Installation

SBCS™

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- Document Number: TL-120101-1001
- Document Title: SBCS™ Installation
- Issue Number: 1 Date: July 1987

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INTRODUCTION AND PRE-INSTALLATION INFORMATION

1.0 This document, TL-120101-1001 SBCS™ Installation, is a Fujitsu GTE Business Systems' Technical Practice which covers installation material for the Fujitsu GTE Business Systems' SBCS™ (Small Business Communication System). This practice is part of a complementary series of technical practices which include the following:

Technical Practice TL-120201-1001	SBCS™ Maintenance
Technical Practice TL-120001-1001	SBCS™ System Description/Features
Technical Practice TL-120301-1001	SBCS™ Data Base
Technical Practice TL-120401-1001	SBCS™ Site Log

Intent and Scope

1.1 This technical practice serves as the installation document for SBCS™ Feature Packages A through D. It is a task-oriented hardware installation and software initialization manual which references other technical practices in this series for system/feature descriptions, software programming, and maintenance practices. This document assumes that the user is familiar with the operating principles of telecommunications systems and possesses the skills required for installing, configuring, and validating those systems.

Using This Document

1.2 This document is composed of 10 sections which follow the sequential order of a typical system installation. The exceptions to the sequential order of installation are Section 9 - Station Message Detail Recording Option Installation, and Section 10 - Hotel/Motel Option Installation. It should be noted that these are options and are not applicable to a typical installation; for that reason, they appear out of sequence. If the subject installation includes one of these options, the installer is advised to refer to this material first, noting how the installation steps for these options will affect the typical installation sequence. This document is organized as follows:

Section 1.0 Introductory material, installation practices, and pre-installation information.

Section 2.0 Installation information on components common to all installations: equipment cabinet, power supply, and common control cards.

Section 3.0 Installation information on components common to all system configurations. Covers possible card configurations and system cross-connect wiring.

Section 4.0 Installation information on voice applications and peripherals.

Section 5.0 Installation information on data communication applications and peripherals.

The primary component of the system is a wall-mounted equipment cabinet which measures 34 inches wide, 16 inches high, and 14.6 inches deep. This equipment cabinet houses all hardware including the power supply, common control cards, and battery back-up, which providing two weeks of data base protection in the event of a system power outage. The equipment cabinet has card slots which may contain specific voice or data interfaces depending on the installation configuration. Figure 1.1 is a system functional block diagram of peripherals and cards. Table 1.1 introduces abbreviations used in Figure 1.1 and throughout this document. The basic system consists of one equipment cabinet called the basic cabinet, and the expanded system, shown in Figure 1.2, consists of an additional equipment cabinet called the expansion cabinets.

Table 1.1 Abbreviations

ABBREVIATION	DESCRIPTION
BMEM	Basic Memory
4BWC	Central Office Bothway Trunk card
CDF	Combined Distribution Frame
4CHT	Character Trunk card
CO	Central Office Line
CPM	Central Processing Unit and Memory card
DIU	Data Interface Unit
4DMR	Dual Tone Multi-Frequency Receiver card
DTA	Data Terminal Adapter
DTI	Digital Telephone Interface
8DTC	Proprietary Digital Telephone card
DTMFR	DTMF Receiver
DSS/BLF	Direct Station Selection/Busy Lamp Field Console
8EKC	Electronic Key Telephone card
EKI	Proprietary Electronic Key Telephone Circuit
EKT	Proprietary Electronic Key Telephone
FX	Foreign Exchange Line
ICG	Interface Card Group
MEM	Memory card
MIX	Mixing Circuit
MODEM	Modulator/Demodulator
PABX	Private Automatic Branch Exchange
6PFE	Power Failure Transfer (Expanded) card
6PFT	Power Failure Transfer card
PMP	Portable Maintenance Panel
RGEN	Ring Generator
SCI	Serial Communication Interface
8SLC	Single-Line Telephone card
SLT	Single-Line Telephone
SMDR PRTR	Station Message Detail Recording Printer
SWC	Switch Control card
TIE	Tie Line
TONE	Tone Generator
2TTE	E&M Tie Trunk card
2TTL	Loop Dial Tie Trunk card
RVAC	Recorded Voice Announcement card
WATS	Wide Area Telephone Service Line
DID	Direct Inward Dialing trunks

The system is software-controlled and can be programmed to accommodate various features and configurations. The software includes an extensive diagnostic program which aids in troubleshooting the system. System features are categorized and updated through feature packages. This document covers Packages A, B, C, and D. A list of package features is as follows.

Package A

1.4.1 Package A includes the following features and capabilities:

- Reliable and efficient voice communications service
- Latest design and technology for integrating key and PABX systems
  - completely digital hybrid PABX system
  - multi-line electronic instrument support
  - single-line telephone support
- Full voice communications capabilities
  - standard voice features
  - enhanced business features
  - sophisticated least cost routing
- Operational flexibility
  - on-site or remote diagnostics
  - on-site or remote data base changes
- System software flexibility provides user control of requirements
- Tenant partitioning

Package B

1.4.2 Package B includes the following features and capabilities:

- Basic data switching capabilities
  - simultaneous voice/data transmission
  - asynchronous and synchronous up to 19.2 Kbps support
  - half and full duplex transmission mode
  - one-pair wiring
- System software flexibility
  - flexible configuration of system options
  - software control via an MCT (Master Control Telephone)
- Digital telephone set with soft key operation

- Telephone instruments *
- Ring generator (for use with single-line telephones)
- Power Failure Transfer cards 6PFT or 6PFE (if applicable)

* Wall-mounting kits for proprietary electronic key sets must be ordered separately.

Handling And Unpacking System Components

1.6 The following guidelines should be observed when unpacking and inspecting the system components.

1. Inspect all shipping container(s) for evidence of damage during shipment. If such evidence is found, advise the carrier and distributor.

2. Open the shipping container(s) and remove the contents.

3. Inspect the contents of the container(s) for any evidence of damage. If such evidence is found, advise the carrier and distributor.

4. Ensure that the back-up battery is installed in the battery compartment.

CAUTION

When removing the equipment cabinet from the container, place it on the floor on its back with the door facing up. DO NOT place any weight on the bottom of the cabinet. Damage to the connector board could result.

When handling cards, do not remove them from the anti-static bags until card installation. Cards should be handled by the extractor tabs to avoid damage to the edge connectors. Take normal precautions against electrostatic discharge to CMOS (Complementary Metal-Oxide Semiconductor) devices (anti-static spray, grounding, etc.).

Account for all system components before discarding packing materials.

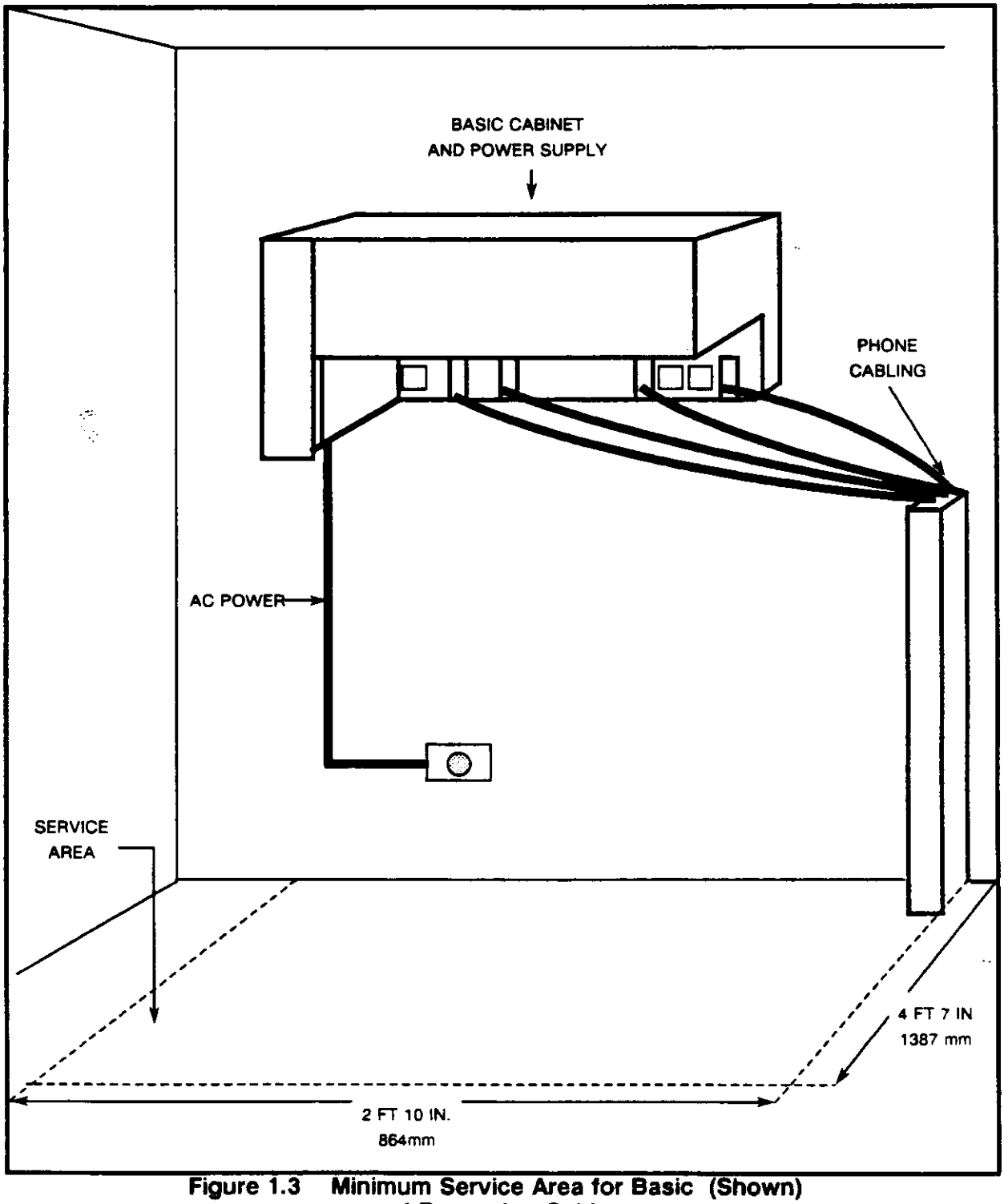


Figure 1.3 Minimum Service Area for Basic (Shown) and Expansion Cabinet

INSTALLATION OF EQUIPMENT CABINET(S), POWER SUPPLY(S), CABLING, AND COMMON CONTROL CARDS

2.0 This section contains installation information for system-level components common to all installations. These components include the equipment cabinets, power supply units, cabling, and common control cards. Separate installation procedures are presented for the basic (one-cabinet) system, and the expanded (two-cabinet) system. Complete section 2.1 below, then proceed to section 2.3 for the basic system. Complete section 2.1 below and section 2.2 before proceeding to section 2.3 for the expansion system.

Installation of Equipment Cabinet and Power Supply for the Basic System

2.1 This paragraph contains installation information for mounting the basic system equipment cabinet, installing the power supply, and grounding and wiring the basic cabinet.

Unpacking and Inspecting Equipment

2.1.1 Unpack, inspect, and verify shipment of the following components:

- Equipment cabinet with back-up battery (basic cabinet)
- Power supply unit with AC power cord
- Power cable (power supply to cabinet)
- Mounting bracket
- Screws for connector

The following mounting hardware is not shipped and must be obtained locally:

- Mounting bolts: expansion bolts, or No.10 bolts with insert sleeves, or No. 10 x 5/8 inch woodscrews (minimum size)

  NOTE: If an expanded system (two cabinets) is being installed, both cabinet brackets should be mounted at the same time. See section 2.2.

- Frame ground wire: 6AWG minimum

Mounting the Mounting Bracket

2.1.2 The mounting bracket is attached to the wall, and the equipment cabinet and power supply are mounted to the bracket. The following mounting procedure is recommended. Either expansion bolts or bolts and insert sleeves can be used. The bolts must be at least a No. 10 bolt; or, if the bracket is mounted on wood, the minimum size wood screw permitted is a No. 10 x 5/8 inch.

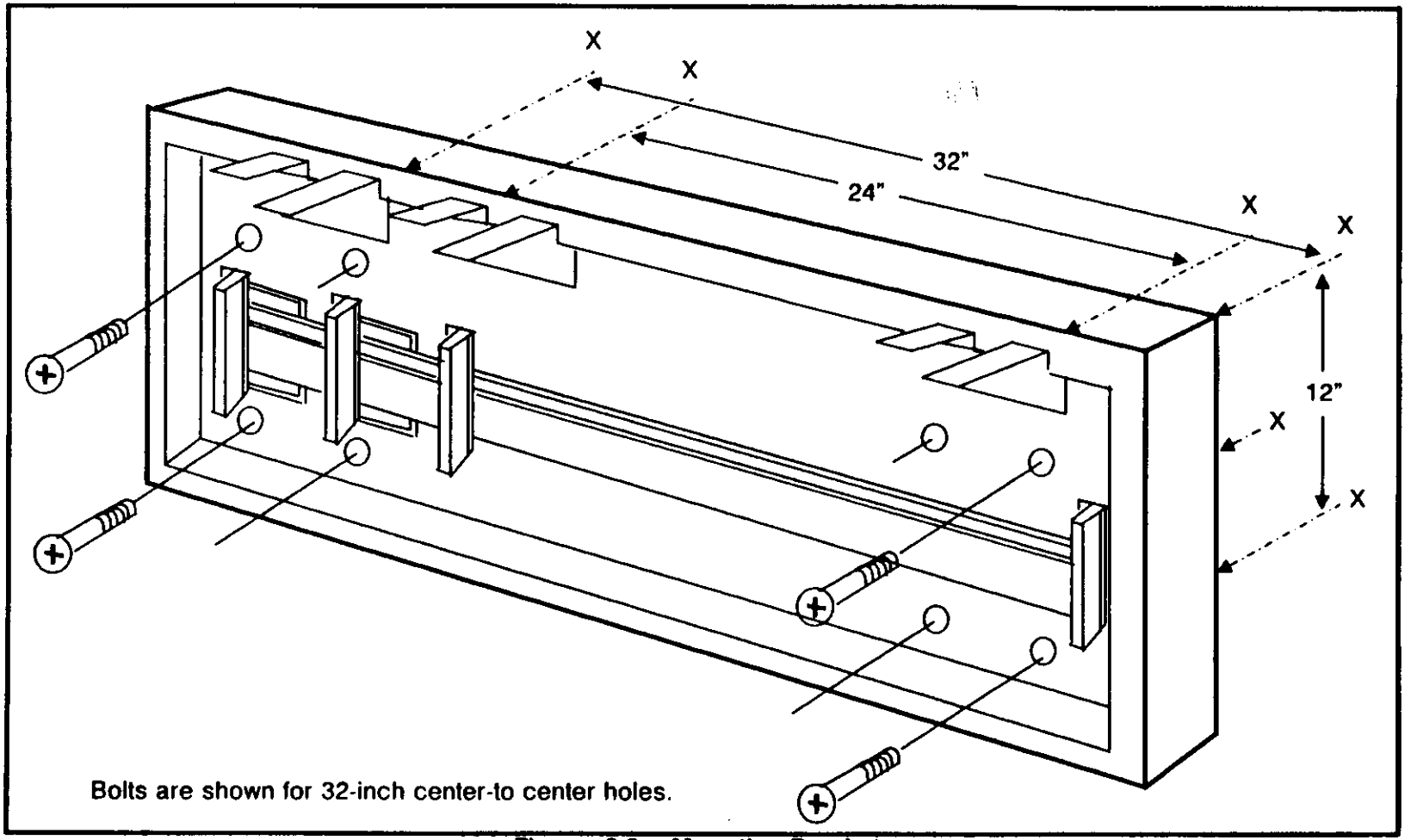


Figure 2.2 Mounting Bracket

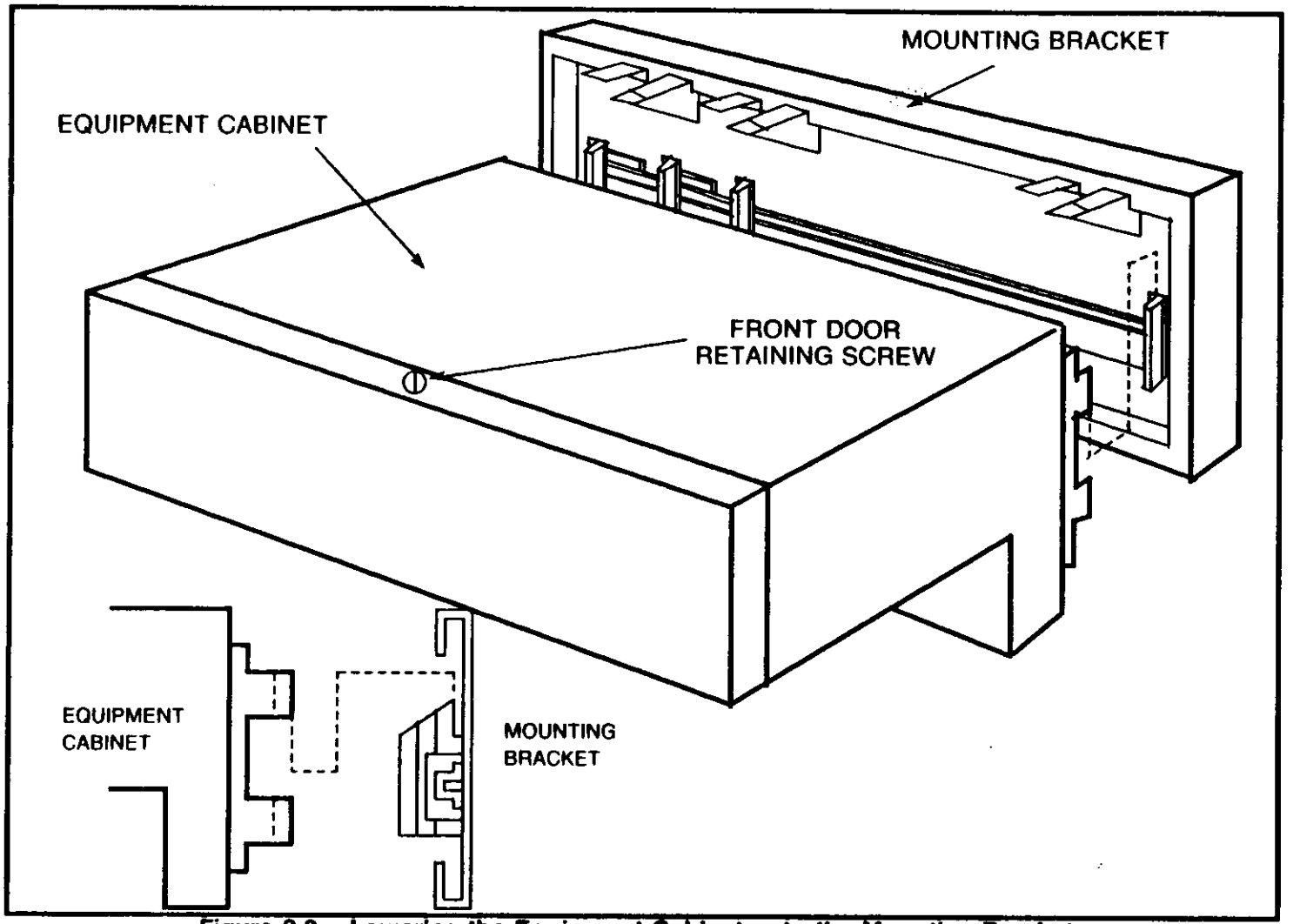


Figure 2.3 Lowering the Equipment Cabinet onto the Mounting Bracket

Mounting the Equipment Cabinet Power Supply Unit

2.1.4 The power supply unit can now be mounted in the equipment cabinet.

1. Lift the power supply unit and attach it to the left-hand side of the mounting bracket, lining up the mounting screws.

2. Use two bolts to attach the power supply unit to the mounting bracket; one is located on the top of the power supply unit, and the other is located on the bottom. Each bolt has a retaining washer.

Grounding the Basic System

2.1.5 The system requires three ground wires (see Figure 2.5): one for the equipment cabinet frame ground (safety ground); a second for the power supply unit frame ground; and a third for the equipment cabinet signal ground. The ground wires must be a minimum of 6AWG insulated copper.

CAUTION

DO NOT overtighten the ground connection for the frame ground terminal on the power supply. The connector could thread off in the power supply.

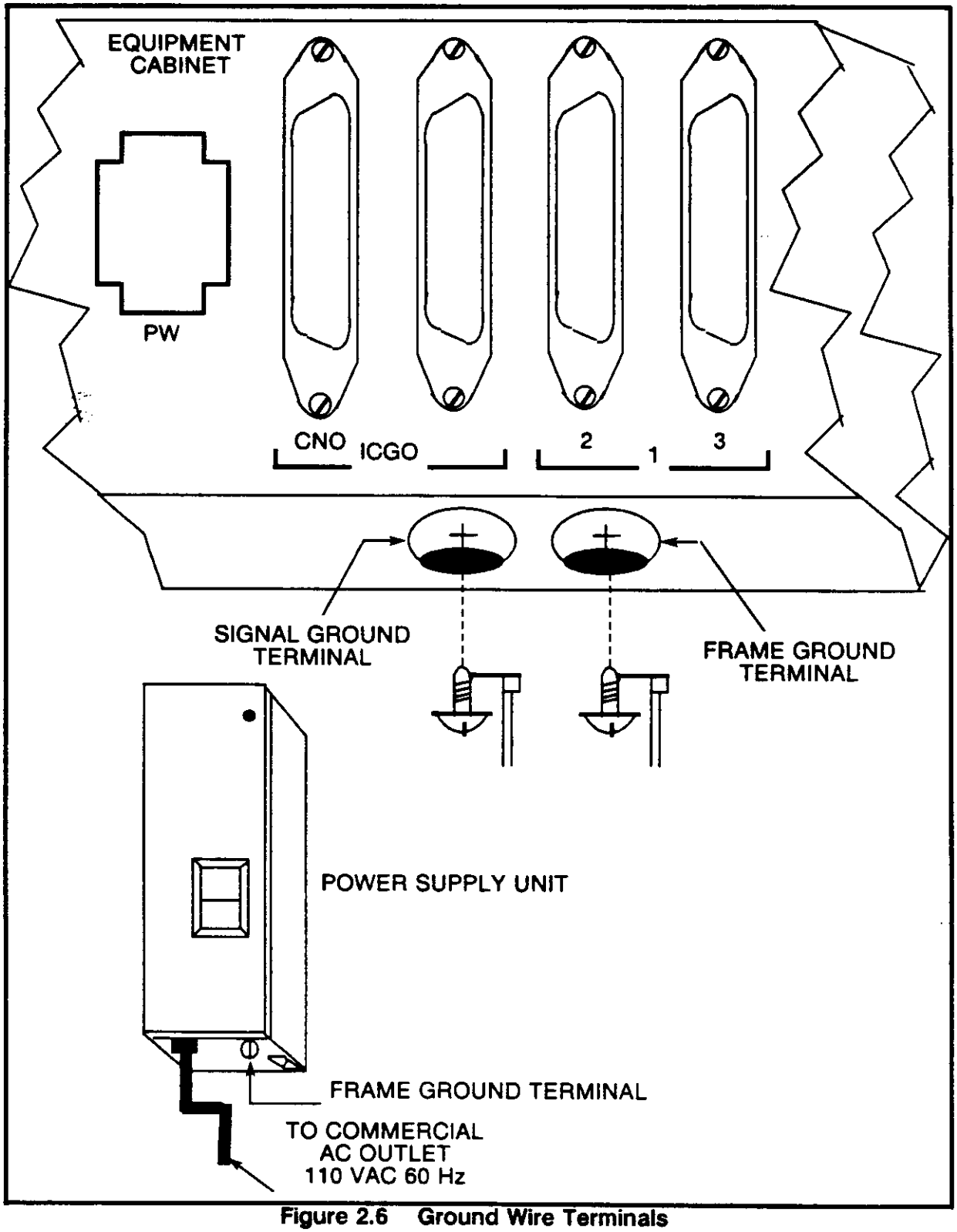


Figure 2.6 Ground Wire Terminals

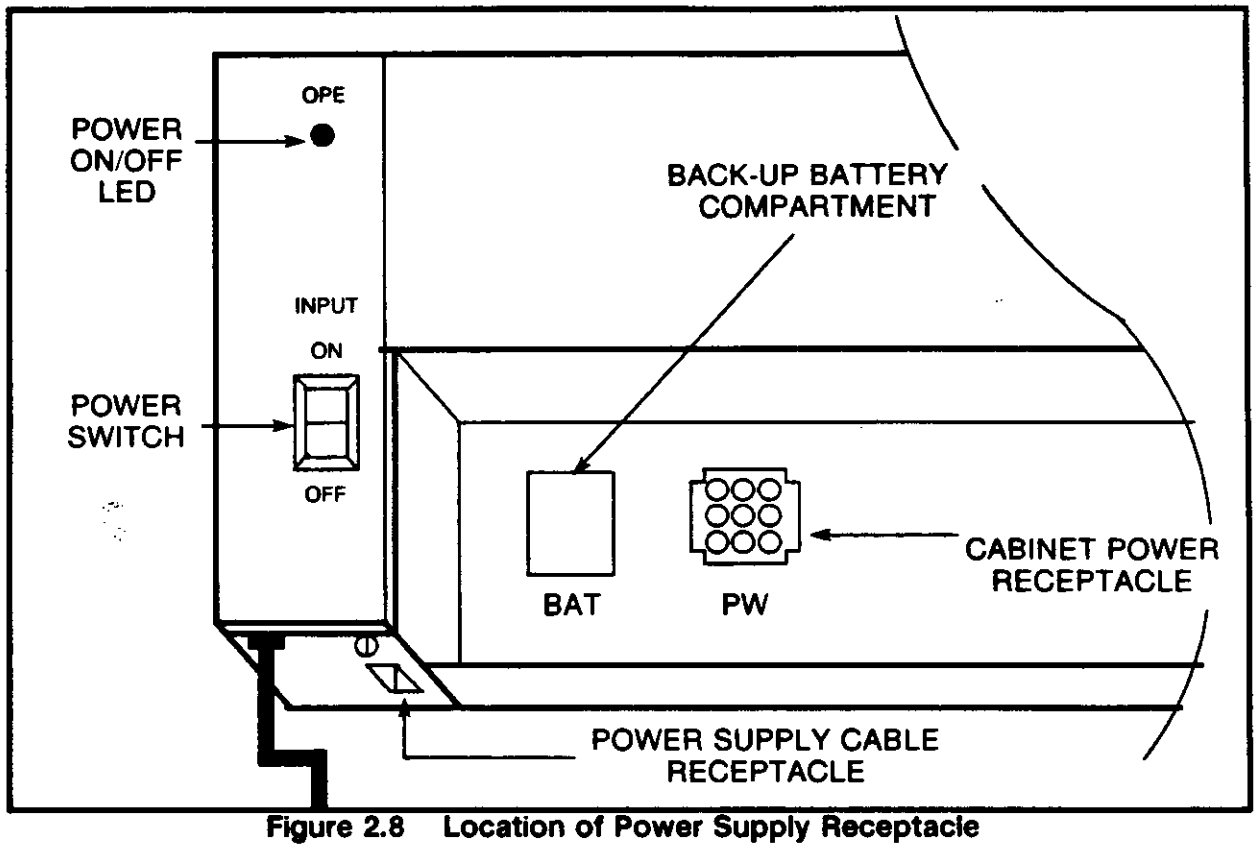


Figure 2.8 Location of Power Supply Receptacle

Battery Back-up of the Basic System

2.1.7 A back-up battery is provided to protect the data base in the event of a power failure. The range of charge required for data base protection is 2.1 to 3.6 VDC. As a safety feature, a battery alarm is provided by the alarm LED on the CPM card. The alarm LED (as well as the EKT alarm button or any remotely installed alarms) will light steadily when there is a potentially low battery charge.

