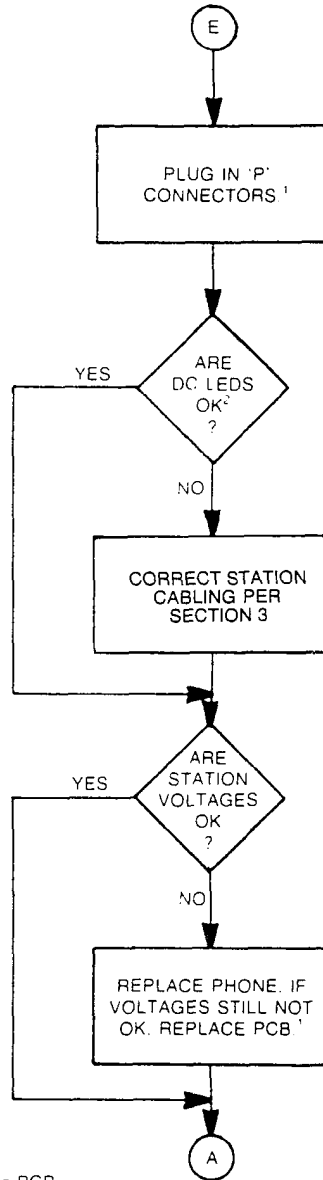
## VOLTAGE/PCB CHECK



- <sup>1</sup> Turn power supply off before removing fuse or PCB  
Turn power supply on after replacing fuse or PCB  
<sup>2</sup> Verify LEDs and test points per Figure 9-2 and Table 9-2

FIGURE 9-1 FLOWCHART (Page 4 of 6)

### CABLE CHECK



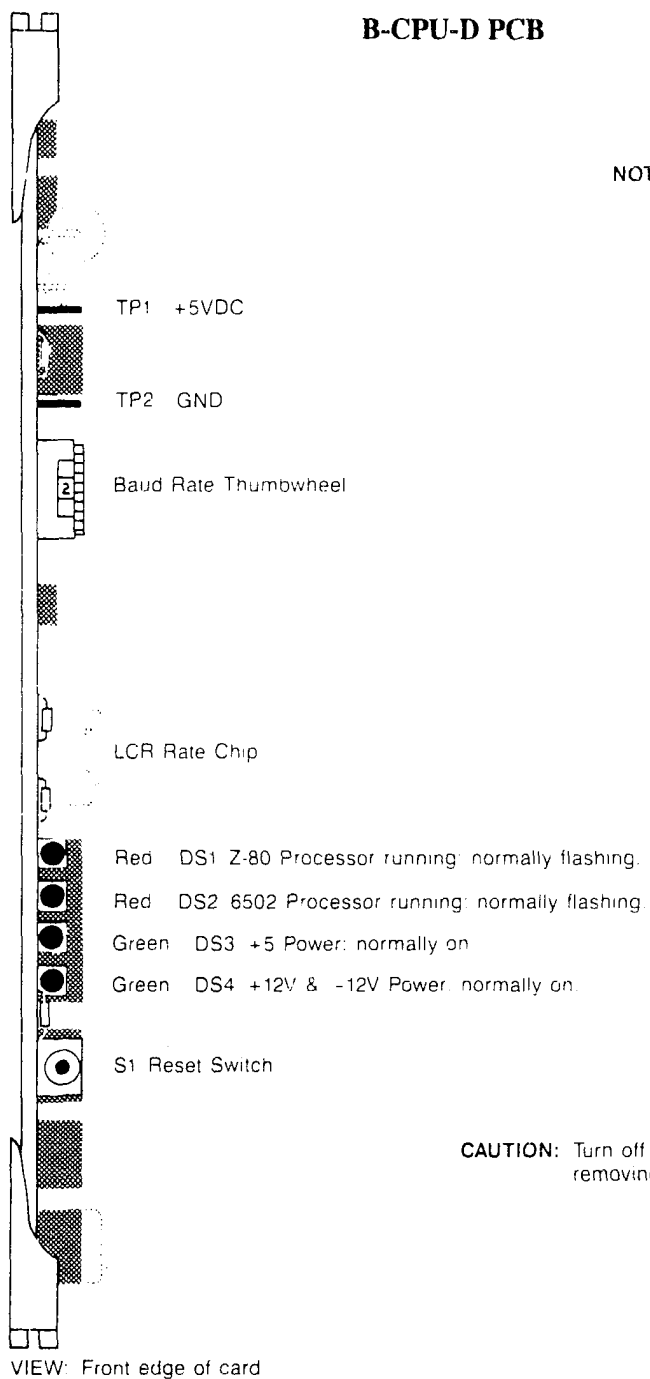
<sup>1</sup> Turn power supply off before plugging in 'P' connector or removing PCB  
 Turn power supply on after plugging in 'P' connector PCB.  
<sup>2</sup> Verify LEDs and test points per Figure 9-2 and Table 9-2

FIGURE 9-1 FLOWCHART, (Page 5 of 6)



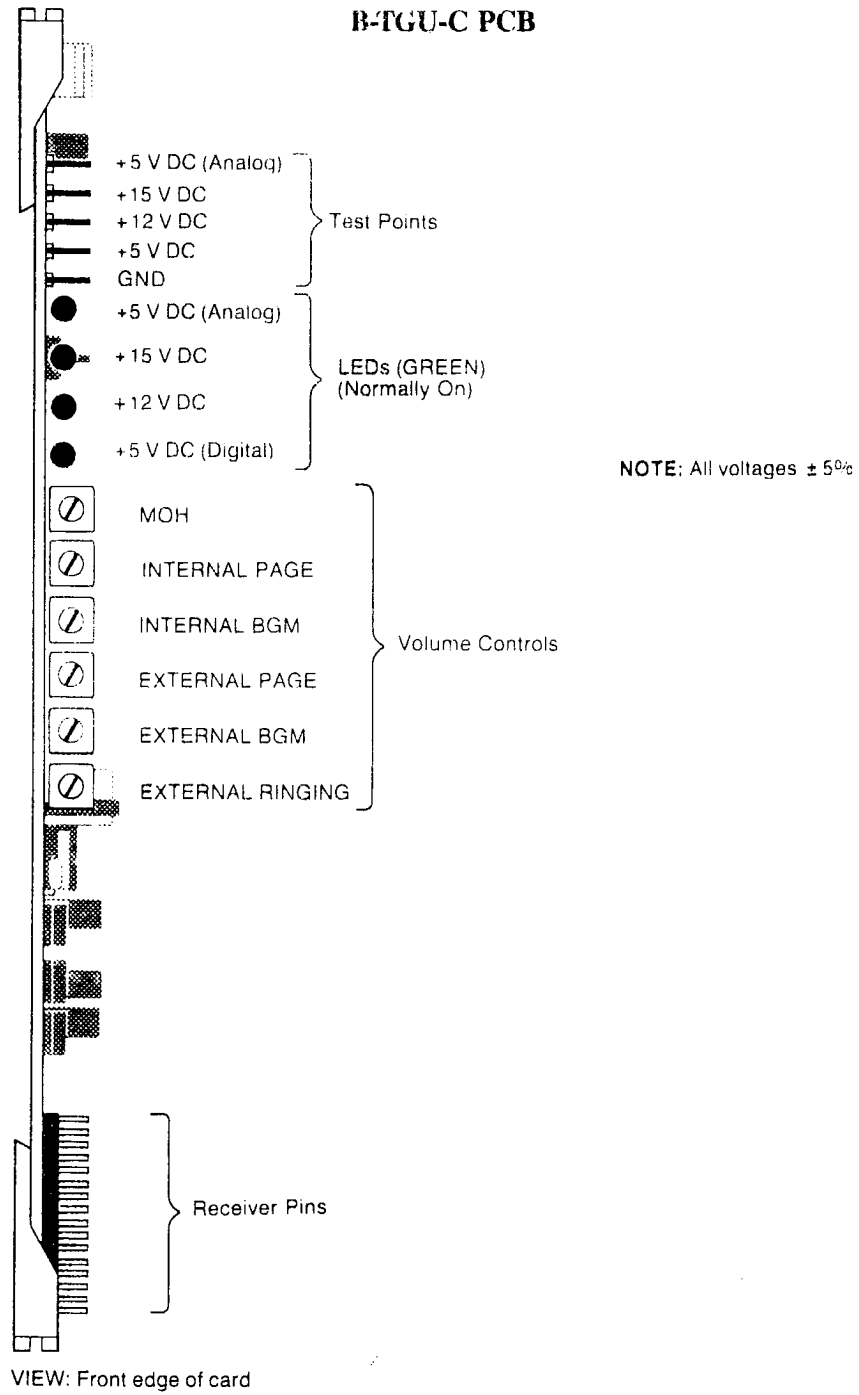
### B-CPU-D PCB

NOTE: All voltages  $\pm 5^{\circ}\mu$



CAUTION: Turn off power before inserting or removing B-CPU-D PCB.

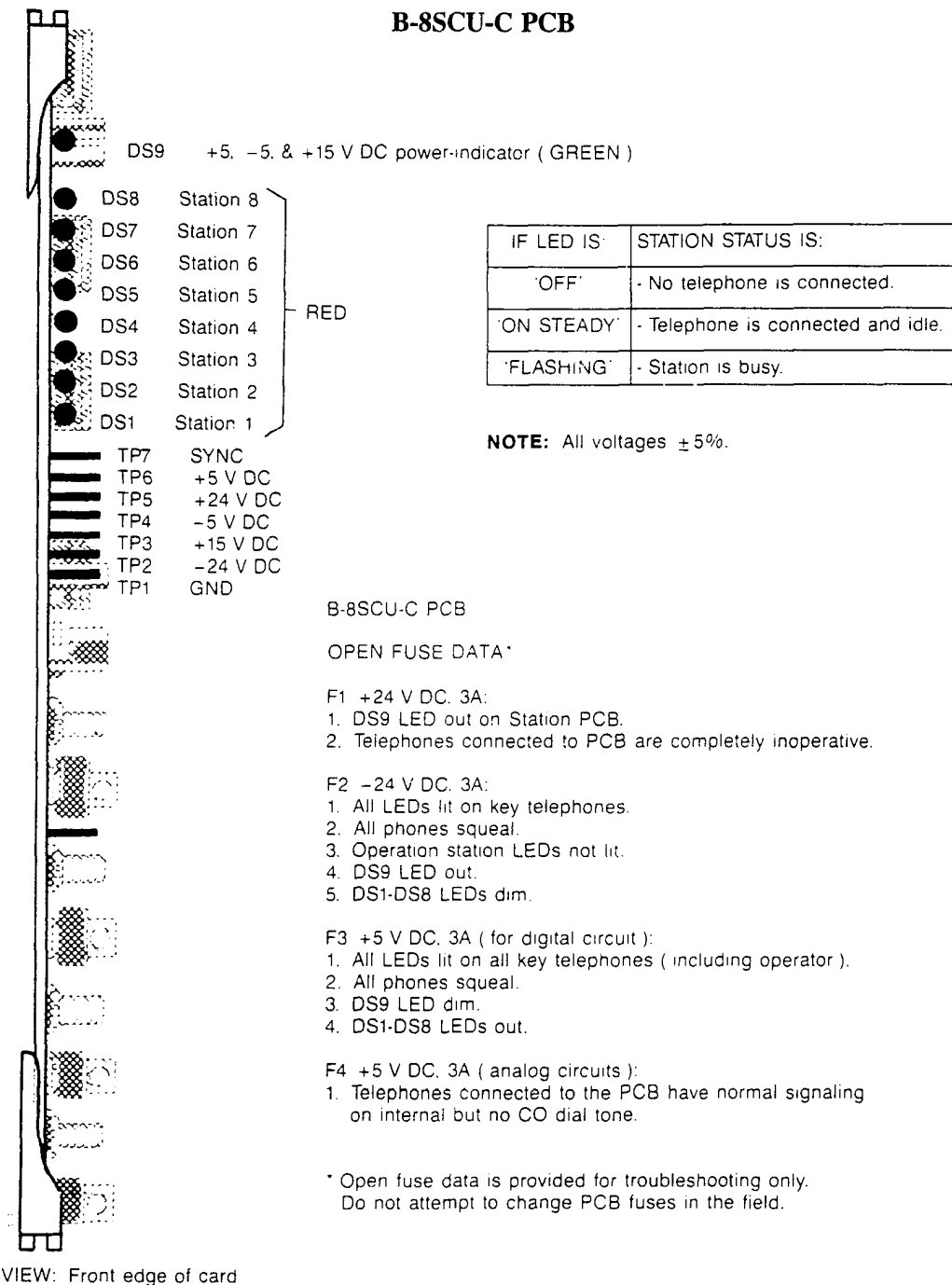
FIGURE 9-2 LEDS AND TEST POINTS (Page 1 of 6)



**FIGURE 9-2 LEDs AND TEST POINTS (Page 2 of 6)**

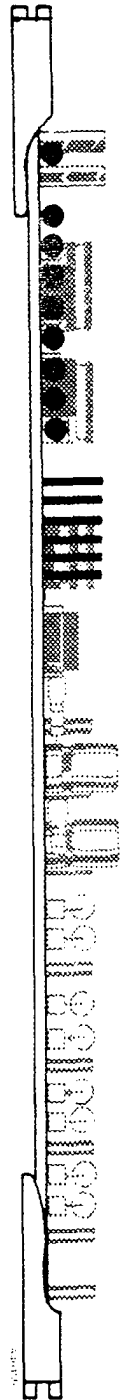


### B-8SCU-C PCB



**FIGURE 9-2 LEDS AND TEST POINTS (Page 3 of 6)**

**B-8SLU-B PCB**



DS9 +5, -5, & +15 V DC power-indicator NORMALLY ON ( GREEN )

DS8 Station 8  
 DS7 Station 7  
 DS6 Station 6  
 DS5 Station 5  
 DS4 Station 4  
 DS3 Station 3  
 DS2 Station 2  
 DS1 Station 1

} RED

IF LED IS	STATION STATUS IS
OFF	No telephone is connected
ON STEADY	Telephone is connected and idle
FLASHING	Station is busy

**NOTE:** All voltages  $\pm 5\%$ .

TP6 +5 V DC  
 TP5 +24 V DC  
 TP4 -5 V DC  
 TP3 +15 V DC  
 TP2 -24 V DC  
 TP1 GND

**B-8SLU-B PCB**

**OPEN FUSE DATA**

- F1 +24 V DC, 3A:**
1. DS9 LED out on SLU PCB
  2. Telephones connected to PCB are completely inoperative.
- F2 -24 V DC, 3A:**
1. Same as F1.
- F3 +5 V DC, 3A:**
1. Phones squeal when on-hook
  2. DS9 LED is out

\* Open fuse data is provided for troubleshooting only.  
 Do not attempt to change PCB fuses in the field.

Strap circuit E1 to E2 for 2500 type telephone  
 Strap circuit E2 to E3 for Single Line and OPX telephones

VIEW: Front edge of card

**FIGURE 9-2 LEADS AND TEST POINTS (Page 4 of 6)**

### B-4COU-A PCB



TP403 XPT Analog  
 TP402 Tip  
 TP401 Ring  
 DS401 Status ( RED )  
 TP3 -12 V DC

Line  
 Ckt.  
 #4

Normal LED Status

DS1 and DS2 - ON

DS101 - 401:  
 OFF Line is idle  
 On Steady - Line is busy or busied out by program

DS1 +15 & -12 V DC ( GREEN )  
 TP2 +15 V DC

TP303 XPT Analog  
 TP302 Tip  
 TP301 Ring  
 DS301 Status ( RED )

Line  
 Ckt.  
 #3

**NOTE:** Lines 1-20 are Direct Access Lines.  
 Lines 21-32 are dial-up lines ( i.e., require an Intercom link )

DS2 +5 V DC ( GREEN )  
 TP1 GND

TP203 XPT Analog  
 TP202 Tip  
 TP201 Ring  
 DS201 Status ( RED )

Line  
 Ckt.  
 #2

B-4COU-A PCB

OPEN FUSE DATA\*  
 F1 -24 V DC, 3/4A  
 1. DS1 dims to DS2 brightness.  
 2. Lines on affected PCB "dead".

F2 -24 V DC, 3/4A  
 1. DS1 dims to DS2 brightness.  
 2. Distorted MOH and audio on calls.

F3 -5V DC, 3/4A  
 1. DS2 LED out  
 2. Lines on affected PCB "dead".

TP103 XPT Analog  
 TP102 Tip  
 TP101 Ring  
 DS101 Status ( RED )

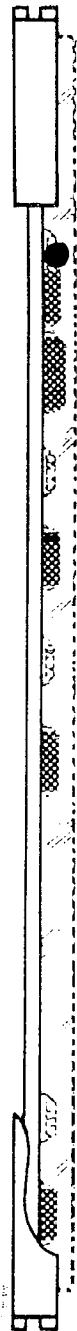
Line  
 Ckt.  
 #1

\* Open fuse data is provided for troubleshooting only.  
 Do not attempt to change PCB fuses in the field.

VIEW: Front edge of card

**FIGURE 9-2 LEDs AND TEST POINTS (Page 5 of 6)**

**B-BUF-A PCB**



DS1 power-indicator NORMALLY ON

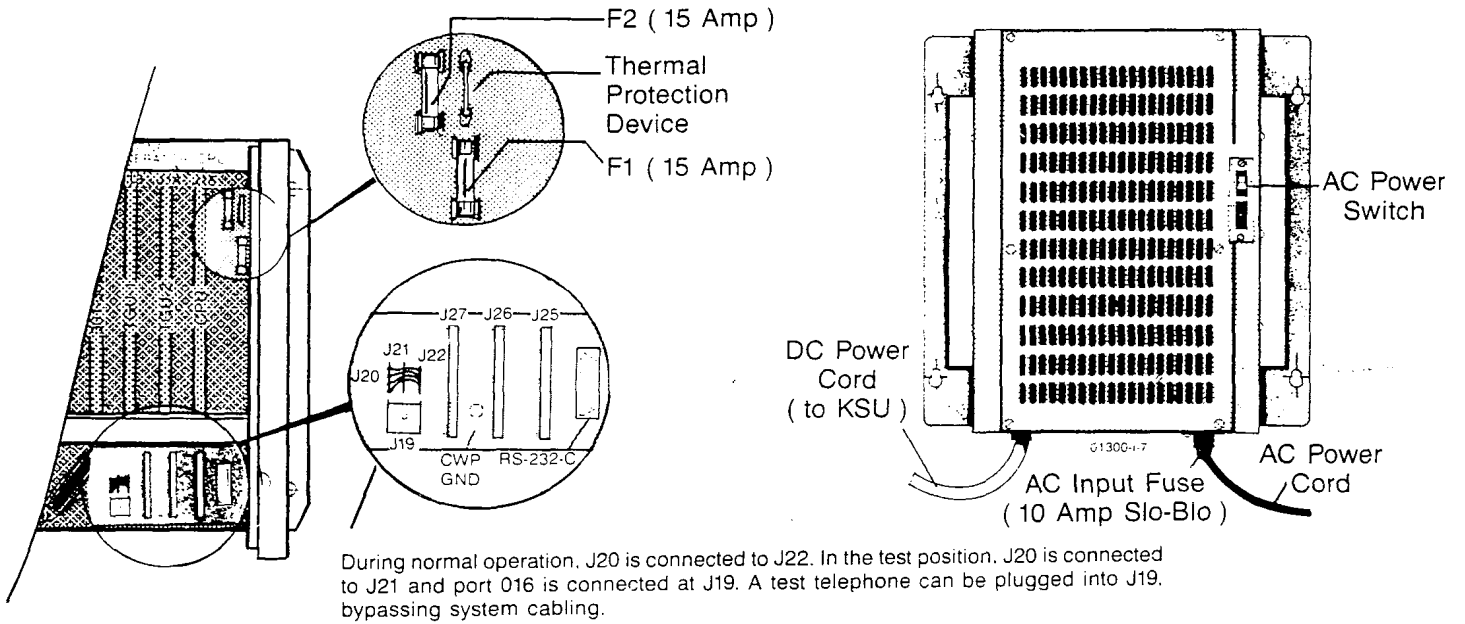
OPEN FUSE DATA  
F1 +5 V DC. 3/4 AMP

\* Open fuse data is provided for troubleshooting only.  
Do not attempt to change PCB fuses in the field.

**NOTE:** The B-BUF-A PCB is only used if an expansion cabinet is installed.

VIEW: Front edge of card

**FIGURE 9-2 LEDS AND TEST POINTS (Page 6 of 6)**



**FIGURE 9-3 FUSE AND TEST CONNECTOR LOCATIONS**

TABLE 9-1 OPERATIONAL TEST PROCEDURE (Page 1 of 2)

FEATURE	AVAILABLE <sup>1</sup>	VERIFIED <sup>2</sup>		PROGRAM- MABLE	SYMPTOM	PROBABLE CAUSE <sup>3</sup>
		YES	NO			
INTERNAL						
INTERCOM	ALL			N		8SCU, 8SLU, CPU
DATE AND TIME	AT,MB			Y		CPU, 8SCU
DIRECT STATION SELECTION	AT,MB			Y		8SCU, CPU
HOTLINE	MB			Y		8SCU, CPU
MICROPHONE CUTOFF MUTE	MB			N		8SCU, CPU
HANDSFREE ANSWERBACK	AT,MB,FB			Y		8SCU, CPU
PAGING	ALL			Y		8SCU, 8SLU, TGU, CPU
CALL WAITING	ALL			Y		8SCU, 8SLU, CPU
CALLBACK	AT,MB			N		8SCU, CPU
CALL FORWARDING	AT,MB			N		8SCU, CPU
CALL FORWARDING CANCEL	AT			N		CPU, 8SCU
MESSAGE WAITING	AT,MB,FB			N		8SCU, CPU
DO NOT DISTURB	MB			N		8SCU, CPU
DO NOT DISTURB OVERRIDE	AT,MB			N		8SCU, CPU
BARGE IN	AT,MB			Y		8SCU, CPU
ALT. ATTENDANT STATION	AT			Y		8SCU, CPU
VOLUME CONTROLS	AT,MB,FB,SL			N		8SCU, 8SLU, CPU
EXTERNAL						
DIRECT LINE ACCESS	AT			N		4COU, TGU, 8SCU, CPU
ANSWERING A CALL	ALL			Y		4COU, 8SCU, 8SLU, TGU
PLACING A CALL	ALL			Y		4COU, 8SCU, 8SLU, TGU
HOLD	ALL			Y		4COU, 8SCU, 8SLU
HANDSFREE	AT,MB			Y		8SCU, CPU
MONITOR	AT,MB,FB			Y		8SCU, CPU
FLASH	AT,MB			Y		8SCU, CPU
TRANSFER	ALL			N		8SCU, 8SLU, CPU
LAST NUMBER REDIAL	ALL			N		8SCU, 8SLU, CPU
SAVE	AT,MB			N		8SCU, 8SLU, CPU
DIRECT INWARD LINES	ALL			Y		4COU, 8SCU, 8SLU, CPU

Verify according to Operational Specification.

For a maintenance record, circle item actually at fault.

AT = Attendant Multibutton  
 MB = Multibutton  
 FB = Four Button  
 SL = Single Line/2500 Type



**TABLE 9-1 OPERATIONAL TEST PROCEDURE (Page 2 of 2)**

FEATURE	AVAILABLE <sup>1</sup>	VERIFIED <sup>2</sup>		PROGRAM- MABLE	SYMPTOM	PROBABLE CAUSE <sup>3</sup>
		YES	NO			
EXTERNAL (cont'd)						
SPLIT	ALL			N		4COU, 8SCU, 8SLU
CONFERENCE	AT,MB,FB			N		4COU, 8SCU, CPU
LINE QUEUING	AT,MB,FB			N		8SCU, 4COU
SPEED DIAL	ALL			Y		8SCU, 8SLU, 4COU
SPLIT RINGING	ALL			Y		8SCU, 8SLU, 4COU
NIGHT SERVICE (UNA & ANA)	ALL			Y		8SCU, 8SLU, CPU, 4COU
RELEASE	AT			N		8SCU, 8SLU, 4COU
BUSY OUT LINES	AT			N		8SCU, 8SLU, 4COU
CALL PICKUP, DIRECTED	ALL			N		8SCU, CPU, COU
CALL PICKUP, GROUP	ALL			Y		8SCU, CPU, COU
PARK	ALL			N		8SCU, CPU, COU
PRIVATE LINE	AT,MB			Y		8SCU, CPU, COU
TOLL RESTRICTION	ALL			Y		4COU, 8SCU, TGU, CPU
OPTIONAL				Y		CPU
MUSIC ON HOLD	ALL			Y		TGU, 8SLU, 8SCU, 4COU
BACKGROUND MUSIC	AT,MB,FB			Y		TGU, 8SLU, 8SCU
SMDR	ALL,PRINTER			Y		CPU
ACCOUNT CODE	ALL,PRINTER			Y		CPU

AT = Attendant Multitouch  
 MB = Multitouch  
 FB = Four Button  
 SL = Single Line 2500 Type

Verify according to Operational Specification

For a maintenance record, circle item actually at fault.

