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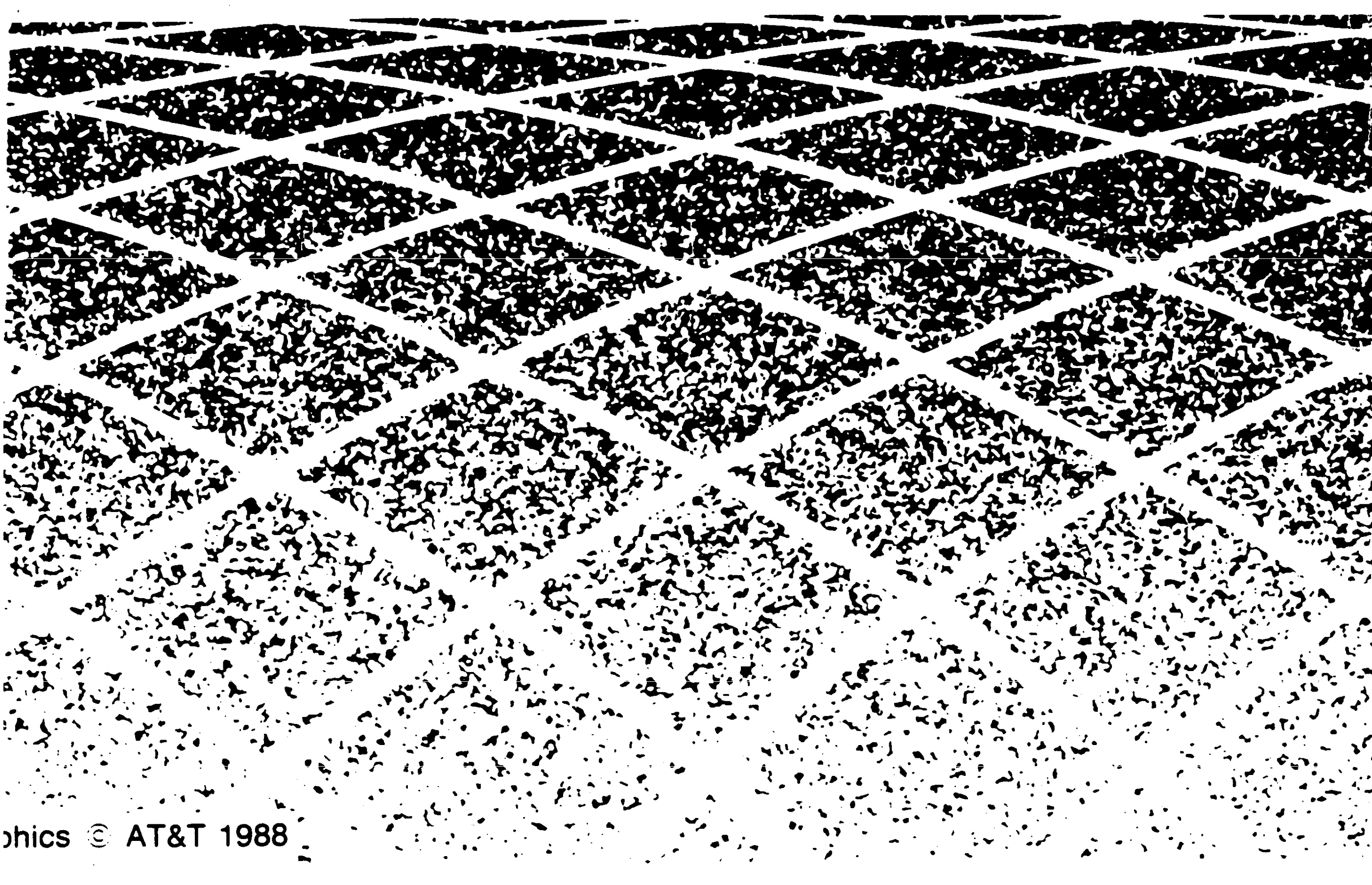
DEFINITY® Communications System Generic 1 and Generic 3

System Description and Specifications



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Federal Communications Commission Statement

Class A Statement. This equipment generates, uses, and can radiate radio-frequency energy and, if not installed and used in accordance with the instruction manual, may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment.

Operation of this equipment in a residential area is likely to cause interference, in which case the user at his/her own expense will be required to take whatever measures may be required to correct the interference.

Network Registration Number. This equipment is registered with the FCC under FCC network registration number AS593M-13283-MFE.

Answer-Supervision Signaling. Allowing this equipment to be operated in such a manner as to not provide proper answer-supervision signaling is in violation of Part 68 rules. This equipment returns answer-supervision signals to the public switched network when:

- Answered by the called station
- Answered by the attendant
- Routed to a recorded announcement that can be administered by the CPE user.

This equipment returns answer-supervision on all DID calls forwarded back to the public switched telephone network. Permissible exceptions are:

- A call is unanswered
- A busy tone is received
- A reorder tone is received

Trademarks

DEFINITY is a registered trademark of AT&T. In this document, DEFINITY Communications System Generic 3 is often abbreviated to DEFINITY Generic 3 or Generic 3.

Ordering Information

The ordering number for this document is 555-230-200 To order this document, call the AT&T Customer Information Center at 1-800-432-6600 (in Canada, 1-800-255-1242). For more information about AT&T documents, refer to the *Business Communications Systems Publications Catalog* (555-000-010).

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Acknowledgment

This document was prepared by the AT&T Technical Publications Department, Denver CO.

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About This Document

This document offers a comprehensive system-level description of these AT&T switches:

- DEFINITY® Communications System Generic 1 (G1)
- DEFINITY Communications System Generic 3 (G3)

This document contains the following information about G1 and G3 switches:

- High-level overview
- Hardware description
- Power and grounding description
- Configuration diagrams
- Cabling diagrams
- Architecture description
- Connections to external trunks, lines, and peripheral systems
- Technical specifications

Intended Audiences

The information in this document is intended for the following readers:

- Customer personnel, AT&T marketing, sales, installation and services personnel to understand G1 and G3
- Educators and trainers to understand and teach G1 and G3 to AT&T and customer personnel

How this Document Is Organized

This document consists of the following chapters, and a glossary and index as follows:

- Chapter 1, “Overview” — Introduces G1 and G3, presents an overview of hardware, architecture, administration and maintenance, provides a brief functional description of the systems, lists G3-G enhancements, and compares the systems
- Chapter 2, “Cabinets, Carriers, and Circuit Packs” — Describes the main system hardware components: cabinets, carriers, and circuit packs
- Chapter 3, “Power and Fans” — Describes AC and DC power systems, ground wiring, and cooling fan units in the system cabinets
- Chapter 4, “Cabinet and Carrier Configurations” — Describes the various configurations of cabinets and carriers, which compose different systems
- Chapter 5, “Cabling” — Describes the cabling between carriers, cabling between cabinets, and cabling between the system and external environment
- Chapter 6, “Architecture” — Describes the operating system, applications software (call processing, maintenance, and administration), internal connectivity, and protocols handled by the system
- Chapter 7, “Connections to Trunks, Data Lines, and Networks” — Describes the types of trunks, data lines, and networks that can be connected to the system
- Chapter 8, “Connections to Peripherals” — Describes optional external data terminal equipment (DTE) and data communications equipment (DCE) that can be connected to the system
- Chapter 9, “Maintenance” — Describes hardware, tests, procedures, error logs, alarm logs and documents used for maintaining and testing the system
- Chapter 10, “Environmental Requirements” — Describes floor area, wall area, temperature and humidity, lighting, air purity, and noise levels required for the system and peripheral equipment connected to the system
- Chapter 11, “Technical Specifications” — Lists the specifications for capabilities, performance, and capacities of the system
- Abbreviations
- Glossary
- Index

Conventions Used in this Document

The following conventions are used in this document:

- The word, *system,* in relation to DEFINITY is a general term that encompasses DEFINITY G1 and DEFINITY G3.
- DEFINITY systems are called: DEFINITY G1; DEFINITY G3; DEFINITY G3i; DEFINITY G3i-Global; DEFINITY G3r; G1; G3; G3i; G3i-Global and G3i-G; G3r.
- All occurrences of G3 without an “i,” “r,” or “i-Global” following the “3” mean *G3i, G3i-Global,* and *G3r.*
- A component of a DEFINITY system, such as a circuit pack, which occurs without reference to any specific DEFINITY system, is assumed to be part of DEFINITY G1 and DEFINITY G3.

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Related Documents

The following AT&T documents are useful for system-related information:

- "Introduction to DEFINITY Communications System Generic 3" (555-230-020)
- "DEFINITY Communications System Generic 3 — Capabilities" (555-230-499)
- "DEFINITY Communications System Generic 1 and Generic 3 Feature Description" (555-230-201)
- "DEFINITY Communications System Generic 1 and Generic 3 Planning and Configuration" (555-230-600)
- "DEFINITY Communications System Generic 1 and Generic 3 Main Distribution Field Design" (555-230-630)
- "DEFINITY Communications System Generic 1 and Generic 3 Installation and Test" (555-230-104)
- "DEFINITY Communications System Generic 1 and Generic 3i Implementation" (555-230-650)
- "DEFINITY Communications System Generic 3r Implementation" (555-230-651)
- "DEFINITY Communications System Generic 1 and Generic 3 System Management" (555-230-500)
- "DEFINITY Communications System Generic 1 and Generic 3i Maintenance" (555-204-105)
- "DEFINITY Communications System Generic 3r Maintenance" (555-230-105)
- "DEFINITY Communications System Generic 1 and Generic 3i — Upgrades and Additions" (555-204-106), which will be available 9/92
- "DEFINITY Communications System Generic 3r — Upgrades and Additions" (555-230-106)
- "DEFINITY AUDIX System — System Description" (585-300-205)
- "AT&T Network and Data Connectivity" (555-025-201)

This document contains some information that is duplicated in the documents listed below. Procedures on how to plan and configure, install, and upgrade a system are given in the followlng AT&T documents:

- "DEFINITY Communications System Generic 1 and Generic 3 Planning and Confirmation" (555-230-600)
- "DEFINITY Communications System Generic 1 and Generic 3 Main Distribution Field Design" (555-230-630)
- "DEFINITY Communications System Generic 1 and Generic 3 Installation and Test" (555-230-104)
- "DEFINITY Communications System Generic 1 and Generic 3i — Upgrades and Additions" (555-204-106)
- "DEFINITY Communications System Generic 3r — Upgrades and Additions" (555-230-106), which will be available 9/92

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Overview

1

1

This chapter introduces the DEFINITY® Generic 1 (G1) and DEFINITY Generic 3 (G3) systems and describes them at an overview level.

DEFINITY G1 and DEFINITY G3 have much in common, yet there are differences in their configurations and internal structures. DEFINITY G3 hardware includes most DEFINITY G1 hardware and some non-G1 hardware.

The three versions of DEFINITY G3 are: G3i, G3i-Global, and G3r. G3r is distinguished from G3i by a different processor used in each system. G3r can be configured to handle more lines and trunks and have faster call throughput than G1, G3i, and G3i-Global.

G3i-Global is a G3i configured to operate “globally,” which means it can operate in countries throughout the world, including the USA. Selected features and circuit packs are installed in G3i-Global to meet telecommunications requirements in different countries.

Global features are described in “DEFINITY Communications System Generic 1 and Generic 3i Feature Description” (555-230-201). Chapter 2, “Cabinets, Carriers, and Circuit Packs,” describes the global circuit packs that can be installed in G3i-G.

This chapter covers the following topics:

What Is the System?

The system is a digital switch that processes and routes voice communications (phone calls) and data communications from one point to another, as shown in figure 1-1. Because the switching is digital, the system makes high-speed data connections between external trunks, data lines connected to host computers, data entry terminals and personal computers (PCs), and groups of terminals and/or computers.

The system converts external analog signals to internal coded digital signals. Incoming analog-trunk calls to the system are converted to digital code by interface circuits through which the calls enter the system. Inside the system, analog voice is always coded digitally. Outgoing digital calls from the system are converted to analog calls by interface circuits through which the calls exit the system. Incoming digital calls to the system are not converted.

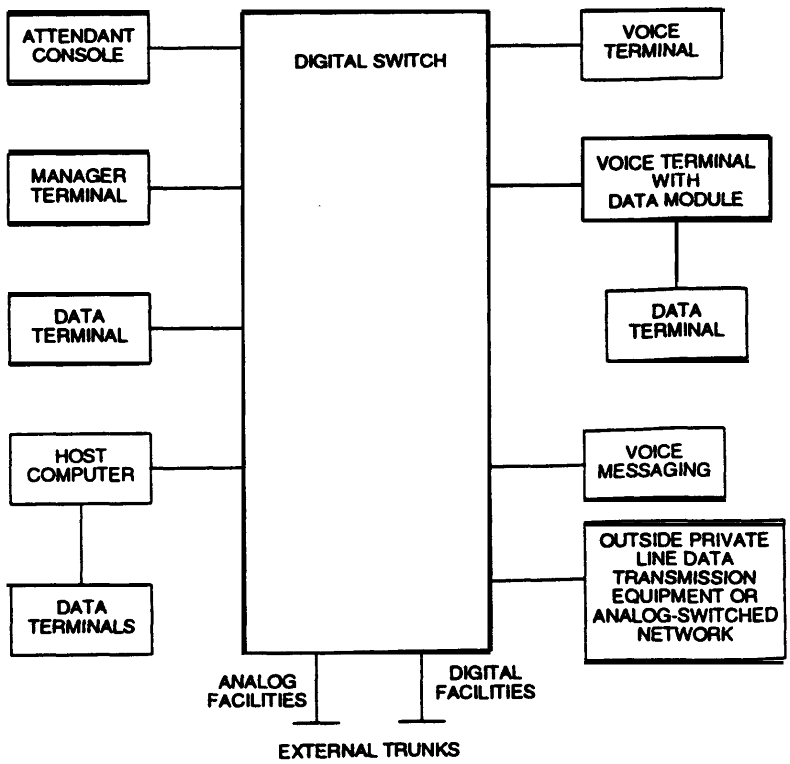


Figure 1-1. The System as a Digital Switch

Components

The basic component of the system is a port network (PN), which consists of port circuits that connect the system to trunks, voice and data lines, communications equipment, and maintenance facilities. The port circuits are connected to internal common buses that allow the circuits to communicate with each other.