Mounting the Expansion Cabinet Mounting Bracket

2.2.2 The mounting bracket for the expansion cabinet is mounted on the wall below the basic cabinet.

Drill Mounting Bolt Holes

2.2.2.1 Using the procedures and measurements from paragraph 2.1 drill a set of mounting bolt holes that will position the expansion cabinet mounting bracket below the basic cabinet bracket.

Mount the Mounting Bracket

2.2.2.2 The expansion cabinet mounting bracket is mounted identically to the basic cabinet bracket as described in paragraph 2.1.

Mounting the Expansion Cabinet

2.2.3 The expansion cabinet is attached to the mounting bracket in the identical manner as the basic cabinet as described in paragraph 2.1.

Mounting the Expansion Cabinet Power Supply Unit

2.2.4 The expansion cabinet power supply unit is attached to the mounting bracket in the identical manner as the basic cabinet power supply unit as described in paragraph 2.1.

Grounding the Expanded System

2.2.5 Grounding for the expanded system is similar to grounding for the basic system as described in paragraph 2.1, with the exception of additional inter-module connections as shown in Figure 2.9.

Power Cabling for the Expansion System

2.2.6 Power cabling for the expanded system is identical to power cabling for the basic system as described in paragraph 2.1, with the exception of additional inter-cabinet connections as shown in Figure 2.9 and described in paragraph 2.4.

Battery Back-up of the Expanded System

2.2.7 Since the expansion cabinet does not house processing and memory cards, a back-up battery is not required. Battery back-up for the expanded system is provided by the basic cabinet back-up battery.

CCG (Common Control Group) Installation for the Basic System

2.3 This paragraph describes the installation of CCG (Common Control Group) cards for the basic system. These cards perform the switching, call processing, and control functions. Guidelines for handling, inserting, seating/unseating, and removing cards are provided.

Handling, Inserting, Seating/Unseating, and Removing Cards

2.3.1 Each card has a plastic ejector lever on the top and bottom of the outside card edge. When the card is inserted into a card slot, the card type shows on the top ejector. All cards except RGEN have components facing left when in a slot. The CCG cards have a pin guide which prevents installation in line or trunk card slots.

Handling Cards

2.3.1.1 Handle the cards by the extractor tabs (do not touch the edge connectors).

Inserting/Seating Cards

2.3.1.2 Insert and seat the cards as follows:

1. Protect against electrostatic discharge. Wear a wrist strap clipped to ground.
2. Remove the card from the anti-static plastic bag.
3. Ensure proper orientation:
   (a) Card edge connectors face toward the backplane.
   (b) Card edges ride on tracks (top and bottom). Slot numbers are marked on the frame top, to the left of the slot. CCG card slots are marked on the frame bottom, to the left of the slot.
   (c) Card type imprint shows on the top ejector; components are on the left (except RGEN).
4. Slide the card into a slot and push in with gentle pressure until it stops.
5. Push simultaneously on the top and bottom ejector levers to seat the card in the backplane.

Unseating/Removing Cards

2.3.1.3 Unseat/remove cards as follows:

1. Protect against electrostatic discharge. Wear a wrist strap clipped to ground.
2. Grasp the top and bottom plastic ejectors.
3. Move the ejectors 90° with some pressure. Top ejector lifts up and toward ceiling; bottom ejector pulls down and toward the floor.

CPM Card Installation

2.3.2 The CPM (Central Processing Unit and Memory) card contains the CPU (Central Processing Unit), which performs system control supervision, and the basic memory which retains the program code. CPMs are labeled CPM-A, CPM-B, CPM-C, or CPM-D depending on the feature package level.

The CPM is installed in the basic cabinet by inserting it into card slot 20 labeled CPM as shown in Figure 2.11.

Hardware Compatibility

Prior to installing the CPM card and MEM (Memory) cards in the basic cabinet, the identification markings on both cards must be compared. The card name and package are stamped on the upper card tabs. The package ID must be the same for both cards; e.g., CPM-C card goes with an MEM-C card, CPM-B card goes with an MEM-B card. If these two cards do not have the same package ID, the system will not work. For Package C only, a hardware version cross-reference guide is necessary to further ensure compatibility of CPM-C and MEM-C cards. A hardware version cross-reference code is part of the bar code number located on the front edge of each card. In the following bar code number, the hardware cross-reference code is underlined:

Example: QC1608E6400977

See Table 2.1 for Package C hardware compatibility.

TABLE 2.1 Hardware Compatibility - Package C

HARDWARE VER. CPM-C	HARDWARE VER. MEM-C	SOFTWARE VER.	REMARKS
07D	07D	CO1 1.2	COMPATIBLE
08E	08E	CO1 1.3	COMPATIBLE
09F	08E	CO1 1.4	COMPATIBLE
10G 11G 12G 13G	10F 11F 12F	CO1 1.5	COMPATIBLE

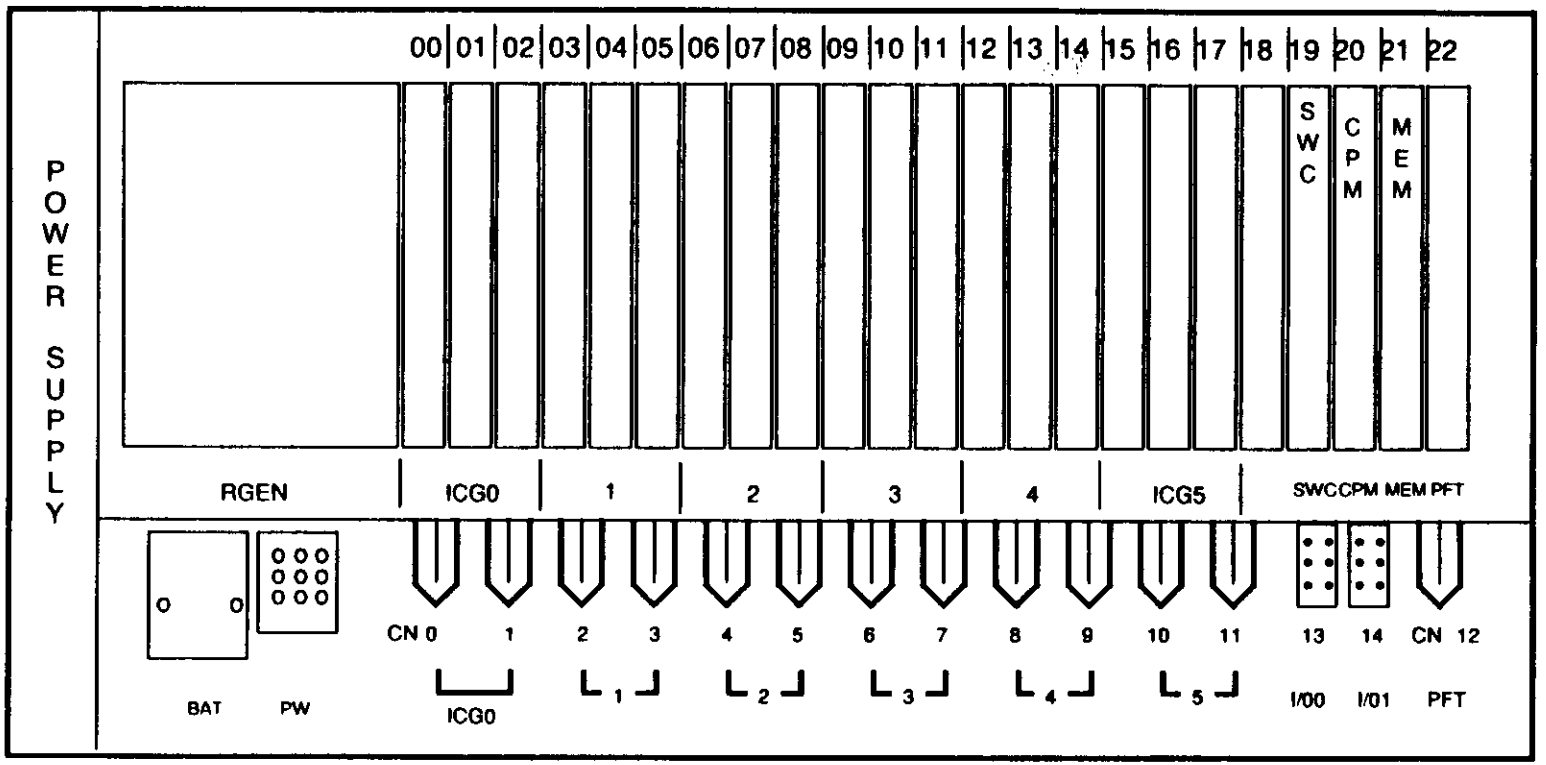


Figure 2.11 Placement of CCG (Common Control Group) Cards

2. Remove the frame screw located to the right of card slot 22. Slip the screw through the grounding lug and secure the screw to the frame.

3. Connect the cable to the female connector on the front edge of the SWB-A card.

4. Insert the cable end marked SWE through the slot in the expansion cabinet. The slot is on the underside of the cabinet door, to the right of card slot 20 location.

5. Remove the frame screw located to the right of card slot 22. Slip the screw through the grounding lug and secure the screw to the frame.

6. Connect the cable to the female connector on the front edge of the SWE card.

7. Secure any loose cable.

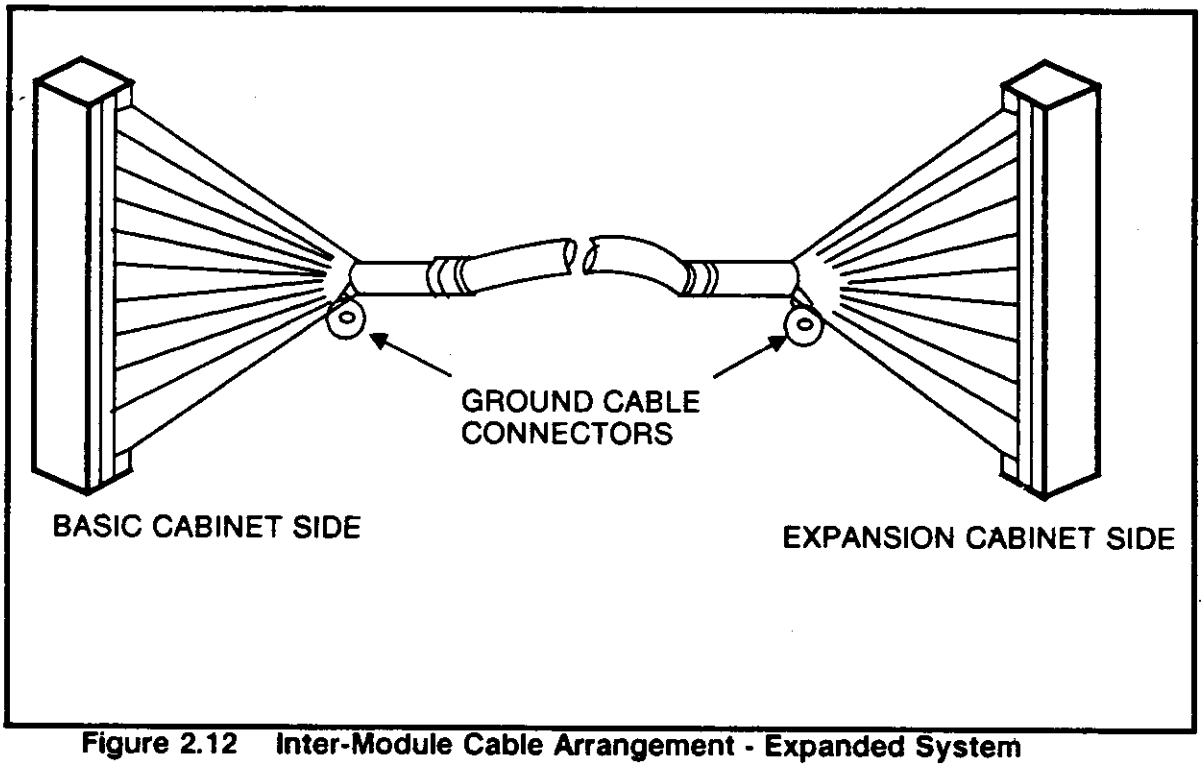


Figure 2.12 Inter-Module Cable Arrangement - Expanded System

DESCRIPTION OF SYSTEM CARDS, CARD PLACEMENT, AND CROSS-CONNECT WIRING

3.0 This section provides system-level information for configuring the system .

Included is information for configuring the basic and expanded system cabinets with specific line, trunk, and service function cards. Also included is the wiring description for the CDF (Combined Distribution Frame).

The section is provided as a reference for use with the Data Base and Configuration Worksheets that provide the installer with exact quantities and card slot locations for Common Control Group and application-specific cards.

Description of Application-Specific Cards

3.1 The system provides functional support of various user peripherals (station sets, data terminals, etc.) and trunks through a variety of interface (line and trunk) cards. Special service functions such as voice messaging are provided through service function cards. The following paragraphs identify the interface and service function cards and list their specifications and card slot locations.

Line Card Specifications

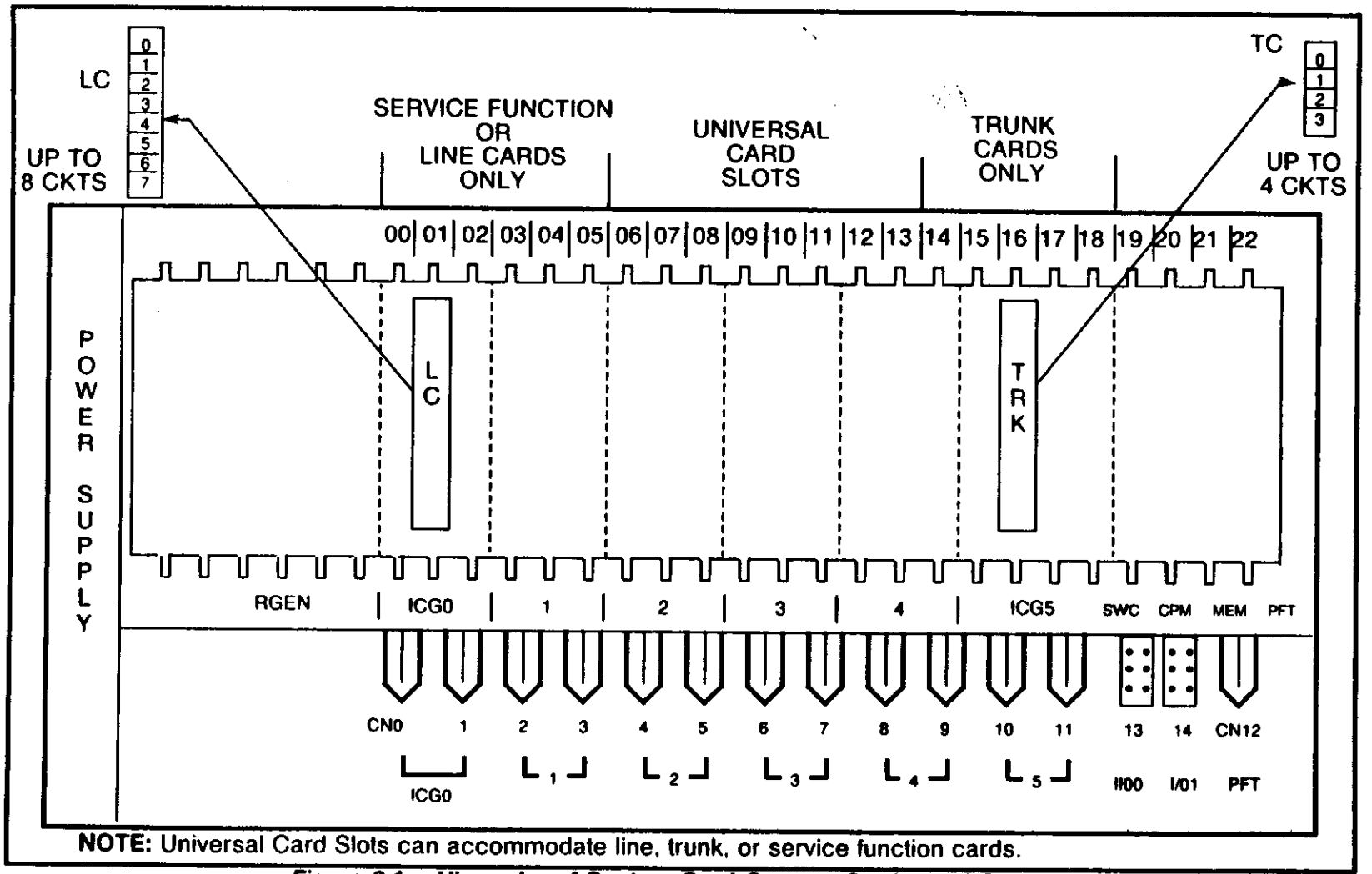
3.1.2 Table 3.2 describes the line cards and provides their electrical specifications.

Table 3.2 Line Card Specifications

CARD	SPECIFICATION	REMARKS
8SLC	Loop Limit - 600 ohms (including telephone) Line Leakage Resistance - 15K ohms Number of Circuits - 8	8 Circuits analog, standard telephone Interface, card slots 00-14
8EKC	Loop Limit - 2000 ft; 24 AWG Line Leakage Resistance - 15K ohms Wiring - 4 wires/EKT Number of Circuits - 8	8 Circuits for electronic proprietary terminals: (CS 10/20, Attendant Console, and DSS/BLF Console) interfaces, card slots 00-14
8DTC	Loop Limit - 2000 ft; 24 AWG Line Leakage Resistance - 15K ohms Wiring - 2 wires/CSD, DIU Number of Circuits - 8 (Note 1)	8 Circuits digital simultaneous voice/data, CSD Telephone/DIU Interfaces, card slots 00-14 for voice/data, card slots 00, 03, 06, 09, 12 for simultaneous voice/data

NOTE: The 8DTC card can accommodate the following configurations:

- 8 CSDs - voice only
- 8 DIUs
- 6 CSDs w/DTA in addition to two CSDs w/o DTA, or two DIUs



NOTE: Universal Card Slots can accommodate line, trunk, or service function cards.

Figure 3.1 Hierarchy of System Card Groups, Cards, and Cables

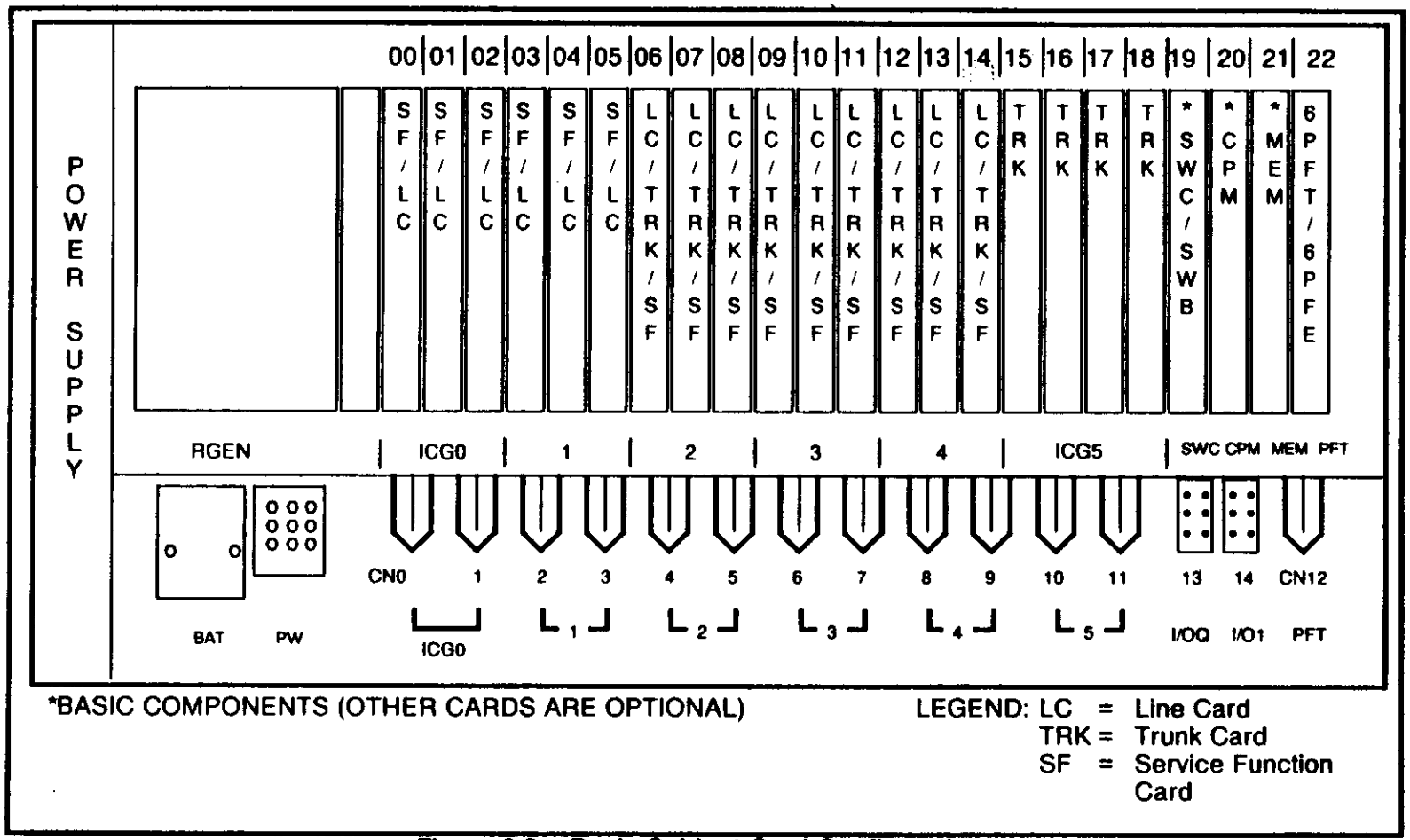


Figure 3.2 Basic Cabinet Card Configuration

Table 3.5 is a matrix that describes the application-specific cards that can be used in each slot of the basic cabinet.

Table 3.5 Basic Cabinet Card Configuration Matrix

Card Group	No. 0			No. 1			No. 2			No. 3			No. 4			No. 5			
Slot	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18
8EKC	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X				
8SLC	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X				
4DMR	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X				
8DTC	X*	X	X	X*	X	X	X*	X	X	X*	X	X	X*	X	X				
4CHT	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X				
RVAC	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X				
4BWC							X	X	X	X	X	X	X	X	X	X	X	X	X
2TTL/ 2TTE							X	X	X	X	X	X	X	X	X	X	X	X	X

* 6 CSD telephones with Data Terminal Adapters are available for this card slot location.

Table 3.6 is a matrix that describes the application-specific cards that can be used in each slot of the expansion cabinet. Note that 8EKC and 8DTC cards cannot be used in the expansion cabinet.