**TABLE 9-2 SYSTEM VOLTAGES**

**DANGER: DIRECT CONTACT WITH POWER SUPPLY INPUT AND OUTPUT VOLTAGES MAY BE HARMFUL OR LETHAL. ONLY QUALIFIED PERSONNEL SHOULD ATTEMPT TO TAKE THE VOLTAGE READINGS OUTLINED IN THE CHART BELOW.**

DESCRIPTION	READING <sup>1</sup>	TEST CONDITION	TEST POINT LOCATION
AC Input	95 to 130 VAC	No load ( i.e., no PCBs installed ) and full load ( i.e., all PCBs installed ).	Measure service outlet or use power line monitor.
<b>Power Supply</b> +24 V DC	+24.0 V DC to +25.0	No load.	Measure between F2 (+) and GND (-) lug.
-24 V DC	-24.0 V DC to -25.0 V DC	No load.	Measure between F1 (+) and GND (-) lug.
<b>PCB Voltages</b> +5V DC	+4.75 V DC to +5.25 V DC	Full load.	Measure between TP6 (+) and TP1 (-) on left most SLU/SCU PCB.
+5 V DC	+4.75 V DC to +5.25 V DC	Full load.	Measure between TP6 (+) and TP1 (-) on any right most SLU/SCU PCB.
-5 V DC	-4.75 V DC to -5.25 V DC	Full load.	Measure between TP4 (+) and TP1 (-) on any SLU/SCU PCB.
+15 V DC	+14.25 V DC to +15.75 V DC	Full load.	Measure between TP3 (+) and TP1 (-) on any SLU/SCU PCB.
+24 V DC	+22.8 V DC to +25.2 V DC	Full load.	Measure between TP5 (+) and TP1 (-) on any SLU/SCU PCB.
-24 V DC	-22.8 V DC to -25.2 V DC	Full load.	Measure between TP2 (+) and TP1 (-) on any SLU/SCU PCB.
<b>Sta. Voltages</b> Multibutton, Four Button Data Power	+38 V DC to +48 V DC	Telephone installed.	Open cover on 625 jack. Measure between RED (+) and GRN (-) lugs.
<b>Single Line</b> +24 V DC	+22.8 V DC to +25.2 V DC	Telephone installed.	Open cover on 625 jack. Measure between GRN (+) and BLK (-) lugs, and YEL (+) and BLK (-) lugs.
-24 V DC	-22.8 V DC to -25.2 V DC	Telephone installed. ( on hook )	Open cover on 625 jack. Measure between RED (+) and BLK (-) lugs.

<sup>1</sup> Readings should be made with a digital voltmeter with a known accuracy of  $\pm 1\%$  or better.



**TABLE 9-3 REPLACEABLE PARTS**

ITEM	PART NUMBER	DESCRIPTION	WHERE USED
KSU	86003 <sup>1</sup>	Key Service Unit (KSU)	KSU/EXP
B-EXP-A	86016 <sup>1</sup>	Expansion Cabinet	EXP
B-PSU-B	86007 <sup>1</sup>	Power Supply	KSU/EXP
B-CPU-D	86051 <sup>1</sup>	Central Processing Unit PCB	KSU
B-8SCU-C	86023 <sup>1</sup>	Station Card Unit PCB	KSU/EXP
B-8SLU-B	86027/A <sup>1</sup>	Single Line Instrument Unit PCB	KSU/EXP
B-4COU-A	86010 <sup>1</sup>	CO Line Unit PCB	KSU/EXP
B-TGU-C	86031 <sup>1</sup>	Tone Generator Unit PCB	KSU
B-BUF-A	86017 <sup>1</sup>	Buffer PCB	EXP
—	86015 <sup>1</sup>	DTMF Receiver Daughter Board	TGU
—	86185 <sup>1</sup>	Special Loud Ringing Tone Board	S/L TEL.
—	86187 <sup>1</sup>	TIE Electronic Ringer	S/L TEL.
B-OPX-A	86043 <sup>1</sup>	OPX Adaptor PCB	OPX
—	86073 <sup>1</sup>	Display Multibutton Key Telephone	Station
—	86070 <sup>1</sup>	Multibutton Key Telephone	Station
—	86071 <sup>1</sup>	Four Button Key Telephone	Station
—	86075 <sup>1</sup>	DSS Console	Attendant
—	86057 <sup>1</sup>	Single Line Telephone	Station
—	86076M <sup>1</sup>	Multibutton Wall Mounting Kit	Station
—	86077M <sup>1</sup>	Four Button/Single Line Wall Mounting Kit	Station
—	86076A <sup>1</sup>	Wall Mount Hanger	Station
F1,F2	— <sup>2</sup>	KSU Fuse, 15 Amp (312/AGC)	KSU/EXP
—	— <sup>2</sup>	AC Input Fuse, 10 Amp (313/MDL)	Power Supply
—	TBD	Handset (Carbon)	Station
—	TBD	Handset (Electret)	Station
—	TBD	Handset Coil Cord	Station
—	TBD	Line Cord	Station
—	— <sup>2</sup>	Station Cable	Station
—	— <sup>2</sup>	66M1-50 Connection Blocks (w/clips)	KSU/EXP
—	— <sup>2</sup>	625A4 Modular Station Jack	Station
—	— <sup>2</sup>	625F4 Modular Station Jack	Station
—	— <sup>2</sup>	Plug-In Power Line Surge Protector	Power Supply
—	— <sup>2</sup>	Antistatic Wrist Ground Strap	KSU/EXP
—	TBD <sup>1</sup>	Key Cap Kit	Station
—	01302 IMG <sup>1</sup>	TCX-128 System Manual	—
—	01302 AC <sup>1</sup>	TCX-128 Attendant Feature Handbook	—
—	01302 MB <sup>1</sup>	TCX-128 Multibutton Feature Handbook	—
—	01302 FB <sup>1</sup>	TCX-128 Four Button Feature Handbook	—
—	01302 SL <sup>1</sup>	TCX-128 Single Line Feature Handbook	—

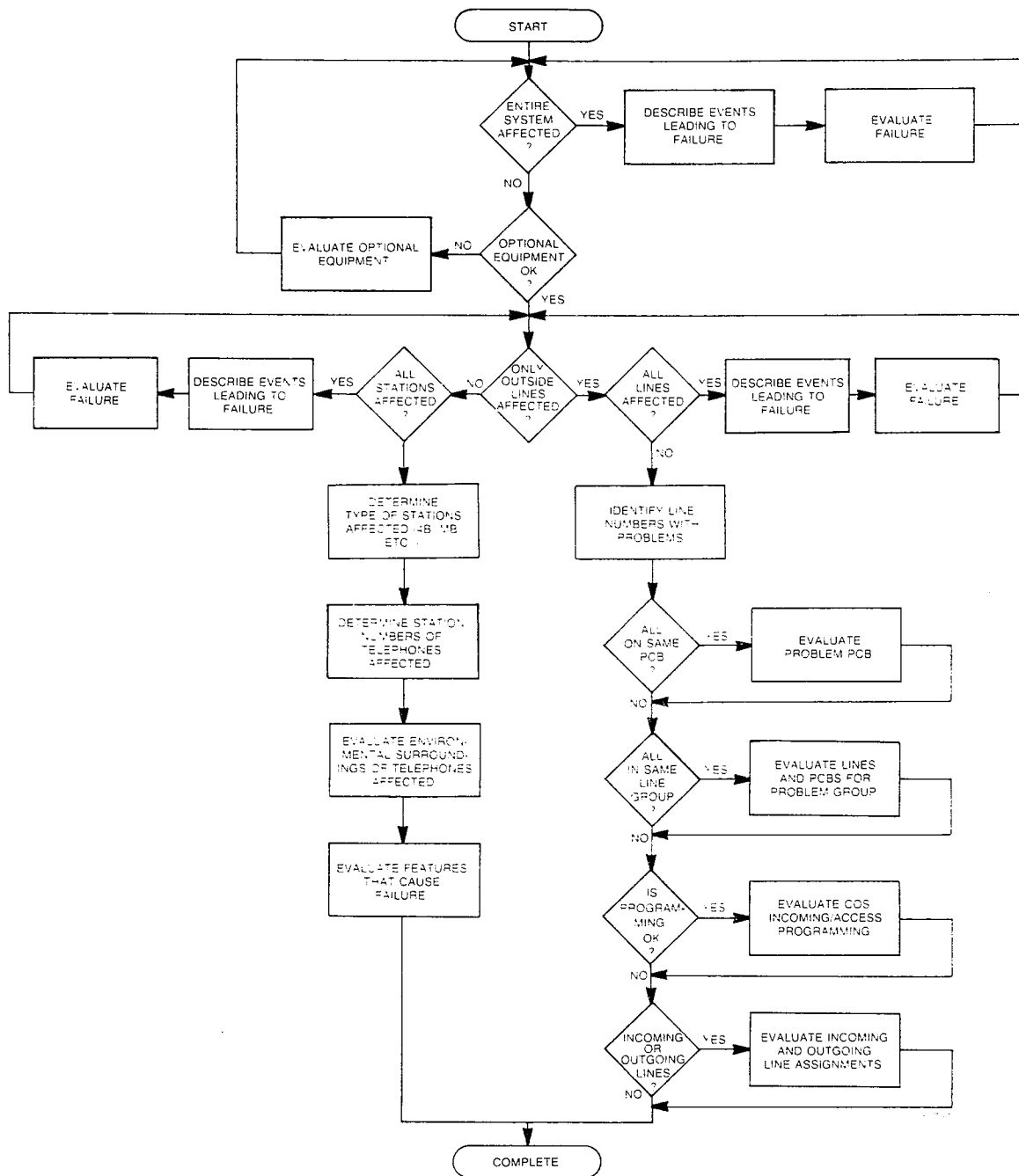
<sup>1</sup> Parts available from TIE/communications, Inc., unless otherwise indicated.

<sup>2</sup> Parts available from Telephone equipment supply houses.

**TABLE 9-4 COMMON SYSTEM FAULTS**

FAULT	SOLUTION
(1) Cannot program system.	Check B-CPU-D PCB LEDs and fuses. Check B-CPU-D PCB switches S2 and S3 for correct settings. Troubleshoot system per Figure 9-1.
(2) Constant ringing on all telephones.	Check B-CPU-D PCB LEDs and fuses. Troubleshoot system per Figure 9-1.
(3) No audible tones.	Check B-TGU-C PCB LEDs and fuses, replace PCB. Troubleshoot system per Figure 9-1.
(4) Excessive crosstalk on outside calls, Intercom calls and Page.	Systems with an expansion cabinet must use a B-TGU-C in TONE GEN slot 2. Replace B-TGU-C PCB. Troubleshoot system per Figure 9-1.
(5) Switch S1 on B-CPU-D PCB does not reset system.	If B-CPU-D PCB LEDs are OK, replace PCB. If an individual B-8SCU-C or B-8SLU-B PCB cannot be reset, check LEDs, then replace PCB. Troubleshoot system per Figure 9-1.
(6) SMDR prints alpha characters instead of numbers.	Replace B-CPU-D PCB.
(7) Low Page volume.	Adjust potentiometers ( per Figure 9-2 ) on B-TGU-C.
(8) Various LEDs on key telephones flash and stations do not work. All stations may be ringing constantly.	Check B-8SCU-C PCB LEDs and fuses, replace PCB.
(9) Telephone dead.	Check B-8SCU-C / B-8SLU-B LEDs and fuses, replace PCB. Troubleshoot system per Figure 9-1.
(10) Intermittent or delayed dial tone.	All DTMF receivers and links busy due to heavy traffic. Add additional DTMF receivers, if possible.
(11) Constant ringing on all single line telephones.	Check B-8SLU-B LEDs and fuses, replace PCB.
(12) Cannot program Station Speed Dial numbers.	Stations 51-128 do not have memory programming. Replace B-CPU-D PCB, then B-TGU-C PCB.
(13) Fluctuating display telephone brightness.	Wrong handset installed. Display telephone handset transmitters are "silver metallic" ( electret ). All other transmitters are black ( carbon ).
(14) Outside line cannot be used ( i.e., no dial tone or audio ).	Check programming. Check B-4COU-A PCB LEDs and fuses, replace PCB.
(15) From attendant's station, cannot seize line using Direct Line Access.	Check B-4COU-A PCB LEDs and fuses, replace PCB.
(16) Expansion cabinet cannot be used.	Check B-BUF-A PCB. Check ribbon cable connections.

11302IM 9-4



**FIGURE 9-4 HOW TO EVALUATE A SYSTEM PROBLEM**



**05 — DND**

This code shows that the station is in Do Not Disturb.

**06 — Off Hook**

When a multibutton station is off hook (i.e., handset lifted), this status code will display.

**07 — Off Hook, Link Seized**

If the station is off hook and making an Intercom call, code 07 will display.

**08 — Handsfree**

Code 08 indicates that the multibutton station has pressed the HF or MON key.

**09 — Handsfree, Link Seized**

If a station uses the Handsfree or Monitor mode to place an Intercom call, status code 09 will display.

**0A — Handsfree Answerback**

Multibutton and four button telephones can use Handsfree Answerback to answer Intercom calls without touching the handset. If the report is run while a station is in the Handsfree Answerback mode, code 0A will display.

**0B — Handsfree, Off Hook**

Status code 0B indicates that a multibutton station is off hook and the HF (or MON) key has been pressed. This condition will occur if the station user switches from the handset mode to the Handsfree mode, before placing a call, and does not hang up the handset.

**0C -- Handsfree, Off Hook, and Link Seized**

If a multibutton station has the handset off hook, and the HF (or MON) and INT keys code will also display if a four button station pressed, status code 0C will display. This is off hook and the MON key has been pressed. This condition will occur if the station user places an Intercom call using the handset and switches to the Handsfree (or Monitor) mode without hanging up the handset.

**0D -- Off Hook, Line Seized**

Status code 0D indicates that the station is busy on an outside call.

**0E — Handsfree, Line Seized**

If a key station is busy on a Handsfree or Monitored outside call, status code 0E will display.

**0F — Handsfree, Off Hook, and Line Seized**

If a key station has the handset off hook, the HF (or MON) key pressed and a line seized, status code 0F will display. A line can be seized only if it is allowed by 'E' —> STATIONS FEATURES, CO ACCESS (NN..NN) IS.. programming. Status code 0F will display if the handset was used to place an outside call, and the station user switched to the Handsfree or Monitor mode without hanging up the handset.

**10 — Speed Dial Being Programmed**

Status code 10 indicates that a multibutton station is entering Speed Dial numbers.





**Table 9-5 PORT NUMBER TO HEXADECIMAL CONVERSION**

PORT	HEX	PORT	HEX	PORT	HEX	PORT	HEX
001	00	033	20	065	40	097	60
002	01	034	21	066	41	098	61
003	02	035	22	067	42	099	62
004	03	036	23	068	43	100	63
005	04	037	24	069	44	101	64
006	05	038	25	070	45	102	65
007	06	039	26	071	46	103	66
008	07	040	27	072	47	104	67
009	08	041	28	073	48	105	68
010	09	042	29	074	49	106	69
011	0A	043	2A	075	4A	107	6A
012	0B	044	2B	076	4B	108	6B
013	0C	045	2C	077	4C	109	6C
014	0D	046	2D	078	4D	110	6D
015	0E	047	2E	079	4E	111	6E
016	0F	048	2F	080	4F	112	6F
017	10	049	30	081	50	113	70
018	11	050	31	082	51	114	71
019	12	051	32	083	52	115	72
020	13	052	33	084	53	116	73
021	14	053	34	085	54	117	74
022	15	054	35	086	55	118	75
023	16	055	36	087	56	119	76
024	17	056	37	088	57	120	77
025	18	057	38	089	58	121	78
026	19	058	39	090	59	122	79
027	1A	059	3A	091	5A	123	7A
028	1B	060	3B	092	5B	124	7B
029	1C	061	3C	093	5C	125	7C
030	1D	062	3D	094	5D	126	7D
031	1E	063	3E	095	5E	127	7E
032	1F	064	3F	096	5F	128	7F

KSU
Expansion Cabinet

T1302IM.9-5

**3.07** The Link Status bits (bits 1 and 2) are defined as follows:

**00 — Link Idle**

Any link that is not being used when the report is run will be given status 00. If a link is idle, any random port assignment that may appear in bits 3 and 4 is not meaningful.

**01 — Waiting for a DTMF Receiver**

Status code 01 indicates that a station has seized a link for which no DTMF receiver is available.

**02 — Link, Dial Tone**

If a link has been seized by a station, and dial tone has been switched onto that link, code 02 displays. This code is valid only while dial tone is present (i.e., before timeout occurs) and if a DTMF receiver has been assigned.

**03 — Link Ringing**

CO Audible from incoming calls is derived from tones on the B-TGU-C PCB. These tones are connected to the ringing stations through a link. When a link is switched for ringing, it is assigned status code 03. The port number designation (bits 3 and 4) is not meaningful for this code.

**04 — Link, Talk**

Status code 04 indicates that the station has seized an Intercom link and established a talkpath with another station.

**05 — Destination Busy**

When a station seizes a link and places an Intercom call to a busy extension, status code 05 is displayed. The Display System Status report must be run while the calling station is receiving a busy tone.

**06 — Reorder Tone**

Reorder tone is sent to a station when a link is seized and an invalid dial command is attempted or link timeout occurs. If a link is receiving a reorder tone, the status code 06 will be displayed.

**07, 0C — Splash Tones**

When placing an Intercom call, splash tones are sent to a key telephone before a Handsfree Answerback talkpath is established. If the diagnostic is run as the splash tones are being sent to the receiving station (before the talkpath is established), status code 07 or 0C will display.

**08—0B — Not Used**

**0D — Link Connected to Dial-Up Line**

Lines 21-32 are termed dial-up lines, and are connected to a station through an Intercom link. If a call has been established using a dial-up line, status code 0D will display for the link used. The port number designation is the hexadecimal number of the line seized, offset by one (refer to Table 9-6). For example, the port designation for line 25 is hex 18.

**0E, 12 — Attendant or Hotline Partner Call Waiting**

If the attendant calls a busy station, or a station calls its busy Hotline partner, Call Waiting tones are sent to the busy station. The calling station link is camped-on to the busy station. Codes 0E and 12 will indicate that the link camped-on condition exists. Code 0E will also display if CO Call Waiting beeps are being sent when the report is run.

**0F—11 — Not Used**



**13 — Link Paging**

Status code 13 indicates that a station is Paging (All Call or Zone).

**14 — Not Used**

**15 — Confirmation Tone**

Under certain conditions, a confirmation tone is broadcast to indicate to the user that an action has been successfully completed. If the report is run while the confirmation tone is on the link, code 15 will display.

**16 — Not Used**

**17 — Forced Intercom Ringing Enabled**

If an Intercom call is placed to a key telephone that is programmed to ring, the link seized by the calling party will display status code 17. Forced Intercom Ringing can be enabled on a system wide or station wide basis.

**18, 19 — Not Used**

**1A — Sending Call Waiting Tone**

If the link is sending Call Waiting Tones, code 1A will display.

**1B — Page Tone**

When a station initiates a Page, a Page tone is sent out over the link it has seized. If the Display System Status diagnostic is run at the instant the Page tone is on the link, status code 1B will display.

**1C — Accepting DTMF Digits (Dial Pulse Call Only)**

If the link is accepting DTMF digits from a

station that is placing a call on a Dial Pulse line, code 1C will display. This code is applicable for non-display telephones only.

**1D — Message Waiting Tone**

Code 1D indicates that the Message Waiting confirmation tones are being sent to the station connected to the link.

**1E — Barge In Tones**

If the Display System Status report is run while Barge In tones are being received on the link, code 1E will display.

**1F — Barge In**

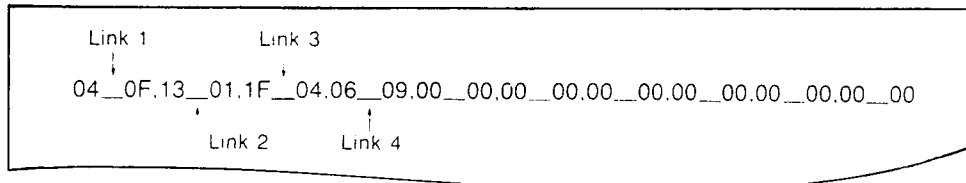
Status code 1F indicates that a station has seized a link and used Barge In to connect to an existing call.

**3.08** For example, the sample report below indicates that:

- Port 016 is on an Intercom call over link 1.
- Port 002 is making a Page announcement over link 2.
- Port 005 has used link 3 to Barge In to an existing conversation.
- Port 010 has attempted an illegal command and is receiving reorder tone.

**LINE STATUS**

**3.09** Lines 9 through 11 of the 'D' —> DISPLAY SYSTEM STATUS report shows the status of the 32 incoming lines. This field uses 32 4-bit fields (one field for each line) to show line status (bits 1 and 2) and the station port which is using the line (bits 3 and 4). Bits 2 and 3 of each field are separated by an underscore. Each field is separated from the next by a comma. The first field is for line 1; the last field is for line 32. The port (bits 3 and 4) is represented by its hexadecimal equivalent, offset by one (Table 9-5).



**LINK STATUS REPORT**

**3.10** The Line Status codes are defined as follows:**00 — Line Idle**

If a line is installed and not being used, status code 00 will display. The port assignments for lines with status 00 are not meaningful.

**01 — Line Ring**

Status code 01 will be displayed for each line that has a call ringing in. The port designation is not meaningful.

**02 — Hold**

Status code 02 will be displayed for all lines on Hold.

**03 — Hold Recall/Transfer**

If a call is left on Hold (or in orbit) longer than the programmed recall period, it will recall the station that placed it on Hold. Status code 03 will be displayed if the diagnostic is run while the line is recalling. This code also designates the station to which a line is transferred, and the station being resgnaled by a previously transferred call (i.e., Transfer Recall).

**04 — Flash**

If the Display System Status diagnostic is run while a line is being flashed (loop current interruption), the display shows code 04.

**05 — Line In Use**

Status code 05 will be displayed whenever a line is used to place a call and at least one digit is dialed. This status code will also be displayed if a line is seized and at least six seconds expire before running the diagnostic. Additionally, code 05 will display for all lines busy on incoming calls when the diagnostic is run.

**06 — Line Conference**

A Line Conference is a Conference between one internal party and two outside lines. When a station establishes a Line Conference, status code 06 (and the port assignment) displays for both lines.

**07 — Dial Tone Timeout**

If a line is waiting for dial tone (i.e., the DIAL TONE TIME-OUT. (SEC). interval has not been exceeded), status code 07 will display. This code is valid only for toll restricted telephones.

**08 — Last Number Redial**

When a user initiates a Last Number Redial, status code 08 will display (for the line seized) as the number dials out.

**09 — Line Seized**

Status code 09 will display if a station has seized a line and run the diagnostic before six seconds have expired. After six seconds or as soon as a digit is dialed, code 05 will display.

**0A — Last Number Redial (Flash)**

When a multibutton telephone user presses the L# key while a line is seized, the Last Number Redial facility flashes the line and sends the last number dialed. If the diagnostic is run as the flash is occurring, status code 0A will display.

**0B — Not Used****0C — CO Transfer**

Status code 0C indicates that the line has been transferred to the executive station in a Hotline pair.



### DTMF RECEIVER STATUS

3.12 The thirteenth line of the Display System Status diagnostic displays the status of the DTMF receivers in the system. The eight receivers are displayed in the following order (from left to right):

- DTMF Receiver 1 (B-TGU-C1)
- DTMF Receiver 2 (B-TGU-C1)
- DTMF Receiver 3 (Daughter Board 1, B-TGU-C1)
- DTMF Receiver 4 (Daughter Board 2, B-TGU-C1)
- DTMF Receiver 5 (B-TGU-C2)
- DTMF Receiver 6 (B-TGU-C2)
- DTMF Receiver 7 (Daughter Board 1, B-TGU-C2)
- DTMF Receiver 8 (Daughter Board 2, B-TGU-C2)

Each status field is separated from the next by an underscore.

3.13 The DTMF Receiver status bits are:

- 00 — Idle  
The DTMF Receiver is installed but not in use.
- 01 — In Use  
The DTMF Receiver is processing digits.
- 77 — Not Installed.

3.14 For example, the sample report below indicates that:

- DTMF Receiver 1 is busy.
- DTMF Receiver 2 is installed and idle.
- DTMF Receivers 3, 4, 7 and 8 (daughter boards) are not installed.
- DTMF Receivers 5 and 6 (B-TGU-C2) are installed but idle.

```

DTMF 1  DTMF 3  DTMF 5  DTMF 7
01_00_77_77_00_00_77_77--DTMF 8
DTMF 2  DTMF 4  DTMF 6

```

### DISPLAY SYSTEM STATUS SUMMARY

Field: 'D' —> DISPLAY SYSTEM STATUS

#### Access:

On the programming terminal, press the M key to turn off the SMDR and enter the programming mode. Once the main menu displays, press the D key. The Display System Status diagnostic will run in its entirety once the D key is pressed.

#### Description:

The 'D' —> DISPLAY SYSTEM STATUS report is a diagnostic that shows the status of all station ports, Intercom links, lines and DTMF receivers in the system. The display is valid at the instant the report is run.

#### Instructions:

The entire 'D' —> DISPLAY SYSTEM STATUS diagnostic will run when the D key is pressed.

#### Example:

Refer to examples on the preceding pages.

Default Value: not applicable

#### Conditions:

The report is run from the programming terminal.