PPN

The processor port network (PPN) is the required component that contains

- The switch processing element (SPE), which operates the system, performs call processing, and controls the PN
- Ports, as described above under "PN"

EPN

An expansion port network (EPN) (which is optional) contains additional ports that increase the number of connections from the system to trunks and lines.

CSS

A center stage switch (CSS) (which is optional for three PNs or less) in G3r is the central interface between the PPN and EPNs. A CSS consists of one or two switch nodes (SNs). One SN can expand the system from one EPN up to 15 EPNs, and two SNs can expand the system up to 21 EPNs. A CSS can be used for one EPN or two EPNs to plan for future expansion of the EPNs.

Main Configurations

Figure 1-2 shows the components arranged in five main configurations of PNs (which are the PPN and/or EPNs) and CSSs:

- Basic system, which consists of a PPN only
- Directly connected systems, which consist of:
  — Two PNs (one PPN and one EPN) connected directly together
  — Three PNs (one PPN and two EPNs) connected directly together
- CSS-connected systems in DEFINITY G3r, which consist of:
  — Up to 15 EPNs interconnected by one SN to the PPN
  — Up to 21 EPNs interconnected by two SNs to the PPN

Chapter 4, "Cabinet and Carrier Configurations," describes different PPN, EPN, and CSS configurations.

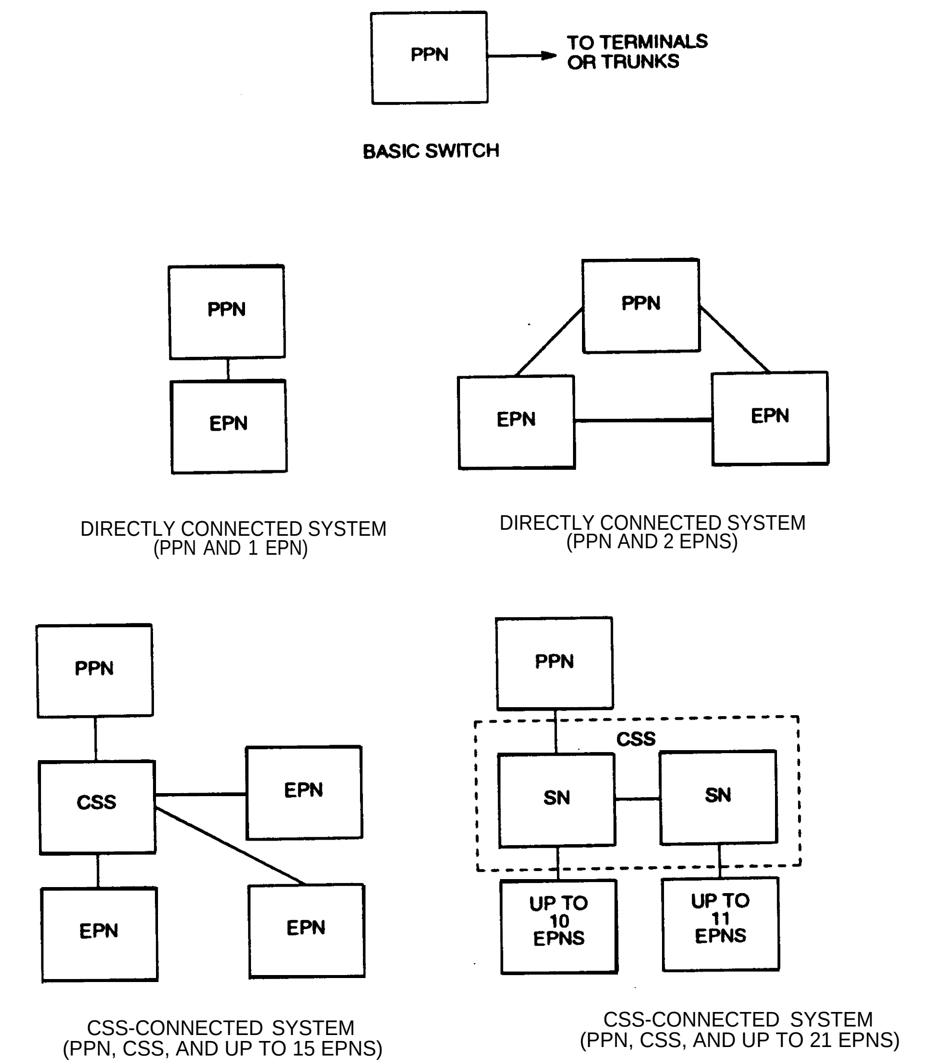


Figure 1-2. Main Configuration

Functional Parts

Figure 1-3 shows a directly connected system having the following functional parts:

- SPE in the PPN, which operates the system and processes voice calls and data calls
- PN distributed throughout the PPN and two EPNs, which routes voice calls and data calls between external trunks and lines

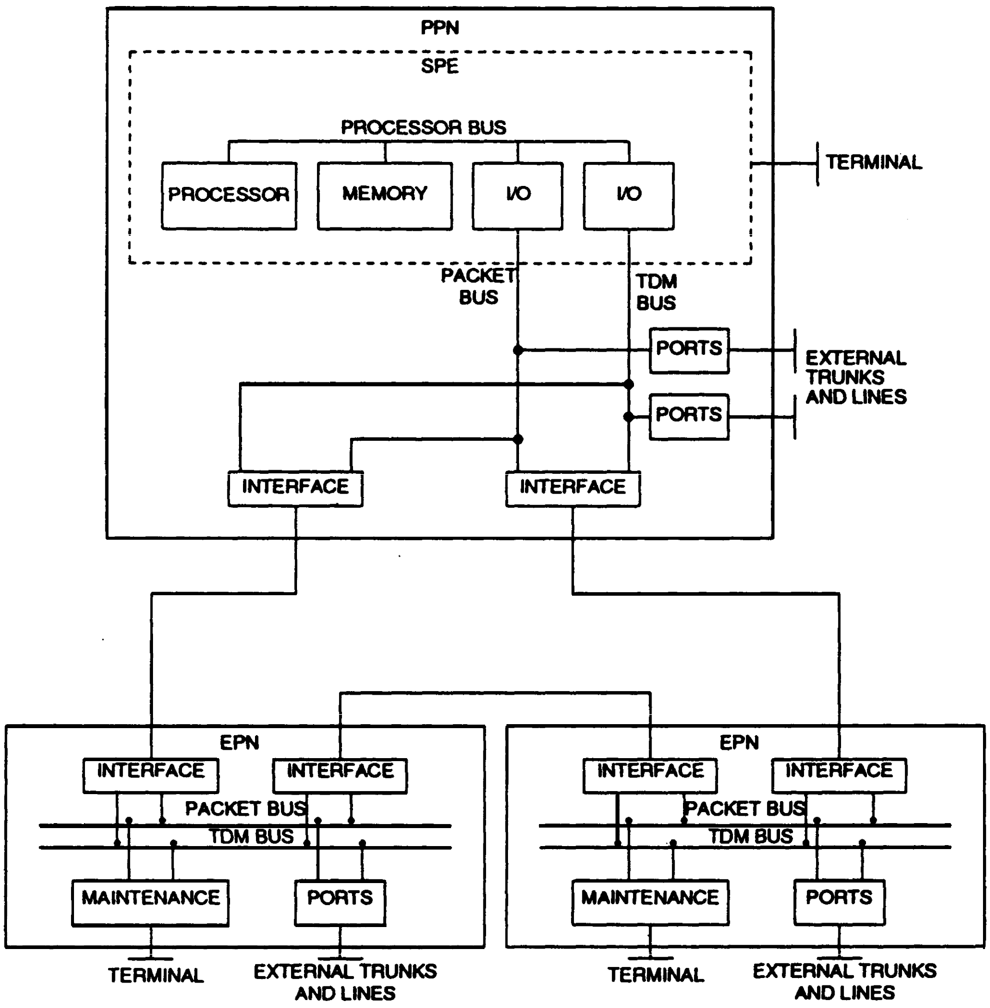


Figure 1-3. Functional Parts of a Directly Connected System

Figure 1-4 shows a CSS-connected G3r having the same functional parts as a directly connected system, but with the added CSS, which routes voice and data calls between external trunks and lines

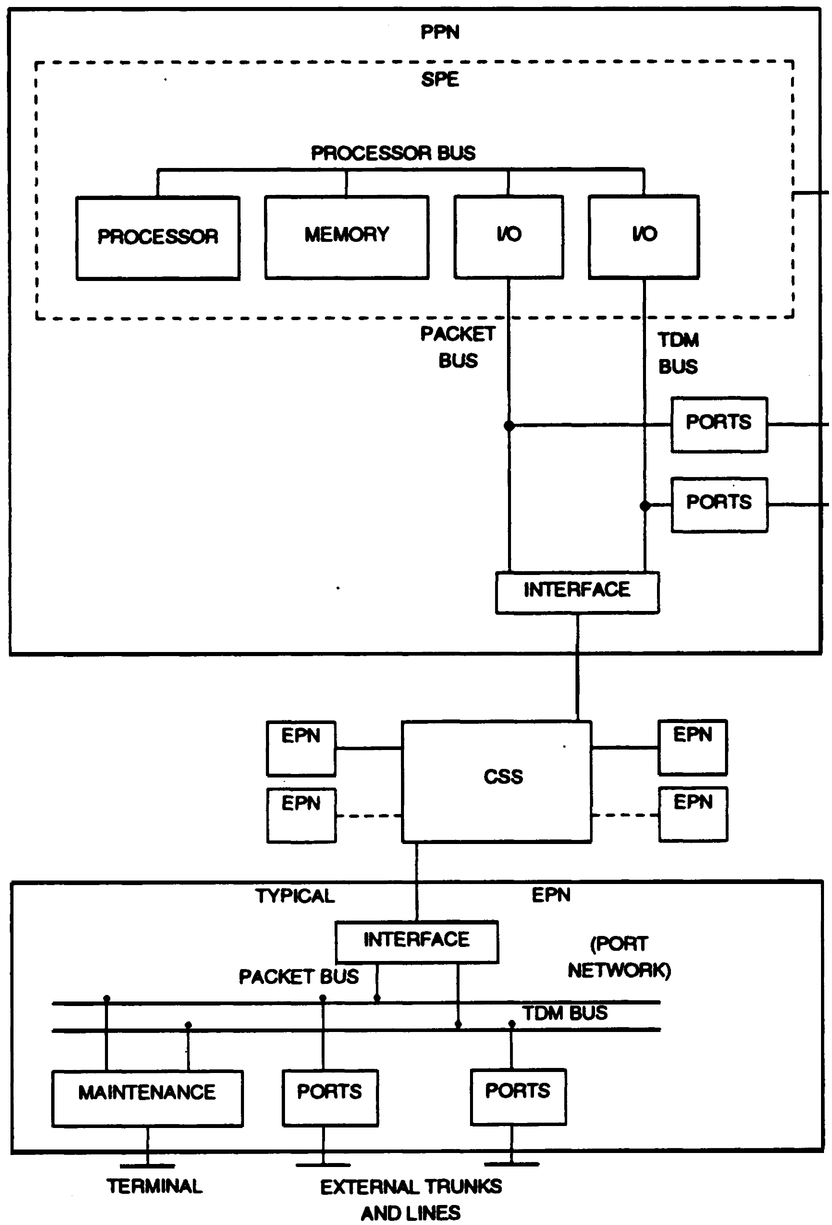


Figure 1-4. Functional Parts of a CSS-Connected System

SPE

The SPE consists of the following control circuits connected by a processor bus:

- Processor:
  - A G3i and a G3i-G have an SPE equipped with an Intel® 80286 processor that operates at 8 MHz.
  - A G3r has an SPE equipped with a reduced instruction set computer (RISC) that operates at 33 MHz. The RISC allows greater call processing speed and capacity in G3r than in G1, G3i, and G3i-G. The 32-bit address and data buses in the RISC obtain and execute instructions.
- Memory, which has one of the following capacities:
  - In G1, 6 Mbytes on one 6-Mbyte circuit pack
  - In G3i and G3i-G, 12 Mbytes on two 6-Mbyte circuit packs
  - In G3r, 64 Mbytes on two 32-Mbyte circuit packs
- Tape drive, which is a nonvolatile system bootstrap and translation storage device.
- Disk drive in G3r, which is optional for directly connected systems and required for CSS-connected systems
- Input/output (I/O) circuits that act as interfaces between the SPE and the TDM and packet buses
- Maintenance interface that is used to connect the system to an administration terminal and monitor power failure and clock signals, and temperature sensors

PN

The PN consists of the following parts:

- Time-division multiplex (TDM) bus, which runs internally throughout each PN in the system, and is terminated by resistors on each end. The TDM bus consists of two eight-bit parallel buses: TDM bus A and TDM bus B. TDM buses A and B carry switched digitized voice and data signals, and control signals continuously between: all port circuits and port circuits and the SPE. The port circuits place digitized voice and data signals on a TDM bus. TDM bus A and TDM bus B are normally active simultaneously. If one TDM bus fails, the other TDM bus takes over.