Table 3.6 Expansion Cabinet Card Configuration Matrix

Card Group	No. 0			No. 1			No. 2			No. 3			No. 4			No. 5			
Slot	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18
8SLC	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X				
4DMR	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X				
4CHT	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X				
RVAC	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X				
4BWC							X	X	X	X	X	X	X	X	X	X	X	X	X
2TTL/ 2TTE							X	X	X	X	X	X	X	X	X	X	X	X	X

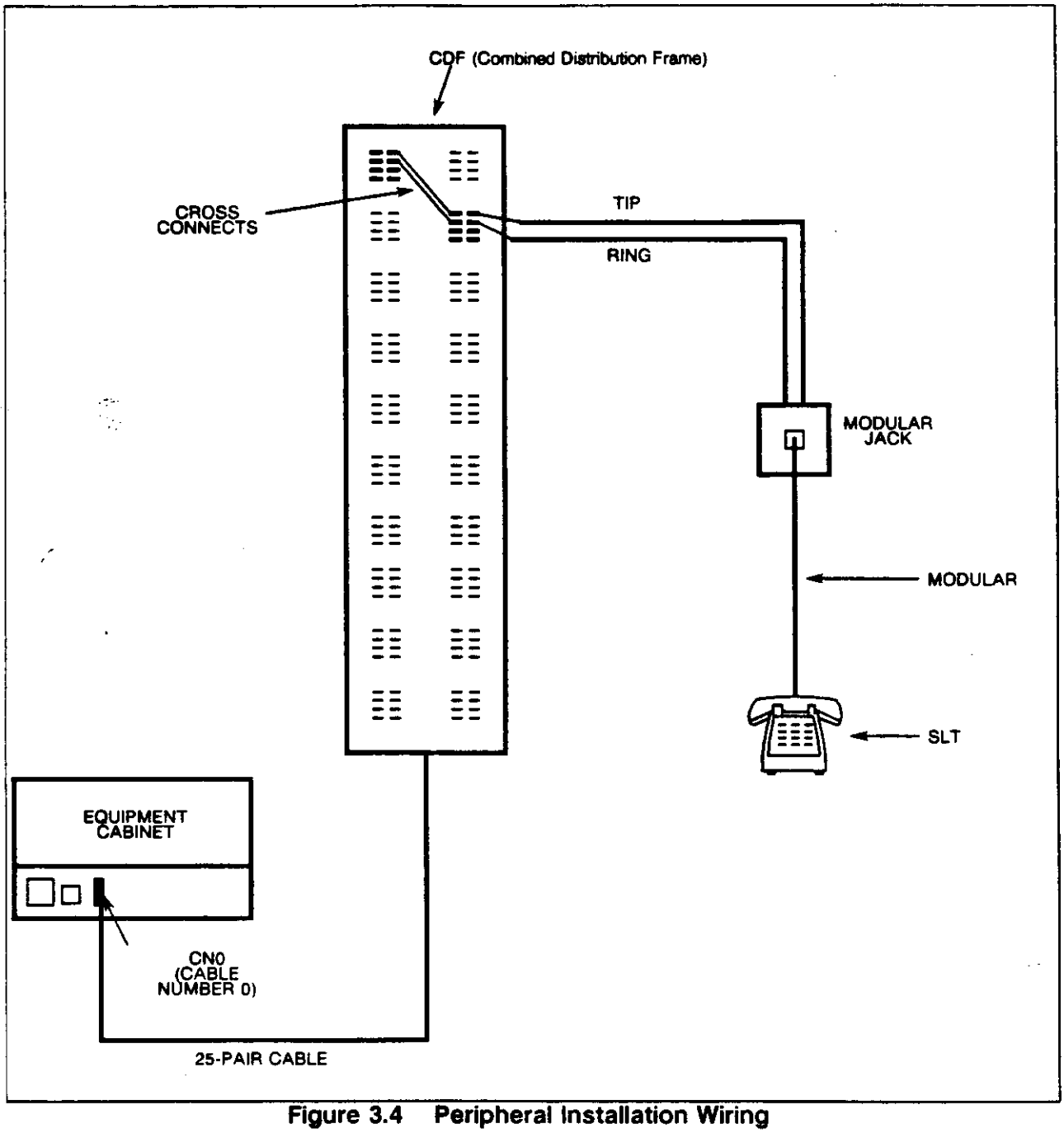


Figure 3.4 Peripheral Installation Wiring

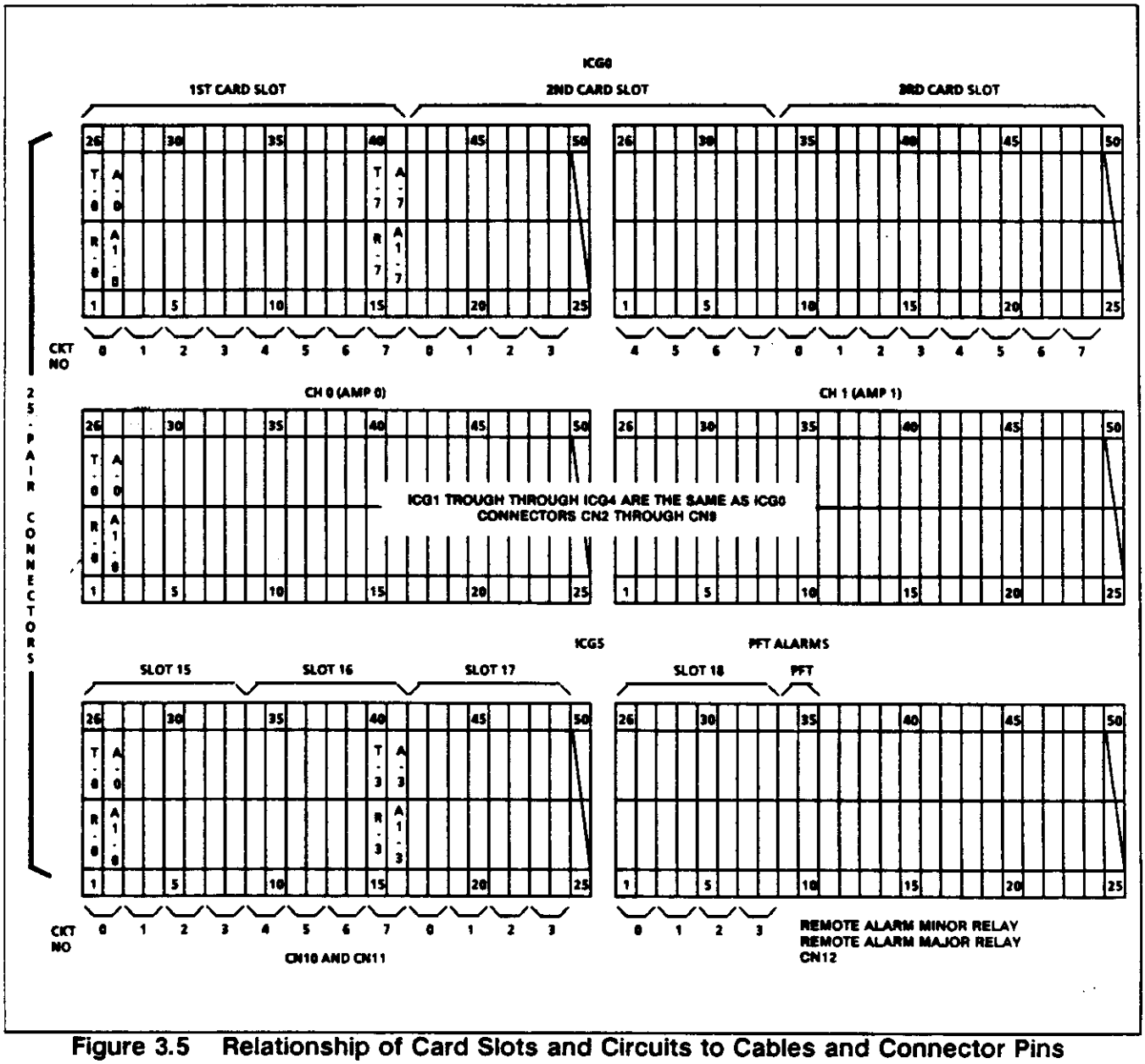


Figure 3.5 Relationship of Card Slots and Circuits to Cables and Connector Pins

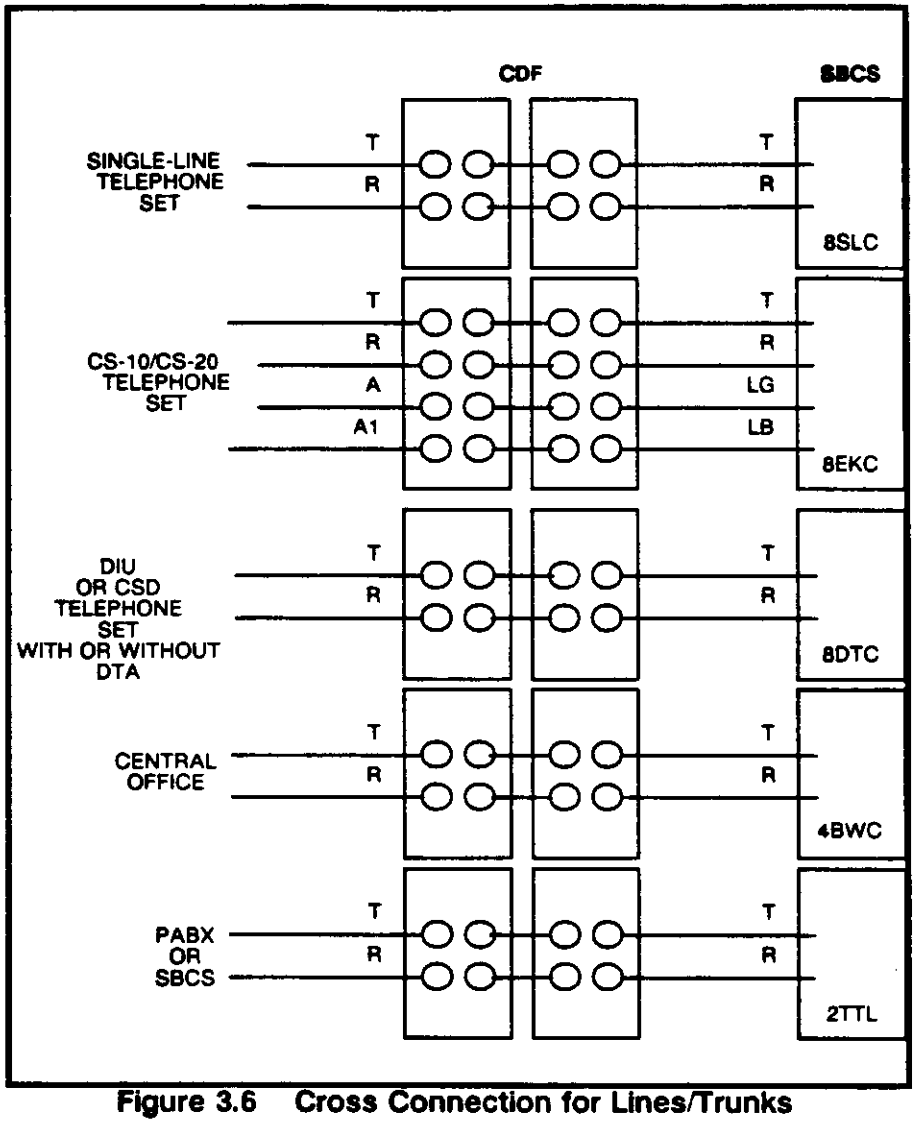


Figure 3.6 Cross Connection for Lines/Trunks

VOICE APPLICATION PERIPHERAL INSTALLATION

4.0 This section describes the installation of voice-related applications. Specifically, this section covers the installation of peripherals, cards, telephone company connections, etc., with analog interfaces. The voice application of the proprietary CSD digital telephone is described in this section. Data communications applications are covered in Section 5.0. This section is organized according to the following installation groupings:

- Service Function Cards. These cards provide voice-related service functions (e.g., ringing current) to the system installation.
- Line-Side Voice Card Applications. These installations include the station-side analog applications serviced by loop signaling cards which interconnect to end-user peripherals.
- Trunk-Side Voice Card Applications. These installations include the trunk-side analog applications serviced by bothway central office trunk, loop start, and E&M Tie trunk cards which interconnect to telephone company or common carrier facilities.

Voice Service Function Card Installation

4.1 This paragraph describes the installation of cards that provide service functions to voice applications. These cards are not mandatory, but depend on the specific configuration of the system as outlined by the data base and configuration worksheet package. Installation of the following cards is covered in detail:

- RGEN (Ring Generator)
- RVAC (Recorded Voice Announcement Card)
- 6PFT/6PFE (Power Failure Transfer/Expanded)
- 4DMR (Dual Tone Multi-Frequency Receiver)

RGEN Card Installation

4.1.1 The RGEN unit provides 80V rms AC ringing voltage to called stations or key systems associated with the basic or expansion cabinet. The RGEN provides four distinct ringing patterns corresponding to the service of a call. The RGEN provides -100 VDC to power the message waiting option and/or neon lamps on SLTs (Single-Line Telephones).

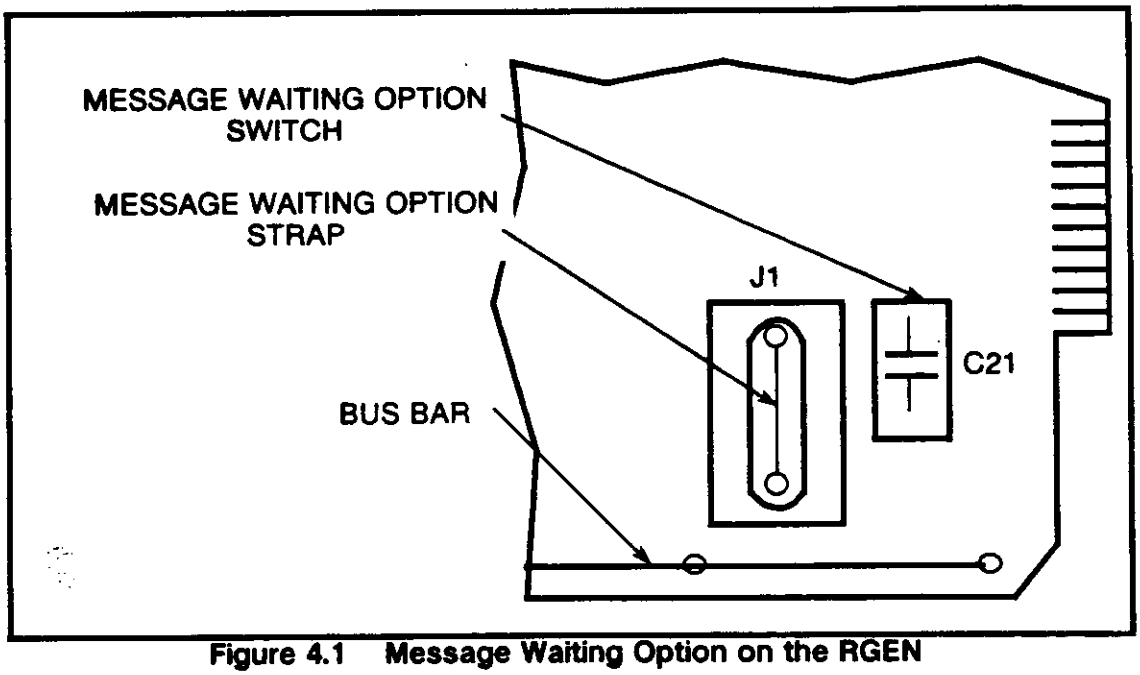


Figure 4.1 Message Waiting Option on the RGEN

Power Failure Transfer Card Installation

4.1.3 The 6PFT (Power Failure Transfer) card and 6PFE (Power Failure Transfer Expanded) card allow the direct connection of predetermined SLTs to outgoing telephone company lines during a power failure or call processing interruption. Up to six wire pairs can be served for a mix of stations/lines. The cards provide relay contact closures to signal minor or major alarms to external customer-provided devices.

The 6PFT card can only be used in the basic cabinet. The 6PFE card has a toggle switch which allows it to be used in either the basic or expansion cabinet. The expanded system requires 6PFE cards in both cabinets. The 6PFT card cannot be used in the expanded cabinet.

The station/line transfer function can be activated manually from the toggle switch on the front edge of the card. See Figure 4.2.

Table 4.1 is an event/result table which describes the basic/expansion cabinet conditions that result from power failures or activating the manual transfer switch.

6PFT/6PFE Cross-Connects

7. Cross connect the Telephone Company lines and CDF cable on the CDF. A typical installation is shown in Figure 4.4. Cross-connect information for the six circuits is provided in Table 4.2.

6PFT/6PFE Alarm Connections

8. If applicable, install external alarms.

   (a) Wire alarms to the CDF.
   (b) Cross connect per Figure 4.4 using information in Table 4.2.
   (c) Optional alarm cross connects are shown in Figure 4.4 for the basic system and Figure 4.5 for the expanded system. CDF cable information is provided in Table 4.2.

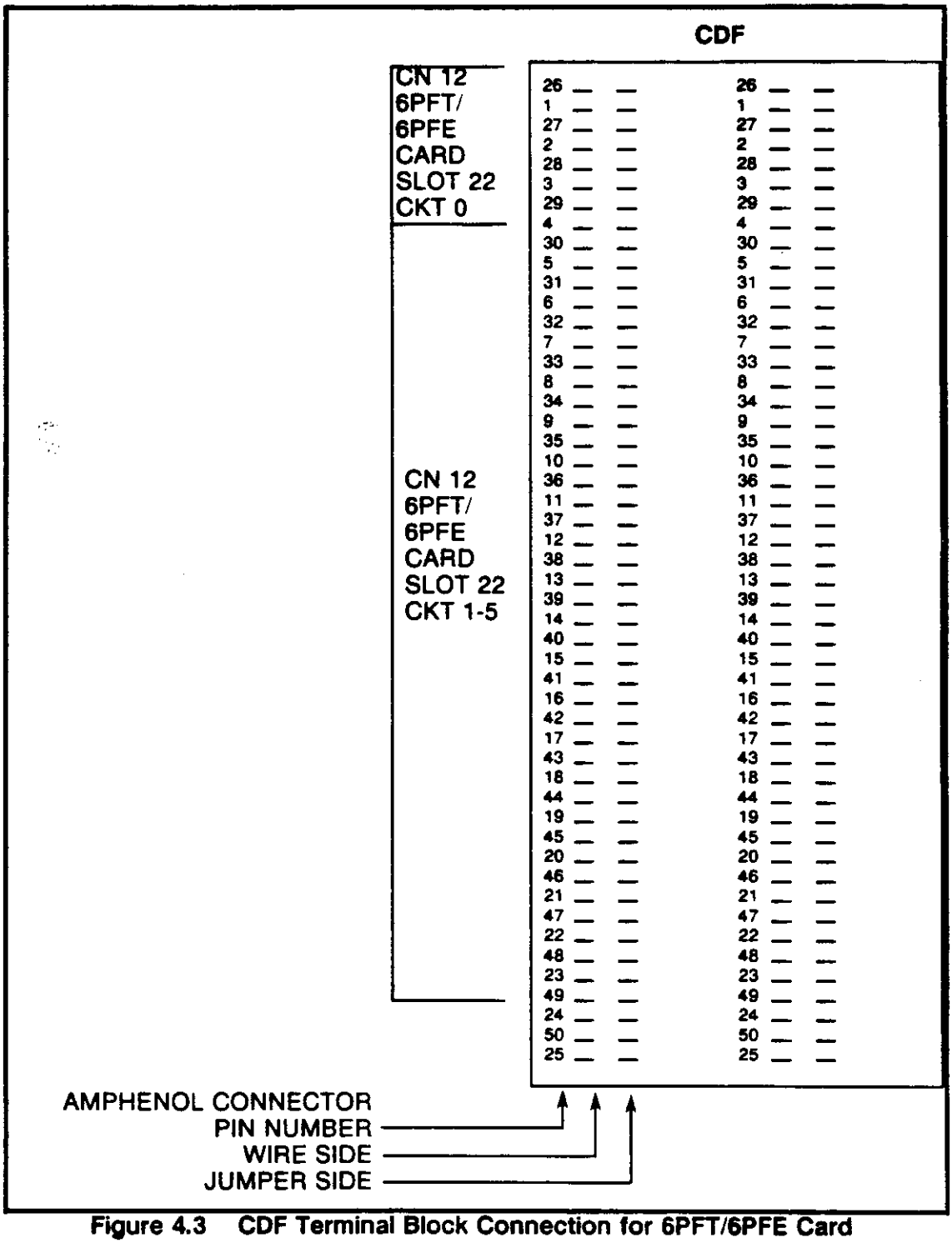


Figure 4.3 CDF Terminal Block Connection for 6PFT/6PFE Card

Table 4.2 CN 12 Power Failure Transfer Cross-Connect Data for Loop Trunk

AMP PIN NUMBER	SIGNAL NAME	CDF CABLE COLOR CODE	CIRCUIT NUMBER	CN0	CARD SLOT	DESTINATION
26	TCO	WHT-BLU	0	CN12	22	CO Line Tip
1	RCO	BLU-WHT		CN12	22	CO Line Ring
27	TTO	WHT-ORN		CN12	22	CO Trunk
2	RTO	ORN-WHT				CO Trunk
28	TSO	WHT-GRN				Telephone Set
3	RSO	GRN-WHT				Telephone Set
29	TLO	WHT-BRN				SBCS Line Ckt.
4	RLO	BRN-WHT				SBCS Line Ckt.
30	TC1	WHT-SL	1			↑
5	RC1	SL-WHT				
31	TT1	RED-BLU				Same
6	RT1	BLU-RED				as
32	TS1	RED-ORN				Circuit
7	RS1	ORN-RED				0
33	TL1	RED-GRN				
8	RL1	GRN-RED				↓
34	TC2	RED-BRN	2	CN12	22	↑
9	RC2	BRN-RED				
35	TT2	RED-SL				
10	RT2	SL-RED				
36	TS2	BLK-BLU				
11	RS2	BLU-BLK				
37	TL2	BLK-ORN				Same
12	RL2	ORN-BLK				as
38	TC3	BLK-GRN	3	CN12	22	Circuit
13	RC3	GRN-BLK				0
39	TT3	BLK-BRN				
14	RT3	BRN-BLK				
40	TS3	BLK-SL				
15	RS3	SL-BLK				
41	TL3	YEL-BLU				
16	RL3	BLU-YEL				↓
42	TC4	YEL-ORN	4			↑
17	RC4	ORN-YEL				
43	TT4	YEL-GRN				
18	RT4	GRN-YEL				
44	TS4	YEL-BRN				
19	RS4	BRN-YEL				
45	TL4	YEL-SL				Same
20	RL4	SL-YEL				as
46	TC5	VIO-BLU	5			Circuit
21	RC5	BLU-VIO				0
47	TT5	VIO-ORN				
22	RT5	ORN-VIO				
48	TS5	VIO-GRN				
23	RS5	GRN-VIO				
49	TL5	VIO-BRN				
24	RL5	BRN-VIO				↓

4DMR (Dual Tone Multifrequency Receiver)

The 4DMR (Dual Tone Multi-frequency Receiver) card provides DTMF receiver service for up to four simultaneous circuits.The 4DMR card converts dual tone multi-frequency signals into digital signals required by the system microprocessor.

4DMR Installation

Insert the 4DMR card(s) in slots 00 through 14 (maximum two cards per system) preferably between line and trunk card locations per data base and configuration worksheets.

Line (Station) Voice Application Installation

4.2 This paragraph describes the installation of line cards in the system. Line cards interface station sets to the system. The system utilizes three different line cards: the 8SLC (Single-Line Telephone Card), the 8EKC (Electronic Key Telephone Card), and the 8DTC (Digital Telephone Card). These cards are the system interface for both voice and data stations. The 8SLC card supports single-line telephones and analog dial-up modems etc. The 8EKC card supports EKTs (Electronic Key Telephones), CS-10s, CS-20s, Attendant Consoles and the DSS/BLF (Direct Station Selection/Busy Lamp Field) Consoles. The 8DTC card supports digital telephones, the CSD, and/or CSDs with DTAs (Data Terminal Adapters) and DIUs (Data Interface Units).

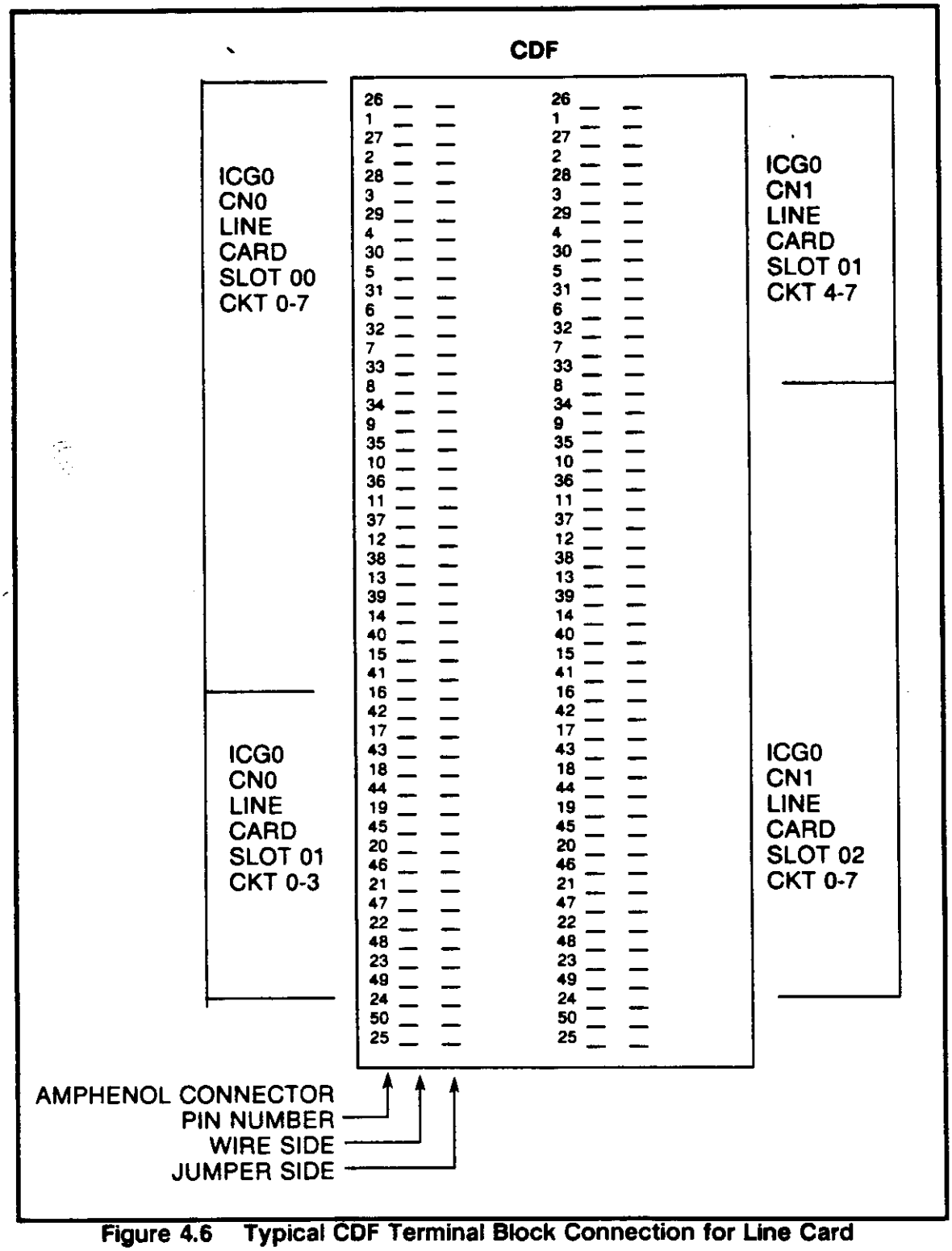


Figure 4.6 Typical CDF Terminal Block Connection for Line Card

Table 4.3 CN 0, 2, 4, 6, and 8 Cross-Connect Data for Line Circuits

AMP PIN NUMBER	SIGNAL NAME	CDF CABLE COLOR CODE	CIRCUIT NUMBER	CABLE/ CARD SLOT	8SLC/8DTC #LEAD NAME	8EKC LEAD NAME
26	T0	WHT-BLU	0		TIP 0	T0
1	R0	BLU-WHT			RING 0	R0
27	A0	WHT-ORN			---	LG0
2	A10	ORN-WHT			---	LB0
28	T1	WHT-GRN	1		TIP 1	T1
3	R1	GRN-WHT			RING 1	R1
29	A1	WHT-BRN		CN0/(00)	---	LG1
4	A11	BRN-WHT		CN2/(03)	---	LB1
30	T2	WHT-SL	2	CN4/(06)	TIP 2	T2
5	R2	SL-WHT		CN6/(09)	RING 2	R2
31	A2	RED-BLU		CN8/(12)	---	LG2
6	A12	BLU-RED			---	LB2
32	T3	RED-ORN	3		TIP 3	T3
7	R3	ORN-RED			RING 3	R3
33	A3	RED-GRN			---	LG3
8	A13	GRN-RED			---	LB3
34	T4	RED-BRN	4		TIP 4	T4
9	R4	BRN-RED			RING 4	R4
35	A4	RED-SL			---	LG4
10	A14	SL-RED			---	LB4
36	T5	BLK-BLU	5		TIP 5	T5
11	R5	BLU-BLK			RING 5	R5
37	A5	BLK-ORN		CN0/(00)	---	LG5
12	A15	ORN-BLK		CN2/(03)	---	LB5
38	T6	BLK-GRN	6	CN4/(06)	TIP 6	T6
13	R6	GRN-BLK		CN6/(09)	RING 6	R6
39	A6	BLK-BRN		CN8/(12)	---	LG6
14	A16	BRN-BLK			---	LB6
40	T7	BLK-SL	7		TIP 7	T7
15	R7	SL-BLK			RING 7	R7
41	A7	YEL-BLU			---	LG7
16	A17	BLU-YEL			---	LB7
42	T0	YEL-ORN	0		TIP 0	T0
17	R0	ORN-YEL			RING 0	R0
43	A0	YEL-GRN			---	LG0
18	A10	GRN-YEL			---	LB0
44	T1	YEL-BRN	1		TIP 1	T1
19	R1	BRN-YEL			RING 1	R1
45	A1	YEL-SL		CN0/(01)	---	LG1
20	A11	SL-YEL		CN4/(04)	---	LB1
46	T2	VIO-BLU	2	CN6/(07)	TIP 2	T2
21	R2	BLU-VIO		CN6/(10)	RING 2	R2
47	A2	VIO-ORN		CN8/(13)	---	LG2
22	A12	ORN-VIO			---	LB2
48	T3	VIO-GRN	3		TIP 3	T3
23	R3	GRN-VIO			RING 3	R3
49	A3	VIO-BRN			---	LG3
24	A13	BRN-VIO			---	LB3

8EKC Card Applications

4.2.2 The 8EKC card provides system interface for CS-10s, CS-20s, Attendant Consoles, and DSS/BLF (Direct Station Selection/Busy Lamp Field) peripherals.