#### Related Programming:

The system programmable options will affect the way all stations function. Thus, the content of the report is in large part determined by system programming.

Feature Reference: not applicable



**APPENDIX A**  
**ATTENDANT MULTIBUTTON KEY TELEPHONE**  
**OPERATIONAL SPECIFICATION**

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**NOTES:**

- (a) If your telephone is equipped with a MON key, it does not have a speakerphone. Intercom calls can be received Handsfree (Handsfree Answerback) and outside calls may be monitored (Monitor). Handsfree CO calls are not permitted.
- (b) Wherever these instructions tell you to lift the handset, you may press the HF (or MON) key instead. Refer to the Handsfree (Speakerphone) and Monitor features.



## ACCOUNT CODE CAPABILITY

To assign an Account Code (up to nine digits) as you place a call:

- *Lift handset.*
- *Place outside call (or let Speed Dial number dial out).*
- *Dial # (within three seconds).*
- *Dial Account Code.*

**NOTE:** To assign an Account Code as you place a call, the telephone number that you dial must be at least seven digits long.

To assign an Account Code to a call in progress:

- *Press TRF/VOICE key.*
- *Dial 2 #, #.*
- *Dial Account Code (do not wait longer than six seconds between digits).*
- *Dial # to return to the call.*

If the Account Code is nine digits long, you are automatically returned to the call after the ninth digit is dialed.

To enter a Forced Account Code (before the call is placed):

- *Lift the handset.*
- *Press the TRF/VOICE key. Receive internal dial tone.*
- *Dial 6.*
- *Dial #.*
- *Enter the Account Code (up to nine digits).*
- *Dial #.*
- *Seize an outside line (within 30 seconds).*
- *Place outside call.*

**NOTE:** If the Account Code is not entered six seconds before or after dialing, the line is dropped.

**NOTE:** Emergency numbers (i.e., N11 numbers) and the operator (0) can always be dialed—Forced Account Codes are not required.

To store a permanent Account Code (to accompany all calls on a record of calls):

- *Lift handset.*
- *Press the TRF/VOICE key. Receive internal dial tone.*
- *Dial 6, \*.*
- *Enter the Account Code (up to nine digits).*
- *Dial #.*
- *Hang up.*

To erase a permanent Account Code:

- *Lift handset.*
- *Press the TRF/VOICE key. Receive internal dial tone.*
- *Dial 6.*
- *Dial #, #.*
- *Hang up.*

## ALTERNATE ATTENDANT EXTENSION

You can redirect all your calls to any extension (an Alternate Attendant).

To send your calls to the Alternate Attendant:

- Press ALT key. Key flashes.

To return your calls to you:

- Press ALT key again. ALT key extinguishes.

You can reassign the Alternate Attendant from your telephone.

To change the number of the Alternate Attendant:

- Lift handset.
- Press ALT key. Receive internal dial tone.
- Dial number of the extension to be assigned as the Alternate Attendant. The ALT key flashes.

Display: FORWARD TO YYY

- Hang up. Alternate Attendant Extension is activated. The ALT key extinguishes.

When you change the Alternate Attendant assignment, your telephone broadcasts a short tone every two minutes. The following message is briefly displayed every time the tone occurs:

Display: FORWARD TO YYY

To cancel the Alternate Attendant Extension assignment you made:

- Do not lift handset.
- Press flashing ALT key. The key extinguishes.

## ANSWERING A CALL

To answer a call:

- Lift handset.
- Press flashing incoming line key (keys 1-5).

Display: LINE XX

To answer a second call:

- Press flashing line key.

Display: LINE XX

The first call is automatically placed on Hold. Any number of calls can be answered and placed on Hold in this manner.

To display the line number of the ringing call:

- Do not lift handset.
- Press the dial pad digit (1-5) that corresponds to the number of the flashing incoming line key.

Display: LINE XX

## BACKGROUND MUSIC

To turn Background Music on or off:

- Press HOLD key. Key flashes when Background Music is turned on.

To regulate the volume of Background Music on a non-display telephone:

- Turn left volume control clockwise to decrease volume.
- Turn left volume control counterclockwise to increase volume.

To regulate the volume of Background Music on a display telephone:

- Do not lift handset.
- Press VOL UP key to increase volume.
- Press VOL DN key to decrease volume.



**BARGE IN**

**CAUTION: UNAUTHORIZED MONITORING OF CALLS USING THE BARGE IN FEATURE MAY BE INTERPRETED AS AN INVASION OF PRIVACY.**

To Barge In to a call:

- *Lift handset.*
  - *Press TRF/VOICE key and dial extension number (receive busy tone).*
- OR**
- *Press DSS key (receive busy tone).*

Display:

**YYY BUSY**

- *Press BARGE IN key. You hear three short tones as you join the conversation.*

Your calls may be Barged In upon by other extension users. You hear three short tone bursts as the Barge In occurs, and are periodically alerted by three short Privacy Tones afterwards. If you are on an Intercom call that has been answered using Handsfree Answerback, you also hear a longer Privacy Tone after the Barge In Privacy Tones.

**BUSY OUT LINES**

Lines that are busied out cannot be accessed by any extension in the system.

To remove a problem line (busy out) from service:

- *Lift handset.*
- *Press TRF/VOICE key.*
- *Press \**
- *Dial number of line to be busied out (01-12). An acknowledgment tone is heard.*

Display:

**DISABLE LINE XX**

To return the line to service:

- *Repeat procedure above.*

Display:

**ENABLE LINE XX**

**CALL FORWARDING CANCEL**

To cancel all Call Forwarding throughout the system:

- *Lift handset.*
- *Press TRF/VOICE key.*
- *Dial #, #.*
- *Hang up.*

**CALL PICKUP, DIRECTED**

To answer an outside call you hear ringing at a nearby telephone:

- *Lift handset.*
- *Press PARK key.*
- *Dial number of telephone that is ringing.*

Display:

**PICK-UP FROM YYY**

**CALL PICKUP, GROUP**

To answer a call that rings into your Pick Up Group:

- *Lift handset.*
- *Press flashing PKUP key.*

Display:

**PICK-UP FROM YYY**

You can enable your telephone to ring for calls to other extensions in your Pick Up group which *do not* normally ring at your telephone.

To receive ringing from other extensions in your Pick Up group:

- *Lift handset.*
- *Press TRF/VOICE key.*
- *Dial 1803.*

To prevent ringing from other extensions in your Pick Up group:

- *Lift handset.*
- *Press TRF/VOICE key.*
- *Dial 1802.*

To determine which extension in your Pick Up group the call was intended for:

- *Do not lift handset.*
- *Press flashing PKUP key.*

Display:

PICK-UP FROM YYY

## CALL WAITING

### *Call Waiting, CO Call*

To answer a Call Waiting signal (double beep):

- *Press flashing line key. If the initial call is a CO call, it is put on Hold. If an Intercom call, it is dropped.*

Display:

EXT YYY WAITING

If you hear Call Waiting tones and your RLS key flashes, another extension in the system has transferred a call to you and wishes to talk to you before completing the transfer. The number of the transferring extension is displayed.

To talk to the transferring party before answering the call:

- *Press HOLD key (if initial call is outside call).*
- *Press flashing RLS key to be connected to the party transferring the call.*

### *Call Waiting, Hotline Partner*

You may be assigned as the Hotline partner for another extension in the system. When on another call, you may receive a double beep and a flashing RLS key signal indicating that a call from your Hotline partner is waiting to be answered.

## CONFERENCE

### *Add-On Conference*

To add a second internal party to an outside call:

- *Press HOLD key.*
- *Press TRF/VOICE key and dial extension number to be added to conference.*

OR

- *Press DSS key for extension to be added to conference.*

Display:

EXTENSION YYY

- *Announce conference.*
- *Press CONF key. Outside call reconnected.*

To join an Add-On Conference:

- *Lift handset.*
- *Press flashing incoming line key.*

### *Line Conference*

To establish a conference call with two outside lines:

- *Place first call.*
- *Establish second call on another line (first call automatically put on Hold).*

Display:

LINE XX

- *Press CONF key to be connected to both external calls.*

Do not answer another incoming call while establishing a Line Conference. This call would be included in the conference.

Two lines in the same line group can be assigned to different outgoing line keys (keys 8-13). To place and join in conference two calls in the same line group (using the same outgoing line key):

- *Place first call.*
- *Press CONF key. Call will move up to first available incoming line key.*
- *Press HOLD key.*
- *Place second call, using the same outgoing key as for first call.*
- *Press CONF key. Key is illuminated and conference is established.*

### Meet-Me Conference

To initiate a Meet-Me Conference:

- Page all parties to join the conference and announce the Conference Code.
- Press TRF/VOICE key. Receive internal dial tone.
- Dial 19.

#### NOTES:

- If five or more parties join a Meet-Me Conference, volume of the conference begins to decrease.
- Each time an inside party joins a Meet-Me Conference a tone is heard.
- If you establish a Meet-Me Conference then hang up, the parties remain connected.

To join a Meet-Me Conference:

- Lift handset.
- Press TRF/VOICE key. Receive internal dial tone.
- Dial 19.

### Unsupervised Trunk Conference

To establish an Unsupervised Trunk Conference:

- Place or receive first call.
- Press the HOLD key.
- Place or receive second call.
- Press the HOLD key.
- Press the CONF key.
- Press the HOLD key.
- Press the TRF/VOICE key. Receive internal dial tone.
- Dial 15.
- Hang up.

To rejoin the conference:

- Lift the handset.
- Press the TRF/VOICE key. Receive internal dial tone.
- Dial 15.

### DATE AND TIME

To set the Date and Time:

- Lift handset.
- Press TRF/VOICE key.
- Dial 7.
- Enter hour (two digits, 24 hour clock, e.g. 1 PM = 13). †
- Enter minutes past the hour (two digits, 00-59).
- Enter month (two digits, January = 01; December = 12).
- Enter day of the month (two digits).
- Enter year (two digits, 1986 = 86).
- Enter day of the week (one digit, e.g., Sunday = 1, Saturday = 7).

An acknowledgment tone is heard after the last entry. The time and date display returns after three seconds.

† Each entry must be made within six seconds of the last, or you must start the procedure again.

The procedure may be exited at any time.

To return the display to your extension number:

- Do not lift handset.
- Press the VOL UP key.

Display:

THIS IS EXT YYY

The display also tells you when a power failure has occurred (after normal system power has returned):

Display:

POWER FAIL

The normal time and date display returns after three seconds.

To cancel the power failure display:

- Do not lift handset.
- Press the VOL UP key.

Display:

THIS IS EXT YYY

## DIRECT LINE ACCESS

Direct Line Access overrides Least Cost Routing.

To select a specific line (rather than a line group):

- Lift handset.
- Press TRF/VOICE key.
- Dial #.
- Dial line number (01-32).

Display:

LINE XX

## DIRECT STATION SELECTION

### Systems With a DSS Console

To place an Intercom call using the DSS Console:

- Lift handset (or press HF key).
- Press DSS key for extension being called.

Display:

EXTENSION YYY

The DSS Console normally provides access to extensions 301-363. To access extensions 401-463, press the SHIFT key.

The DSS Console is a Busy Lamp Field (BLF) for the system. When a telephone is idle, the appropriate DSS Console LED is off. When a telephone is off-hook, the LED is on. When a telephone is in Do Not Disturb, the LED flashes slowly.

### Systems Without a DSS Console

If the attendant telephone does not have a DSS Console, the first 14 keys automatically convert into Direct Station Selection keys (for six seconds) when you press the TRF/VOICE key. This allows one button access to selected extensions. After your telephone is installed, you may select the extension which corresponds to each DSS key. The DSS keys initially connect you to extensions 301-314.

The DSS keys serve as a Busy Lamp Field for the extensions assigned to them. When a telephone is idle, the corresponding DSS key is off. When a telephone is busy, the DSS key is on. When a telephone is in Do Not Disturb, the DSS key flashes slowly.

To program your DSS keys:

- Do not lift handset or press HF key.
- Press OUT/MEM key. Key flashes.

Display:

PROGRAM MEMORY

- Press DSS key (1-14). Key flashes.

Display:

NUMBER TO BIN WW

- Dial \*.
- Dial extension number that is to be assigned to the DSS key.
- Press bin key again (1-14).

Display:

PROGRAM COMPLETE

**NOTE:** When assigning DSS numbers, do not allow more than six seconds to elapse between steps. If you do, you must begin the procedure again. Also, do not program more than one DSS key for the same extension.

To use your DSS keys:

- Lift handset.
- Press TRF/VOICE key.
- Press DSS key (within six seconds) of extension you wish to call.

Display:

EXTENSION YYY

**DO NOT DISTURB (DND) OVERRIDE**

To override an extension's DND:

- *Lift handset.*
- *Press flashing DSS key.*

Display:

YYY DND

- *Make announcement.*

**EXTENSION HUNTING**

To answer a call ringing in your Hunt group:

- *Lift handset.*
- *Press flashing incoming line key (key 1-5).*

Display:

LINE XX

**NOTES:**

- (a) Extension Hunting does not ring busy telephones or those in Do Not Disturb.
- (b) A call that rings through a Terminal Hunting group (and is not answered) ends up at the last telephone in the group or a predetermined "overflow" extension.
- (c) A call that rings through a UCD Hunting group (and is not answered) continues to cycle through the group or rings the predetermined "overflow" extension.

**FLASH**

To Flash a line:

- *Do not hang up.*
- *Press line key presently in use.*

**FORCED INTERCOM RINGING**

To force an Intercom call to a Multibutton or Four Button telephone to ring (as you place the call):

- *Lift handset.*
- *Press TRF/VOICE key.*
- *Dial 1, then extension number.*

To force all Intercom calls throughout the system to ring:

- *Lift handset.*
- *Press TRF/VOICE key.*
- *Dial 1801.*
- *Hang up.*

To cancel Forced Intercom Ringing throughout the system:

- *Lift handset.*
- *Press TRF/VOICE key.*
- *Dial 1800.*
- *Hang up.*

**HANDSFREE (SPEAKERPHONE)**

To initiate Handsfree mode:

- *Press HF key. HF key lights.*

To return to handset operation:

- *Lift handset. HF key extinguishes.*

**HEADSET INSTALLATION**

To install a headset:

- *Lift handset.*
- *Press TRF/VOICE key.*
- *Dial 1805. L# key LED (key 7) steadily illuminated.*
- *Unplug handset.*
- *Plug in headset.*

To return to a handset:

- *Press TRF/VOICE key.*
- *Dial 1804. L# key LED (key 7) extinguishes.*
- *Unplug headset.*
- *Plug in handset.*

## HOLD

### *Automatic Hold*

You can automatically put your first call on Hold when answering a second call. You must have a DSS Console to use this feature.

To answer second call:

- *Press flashing line key.*

### *Exclusive Hold*

To place a call on Exclusive Hold:

- *Press HOLD key.*

To return to a call on Exclusive Hold:

- *Press flashing line key.*

### NOTES:

- (a) Any call left on Hold longer than the Hold Recall interval, re-rings your telephone.
- (b) When the system is in the night mode, a call left on Hold longer than the Hold Recall interval rings all telephones and loud ringers assigned for night ringing on that line.

## HOTLINE

To call your Hotline partner:

- *Lift handset.*
- *Press HL key.*

Display:

EXTENSION YYY

To transfer an outside call to your Hotline partner:

- *Press HL key.*
- *Announce call.*
- *Do not hang up.*

Display:

EXTENSION YYY

If your Hotline partner accepts the call:

- *Hang up.*

If your Hotline partner would like the call in the Handsfree mode:

- *Press HL key again.*
- *Hang up.*

If your Hotline partner does not want to take the call:

- *Press flashing line key to return to call.*

When your Hotline partner is on a call, your HL key is lit. If your Hotline partner is in Do Not Disturb, your Hotline key flashes slowly.

### NOTES:

- (a) You can override your partner's Do Not Disturb by pressing the HL key.
- (b) You may be part of a Hotline group, rather than having a single Hotline partner. If you are the person in your group assigned as the secretary/receptionist, you have the highest-numbered extension. Any calls transferred from any other extension in your group using just the HL key, ring your telephone. When any of the partners in the group press the HL key, they are connected to you. The extension that you reach by pressing your HL key is determined during installation.

## INTERCOM

To place an Intercom call:

- *Lift handset.*
  - *Press TRF/VOICE key and dial extension number.*
- OR
- *Lift handset.*
  - *Press appropriate DSS key (301-363, 401-463).*

Display:

EXTENSION YYY

When you call a Single Line telephone, it rings. When you call a Multibutton or Four Button telephone, it receives your call Handsfree (unless programmed otherwise).

When an Intercom call is placed to your telephone, the display shows the extension number of the calling party:

Display:

EXT YYY CALLING

## LAST NUMBER REDIAL

To redial the last call made (or attempted):

- *Press L# key. Handsfree mode is automatically selected.*

Display:

LINE XX

Display:

DIGITS

- *Lift handset if privacy is desired.*

## LEAST COST ROUTING

To place a call using Least Cost Routing:

- *Lift handset.*
- *Press outgoing line key 12 or 13 (key flashes).*

Display:

L

- *Dial number.*

Display:

DIGITS

Display:

LINE XX

Display:

DIGITS

Display:

COST \$VV.VV

**NOTE:** Do not allow more than six seconds to elapse between the digits you dial, or you must start the sequence again.

## LEAST COST ROUTING BYPASS

You can bypass LCR by placing a call using outgoing line keys 8-11, or by accessing line groups not represented by the outgoing line keys (refer to Placing a Call).

You may also bypass LCR by using Direct Line Access.

**NOTE:** Bypassing LCR does not disable Toll Restriction.

## MESSAGE WAITING

To leave a Message Waiting at an extension where no one answers:

- Press *M.WAIT* key.
- Hang up.

If a Message Waiting is left at your extension, you see:

Display: MSG FROM EXT YYY

You also receive a tone every two minutes.

To respond to a Message Waiting indication:

- Lift handset.
- Press *M.WAIT* key.

Display: EXTENSION YYY

To cancel a Message Waiting signal left at your telephone:

- Do not lift handset.
- Press *M.WAIT* key. LED extinguishes.

You may have more than one message. If so, continue pressing the *M.WAIT* key until all messages are canceled.

## MONITOR

To dial and listen to calls without lifting the handset:

- Press *MON* key.

**NOTE:** You must lift the handset to speak.

## NIGHT SERVICE

To put the system in the night mode:

- Do not lift handset.
- Press *NIGHT* key. Key flashes.

To return the system to normal operation:

- Do not lift handset.
- Press *NIGHT* key. Key extinguishes.

When another attendant puts the system in the night mode, your *NIGHT* key flashes. Pressing your *NIGHT* key returns the system to normal operation.

### *Assigned Night Answer*

To answer a night mode call ringing at your telephone at night:

- Lift handset.
- Press flashing incoming line key (keys 1-5).

### *Universal Night Answer*

To answer a night mode call ringing over the Paging system or external alerting device at night:

- Lift handset.
- Press flashing incoming line key (keys 1-5).

OR

- Lift handset.
- Press *TRF/VOICE* key.
- Dial 69.

## PAGING

### *All Call Page*

To initiate All Call Page:

- Lift handset.
- Press *PAGE* key.
- Make announcement.
- Hang up.

### *Zone Page*

To Page a specific zone:

- Lift handset.
- Press *TRF/VOICE* key.
- Dial desired zone (61-68).
- Make announcement.
- Hang up.





## PARK

### General Park Orbit

To place a call into a General Park Orbit:

- Press TRF/VOICE key. Call automatically placed on Hold.
- Dial General Park Orbit Code (50-59). Acknowledgment tone audible.

Display:

CO TO ORBIT ZZ

- Press PAGE key (for All Call Page) or use Zone Page to announce call and Orbit Code (50-59).
- Hang up.

To retrieve a call from General Park Orbit:

- Lift handset.
- Press PARK key.
- Dial announced General Park Orbit Code (50-59).

Display:

CO FROM ORBIT ZZ

### Personal Park Orbit

To Park a call at a specific extension:

- Press TRF/VOICE key. Internal dial tone audible.
- Dial number of extension where call is to be parked.  
OR
- Press DSS key for extension where call is to be parked.

Display:

EXTENSION YYY

- Press PAGE key (for All Call Page) or use Zone Page to announce call and extension number.
- Hang up.

To retrieve a call from Personal Park Orbit:

- Lift handset.
- Press PARK key.
- Dial the number of the extension to which the call was transferred.

Display:

PICK-UP FROM YYY

## NOTES:

- If an acknowledgment tone is not heard after dialing a Park Orbit Code, the orbit you dialed is busy. Dial a different Park Orbit Code.
- A call that you leave in a Park Orbit longer than the Orbit Recall interval re-rings your telephone. Calls parked by other extensions that are not picked up also ring your telephone.
- When the system is in the night mode, a call in orbit longer than the Transfer Recall interval rings all extensions and loud ringers assigned night ringing for that line.

## PLACING A CALL

To place an outside call:

- Lift handset.
- Press outgoing line key (keys 8-13).

Display:

LINE XX

- Dial telephone number.

Display:

DIGITS

Display:

COST \$VV.VV

## NOTES:

- If you see CHECK LINE XX after pressing a line key, then there is a problem with that line.
- Your telephone may periodically display the elapsed time on a call instead of the call cost.

Display:

TIMER HR-MN

HR = hours; MN = minutes.

To access lines not available on your outgoing line keys (8-13):

- Lift handset.
- Press TRF/VOICE key.
- Dial line group (90-99).

Display: LINE XX

**NOTES:**

- (a) Dialing 91-99 accesses line groups 1 through 9. Dialing 90 accesses line group 10.
- (b) If Least Cost Routing is not enabled, you may be able to place a call so that an Other Common Carrier (OCC) is automatically selected for your call. To enable this facility, you must store the OCC access and security codes in designated System Speed Dial bins. The Speed Dial bin assignment and the codes that must be dialed are as follows:

System Bin Containing OCC Access and Security Code	Code To Be Dialed
70 .....	0
73 .....	1
76 .....	2
79 .....	3
82 .....	4
85 .....	5
88 .....	6
91 .....	7
94 .....	8
97 .....	9

To place a call so that an OCC is automatically selected:

- Lift handset.
- Dial 9, #.
- Dial the code (0-9) assigned to the OCC.
- Dial number.

Display: DIGITS

Display: LINE XX

Display: DIGITS

The OCC line and access code are automatically inserted before the number you dial.

If another user in the system selects a line that the system detects as being faulty, your telephone displays the faulty line number.

Display: CHECK LINE XX

**PRIVACY TONE**

The Privacy Tone indicates that another extension has Barged In on your call, or that you have answered an Intercom call using Handsfree Answerback, or that an Intercom call you placed has been answered using Handsfree Answerback. This feature indicates monitoring of conversations in your office or work area.

The Handsfree Answerback Privacy Tone is a single tone.

The Barge In Privacy Tone is three short tones.

The Privacy Tone is repeated at a predetermined interval as long as the Handsfree Answerback or Barge In condition exists.

**PRIVATE LINE**

To place or answer a call using a Private Line:

- Lift handset.
- Press incoming line key 4 or 5.

Display: LINE XX

**NOTE:** Private Lines ring only at the designated extension.

## SAVE

To Save a number for redialing at a later time:

- Lift handset.
- Select outgoing line key.

Display: LINE XX

- Dial number.

Display: DIGITS

Display: COST \$VV.VV

- Press **SAVE** key anytime after digits are dialed or while engaged on a call.
- Hang up.

To redial a Saved number:

- Press **SAVE** key. Handsfree mode is automatically selected.
- Lift handset for privacy.

## SIGNAL BUSY OPERATOR

While on a call, you may be signaled by a flashing RLS and DSS key that an extension is trying to reach you. The DSS key corresponds to the calling extension.

## SPEED DIAL

### *Extension Speed Dial*

Only the first 50 extensions in the system have access to Extension Speed Dial.

To store an Extension Speed Dial number:

- Press **OUT/MEM** key. Key flashes. †

Display: PROGRAM MEMORY

- Press bin (1-14) where number is to be stored. Key flashes.

Display: NUMBER TO BIN WW

- Dial number to be stored (maximum of 16 digits). Pauses count as a digit and are stored by dialing #.
- Press bin key again. Key stops flashing.

Display: PROGRAM COMPLETE

† If you want to preselect a line group for the bin, press a line key in the desired group before pressing the **OUT/MEM** key. When LCR is installed, the line is selected for you.

To dial an Extension Speed Dial number:

- Lift handset.
- Press **OUT/MEM** key.
- Press bin (1-14) where number is stored. Key flashes.

Display: LINE XX

Display: DIGITS

Display: COST \$VV.VV

### *System Speed Dial*

You can store up to 100 frequently-dialed numbers for system wide use.

If the system is equipped with Direct Inward System Access (DISA) lines, the DISA Access Code must be stored in the last System Speed Dial location (99), and preceded by the directive \*1 or \*3. This directive prevents the code from being dialed out on display telephones.

To store a System Speed Dial number (up to 16 digits long):

- Press **OUT/MEM** key. Key illuminates and dial tone is audible.

Display: PROGRAM MEMORY

- Select and press a bin key (1-14). The key illuminates.

Display: NUMBER TO BIN WW

- Dial #.
- Enter one location code (00-99).

Display: DIGITS

- Dial number to be stored, including directives. Pauses count as a digit and are stored by dialing #. When storing the DISA Access Code in location 99, precede the code with the directive \*1.