- Packet bus, which runs internally throughout each PN in the system and is terminated by resistors on each end. The packet bus is an eight-bit parallel bus that carries two *logical links,* which are the communications paths carrying control messages from the SPE, through port circuits, to endpoints such as terminals and adjuncts. The packet bus carries the following types of logical links between all port circuits in the system:

  — Links that connect the SPE to the interface circuits, and to the switch node interfaces (SNIs) in an SN when there's a CSS in a G3r system

  — Integrated Services Digital Network basic rate interface (ISDN/BRI) in G3, and ISDN primary rate interface (PRI) D-channel links, which are sent on the packet bus in G3r only. G3i uses the packet bus for BRI and ASAI only.

  — X.25 links, including distributed communications system (DCS) links; X.25 is used in G3r only

- Port circuits, which provide the links between external trunks, lines and communications equipment, and the TDM bus and packet bus. Incoming analog signals are converted to pulse-code modulated (PCM) digital signals and placed on the TDM busby port circuits. Port circuits convert outgoing signals from PCM to analog for external analog devices. Because all port circuits are connected to the TDM bus and packet bus, any port can send a signal to any other port.

- Interface circuits, in the PPN and each EPN, are types of port circuits that terminate fiber-optic cables connecting the following:

  — TDM buses and packet bus from the PPN cabinet to the TDM buses and packet bus of each EPN cabinet

  — CSS to the PPN and EPNs

  These interface terminations and cabling connect all port circuits together in the system.

An expansion interface (EI) circuit terminates the following cabling:

— Each end of a cable connecting the PPN to an EPN

— Each end of a cable connecting an EPN to another EPN

— The PN-end of a cable connected between a PN carrier and an SN carrier in G3r

An SNI circuit pack terminates the SN-carrier end of a cable connected between an SN carrier and a PN.

Chapter 5, “Cabling,” shows EI and SNI terminations of intercabinet cabling.

- Service circuits, which provide the following:

  — Connection to an external terminal to monitor, maintain, and troubleshoot the system

  — Tone production and detection

  — Call classification

  — Modem pooling

  — Recorded announcement

  — Speech synthesis

CSS

Figure 1-5 shows that the CSS links the PPN to EPNs by means of SNIs in an SN. SNs reduce the amount of interconnecting cabling between the PPN and EPNs by being “hubs” that distribute the cabling to EPNs.

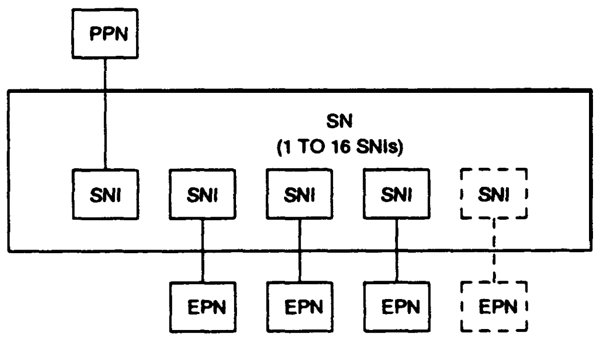


Figure 1-5. CSS

A CSS-connected system has the following characteristics:

- The CSS can be connected to one PN to 22 PNs (including one PPN)
- The CSS can consist of:
  - — One SN or two SNs
  - — Two SN carriers, or four SN carriers in a critical reliability system, which is described in the “Duplication” section in this chapter
- Each SN contains from one SNI to 16 SNIs:
  - — Each SNI can be connected by fiber-optic cable to a PN or another SN.
  - — One SNI is always connected to the PPN, and one SNI is connected to each EPN.
  - — In a high reliability system (which is a system that has a duplicated processor and is described in the “Duplication” section in this chapter), two SNIs are connected to the PPN, which allows 15 maximum PNs to be connected to one SN and 22 maximum PNs to be connected to two SNs.

TDM

Multiplexing is a technique used in the system that interleaves signals from multiple port circuits into one communication path. Time-division multiplexing (TDM) is a switching technique that splits a large bandwidth (range of frequencies) in the frequency domain into many small time slots in the time domain. Each time slot carries a signal from one of the multiple port circuits. Two time slots are used in a two-party call. Each party transmits (talks) on one time slot and receives (listens) on another time slot.

Figure 1-6 shows the time slots generated on the TDM bus. The system framing pulse frames the TDM bus frequency, which produces 256 time slots on each bus for a total of 512 time slots on each PN. Only 483 slots are used for calls. The other 29 slots are used for tones, message communications, and optional features such as Music-On-Hold.

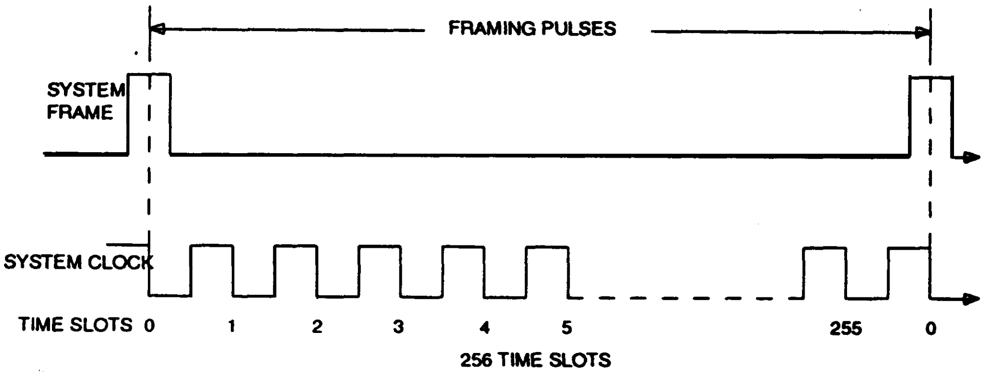


Figure 1-6. TDM Time-Slot Generation

Architecture

The system architecture is divided into two parts:

- Operating system
- Applications layer

The operating system is Oryx/Pecos, which is a proprietary real-time, multi-processing system. Oryx/Pecos supports the SPE.

The applications layer consists of three major subsystems: call processing, maintenance, and system management (administration).

Call processing starts up and completes calls, and manages voice and data in the system.

Maintenance software detects faults, recovers operations, and performs tests in the system.

System management software controls the internal processes necessary to install, administer, and maintain the system.

Logical interconnectivity between system components refers to the two kinds of logical links into the SPE:

- System links established for internal system control
- Application links used by external applications such as adjuncts

Chapter 6, “Architecture,” describes the hardware and software architecture composing the system.

Cabinets

The system cabinets house all the components (PPN, EPN, and CSS), including equipment that supplies power to the components. A cabinet contains at least one carrier, which is an enclosed shelf containing vertical slots that hold circuit packs. The circuit packs fit into connectors attached to the rear of the slots. Every connector is connected to signal buses and power supplies in a cabinet. Chapter 2, “Cabinets, Carriers, and Circuit Packs,” describes the cabinets in more detail, and chapter 3, “Power and Fans,” describes the power supply equipment in the cabinets.

There are two cabinet types:

- Single-carrier cabinet, which is a combined cabinet and carrier unit that contains one carrier.
- Multicarrier cabinet, which is a structure that contains one to five carriers

Figure 1-7 shows the front of a single-carrier cabinet with the door closed.

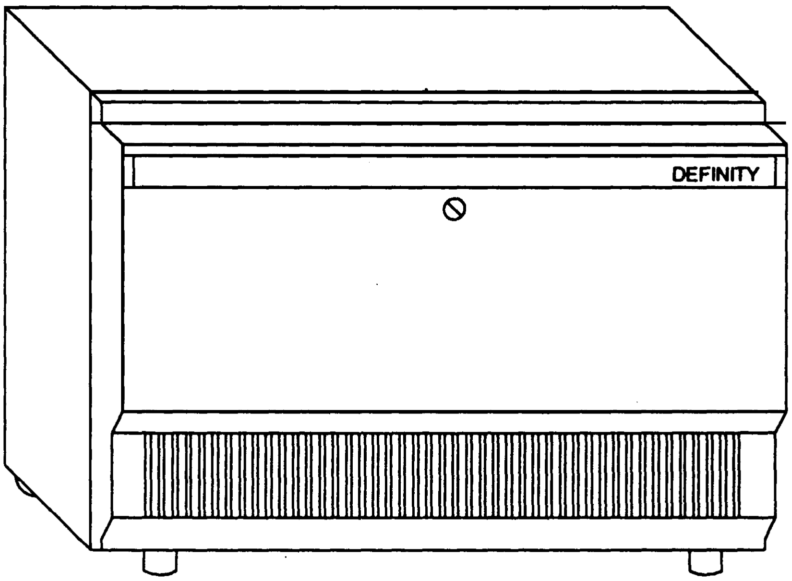


Figure 1-7. Single-Carrier Cabinet

Figure 1-8 shows the front of a multicarrier cabinet with the door closed.

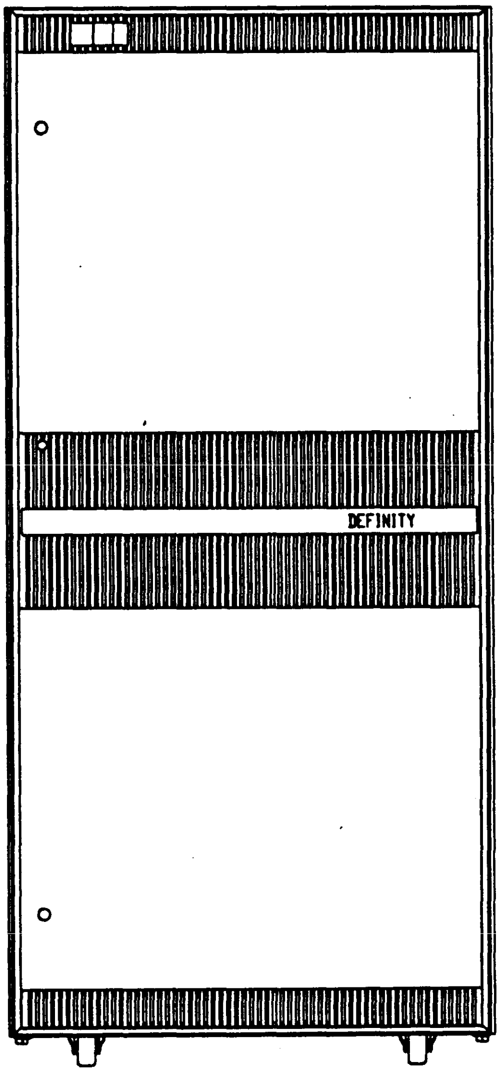


Figure 1-8. Multicarrier Cabinet

Multicarrier Cabinets

There are three types of multicarrier cabinets:

- PPN cabinet, which contains:
  - — SPE that performs call processing
  - — Ports
  - — An interface to an EPN cabinet
  - — SN in a CSS-connected system
- EPN cabinet, which contains:
  - — Additional ports
  - — Interfaces to the PPN cabinet and other EPN cabinets
  - — Maintenance interface
  - — SN in a CSS-connected system
- Auxiliary cabinet, which contains equipment used for optional system-related hardware

The following carriers can be installed in multicarrier PPN and EPN cabinets:

- Control carrier (located only in the PPN cabinet), which contains SPE circuit packs that perform call processing, maintenance, and administration. Unlike the G3r control carrier (also called “processor carrier”), the G1, G3i, and G3i-G control carriers also contain port circuit pack slots.
- Duplicated control carrier (optional and located only in the PPN cabinet), which contains duplicated SPE circuit packs that perform call processing, maintenance, and administration identically to the control carrier. The G3r control carrier is used for duplication. Unlike the G3r control carrier, the G1, G3i, and G3i-G duplicated control carriers also contain port circuit pack slots.
- Port carrier (optional in G1 and G3 and located in the PPN cabinet and EPN cabinets), which contains port, service, and tone/clock circuit packs.
- Expansion control carrier (located only in EPN cabinets), which contains extra port circuit packs, a tone-clock in G 1 and G3i, and a maintenance interface.
- SN carrier in G3r (optional and located in the PPN cabinet and/or EPN cabinets), which contains switch node interface (SNI) circuit packs that compose the CSS.

Chapter 2, “Cabinets, Carriers, and Circuit Packs,” has descriptions of multicarrier cabinets, carriers, and circuit packs.