8EKC Installation

8EKC cards and peripherals are installed as follows:

1. Install modular station lines on the CDF and run to the location of the peripheral(s).

   (a) CS-10 or CS-20 EKTs require four-wire 24 AWG cables with a 2000 foot maximum run.

   (b) The Attendant Console can be installed with four-wire 24 AWG cable up to 300 feet from the equipment cabinet using one port on the 8EKC card. If more distance is required, an additional wire pair using an additional card port for power must be used with a six-wire 24AWG cable for a maximum distance of 2000 feet. See Figure 4.10 for Attendant Console cross connections to the CDF.

   (c) Install appropriate four-pin or six-pin modular jacks.

8EKC CS-10/CS-20 Peripherals

2. Install the proprietary CS-10 or CS-20 four-wire EKT. If the EKT is to be wall mounted:

   (a) Attach the wall-mounted metal base to the wall. There are two screw locations as shown in Figure 4.8.

   (b) Place the telephone set on the wall-mounted metal base as shown in Figure 4.8.

   (c) Install the handset hook as shown in Figure 4.8.

8EKC Attendant Console Peripheral

The Attendant Console is available in Packages C and D.

3. Install the Attendant Console with appropriate four of six-pin or six of six pin modular line connector.

8EKC DSS/BLF Peripheral

The DSS/BLF requires a separate line circuit.

The DSS/BLF can be installed in any EKC circuit, but will automatically have a default value only if it is installed in an odd number circuit in card slot 01, paired with an EKT in the next lower even-numbered circuit. The values for all DSS/BLF Consoles can be assigned using CMC commands.

Example: The DSS/BLF is installed in circuit number 01 of card slot 01. The DSS/BLF is paired with the EKT installed in circuit number 00 of card slot 01. The DSS/BLF will assume the default values of the EKT in circuit number 00. The DSS/BLF normally requires two wire pairs. When this configuration is used, the tip and ring wire pair may be omitted. The default feature is auto intercom.

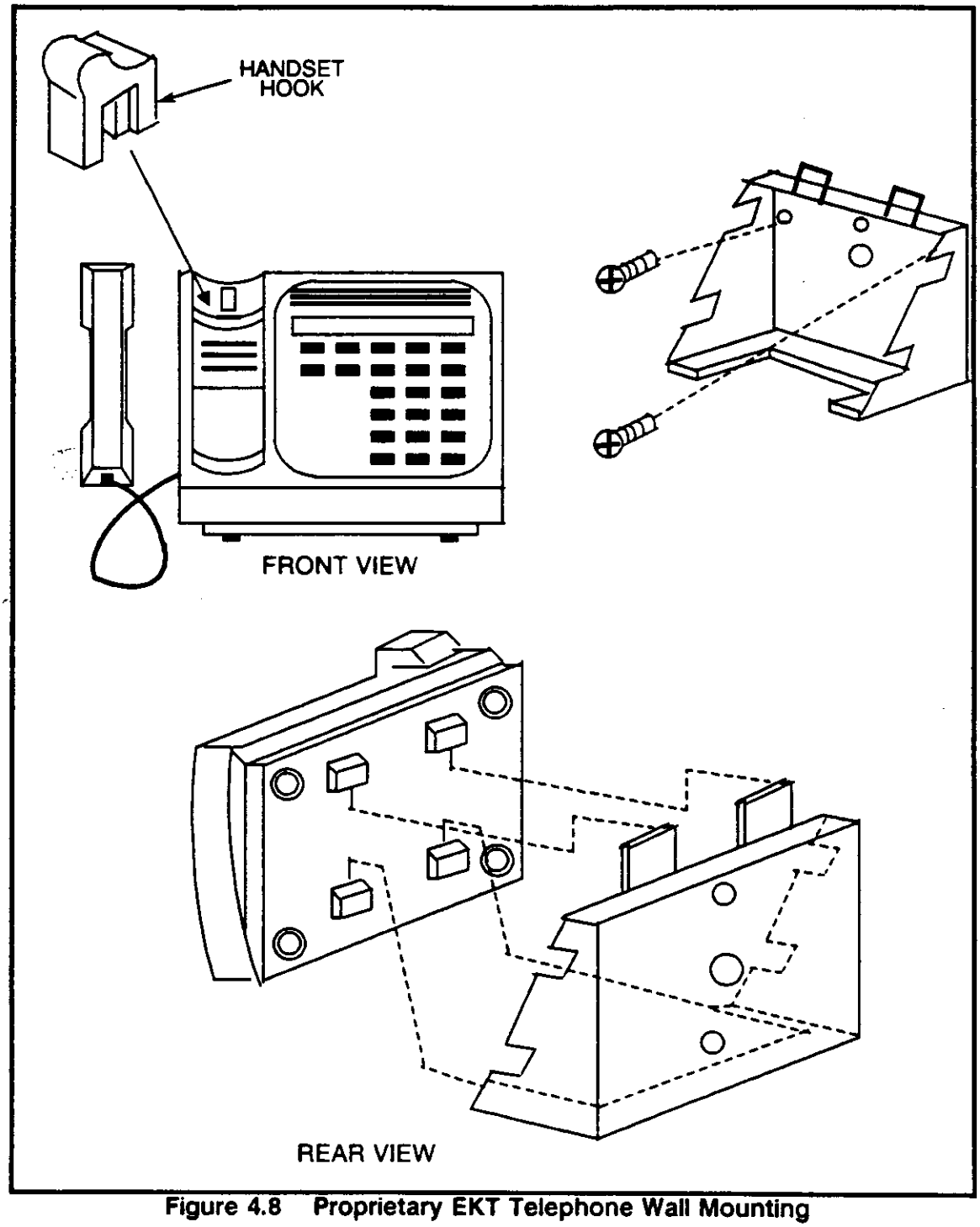


Figure 4.8 Proprietary EKT Telephone Wall Mounting

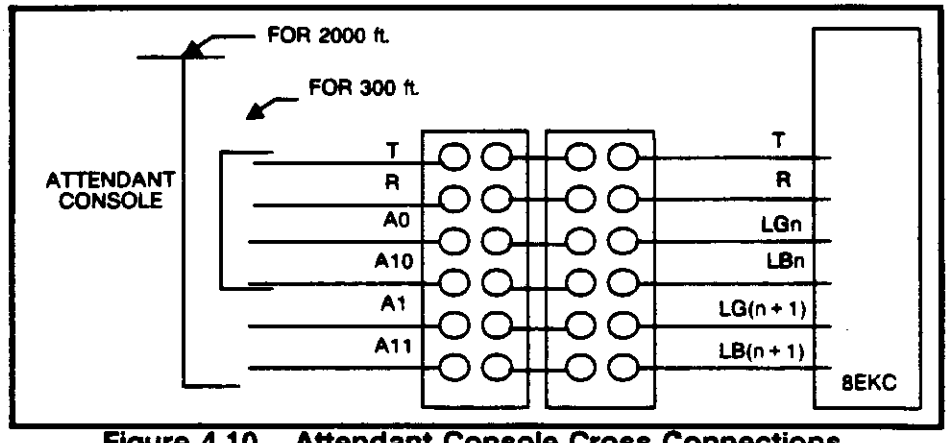


Figure 4.10 Attendant Console Cross Connections

8DTC Card Applications

4.2.3 The 8DTC provides system interface for CSDs (Digital Telephones), CSDs with DTAs (Data Terminal Adapters), and DIUs (Digital Interface Units). The 8DTC supports both voice and digital data communications (see section 5.0) over a single-wire pair.

8DTC Installation

8DTC cards and peripherals are installed as follows:

1. Wire the station cable onto the CDF, run the wire to the peripheral location, and install the modular jacks.
2. If a DTA is to be installed in the CSD, see paragraph 5.1.1, CSD/DTA Installation.
3. Insert 8DTC card(s) in slots 00 through 14 of the basic cabinet (10 cards maximum).
4. Connect the CDF cable to the cabinet and label/run to the CDF. Terminal block information is provided in Figure 4.6.
5. Cross connect the lines on the CDF. A typical example is shown in Figure 4.7. Cross-connect information is provided in Table 4.3 for CDF cables 0, 2, 4, 6, and 8; and Table 4.4 for CDF cables 1, 3, 5, 7, and 9.

Trunk (Central Office) Side Voice Application Installation

4.3 This paragraph describes the installation of trunk applications using analog interfaces. These applications generally interconnect the system with PABXs and central office trunk connections using loop and E&M type signaling.

Specifically, this paragraph covers applications serviced by the following cards:

- 4BWC (Central Office Bothway Trunk) card
- 2TTE (E&M Tie Trunk) card
- 2TTL (Loop Dial Tie Trunk) card

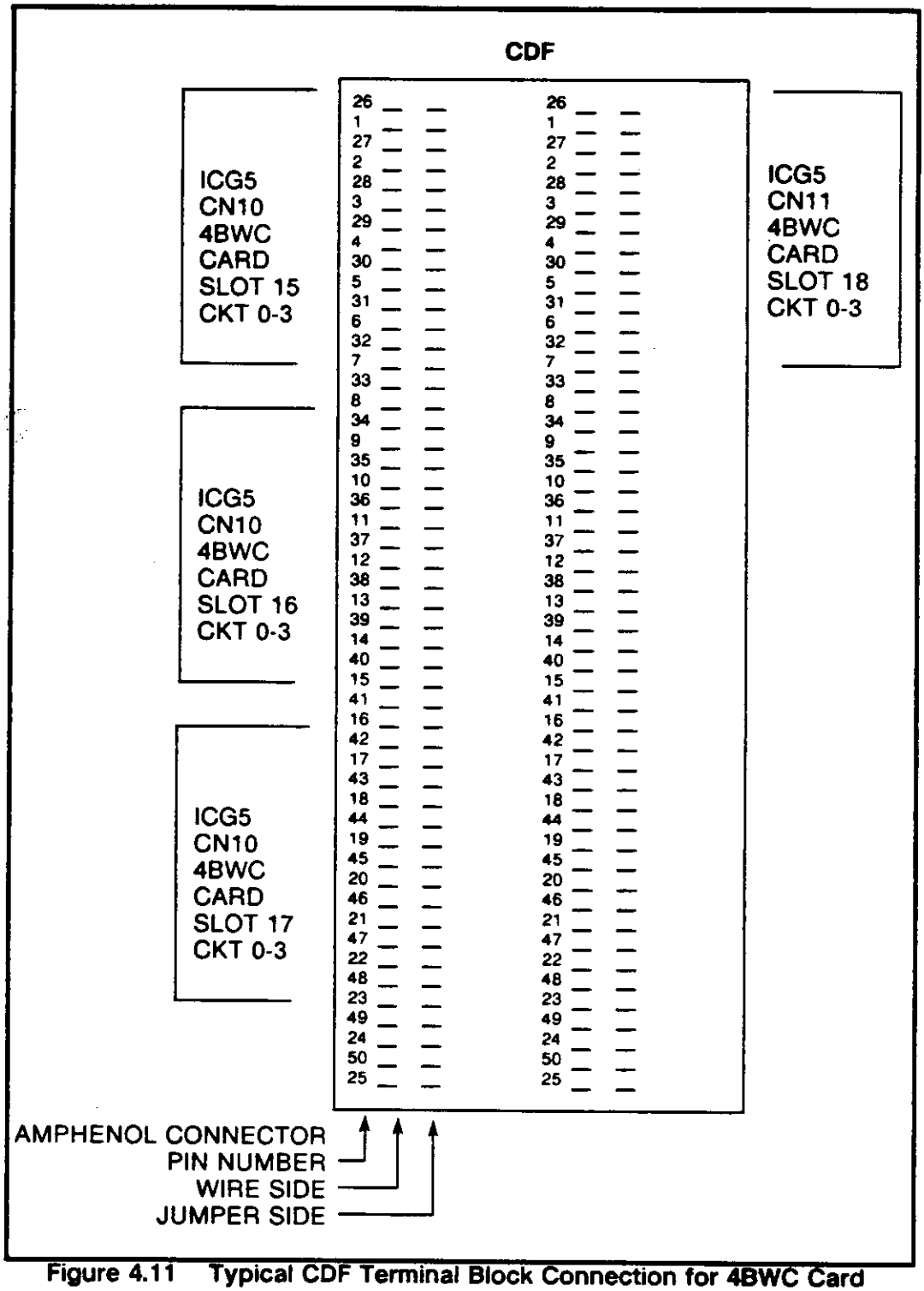


Figure 4.11 Typical CDF Terminal Block Connection for 4BWC Card

Table 4.6 CN 5, 7, and 9 Cross-Connect Data for 2-Wire E&M Trunks and Loop Trunks

AMP PIN NUMBER	SIGNAL NAME	CDF CABLE COLOR CODE	CABLE/ CARD SLOT #	2-Way Loop Trunk* 4BWC LEAD NAME	2-Way Loop Trunk* 2TTL LEAD NAME	E&M 2-Wire Trunk** 2TTE LEAD NAME
26	T4	WHT-BLU		---	---	---
1	R4	BLU-WHT		---	---	---
27	A4	WHT-ORN		---	---	---
2	A14	ORN-WHT		---	---	---
28	T5	WHT-GRN		---	---	---
3	R5	GRN-WHT		---	---	---
29	A5	WHT-BRN	CN5/(07)	---	---	---
4	A15	BRN-WHT	CN7/(10)	---	---	---
30	T6	WHT-SL	CN9/(13)	---	---	---
5	R6	SL-WHT		---	---	---
31	A6	RED-BLU		---	---	---
6	A16	BLU-RED		---	---	---
32	T7	RED-ORN		---	---	---
7	R7	ORN-RED		---	---	---
33	A7	RED-GRN		---	---	---
8	A17	GRN-RED		---	---	---
34	T0	RED-BRN		TIP 0	TIP 0	T0
9	R0	BRN-RED		RING 0	RING 0	R0
35	A0	RED-SL		---	---	MI0
10	A10	SL-RED		---	---	E0
36	T1	BLK-BLU		TIP 1	TIP 1	SG0
11	R1	BLU-BLK		RING 1	RING 1	E0
37	A1	BLK-ORN	CN5/(08)	---	---	MI10
12	A11	ORN-BLK	CN7/(11)	---	---	SB0
38	T2	BLK-GRN	CN9/(14)	TIP 2	---	T1
13	R2	GRN-BLK		RING 2	---	R1
39	A2	BLK-BRN		---	---	MI1
14	A12	BRN-BLK		---	---	E1
40	T3	BLK-SL		TIP 3	---	SG1
15	R3	SL-BLK		RING 3	---	E1
41	A3	YEL-BLU		---	---	MI11
16	A13	BLU-YEL		---	---	SB1
42	T4	YEL-ORN		---	---	---
17	R4	ORN-YEL		---	---	---
43	A4	YEL-GRN		---	---	---
18	A14	GRN-YEL		---	---	---
44	T5	YEL-BRN		---	---	---
19	R5	BRN-YEL		---	---	---
45	A5	YEL-SL	CN5/(08)	---	---	---
20	A15	SL-YEL	CN7/(11)	---	---	---
46	T6	VIO-BLU	CN9/(14)	---	---	---
21	R6	BLU-VIO		---	---	---
47	A6	VIO-ORN		---	---	---
22	A16	ORN-VIO		---	---	---
48	T7	VIO-GRN		---	---	---
23	R7	GRN-VIO		---	---	---
49	A7	VIO-BRN		---	---	---
24	A17	BRN-VIO		---	---	---

* Line and trunk number designations agree with data base entries.
** Both E&M Type I and Type II trunks are listed in this column.

Table 4.8 CN 11 Cross-Connect Data for 2-Wire E&M Trunks, Loop Trunks, and 6PFT/6PFE Cards (Basic and Expanded)

AMP PIN NUMBER	SIGNAL NAME	CDF CABLE COLOR CODE	CABLE/ CARD SLOT #	2-Way Loop Trunk* 4BWC LEAD NAME	2TTL LEAD NAME	E&M 2-Wire Trunk** 2TTE LEAD NAME
26	T0	WHT-BLU	▲	TIP 0	TIP 0	T0
1	R0	BLU-WHT		RING 0	RING 0	R0
27	A0	WHT-ORN		—	—	M10
2	A10	ORN-WHT		—	—	E0
28	T1	WHT-GRN		TIP 1	TIP 1	SG0
3	R1	GRN-WHT		RING 1	RING 1	E0
29	A1	WHT-BRN		—	—	MI10
4	A11	BRN-WHT		—	—	SB0
30	T2	WHT-SL	CN11/(18)	TIP 2	—	T1
5	R2	SL-WHT		RING 2	—	R1
31	A2	RED-BLU		—	—	MI1
6	A12	BLU-RED		—	—	E1
32	T3	RED-ORN		TIP 3	—	SG1
7	R3	ORN-RED		RING 3	—	E1
33	A3	RED-GRN		—	—	MI11
8	A13	GRN-RED	▼	—	—	SB1
			BASIC			
34	JA0	RED-BRN	▲	JA0	REMOTE ALARM	-MAJOR (or
9	JA1	BRN-RED	CN11/(22)	JA1	EXPANSION	-JA 0/1)
35	NA0	RED-SL	(6PFT/6PFE)	NA0	REMOTE ALARM	-MINOR
10	NA1	SL-RED	▼	NA1	REMOTE ALARM	-MINOR
			EXPANSION			
34	JA0	RED-BRN	▲	JA0	REMOTE ALARM	-MAJOR
9	JA1	BRN-RED	CN11/(22)	JA1	REMOTE ALARM	-MAJOR
35	NA1	RED-SL	(6PFT/6PFE)	NA0	REMOTE ALARM	-MINOR (or
10	NA1	SL-RED	▼	NA1	BASIC	-JA 0/1)
36						
•						
•						
•						
•						
•			(NOT USED)			
•						
•						
•						
•						
•						
25						

* Line and trunk number designations agree with data base entries.
** Both E&M Type I and Type II trunks are listed in this column.

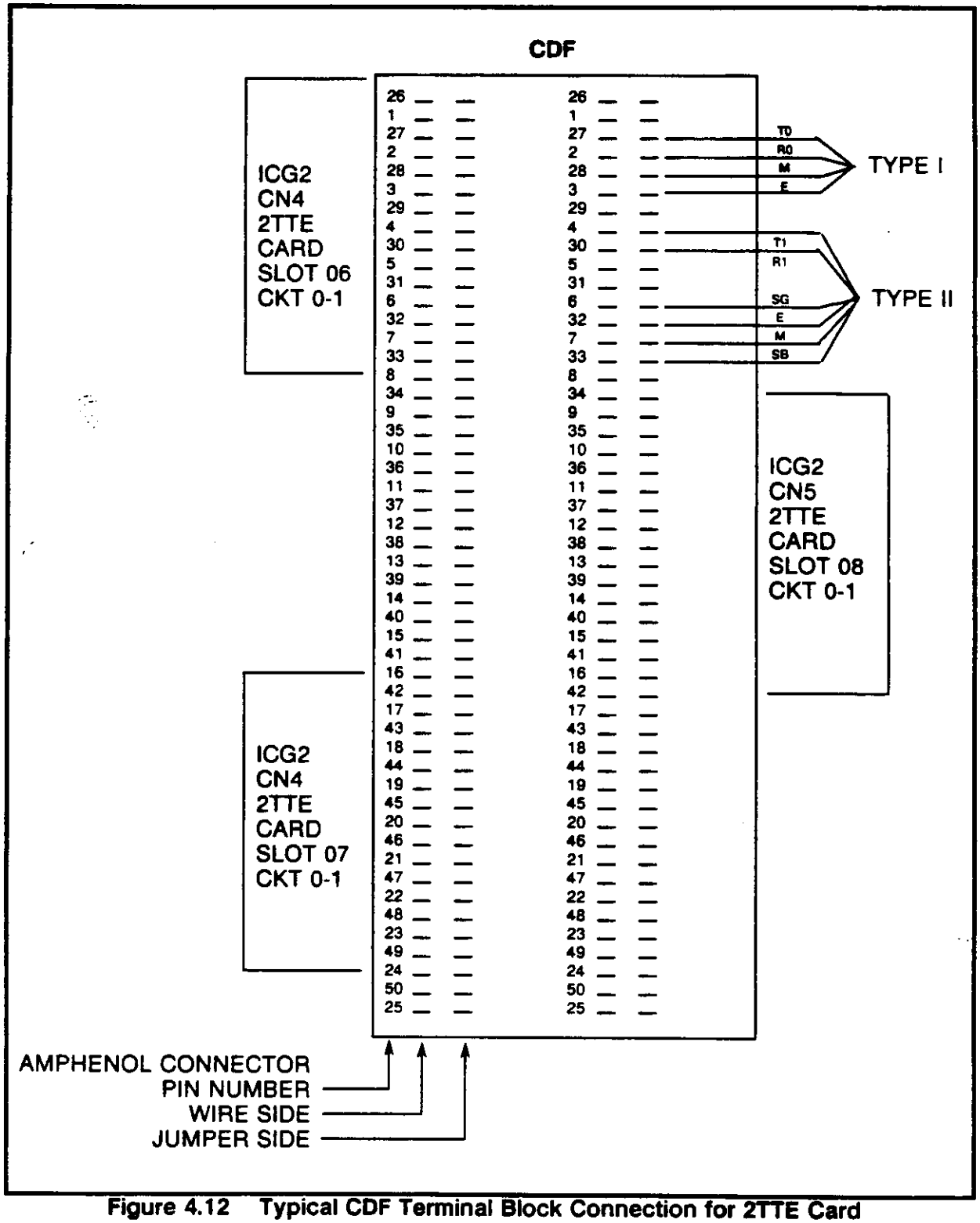


Figure 4.12 Typical CDF Terminal Block Connection for 2TTE Card

Music-On-Hold Installation

4.4.2 A customer-provided music source (FM radio, tape deck, etc.) can be interconnected to the system to allow incoming callers to listen to music while on hold. A music source can be connected by using the 4BWC card with Packages A - D or by using the RVAC card with Package D. There is no limitation to the number of lines or trunks that can be programmed through the system software for the music-on-hold feature.

Music Source RVAC Card

4.4.3 With Package D, the system offers music with the RVAC card. The music is programmed onto the card (see Data Base TL-12301-1001).

Music Source RVAC Card Installation

Insert the RVAC card into a card slot, 00 to 14.

Music Source 4BWC Card

With Packages A-D, a 4BWC music source is installed as follows:

1. Wire the music source station wire onto the CDF and run the wire to the music source.
2. Install the 600-ohm music source per manufacturer's documentation or, if applicable, Appendix III.
3. Insert the 4BWC card, connect the CDF cable, and cross connect per paragraph 4.2.1.

External Paging Option

4.4.4 A customer-provided external paging amplifier allows a station operator to page individuals or make announcements.

A typical external paging device is installed as follows:

1. Wire the external paging station wire onto the CDF and run a wire to the paging amplifier.
2. Install the 600-ohm paging amplifier per vendor documentation or, if applicable, Appendix III.
3. Insert the 4BWC card, connect the CDF cable, and cross connect per paragraph 4.2.1.

NOTE: The external paging unit can be accessed as a normal station when cross connected an 8SLC card. When used with a 4BWC card, the external paging unit must be accessed and answered with a feature access code.