Display: DIGITS

- Press lit bin key (1-14) again. Number is stored and key extinguishes.

Display: PROGRAM COMPLETE

System Speed Dial calls are normally placed on line group 1. To preselect a line group, press the outgoing line key for the desired line group before beginning the programming sequence. When LCR is installed, the call is automatically placed on the least expensive route.

To dial a System Speed Dial number:

- Lift handset.
- Press **TRF/VOICE** key.
- Dial code (800-899) for desired System Speed Dial number.

Display: LINE XX

Display: DIGITS

Display: COST \$VV.VV

## SPEED DIAL, CHAINING BINS

### Manually Chaining Extension Speed Dial Bins

To manually chain two Extension Speed Dial bins:

- Lift handset.
- Press **OUT/MEM** key.
- Sequentially press bin keys to be chained (within six seconds).

Display: LINE XX

Display: DIGITS

Display: COST \$VV.VV



### Chaining an Extension Speed Dial Bin to a Manually Dialed Number

To use an Extension Speed Dial bin with a manually dialed number:

- Lift handset.
- Press OUT/MEM key.
- Press appropriate bin key. Let number dial out.

Display: LINE XX

Display: DIGITS

- Manually dial second number.

Display: COST \$VV.VV

**NOTE:** This can be done only from unrestricted telephones (COS 0).

### Chaining System Speed Dial Bins

To chain up to four System Speed Dial bins:

- Lift handset.
- Press TRF/VOICE key.
- Dial 8, \*.
- Dial System Speed Dial bins to be chained (00-99).
- Dial \* to end sequence.

Display: LINE XX

Display: DIGITS

Display: COST \$VV.VV

### Chaining System and Extension Speed Dial Bins

To chain a System Speed Dial bin with up to three Extension Speed Dial bins:

- Lift handset.
- Press TRF/VOICE key.
- Dial 8, \*.
- Dial bin (00-99) for desired System Speed Dial number.
- Dial #.
- Dial desired Extension Speed Dial bin (01-14). (Do not press bin key.)
- If another Extension Speed Dial number is to be chained, dial # between the bin numbers.
- Dial \* to end sequence.

Display: LINE XX

Display: DIGITS

Display: COST \$VV.VV

### Chaining a System Speed Dial Bin to a Manually Dialed Number

To use a System Speed Dial number with a manually dialed number:

- Dial System Speed Dial number.

Display: LINE XX

Display: DIGITS

- When system bin has dialed out, manually dial number (within six seconds).

Display: COST \$VV.VV

## Chaining a \*2\* System Speed Dial Bin to an Extension Speed Dial Bin

To chain a \*2\* System Speed Dial bin to an Extension Speed Dial bin:

- Lift handset.
- Press TRF/VOICE key.
- Dial code (800-899) for System Speed Dial number.

Display: LINE XX

Display: DIGITS

- Let System Speed Dial number dial out. OUT/MEM key illuminates.
- Press Extension Speed Dial bin key (within six seconds).

Display: DIGITS

Display: COST \$VV.VV

## SPEED DIAL DIRECTIVES

Speed Dial directives can be entered to increase the flexibility of Speed Dialing. See Section 5, FEATURES for more information.

## TERMINATING A CALL

To terminate a call:

- Press RLS key.

## TIE LINE ACCESS

To access a tie line from your system:

- After dial tone from the tie line is received, access any feature from the remote system.

## TRANSFER

### Screened (Announced) Transfer

To transfer a screened call:

- Press TRF/VOICE key.
- Dial number (or press DSS key) of extension to receive transfer.

Display: EXTENSION YYY

- Announce call and wait for reply.
- If party accepts the transfer, hang up.

To return to the call:

- Do not hang up.
- Press flashing line key.

If you make a Screened Transfer and the party wishes to accept the call Handsfree:

- Press HF/TRF key.
- Hang up.

**Unscreened (Unannounced) Transfer**

To transfer an unscreened call:

- Press *DSS* key for extension to receive transfer.  
OR
- Press *TRF/VOICE* key.
- Dial number (or press *DSS* key) of extension to receive transfer.

Display:

EXTENSION YYY
---------------

- Hang up.

To send Call Waiting tones each time you transfer a call to a busy extension:

- Do not lift handset.
- Press *TRF/VOICE* key. Key illuminates.

**NOTES:**

- (a) A call you transfer that is not picked up eventually re-rings your telephone.
- (b) If the system is in the night mode, a call you transfer that is not picked up within the Transfer Recall interval rings all telephones and external alerting devices in the system assigned night ringing for that line.

**VOLUME CONTROLS**

Two volume control thumbwheels are located on the front edge of the telephone. The left thumbwheel is used to adjust the volume of the Page Receive, Splash Tone, Ring Tone and Background Music (BGM). The right thumbwheel controls the volume of incoming Handsfree Answerback and Handsfree conversations. To increase volume, turn the thumbwheels to the right (counterclockwise). On display telephones, volume is controlled by the VOL UP and VOL DN keys.

**APPENDIX B  
MULTIBUTTON KEY TELEPHONE  
OPERATIONAL SPECIFICATION**

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DO NOT DISTURB .....	B-7	(b) Wherever these instructions tell you to lift handset, you may press the HF (or MON) key instead. Refer to the Handsfree (Speakerphone) and Monitor features.	
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		<b>ACCOUNT CODE CAPABILITY</b>	
		To assign an Account Code (up to nine digits) as you place a call (when no permanent code is assigned):	
		• <i>Lift handset.</i>	
		• <i>Place outside call (or let Speed Dial call dial out).</i>	
		• <i>Dial # (within three seconds).</i>	
		• <i>Dial Account Code.</i>	
		<b>NOTE:</b> To assign an Account Code as you place a call, the telephone number that you dial must be at least seven digits long.	



To assign an Account Code to a call in progress:

- Press TRF key.
- Dial 2, #, #.
- Dial Account Code (do not wait longer than six seconds between digits).
- Dial # to return to the call.

If the Account Code is nine digits long, you are automatically returned to the call after the ninth digit is dialed.

To enter a Forced Account Code (before the call is placed):

- Lift the handset.
- Press INT. Receive internal dial tone.
- Dial 6, #.
- Enter the Account Code (up to nine digits).
- Dial #.
- Seize an outside line (within 30 seconds).
- Place outside call.

If you fail to enter a required Forced Account Code, you will receive the following display:

Display:

ENTER ACCNT CODE

**NOTES:**

- (a) If the Account Code is not entered six seconds before or after placing the call, the line is dropped.
- (b) Emergency numbers (i.e., N11 numbers) and the operator (0) can always be dialed—Forced Account Codes are not required.

To store a permanent Account Code (to accompany all calls on a record of calls):

- Lift handset.
- Press the INT key. Receive internal dial tone.
- Dial 6, \*.
- Enter the Account Code (up to nine digits).
- Dial #.
- Hang up.

To erase a permanent Account Code:

- Lift handset.
- Press the INT key. Receive internal dial tone.
- Dial 6.
- Dial #, #.
- Hang up.

Display:

ACCOUNT CODE OFF

**ANSWERING A CALL**

To answer a call:

- Lift handset.
- Press flashing incoming line key (keys 1-5).

Display:

LINE XX

To display the line number of the ringing call:

- Do not lift handset.
- Press the dial pad digit (1-5) that corresponds to the number of the flashing incoming line key.

Display:

LINE XX

## BACKGROUND MUSIC

To turn Background Music on or off:

- Do not lift handset.
- Press **HOLD** key. Key flashes when Background Music is turned on.

To regulate the volume of Background Music at non-display telephones:

- Turn left volume control clockwise to decrease volume.
- Turn left volume control counterclockwise to increase volume.

To regulate the volume of Background Music at display telephones:

- Do not lift handset.
- Press **VOL UP** key to increase volume.
- Press **VOL DN** key to decrease volume.

## BARGE IN

**CAUTION: UNAUTHORIZED MONITORING OF CALLS USING THE BARGE IN FEATURE MAY BE INTERPRETED AS AN INVASION OF PRIVACY.**

To Barge In to a call:

- Lift handset.
- Press **INT** key.
- Dial number for extension (receive busy tone).

Display:

**YYY BUSY**

- Press **DND/M.MUTE** key. You hear three short tones as you join the conversation.

Your calls may be Barged In upon by other extension users. You hear three short tone bursts before the Barge In occurs, and are periodically alerted by three short Privacy Tones afterwards. If you are on an Intercom call that has been answered using Handsfree Answerback, you also hear a longer Privacy Tone after each set of Barge In Privacy Tones.

## CALL FORWARDING

To forward your calls to another extension:

- Lift handset.
- Press **C.FWD** key.
- Dial number for destination extension. Listen for acknowledgment tone.

Display:

**FORWARD TO YYY**

- Hang up. **C.FWD** key flashes.

To forward the calls onward from another Multibutton extension:

- Lift handset.
- Press **C.FWD** key. Receive internal dial tone.
- Dial \*.
- Dial your extension.
- Dial the number of the extension to which you want the calls forwarded.
- Hang up. The **C.FWD** key flashes on that telephone.

To forward the calls onward from a Four Button or Single Line telephone:

- Lift handset. Receive internal dial tone.
- Dial #.
- Dial \*, \*.
- Dial your extension.
- Dial the number of the extension to which you want the calls forwarded.
- Hang up.

While in the Call Forwarding mode, your telephone broadcasts a short tone every two minutes. The following message is briefly displayed every time the tone occurs:

Display:

**FORWARD TO YYY**

To cancel Call Forwarding:

- At your own telephone, do not lift the handset.
- Press the **C.FWD** key.

**CALL PICKUP, DIRECTED**

To answer an outside call you hear ringing at a nearby telephone:

- Lift handset.
- Press **PARK** key.
- Dial number of extension that is ringing.

Display:

**PICK-UP FROM YYY**

**CALL PICKUP, GROUP**

To answer a call that rings into your Pick Up group:

- Lift handset.
- Press flashing **PKUP** key.

Display:

**PICK-UP FROM XXX**

You can enable your telephone to ring for calls to other extensions in your Pick Up group which *do not* normally ring on your telephone.

To receive ringing from other extensions in your Pick Up group:

- Lift handset.
- Press **INT** key.
- Dial 1 plus 803.

To prevent ringing from other extensions in your Pick Up group:

- Lift handset.
- Press **INT** key.
- Dial 1 plus 802.

To determine for which extension in your Pick Up group a ringing call is intended:

- Do not lift handset.
- Press flashing **PKUP** key.

Display:

**PICK-UP FROM YYY**

**CALL WAITING****Call Waiting, Attendant/Hotline Partner**

To answer an Attendant/Hotline Partner Call Waiting signal (a double beep and flashing **SPLIT** key):

Display:

**EXT YYY WAITING**

- Press flashing **SPLIT** key. Initial call put on Hold (if CO call).

To alternate between the call on Hold and the Attendant/Hotline partner:

- Press the **SPLIT** key.

**NOTE:** If you hear a double beep and the **SPLIT** key is not flashing, you have a CO call waiting to be answered.

**Call Waiting, CO Call**

To answer a CO Call Waiting signal (double beep):

- Press flashing incoming line key (keys 1-5). Initial call terminated.

OR

- If busy on a CO call, press **HOLD** key. Initial call put on Hold.
- Press flashing line key to answer waiting call.

The number of the transferring extension is displayed.

Display:

**EXT YYY WAITING**

**NOTE:** To alternate between two CO calls, use the Split feature.

When you are busy on a call, your telephone can display the number of the line that is ringing in.

## CALLBACK

To leave a Callback request at a busy extension:

- Press *C.BACK* key. Key is steadily illuminated.
- Hang up.

When the busy party becomes available, your telephone rings and the *C.BACK* key flashes slowly.

Display:

CALL BACK ST YYY

To answer the Callback:

- Lift handset.

To cancel the Callback:

- Press illuminated *C.BACK* key.

If you are busy on a call, another extension user can leave a Callback request on your telephone. You see this request as a flashing (fast) *C.BACK* key.

## CONFERENCE

### Add-On Conference

To add a second internal party to an outside call:

- Press *INT* key. Outside call automatically placed on Hold.
- Dial extension number to be added to conference or press *DSS* key.

Display:

EXTENSION YYY

- Announce conference.
- Press *CONF* key. Outside call reconnected. The *CONF* key is steadily illuminated.

To join an Add-On Conference:

- Lift handset.
- Press flashing line key.

### Line Conference

To establish a conference call with two outside lines:

- Place first call on Hold (press *HOLD* key).
- Establish second call on another line.

Display:

LINE XX

- Press *CONF* key to be connected to both external calls.

Do not answer another incoming call while establishing a Line Conference. This call would be included in the Conference.

Two lines in the same line group can be assigned to different outgoing line keys (keys 8-13). To place and join in Conference two calls in the same line group (using the same outgoing line key):

- Place first call.
- Press *CONF* key. Call will move up to first available incoming line key.
- Press *HOLD* key.
- Place second call, using same outgoing line key as for first call.
- Press *CONF* key. Conference is established.

### Meet-Me Conference

To initiate a Meet-Me Conference:

- Page all parties to join the conference and announce the Conference Code.
- Press *INT* key. Receive internal dial tone.
- Dial 19.

### NOTES:

- If five or more parties join a Meet-Me Conference, volume of the conference begins to decrease.
- Each time an inside party joins a Meet-Me Conference, a tone is heard.
- If you establish a Meet-Me Conference, you can hang up, and the parties remain connected.

To join a Meet-Me Conference:

- Lift handset.
- Press *INT* key. Receive internal dial tone.
- Dial 19.

## DIRECT STATION SELECTION

Your telephone automatically converts the first 14 keys into Direct Station Selection keys (for six seconds) when you press the INT key. This allows one-button access to selected extensions. After your telephone is installed, you may select the extension which corresponds to each DSS key. The DSS keys are initially assigned to extensions 301-314.

The DSS keys serve as a Busy Lamp Field for the extensions assigned to them. When an extension is idle, the corresponding DSS key is off. When a telephone is busy, the DSS key is on. When a telephone is in Do Not Disturb, the DSS key flashes slowly.

**NOTE:** When assigning DSS numbers, do not allow more than six seconds to elapse between steps. If you do, you must begin the procedure again. Also, do not program more than one DSS key for the same extension.

To program 14 DSS keys:

- Do not lift handset or press HF key.
- Press OUT/MEM key. Key flashes.

Display:

**PROGRAM MEMORY**

- Press DSS key (1-14). Key flashes.

Display:

**NUMBER TO BIN WW**

- Dial \*
- Dial extension number (301-363, 401-465) that is to be assigned to the DSS key being programmed.
- Press bin key again (1-14).

Display:

**PROGRAM COMPLETE**

To use your DSS keys:

- Lift handset.
- Press INT key.
- Press DSS key (within six seconds) of extension you wish to call.

Display:

**EXTENSION YYY**

## DISPLAY

To display your extension number:

- Do not lift handset.
- Press the VOL UP key.

Display:

**THIS IS EXT YYY**

The normal time and date display returns after three seconds.

The display also tells you if a power failure has occurred (once normal system power has returned):

Display:

**POWER FAIL**

To cancel the power failure mode display:

- Do not lift handset.
- Press the VOL UP key.

Display:

**THIS IS EXT YYY**

The normal time and date display returns after three seconds.

## DO NOT DISTURB (DND)

To enable DND:

- Press DND/M.MUTE key twice. Key flashes slowly.

To disable DND:

- Press DND/M.MUTE key. DND/M.MUTE key extinguishes.

If you call an extension which is in DND, the following display appears:

Display:

YYY DND

**NOTE:** Calls transferred from the attendant to an executive Hotline partner (lower-numbered extension in Hotline pair) in Do Not Disturb flash the first available incoming line key on the executive telephone. The executive extension does not ring. The calls are also simultaneously transferred to the secretary/receptionist (higher-numbered extension in Hotline pair).

To override your Hotline partner's Do Not Disturb:

- Lift handset.
- Press the HL key.

## EXTENSION HUNTING

To answer a call ringing your Hunt group:

- Lift handset.
- Press flashing incoming line key (key 1-5).

Display:

LINE XX

## NOTES:

- (a) Extension Hunting does not ring any telephones that are busy on a call or in Do Not Disturb.
- (b) A call that sequences through a Terminal Hunting group (and is not answered) ends up ringing either the last telephone in the group or a predetermined "overflow" extension.
- (c) A call that sequences through a UCD Hunting group (and is not answered) continues to cycle through the group or rings the predetermined "overflow" extension.

## FLASH

To Flash the line:

- Do not hang up.
- Press line key presently in use.

## FORCED INTERCOM RINGING

To force an Intercom call to a Multibutton or Four Button telephone to ring (as you place the call):

- Lift handset.
- Press INT key.
- Dial 1, then extension number.

To force all Intercom calls to your telephone to ring (i.e., enable Forced Intercom Ringing):

- Lift handset.
- Press INT key.
- Dial 1801.
- Hang up.

To cancel Forced Intercom Ringing to your telephone:

- Lift handset.
- Press INT key.
- Dial 1800.
- Hang up.

## HANDSFREE (SPEAKERPHONE)

To initiate Handsfree mode:

- Press HF key. HF key lights.

To return to handset operation:

- Lift handset. HF key extinguishes.

## HEADSET INSTALLATION

To install a headset:

- Lift handset.
- Press INT key.
- Dial 1805. L# key LED (key 7) steadily illuminated.
- Unplug handset.
- Plug in headset.

To return to a handset:

- Press INT key.
- Dial 1804. L# key LED (key 7) extinguishes.
- Unplug headset.
- Plug in handset.

## HOLD

### *Exclusive Hold*

To place a call on Exclusive Hold:

- Press HOLD key.
- Hang up.

To return to a call on Exclusive Hold:

- Lift handset.
- Press flashing line key.

**NOTE:** A call left on Hold longer than the Hold Recall interval, re-rings your telephone.

## HOTLINE

To call your Hotline partner:

- Lift handset.
- Press HL key.

Display:

EXTENSION YYY

To transfer an outside call to the Hotline partner:

- Press HL key.
- Announce call.
- Do not hang up.

Display:

EXTENSION YYY

If your Hotline partner accepts the call:

- Hang up.

If your Hotline partner would like the call in the Handsfree mode:

- Press HL key again.

If your Hotline partner does not want to take the call:

- Press flashing line key to return to call.

When your Hotline partner is on a call, your HL key is lit. If your Hotline partner is in Do Not Disturb, your Hotline key flashes slowly.

## NOTES:

- (a) You can override your Hotline partner's Do Not Disturb (see Do Not Disturb).
- (b) If you are the secretary / receptionist (higher extension number) in a Hotline pair, you receive a flashing line key and ringing for all calls transferred to your partner (lower extension number).
- (c) You may be part of a Hotline group, rather than having a single Hotline partner. If you are the person in your group assigned as the secretary / receptionist, you have the highest numbered extension. Any calls transferred from any other extension in your group, using just the HL key, ring your telephone. When any of the partners in the group press the HL key, they will be connected to you. The extension that you reach by pressing your HL key is determined during installation.

## INTERCOM

To place an Intercom call:

- Lift handset.
- Press INT key.
- Dial extension number or press appropriate DSS key (1-14).

Display:

EXTENSION YYY

When you call a Single Line telephone, it rings. When you call a Multibutton or Four Button telephone, it receives your call Handsfree (unless programmed otherwise).

When an Intercom call is placed to your telephone, the display shows the extension number of the calling party:

Display:

EXT YYY CALLING

## LAST NUMBER REDIAL

To redial the last call made (or attempted):

- Press L# key (or REDIAL on display telephone). Handsfree mode is automatically selected.

Display:

LINE XX

Display:

DIGITS

- Lift handset if privacy is desired.

## LEAST COST ROUTING

To place a call using Least Cost Routing:

- Lift handset.
- Press outgoing line key 12 or 13 (key flashes).

Display:

L

- Dial number.

Display:

DIGITS

Display:

LINE XX

Display:

DIGITS

Display:

COST \$VV.VV

**NOTE:** Do not allow more than six seconds to elapse between the digits you dial, or you will have to start the sequence again.

## LEAST COST ROUTING BYPASS

To bypass LCR:

- Lift handset.
- Press outgoing line key (keys 8-10).

Display:

LINE XX

- Dial telephone number.

Display:

DIGITS

Display:

COST \$VV.VV

**NOTE:** Bypassing LCR does not disable Toll Restriction.



## LINE QUEUING

To queue for a busy outside line (when phone is idle):

- *Do not lift handset.*
- *Press illuminated outgoing line key (keys 8-13).*
- *Press C.BACK key. Key illuminates.*

To queue for a busy LCR line (after receiving LCR busy tone):

- *Press C.BACK key.*
- *When the queued line calls you back, lift handset. LCR redials the call automatically.*

Your telephone rings and the C.BACK key flashes when a line is available.

Display:

**CALL BACK CO XX**

To respond to a Line Queue:

- *Lift handset and dial as usual.*

If you do not answer the Line Queuing ring within ten seconds, your queue is canceled.

## MESSAGE WAITING

To leave a Message Waiting at an extension where no one answers:

- *Press M.WAIT key. Acknowledgment tone heard.*
- *Hang up.*

If a Message Waiting is left at your extension, you see:

Display:

**MSG FROM EXT YYY**

You also receive a tone every two minutes.

To respond to a Message Waiting indication:

- *Lift handset.*
- *Press M.WAIT key.*

Display:

**EXTENSION YYY**

To cancel a Message Waiting signal left at your telephone:

- *Do not lift handset.*
- *Press M.WAIT key. LED extinguishes.*

You may have more than one message. If so, continue to press the M.WAIT key until all messages are canceled.

## MICROPHONE CUTOFF/MICROPHONE MUTE

To turn off the speaker microphone:

- *Press DND/MUTE key. Key flashes fast.*

To turn the speaker microphone back on:

- *Press DND/MUTE key twice. LED extinguishes.*

To turn the speaker microphone back on while on a call (if you have turned it off):

- *Press flashing DND/MUTE key. Key extinguishes.*

## MONITOR

To dial or listen to a call without lifting the handset:

- *Press MON key.*

**NOTE:** You must lift the handset to speak.

## NIGHT SERVICE

### *Assigned Night Answer*

To answer a call ringing at your telephone at night:

- *Lift handset.*
- *Press flashing incoming line key (keys 1-5).*

### *Universal Night Answer*

To answer a call ringing over the Paging system or external alerting device at night:

- *Lift handset.*
- *Press flashing incoming line key (keys 1-5).*

**OR**

- *Lift handset.*
- *Press INT key.*
- *Dial 69.*

## PAGING

### All Call Page

To initiate All Call Page:

- Lift handset.
- Press PAGE key.
- Make announcement.
- Hang up.

### Zone Page

To Page a specific zone:

- Lift handset.
- Press INT key.
- Dial desired zone (61-68).
- Make announcement.
- Hang up.

## PARK

### General Park Orbit

To place a call into a General Park Orbit:

- Press TRF key. Call automatically placed on Hold.
- Dial General Park Orbit code (50-59). Acknowledgment tone audible.

Display:

CO TO ORBIT ZZ

- Press PAGE key (for All Call Page) or use Zone Page to announce call and orbit code (50-59).
- Hang up.

To retrieve a call from General Park Orbit:

- Lift handset.
- Press PARK key.
- Dial announced General Park Orbit number (50-59).

Display:

CO FROM ORBIT ZZ

### Personal Park Orbit

To Park a call at a specific extension:

- Press TRF key. Internal dial tone audible.
- Dial number of extension where call is to be parked or press DSS key.

Display:

EXTENSION YYY

- Press PAGE key (for All Call Page) or use Zone Page to announce call and extension number.
- Hang up.

To retrieve a call from Personal Park Orbit:

- Lift handset.
- Press PARK key.
- Dial the number of the extension at which the call was parked.

Display:

PICK-UP FROM YYY

## NOTES:

- (a) If an acknowledgment tone is not heard after dialing a Park Orbit code, the orbit you dialed is busy. Dial a different Orbit code.
- (b) A call that you leave in a Park Orbit longer than the Orbit Recall interval re-rings your telephone.
- (c) If the system is in the night mode, a call left in a Park Orbit longer than the Transfer Recall interval re-rings your telephone, then all extensions and loud ringers in the system assigned night ringing for that line.

**PLACING A CALL**

To place an outside call:

- *Lift handset.*
- *Press outgoing line key (keys 8-13).*

Display:

LINE XX

- *Dial telephone number.*

Display:

DIGITS

Display:

COST \$VV.VV

**NOTE:** Your telephone display may periodically show the elapsed time on a call instead of the call cost.

Display:

TIMER HR-MN

HR = hours; MN = minutes

To access lines not available on your outgoing line keys (8-13):

- *Lift handset.*
- *Press INT key.*
- *Dial line group (90-99).*

Display:

LINE XX

**NOTE:** Dialing 91-99 accesses line groups 1 through 9. Dialing 90 accesses line group 10.

To place a call so that an OCC is automatically selected:

- *Lift handset.*
- *Press INT key.*
- *Dial 9, #.*
- *Dial the code (0-9) that is assigned to the OCC.*
- *Dial number.*

Display:

DIGITS

Display:

LINE XX

Display:

DIGITS

The OCC line and access code are automatically inserted before the number you dial.