Single-Carrier Cabinets

There are four types of single-carrier cabinets:

- Basic control cabinet (located in the PPN only) in G1, G3i, and G3i-G, which contains a control complex that performs call processing, ports, and an interface to an optional duplicated control cabinet
- Duplicated control cabinet (optional and located only in the PPN) in G1, G3i, and G3i-G, which contains a duplicated control complex, ports, and an interface to an expansion control cabinet
- Expansion control cabinet (optional and located only in an EPN), which contains ports, a tone-clock, an interface to a port cabinet, and a maintenance interface
- Port cabinet (located in the PPN and in EPNs), which contains ports and an interface to an expansion control cabinet

A maximum of four single-carrier cabinets can be stacked on top of each other. Single-carrier cabinet stacks can be used only as EPNs in G3r.

Chapter 2, “Cabinets, Carriers, and Circuit Packs,” has descriptions of single-carrier cabinets.

Connections to the External Environment

The system can be connected to the following externals:

- Trunks, which are communications paths that transmit voice and data signals between the system and a central office (CO) switch and/or other private branch exchanges (PBXs). Chapter 7, "Connections to Trunks, Data Lines, and Networks," describes trunks connected to the system.
- Networks (public and private), which are a series of communications devices, such as terminals and computers, that are interconnected to be shared. Chapter 7, "Connections to Trunks, Data Lines, and Networks," describes networks that can be connected to the system.
- Peripherals (see chapter 8, "Connections to Peripherals"):
  - Digital data lines connected from the system to data endpoints called data terminal equipment (DTE). Data originates and/or terminates at DTE.
  - Terminals used to administer and maintain the system.
  - Auxiliary equipment used for features, such as Loudspeaker Paging and Music-On-Hold.

Figure 1-9 shows a typical DEFINITY G1 or G3 system, which consists of the PPN cabinet and an EPN cabinet, connected to the external environment.

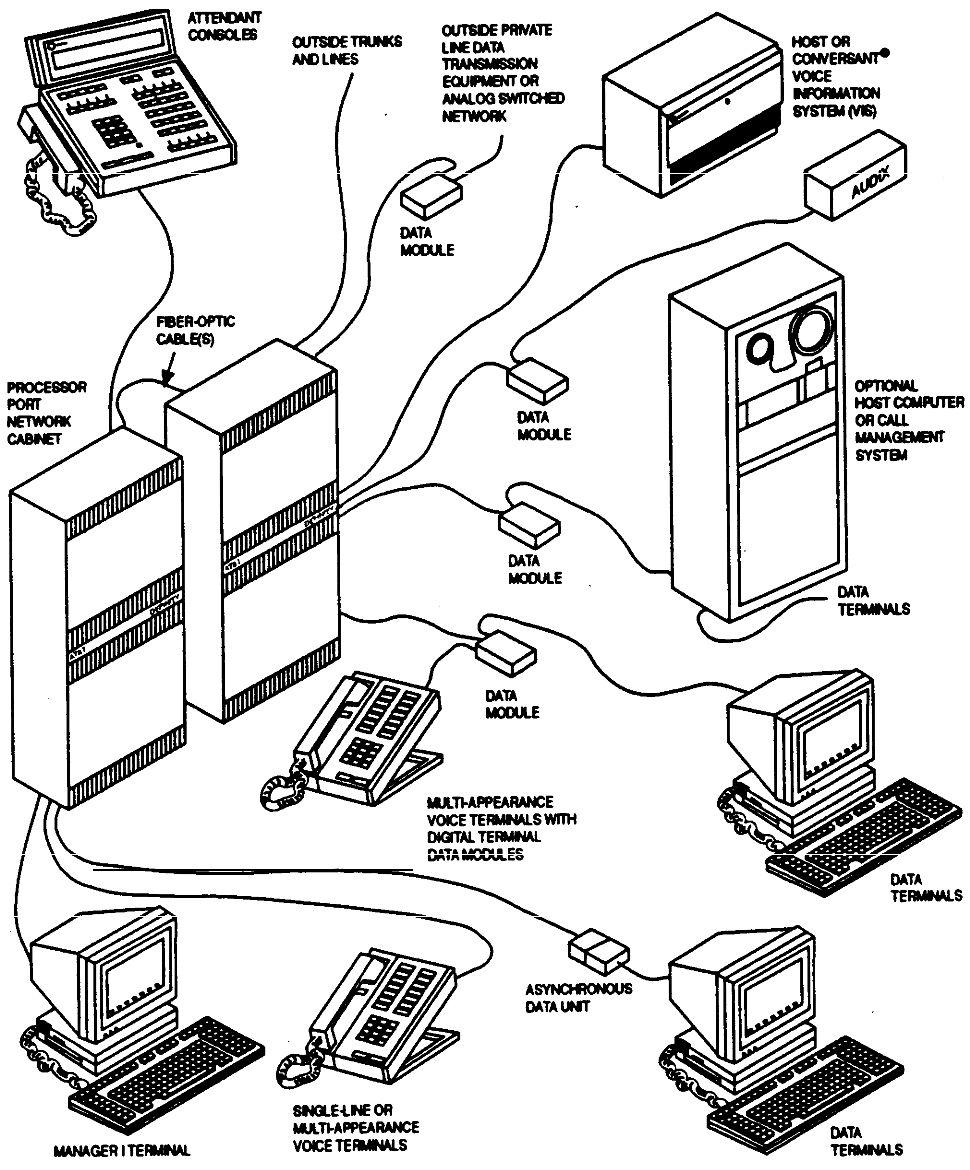


Figure 1-9. Typical DEFINITY G1 or G3 Connected to the External Environment

Duplication

Duplication is the extent to which system hardware components are made redundant. Duplication minimizes single failure points that can interrupt call processing. As duplication increases, the maximum number of port carriers and consequent port circuit packs per cabinet decreases.

Three system duplication options are available:

- Standard reliability
- High reliability in G3r only
- Critical reliability

Chapter 4, "Cabinet and Carrier Configurations," describes cabinet arrangements composing the duplication options.

Standard Reliability

A standard reliability system has no duplicated hardware and includes the following:

- One control carrier
- One Tone-Clock circuit pack per PN
- PNs interconnected by single cables
- One switch node carrier (G3r only), if required

High Reliability (G3r only)

High reliability systems include the following:

- Two control carriers located in the PPN cabinet, which contain duplicate SPEs and tone-clock circuit packs (one is active and the other is in standby)
- One tone-clock circuit pack per EPN
- Duplicate expansion interface circuit packs in the PPN (G3r with CSS)
- PNs interconnected by single cables
- Duplicate SN clock circuit packs (one is active and the other is in standby) in switch node carrier (G3r only)

With duplicate processors, one SPE is active and the other SPE is in standby . (ready to be substituted). The memory in the standby SPE is constantly updated to reflect the memory in the active SPE by a process called "memory shadowing." Memory shadowing enables all writes to the active SPE memory to be transferred to the standby SPE memory. If the standby SPE becomes active, its memory is then identical to the formally active SPE. The standby SPE becomes active when the active SPE fails or is reset by an external command. When the standby SPE becomes active, it processes calls without interrupting the system. Figure 1-10 shows a high reliability, directly connected G3r system.

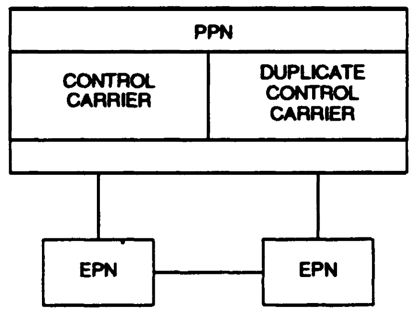


Figure 1-10. High Reliability, Directly Connected G3r System

Figure 1-11 shows a high reliability, CSS-connected G3r system, where each of the two PPN EI circuit packs are connected by a fiber-optic cable to the CSS. The resulting two links operate “active-active,” which means that they share active call traffic and control-connectivity from the processor to EPNs. If an EI circuit pack fails, all call traffic and control connectivity is transferred to the other link.

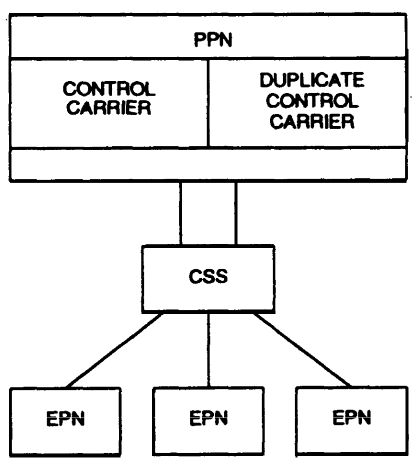


Figure 1-11. High Reliability, CSS-Connected G3r System

Critical Reliability

A critical reliability system includes the following duplicated components:

- Control carrier
- Tone-clock circuit packs in each PN
- Expansion interface circuit packs in each PN
- Cabling between PNs
- CSS in a CSS-connected system (G3r only)

The duplicated processors in this option use memory shadowing that functions exactly as described in the "Duplicate Processor-Only System" section.

In a critical reliability system, all port network connectivity, including CSS, EI circuit packs, fiber-optic cabling, and digital signal level-1 converter (DS1C) facilities (if present) are fully duplicated. An active-standby method is used that sets up calls over the active PN connectivity and backs up the calls in the standby PN connectivity. If the active PN connectivity fails, the standby connectivity becomes active to continue the call service.

Each pair of tone-clock circuit packs in a PN are used in active-standby. The SN clock in each SN carrier is not duplicated.

Figure 1-12 shows two control carriers and duplicate fiber-optic cables that connect each PN in a critical reliability, directly connected system.

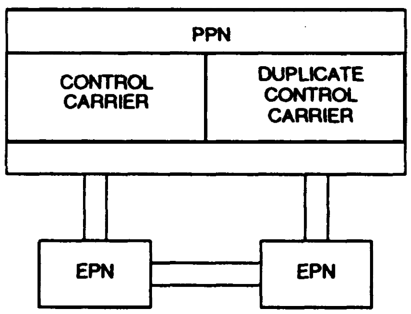


Figure 1-12. Critical Reliability, Directly Connected System

Figure 1-13 shows two control carriers and two CSSs in a critical reliability, CSS-connected G3r system. As shown in the figure, a fiber-optic cable connects each PN to the CSS, and another fiberoptic cable connects each PN to the duplicate CSS.

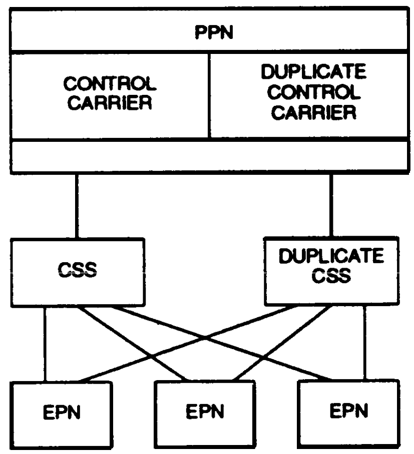


Figure 1-13. Critical Reliability, CSS-Connected G3r System

G3i-Global Enhancements

G3i-G has the following enhancements for global use:

- Connectivity to lines and trunks:
  - Postal telephone and telegraph (PTT) CO trunks, which are used between countries and within a country outside the USA
  - 24-channel ISDN PRI, 24-channel IC PRI, and 32-channel ISDN PRI
  - Polarity-reversal signaling on loop-start CO trunks

  "AT&T Network and Data Connectivity" (555-025-201) describes connectivity from G3i-G to trunks used in countries outside the USA.
- Internal switch operations:
  - English- and Italian-language, visually-impaired attendant service
  - Call Management System (CMS) compatibility
  - Enhanced DCS (EDCS), which provides: remote calling and called party restriction checking; administrable local and remote Direct Inward Dialing (DID) application of intercept treatment; display-called line status for an attendant; intrusion from an attendant
  - Multifrequency-compelled (MFC), release 2 (R2) DID signaling
- Administrable selection of:
  - Terminal-display languages
  - Five different tone plans, and six customizable tones in a tone plan
  - Country-specific tone plans for USA, Australia, Japan, Italy, Netherlands, Singapore, Mexico, Belgium, Saudi Arabia, and UK
  - Transmission, conference-loss and tone-loss plans
  - Ringing cadences
  - Pulse position metering (PPM) of 50 Hz, 12 Hz, or 16 kHz
  - A-law or Mu-law companding
  - ISDN and non-ISDN digital protocols
  - Bit-oriented protocols
  - Some circuit pack impedances and gain and loss characteristics
  - DS1 (at 1.544 Mbps) and European conference of postal and telecommunications rate 1 (CEPT1) (at 2.048 Mbps) protocol interfaces.

DS1 ports can be administered to convert DS1 framing, signaling, line coding, and commanding to that required on CEPT1 trunks, and vice-versa.

- Global circuit packs used for trunks, lines, and tones outside the USA:
  - DID and direct inward and outward dialing (DIOD) analog trunks
  - CO analog trunks
  - Loop-start and ground-start analog CO trunks
  - Tie trunks
  - Auxiliary trunks
  - Digital trunks
  - Analog and digital lines
  - Tone-clock and tone detector
  - Speech synthesizer

  Chapter 2, “Cabinets, Carriers, and Circuit Packs,” describes global circuit packs.