DATA APPLICATION PERIPHERAL INSTALLATION

5.0 This section describes the installation of data communications peripherals. The peripherals are the DTA (Data Terminal Adapter) and the DIU (Data Interface Unit) associated with the system, as well as customer-provided modems, terminals, printers, etc. All data communications devices connected to the DTA or DIU must be equipped with a digital serial interface conforming to the EIA (Electric Industries Association) RS-232C Standard.

Installation procedures are provided for the following:

- DTA equipped CSD telephones and peripherals.
- DIUs and peripherals.

Appendix I of this document, RS-232C Cable and Pin Configuration Information, is provided as reference.

CSD Telephone Equipped with DTA (Data Terminal Adapter) Overview and Installation

5.1 This paragraph describes the installation of the CSD telephone equipped with a DTA. The DTA is installed in the CSD and provides an RS-232C connector to be used with terminals, printers, and other data communications-related equipment configured as DTEs (Data Terminal Equipment). The DTA works in conjunction with the system to support switched data calls at a variety of bit rates. Figure 5.1 shows the typical data communications configuration using a DTA equipped CSD. This paragraph covers installation of the following:

- Installation of the DTA and CSD.
- Installation of DTE-configured equipment (terminals, printers, etc.) connected to the DTA.

CSD/DTA Installation

5.1.1 The CSD equipped with a DTA is installed as follows:

DTA Installation

Referring to Figure 5.2, install the DTA card in the CSD telephone as follows:

CAUTION

Installation should be done by a craftsperson on a conductive mat and with a ground strap attached to the wrist to protect the CMOS (Complementary Metal Oxide Semiconductor) components in the DTA and CSD from electrostatic discharge.

1. Remove the DTA, AC power adapter, two grounding wires, five washers, and three screws from the package.

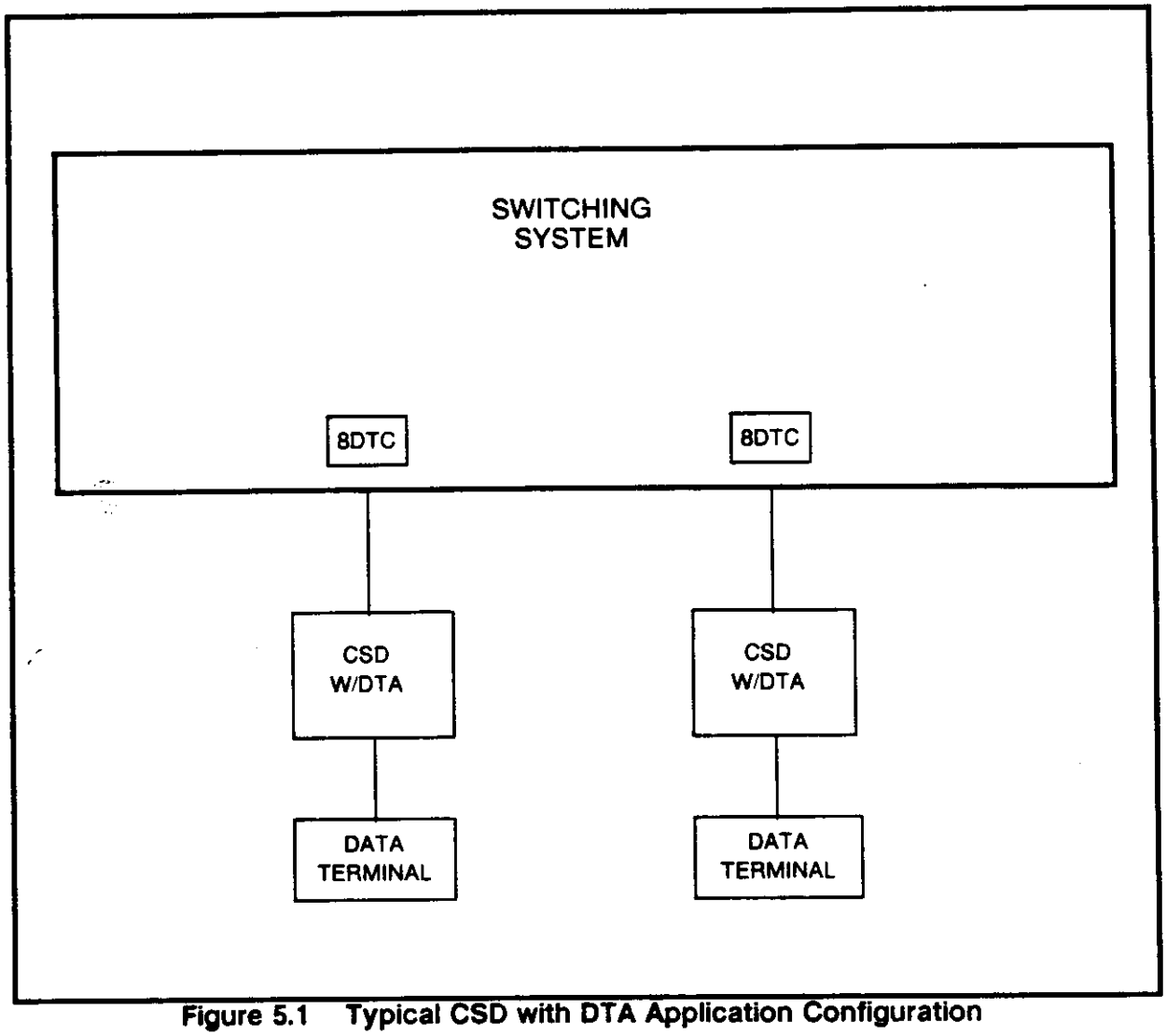


Figure 5.1 Typical CSD with DTA Application Configuration

CSD with Terminal or Printer Installation

5.1.2 To configure a CSD/DTA to a terminal, printer, or other DTE device, install the DTE equipment as follows:

1. Set up the DTE device per manufacturer's documentation.
2. Locate the male-male ended RS-232C cable, and ensure compatible cable configuration using Appendix I as a reference.
3. Connect the RS-232C cable to the CSD and DTE. Secure the RS-232C connectors with machine screws.
4. Power up the DTE device and run self-tests per manufacturer's documentation.

NOTE: For operational information, reference CI-484-436 System CSD User's Guide.

DIU Overview and Installation

5.2 The DIU as shown in Figure 5.3 is used to establish intra-system data calls. The DIU is paired with an EKT through the system software for simultaneous voice and data calling.

The following DIU configurations are supported:

- Stand-alone DIU with connected terminal
- DIU with associated EKT and connected DTE terminal or printer

NOTE: Connection of the system to a DCE (Data Communications Device) through a DIU is not available with Package D.

DIU Installation

5.2.1 The DIU is installed as follows:

DIU Installation/ Cabling/Wiring

1. The DIU is cabled/wired and cross-connected to an 8DTC card as outlined in paragraph 4.2.3. The DIU is connected to the 8DTC through pin numbers 3 (RING) and 4 (TIP) of the line RJ11C connector as shown in Figure 5.4.

DIU to DTE Installation

2. Place the DIU at the desired location.

Terminal/Printer Installation

3. If applicable, install the customer premises DTE terminal or printer as follows:

   (a) Install the customer premises terminal/printer per manufacturer's documentation.

   (b) Position the DIU rear panel switch to DTE mode.

   (c) Connect the terminal/printer to DIU using a RS-232C male-male connectors. Consult manufacturer's documentation or the pinout information contained in Appendix I to ensure terminal/printer-DIU compatibility.

4. Power on the terminal/printer per manufacturer's documentation. The DIU is line powered.

NOTE: For operational information, refer to CI-484-447 Data Communications using a Data Interface Unit.

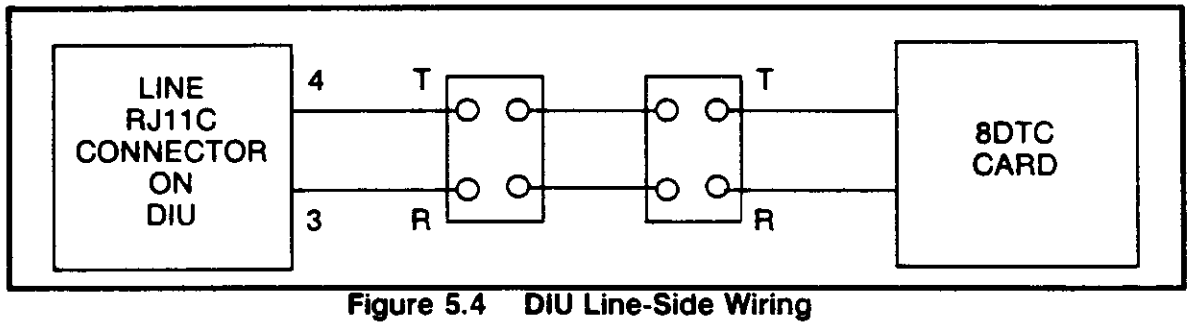


Figure 5.4 DIU Line-Side Wiring

Associated EKT Installation

5.2.2 A DIU associated EKT is installed as follows:

1. Wire and install the EKT per paragraph 4.2.2. The EKT can be cabled to the system separately with a dedicated line or can optionally be cabled through the DIU, making use of the DIU modular connector and cable as shown in Figure 5.5.

2. The EKT must be paired with an installed DIU per the TL-120301-1001 Data Base.

4CHT Installation

5.2.3 The 4CHT card, in Packages C and D, provides output to a Hotel/Motel printer.

Insert the 4CHT card in card slot 00 through 14 of the basic or expansion cabinet.

SYSTEM CONTROL COMPONENT INSTALLATION

6.0 This section describes the procedures for installing the administrative control devices used to monitor and load the system software. Data base programming, maintenance, and diagnostics are performed with this device. The administrative control device communicates with the switching system through one of two RS-232C serial communications interface ports.

This section provides installation procedures for the following three administrative control devices:

- PMP (Portable Maintenance Panel) - An EPSON HX-20 microcomputer connected to the system on serial communications port 00 (CN13)
- PC (Personal Computer) - An IBM or compatible PC connected to serial communications port 00 (CN13)
- MCT (Master Control Telephone) - A CSD or Attendant Console connected to the system

Administrative control can be accomplished on-site using the PMP, personal computer, or MCT connected directly to the equipment cabinet. Remote administrative control is also possible with the system. A PMP or personal computer can be connected to the system using a modem link. Figure 6.1 shows typical remote maintenance center connections.

Serial Communications Ports

6.1 The data base programming, maintenance, diagnostics, and control of the system are provided through two independently programmable RS-232C serial communications ports. These ports support the PMP (Portable Maintenance Panel) and PcMP (Personal Computer Maintenance Panel). An MCT (Master Control Telephone) communicates with the system through a line card.

The specifications of both RS-232C communications ports are as follows:

Format:	Asynchronous
Communications Mode:	Full duplex
Speed:	110, 300, 600, 1200, 2400, 4800 bps
Code:	7 bit ASCII
Stop Bit:	One or two
Parity:	Even, odd, or none
Character Length:	7 or 8 bit (for 8 bit, most significant bit must be zero or space)

PMP (Portable Maintenance Panel) Overview

6.2 The PMP is a dedicated communications device used for system maintenance, diagnostics, and data base programming. The PMP, shown in Figure 6.2, is an EPSON HX-20 hand-held microcomputer. It has a keyboard for entry of CMC (Change and Maintenance Command) code numbers, a small built-in printer for screen-to-printer hard copy, an LCD display, function keys, an RS-232C port, a battery charger, and a built-in microcassette tape drive. A microcassette tape must be purchased to store the system data base. It is required that another 60-minute backup cassette* be provided to store all ODDB (Office Dependent Data Base) enhancements or modifications. If the installation includes the optional floppy disk drive and the HX-20 memory expansion, the ODDB can be saved on diskette.

CAUTION

*Use only Leaderless Cassette Tapes. Use of cassettes with tape leaders may cause the loss of the ODDB.

PMP Installation

6.2.1 The PMP is connected to the system as follows:

1. Ensure power switch of the PMP is in the OFF position.
2. Connect the EPSON #715 cable to CN13 on the equipment cabinet as shown in Figure 6.3. Secure the cable with machine screws.
3. Connect the eight-connector plug to the PMP receptacle labeled RS-232C as shown in Figure 6.3. See Appendix I for #715 cable configuration and color codes.
4. Ensure that the PMP's batteries are fully charged. If the battery is discharged, plug in the power supply to power outlet and then plug the power cabling to the PMP receptacle labeled adapter.
5. Insert the control program tape and power up to prepare the unit for software load (Software initialization and load is covered in section 7.0).
6. The PMP will prompt user to port configuration.

PMP Installation with Optional Disk Drive

6.2.2 The Optional Disk Drive Unit EPSON TF-20 is installed as follows:

1. Ensure that the PMP is equipped with the RAM expansion H20EU. The expansion unit is attached to the left hand side of the PMP and is marked EXPANSION UNIT.
2. Ensure that the PMP and disk drive power switches are in the OFF positions.
3. Remove the bottom panel of the PMP (Figure 6.3)
4. Set dip 4 of the dip switch in the PMP to on. The dip switch is well inside and to the left as viewed when the bottom panel is open.
5. Replace the PMP bottom panel.
6. Connect the EPSON #707 cable between the PMP and disk drive using the connector receptacles shown in Figure 6.3.

CAUTION

Always turn on the PMP disk drive before turning on the PMP power switch.

7. Power up the unit and insert the control program disk or tape to prepare unit for software load. (Software load is covered in section 7.0.)

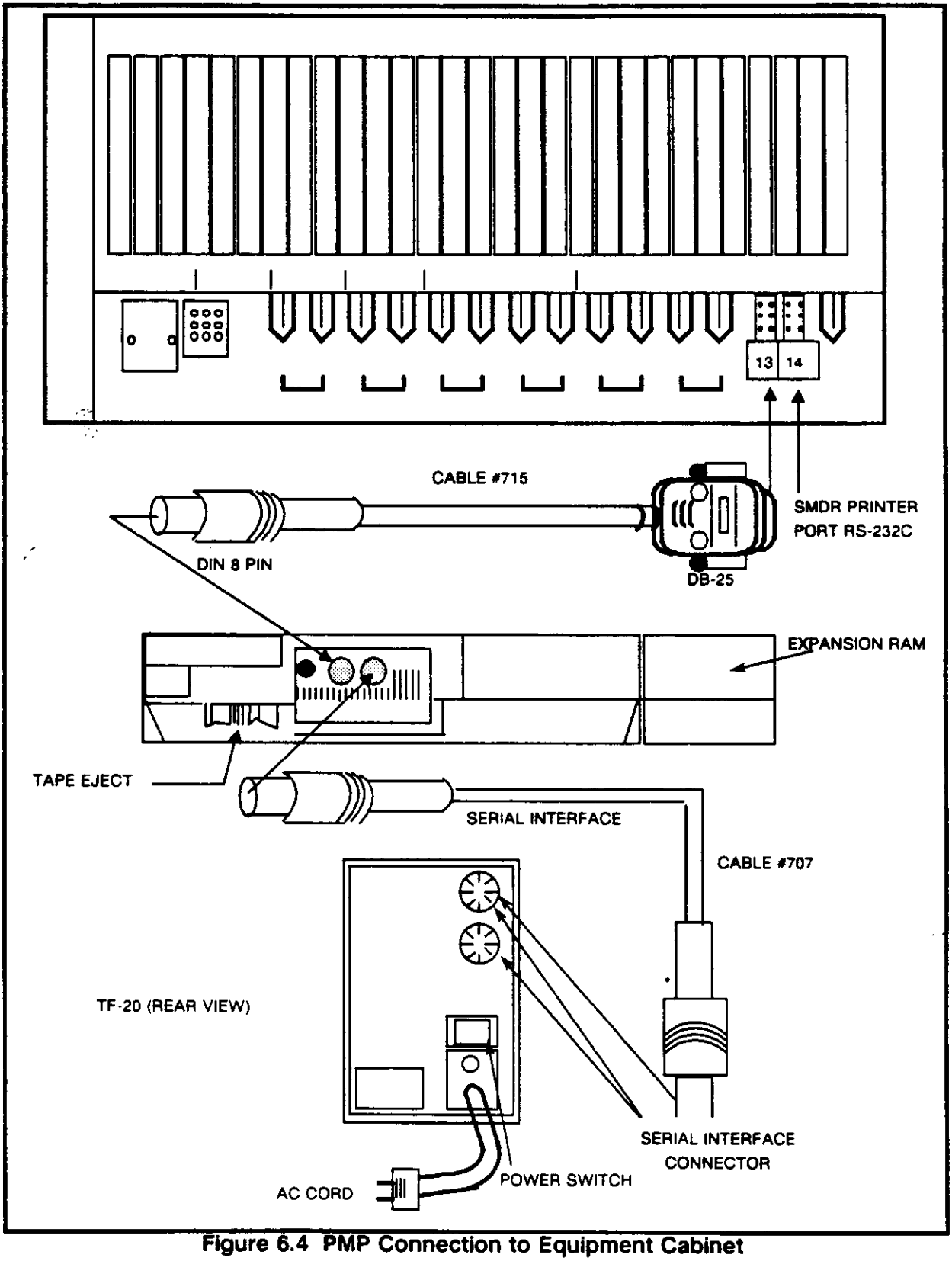


Figure 6.4 PMP Connection to Equipment Cabinet

Table 6.1 PMP Program Function Key Definitions

Function	PMP Key(s)	Description
Select/Return	RETURN	Required as a prompt to the system after typing the security code or CMC three-digit number. Can be used to move the cursor to the next parameter position
Release/RLS	PF1	Permits exit from a command at any time. Useful to change to another command or exit from an error condition.
Terminate/ TRM	SHIFT + PF1 (PF6)	Terminates the command mode. (RLS must be used before using TRM.)
Cancel/CAN	PF2	Cancels a keyed in P value. Useful to erase typing errors. Will not delete a value from memory. (Can be used to enter a blank value.)
PRINT	CTRL + PF2	Sends the display on the current screen to the printer. One screen is printed at a time. The cursor must be visible on the screen and all PMP/system communications completed before pressing PRINT.
ADD/CHG	PF3	Writes (enters) the typed P values into data base memory. In some tables, RMV must be used to delete old values before pressing ADD/CHG. PMP screen indicates whether the values were added or changed.
Duplicate/ DUP	PF4	Increments the table's key parameter(s) while causing the remaining P values to stay the same as the previous screen. Useful for entering repetitive values such as station and trunk data.
Tape Start	SHIFT + PF4 (PF9)	Starts the ODDB back-up tape during the load or save data base procedure.
Display/DSP	PF5	Required after entering some CMC commands. Shows P values of a table. If no value exists for a parameter, the P value is blank. Depressing DSP a second time increments the main parameters, and their P values are displayed. Depressing DSP at the end of a table listing either displays the first P values again or releases the table by exiting.
Remove/RMV	SHIFT + PF5 (PF10)	Deletes all P values from a table. Required at some tables before new values can be entered.

- Color or monochrome monitor
- 512K bytes of memory
- DOS 2.1 or later release
- Printer (serial or parallel)
- Serial RS-232C port for communications
- Printer port (serial or parallel)
- Associated cables
- Two floppy disk drives (or one floppy disk and a hard disk drive)

For remote application, a pair of modems is necessary. The modems must have the following features:

- Auto answer capability (system side)
- Full duplex
- Asynchronous
- Loss of carrier disconnect

SYSTEM HARDWARE AND DATA BASE INITIALIZATION

7.0 This section describes the procedures for initializing the system hardware and loading the initial system software. The installation of the basic or expanded system has been covered in sections 1.0 through 6.0. If the system installation includes either the SMDR (Station Message Detail Recording) or Hotel/Motel options, the installer can choose to proceed to section 9.0 or 10.0 installing the associated optional equipment, or continue with this section to initialize the baseline system, implementing the options at a later time.

System Hardware Initialization

7.1 This paragraph describes the procedures for powering up the newly installed system hardware.

Powering Up the System

7.1.1 Power up the system as follows:

1. Connect the male end of the power supply cable to the equipment cabinet connector labeled PW.

2. Plug the power cord into the power outlet.

3. Power up the system by placing the main power switch in the ON position.

An LED power indicator (OPE) is located on the top right of the power supply. When lit, it indicates that the power supply is working. See Figure 7.1.

When the LED is not lit, it indicates the power supply has stopped working for one or more of the following reasons:

1. Commercial AC power has been lost.

2. The INPUT switch of the power supply has been set to the OFF position.

3. A major failure has occurred in the power supply.

4. One of the DC outputs is overloaded; i.e., there is a short circuit in the equipment cabinet.

System Memory Back-up

7.1.2 The system has a limited capability to maintain memory and call status during power interruption. Figure 7.2 shows the relationship of line use to length of storage time in milliseconds of interrupt. A memory back-up battery is continuously charged by the system to preserve the ODDB (Office Dependent Data Base) during a power failure. A fully charged battery will preserve the ODDB in RAM for approximately two weeks. Battery discharge status is indicated by the CPM card ALM lamp and other alarm devices. (Alarm button on an EKT, Attendant Console or DSS/BLF Console or a remote alarm unit.)

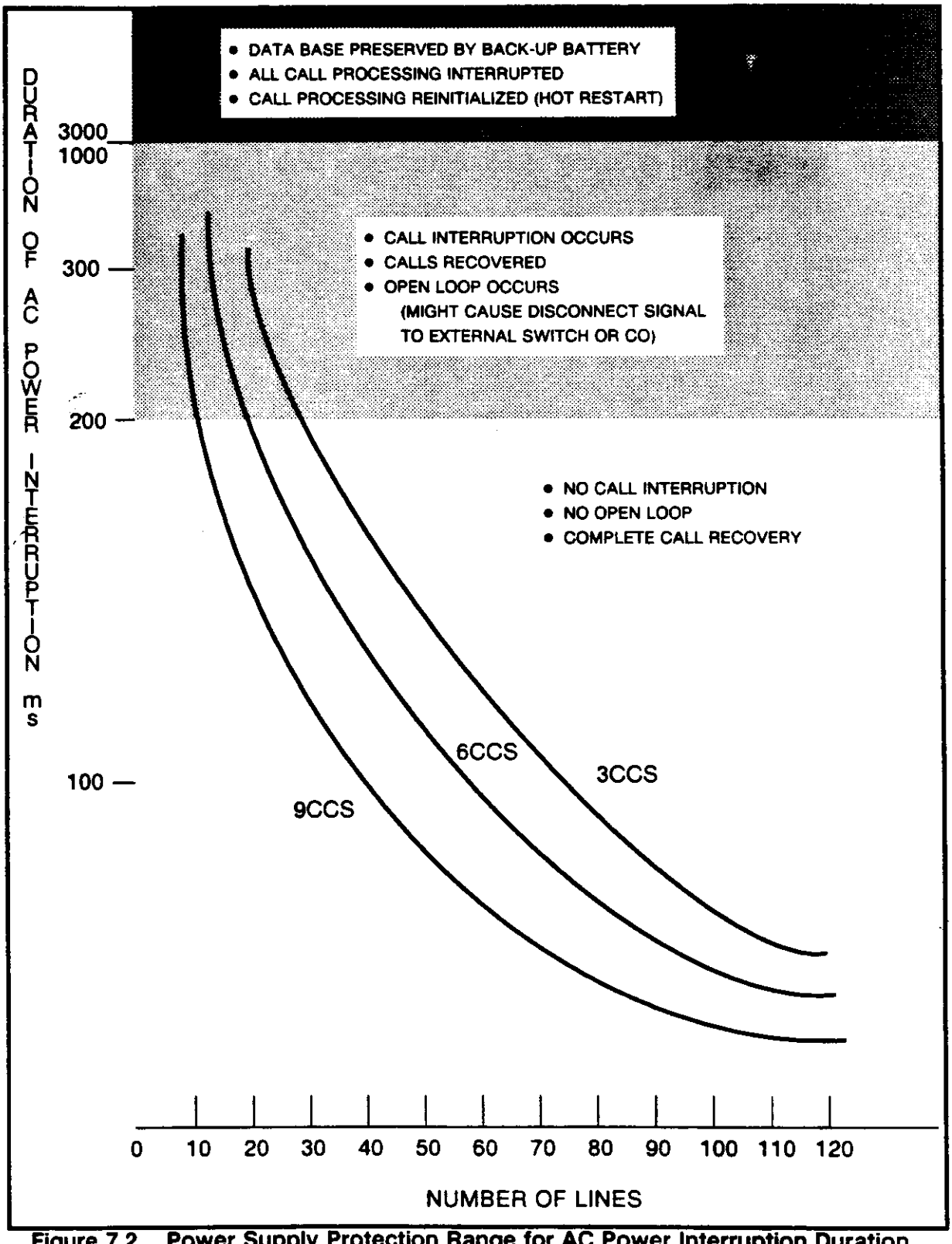


Figure 7.2 Power Supply Protection Range for AC Power Interruption Duration of Interrupt (ms) by Number of Lines per Hundred Call Seconds (CCS)

System Controls, Alarms, and Indicators

7.1.3 Both the basic and expanded systems provide indicators of system status after the initial power up procedure. These indicators provide a quick indication of trouble conditions resulting from faulty equipment components or improper installation.

Alarm Indicators on CPM Card

The CPM card has a manual reset button, a restart COLD/HOT switch, and three LED lamps for indication of system status. See Figure 7.4.

The three LED lamps on the CPM card are:

- RUN (Green): - ON for normally operating system

  When the RUN lamp goes off, it indicates

  - System power failure
  - The CPM or SWC clock oscillating circuit is defective
  - The sixteenth attempt to restart the system through the watchdog timer has failed

  The RUN lamp is a MAJ (Major) alarm indicator. If the system is equipped with the 6PFT/6PFE (Power Failure Transfer/Expanded) option, calling service is transferred to the designated SLTs (Single-Line Telephones) and the customer-provided MAJ alarm indicator is activated.

- ALM (Red): - ON in the event of trouble

  When lit, the ALM (Alarm) lamp indicates that the software program has detected a failure in one or more areas of system operation. More detailed information on the cause of the failure can be obtained by using the fault log. When the ALM is on, the MIN (Minor) lamp at the remote location is also turned on via the optional 6PFT/6PFE.

- TO (Red): - ON in the event of trouble

  When lit, the TO (Timer Overflow) lamp indicates that the watchdog timer has detected a failure. Timer overflow indicates a failure in the CPM or MEM card; or the operating program has detected an error. When this happens, the system attempts to restart. If successful, the fault is logged. If after 16 retries the system has not been successfully restarted, the hardware which monitors these sequences will shut off the RUN lamp.