**PRIVACY TONE**

The Privacy Tone signal indicates that a Barge In is active on your call, that you have answered an Intercom call using Handsfree Answerback, or that an Intercom call you placed has been answered using Handsfree Answerback. This feature prevents unauthorized monitoring of conversations in your office or work area.

The Handsfree Answerback Privacy Tone is a single tone.

The Barge In Privacy Tone is three short tones.

The Privacy Tone is repeated at a predetermined interval as long as the Handsfree Answerback or Barge In condition exists.

## PRIVATE LINES

To place or answer a call using a Private Line:

- Lift handset.
- Press incoming line key 4 or 5.

Display:

LINE XX

**NOTE:** When the system is in the night mode, your Private Lines do not ring over the external speakers or external alerting devices.

## SAVE

To Save a number for redialing at a later time:

- Lift handset.
- Select outgoing line key.

Display:

LINE XX

- Dial number.

Display:

DIGITS

Display:

COST \$VV.VV

- Press SAVE key after digits are dialed or while engaged on call.
- Hang up.

To redial a Saved number:

- Press SAVE key. Handsfree mode is automatically selected.
- Lift handset if privacy is desired.

Display:

LINE XX

Display:

DIGITS

Display:

COST \$VV.VV

## SIGNAL BUSY OPERATOR

If you attempt to reach a busy operator, your extension automatically camps-on, and signals that extension. You hear a camp-on tone, then ringing.

## SPEED DIAL

### Extension Speed Dial

Only the first 50 extensions in the system have access to Extension Speed Dial.

To store an Extension Speed Dial number:

- Press OUT/MEM key. Key flashes. +

Display:

PROGRAM MEMORY

- Press bin (1-14) where number is to be stored. Key flashes.

Display:

NUMBER TO BIN WW

- Dial number to be stored (maximum of 16 digits). Pauses count as digits and are stored by dialing #.
- Press bin key again. Key stops flashing.

Display:

PROGRAM COMPLETE

+ If you want to preselect a special line group to be used whenever the bin is accessed, press an outgoing line key in the desired group before pressing the OUT/MEM key. If LCR is installed, the line is selected for you.

To dial an Extension Speed Dial number:

- Lift handset.
- Press OUT/MEM key.
- Press bin (1-14) where number is stored. Key flashes.

Display: LINE XX

Display: DIGITS

Display: COST \$VV.VV

**System Speed Dial**

To dial a System Speed Dial number:

- Lift handset.
- Press INT key.
- Dial code (800-899) for desired System Speed Dial number.

Display: LINE XX

Display: DIGITS

Display: COST \$VV.VV

**SPEED DIAL, CHAINING BINS**

**Manually Chaining Extension Speed Dial Bins**

To manually chain two Extension Speed Dial bins:

- Lift handset.
- Press OUT/MEM key.
- Sequentially press bins to be chained (within six seconds).

Display: LINE XX

Display: DIGITS

Display: COST \$VV.VV

**Chaining an Extension Speed Dial Bin to a Manually Dialed Number**

To use an Extension Speed Dial bin with a manually dialed number:

- Lift handset.
- Press OUT/MEM key.
- Press appropriate bin key. Let number dial out.

Display: LINE XX

Display: DIGITS

- Manually dial second number.

Display: COST \$VV.VV

**NOTE:** This can be done only from unrestricted telephones (COS 0).

## Chaining System Speed Dial Bins

To chain up to four System Speed Dial bins:

- Lift handset.
- Press INT key.
- Dial 8, \*
- Dial System Speed Dial bins to be chained (00-99).
- Dial \* to end sequence.

Display: LINE XX

Display: DIGITS

Display: COST \$VV.VV

## Chaining System and Extension Speed Dial Bins

To chain a System Speed Dial bin with up to three Extension Speed Dial bins:

- Lift handset.
- Press INT key.
- Dial 8, \*
- Dial bin (00-99) for desired System Speed Dial number.
- Dial #.
- Dial desired Extension Speed Dial bin (01-14). (Do not press bin keys.)
- If another Extension Speed Dial bin is to be chained, press # between the bin numbers.
- Dial \* to end sequence.

Display: LINE XX

Display: DIGITS

Display: COST \$VV.VV

## Chaining a System Speed Dial Bin to a Manually Dialed Number

To use a System Speed Dial number with a manually dialed number:

- Dial System Speed Dial number.

Display: LINE XX

Display: DIGITS

- When system bin has dialed out, manually dial number (within six seconds).

Display: COST \$VV.VV

## Chaining a \*2\* System Speed Dial Bin to an Extension Speed Dial Bin

To chain a \*2\* System Speed Dial bin to an Extension Speed Dial bin:

- Lift handset.
- Press INT key.
- Dial code (800-899) for System Speed Dial number.

Display: LINE XX

Display: DIGITS

- Let System Speed Dial number dial out. OUT/MEM key illuminates.
- Press Extension Speed Dial bin key (within six seconds).

Display: DIGITS

Display: COST \$VV.VV



## SPEED DIAL DIRECTIVES

Speed Dial directives can be entered into Speed Dial bins to increase the flexibility of Speed Dialing. For details, see Section 5, FEATURES.

### SPLIT

To talk to a second caller while already on a call:

- Press *HOLD* key to put first call on Hold.
- Press flashing line key to answer second call.

To alternate (split) between the two outside calls:

- Press *SPLIT*.

### TIE LINE ACCESS

To access a tie line from your system:

- After dial tone from the tie line is received, access any feature from the remote system.

### TRANSFER

#### NOTES:

- (a) A call you Transfer that is not picked up eventually re-rings your telephone.
- (b) If the system is in the night mode, a call you Transfer that is not picked up within the Transfer Recall interval re-rings your telephone, then all telephones in the system assigned to ring at night for that line.
- (c) If you Transfer a call to the attendant, it may recall to you if it is not picked up. If you Transfer a call to the attendant when the system is in the night mode, the call rings all telephones assigned to ring for that line at night. It may also ring at an external alerting device. To retrieve the call, lift handset and press the flashing incoming line key (keys 1-5).

### Screened (Announced) Transfer

To Transfer a screened call:

- Press *TRF* key.
- Dial number (or press *DSS* key) for extension to receive Transfer.

Display:

EXTENSION YYY

- Announce call and wait for reply.

If the party accepts the Transfer, hang up.

To return to the call:

- Do not hang up.
- Press flashing line key.

### Unscreened (Unannounced) Transfer

To Transfer an unscreened call:

- Press *TRF* key.
- Dial number (or press *DSS* key) for extension to receive Transfer.

Display:

EXTENSION YYY

- Hang up.

### VOLUME CONTROLS

Two volume control thumbwheels are located on the front edge of the telephone. The left thumbwheel is used to adjust the volume of the Page Receive, Splash Tone, Ring Tone and Background Music (BGM). The right thumbwheel controls the volume of incoming Handsfree Answerback and Handsfree conversations. To increase volume, turn the thumbwheels counterclockwise. On display telephones, volume is controlled by the VOL UP and VOL DN keys.

**APPENDIX C**  
**FOUR BUTTON KEY TELEPHONE**  
**OPERATIONAL SPECIFICATION**

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**NOTE:** Wherever these instructions tell you to lift handset, you may press the MON key instead. Refer to the Monitor feature.

**ACCOUNT CODE CAPABILITY**

To assign an Account Code (up to nine digits) as you place a call:

- *Lift handset.*
- *Place outside call (or let Speed Dial call dial out).*
- *Dial # (within three seconds).*
- *Dial Account Code.*

**NOTE:** To assign an Account Code as you place a call, the telephone number that you dial must be at least seven digits long.

To assign an Account Code to a call in progress:

- *Press HLD/TRF key.*
- *Dial 2, #, #.*
- *Dial Account Code (do not wait longer than six seconds between digits).*
- *Dial # to return to the call.*



If the Account Code is nine digits long, you are automatically returned to the call after the ninth digit is dialed.

To enter a Forced Account Code (before the call is placed):

- *Lift the handset. Receive internal dial tone.*
- *Dial 6, #.*
- *Enter the Account Code (up to 9 digits).*
- *Dial #.*
- *Seize an outside line (within 30 seconds).*
- *Place outside call.*

If an Account Code is not entered six seconds before or after placing the call, the line is dropped.

**NOTE:** Emergency numbers (i.e., N11 numbers) and the operator (0) can always be dialed—Forced Account Codes are not required.

To store a permanent Account Code (to accompany all calls on a record of calls):

- *Lift handset. Receive internal dial tone.*
- *Dial 6, \*.*
- *Enter the Account Code (up to 9 digits).*
- *Dial #.*
- *Hang up.*

To erase a permanent Account Code:

- *Lift handset. Receive internal dial tone.*
- *Dial 6.*
- *Dial #, #.*
- *Hang up.*

## ANSWERING A CALL

To answer a call:

- *Lift handset.*

## BACKGROUND MUSIC

To turn Background Music on or off:

- *Press the HLD/TRF key.*

To regulate the volume of Background Music:

- *Turn left volume control clockwise to decrease volume.*
- *Turn left volume control counterclockwise to increase volume.*

## BARGE IN

**CAUTION: UNAUTHORIZED MONITORING OF CALLS USING THE BARGE IN FEATURE MAY BE INTERPRETED AS AN INVASION OF PRIVACY.**

Your calls may be Barged In upon by other extension users. You hear three short burst tones as a Barge In occurs, and are periodically alerted by three short Privacy Tones afterwards. If you are on an Intercom call that has been answered using Handsfree Answerback, you also hear a longer Privacy Tone after each set of Barge In Privacy Tones.

## CALL FORWARDING

To forward all of your calls to another extension:

- *Lift handset. Receive internal dial tone.*
- *Dial #.*
- *Dial \*.*
- *Dial your extension.*
- *Dial number of destination extension. Listen for acknowledgement tone.*
- *Hang up.*

To cancel Call Forwarding:

- *Lift handset. Receive internal dial tone.*
- *Dial #.*
- *Dial \*.*
- *Dial your own extension number.*
- *Hang up.*

## CALL PICKUP, DIRECTED

To answer an outside call ringing at a nearby telephone:

- *Lift handset.*
- *Dial #, #.*
- *Dial number of telephone that is ringing.*

## CALL PICKUP, GROUP

To pick up a call you hear ringing into your Pick Up Group:

- *Lift handset.*
- *Press flashing PKUP/CONF key.*

You can also enable your telephone to ring for calls to other extensions in your Pick Up group which *do not* normally ring on your telephone.

To receive ringing from other extensions in your Pick Up Group:

- *Lift handset.*
- *Dial 1803.*

To prevent ringing from other extensions in your Pick Up Group:

- *Lift handset.*
- *Dial 1802.*

## CALL WAITING

### *Call Waiting, Attendant/Hotline Partner*

To answer an Attendant/Hotline Partner Call Waiting signal (double beep):

- *Press HLD/TRF key. You are connected to the attendant/Hotline partner. (Outside call is put on Hold. Intercom calls are dropped.)*

If you hear dial tone after pressing the HLD/TRF key, the Call Waiting signal is from an incoming CO call. Refer to CO Call Waiting.

To return to the initial outside call on Hold:

- *Press HLD/TRF key.*

To alternate between the initial outside call and the attendant:

- *Press HLD/TRF key.*

### *Call Waiting, CO Call*

To answer a CO Call Waiting signal (double beep):

- *(Optional) Press HLD/TRF key. Dial tone audible. + An outside call will be placed on Hold; an Intercom call is dropped.*
- *Hang up.*
- *When telephone rings, lift handset. You are connected to waiting call.*

To answer a CO Call Waiting signal, if you are part of a Pick Up Group:

- *Press HLD/TRF key. Dial tone audible. An outside call is placed on Hold; an Intercom call is dropped.*
- *When you hear dial tone, press flashing PKUP/CONF key. +*

+If the Call Waiting signals are from the attendant, you do not hear dial tone and you are automatically connected to the attendant.

**NOTE:** To alternate between two CO calls, use the Split feature.

## CALLBACK

To initiate a Callback to a busy extension:

- *Press MW/CB key. LED illuminates.*
- *Hang up.*

When the telephone becomes available, your telephone rings and your MW/CB key flashes slowly.

To answer Callback:

- *Lift handset. You are connected automatically to the called extension.*

If you are busy on a call, another extension user may leave a Callback request on your telephone. You see this request as a flashing (fast) MW/CB key. When you hang up, the telephone which left the Callback is signaled. If that extension user answers the signal, an Intercom call is automatically placed to your telephone.



## CONFERENCE

### *Add-On Conference*

To add a second internal party to an outside call:

- Press HLD/TRF key. Outside call placed on Hold. Internal dial tone audible.
- Dial internal extension number to be added to conference.
- Announce conference.
- Press PKUP/CONF key. All three parties are connected. +

To join a conference (when announced), press the PKUP/CONF key within 10 seconds.

### *Line Conference*

To create a conference call with two external lines:

- Press HLD/TRF key. First call placed on Hold.
- Establish second call on another line.
- Press PKUP/CONF key. +
- Announce conference. All three parties are connected.

+Do not answer another incoming call while a conference is being established. This call would be included in the conference.

### *Meet-Me Conference*

To initiate a Meet-Me Conference with several inside parties:

- Page all parties to join the conference and announce the Conference Code.
- Press and release the hookswitch. Receive internal dial tone.
- Dial 19.

### NOTES:

- If five or more parties join a Meet-Me Conference, volume of the conference begins to decrease.
- Each time an inside party joins a Meet-Me Conference, a tone is heard.

To join a Meet-Me Conference:

- Lift handset. Receive internal dial tone.
- Dial 19.

## EXTENSION HUNTING

To answer a call ringing into your Hunt group:

- Lift handset.

If you hear dial tone after lifting the handset:

- Press the flashing PKUP/CONF key.

### NOTES:

- Extension Hunting does not ring any telephones that are busy on a call or in Do Not Disturb.
- A call that sequences through a Terminal Hunting group (and is not answered) ends up ringing either the last telephone in the group or a predetermined "overflow" extension.
- A call that sequences through a UCD Hunting group (and is not answered) continues to cycle through the group or rings the predetermined "overflow" extension.

## FLASH

To Flash the line:

- Do not hang up.
- Press the HLD/TRF key.
- Dial 1, \*.
- Place the next call.

## FORCED INTERCOM RINGING

To force an Intercom call to a multibutton or four button telephone to ring (as you place the call):

- Lift handset.
- Dial 1, then extension number.

To force all Intercom calls to your telephone to ring (i.e., enable Forced Intercom Ringing):

- Lift handset.
- Dial 1801.
- Hang up.

To cancel Forced Intercom Ringing to your telephone (if you have enabled it):

- Lift handset.
- Dial 1800.
- Hang up.

## HOLD

### *Exclusive Hold*

To place a call on Exclusive Hold:

- Press HLD/TRF key.
- Hang up.

To return to a call on Exclusive Hold:

- Lift handset.
- Dial \*.

### NOTES:

- If the call is left on Hold longer than the Hold Recall interval, the call re-rings your telephone.
- If the system is in the night mode, a call left on Hold longer than the Hold Recall interval re-rings your telephone, then rings all telephones and external alerting devices in the system assigned night ringing for that line.

## INTERCOM

To place an Intercom call:

- Lift handset.
- Dial extension number (301-363, 401-465, 0 for attendant).

### NOTES:

- When you use the MON key to place an Intercom call, you must lift the handset to talk.
- When you call a single line telephone, it rings. When you call a multibutton or four button telephone, it receives your call Handsfree (unless programmed otherwise).

## LAST NUMBER REDIAL

To redial the last call made (or attempted):

- Lift handset.
- Dial #, 1.

## LEAST COST ROUTING

To place a call using Least Cost Routing:

- Lift handset.
- Dial 9, \*.
- Dial number (with less than six seconds between digits).

## LEAST COST ROUTING BYPASS

To bypass Least Cost Routing:

- Lift handset.
- Dial 9.
- Dial line group number (0-9) to get dial tone. +
- Dial telephone number.

+Line groups 1-9 are accessed by dialing 91-99. Line group 10 is accessed by dialing 90.

## LINE QUEUING

To queue for a busy line:

- Press MW/CB key. LED illuminates.
- Hang up.

The MW/CB LED flashes and your telephone rings when a line is available.

When your telephone rings:

- Lift handset.
- Dial number.

If you do not answer the Line Queuing ring within 10 seconds, your queue is canceled.



## MESSAGE WAITING

To leave a Message Waiting at an extension when no one answers:

- Press MW/CB key.
- Hang up.

If someone leaves you a Message Waiting signal, the HLD/TRF key flashes, and your telephone emits a tone every two minutes.

To respond to a Message Waiting indication at your telephone:

- Lift handset.
- Press flashing HLD/TRF key.

The extension leaving the Message Waiting is automatically signaled. If the HLD/TRF key continues to flash, then another message is still waiting.

To cancel a Message Waiting signal left at your telephone:

- Do not lift handset or press MON key.
- Press flashing HLD/TRF key.

## MONITOR

To dial or listen to a call without lifting the handset:

- Press MON key.

**NOTE:** You must lift the handset to talk.

## NIGHT SERVICE

### *Assigned Night Answer*

To answer a call ringing at your telephone at night:

- Lift handset.

### *Universal Night Answer*

To answer a call ringing over the Paging system or external alerting device at night:

- Lift handset.
- Dial 69.

## PAGING

### *All Call Page*

To initiate All Call Page:

- Lift handset.
- Dial 60.
- Make announcement.
- Hang up.

### *Zone Page*

To Page a specific zone:

- Lift handset.
- Dial desired zone (61-68).
- Make announcement.
- Hang up.

## PARK

### General Park Orbit

To place a call into a General Park Orbit:

- Press HLD/TRF key. Intercom dial tone audible.
- Dial General Park Orbit code (50-59). Acknowledgement tone audible.
- Press HLD/TRF key. Internal dial tone audible.
- Dial 60 (All Call), 61-68 (Zone Page).
- Announce call and orbit code (50-59).
- Hang up.

To retrieve a call from General Park Orbit:

- Lift handset.
- Dial announced General Park Orbit code (50-59).

### Personal Park Orbit

To Park a call at a specific extension:

- Press HLD/TRF key. Internal dial tone audible.
- Dial number of extension where call is to be parked.
- Press and release hookswitch. Internal dial tone audible.
- Dial 60 (All Call), 61-68 (Zone Page) and announce call and extension number.
- Hang up.

To retrieve a call from Personal Park Orbit:

- Lift handset.
- Dial #, #.
- Dial the number of the extension where the call is parked.

## NOTES:

- If an acknowledgement tone is not heard after dialing a Park Orbit code, the orbit that you dialed is busy. Dial a different Park Orbit code.
- A call left in a Park Orbit longer than the Orbit Recall interval re-rings your telephone. If the call remains unanswered, it rings at the attendant's telephone.
- If you Park a call at the attendant's extension, it may recall to you if it is not picked up. If you Park a call at the attendant's extension when the system is in the night mode, the call rings all telephones and external alerting devices assigned night ringing for that line.

## PLACING A CALL

To place an outside call:

- Lift handset. Dial tone audible.
- Dial 9.
- Dial line group number (0-9) to get dial tone. +
- Dial telephone number.

+Line groups 1-9 are accessed by dialing 91-99. Line group 10 is accessed by dialing 90.

To place a call so that an OCC is automatically selected:

- Lift handset.
- Dial 9, #.
- Dial the code (0-9) that is assigned to the OCC.
- Dial number.

The OCC line and access code are automatically inserted before the number you dial.

## PRIVACY TONE

The Privacy Tone signal indicates that a Barge In is active on your call, that you have answered an Intercom call using Handsfree Answerback, or that an Intercom call you have placed has been answered using Handsfree Answerback. This feature prevents unauthorized monitoring of conversations in your office or work area.

The Handsfree Answerback Privacy Tone is a single tone. The Barge In Privacy Tone is three short tones.

The Privacy Tone is repeated at a predetermined interval as long as the Handsfree Answerback or Barge In condition exists.

## SIGNAL BUSY OPERATOR

If you attempt to reach a busy operator, your extension automatically camps-on, and signals that extension. You hear a camp-on tone, then ringing.

## **SPEED DIAL**

### ***Extension Speed Dial***

Only the first 50 extensions in the system have access to Extension Speed Dial.

To store an Extension Speed Dial number:

- *Lift handset.*
- *Dial #, 7.*
- *Dial line group (0-9). +*
- *Dial bin 0-9 (10 storage locations).*
- *Dial number to be stored (maximum 16 digits). Pauses count as digits, and are stored by dialing #.*
- *Dial \*.*

+Dialing 1-9 stores line groups 1-9. Dialing 0 stores line group 10. If LCR is installed, the system overrides the line group assignment you have made and places the call on the least expensive available route.

To dial an Extension Speed Dial number:

- *Lift handset.*
- *Dial 7.*
- *Dial 0-9 (bin where desired number was stored).*

### ***System Speed Dial***

To dial a System Speed Dial number:

- *Lift handset. Dial tone audible.*
- *Dial desired code (800-899).*

## **SPEED DIAL, CHAINING BINS**

### ***Chaining System Speed Dial Bins***

To chain up to four System Speed Dial bins:

- *Lift handset.*
- *Dial 8, \*.*
- *Dial System Speed Dial bins to be chained (00-99).*
- *Dial \* to end sequence.*

### ***Chaining System and Extension Speed Dial Bins***

To chain a System Speed Dial bin with up to three Extension Speed Dial bins:

- *Lift handset.*
- *Dial 8, \*.*
- *Dial bin (00-99) for desired System Speed Dial number.*
- *Dial #.*
- *Dial desired Extension Speed Dial bin number (0-9).*
- *If additional Extension Speed Dial bins are to be chained, dial # between the bin numbers.*
- *Dial \* to end sequence.*

## **SPEED DIAL DIRECTIVES**

Speed Dial directives can be entered into Speed Dial bins to increase the flexibility of Speed Dialing. See Section 5, FEATURES, for more information.

### **SPLIT (Alternate)**

To talk to a second caller while already on a call:

- *Press HLD/TRF key. First call placed on Hold.*
- *Hang up.*
- *When telephone rings, lift handset.*

You may alternate (Split) between two outside calls as follows:

- *Press HLD/TRF key.*
- *Dial \*.*

## **TIE LINE ACCESS**

To access a tie line from your system:

- *After dial tone from the tie line is received, access any feature from the remote system.*

## TRANSFER

### *Screened (Announced) Transfer*

To Transfer a screened call:

- Press HLD/TRF key.
- Dial extension number to receive call.
- Announce call.

If the party accepts the Transfer:

- Hang up.

To return to an outside call:

- Do not hang up.
- Press HLD/TRF key.
- Dial \*.

### *Unscreened (Unannounced) Transfer*

To Transfer an unscreened call:

- Press HLD/TRF key.
- Dial extension number to receive Transfer.
- Hang up.

## NOTES:

- (a) A call that you Transfer that is not answered re-rings your telephone.
- (b) If the system is in the night mode, a call that you Transfer that is not picked up within the Transfer Recall interval rerings your telephone, then rings all telephones and external alerting devices assigned to night ringing for that line.
- (c) If you Transfer a call to the attendant, it may recall to you if it is not picked up. If you Transfer a call to the attendant when the system is in the night mode, the call rings all telephones and external alerting devices assigned night ringing for that line.

## VOLUME CONTROLS

Two volume control thumbwheels are located on the front edge of the telephone. The left thumbwheel is used to adjust the volume of the Page Receive, Splash Tone, Ring Tone, and Background Music (BGM). The right thumbwheel controls the volume of Monitor and incoming Handsfree Answerback conversations. To increase volume turn the thumbwheels counterclockwise.





**APPENDIX D**  
**SINGLE LINE TELEPHONE**  
**OPERATIONAL SPECIFICATION**

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**NOTE:** If using a 2500 type telephone, replace "HOLD/TRANSFER bar" with "hookswitch" throughout this specification.

**ACCOUNT CODE CAPABILITY**

To assign an Account Code (up to nine digits) as you place a call:

- *Lift handset.*
- *Place outside call (or let Speed Dial call dial out).*
- *Dial # (within three seconds).*
- *Dial Account Code.*

To assign an Account Code to a call in progress:

- *Press HOLD/TRANSFER bar.*
- *Dial 2, #, #.*
- *Dial Account Code (do not wait longer than six seconds between digits).*
- *Dial # to return to the call.*

If the Account Code is nine digits long, you are automatically returned to the call after the ninth digit is dialed.

**Forced Account Code (up to nine digits)**

To enter a Forced Account Code:

- *Lift handset.*
- *Dial 6, #.*
- *Enter the Account Code (up to nine digits).*
- *Dial #.*
- *Seize an outside line (within 30 seconds).*
- *Place outside call.*

**NOTE:** If the Account Code is not entered six seconds before or after dialing, the line is dropped.

To store a permanent Account Code:

- *Lift handset.*
- *Dial 6, \*.*
- *Enter the Account Code (up to nine digits).*
- *Dial #.*
- *Hang up.*

To erase a permanent Account Code:

- *Lift handset.*
- *Dial 6.*
- *Dial #, #.*
- *Hang up.*

**ANSWERING A CALL**

To answer a call:

- *Lift handset.*

**BARGE IN**

**CAUTION: UNAUTHORIZED MONITORING OF CALLS USING THE BARGE IN FEATURE MAY BE INTERPRETED AS AN INVASION OF PRIVACY.**

Your calls can be Barged In upon by certain extension users. You hear three short tone bursts before the Barge In occurs and are periodically alerted by three short Privacy Tones afterwards. If you are on an Intercom call that has been answered using Handsfree Answerback, you also hear a longer Privacy Tone after each set of Barge In Privacy Tones.