Administration

A terminal connected to the control carrier in a multicarrier system or the control cabinet in a single-carrier system is used to administer the system. A person types commands at the terminal to access and display screens. The screens are used to list data, and to add, change and remove system and voice terminal features. Figure 1-14 shows a typical screen.

```
                                            STATION                  Page 1 of x
Extension: 300              BCC: 0
     Type: 500_                      Lock Messages? n         COR: 1_
     Port: _______                   Security Code:____       COS: 1_
     Name: _______________           Coverage Path: _       Tests? y

FEATURE OPTIONS
          LWC Reception: spe____                  Coverage Msg Retrieval? y
         LWC Activation? y                                   Auto Answer? n
            CDR Privacy? y                              Data Restriction? n
  Redirect Notification? y                       Call Waiting Indication? y
    Off Premise Station? y                  Att. Call Waiting Indication? y
      R Balance Network? _                     Distinctive Audible Alert? y
        Switchhook Flash? y                     Message Waiting Indicator: ____
```

Figure 1-14. Typical Administration Screen With Default Entries

Screens are presented in the following AT&T documents:

- For G1, "DEFINITY® Communications System Generic 1 — Implementation" (555-204-654)
- For G3i and G3i-G, "DEFINITY® Communications System Generic 3i — Implementation" (555-230-650)
- For G3r, "DEFINITY® Communications System Generic 3r — Implementation" (555-230-651)

Procedures for typing data on screens are in the following AT&T documents:

- For G1, "DEFINITY® Communications System Generic 1 and System 75 Administration and Measurement Reports" (555-200-500)
- For G3i and G3i-G, "DEFINITY® Communications System Generic 1 and Generic 3 — System Management" (555-230-500) and "DEFINITY® Communications System Generic 1 and Generic 3i — System Reports" (555-204-510)

A formal training course on system administration is offered by AT&T. In addition, a PC-based training program “System Management Fundamentals” (555-200-550) is available and consists of the following modules:

- “System Management Fundamentals I” (555-200-551) consists of three lessons: introduction to System 75, using the G3-MT terminal, and entering commands and completing forms.
- “System Management Fundamentals II” (555-200-552) consists of three lessons: feature access codes/dial plan, class of restriction/class of service, and voice terminal management.
- “System Management Fundamentals III” (555-200-553) consists of three lessons: abbreviated dialing, call coverage, and hunt groups.

Comparisons Between G1, G3i, G3i-G, and G3r

Table 1-1. Comparison Between G1, G3i, G3i-G, and G3r Components

System	Processor	PPN	Maximum EPNs	Can be directly connected	Can be CSS-connected
G1	80286	1	1	Yes	No
G3i, G3i-G	80286	1	2	Yes	No
G3r	RISC	1	21	Yes	Yes

Table 1-2. Comparison Between G1, G3i, G3i-G, and G3r Carriers in Multi-carrier Cabinets

Carrier	G1	G3i and G3i-G	G3r
Control	In PPN cabinet	In PPN cabinet	In PPN cabinet
Duplicated control	In PPN cabinet	In PPN cabinet	In PPN cabinet
Port	PPN and EPN cabinet	PPN and EPN cabinet	PPN and EPN cabinets
Expansion control	EPN cabinet	EPN cabinet	EPN cabinet
Switch node	None	None	PPN and EPN cabinets

Table 1-3. Comparisons Between G1, G3i, G3i-G, and G3r Single-Carrier Cabinets

Cabinet	G1	G3i and G3i-G	G3r
Basic control	In PPN	In PPN	None
Duplicated control	In PPN	In PPN	None
Port	PPN and EPN	PPN and EPN	EPN
Expansion control	EPN	EPN	EPN

Upgrades and Additions

An upgrade to a system is the process of transforming the hardware and software of a previously installed system to the hardware and software of a later system version. This upgrade is performed under one or more of the following:

- Call processing demands an increased system size
- Later features are needed
- Other changes in customer requirements justify an upgrade

An addition to a system is the process of adding voice terminals, circuit packs, cabinets, or software features to an existing system without upgrading the version of the system. The system's design makes additions easy and aids a customer in planning and managing system growth.

The following AT&T documents give procedures on how to do upgrades and additions:

- "DEFINITY Communications System Generic 1 and Generic 3i — Upgrades and Additions" (555-204-106)
- For G1, "DEFINITY Communications System Generic 1 — Administration and Measurement Reports" (555-200-500)
- For G3r, "DEFINITY Communications System Generic 3r — Upgrades and Additions" (555-230-106)

Cabinets, Carriers, and Circuit Packs

2

2

This chapter describes the DEFINITY Generic 1 (G1) and DEFINITY Generic 3 (G3) cabinets, carriers, and circuit packs, and their functions, physical specifications, and interconnections in the following order:

- Multicarrier cabinets (see page 2-2)
- Single-carrier cabinets (see page 2-8)
- Carriers installed in multicarrier cabinets (see page 2-12)
- Carriers installed in single-carrier cabinets (see page 2-35)
- Circuit packs installed in carriers (see page 2-51)

Procedures used to determine types and numbers of cabinets, carriers, and circuit packs in a system before installation are given in the following AT&T document: “DEFINITY Communications System Generic 1 and Generic 3 Planning and Configuration” (555-230-600).

Multicarrier Cabinets

This section describes the following multicarrier cabinets:

- Processor port network (PPN) cabinet (J58890A)
- Expansion port network (EPN) cabinet (J58890A)
- Auxiliary cabinet (J58886N)

Figure 2-1 shows the front of a multicarrier cabinet without the front door. A multicarrier cabinet can be used as a PPN cabinet or an EPN cabinet. The following “A” through “G” positions in the cabinet are identified:

- Carriers — “A” through “E”
- Fan unit — “F”
- Power distribution unit — “G”

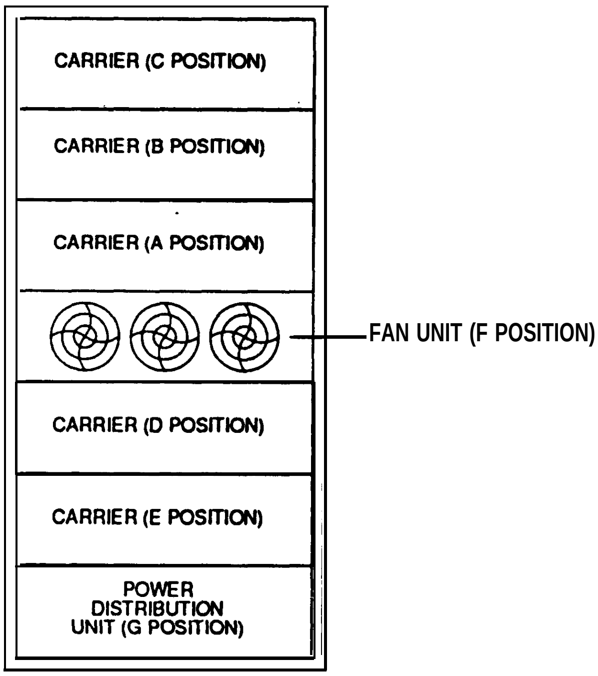


Figure 2-1. Multicarrier Cabinet

An AC power distribution unit or DC power distribution unit in the bottom (G position) of the cabinet supplies, respectively, AC voltage or DC voltage to the power unit circuit packs in each carrier. A DC power distribution unit is mandatory in all G3i-G cabinets. An optional battery charger and batteries are available to back up the cabinet power if external AC power fails. The fan unit in the middle of the cabinet cools the carriers. Chapter 3, “Power and Fans,” describes external power sources used for multicarrier cabinets, power distribution units and the fan unit in multicarrier cabinets.

Doors on the front and rear of the cabinet protect the internal equipment and allow easy access. The front cabinet door is secured by screw-type latches located on the left side of the front door. The two doors at the rear of the cabinet are secured by screw-type latches located in the middle of the cabinet. Turning the screws clockwise loosens the latches and opens the front and rear doors.

Slotted areas at the top, bottom, and of the cabinet’s front and rear are used for air circulation.

Each cabinet is equipped with casters. When a cabinet is in place, leveling screws keep it from rolling. Each corner of a cabinet can be bolted to the floor when required.

Chapter 3, “Power and Fans,” describes the power supplies in multicarrier cabinets. “DEFINITY Communications System Generic 1 and Generic 3 Planning and Configuration” (555-230-600) describes the electrical requirements at the customer’s site.

Dimensions and Weights

Table 2-1 lists the multicarrier cabinet dimensions and average weights.

Table 2-1. Multicarrier Cabinet Dimensions and Average Weights

Cabinet Type	Dimensions (in and cm)	Weight (lb and kg)
PPN and EPN	70 in. H x 32 in. W x 28 in. D 178 cm H x 81 cm W x 71 cm D	800 lb 360 kg
Auxiliary	70 in. H x 32 in. W x 28 in. D 178 cm H x 81 cm W x 71 cm D	200 lb minimum 90 kg minimum

Heat Dissipation

The average heat dissipation of a multicarrier cabinet is 5,000 BTUs (1,260 kcalories) per hour. A fully loaded multicarrier PPN or EPN cabinet dissipates about 8,000 BTUs (2,016 kcalories) per hour.

PPN Cabinet (J58890A)

Figure 2-2 shows the PPN cabinet, which is the basic system cabinet. The PPN cabinet can contain the following carriers (their J-identification numbers and quantities are included):

- Port carrier (J58890BB) — one to four
- Control carrier (J58890AH) in G1, G3i, and G3i-G — one in all systems
- Duplicated control carrier (J58890AJ) in G1, G3i, and G3i-G — one in a critical reliability system
- Control carrier (J58890AP; also called “processor carrier”) in G3r — one in all systems, and two in high reliability and critical reliability systems
- Switch node (SN) carrier (J58890SA) in G3r — one (without duplication) or two (with duplication) with a center stage switch (CSS)

2

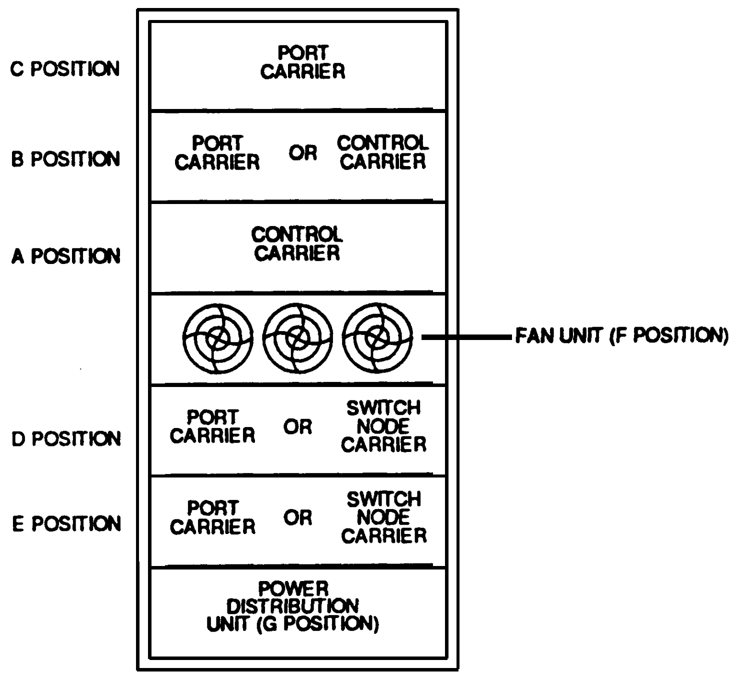


Figure 2-2. Multicarrier PPN Cabinet (J58890A)

EPN Cabinet (J58890A)

Figure 2-3 shows an EPN cabinet, which contains the following carriers (their J-identification numbers and quantities are included):

- Port carrier (J58890BB) — one to four
- Expansion control carrier (J58890AF) — one
- SN carrier (J58890SA) in the following CSS-connected G3r-only systems: zero, one, or two when required

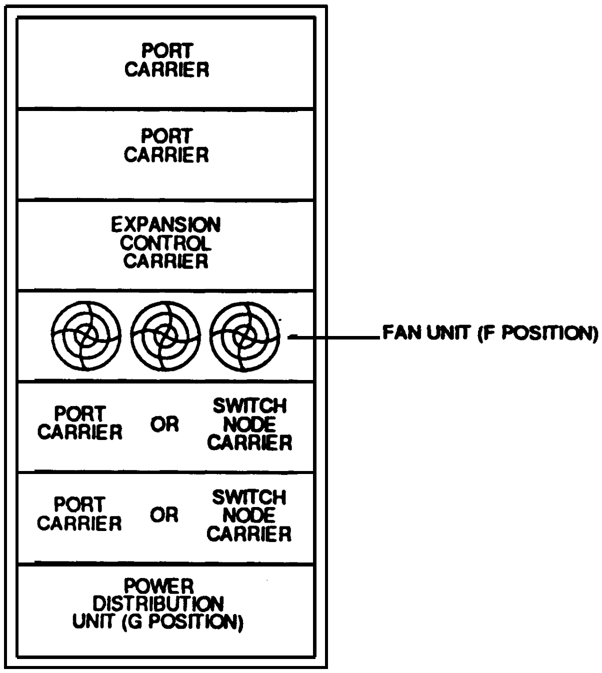


Figure 2-3. Multicarrier EPN Cabinet (J58890A)