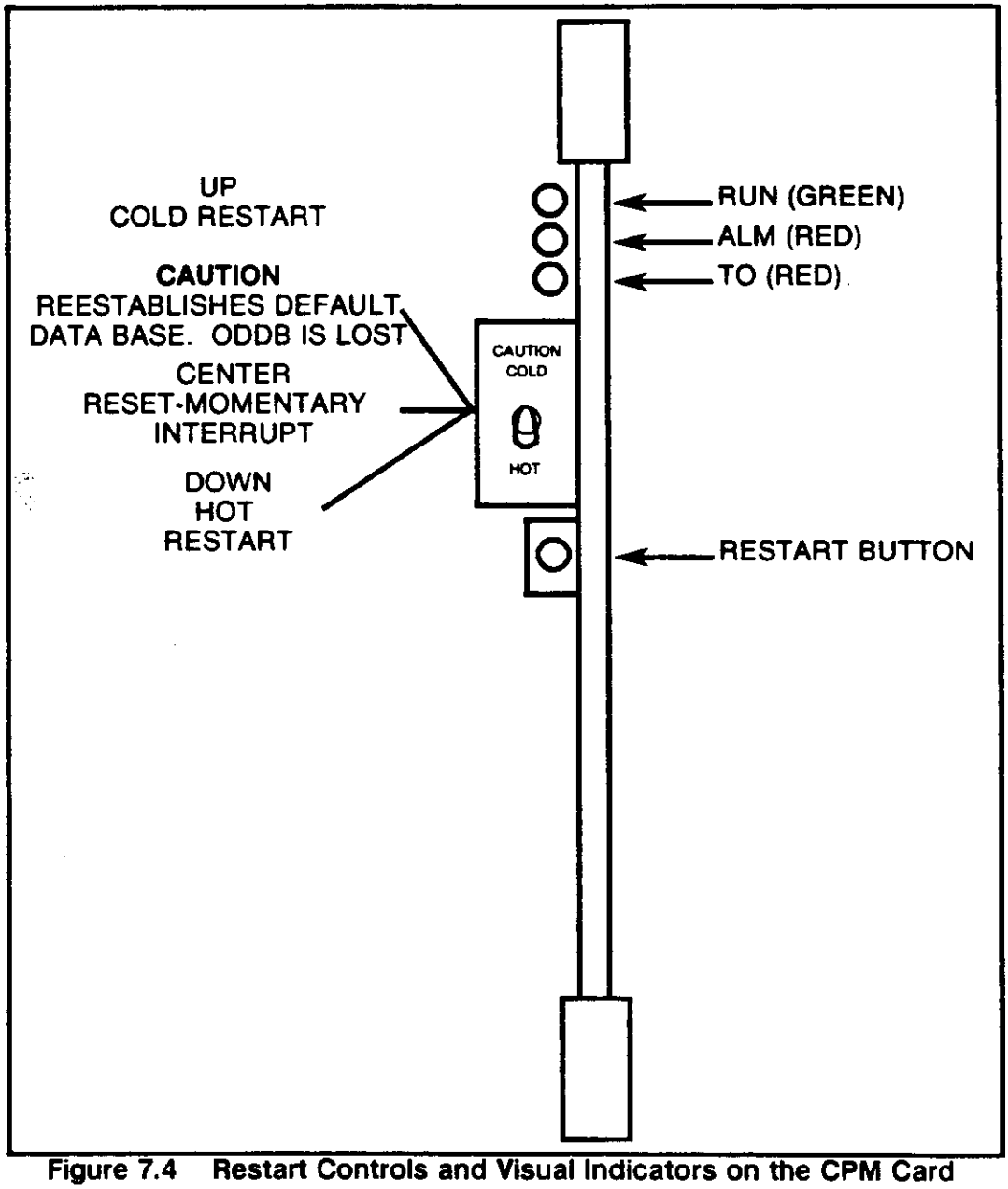


Figure 7.4 Restart Controls and Visual Indicators on the CPM Card

System Software Initialization and ODDB Load

7.2 This paragraph provides background information and outlines the procedures for initializing the system. This paragraph also provides information on loading and making ODDB changes with a PMP, PcMP, or MCT.

System CPM/Software Initialization Overview

7.2.1 To activate the RAM, the CPM must be initialized. Initialization resets program controls and RAM operation memory. The system can be initialized in three ways. The CPM card, in card slot 20, has a three-position restart toggle switch. See Figure 7.4. The three positions are center (normal) for RESET restart, up for COLD restart, and down for HOT restart. Below the toggle switch is a small restart momentary contact pushbutton. The toggle position determines which restart is initiated when the restart button is pushed.

- **COLD RESTART** - A COLD restart loads RAM with the operating system and the standard default data base. COLD Restart is used after installation to initialize the system, after a serious system failure, and/or after replacing the CPM or MEM cards. When power is restored after a power outage that resulted in the loss of battery back-up, a COLD restart must be performed. After a COLD restart, the system clock must be reset.

CAUTION

Modified data base, ODDB, and enhancements to the default data base are lost on COLD restart. Modified programs should be saved on a back-up data base tape or diskette for loading when a COLD restart is initiated.

To manually initiate a COLD restart: Hold the toggle switch in the UP position and push the restart button for approximately 5 seconds. Release the toggle switch back to center.

- **HOT RESTART** - A HOT restart resets program controls but does not affect the contents of RAM. All calls are dropped during HOT Restart. Any data base changes, modifications, or enhancements remain in the operating data base. The system initiates a HOT restart when it automatically recovers from power failure.

  To manually initiate a HOT restart: Hold the toggle switch in the DOWN position and push the restart button for approximately 5 seconds. Release the toggle switch to the center position.

System CPM Software Initialization

7.2.2 When the system is first powered up, software programming must be loaded into the system. The system operating program and the default data base are loaded by initiating a COLD restart. The ODDB must now be loaded into the system using the PMP (Portable Maintenance Panel).

Initializing the PMP Using Cassette Tape

7.2.3 Initially, or if the PMP batteries have been allowed to discharge, the PMP control program must be loaded into the PMP memory. Once the program is loaded, it should not be necessary to reload the program unless the batteries discharge. Using the PMP charging unit will not interfere with operation of the PMP control program. The initialization can be skipped if the control program is already in the PMP. See specific CMC (Change and Maintenance Code) commands in section TL-120201-1001 Data Base.

Perform the following procedures to load the PMP control program from tape.

1. Power on the PMP by pressing the <POWER ON> switch located on the right side of the PMP.

2. The PMP will display the program menu:

```
CTRL/@ INITIALIZE
   1 MONITOR
   2 BASIC
```

3. Press the <CTRL> and <@> keys simultaneously. The PMP will display the following screen which prompts for year, date, and time:

```
ENTER DATE AND TIME
MM DD YY HH MM SS cr
=
PRESS BREAK TO ABORT
```

4. Type the year, date, and time (for example:070885084500) and press the <RETURN> key. The PMP will display the following:

```
CTRL/@ INITIALIZE
   1 MONITOR
   2 BASIC
```

```
SEARCHING
FOUND: LOADER
TITLE "PMPCTRL"
```

```
A = ØØ B = 6E X = AB1C
C = C4 S = 3CEC P = A3B5
```

14. Type K3 DO NOT PRESS THE <RETURN> KEY.

    NOTE: The number three (3) in this entry can vary. It identifies the numeric order of the programs in the PMP. The main menu displays all stored programs in order. If three programs already exist, 3 cannot be used in this entry. Enter the next available number sequence instead of 3.

15. Press the <CTRL> key and <@> key simultaneously. DO NOT PRESS THE <RETURN> KEY.

16. Turn the power off and then on. A screen displaying the main program menu and copyright information will appear briefly, then disappear. The PMP port configuration will be displayed. This confirms that PMPCTRL has been loaded properly.

NOTE: It is advisable to make a copy of the PMP control program for back-up purposes. Refer to **Making Back-up Copies of the PMP Control Program**.

Save PMP Control Program to Tape

7.2.4 If a second PMP control program tape is desired as a protection copy, the following procedure can be used after the control program has been loaded into the PMP:

1. Set the power switch on the PMP to ON (the port configuration menu is displayed).
2. Press the BREAK button to forcibly terminate any program that the system attempts to execute.
3. Type LOGIN 2. Then press RETURN. The cursor appears on the display.
4. Insert the control program tape into the cassette.
5. Type WIND. Then press RETURN. The tape rewinds.
6. Type LOAD"CASØ:LOADER". Then press RETURN. The tape moves.

1. Turn the disk drive power switch on.

2. Set the system disk (the EPSON Disk BASIC that comes with the disk drive) in drive A of the disk drive and check that the drive select LED blinks, indicating that the DOS program has started.

3. Turn the PMP power switch on. Check that the drive select LED blinks again, indicating that disk BASIC is booted on the PMP.

The initial screen (PORT CONFIGURATION) will be displayed at the PMP. Enter the command mode.

b. Preparation of floppy diskettes for SAVE and LOAD operation

- One SAVE floppy diskette can hold data for one save operation using a sequential file.

- The SAVE floppy diskette must be initialized or have been used in a previous SAVE operation. SAVE data on a diskette used previously will be overwritten by new data. Complete the following procedure if the floppy diskette has not been initilized. If the floppy diskette has been initialized, go to step 4.

3. Floppy diskette initialization

a. Put the PMP in the BASIC mode by turning power on, displaying the initial screen, and pressing the BREAK key.
b. Set the floppy diskette to be initialized in disk drive drive A.
c. Enter FORMAT "A:" RETURN.
d. When "Are you sure?" is displayed, enter Y.

4. LOAD procedure

a. Put the PMP in the command mode.
b. Enter CMC = 703 (Guard release: A02 file only).
c. Enter CMC = 902.
d. Enter LOAD on P1 and press the ADD/CHG button.
e. Set the floppy diskette to be saved in disk drive drive B.
f. Depress PF9 (SHIFT + PF4).
g. Check that the save date and file version are displayed. Then press PF9. The switching system will be placed in off-line mode automatically, stopping all the switching operation.
h. The switching system TO lamp will light after loading ends. Perform a HOT restart. The PMP screen will display "SECURITY CODE = ". Enter the security code to set the system in the command mode.
i. Use CMC = 801 to check the load end history. Then turn the TO lamp off. Load end history.

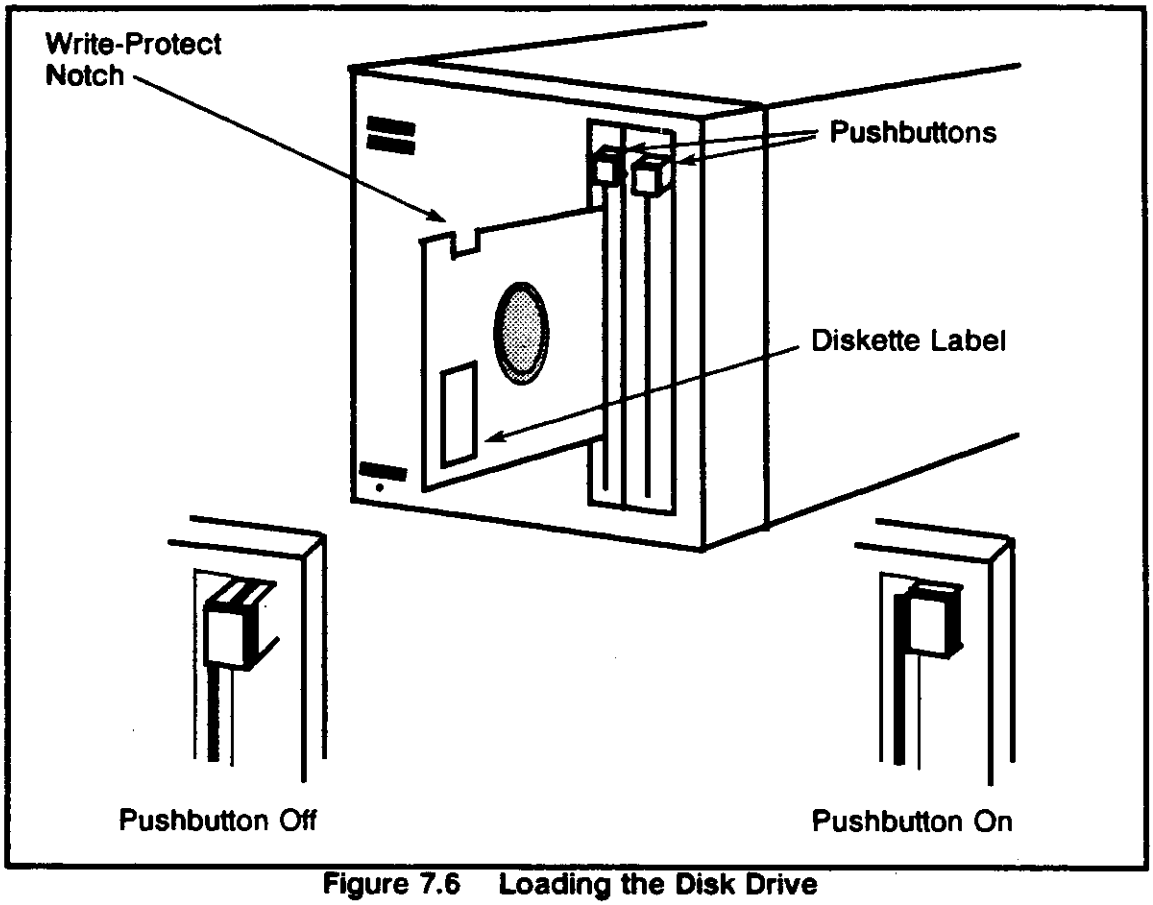


Figure 7.6 Loading the Disk Drive

Floppy Diskette Ejection

Eject the floppy diskette as follows:

1. Check that the drive select LED of the drive containing the floppy diskette is off. If it is on, wait for the current read or write process to end.

2. Press the drive eject pushbutton in so that it pops out to the off position (Figure 7.8). The floppy diskette will be ejected 2 to 3 cm.

3. Slowly remove the floppy diskette from the drive.

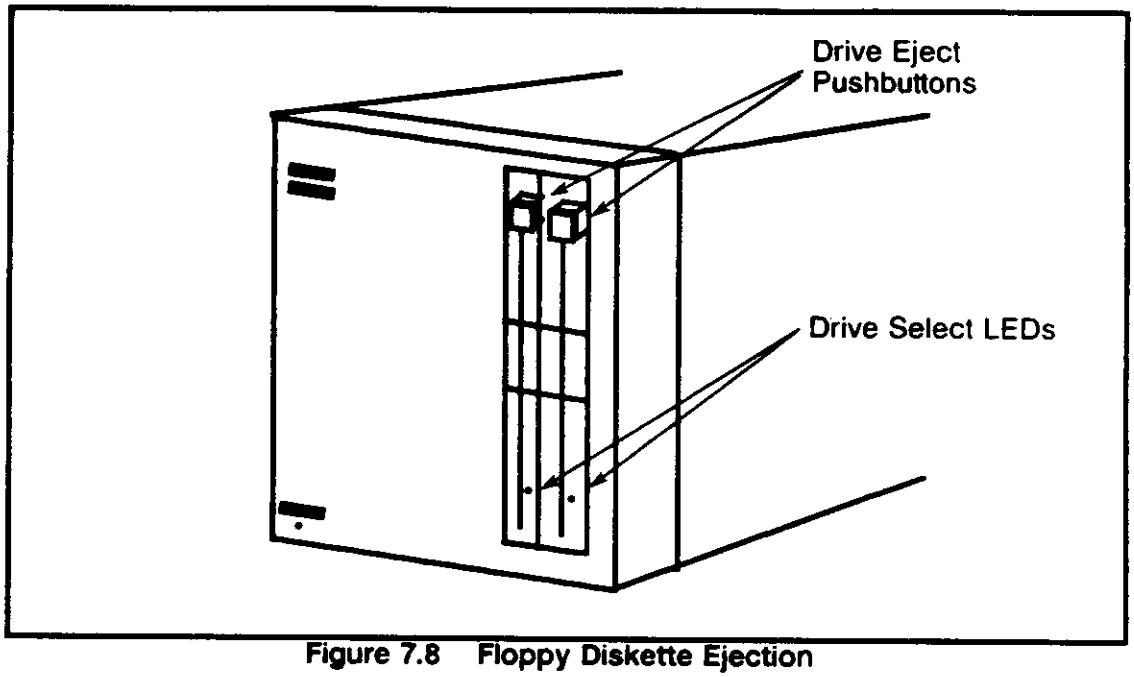


Figure 7.8 Floppy Diskette Ejection

Checking PMP Port Configuration for Serial Communications Port or Modem Use

7.2.6 This paragraph describes the procedure for checking the serial port to ensure that port parameters match the PMP or, in the remote application (as shown in Figure 6.1) , the auto-answer modem.

The PMP control program port configuration is preset to match the PMP port to the system default values for the RS-232C port at CN13, I/O. If the PMP will be remoted with a modem, the PMP parameter must be checked/changed to match the modem characteristics. The CMC commands for changing the system port configuration are given at CMC 900 as described in TL-120301-1001 Data Base .

CAUTION

The procedure listed below changes the port configuration on the PMP. The two ports must match for communication between the PMP and the system. Cycle the PMP OFF and ON to return to the default port configuration.

The following procedure is used to display the screens that represent the port configuration default values. After completion of the initialization procedures described in paragraph 7.2, the following PMP port configuration screen is displayed.

```
PARITY    (E)
O = ODD     E = EVEN
N = NONE
```

4. Enter the letter of your choice and press RETURN to change or press RETURN to accept the default value (E).

   The word length menu is displayed.

```
CHARACTER LENGTH?  (7)
7 = 7 bits
8 = 8 bits
```

5. Enter 8 and press RETURN to change or press RETURN to enter the default value (7).

```
BIT RATE          [4]
STOP BITS         [1]
PARITY            [E]
CHARACTER LENGTH  [7]
```

6. Ensure the configuration is correct.

7. Press any alpha/numeric key to return to step (1) for further changes or correction.

8. Press RETURN to enter new configuration screen values. The security code prompt is displayed.

```
SECURITY CODE = ___
```

9. Go to Step 4 of the following paragraph (paragraph 7.2.7).

PMP Operational Overview

7.2.7 After the PMP has been initialized and contains the PMP control program in memory, the PMP can be locally or remotely connected to the system and used as the Portable Maintenance Panel. The Data Base section provides a detailed discussion of the CMC command operation. The following procedure

c. If the security access has been cleared, the following screen will appear, indicating the user is now in PMP command mode:

```
CMC = #####
COMMAND READY
```

Entering CMC Commands

CMC commands can be entered from the following display:

NOTE: The cursor must appear on the display to enter commands.

```
CMC = ___      ****

COMMAND READY
```

5. Enter the desired CMC command (refer to Data Base TL-120301-1001).

6. To terminate command entry mode and load the command, press PF6, then shift and PF1. Pressing any key returns the users to the port configuration menu.

Remote PMP Operation

7.2.8 The following procedure describes the operation of the remote PMP using an auto answer modem connected to the system communications port.

1. Ensure the modems at the system site and remote site are compatible.

2. Ensure a modem is connected to the system. RS-232C cable length must be within 25 feet. (Pinout information is contained in Appendix I.)

3. Ensure power is ON for the modem connected to the system.

4. Ensure power is ON for the system.

5. Ensure the port configuration matches manufacturer's data for the modem.

6. After the modem communications link has been validated, the PMP is connected to the remote modem.

7. Remote PMP operation is identical to local PMP operation.

Attendant Console Used as an MCT

7.2.14 The Attendant Console can also be used as an MCT when it is in the Position Busy mode, and then entering the correct security code.

Once in the position busy mode, the operation of the Attendant Console as an MCT is the same as for the CSD telephone in the MCT mode.

The button function of the Attendant Console in the MCT mode is shown in Figure 7.10 and Table 7.3.

1. To exit from the MCT mode of operation, press the RSL (release) key.

2. Press the TRM (Terminate) key.

3. When the LCD displays POSITION BUSY, press the POSITION BUSY soft key to return to the call processing mode.

Table 7.2 CSD/MCT Function Keys

Function Key Assignments	Description
Return/RTN	Required as a prompt to the system after typing the security code or CMC three-digit number. Can be used to move the cursor to the next parameter position.
Release/RLS	Permits exit from a command at any time. Useful to change to another command or exit from an error condition.
Terminate/ TRM	Terminates the command mode. (RLS must be used before using TRM.)
Cancel/CAN	Cancels a keyed in P value. Useful to erase typing errors. Will not delete a value from memory. (Can be used to enter a blank P value.)
ADD/CHG	Writes (enters) the typed P values into data base memory. In some tables, RMV must be used to delete old values before pressing ADD/CHG. PMP screen indicates whether the values were added or changed.
Duplicate/ DUP	Increments the table's key parameter(s) while causing the remaining P values to stay the same as on the previous screen. Useful for entering repetitive P values such as station and trunk data.
Display/DSP	Required as a prompt to the system after entering displayable CMC commands. Shows P values of a table. If no value exists for a parameter, the P value is blank. Depressing DSP a second time increments the main parameters, and their P values are displayed. Depressing DSP at the end of a table listing either displays the first P value again or releases the table by exiting.
Remove/RMV	Deletes all P values from a table. Required at some tables before entering new values.

Table 7.3 Attendant Console/MCT Function Keys

Function Key Assignment	Description
Return/RTN	Required as a prompt to the system after typing the security code or CMC three-digit number. Can be used to move the cursor to the next parameter position.
Release/RLS	Permits exit from a command at any time. Useful to change to another command or exit from an error condition.
Terminate/ TRM	Terminates the command mode. (RLS must be used before using TRM.)
Cancel/CAN	Cancels a keyed in P value. Useful to erase typing errors. Will not delete a value from memory. (Can be used to enter a blank P value.)
ADD/CHG	Writes (enters) the typed P values into data base memory. In some tables, RMV must be used to delete old values before pressing ADD/CHG. PMP screen indicates whether the values were added or changed.
Duplicate/ DUP	Increments the table's key parameter(s) while causing the remaining P values to stay the same as on the previous screen. Useful for entering repetitive P values such as station and trunk data.
Display/DSP	Required as a prompt to the system after entering displayable CMC commands. Shows P values of a table. If no value exists for a parameter, the P value is blank. Depressing DSP a second time increments the main parameters, and their P values are displayed. Depressing DSP at the end of a table listing either displays the first P value again or releases the table by exiting.
Remove/RMV	Deletes all P values from a table. Required at some tables before entering new values.

SYSTEM VERIFICATION AND VALIDATION

8.0 This section describes the procedures for verifying, testing, and initializing the completed site installation. These are the last procedures performed before the installed system is cut over for customer use.

Installation Validation Checklist

8.1. The following installation validation checklist is a quick-reference review of the procedures and sequence for installation of the system. The installer should verify that the basic sequence was followed and that all applicable steps were performed.

The test should verify the proper operation of all system features and all possible line-to-line, line-to-trunk, trunk-to-line, and trunk-to-trunk connections in the installation.

1. Unpack the equipment cabinet, mounting bracket, power cable, common control cards, line and trunk cards, and RGEN (if ordered).
   a. Visually inspect the unit for unacceptable conditions.
   b. Visually inspect the cabinet for any loose wires or unacceptable conditions.
   c. Ensure that the Line and Trunk cards agree with CSS sheets. Note any discrepancies.
2. Unpack the power supply.
3. Install the wall mounting bracket.
4. Mount the equipment cabinet(s).
5. Mount power supply unit.
6. Ground the system.
7. Ensure placement of the back-up battery.
8. Power-up the system.
   a. Visually inspect the card slot connections.
   b. Connect the cabinet to the power supply with the supplied cable.
   c. Connect the system to commercial AC power.
      1. Connect the power supply unit to AC power.
      2. Set the power switch on the power supply to ON.
      3. Ensure the OPE lamp on the power supply is steadily ON.
   d. Set the power switch on the power supply unit to OFF. Ensure the OPE lamp on the power supply is OFF.
   e. Install the cards.
9. Install the cable from the cabinet to the CDF.
   a. Ensure the power is OFF.
   b. Connect the AMP connector to the first ICG group.

Table 8.1 Controls and Indicators on the Power Supply Unit

CONTROLS/ INDICATORS	DESIGNATOR	FUNCTION
Power switch	INPUT	Two position lock type switch which specifies the power on or off.
Power lamp	OPE	Glows steadily when the power supply is in proper working order.

Table 8.2 Controls and Indicators on the CPM Card

CONTROLS/ INDICATORS	DESIGNATOR	FUNCTION
Restart button	SET	Push button which activates the system restart.
CPM toggle switch	INS/RECO/CRS	Three position non-lock type switch which specifies the restart mode. INS: Initial start mode (COLD restart) RECO: Call recovery mode (Reset Restart) CRS: Clear restart mode (HOT Restart)
System running lamp	RUN	Glows steadily when the system is running without major problems.
System alarm lamp	ALM	Glows steadily when a minor problem occurs.
Timer overflow lamp	TO	Glows steadily when normal computer program sequencing is interrupted.

Initialize the operating program and data base as follows:

1. Locate the CPM card, slot 20.
2. Locate the CPM toggle switch.
3. Locate the restart button.
4. Initiate a COLD restart.

   a. Hold the toggle switch on the CPM card in the UP position while momentarily depressing the restart button.
   b. Release the toggle switch. The toggle switch returns to center location.
5. Observe the LED on the CPM card.

   a. Ensure the RUN lamp is steadily ON.

System Verification Tests

8.3. Proper operation of the installed system must be verified before it is cut over to customer service. System verification tests are performed in four stages to test intra-system features and connections (without telephone company connections), outgoing off-premises (telephone company type) connections, incoming DID (Direct Inward Dialing) trunk connections, and system options/customer equipment. The following User's Guides may be referenced:

- CI-484420 CS-10, CS-20, and Single Line Telephone User's Guide
- CI-484428 CSD User's Guide
- CI-484439 Attendant Console User's Guide
- CI-484440 CSD User's Guide for Front Desk Console Capabilities

If problems occur during the verification, see TL-120201-1001 Maintenance.