**CALL FORWARDING**

To forward all of your calls to another extension:

- *Lift handset. Receive internal dial tone.*
- *Dial #.*
- *Dial \*.*
- *Dial number of destination extension. Listen for acknowledgment tone.*

To forward the calls onward from a Four Button or Single Line telephone:

- *Lift handset.*
- *Dial #.*
- *Dial \*.*
- *Dial the number of the extension to which your calls are forwarded.*
- *Dial the number of the extension to which you want the calls to be forwarded.*
- *Hang up.*

To cancel Call Forwarding:

- Lift handset.
- Dial #.
- Dial \*.
- Dial your own extension number.
- Hang up.

## CALL PICKUP, DIRECTED

To answer an outside call you hear ringing at a nearby telephone:

- Lift handset.
- Dial #, #.
- Dial extension number of telephone that is ringing.

## CALL PICKUP, GROUP

To pick up a call you hear ringing at another extension in your Pick Up Group:

- Lift handset.
- Dial 22.

## CALL WAITING

### *Call Waiting, Attendant/Hotline Partner*

To answer an Attendant/Hotline Partner Call Waiting signal (double beep):

- Press HOLD/TRANSFER bar. (Outside call is put on Hold. Intercom calls are dropped.)

**NOTE:** If you hear dial tone after you press the HOLD/TRANSFER bar, Call Waiting signal is from an incoming CO call, *not* from the attendant. See CO Call Waiting.

To return to the initial outside call on Hold:

- Press HOLD/TRANSFER bar.

To alternate between the initial outside call and the attendant:

- Press HOLD/TRANSFER bar.

### *Call Waiting, CO Call*

To answer a CO Call Waiting signal (double beep):

- Hang up. Initial call terminated.
- When telephone rings, lift handset. You will be connected to the waiting call.  
OR
- Press HOLD/TRANSFER bar. First call (if CO call) will be placed on Hold.
- Hang up.
- When telephone rings, lift handset.

**NOTE:** To alternate between the two calls, use the Split feature.

## CALLBACK

To initiate a Callback to a busy extension:

- Place Intercom call; receive busy signal.
- Press and release hookswitch.
- Dial 1.
- Dial #; receive confirmation tone.
- Hang up.

To cancel a Callback request:

- Lift handset; receive internal dial tone.
- Dial 1.
- Dial #.
- Hang up.

## CONFERENCE

### *Add-On Conference*

To join an Add-On Conference:

- *Stay on line after conference is announced.*

### *Meet-Me Conference*

To initiate a Meet-Me Conference:

- *Page all parties to join the conference and announce the Conference Code.*
- *Press and release hookswitch.*
- *Dial 19.*

To join a Meet-Me Conference:

- *Lift handset.*
- *Dial 19.*

### NOTES:

- (a) If five or more parties join a Meet-Me Conference, volume of the conference begins to decrease.
- (b) Each time an inside party joins a Meet-Me Conference, a tone is heard.
- (c) If you establish a Meet-Me Conference, you can hang up, and the other callers remain connected.

## EXTENSION HUNTING

To answer a call ringing into your Hunt Group:

- *Lift handset.*

If you hear dial tone after lifting the handset:

- *Dial 22.*

### NOTES:

- (a) Extension Hunting does not ring any telephones that are busy on a call or in Do Not Disturb.
- (b) A call that sequences through a Terminal Hunting group (and is not answered) ends up ringing either the last telephone in the group or a predetermined "overflow" extension.
- (c) A call that sequences through a UCD Hunting group (and is not answered) continues to cycle through the group or rings the predetermined "overflow" extension.

## FLASH

To Flash a line:

- *Do not hang up.*
- *Press HOLD/TRANSFER bar.*
- *Dial 1, \*.*
- *Place next call.*

## FORCED INTERCOM RINGING

To force an Intercom call to a Multibutton or Four Button telephone to ring (as you place the call):

- *Lift handset.*
- *Dial 1, then the extension number.*

## HOLD

### *Exclusive Hold*

To place a call on Exclusive Hold:

- *Press HOLD/TRANSFER bar.*

To return to a call on Exclusive Hold:

- *Press HOLD/TRANSFER bar.*
- *Dial \*.*

### NOTES:

- (a) If the call is left on Hold longer than the Hold Recall interval, the call re-rings your telephone.
- (b) If the system is in the night mode, a call left on Hold longer than the Hold Recall interval re-rings your telephone, then all telephones and external alerting devices in the system assigned night ringing for that line.

## INTERCOM

To place an Intercom call:

- *Lift handset.*
- *Dial extension number (301-363, 401-465, or 0 for attendant).*

When you call a Single Line telephone, it rings. When you call a Multibutton or Four Button telephone, it is received in the Handsfree Answerback mode (unless programmed otherwise).

## LAST NUMBER REDIAL

To redial the last call made (or attempted):

- *Lift handset.*
- *Dial #.*
- *Dial 1.*

## LEAST COST ROUTING

To place a call using Least Cost Routing:

- *Lift handset.*
- *Dial 9, \**
- *Dial number (with less than six seconds between digits).*

## LEAST COST ROUTING BYPASS

To bypass Least Cost Routing:

- *Lift handset.*
- *Dial 9.*
- *Dial line group number (0-9) to get dial tone. +*
- *Dial telephone number.*

+ Line groups 1-9 are accessed by dialing 91-99. Line group 10 is accessed by dialing 90.

## NIGHT SERVICE

### *Assigned Night Answer*

To answer a call ringing at your telephone at night:

- *Lift handset.*

### *Universal Night Answer*

To answer a call ringing over the Paging system or external alerting device at night:

- *Lift handset.*
- *Dial 69.*

## PAGING

### *All Call Page*

To initiate All Call Page:

- *Lift handset.*
- *Dial 60.*
- *Make announcement.*
- *Hang up.*

### *Zone Page*

To Page a specific zone:

- *Lift handset.*
- *Dial desired zone (61-68).*
- *Make announcement.*
- *Hang up.*

## **PARK**

### **General Park Orbit**

To place a call into a General Park Orbit:

- Press *HOLD/TRANSFER* bar. Intercom dial tone is audible.
- Dial General Park Orbit code (50-59). Acknowledgment tone heard.
- Press *HOLD/TRANSFER* bar. Intercom dial tone is audible.
- Dial 60 (All Call) or 61-68 (Zone Page).
- Announce call and Orbit code (50-59).
- Hang up.

To retrieve a call from General Park Orbit:

- Lift handset.
- Dial announced General Park Orbit code (50-59).

### **Personal Park Orbit**

To Park a call at a specific extension:

- Press *HOLD/TRANSFER* bar. Intercom dial tone audible.
- Dial number of extension where call is to be Parked.
- Press *HOLD/TRANSFER* bar. Intercom dial tone audible.
- Dial 60 (All Call) or 61-68 (Zone Page).
- Announce call and extension number.
- Hang up.

To retrieve a call from Personal Park Orbit:

- Lift handset.
- Dial #, #.
- Dial the number of the extension to which the call was parked.

## **NOTES:**

- (a) A call left in a Park Orbit longer than the Orbit Recall interval re-rings your telephone. If the call is unanswered, it rings the attendant's telephone.
- (b) If you Park a call at the attendant's extension, it may recall to you if it is not picked up. If you Park a call at the attendant's extension when the system is in the night mode, the call rings all telephones and external alerting devices assigned night ringing for that line.

- (c) If the system is in the night mode, a call left in a Park Orbit longer than the Transfer Recall interval re-rings your extension. If the call is unanswered, it rings all telephones and external alerting devices in the system assigned night ringing for that line.

## **PLACING A CALL**

To place an outside call:

- Lift handset.
- Dial 9.
- Dial line group number (0-9) to get dial tone. +
- Dial telephone number.

+ Line groups 1-9 are accessed by dialing 91-99. Line group 10 is accessed by dialing 90. If Least Cost Routing is installed, you may be required to use a different procedure when placing calls. Refer to Least Cost Routing.

To place a call so that an OCC is automatically selected:

- Lift handset.
- Dial 9, #.
- Dial the code (0-9) that is assigned to the OCC.
- Dial number.

The OCC line and access code are automatically inserted before the number you dial.

## **PRIVACY TONE**

The Privacy Tone signal indicates that a Barge In is active on your call or that an Intercom call you placed has been answered using Handsfree Answerback. This feature prevents unauthorized monitoring of conversations in your office or work area.

The Handsfree Answerback Privacy Tone is a single tone.

The Barge In Privacy Tone is three short tones.

The Privacy Tone is repeated at predetermined intervals as long as the Handsfree Answerback or Barge In condition exists.

## SIGNAL BUSY OPERATOR

If you attempt to reach a busy operator, your extension automatically camps-on, and signals the operator. You hear a camp-on tone, then ringing.

## SPEED DIAL

### *Extension Speed Dial*

Only the first 50 extensions in the system have access to Extension Speed Dial.

To store an Extension Speed Dial number:

- *Lift handset. Dial tone audible.*
- *Dial #, 7.*
- *Dial line group (0-9). +*
- *Dial bin 0-9 (10 storage locations).*
- *Dial number to be stored (maximum 16 digits). Pauses count as a digit, and are stored by dialing #.*
- *Dial \*.*

+ Dialing 1-9 stores line groups 1-9. Dialing 0 stores line group 10. If LCR is installed, the system overrides the line group assignment you have made and places the call on the cheapest available route.

To dial an Extension Speed Dial number:

- *Lift handset.*
- *Dial 7.*
- *Dial 0-9 (bin where desired number is stored).*

### *System Speed Dial*

To dial a System Speed Dial number:

- *Lift handset. Dial tone is audible.*
- *Dial desired code (800-899).*

## SPEED DIAL, CHAINING BINS

### *Chaining System Speed Dial Bins*

To chain up to four System Speed Dial bins:

- *Lift handset.*
- *Dial 8, \*.*
- *Dial System Speed Dial bins to be chained (00-99).*
- *Dial \* to end sequence.*

### *Chaining System and Extension Speed Dial Bins*

To chain a System Speed Dial bin with up to three Extension Speed Dial bins:

- *Lift handset.*
- *Dial 8, \*.*
- *Dial bin (00-99) for desired System Speed Dial number.*
- *Dial #.*
- *Dial desired Extension Speed Dial bin number (0-9).*
- *If additional Extension Speed Dial bins are to be chained, dial # between the bin numbers.*
- *Dial \* to end sequence.*

## SPEED DIAL DIRECTIVES

Speed Dial Directives can be entered into Speed Dial bins to increase the flexibility of Speed Dialing. See Section 5, FEATURES for more information.

## SPLIT (Alternate)

To talk to a second caller while already on a call:

- *Press HOLD/TRANSFER bar. First call placed on Hold.*
- *Hang up.*
- *When telephone rings, lift handset to talk to second caller.*

You can alternate (split) between two outside calls as follows:

- *Press HOLD/TRANSFER bar.*
- *Dial \*.*



## TIE LINE ACCESS

To access a tie line from your system:

- After dial tone from the tie line is received, access any feature from the remote system.

## TRANSFER

### *Screened (Announced) Transfer*

To Transfer a screened call:

- Press *HOLD/TRANSFER* bar.
- Dial destination extension number.
- Announce call.
- If the party accepts the transfer, hang up.

To return to the call:

- Press *HOLD/TRANSFER* bar.
- Dial \*.

If you use the above procedure and hear reorder tone, to retrieve the call:

- Press *HOLD/TRANSFER* bar.
- Dial #, #.
- Dial number of extension that was to receive Transfer.

### *Unscreened (Unannounced) Transfer*

To Transfer an unscreened call:

- Press *HOLD/TRANSFER* bar. Call placed on Hold.
- Dial destination extension number.
- Hang up.

### NOTES:

- (a) A call you Transfer that is not picked up within the Transfer Recall interval re-rings your telephone. If the call remains unanswered, it rings the attendant's telephone.
- (b) If the system is in the night mode, a call you Transfer that is not picked up within the Transfer Recall interval re-rings your telephone. If the call is unanswered, it rings all telephones and external alerting devices in the system assigned night ringing for that line.
- (c) If you Transfer a call to the attendant, it may recall to you if it is not picked up.

## APPENDIX E

### TIE LINE INSTALLATION

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#### 1. GENERAL DESCRIPTION

**1.01** Tie lines allow communication between two systems. When an extension user in one system uses a tie line to call another system, the features of the second system can be accessed. A tie line may also be used to call another system in order to access *that* system's tie lines—this procedure is called tandeming.

**1.02** The Tie Line Controller (B-2TLU-A) PCB (P/N 86041) provides two tie line circuits to the TCX-128. The PCB supports tie line types TL1M, TL2M, TL31M, and TL32M. The Tie Line Slave (B-4TLU-A) PCB (FUTURE) will provide an additional four tie lines.

**1.03** The B-2TLU-A PCB must be used with the B-TGU-C PCB and B-CPU-D PCB only.

**1.04** The B-2TLU-A PCB is installed in KSU slot J8 and the B-4TLU-A PCB in slot J7. If the B-4TLU-A PCB is not used, slot J7 *must* not be used.

**1.05** When tie lines are installed, CO/PBX lines 27 through 32 may not be installed. These lines are used when programming tie lines.

**1.06** Each tie line PCB supports Type I (two-wire) or Type III (four-wire) transmission, and Type I or Type II E & M (Ear and Mouth) signaling. The PCBs also support wink start or delay dial operation, and dial pulse or DTMF address signaling to the system receiving calls from your tie lines.

**1.07** For tie lines with Type I signaling:

When an outgoing call is made on a tie line, the tie line circuit supplies  $-48$  V on the M-lead. Address signaling to the other system is sent as dial pulses on the M-lead, or tone signaling on the transmission leads. A ground placed on the E-lead indicates that the other system has received the address signaling and a connection has been established.

When receiving a call on a tie line, a ground placed on the E-lead by the other system indicates the line has been seized. Address signaling to your system is sent as dial pulses on the E-lead, or DTMF tones on the transmission leads. A ground placed on the M-lead by your system indicates that it has received the address signaling, and a connection is established between the two systems.

**1.08** For tie lines with Type II signaling:

When an outgoing call is made on a tie line, the tie line circuit connects a telco-supplied battery (-48 V) to the M-lead. Address signaling to the other system is sent as dial pulses on the M-lead, or tone signaling on the transmission leads. A connection between the E-lead and the telco signal ground indicates that the other system has received the address signaling and a connection between the systems is established.

When receiving a call on a tie line, a connection of the E-lead to the telco signal ground by the other system indicates that the other system has seized the line. Address signaling to your system is in the form of dial pulses on the E-lead, or DTMF tones on the audio pair. The circuit connects the telco-supplied battery to the M-lead when your system receives the address signaling, and a connection to your system is established.

**2. TIE LINE INSTALLATION PROCEDURE**

**WIRING FIGURES E-3 THROUGH E-7 (LOCATED AT THE END OF THIS APPENDIX) ILLUSTRATE THE INSTALLATION OF EACH TYPE OF TIE LINE. USE THE APPROPRIATE DIAGRAM WHEN INSTALLING TIE LINES.**

**2.01** Install the Tie Line Controller (B-2TLU-A) PCB in slot J8. Install the Tie Line Slave (B-4TLU-A) PCB in slot J7. Strap these PCBs together. The straps are keyed to prevent improper installation.

**2.02** Connect the tie line circuits from the telco to the P3 connector as shown in the five wiring diagrams (see Figures E-3 through E-7) and Figure E-1. A 48 V, 250 mA power supply is needed to supply current for all six circuits (such as a Tellabs 8012).

**NOTE:** The P3 connector on the KSU must only be used for tie line connections to the telco.

**2.03** Each B-2TLU-A PCB has one switch and two jumpers that must be set for each tie line. Jumper 1-2-3, jumper 4-5-6 and switch S1 are used for the first tie line. Jumper 7-8-9, jumper 10-11-12 and switch S2 are used for the second tie line. Use the following chart to strap the jumpers and set the switches:

Tie Line Type	Switches		Jumpers			
	S1	S2	1-2-3	4-5-6	7-8-9	10-11-12
TL11M (two-wire, Type I signaling)	D	D	1-2	5-6	7-8	11-12
TL12M (two-wire, Type II signaling)	D	D	2-3	4-5	8-9	10-11
TL31M four-wire, Type I signaling)	U	U	1-2	5-6	7-8	11-12
TL32M (four-wire, Type II signaling)	U	U	2-3	4-5	8-9	10-11

Note: D=Down  
U=Up

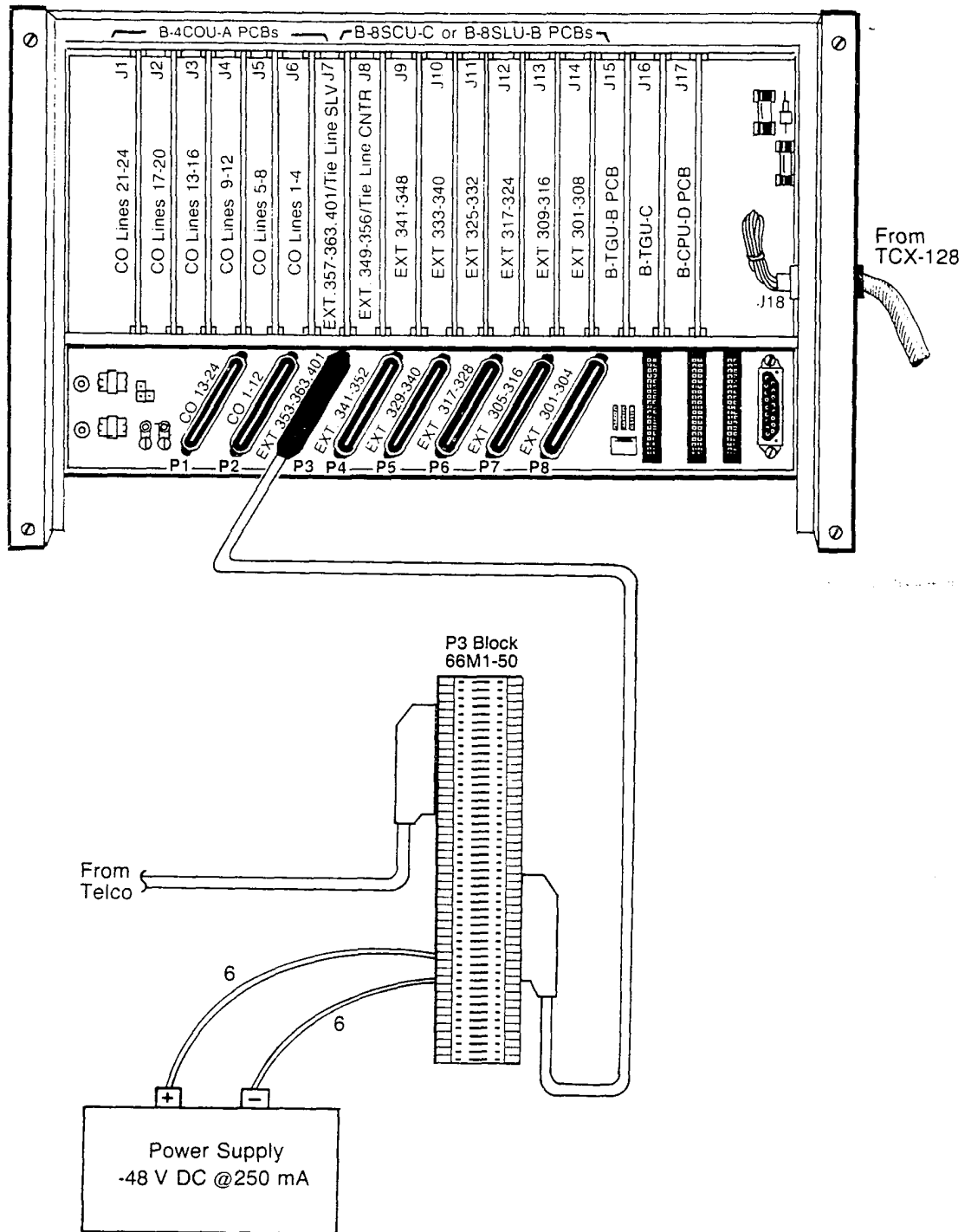
**3. PROGRAMMING TIE LINES**

**3.01** When programming, tie lines 1 to 6 appear as CO lines 27 to 32 in line programming, and extensions 349 to 354 in station programming.

**Programming example:**

- Enter "M" to obtain the TCX system menu.
- Enter "S" to obtain the system commands menu.
- Enter "G" to program CO groups. Assign tie line(s) to CO group(s) 1-10.
- Enter "P" to program line type. Lines 27-32 must be set to the type of tie line (i.e., tone or pulse, etc.).
- Enter "F" to program system options. Enter YES for option #27. Program any other tie line options desired.
- Enter "E" to program station options. Program toll restriction or account code use.

**3.02** Toll Restriction and the use of Account Codes on tie line calls must be set in E: STATION FEATURES. Tie lines 1-6 appear as extensions 349-354. Program tie line restrictions for these extensions.



**Figure E-1 TIE LINE CONNECTIONS**



**Table E-1 TIE LINE CABLING**

25 Pair Cable		66M1-50	Block B1	Block B2	Block B3	Block B4	Block B5	Block B6	STA LEAD DESIG		
Conn Pin	Color Code	Block Term.	Connector P8	Connector P7	Connector P6	Connector P5	Connector P4	Connector P3			
26	WHT-BLU	1	NOT USED	AT (305)	AT (317)	AT (329)	AT (341)	T	Tie	GRN	
1	BLU-WHT	2		AR PORT	AR PORT	AR PORT	AR PORT	R		RED	
27	WHT-ORN	3		BT 005	BT 017	BT 029	BT 041	T1		BLK	
2	ORN-WHT	4		BR J14	BR J12	BR J11	BR J9	R1		YEL	
28	WHT-GRN	5	NOT USED	AT (306)	AT (318)	AT (330)	AT (342)	E	Line #1	GRN	
3	GRN-WHT	6		AR PORT	AR PORT	AR PORT	AR PORT	SG		RED	
29	WHT-BRN	7		BT 006	BT 018	BT 030	BT 042	M		BLK	
4	BRN-WHT	8		BR J14	BR J12	BR J11	BR J9	SB		YEL	
30	WHT-SLT	9	NOT USED	AT (307)	AT (319)	AT (331)	AT (343)	T	Tie Line	GRN	
5	SLT-WHT	10		AR PORT	AR PORT	AR PORT	AR PORT	R		RED	
31	RED-BLU	11		BT 007	BT 019	BT 031	BT 043	T1		BLK	
6	BLU-RED	12		BR J14	BR J12	BR J11	BR J9	R1		YEL	
32	RED-ORN	13	NOT USED	AT (308)	AT (320)	AT (332)	AT (344)	E	#2	GRN	
7	ORN-RED	14		AR PORT	AR PORT	AR PORT	AR PORT	SG		RED	
33	RED-GRN	15		BT 008	BT 020	BT 032	BT 044	M		BLK	
8	GRN-RED	16		BR J14	BR J12	BR J11	BR J9	SB		YEL	
34	RED-BRN	17	Relay #1	AT (309)	AT (321)	AT (333)	AT (345)	T	Tie	GRN	
9	BRN-SLT	18		AR PORT	AR PORT	AR PORT	AR PORT	R		RED	
35	RED-SLT	19	Relay #3	BT 009	BT 021	BT 033	BT 045	T1		BLK	
10	SLT-RED	20	BR J13	BR J12	BR J10	BR J9	R1	YEL			
36	BLK-BLU	21	Relay #2	AT (310)	AT (322)	AT (334)	AT (346)	E	Line #3	GRN	
11	BLU-BLK	22		AR PORT	AR PORT	AR PORT	AR PORT	SG		RED	
37	BLK-ORN	23	Relay #4	BT 010	BT 022	BT 034	BT 046	M		BLK	
12	ORN-BLK	24	BR J13	BR J12	BR J10	BR J9	SB	YEL			
38	BLK-GRN	25	NOT USED	AT (311)	AT (323)	AT (335)	AT (347)	T	Tie	GRN	
13	GRN-BLK	26		AR PORT	AR PORT	AR PORT	AR PORT	R		RED	
39	BLK-BRN	27		BT 011	BT 023	BT 035	BT 047	T1		BLK	
14	BRN-BLK	28		BR J13	BR J12	BR J10	BR J9	R1		YEL	
40	BLK-SLT	29	NOT USED	AT (312)	AT (324)	AT (336)	AT (348)	E	Line #4	GRN	
15	SLT-BLK	30		AR PORT	AR PORT	AR PORT	AR PORT	SG		RED	
41	YEL-BLU	31		BT 012	BT 024	BT 036	BT 048	M		BLK	
16	BLU-YEL	32		BR J13	BR J12	BR J10	BR J9	SB		YEL	
42	YEL-ORN	33	AT (301)	AT (313)	AT (325)	AT (337)	Ports 049-064 are not available when tie lines are installed.	T	Tie Line	GRN	
17	ORN-YEL	34	AR PORT	AR PORT	AR PORT	AR PORT		R		RED	
43	YEL-GRN	35	BT 001	BT 013	BT 025	BT 037		T1		BLK	
18	GRN-YEL	36	BR J14	BR J13	BR J11	BR J10		R1		YEL	
44	YEL-BRN	37	AT (302)	AT (314)	AT (326)	AT (338)		E		#5	GRN
19	BRN-YEL	38	AR PORT	AR PORT	AR PORT	AR PORT		SG			RED
45	YEL-SLT	39	BT 002	BT 014	BT 026	BT 038	M	BLK			
20	SLT-YEL	40	BR J14	BR J13	BR J11	BR J10	SB	YEL			
46	VIO-BLU	41	AT (303)	AT (315)	AT (327)	AT (339)	Ports 049-064 are not available when tie lines are installed.	T	Tie	GRN	
21	BLU-VIO	42	AR PORT	AR PORT	AR PORT	AR PORT		R		RED	
47	VIO-ORN	43	BT 003	BT 015	BT 027	BT 039		T1		BLK	
22	ORN-VIO	44	BR J14	BR J13	BR J11	BR J10		R1		YEL	
48	VIO-GRN	45	AT (304)	AT (316)	AT (328)	AT (340)		E		Line #6	GRN
23	GRN-VIO	46	AR PORT	AR PORT	AR PORT	AR PORT		SG			RED
49	VIO-BRN	47	BT 004	BT 016	BT 028	BT 040	M	BLK			
24	BRN-VIO	48	BR J14	BR J13	BR J11	BR J10	SB	YEL			
50	VIO-SLT	49									
25	SLT-VIO	50									

**NOTE 1:** The power supply connections listed are for tie lines with Type I signaling only. For installation of tie lines with Type II signaling, see the wiring tables at the end of this appendix.