Auxiliary Cabinet (J58886N)

Figure 2-4 shows an auxiliary cabinet, which contains hardware (listed in chapter 8, "Connections to Peripherals") used for optional features. The cabinet allows the following types of mountings: carrier, rack (width: 23 in.; 58.4 cm), and panel. An auxiliary cabinet contains the following equipment:

- Fuse panel (J58889AB), which distributes -48 VDC to fused cabinet circuits.
- Thermal sensor, which monitors cabinet temperature
- Power receptacle strip, which has 13 120 VAC receptacles
- AC filter unit (J58889AK), which provides AC power, filtering, and frame grounding
- Rectifier (KS-22028), which supplies -48 VDC power at 20A and can be shelf-mounted or mounted on the cabinet's bottom
- Alarm distribution panel (J58889AE), which detects and reports equipment malfunctions

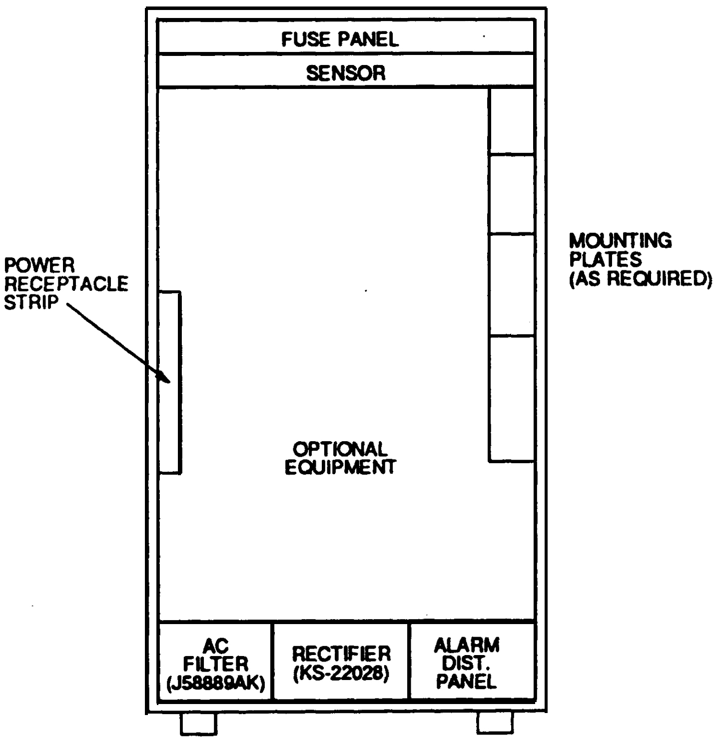


Figure 2-4. Multicarrier Auxiliary Cabinet (J58886N)

Single-Carrier Cabinets

This section describes the following single-carrier cabinets:

- Basic control cabinet (J58890L) — G1, G3i, and G3i-G
- Duplicated control cabinet (J58890M) — G1, G3i, and G3i-G
- Expansion control cabinet (J58890N)
- Port cabinet (J58890H)

A maximum of four single-carrier cabinets can be stacked on top of each other. Each cabinet has 18 vertical slots that hold circuit packs. A blank faceplate covers each unused slot.

Each stack of single-carrier cabinets requires at least one basic control cabinet or one expansion control cabinet on the bottom in G1, G3i, and G3i-G, and one expansion control cabinet on the bottom in G3r. Consequently, there is a maximum of three port cabinets per stack.

The positions of the stacked cabinets are labeled from “A” through “D,” as shown in the figures. The position of the basic control cabinet or expansion control cabinet is always labeled “A.” Additional port cabinet positions are labeled “B,” “C,” and “D,” sequentially, as required.

A screw-type latch, located below the identification stripe, secures the front door to the cabinet. Turning the screw counterclockwise loosens the latch and releases the door. Two holes in the rear bottom of a cabinet can secure it to the floor, which is required for earthquake protection.

Cabinet clips in the front of the cabinets connect the cabinets together. At the rear of the cabinets, a ground plate connected between cabinets provides ground integrity.

Chapter 3, “Power and Fans,” describes external power sources used for single-carrier cabinets and power supplies in single-carrier cabinets. “DEFINITY Communications System Generic 1 and Generic 3 Planning and Configuration” (555-230-600) describes the electrical requirements at the customer’s site.

Dimensions and Weights

Table 2-2 lists single-carrier cabinet dimensions and average weights.

Table 2-2 Single-Carrier Cabinet Dimensions and Average Weights

Cabinet Type	Dimensions (In. and cm)	Weight (lb and kg)
Control (basic and duplicated), port and expansion	20 in. H x 27 in. W x 22 in. D 51 cm H x 69 cm W x 56 cm D	125 lb 56 kg

Heat Dissipation

The average heat dissipation of one single-carrier cabinet is 1,700 BTUs (428 kcalories) per hour. A fully loaded stack of four single-carrier cabinets dissipates about 6,700 BTUs (1,688 kcalories) per hour.

Configurations

Figures 2-5 and 2-6 show two different configurations of four stacked single-carrier cabinets without front doors.

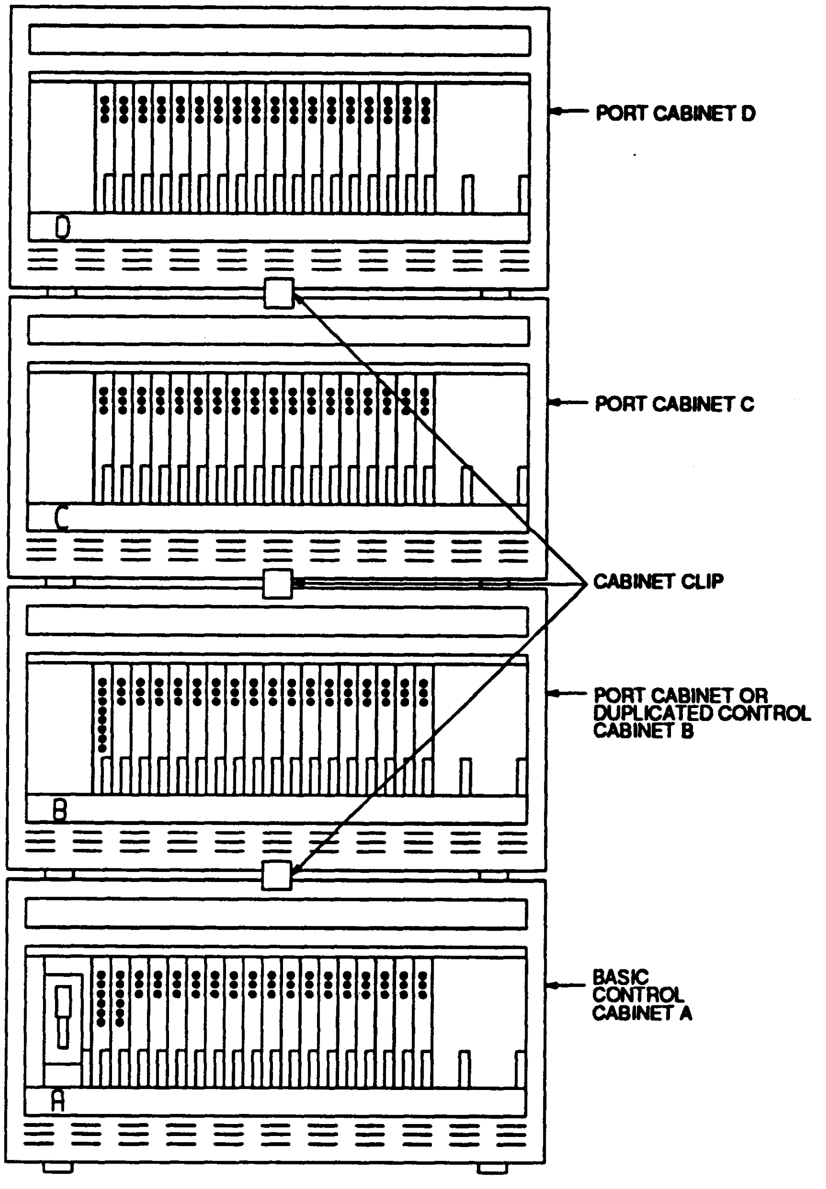


Figure 2-5. Fully Equipped Single-Carrier Cabinet Stack — G1, G3i, and G3-G

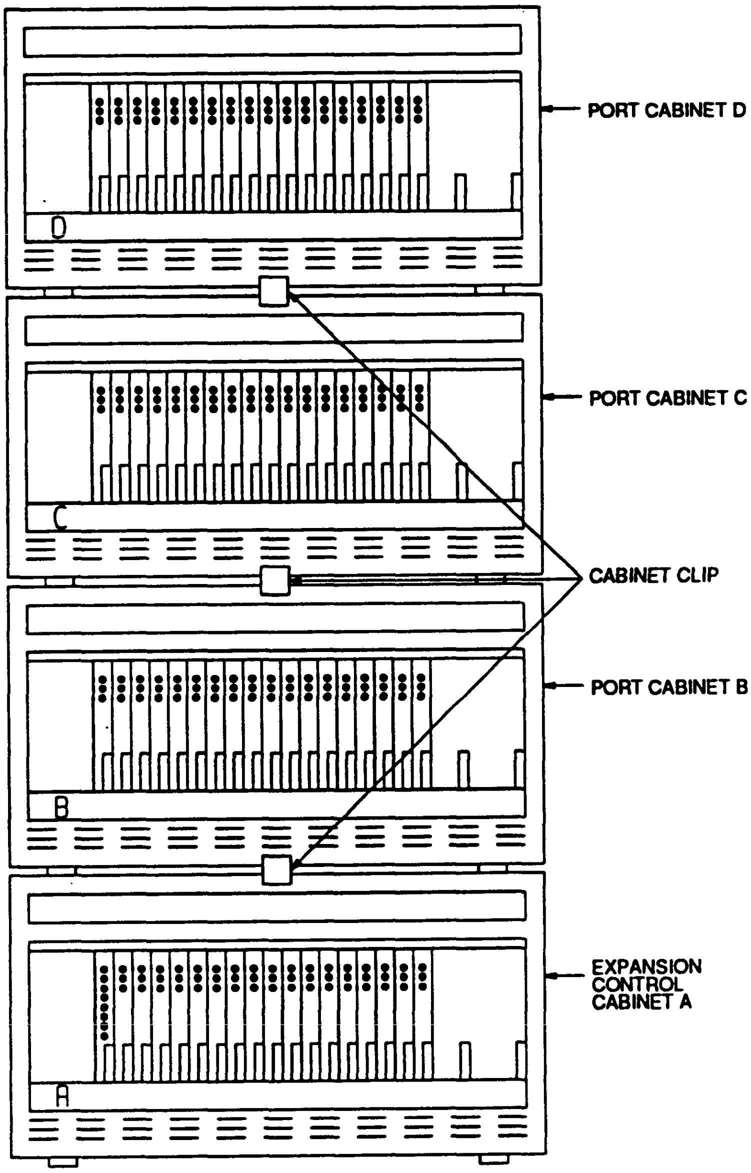


Figure 2-6. Fully Equipped Single-Carrier Cabinet EPN Stack — G1 and G3

Carriers in Multicarrier Cabinets

This section describes the following types of carriers that can be installed in multicarrier cabinets:

- Control carrier (J58890AH) in G1, G3i, and G3i-G PPN cabinet (see page 2-13)
- Duplicated control carrier (J58890AJ) in G1, G3i, and G3i-G PPN cabinet (see page 2-17)
- Control carrier (J58890AP; also called “processor carrier”) in G3r PPN cabinet (see page 2-21)
- Port carrier (J58890BB) in PPN cabinet and EPN cabinets (see page 2-24)
- Expansion control carrier (J58890AF) in EPN cabinets (see page 2-28)
- SN carrier (J58890SA) in G3r PPN cabinet and G3r EPN cabinets (see page 2-32)

There are two types of circuit pack slots in the carriers

- Port, which is colored purple and can accept any purple-labeled (not white-labeled) circuit pack
- Dedicated, which is colored white and can accept only a circuit pack assigned to that slot

Each port slot in a port carrier, an expansion control carrier, and a control carrier in G1 and G3i is connected to a 25-pair connector on the carrier’s rear panel. The 25-pair connector is connected to a cable that goes to a cross-connect field.

The following blank face plates (specified with their widths) cover unused circuit pack slots in the carriers to maintain proper airflow:

- Z100A (.75 in.; 1.9 cm)
- Z100B (1.25 in.; 3.2 cm)
- Z100C (.5 in.; 1.27 cm)
- Z100D (.25 in.; .84 cm)

Throughout this section, the power units shown in the front views of the carriers are examples. See the corresponding circuit pack tables for complete lists of optional power units.

Control Carrier (J58890AH) — G1, G3i, and G3i-G

The control carrier has dedicated white-colored circuit pack slots that always contain specific control circuit packs. Purple-colored slots can contain any port circuit packs (see figure 2-7 and table 2-3). AC or DC power units, located at each end of the carrier, supply the power to the carrier. The tape drive is located in carrier slot positons 19 through 21. The control carrier always contains two TN770 memory circuit packs in G3i and G3i-G, and one TN770 in G1.