NOTE: The system can be tested using the default data base. The default data base assigns 3-digit station numbers to stations, trunks to groups, COS to trunks and stations (per TL-120301-1001 Data Base). If the default data base is not used, the system must be modified to customer specifications before verification.

Intra-system Features and Connection Verification

8.3.1 Verify system features and line side station-to-station type connections as follows:

1. Establish a call between stations to evaluate proper operation and voice quality. Next, place a call to an off-hook station to verify a busy signal.

2. Establish calls between the Attendant Console and all stations to evaluate proper operation and voice quality.

3. Establish local system data connections to verify data switching operation and terminal message quality.

4. Evaluate installation specific programmed or default features using an intercom system for interactive communications between test personnel and/or using a prepared test plan/schedule.

b. Have an off-premises tester dial a station through any DID trunk to verify operation and call progress messages.

c. Evaluate voice quality.

FX Trunk Verification

2. Verify FX trunks for the same attributes as CO trunks by having an off-premises tester call into a local station.

Incoming Long Distance or In-WATS Verification

3. Each incoming long distance or in-WATS trunk should be tested for the same attributes as out-WATS trunks by having on off-premises tester call into the station.

System Verification of Options

8.3.4 Customer-provided equipment used with system options such as music-on-hold and external paging, as well as the SMDR and Hotel/Motel printer options, should be tested and verified.

Post-Installation Procedures

8.4 All requisite site information should be entered in the Site Log, TL-120401-1001 after the system installation is completed and verified. It is extremely important to complete this step, because the site log will become the document of record for the installation.

The last step in the installation sequence before cutover to customer service is to ensure that all cables are dressed, fastened, and labeled, that cards are seated, etc., and that the site is clean and in order. A checklist is provided as follows:

1. Cables are labeled?
2. Cabinet and power unit are properly grounded?
3. Required cards are installed?
4. Cable connectors are installed and secured on cabinet connectors?
5. Cables are dressed, tied, and labeled as required?
6. Cabinet door is closed and secured?
7. Cartons and packaging have been removed?
8. Installation site is cleared?

SMDR (STATION MESSAGE DETAIL RECORDING) OPTION

9.0 This section describes the installation of the optional SMDR (Station Message Detail Recording) used to provide a hard copy of outgoing call records. The SMDR option is implemented through data base software as described in TL-120301-1001 Data Base and is supported by a printer connected to one of the system's serial communications ports. The printer is provided by the customer or the firm responsible for the system sale/installation. The system, therefore, provides for a variety of different printer characteristics. This section references CMC (Change and Maintenance Command) codes which are described in TL-120301-1001 Data Base.

Printer, Cable, and System Communications Port Characteristics

9.1 The SMDR printer is connected to the RS-232C communications port of the system in a manner similar to the PMP installation (see section 6.0). Three functional types of printers are supported by the system: (DTE (Data Terminal Equipment) mode printer with RTS (Request To Send), DTE mode printer without RTS, or DCE (Data Communications Equipment) mode printer. The system can accommodate a wide range of characteristics of each type of printer. This is accomplished by configuring the system communications port characteristics to match the printers.

Supportable Printer Characteristics

9.1.1 Table 8.1 lists characteristic and two options supported by the system (power ON/OFF, and XON/OFF).

System Communications Port Characteristics

9.1.2 The SMDR printer is connected to the equipment cabinet on RS-232C serial communication port number 1 at connector CN14. The standard default values for RS-232C port 1 are listed in Table 8.1. After the printer installation, the port characteristics must be set up to match those of the printers, using CMC 900 and 901 as described in TL-120301-1001 Data Base.

Printer Cable Requirements

9.1.3 This paragraph describes the functional cable pinout requirements for the three types of printers supported by the system. Diagrams are provided for each printer type, showing cable leads, RS-232C circuit abbreviations, and DB25 connector pin numbers. Additional cable information is contained in Appendix I.

- The pin-to-pin cable configuration for a DTE Mode printer are shown in Appendix I.
- The pin-to-pin cable configuration for a DCE mode printer is shown in Appendix I.

SMDR Option Installation

9.2 This paragraph describes the procedures for installing the SMDR option.

System Communications Port Configuration

9.2.2 After the printer is installed, the system port must be configured to match the printer characteristics.

1. Set the following parameters to match the printer's characteristics using CMC 900 and the printer manufacturer's documentation:

   P1 Port - 1
   P2 Speed (bit/baud rate)
   P3 Code
   P3 Parity
   P4 Character Length (for 8 bit -- most significant bit equals space or zero)
   P5 Stop bit
   P6 Echo Back

2. Set the following parameters to match the printer's characteristics using CMC 901 and the printer manufacturer's documentation.

   P1 Port - 1
   P2 XON/XOFF Option-If Printer supports - see paragraph 8.2.3.-If printer does not support, set to NO.
   P3 Power control Power On/Off Option-If Printer supports - see paragraph 8.2.4. If printer does not support, set to NO.
   P4 Power On Timing
   P5 Power Off Timing
   P6 Printer Format

Printer XON/XOFF Option

9.2.3 The system has the ability to provide an XON/XOFF option to start/stop character transmission from the system to the printer. If the system receives an XOFF character from the printer, the system stops transmitting characters immediately. This may happen when there is no paper in the printer. After adding paper, the printer status is set to receive characters and the printer sends the XON character. When the XON character is received by the system, characters are again sent to the printer. XON/XOFF character can be selected using CMC 901:

Using the Printer Manufacturer's documentation, select/set the XON/XOFF character from the following two patterns:

- Pattern 1: XON/DC1 XOFF/DC3
- Pattern 2: XON/DC2 XOFF/DC4

NOTES:

1. DC1, DC2, DC3, and DC4 are ASCII code characters.
2. The system automatically resets to XON character 30 seconds after receiving an XOFF character in cases where XON is not received (e.g., transmission error).

(8) = Account code (If not specified, no code is output)
(9) = Tenant number (If not specified, no tenant number is output)
(10) = Metering group (If not specified, no metering group is output)

Message Screening

9.3.2 System messages are output as a supplement to call base messages. The following shows the system messages and descriptions.

Time and Date Change

This message is printed out just before the first SMDR message in an hour to indicate time and date and separate the SMDR messages. Time increments by hour. The format is as follows:

HH:MM MM/DD/YY

Where

HH:MM = Time

MM/DD/YY = Date

System Restart

When a COLD restart or HOT restart occurs, the system restart message with date is output as follows:

```
SYSTEM READY MM/DD/YY
```

Power Failure

When a power failure occurs during an output, the power failure message is output after restoration of power as follows:

```
POWER FAIL
```

- Printer without paper end alerting function

  a. This type of printer continues to output SMDR message or system messages even if paper ends. Turn the printer power OFF immediately. Change the paper. Turn the printer power ON. The messages that were printed out during paper end will have been erased from the system and cannot be retrieved.

  b. If there is enough time before the paper ends, enter the CMC command (CMC 705) to BUSY OUT the printer. Change the paper quickly while the system holds the call messages in its buffer. Enter the CMC command (CMC 705) and place the printer in-service.

Hotel/Motel Printer Option

10.0 This section describes the installation of the optional Hotel/Motel printer used to provide hard-copy output of call records for Hotel/Motel applications. The Hotel/Motel option is implemented through data base software as described in TL-120301-1001 Data Base, and is supported by one or two printers. The printers are connected to the system using a DIU (Data Interface Unit) or CSD with DTA (Data Terminal Adapter). The system interface for the Hotel/Motel printer is the 4CHT (Character Trunk) card. Since the printer can be provided by the customer or by the firm responsible for the system sale/installation, the system provides support for a variety of printer characteristics. This section references CMC (Change and Maintenance Command) codes which are described in TL-120301-1001 Data Base.

Printer, Cable, and DIU/DTA Port Characteristics

10.1 Two Hotel/Motel printers can be connected to the RS-232C connectors of DIUs or DTAs as described in section 5.0. Two functional types of printers are supported: (DTE (Data Terminal Equipment) mode printer with DTR/RTS (Data Terminal Ready/Request To Send), or DTE mode printer without DTR/RTS. The system can accommodate a wide range of characteristics of each type. This is accomplished by configuring the DIU/DTA port characteristics to match the printers.

Supportable Printer Characteristics

10.1.1 Table 10.1 lists printer characteristics and two options supported by the system.

DIU/DTA/Port Characteristics

10.1.2 An example of how the Hotel/Motel printer(s) are connected to the switching system is shown in Figure 10.1. After the printer(s) is installed, the serial port characteristics must be set to match those of the printers (see TL-120301-1001 Data Base manual).

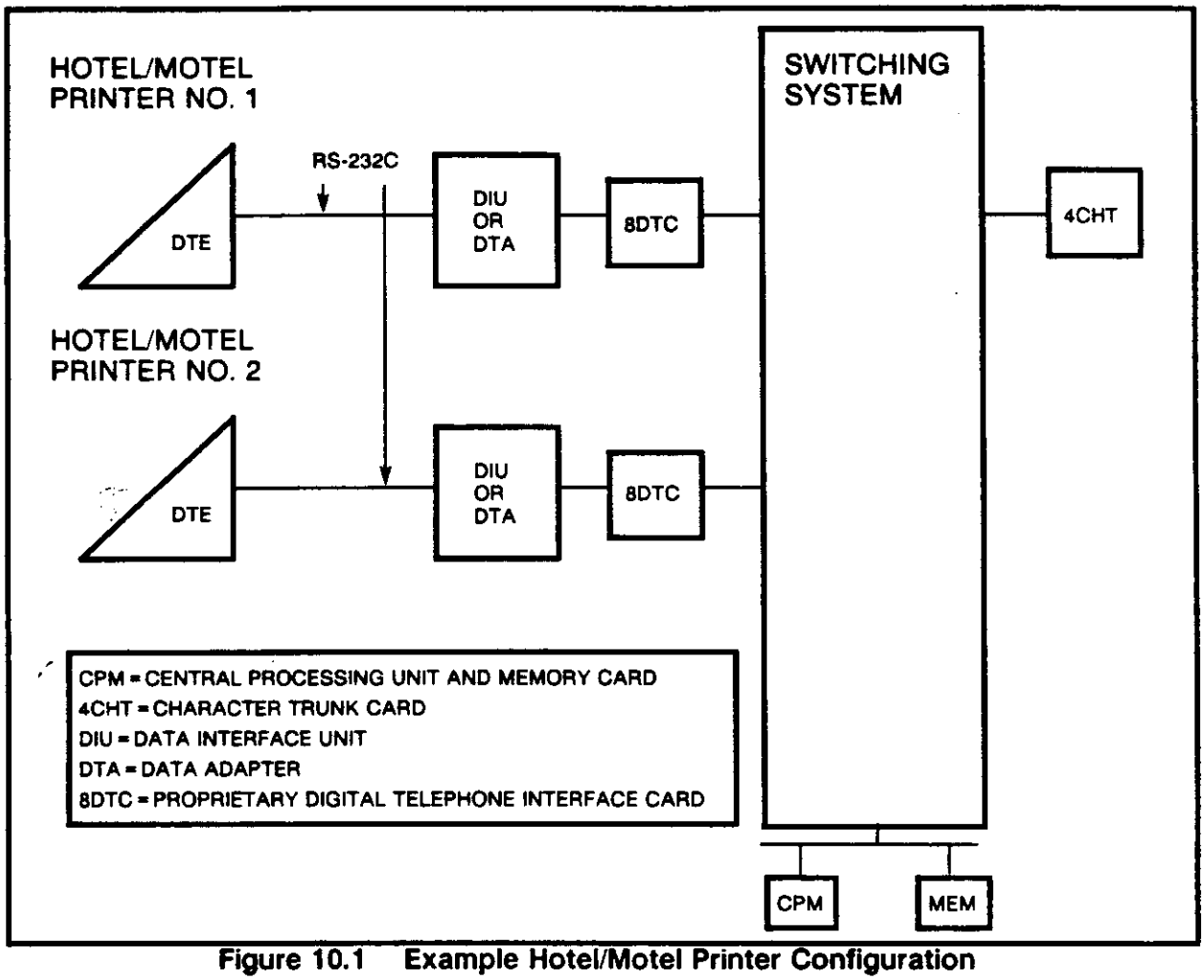


Figure 10.1 Example Hotel/Motel Printer Configuration

P2 Data Speed (bit/baud rate 110 through 19,200 bps)
P3 Synchronization and communications
P4 Word structure (stop bits/word length)
P5 Parity
P6 Echo

2. Set the following parameters to match the printer characteristics using CMC 223 and the printer manufacturer's documentation:

P1 Directory Number
P2 Call Control Mode
P3 RS-232C Interface Mode 1
P4 RS-232C Interface Mode 2

Hotel/Motel Printer Option

10.3 This paragraph describes the operational aspects and printer message formats of the Hotel/Motel printer option. Topics covered include message formats, message screening, and loading the printer paper.

Hotel/Motel Printer Output Format

10.3.1 The following describes the Hotel/Motel printer output format. The messages that are output to the Hotel/Motel printer are classified into the following types:

- Common Messages. These are messages that are independent of the FDC (Front Desk Console) operation. The common messages are output to the pre-registered Hotel/Motel printer.

- Independent Messages. These are messages related to the associated FDC operation. The independent messages are output according to FDC operation.

The Hotel/Motel printer output format is shown in Table 10.2.

The messages that are printed out are as follows:

1. Automatic wake-up registration
2. Automatic wake-up cancellation
3. Automatic wake-up execution
4. Automatic wake-up report
5. Message registration addition
6. Message registration clear
7. Message registration verification
8. Message registration report
9. Short power failure
10. Printer failure
11. Real-time clock failure
12. Real-time clock repair
13. Real-time clock change

Table 10.2 Hotel/Motel Printer Output Format (80 Column) (Continued)

MESSAGE TYPE	OUTPUT
Message Registration	
Addition	mm/dd hh:mm MESSAGE* ADDED rrrr $ddd.cc⊙ $ddd.cc BY rrrr
Clear	mm/dd hh:mm MESSAGE* CLEARED rrrr $ddd.cc⊙ BY rrrr
Verification	mm/dd hh:mm MESSAGE* VERIFIED rrrr $ddd.cc BY rrrr
Report	mm/dd hh:mm MESSAGE* REGISTRATION PRINT OUT BY rrrr
	rrrr $ddd.cc rrrr $ddd.cc rrrr $ddd.cc rrrr $ddd.cc rrrr $ddd.cc
	eeeeee

NOTE:

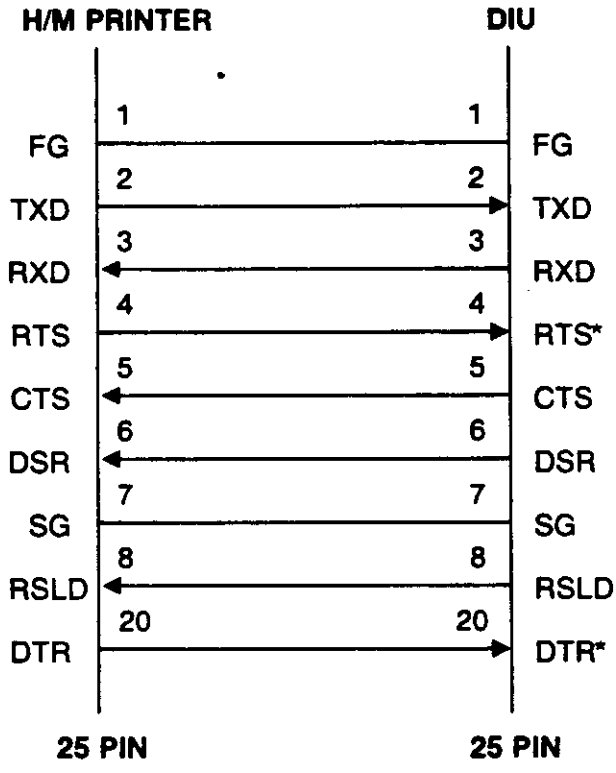
mm/dd hh:mm	=	operated day and time
rrrr	=	registered, cancelled, or verified room number
$ddd.cc⊙	=	old charge
$ddd.cc	=	new message or current charge
BY rrrr	=	operated station number
eeeeee	=	completion message (end or cancel)

MESSAGE TYPE	OUTPUT		
Other			
Short power failure	POWER FAIL		
Printer failure	PRINTER FAILURE		
Real time clock failure	CLOCK FAIL	hh.mm	CHECK WAKE-UP
Real time clock repair	CLOCK REPAIR	hh.mm	CHECK WAKE-UP
Real time clock change	CLOCK CHANGE	hh.mm	CHECK WAKE-UP

APPENDIX I

SECTION 1

CABLE PINOUT DIAGRAMS FOR EQUIPMENT CONNECTED TO THE DIU (DIGITAL INTERFACE UNIT)



*NOTE: DTR signal and/or RTS signal must be omitted and the DTR option and/or RTS option are set by command (CMC-223).

Figure AI-1.2 Cable Pin-Out for a Hotel/Motel Printer Connected to a DIU

DTA Interface

RS-232C Interchange Circuits			Pin Number
Description	Abbr.	Circuit	
Protective Ground	FG	AA	1
Signal Ground (Common Return)	SG	AB	7
Transmitted Data	TD	BA	2
Received Data	RD	BB	3
Request to Send	RTS	CA	4
Received Line Signal Detector	RLSD	CF	8
Clear to Send	CTS	CB	5
Data Set Ready	DSR	CC	6
Data Terminal Ready	DTR	CD	20
Transmission Signal Element Timing (DCE Source)	ST2	DB	15
Receiver Signal Element Timing (DCE Source)	RT	DD	17
Ring Indicator	RI	CE	22

Terminal With DTE Type Interface

Pin Number	RS-232C	
	Abbr.	Circuit
1	FG	AA
7	SG	AB
2	TD	BA
3	RD	BB
4	RTS	CA
8	RLSD	CF
5	CTS	CB
6	DSR	CC
20	DTR	CD
15	ST2	DB
17	RT	DD
22	RI	CE

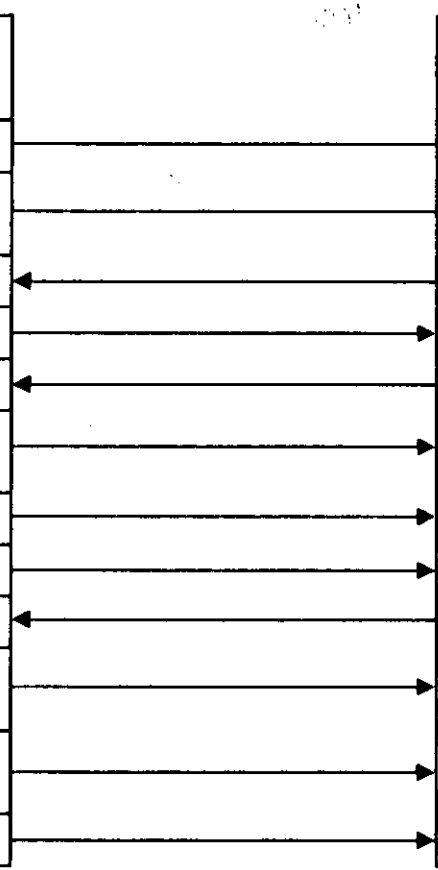
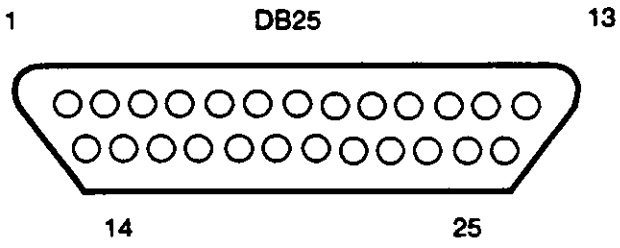
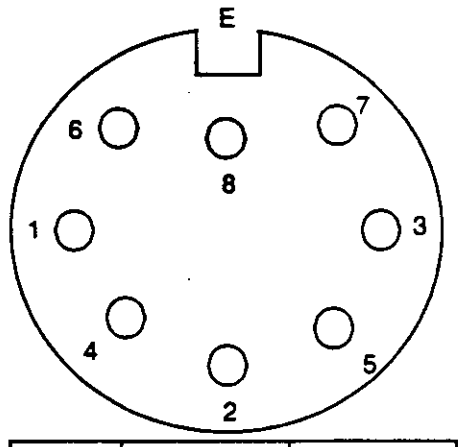


Figure AI-2.1 Generic Cable Pin-Out for a DTE Type Terminal Connected to a DTA



NO.	SIGNAL	COLOR
1	FG	(SHIELD)
2	TXC	WHITE
3	RXD	RED
4-5	---	BLUE
6	DSR	GREEN
7	SG	BLACK
8	CD	BROWN
9-19	NOT USED	---
20	DTR	YELLOW
21-25	NOT USED	---



NO.	SIGNAL	COLOR
1	SG	BLACK
2	TXD	RED
3	RXD	WHITE
4	RTS	BROWN
5	CTS	BROWN
6	DSR	YELLOW
7	DTR	GREEN
8	CD	BLUE
E	FG	(SHIELD)

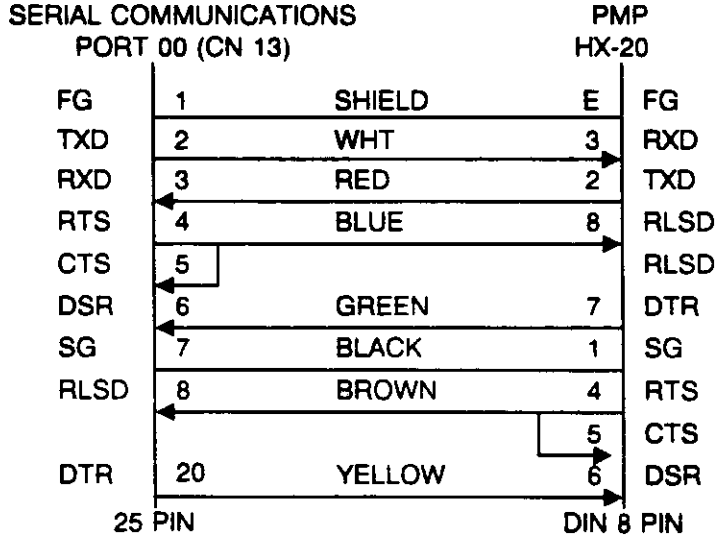
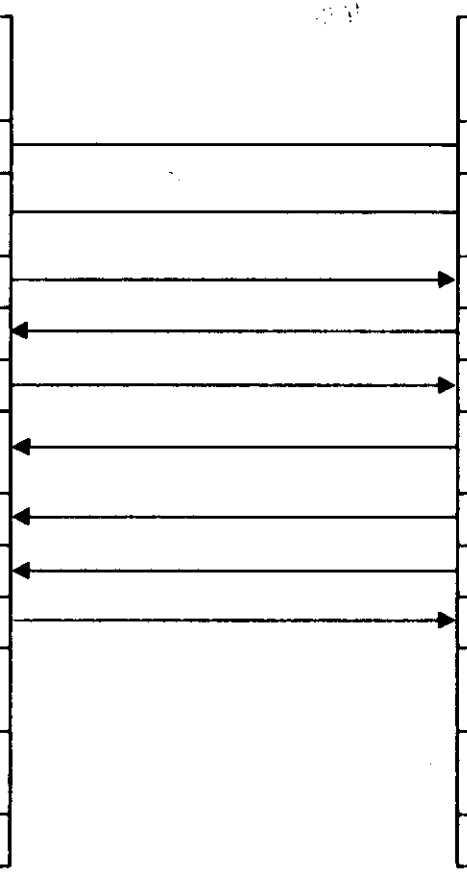


Figure AI-3.1 Specific Cable Pinout for PMP Connected to the Serial Communications Port

IBM PC Interface

RS-232C Interchange Circuits			Pin Number
Description	Abbr.	Circuit	
Protective Ground	FG	AA	1
Signal Ground (Common Return)	SG	AB	7
Transmitted Data	TD	BA	2
Received Data	RD	BB	3
Request to Send	RTS	CA	4
Received Line Signal Detector	RLSD	CF	8
Clear to Send	CTS	CB	5
Data Set Ready	DSR	CC	6
Data Terminal Ready	DTR	CD	20
Transmission Signal Element Timing (DCE Source)	ST2	DB	15
Receiver Signal Element Timing (DCE Source)	RT	DD	17
Ring Indicator	RI	CE	22



Modem with DCE

Pin Number	RS-232C	
	Abbr.	Circuit
1	FG	AA
7	SG	AB
2	TD	BA
3	RD	BB
4	RTS	CA
8	RLSD	CF
5	CTS	CB
6	DSR	CC
20	DTR	CD
15	ST2	DB
17	RT	DD
22	RI	CE

Figure AI-3.3 Cable Pinout for DCE Type Modem Connected to the IBM PC for Use as a Remote Maintenance Device

Serial Communications Interface Port 01 (CN14)

RS-232C Interchange Circuits			Pin Number
Description	Abbr.	Circuit	
Protective Ground	FG	AA	1
Signal Ground (Common Return)	SG	AB	7
Transmitted Data	TD	BA	2
Received Data	RD	BB	3
Request to Send	RTS	CA	4
Received Line Signal Detector	RLSD	CF	8
Clear to Send	CTS	CB	5
Data Set Ready	DSR	CC	6
Data Terminal Ready	DTR	CD	20
Transmission Signal Element Timing (DCE Source)	ST2	DB	15
Receiver Signal Element Timing (DCE Source)	RT	DD	17
Ring Indicator	RI	CE	22

SMDR Printer with DTE Type Interface

Pin Number	RS-232C	
	Abbr.	Circuit
1	FG	AA
7	SG	AB
2	TD	BA
3	RD	BB
4	RTS	CA
8	RLSD	CF
5	CTS	CB
6	DSR	CC
20	DTR	CD
15	ST2	DB
17	RT	DD
22	RI	CE

Figure AI-3.5 Cable Pinout for DTE Type SMDR Printer Connected to the Serial Communications Port

Serial Communications Interface
Port 01 (CN14)