**NOTE 2:** Default station numbers are shown in parenthesis.

## 4. TIE LINE PROGRAMMABLE OPTIONS

**4.01** Tie lines are configured in the S: TIE LINE TYPE program. To program tie lines, press the M key to enter the main menu, the S key to enter SYSTEM FEATURES, then S again to enter the TIE LINE TYPE program. Configure each tie line according to the following instructions:

BIT NUMBER	DESIGNATION	DEFINITION
Bit 0	Line Installed	0 = tie line uninstalled 1 = tie line installed
Bit 1	Tone/Pulse	0 = tone signaling 1 = pulse signaling
Bit 2	Two/Four Wire	0 = Type I (two-wire) 1 = Type III (four-wire)
Bit 3	Wink Start	1 = Your system wink starts incoming calls; otherwise, set this bit to 0
Bit 4	Delay Dial	1 = Your system delay dials incoming calls; otherwise, set this bit to 0
Bit 5	Four Second Remote Answer	1 = Other system's answer signal must be present four seconds to be valid (this is helpful when hits on the line are detected as an answer signal); otherwise, set this bit to 0
Bit 6	Delay Dial Incoming	1 = Your system provides the other system with a wink start/delay dial pulse on incoming calls; otherwise, set this bit to 0 (in which case the calls are immediate start).
Bit 7	Gain Control	1 = To increase the transmit and receive audio levels; if echo develops on the tie line due to increased audio levels, reset the bit to 0.

**4.02** For each tie line configured, you will arrive with an eight-digit binary number. Using Table 6-1, convert the binary number to a hexadecimal number. This number is entered when programming (see Section 7, PROGRAM ENTRY).

**4.03** Following is an example of a typical tie line configuration:

BIT NUMBER	7	6	5	4	3	2	1	0
FUNCTION	GAIN	IN-DD	4S-RA	OT-DD	WINK	4/2WR	P/T	INSTL

TIE LINE..01..TYPE IS....49

In the above programming example, tie line circuit one is:

- Sending a wink start/delay dial pulse to the other system (remote PBX) when the other system calls into your system (bit 6 is set)
- Connected to a system that wink starts incoming calls (bit 3 is set)
- Two wire—Type I (bit 2 is not set)
- Tone signaling (bit 1 is not set)
- Installed (bit 0 is set)

## 5. TIE LINE INSTALLATION VERIFICATION

### LED Verification

**5.01** Each B-2TLU-A PCB has been equipped with two red LEDs to show E-lead and M-lead status (see Figure E-2). Their assignment is as follows:

- DS1 — tie line circuit one: M-lead
- DS2 — tie line circuit one: E-lead
- DS3 — tie line circuit two: M-lead
- DS4 — tie line circuit two: E-lead

**5.02** The B-2TLU-A PCB is equipped with three green LEDs, DS5 through D7 (see Figure E-2). If the LEDs are not lit, the card is inoperable.

**5.03** When dialing out on a tie line:

The M-lead LED (DS1 or DS3) lights when the tie line is accessed. This is followed by a momentary flash of the corresponding E-lead LED if the other system wink starts or delay dials incoming calls.

The E-lead LED (DS2 or DS4) lights when the remote PBX has decoded address signaling and entered the conversation mode.

**5.04** When the other system calls in on a tie line:

The E-lead LED lights. This is followed by a momentary flash of the M-lead LED if the TCX is programmed to send a wink start/delay dial pulse to the other system on incoming calls.

The M-lead LED lights when the TCX has decoded address signaling and entered the conversation mode.

**Verification Test**

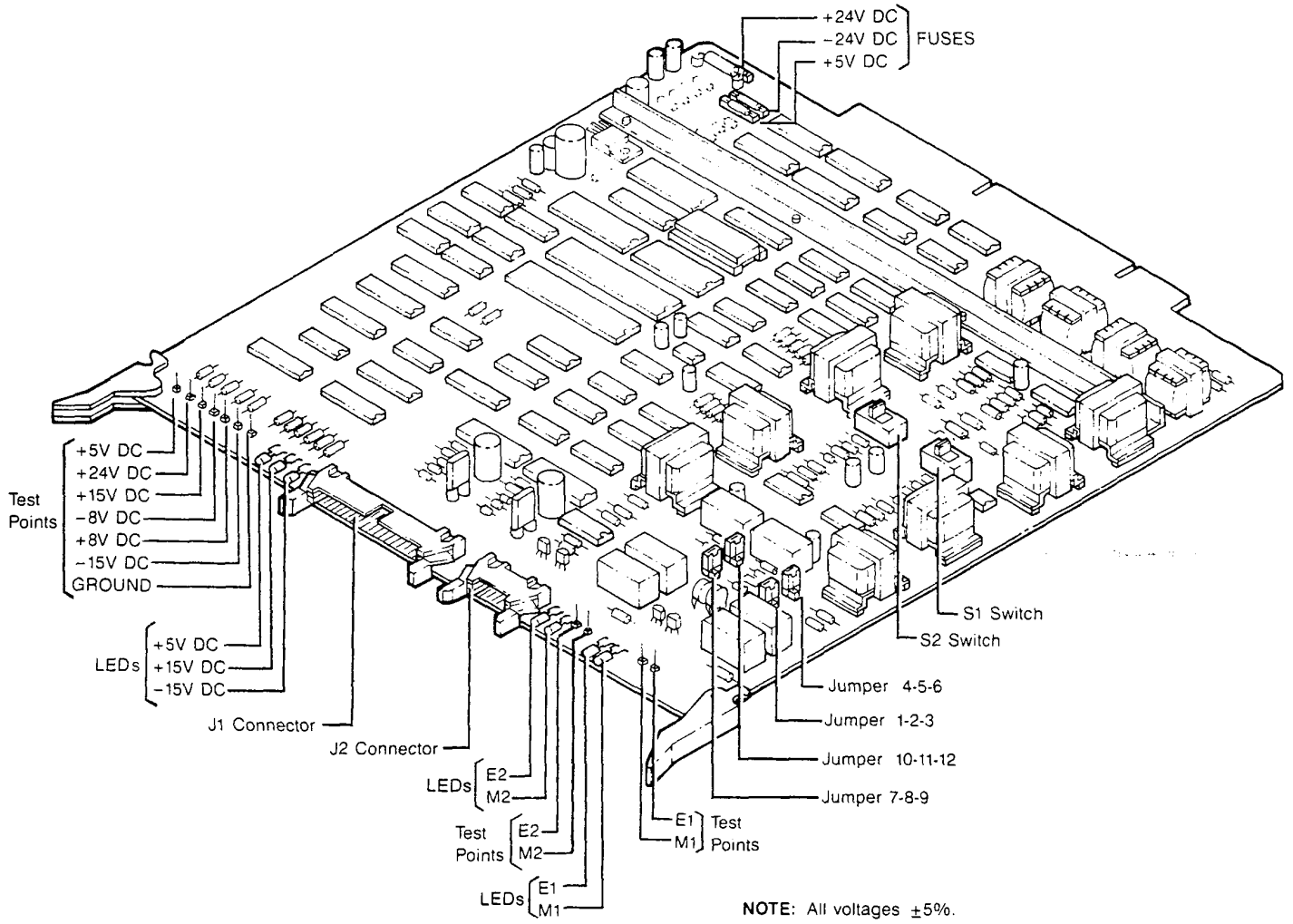
**5.05** To verify proper operation and installation of the 48V supply, 66M1-50 block, the cable assembly connected to P3, and the B-2TLU-A PCB, connect the tie lines directly together (see Figure E-7). This allows you to call into your system on one of your own tie lines. Both tie lines must be programmed for Type II signaling and Type I transmission for this test.

**6. TIE LINE USE****6.01** To access a tie line:

- Dial the line group code of the group containing the tie line(s). Receive dial tone.
- Access any feature in the remote system. If the remote system is another CX system, see below.

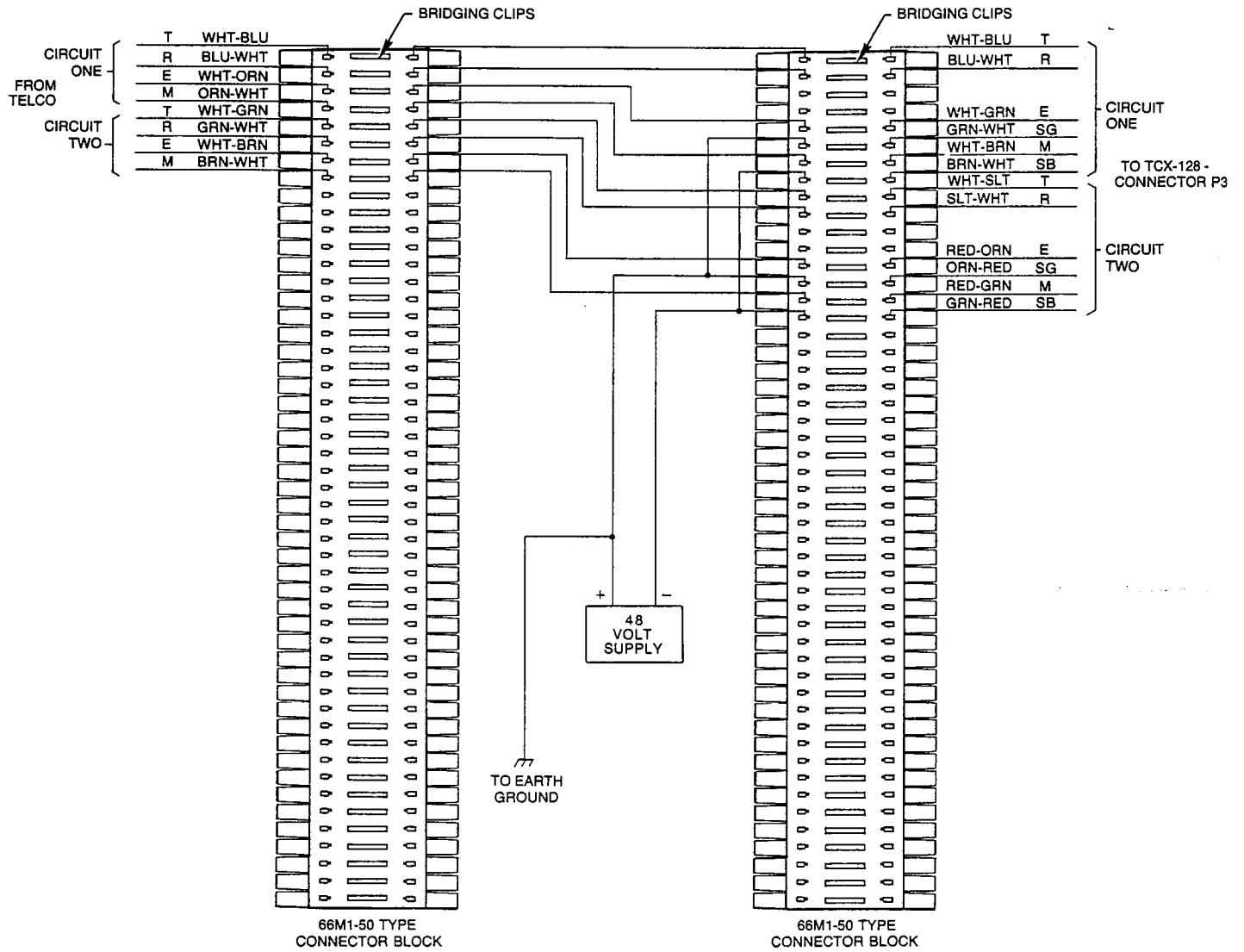
**6.02** If your tie lines connect your system to another TCX-128 system, you may:

- Access any extension or attendant (any extension called rings)
- Access CO/PBX lines in the same manner as they are accessed in your system (dialing 9 + the line group code)
- Access that system's tie lines (by dialing the two-digit tie line code) in order to reach yet another system
- Access that system's System Speed Dial numbers (dialing 800-899)
- Make Paging announcements to that system's extensions and/or speakers (dialing 60-68)
- Signal a busy operator

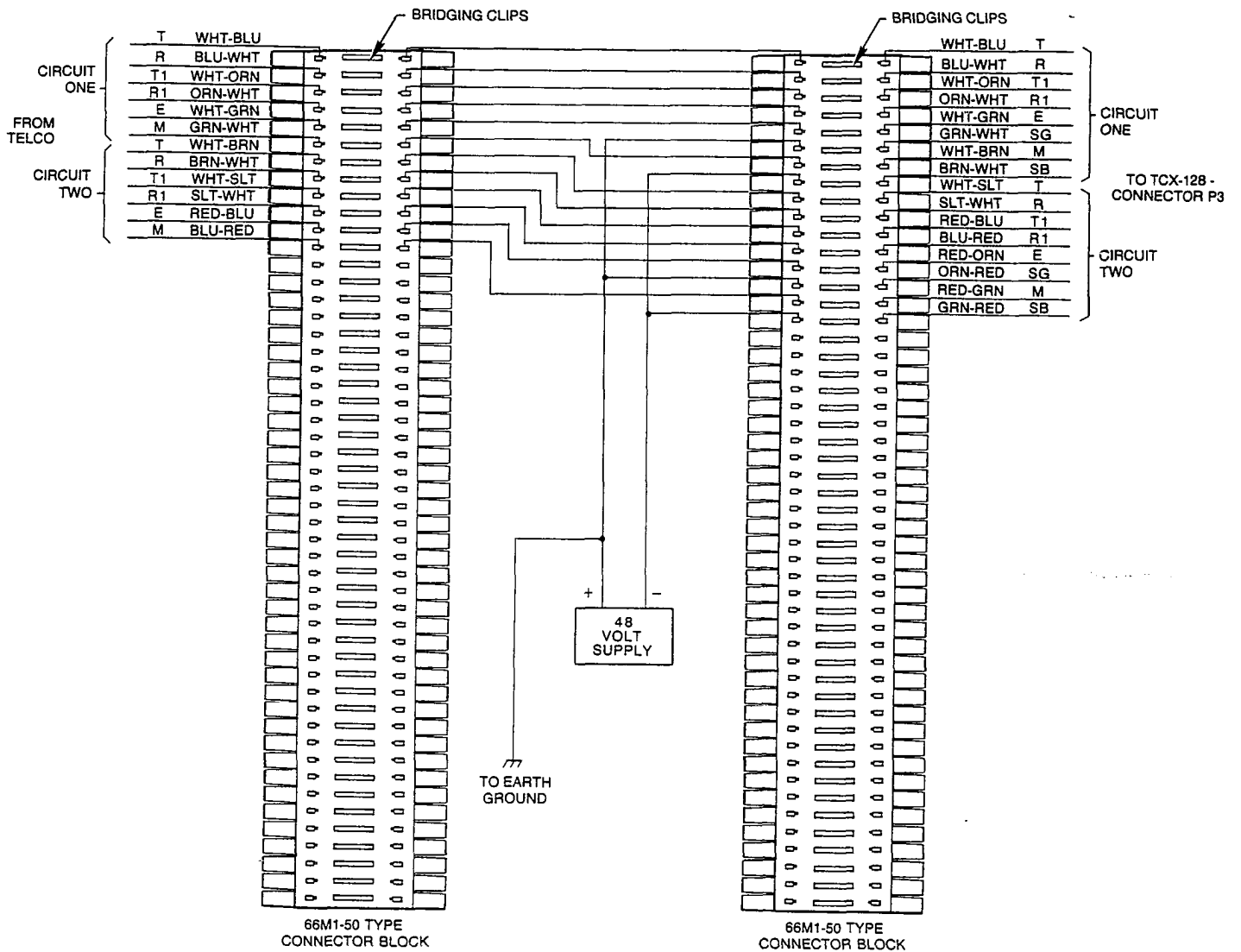


**Figure E-2 TIE LINE CONTROLLER CARD**

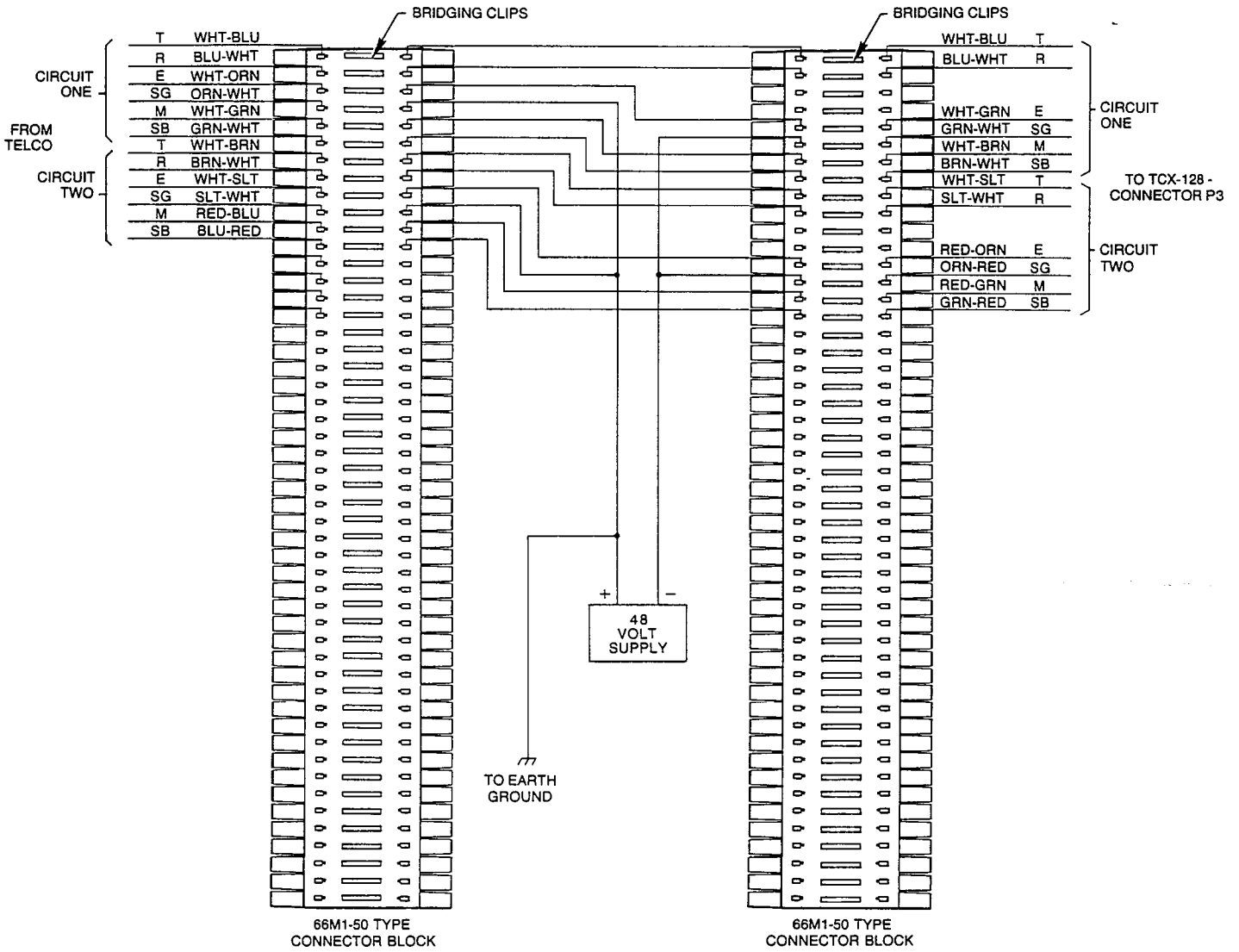




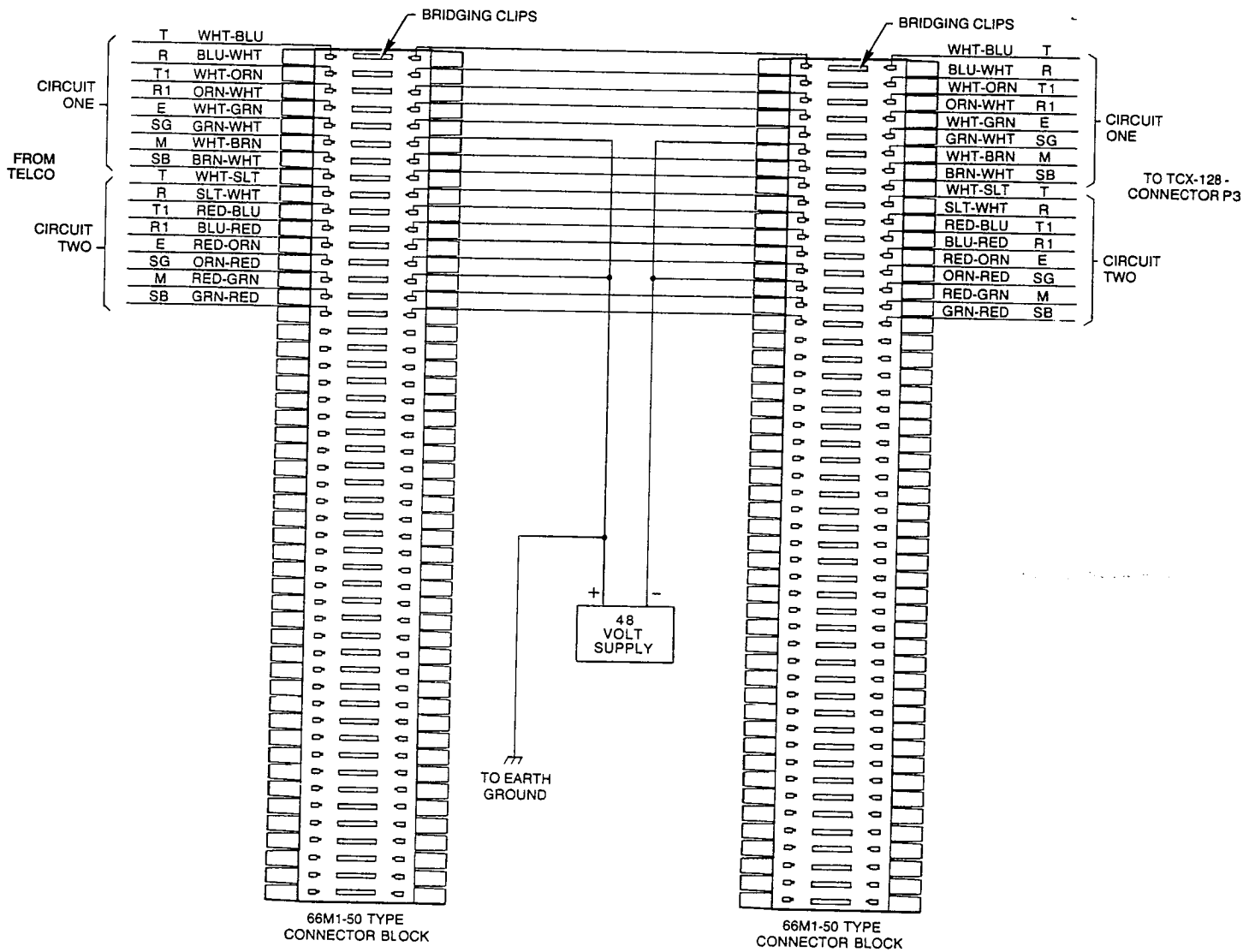
**Figure E-3 TYPE TL11M TIE LINES  
TYPE I TRANSMISSION INTERFACE (2 WIRE)  
TYPE I E & M SIGNALING**