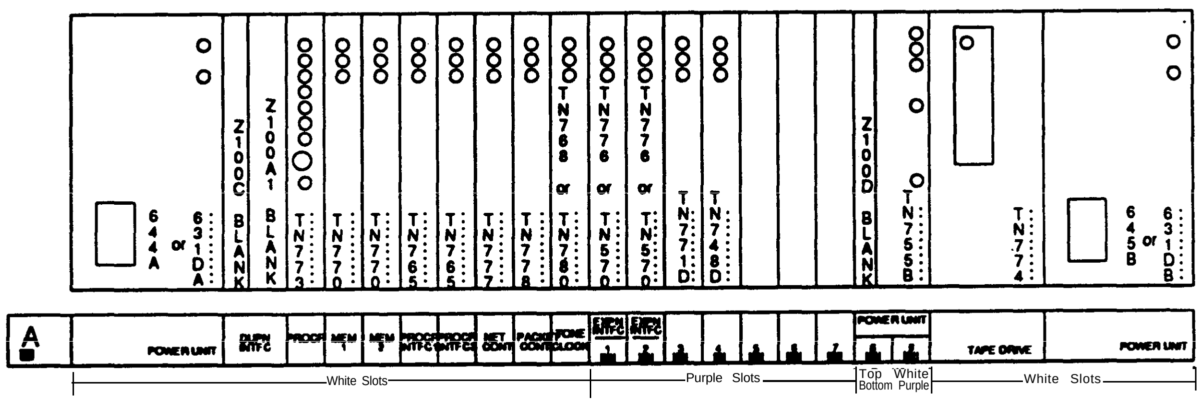


Figure 2-7. Control Carrier (J58890AH-1) — Front View

Table 2-3 lists the circuit packs and their slot locations in the control carrier and references the associated notes on the following page.

Table 2-3. Circuit Packs in Control Carrier (J58890AH-1)

Name	Code	Slot Location	Notes
Power Unit	631DA1	POWER UNIT (left side)	1
Power Unit	644A	POWER UNIT (left side)	2
Duplication Interface	TN772	DUPN INTFC	3
Processor	TN773	PROCR	15
Memory (G1)	TN770	MEMORY 1	15
Memory (G3i, G3i-G)	TN770	MEMORY 1, 2	15
Processor Interface	TN765	PROCR INTFC 1, 2	4
Network Control	TN777	NET CONT	15
Packet Control	TN778	PACKET CONT	5
Tone-clock	TN768, TN419B (G3i-G)	TONE-CLOCK	15
Tone-clock	TN780	TONE CLOCK	6
Call Classifier	TN744	1 to 9	7
Expansion Interface	TN776	1, 2/EXPN INTFC	8, 9
Expansion Interface	TN570	1, 2/EXPN INTFC	10, 11
Maintenance/Test	TN771	1/EXPN INTFC	12, 13
Tone Detector	TN748D, TN420C (G3i-G)	1 to 9	4
CO Trunk	TN747B (G3i-G)	1 to 9	4
CO Trunk (G3i-G)	TN438B, TN2146	1 to 9	4
DID Trunk	TN753	1 to 9	4
DID Trunk (G3i-G)	TN436B, TN459B, TN2146	1 to 9	4
DIOD Trunk (G3i-G)	TN429	1 to 9	4
Tie Trunk	TN760D	1 to 9	4
Tie Trunk (G3i-G)	TN437B, TN439, TN449	1 to 9	4
Tie Trunk (G3i-G)	TN458, TN497, TN2140	1 to 9	4
Auxiliary Trunk	TN763D, TN417 (G3i-G)	1 to 9	4
DS1 Tie Trunk	TN722B, TN464D (G3i-G)	1 to 9	4
DS1 Interface (ISDN)	TN767B, TN464D (G3i-G)	1 to 9	4
Digital Line	TN754, TN754B, TN2136 (G3i-G)	1 to 9	4, 14 (for B)
Hybrid Line	TN762B	1 to 9	4
Analog Line (8)	TN742, TN467 (G3i-G)	1 to 9	4
Analog Line (16)	TN746B, TN468B (G3i-G)	1 to 9	4
Analog Line (16)	G3i-G: TN2135, TN2144, TN2149	1 to 9	4
Analog Line (8) (neon)	TN769	1 to 9	4
Analog Line (16) (neon)	TN746B	1 to 9	4
MET Line	TN735	1 to 9	4
Pooled Modem	TN758	1 to 9	4

Continued on next page

2

Table 2-3. Circuit Packs in Control Carrier — ***continued***

Name	Code	Slot Locatlon	Note
DS1/E1	TN464D	1 to 9	4
Data Line	TN726B	1 to 9	4
Speech Synthesizer	TN725B	1 to 9	4
Speech Synthesizer (G3i-G)	TN433, TN457	1 to 9	4
Announcement	TN750B	1 to 9	4
ISDN Line	TN556	1 to 9	4
AUDIX™ System	None	5 to 9	4
Power Unit	TN755B	8,9/POWER UNIT	4
Tape Drive	TN774	TAPE DRIVE	15
Power Unit	631DB1	POWER UNIT (right side)	1
Power Unit	645B	POWER UNIT (right side)	2

Notes:

1. Required for AC application
2. Required for DC application
3. Required when connecting to a duplicated control carrier (J58890AJ-1)
4. Provided as required
5. Required to activate the packet bus, and required for BRI/ASAI
6. Replaces TN768 when connecting to a Stratum 3 Synchronizer or administering tones in G3i-G.
7. Required for systems with a Call Prompting or Answer Supervision feature
8. Required when connecting to expansion control carrier in EPN1
9. Required when connecting to expansion control carrier in EPN2
10. Provided in place of TN776 when packet bus connections (ISDN-BRI/ASAI) are required in EPN1. Required when connecting to an expansion control carrier (J58890AF-1) in an EPN1.
11. Provided in place of TN776 when packet bus connections (ISDN-BRI/ASAI) are required in EPN2. Required when connecting to an expansion control carrier (J58890AF-1) in an EPN2.
12. Required with the duplication option and ASAI application, or ISDN PRI test calls. Provided in port slot 1 in systems without an EPN.
13. Required with the duplication option and ASAI application, or ISDN PRI test calls. Provided in port slot 2 in systems with an EPN. Provided in port slot 3 with systems having two EPNs.
14. Provides lightning protection for off-premises digital stations
15. Always required

Figure 2-8 and table 2-4 describe connectors on the control carrier rear panel.

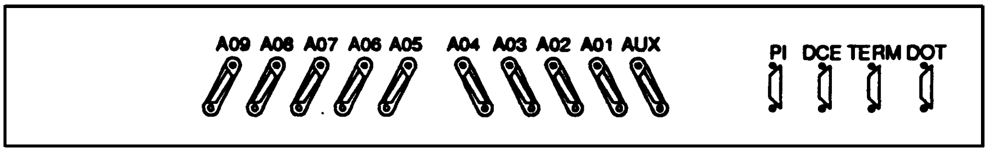


Figure 2-8. Control Carrier (J58890AH-1) — Rear Panel

Table 2-4. Functions of the Control Carrier (J58890AH-1) Rear Connectors

Connector	Function
1 to 9 25-pair	Interfaces between port circuit packs and the crossconnect field
AUX (auxiliary)	Connects a tip/ring pair to the crossconnect field, customer alarms, attendant console power, and emergency power transfer
PI (processor interface)	Connects directly to the processor interface circuit pack. This connector is disabled with the duplication option or in DC-powered systems.
DCE (digital communications equipment)	Connects the processor to the Station Message Detail Recording (SMDR) equipment. It can be used for any reliability option, and AC or DC.
TERM (terminal)	Connects a terminal to the processor in standard reliability systems. In critical reliability systems, connects a terminal to the processor in the duplicated control carrier if the duplication interface circuit pack fails in the control carrier.
DOT (duplication option terminal)	Used in critical reliability systems to connect an administration terminal to the duplication interface slot position.

Duplicated Control Carrier (J58890AJ) — G1, G3i, and G3i-G

The duplicated control carrier has dedicated white-colored circuit pack slots that always contain specific control circuit packs. The purple-colored circuit pack slots can be equipped with any port circuit packs. AC or DC power units, located at each end of the carrier, supply the power to the carrier. The tape drive is located in carrier slot positions 19 through 21. The carrier is equipped with a Duplication Interface (TN772) circuit pack in slot location 1. The duplicated control carrier always contains two TN770 memory circuit packs in G3i and G3i-G, and one TN770 in G1.

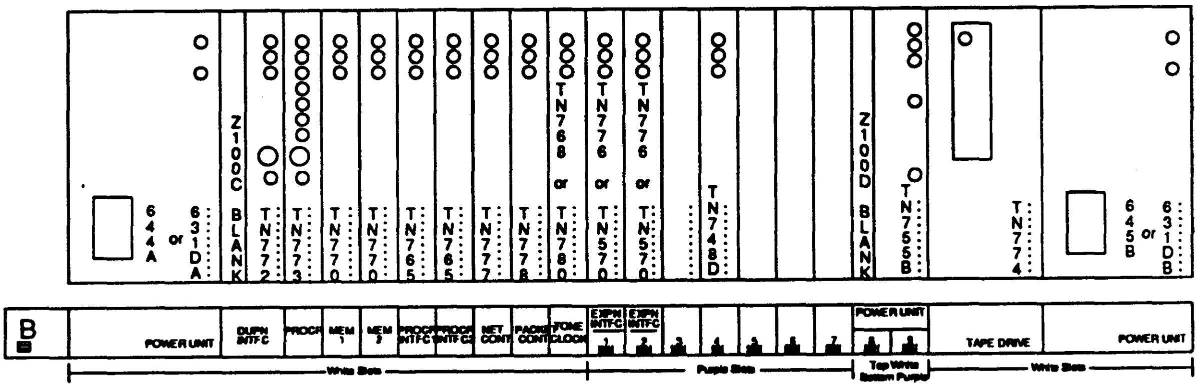


Figure 2-9. Duplicated Control Carrier (J58890AJ-1) — Front View

Table 2-5 lists the circuit packs and their slot locations in the duplicated control carrier and references the associated notes on the following page.

Table 2-5. Circuit Packs in Duplicated Control Carrier (J58890AJ-1)

Name	Code	Slot Location	Notes
Power Unit	631DA1	POWER SLOT (left side)	1
Power Unit	644A	POWER SLOT (left side)	2
Duplication Interface	TN772	DUPN INTFC	3
Processor	TN773	PROCR	15
Memory (G1)	TN770	MEMORY 1	13
Memory (G3i, G3i-G)	TN770	MEMORY 1, 2	13
Processor Interface	TN765	PROCR INTFC 1, 2	4
Network Control	TN777	NET CONT	13
Packet Control	TN778	PACKET CONT	5
Tone-clock	TN768, TN419B (G3i-G)	TONE-CLOCK	4
Tone-clock	TN780	TONE-CLOCK	6
Call Classifier	TN744	1 to 9	7
Expansion Interface	TN776	1, 2/EXPN INTFC	8, 9
Expansion Interface	TN570	1, 2/EXPN INTFC	10, 11
Tone Detector	TN748D, TN420C (G3i-G)	1 to 9	4
CO Trunk	TN747B	1 to 9	4
CO Trunk (G3i-G)	TN438B, TN2147	1 to 9	4
DID Trunk	TN753	1 to 9	4
DID Trunk (G3i-G)	TN436B, TN459B, TN2146	1 to 9	4
DIOD Trunk (G3i-G)	TN429	1 to 9	4
Tie Trunk	TN760D	1 to 9	4
Tie Trunk (G3i-G)	TN437B, TN439, TN449	1 to 9	4
Tie Trunk (G3i-G)	TN458, TN497, TN2140	1 to 9	4
Auxiliary Trunk	TN763D, TN417 (G3i-G)	1 to 9	4
DS1 Tie Trunk	TN722B, TN464D (G3i-G)	1 to 9	4
DS1 Interface (ISDN)	TN767B, TN464D (G3i-G)	1 to 9	4
Digital Line	TN754, TN754B	1 to 9	4,14 (for B)
Digital Line (G3i-G)	TN2136	1 to 9	4
Hybrid Line	TN762B	1 to 9	4
Analog Line (8)	TN742, TN467 (G3i-G)	1 to 9	4
Analog Line (16)	TN746B, TN468B (G3i-G)	1 to 9	4
Analog Line (16)	G3i-G: TN2135, TN2144, TN2149	1 to 9	4
Analog Line (8) (neon)	TN769	1 to 9	4
Analog Line (16) (neon)	TN746B	1 to 9	4
MET Line	TN735	1 to 9	4
Pooled Modem	TN758	1 to 9	4

Continued on next page

Table 2-5. Circuit Packs in Duplicated Control Carrier — *continued*

Name	Code	Slot Location	Notes
DS1/E1	TN464D	1 to 9	4
Data Line	TN726B	1 to 9	4
Speech Synthesizer	TN725B	1 to 9	4
Speech Synthesizer (G3i-G)	TN433, TN457	1 to 9	4
Announcement	TN750B	1 to 9	4
ISDN Line	TN556	1 to 9	4
AUDIX System	None	1 to 9	4
Power Unit	TN755B	8,9/POWER UNIT	4
Tape Drive	TN774	TAPE DRIVE	13
Power Unit	631DB1	POWER UNIT (right side)	1
Power Unit	645B	POWER UNIT (right side)	2

Notes:

1. Required for AC application
2. Required for DC application
3. Required when connecting to a duplicated control carrier (J58890AJ-1)
4. Provided as required
5. Required to activate the packet bus, and required for BRI/ASAI
6. Provided in place of a TN768 tone-clock when connecting to a Stratum 3 Synchronizer
7. Required for systems with a Call Prompting or Answer Supervision feature
8. Required when connecting to expansion control carrier in EPN1
9. Required when connecting to expansion control carrier in EPN2
10. Provided in place of TN776 when packet bus connections (ISDN-BRI/ASAI) are required. Required when connecting to an expansion control carrier (J58890AF-1) in an EPN1.
11. Provided in place of TN776 when packet bus connections (ISDN-BRI/ASAI) are required. Required when connecting to an expansion control carrier (J58890AF-1) in an EPN2.
12. Provides lightning protection for off-premises digital stations
13. Always required

Figure 2-10 and table 2-6 describe the connectors on the duplicated control carrier rear panel.