SMDR Printer
3M

RS-232C Interchange Circuits			Pin Number
Description	Abbr.	Circuit	
Protective Ground	FG	AA	1
Signal Ground (Common Return)	SG	AB	7
Transmitted Data	TD	BA	2
Received Data	RD	BB	3
Request to Send	RTS	CA	4
Received Line Signal Detector	RLSD	CF	8
Clear to Send	CTS	CB	5
Data Set Ready	DSR	CC	6
Data Terminal Ready	DTR	CD	20
Transmission Signal Element Timing (DCE Source)	ST2	DB	15
Receiver Signal Element Timing (DCE Source)	RT	DD	17
Ring Indicator	RI	CE	22

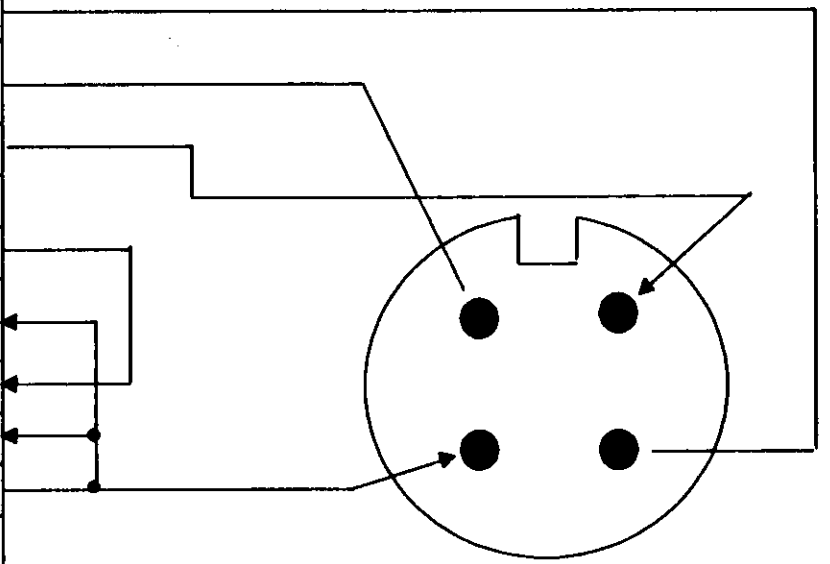
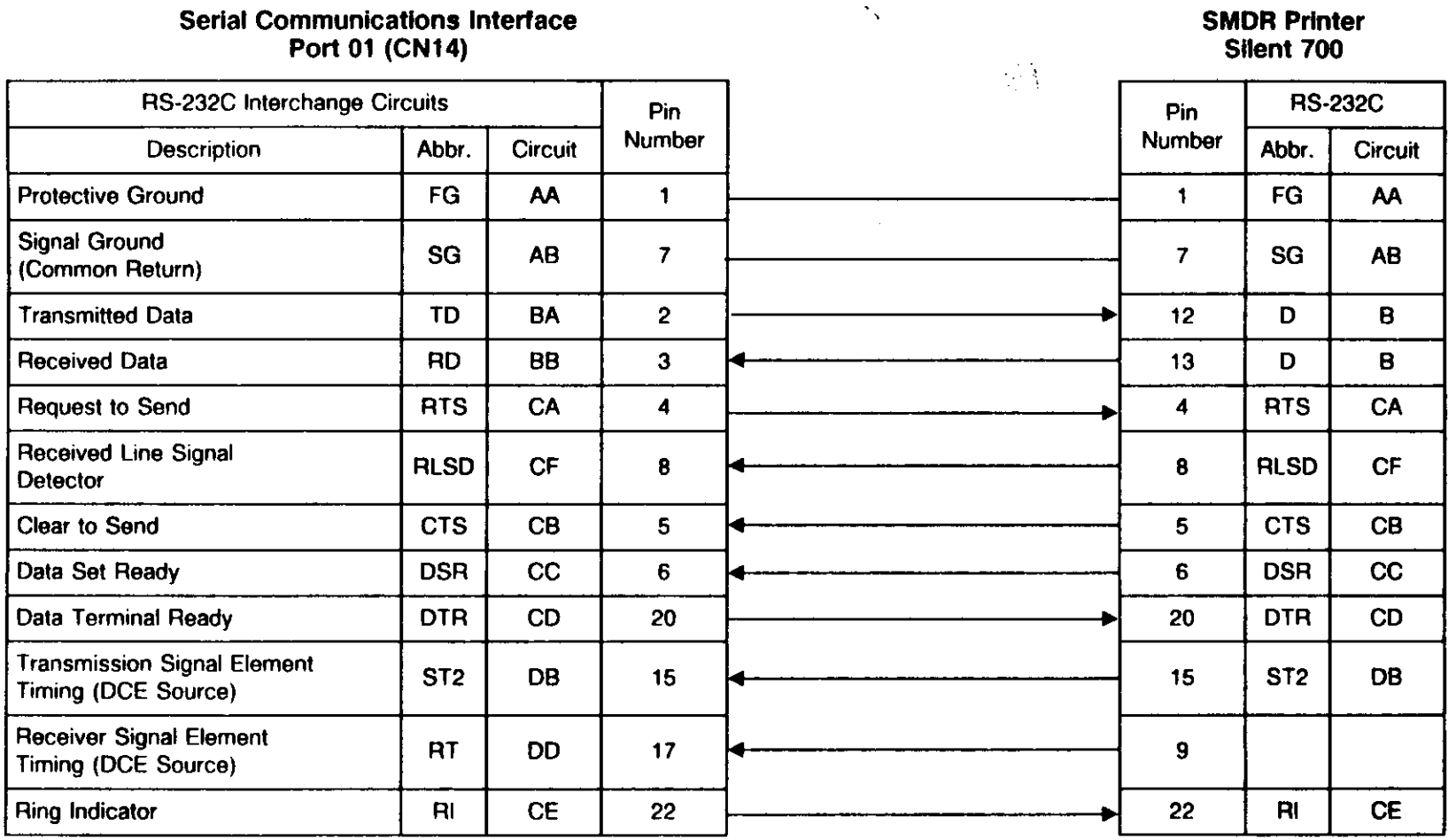


Figure AI-3.7 Specific Cable Pinout for 3M Printer Used as an SMDR Printer



RS-232C Interchange Circuits			Pin Number	Pin Number	RS-232C	
Description	Abbr.	Circuit			Abbr.	Circuit
Protective Ground	FG	AA	1	1	FG	AA
Signal Ground (Common Return)	SG	AB	7	7	SG	AB
Transmitted Data	TD	BA	2	12	D	B
Received Data	RD	BB	3	13	D	B
Request to Send	RTS	CA	4	4	RTS	CA
Received Line Signal Detector	RLSD	CF	8	8	RLSD	CF
Clear to Send	CTS	CB	5	5	CTS	CB
Data Set Ready	DSR	CC	6	6	DSR	CC
Data Terminal Ready	DTR	CD	20	20	DTR	CD
Transmission Signal Element Timing (DCE Source)	ST2	DB	15	15	ST2	DB
Receiver Signal Element Timing (DCE Source)	RT	DD	17	9		
Ring Indicator	RI	CE	22	22	RI	CE

Figure AI-3.9 Specific Cable Pinout for Silent 700 Printer Used as an SMDR Printer

APPENDIX II

SYSTEM HARDWARE LIST

AND

PART NUMBERS

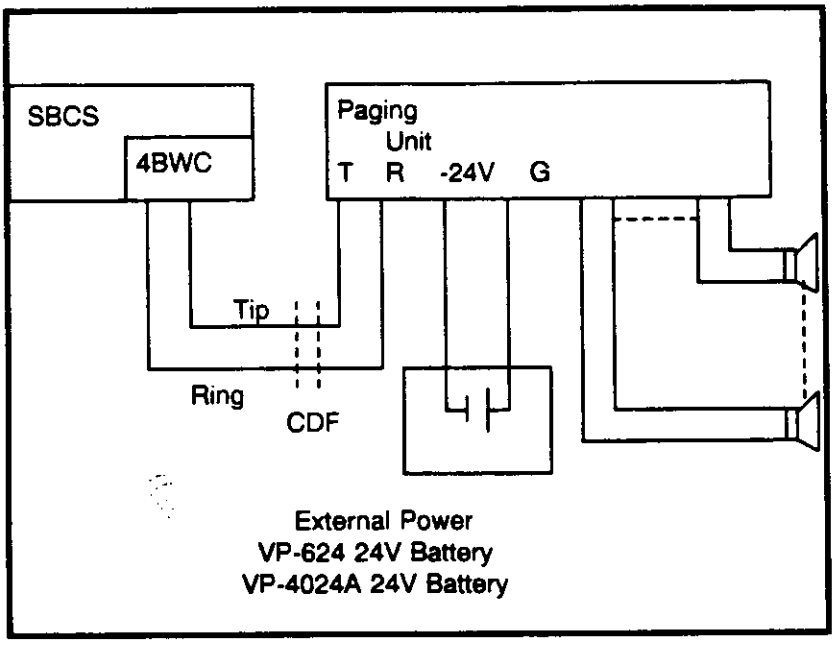
SYSTEM HARDWARE LIST AND PART NUMBERS (Continued)

ORDER CODE	CATALOG NO.
CS-10 (GTE Label) (GTELIA)	SB-8102244136
CS-20 (GTE Label) (GTELIB)	SB-8100634136
DSS40 (GTE Label)	SB-8100664136
DSS80 (GTE Label)	SB-8100674136
CSD (GTE Label) (GTELII)	SB-9103264000
Telephone Wall Mounting Kit (TELLWMK)	SB-8102174136
Data Interface Unit	SB-910406000
Data Terminal Adapter (with AC adapter)	SB-9103263000
Power Cable (PCBL)	SB-8102134136
Cabinet, Front Cover (CABFC)	SB-8102144136
Cabinet, Front Cover (CABFC) (Expansion)	SB-10010022
Cabinet Mounting Bracket (CABMB)	SB-8102154136
Battery (BATT)	SB-8102164136
Directory Tray (100 pc.) (DTRAY)	SB-8102184136
Tray Sheet (100 pc.) (TRAYSH)	SB-8102194136
Telephone Sheet (10 pc.) (TELSH)	SB-8102204136
DSS Sheet (100 pc.) (DSSH)	SB-8102214136
Plastic Sheet Cover (EKT) (100 pc.) (PLCVR-EKT)	SB-8102224136
Plastic Sheet Cover (DSS) (100 pc.) (PLCVR-DSS)	SB-8102234136
Preprinted Button Labels (25)	SB-9101596000
Blank Button Labels	SB-9101613000
Portable Maintenance Panel (PMP)	SB-9102143000
PMP Software VO.6	SB-9101262000
Floppy Disk Drive	SB-9103418000
PMP Cable (4-foot)	SB-9102144000
PMP Cable (10-foot)	SB-9103224000
RAM Expansion Unit for PMP	SB-9103419000
PMP Disk Drive Cable	SB-9103420000

APPENDIX III

INSTALLATION NOTES FOR OPTIONAL VOICE APPLICATION FEATURES

Connection



Without talkback
V-1020C Ceiling Speaker
V-1022C Wall Speaker
V-1030B (5w) Horn Speaker
V-1036B (15w) Horn Speaker
(Required - 24V Power Connection)

With talkback
V-1060A without LED Ceiling Speaker
V-1060B with LED Ceiling Speaker
V-1062B without LED Wall Speaker
V-1062B with LED Wall Speaker
V-1048A without LED Horn Speaker
V-1048B with LED Horn Speaker

Programming Steps

A. For use with Package A

1. Select an unused trunk group number (TGN)13 to 30 for paging access.

2. Select paging access code. Should you choose to change the access code from the default, you can do so at CMC 100.

3. Assign trunk data at CMC 250.

   P1 = Equipment Number
   P2 = Feature Number
   P3 = Trunk Group Number (TGN)
   P4 = 2 (outgoing only)
   P5 = 2 (loop)
   P6 = 1 (wink start)

4. Release all restrictions at CMC 400.

   P1 = Trunk Group Number
   P2 = Blank
   P3 = Blank

NOTE: To enter blank at CMC 400, put trunk group number in P1 and press display. Move cursor to P2 and press cancel, move cursor to P3 and press cancel. Now press add/change. Do not assign this TGN for LCR or SMDR output.

Connections

1. 4BWC Interface (Table AIII.1). No selection of zone. Talkback not required.

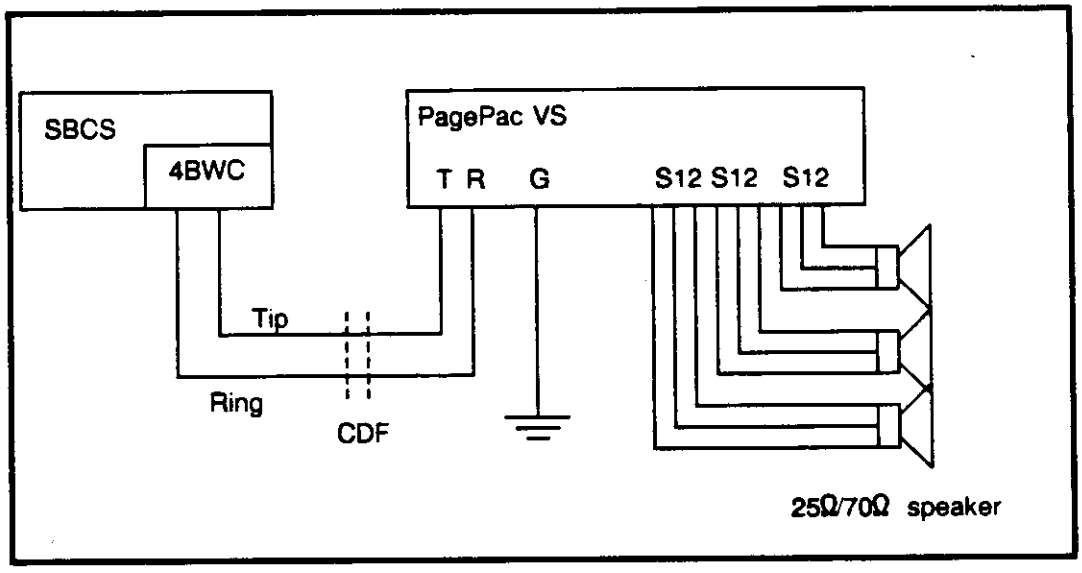


Table AIII.1 J1 OPTION BLOCK TERMINALS
PagePac VS

TALK BATTERY	JUMPERS IN	JUMPERS OUT
-24V	3-3 4-4 6-6 8-8 10-10 11-11	1-1 2-2 5-5 7-7 9-9
-48V	2-2 4-4 6-6 8-8 10-10 11-11	1-1 3-3 5-5 7-7 9-9

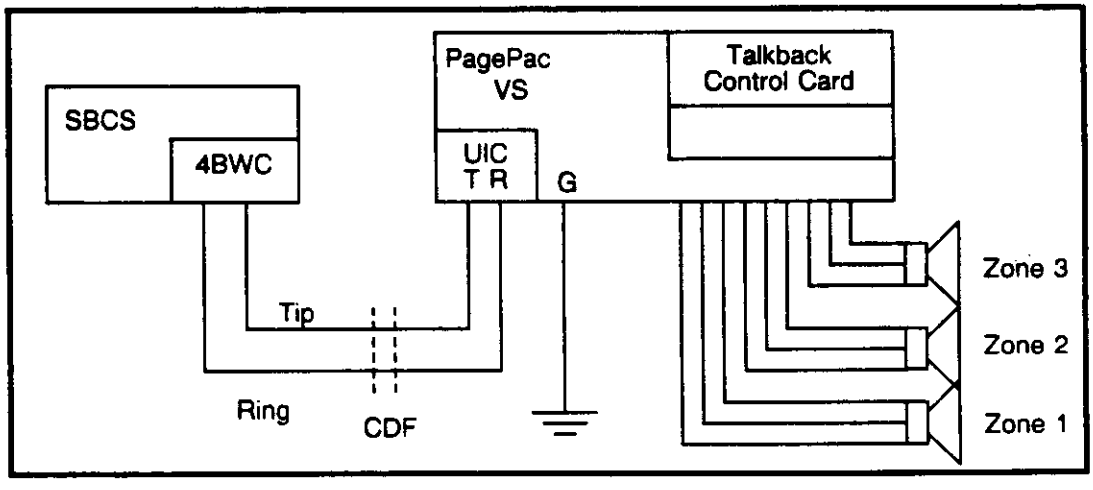
Table AIII.2 J1 OPTION BLOCK TERMINALS on PagePac VS

TALK BATTERY	JUMPERS IN	JUMPERS OUT
-24V	3-3 4-4 6-6 8-8 10-10	1-1 2-2 5-5 7-7 9-9 11-11
-48V	2-2 4-4 6-6 8-8 10-10	1-1 3-3 5-5 7-7 9-9 11-11

Table AIII.3 J3 OPTION BLOCK TERMINALS on UIC

1-1	JUMPER IN
2-2	JUMPER OUT
3-3	JUMPER IN

4. 4BWC Interface. Selection of zones required. Talkback required.



Programming Steps

A. 4BWC Interface with Package A

Follow programming steps in AIII-1.1, Part A.

B. 4BWC Interface with Packages B, C, and D

Follow programming steps in AIII-1.1, Part B.

C. 8SLC Interface with Packages A, B, and C

1. Station directory number can be changed at CMC 200.

2. Change BT and ROT timing (duration of reorder tone at CMC 103 -- this changes BT ROT timing of all call connection).

   P1 = ID for timing (33)
   P2 = Multiplier (5 or 9)

D. SLC Interface with Package D

1. Station directory number can be changed at CMC 200.

2. Change parameter P6 at CMC 204 from 0 to 1 to stop the ROT.

   P1 = Directory number
   P2 = 0
   P3 = 0
   P4 = 0
   P5 = 0
   P6 = 1

C.8SLC Interface with Packages A, B, and C

1. Station directory number can be changed at CMC 200.

2. Change BT and ROT timing (duration of reorder tone at CMC 103 -- this changes BT ROT timing of all call connection).

   P1 = ID for timing (33)
   P2 = Multiplier (5 or 9)

D.SLC Interface with Package D

1. Station directory number can be changed at CMC 200.

2. Change parameter P6 at CMC 204 from 0 to 1 to stop the ROT.

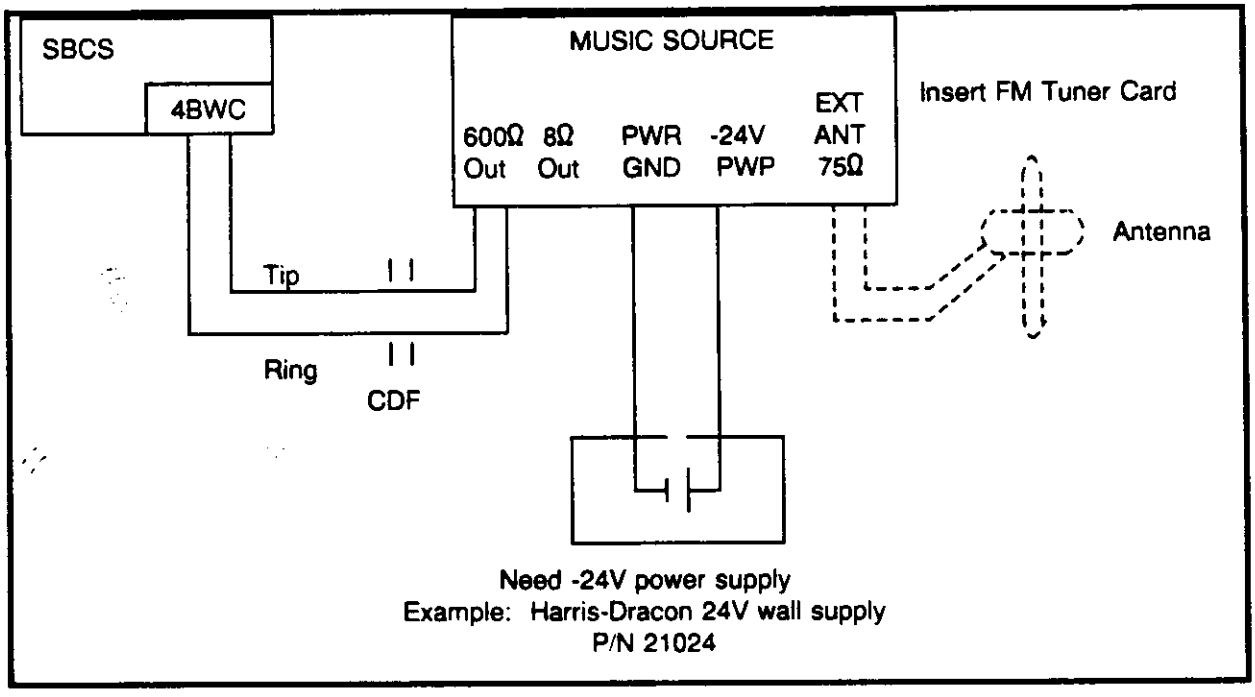
   P1 = Directory number
   P2 = 0
   P3 = 0
   P4 = 0
   P5 = 0
   P6 = 1

SECTION II MUSIC-ON-HOLD

AIII 2.1 Harris Installation Notes (-24V Power Supply is required)

FM Music Source -- Model Number: 22550-001

Connection



Programming Steps

1. Assign trunk data at CMC 250.

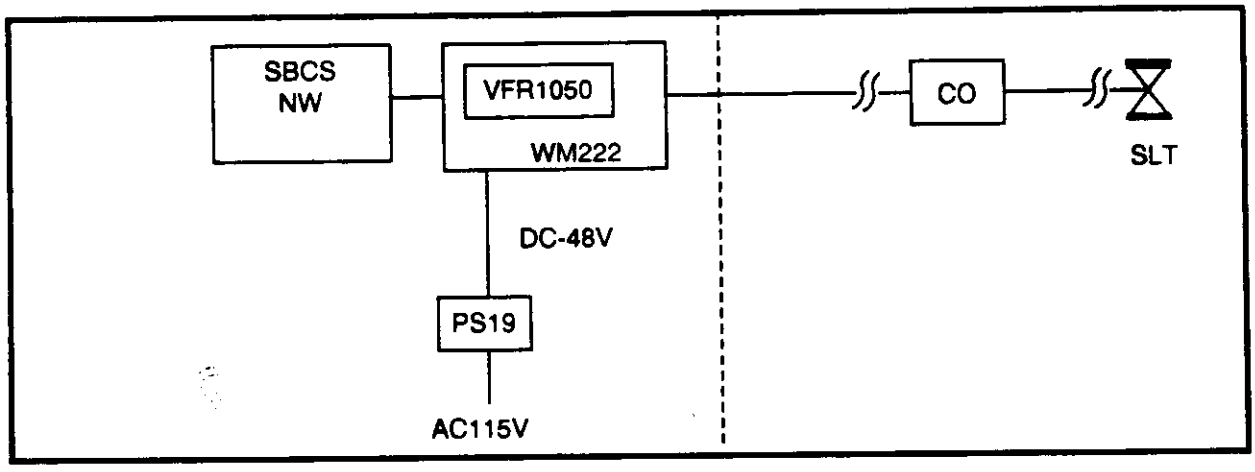
   P1 = Equipment Number
   P2 = Feature Number (11)

2. Assign Music-On-Hold at CMC 305.

   P1 = Equipment Number

C. Loop Limit

1. Loop Resistance: Up to 600 ohms (including CO) (UM2500 is not needed)



2. Loop Resistance: 600-1200 ohms (including CO). (UM 2500 must be set to 36V boost operation.)

3. Loop Resistance: 1200-1600 ohms (including CO). (UM2500 must be set to 48V boost operation.)

4. Loop Resistance: 1600-2100 ohms (including CO). (UM2500 must be set to 48V boost operation and CO must be sent dial pulse.)

2. Configuration 2

A. Components

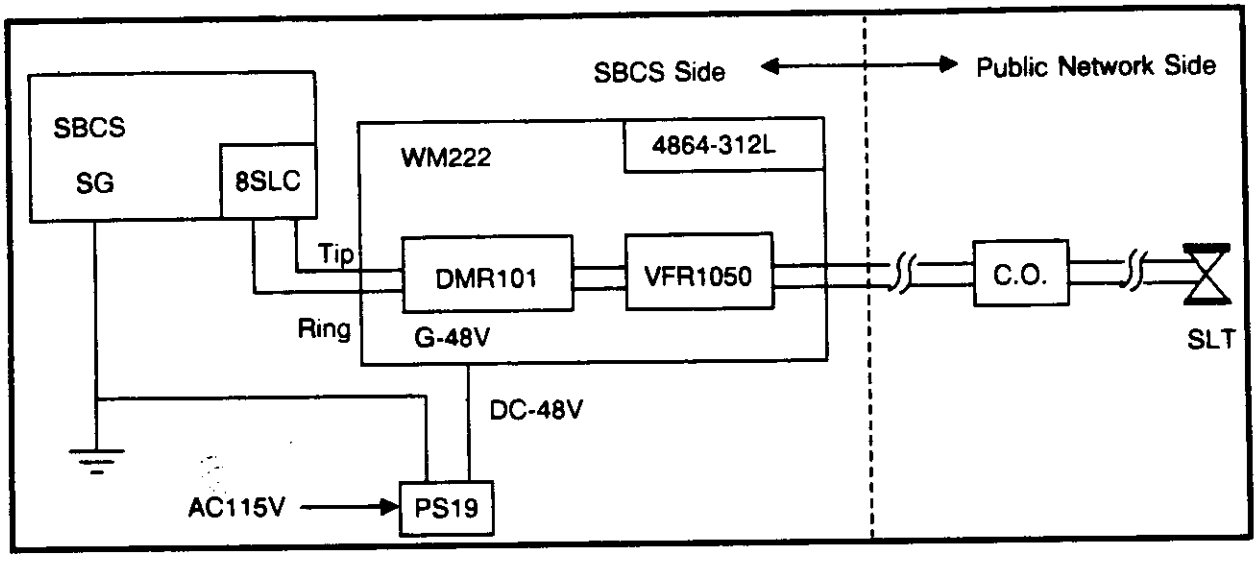
1. DMR101W Dial Range Module

2. VFR5050 Voice Frequency Repeater (FCC-Part 68 registered)

3. PS19 Power Supply with fixed -48 VDC output

4. Wescom Type 400 Mounting Shelf

B. Connection



C. Loop Limit

1. Loop Resistance: Up to 600 ohms (including CO). (DMR 101 and 4864-312L is not required.)

2. Loop Resistance: Up to 1350 ohms (including CO). (DMR 101 must be set to 48V boost operation.)

E

G

H

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