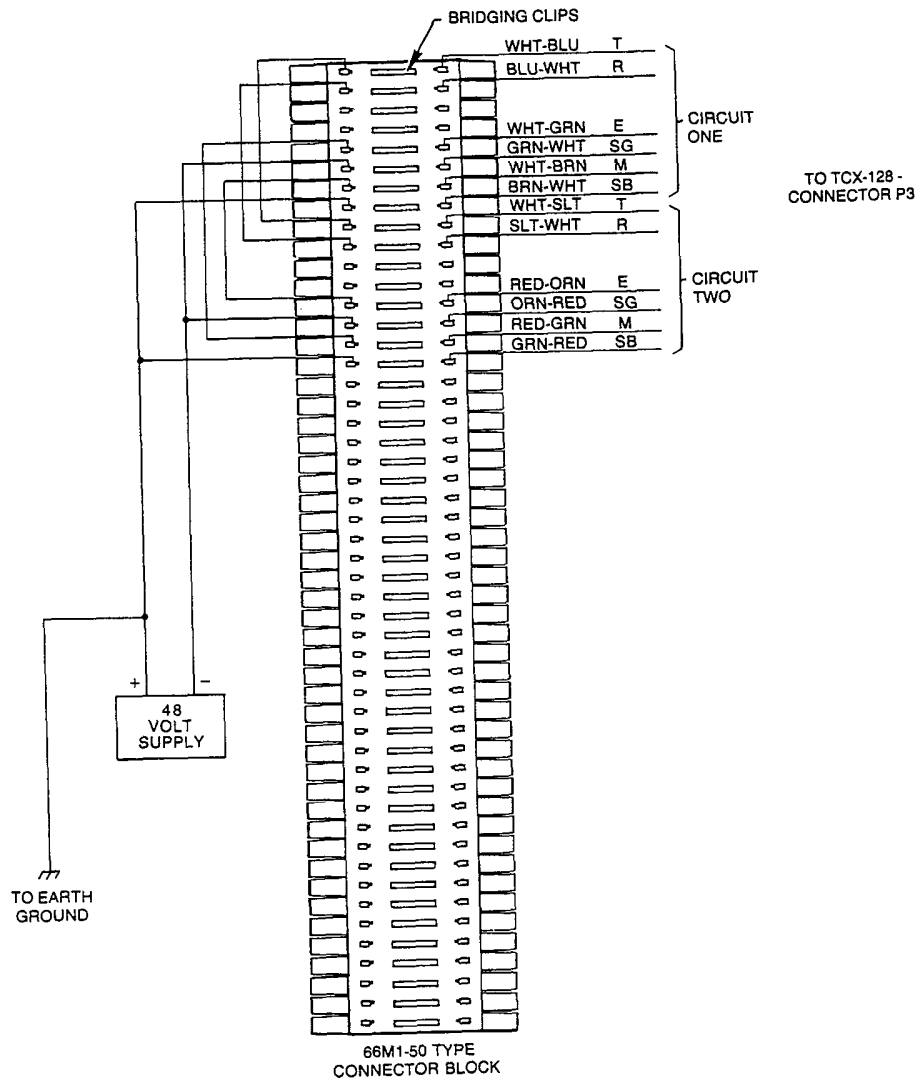
**Figure E-4 TYPE TL31M TIE LINES  
TYPE III TRANSMISSION INTERFACE (4 WIRE)  
TYPE I E & M SIGNALING**



**Figure E-5 TYPE TL12M TIE LINES  
TYPE I TRANSMISSION INTERFACE (2 WIRE)  
TYPE II E & M SIGNALING**



**Figure E-6 TYPE TL32M TIE LINES  
TYPE III TRANSMISSION INTERFACE (4 WIRE)  
TYPE II E & M SIGNALING**



**Figure E-7 CONNECTION OF TWO TIE  
LINE CIRCUITS FOR INSTALLATION VERIFICATION  
TYPE I TRANSMISSION INTERFACE (2 WIRE)  
TYPE II E & M SIGNALING**

## APPENDIX F

### DIAGNOSTIC TRACE SUPPLEMENT

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#### 1. GENERAL DESCRIPTION

**1.01** The Diagnostic Trace provides a history of activity to help determine the cause of problems within a TCX system. A trace occurs over a specified time period. The history will show the events leading up to a reported failure in the system, and a probable cause for the failure. The events can print continuously, or be stored in memory until requested.

**1.02** The system must be equipped with a printer having an RS-232 compatible plug. This printer is plugged into the RS-232-C connector on the KSU and prints out the diagnostic information as required.

**1.03** The parameters of the Diagnostic Trace are defined in three sub-fields of the S: SYSTEM FEATURES field. These sub-fields are:

- 1: SELECT TRACE OPTIONS**
- 2: PRINT TRACE MEMORY**
- 3: PRINT CONTINUOUSLY**

## 2. PROGRAMMING THE DIAGNOSTICS OPTIONS

2.01 The 1: SELECT TRACE OPTIONS field must be programmed before '2' or '3' are accessed for those fields to provide you with information.

### TRACE OPTIONS

2.02 Enter "1". This sub-field selects what type of events should be recorded by the Event Trace. The following Trace Options appear:

- RECORD STATION KEYS ?
- RECORD LINE SIGNALS ?
- RECORD STATION LEDS ?
- RECORD STATION CARD XPTS ?
- RECORD TONE CARD XPTS ?
- RECORD TONE #2 ?
- RECORD LINE CARD RELAYS ?
- RECORD TONE CARD RELAYS ?
- RECORD OUTPUT PULSE DIGITS ?
- RECORD DTMF GEN DIGITS ?
- RECORD DISPLAY CMDS ?
- RECORD LINE STATES ?
- RECORD LINK STATES ?
- RECORD DTMF REC STATES ?
- RECORD STN STATES ?

2.03 To select an option, enter "Y." Otherwise, enter "N." If "Y" is selected for an option, the system records all actions of the selected type, even if no printing is occurring. The recording options are stored in battery-backed Random Access Memory (RAM) so that the selected options continue to be recorded. The RAM also saves the data in the event of a power failure.

2.04 Only those options that are associated with the problem being investigated should be selected.

2.05 The time of occurrence (HR:MIN:SEC) is printed after each Action Code in the Trace printout.

### PRINT TRACE MEMORY

2.06 Selecting "2" prints out the entire Trace Memory. The Trace Memory holds 1,534 events. To stop the printout, press any key except "Q." To resume the printout, press any key except "Q." Events that occur while the Trace is being printed are not recorded. If "Q" is pressed, the printout terminates, and the \* prompt appears.

### PRINT CONTINUOUSLY

2.07 Selecting "3" causes the continuous printing of events. To stop the printout, press any key except "Q." To resume the printout, press any key except "Q." If "Q" is pressed, the printout terminates, and the \* prompt appears. If the printer is not fast enough, and the event queue overflows, a "?" appears for each event that is not recorded.

2.08 Following are descriptions of the actions that each option records and the meanings of the corresponding Action Codes that appear in the Trace printout.

## 3. SELECTING TRACE OPTIONS

### RECORD STATION KEYS ?

**3.01** This option records all keys by all telephones, including dial pad digits. When a key is pressed, the data printed has the following format:

#### Action Codes:

**ACT 0 EXT X KEY Z**

**ACT 2 EXT X DIL Z**

#### Abbreviations:

**ACT 0:** Action Type 0: Key read from Serial and Digital Dial Telephones

**EXT X:** Extension Number X

**KEY Z:** Feature Key Number Z

**ACT 2:** Action Type 2: Key Read From DTMF Receiver

**DIL Z:** Dial Pad Key Number Z

**3.02** Figures F-1 through F-4 are key layouts of each of the TCX telephones. Each key is labeled with a number. When a key (signified by "Z" in the abbreviations above) is pressed, the number corresponding to that key appears in an Action Code (detailed above) on the Diagnostic Trace printout.



1	2	3	VOL UP 56
4	5	6	VOL DN 57
7	8	9	SAVE 58
*	0	#	RE DIAL 59

INCOMING KEY 1 4	INCOMING KEY 2 5	INCOMING KEY 3 6	INCOMING KEY 4 7	INCOMING KEY 5 8	SAVE 9	L# 10
OUTGOING KEY 1 11	OUTGOING KEY 2 12	OUTGOING KEY 3 13	OUTGOING KEY 4 14	OUTGOING KEY 5 15	OUTGOING KEY 6 16	HL 17
M. WAIT 18	C. FWD 19	C. BACK 20	PKUP 21	PAGE 22	PARK 23	CONF. 24
HOLD 25	SPLIT 26	DND/ M. MUTE 27, 35	HF 28	TRF 29	OUT/ MEM 30	INT 31

**Figure F-1 KEY LAYOUT, MULTIBUTTON KEY TELEPHONE**

1	2	3	VOL UP 56
4	5	6	VOL DN 57
7	8	9	SAVE 58
*	0	#	RE DIAL 59

INCOMING KEY 1 4	INCOMING KEY 2 5	INCOMING KEY 3 6	INCOMING KEY 4 7	INCOMING KEY 5 8	SAVE 9	L# 10
OUTGOING KEY 1 11	OUTGOING KEY 2 12	OUTGOING KEY 3 13	OUTGOING KEY 4 14	OUTGOING KEY 5 15	OUTGOING KEY 6 16	HL 17
M. WAIT 18	ALT 19	NIGHT 20	PKUP 21	PAGE 22	PARK 23	CONF 24
HOLD 25	RLS 26	BARGE IN 27, 35	HF 28	TRF/ VOICE 29	OUT/ MEM 30	HF/TRF 31

Figure F-2 KEY LAYOUT, ATTENDANT KEY TELEPHONE

301 68	302 69	303 70	304 71	305 72	306 73	307 74	308 75
309 76	310 77	311 78	312 79	313 80	314 81	315 82	316 83
317 84	318 85	319 86	320 87	321 88	322 89	323 90	324 91
325 92	326 93	327 94	328 95	329 96	330 97	331 98	332 99
333 100	334 101	335 102	336 103	337 104	338 105	339 106	340 107
341 108	342 109	343 110	344 111	345 112	346 113	347 114	348 115
349 116	350 117	351 118	352 119	353 120	354 121	355 122	356 123
357 124	358 125	359 126	360 127	361 128	362 129	363 130	SHIFT 131

**Figure F-3 KEY LAYOUT, DSS CONSOLE**

HOLD/ TRF  7	MON  14	MW/ CB  21	PKUP/ CONF  28
-----------------------	---------------	---------------------	-------------------------

**Figure F-4 KEY LAYOUT, FOUR BUTTON TELEPHONE**

The key numbers for internal switches are:

- 0: off hook
- 32: on hook
- 1: POT switch on
- 33: POT switch off

The Key Telephone Status Codes are:

- 132: Subset 3 Just Installed
- 133: Display Phone Without Display Installed
- 134: Display Phone With Display Installed
- 135: DSS Console is Installed
- 136: Phone was Removed
- 137: Phone is Working
- 138: Phone is Not Working

The Single Line and 2500 Type Telephone Status Codes are:

- 36: SLI on hook (for more than 800 ms)
- 37: SLI off hook
- 38: Hookswitch flash
- 39: SLI on hook (immediate)

## RECORD LINE SIGNALS ?

- 3.03 This option records all incoming signals on CO Lines (such as Ringing Started or Ringing Stopped, etc.)

**Action Codes:**

**ACT 1 COL X SIG Z**

**Abbreviations:**

- ACT 1** Action Type 1: CO Line Incoming Signal
- COL X** Central Office Line Number X
- SIG Z** Signal Code Z

**Signal Codes (Z):**

- If: Z = 0, then ringing has stopped
- Z = 1, then ringing has started
- Z = 2, then Drop Pulse has been received

## RECORD STATION LEDS ?

- 3.04 This option records all commands sent to all stations that cause an LED to turn off or flash.

**NOTE:** Record these actions only if required, as the recording memory fills quickly.

**Action Codes:**

**ACT 3 EXT X LED Z CMD Y**

**Abbreviations:**

- ACT 3:** Action Type 3: Station LED Command
- EXT X:** Extension Number X
- LED Z:** LED Number Z
- CMD Y:** Command Code Y

Each LED on each telephone is assigned a number. Whenever an LED lights, the number corresponding to the LED is recorded on a Diagnostic Trace printout. The LED numbers are signified by Z in the Action Codes above.

**The LED Numbers for Key Phone And Dual Port DSS Consoles Are:**

- 4-31: LED in keys 1-28

**The LED Numbers For Single Port DSS Consoles Are:**

- 0-63: LED in keys 301-364

**The LED Command Codes (Y) Are:**

- 0: LED off
- 1: 500 MS on; 500 MS off
- 2: 50 MS on; 50 MS off
- 3: 500 MS flutter; 500 MS off
- 4: 500 MS flutter; 500 MS on
- 5: LED on
- 6: 450 MS on; 50 MS off
- 7: 100 MS on; 100 MS off
- 8: Reset the telephone

The LED commands are sent to all telephones to control the audio path selection and control switches inside each telephone. In this case, the LED number refers to a particular audio switch.

**Action Codes:**

**ACT 3 EXT X LED Z CMD Y**

**The LED Numbers (Z) For Analog Dial Key Telephones Are:**

- 00H: Mike Mute Switch  
ON = Mute (disable) the Microphone  
OFF = Enable the Microphone
- 01H: Dial Pad Enable Switch  
ON = Enable the Dial Pad  
OFF = Disable the Dial Pad
- 02H: Bypass Switch  
ON = Receive only  
OFF = Transmit and Receive
- 03H: A-B Switch  
ON = Route audio to Handset  
OFF = Route audio to Speaker/Microphone

**The LED Numbers For Single Line and 2500 Type Telephones:**

- 00H: Ringer Switch On; Station Card
- 01H: Muter Switch On; Station Card

**The LED Command Codes (Y) Are:**

For Analog Dial Keyphones:

- 0: Switch Off
- 5: Switch On

For Digital Dial Telephones:

- 10: Let LED Number (Z) control the volume format of Z byte:  
Bits 7..4: Volume setting for volume range 15 (overrides user setting)  
Bits 3..0: Volume range allowed (0 to 14) (sets upper and lower limit of user adjustment)
- 11: Let LED number (Z) control the audio switches format of Z byte:  
Bit 0 controls Mike Enable Switch  
1 = Mic On  
0 = Mic Off  
Bit 1 controls Speaker Enable Switch  
1 = Speaker On  
0 = Speaker Off  
Bit 2 controls A/B Switch  
1 = Route Audio To Speaker/Mic  
0 = Route Audio To Handset  
Bit 3 controls HF/BGM Switch  
1 = Receive Only  
0 = Transmit And Receive

**For Single Line and 2500 Type Telephones The Command Codes Are:**

- 0: Ring or Mute Off
- 1: Ring or Mute On

**RECORD STATION CARD CROSSPOINTS ?**

3.05 This option records Crosspoint Commands sent to Station Cards. These commands connect extensions to links or CO lines.

**Action Codes:**

**ACT 4 EXT X COL Y XPT Z**  
**ACT 4 EXT X LNK Y XPT Z**

**Abbreviations:**

- ACT 4: Action Type 4: Station Card Crosspoint Command
- EXT X: Extension Number X
- COL Y: Central Office Line Number Y
- LNK Y: Link Number Y
- XPT Z: Crosspoint Command Z

## The Crosspoint Command Codes (Z) are:

- 0: Open the Crosspoint
- 1: Close the Crosspoint
- 2: Open all Crosspoints for this Station  
(ignore the link or line number)
- 3: Open All Crosspoints for this Link or Line  
(ignore the extension number)

## The Audio Port Numbers (Y) are:

- LN 1 to 20: CO Lines 1 to 20
- LK 1 to 10: Intercom Links 1 to 10
- LK 11: BGM Link
- LK 12: Page Receive Link

## RECORD TONE CARD CROSSPOINTS ?

- 3.06 This option records Crosspoint Commands sent to all Tone Cards. These commands connect links or CO lines to Tone Card devices.

## The Action Codes for TGU-B PCB are:

- ACT 6 LNK X PGZN Y XPT W
- ACT 6 LNK X REG Y XPT W
- ACT 6 LNK X GEN Y XPT W
- ACT 6 LNK X COL Y XPT W
- ACT 6 LNK X TN Y XPT W
- ACT 6 COL X REG Y XPT W
- ACT 6 COL X GEN Y XPT W

## The Action Codes for the TGU-C PCB (in addition to above):

- ACT 6 LNK X TERM XPT W
- ACT 6 REG X TERM XPT W
- ACT 6 TERM ZON Y XPT W
- ACT 6 PAGE ZON Y XPT W
- ACT 6 BGM ZON Y XPT W
- ACT 6 R-TN ZON Y XPT W

- ACT 6: Action Type 6: Tone Card Crosspoint Command
- LNK X: Link Number X
- PGZN Y: External Page Zone Number Y
- XPT W: Crosspoint Command W
- REG Y: DTMF Receiver Number Y
- GEN Y: DTMF Generator Number Y

- COL Y: Central Office Line Number Y
- TN Y: Tone Generator Number Y (TN 1 is dial tone; TN 2 is splash tone)
- PAGE: External Page (TGU-C Only)
- BGM: External BGM (TGU-C Only)
- R-TN: External Night Ring (TGU-C Only)
- TERM: Termination Resistor (TGU-C Only)
- ZON Y: External Zone Number Y (TGU-C Only)

## The Crosspoint Command Codes (W) are:

- 0: Open
- 1: Close

## RECORD TONE #2 ?

- 3.07 This option records Crosspoint Commands sent to all Tone Cards to connect tone #2 or #3 (splash tone) to a link or CO line.

**NOTE:** Record this action only if required, as the recording memory fills quickly.

## Action Codes:

- ACT 6 LNK X TN Y XPT W
- ACT 6 COL X TN Y XPT W

## Abbreviations:

- ACT 6: Action Type 6: Tone Card Crosspoint Command
- LNK X: Link Number X
- COL X: Central Office Line Number X
- XPT W: Crosspoint Command W
- TN Y: Tone Generator Number Y (TN 1 is Dial Tone; TN 2 is Splash Tone; TN 3 is Loud Splash Tone [Night Ring]/[TGU-C Only])

## The Crosspoint Command Codes (W) are:

- 0: Open
- 1: Close

### RECORD LINE CARD RELAYS ?

**3.08** This option records commands sent to all Line Cards to control relays, conference switches, Music On Hold switches, etc.

**Action Codes:**

**ACT 5 COL X RLY Y**

**Abbreviations:**

**ACT 5:** Action Type 5: Line Relay Command  
**COL X:** Central Office Line Number X  
**RLY Y:** Relay Command Code Y (in hexadecimal)

Each bit of Y controls a relay or switch for CO line X.

**The Command Codes (Y) are:**

- Bit 0:** Loop Relay (1=Close; 0=Open)
- Bit 1:** Ground Relay (1=Close; 0=Open)
- Bit 2:** Conference Switch (1=On; 0=Off)
- Bit 3:** Conference Extender A (1=On; 0=Off)
- Bit 4:** Conference Extender B (1=On; 0=Off)
- Bit 5:** Music Switch (1=On; 0=Off)
- Bit 6:** Not Used
- Bit 7:** Not Used

### RECORD TONE CARD RELAYS ?

**3.09** This option records commands sent to all Tone Card relays.

**Action Codes:**

**ACT 13 RLY X CMD Y**

**Abbreviations:**

**ACT 13:** Action Type 13: Tone Card Relay Command  
**RLY X:** Relay Number X  
**CMD Y:** Command Code Y  
 If: Y = 0, then the relay is open  
 Y = 1, then the relay is closed

### RECORD OUTPULSE DIGITS ?

**3.10** This option records the digits sent out on an Outpulse Line.

**Action Codes:**

**ACT 7 PLS X COL Y**

**Abbreviations:**

**ACT 7:** Action Type 7: Outpulse Digit  
**PLS X:** Number of Pulses Dialed on the Line  
**COL Y:** Central Office Line Number Y

### RECORD DTMF GEN DIGITS ?

**3.11** This option records the digits transmitted by a DTMF generator.

**Action Codes:**

**ACT 14 DIG X GEN Y COL Z**  
**ACT 14 DIG X GEN Y LNK Z**

**Abbreviations:**

**ACT 14:** Action Type 14: DTMF Generator Digit  
**DIG X:** Digit Sent to DTMF Generator  
**GEN Y:** DTMF Generator Number Y used to Transmit the Digit  
**COL Z:** Central Office Line Number Z Receiving the Digit  
**LNK Z:** Intercom Link Number Z Receiving the Digit

### RECORD DISPLAY COMMANDS ?

**3.12** This option records Display Command Codes sent to display telephones.

**Action Codes:**

**ACT 8 EXT X MSG Y**

**Abbreviations:**

**ACT 8:** Action Code 8: Station Display Command  
**EXT X:** Extension Number X  
**MSG Y:** Display Message Number Y

3.13 Each message is assigned a number. Following is a list of messages, and their corresponding numbers.

Message Number	Message
0	< NO MESSAGE >
2	< SUBSEQUENT DIALED DIGIT >
3	EXT XXX CALLING
4	CALL BACK CO XX
5	CALL BACK ST XXX
6	MSG FROM EXT XXX
7	COST \$XX.XX
8	RECALL FROM XXX
9	LINE XX
10	EXTENSION XXX
11	XXX BUSY
12	XXX DND
13	XXX NOT EXIST
14	FORWARD FROM XXX
15	FORWARD TO XXX
16	DO NOT DISTURB
17	CO TO ORBIT XX
18	CO FROM ORBIT XXX
19	PICK-UP FROM XXX
20	HOLD LINE XX
21	PROGRAM MEMORY
22	NUMBER TO BIN XX
23	PROGRAM COMPLETE
24	TOLL RESTRICTED
25	HOLD RECALL XXX
26	TIMER XX-XX
27	THIS IS EXT XXX
28	SYSTEM RESET
29	POWER FAIL
30	< SEND AN ASCII CHARACTER >
31	< SEND A 5 CHARACTER ASCII STRING >
32	< SEND NO MESSAGE >
33	< SEND NO MESSAGE >
34	< SEND NO MESSAGE >
35	< SEND NO MESSAGE >
36	< SEND NO MESSAGE >
37	< MESSAGE IS VARIABLE >
38	< DASH BETWEEN HOURS AND MINUTES >
39	< DISPLAY TIME AND DATE >
41	< FIRST DIALED DIGIT >
68	DISABLE LINE
69	ENABLE LINE
73	< DISPLAY HOURS MINUTES SECONDS >
74	< ACCOUNT CODE OFF >
75	< ENTER ACCNT CODE >



**RECORD LINE STATES ?**

**3.14** This option records state changes of CO Lines, and the associated extension.

**Action Codes:**

**ACT 9 COL X STATE DEV Y DEV Z**

**ACT 9 COL X STATE ORB Y COL Z**

**ACT 9 COL X STATE EXT Y EXT Z**

**Abbreviations:**

**ACT 9:** Action Type 9: CO Line State Change

**COL X:** Central Office Line Number X

**DEV Y:** Associated Device Number Y  
("DEV" is printed if the device type is unknown.)

**ORB Y:** Associated Hold Orbit Number Y

**EXT Y:** Associated Extension Number Y

**COL Z:** Associated CO Line Number Z

**STATE:** Name of New State; One of the Following:

**CO\_\_IDLE:** Line is idle

**CO\_\_RING:** Line has incoming ring

**OR** Hold Recall to operator when system is in Night Mode

**OR** transfer to operator when system is in Night Mode

**HOLD:** On Hold

**HLD\_\_ALARM:**

Hold Alarm

On Hold too long

Ringing the station to which this line was transferred

Ringing the station that transferred this line after a Transfer Recall

**FLASH:** Flash to the Central Office

**SEIZED:** Outside call in progress

**CONF:** Line Conference (2 lines and 1 station)

**DIAL\_\_RES:** Waiting for a DTMF receiver

**LNR:** Executing a Last Number Redial or Speed Dial

**LNR\_\_MON:** Monitoring number being dialed on the line

**LNR\_\_FLSH:** Flash to the Central Office, then Last Number Redial

**CO-DISPO:** Prepare to idle CO (DISA or tie line)

**CO-TRANS:** Announcement being made for a Transfer transferred to "boss"

station in "boss"-secretary Hotline pair

**CO-CB:** Callback station from Line Queuing

**CO\_\_CNF:** Add-On Conference; waiting for added party to press flashing line key

**CO\_\_MOD INT:** CO line is connected to modem, waiting for carrier

**CO\_\_MODEM:** Monitor Modem carrier detector

**CO\_\_ORBIT:** Line in Hold orbit

**CO\_\_SCONF:** Add-On Conference (2 stations and 1 line)

**WAIT\_\_DTMF:** Wait for a DTMF generator RAM buffer

**BAD\_\_TIME:** Temporary Busy-Out because line was seized and found to have no loop current because line is not installed or not working

**DISA\_\_RING:** DISA line is ringing

**DISA\_\_INIT:** DISA line gets dial tone; wait for incoming digits

**DISA\_\_PASS:** Monitor incoming digits (DISA or tie line)

**DISA\_\_OUT:** CO connected to tie line

**DISA\_\_CONF:** Connect DISA or tie line to station

**DISA\_\_PAGE:** DISA or tie line paging

**DISA\_\_SPINT:** Initialize this line for DISA or tie line Speed Dial

**DISA\_\_SPED:** Speed Dialing on this line for DISA or tie line

**DISA\_\_DROP:** No Account Code entered or toll restricted; reorder

**US\_\_CONF:** Unsupervised Trunk Conference