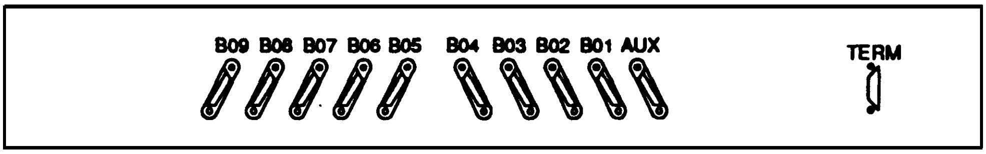


Figure 2-10. Duplicated Control Carrier (J58890AJ-1) — Rear Panel

Table 2-6. Functions of the Duplicated Control Carrier (J58890AJ-1) Rear Connectors

Connector	Function
1 to 9 25-pair	Interfaces between port circuit packs and the crossconnect field
TERM (terminal)	Connects an administration terminal to the process in the duplicated control carrier if the duplication interface circuit pack fails in the control carrier.
AUX (auxiliary)	Connects a tip/ring pair to the crossconnect field, customer alarms, attendant console power, and emergency power transfer

Control Carrier (J58890AP) — G3r

Figure 2-11 shows the control carrier (also called “processor carrier”) and the circuit packs in its slots. The control carrier contains only dedicated slots used for control circuit packs that compose the switch processing element (SPE). It does not contain port circuit pack slots. AC or DC power units, located at each end of the carrier, supply the power to the carrier. The control carrier always contains two TN1650B memory circuit packs.

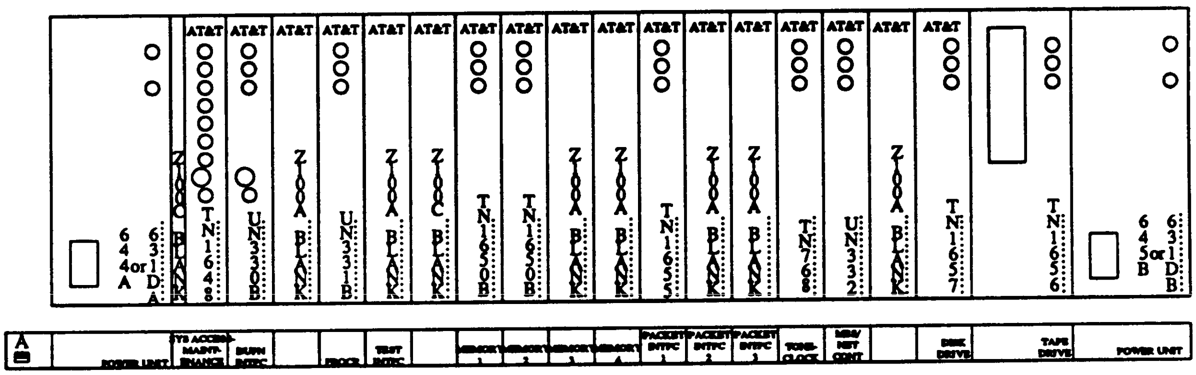


Figure 2-11. Control Carrier (J58890AP) — Front View

2

Table 2-7 lists the circuit packs and their slot locations in the control carrier.

Table 2-7. Circuit Packs in Control Carrier (J58890AP)

Name	Code	Slot Location	Notes
Power Unit (AC, +5V)	631DA1	POWER UNIT (left side)	Required for AC
Power Unit (AC) (-48V/-5V)	631DB1	POWER UNIT (right side)	Required for AC
Power Unit (DC, +5V)	644A1	POWER UNIT (left side)	Required for DC
Power Unit (DC) (-48V/-5V)	645B1	POWER UNIT (right side)	Required for DC
Disk Drive	TN1657	DISK DRIVE	Optional
Duplication Interface	UN330B	DUPN INTFC	Optional
Memory (32 Mbytes)	TN1650B	MEMORY 1 to 4	Two required
Mass Storage System/ Network Control	UN332B	MSS/NET CONT	Required
Packet Interface	TN1655	PACKET INTFC 1 to 3	One required
Processor (RISC)	UN331B	PROCR	Required
System Access and Maintenance	TN1648	SYS ACCESS-MAINTENANCE	Required
Tape Drive	TN 1656	TAPE DRIVE	Required
Tone-clock	TN768 or TN780	TONE-CLOCK	Required

Figure 2-12 and table 2-8 describe the connectors on the control carrier rear panel.

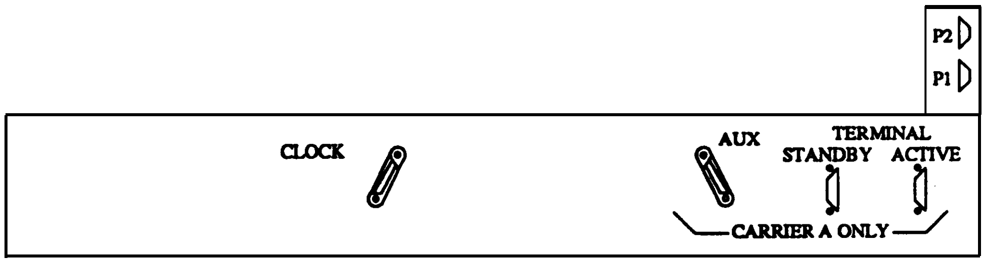


Figure 2-12. Control Carrier (J58890AP) — Rear Panel

Table 2-8. Functions of the Control Carrier (J58890AP) Rear Connectors

Connector	Function
CLOCK (Stratum 3 clock)	Provides interface between the control carrier and the crossconnect field
AUX (auxiliary)	Connects a tip/ring pair to the crossconnect field, customer alarms, attendant console power, and emergency power transfer
TERMINAL, ACTIVE	Connects an administration terminal to the TN1648 system access and maintenance circuit pack in the control carrier
TERMINAL, STANDBY	Used only in duplicated-processors to connect an administration terminal to the stand-by control carrier
P1	Provides the following: Position indicator ofthe control carrier Power to fans Access to alarm and control circuits
P2	Provides control signals to the control carrier

A current limiter board (CFY1B) is plugged into the backplane of the control carrier located in the A position only. The board supplies emergency transfer logic, and current-limited power: -48V to fans and ring generator; 5V to trip main circuit breaker in an over-temperature condition and to operate the ringing transfer relay.

Two terminators (AHF111s) on the backplane terminate each end of the processor expansion bus.

Port Carrier (J58890BB)

Figure 2-13 shows the port carrier and the circuit packs in its port slots. A port carrier contains:

- Port slot locations 1 to 20, in which Port circuit packs can be installed. Slot 1 contains an optional tone-clock circuit pack used for port carriers in the “B” position of an EPN cabinet in critical reliability systems. Slot 2 contains an optional expansion interface (EI) circuit pack.
- Power unit-service, in which power unit circuit packs, or maintenance circuit packs (G3r only) can be installed
- AC or DC power units located at each end of the carrier
- Tone-clock in slot location 1

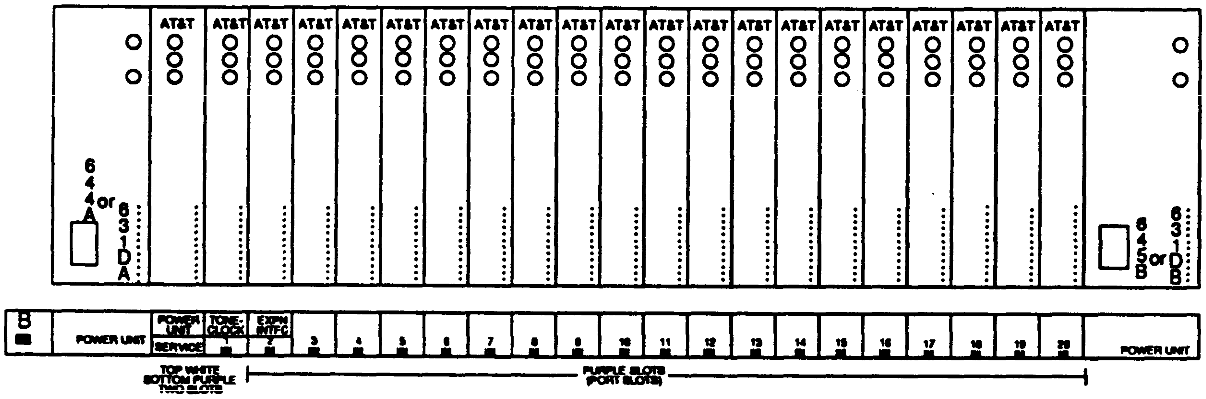


Figure 2-13. Port Carrier (J58890BB) — Front View

Table 2-9 lists the circuit packs and their slot locations in the port carrier.

Table 2-9. Circuit Packs in Port Carrier (J58890BB)

Name	Code	Slot Location	Notes
Power Unit (AC, +5V)	631DA1	POWER UNIT (left side)	Required for AC
Pcwer Unit (AC) (-48V/-5V)	631DB1	POWER UNIT (right side)	Required for AC
Power Unit (DC, +5V)	644A1	POWER UNIT (left side)	Required for DC
Power Unit (DC) (-48V/-5V)	645B1	POWER UNIT (right side)	Required for DC
Expansion Interface	TN570 (G3i, G3i-G, G3r) TN776 (G1 , G3, G3i-G)	EXPN INTFC	Optional
Call Classifier	TN744	POWER UNIT/ SERVICE, 1-20	Optional
Announcement	TN750B	POWER UNIT/ SERVICE, 1-20	Optional
Maintenance/Test (G3)	TN771D	POWER UNIT/ SERVICE, 1-20	Optional
Speech Synthesizer	TN725B G3i-G: TN433, TN457	POWER UNIT/ SERVICE, 1-20	Optional
Tone Detector	TN748C, D, TN420C (G3-G)	POWER UNIT/ SERVICE, 1-20	Required in G1 Optional in G3
Power Unit, Neon	TN755B	POWER UNIT/ SERVICE	Optional
Tone-clock	TN768, TN419B (G3i-G)	TONE-CLOCK	Required only in critical reliability systems
Data Line	TN726B	1 to 20	Optional
ISDN BRI Line (G3)	TN556	1 to 20	Optional
Packet Data Line (G3r)	TN553	1 to 20	Optional
Packet Gateway (G3r)	TN577	1 to 20	Optional
Pooled Modem	TN758	1 to 20	Optional

Continued on next page

Table 2-9. Circuit Packs in Port Carrier (J58890BB) — *continued*

Name	Code	Slot Location	Notes
Analog Line	TN746B, TN742, TN746, TN769	1 to 20	Optional
Analog Line (G3i-G)	TN467, TN468, TN2135, TN2144, TN2149	1 to 20	Optional
Digital Line	TN754, TN754B	1 to 20	Optional
Digital Line (G3i-G)	TN2136	1 to 2O	Optional
Hybrid Line	TN762B	1 to 20	Optional
MET Line	TN735	1 to 20	Optional
DS1 Converter (G3r)	TN574	1 to 20	Optional
Expansion Interface	TN570 (G3) TN776 (G1, G3i, G3i-G)	1 to 20	Optional
Auxiliary Trunk	TN763D, TN417 (G3i-G)	1 to 20	Optional
CO Trunk	TN747B, TN438B (G3i-G)	1 to 20	Optional
CO Trunk (G3i-G)	TN438B, TN2147	1 to 20	Optional
DID Trunk	TN753	1 to 20	Optional
DID Trunk (G3i-G)	TN436B, TN459B, TN2146	1 to 20	Optional
DS1 Interface	TN767B	1 to 20	Optional
DS1 Tie Trunk	TN722B	1 to 20	Optional
Tie Trunk	TN760D	1 to 20	Optional
Tie Trunk (G3i-G)	TN437B, TN439, TN449 TN458, TN497, TN2140	1 to 20	Optional
DS1 Interface (G3r, G3i-G)	TN464C	1 to 20	Optional for G3r ISDN-PRI
DS1/E1 (G3i-G)	TN464D	1 to 20	Optional
DEFINITY AUDIX System	None	Rightmost 5 slots	Optional

Figure 2-14 and table 2-10 describe the connectors on the port carrier rear panel.

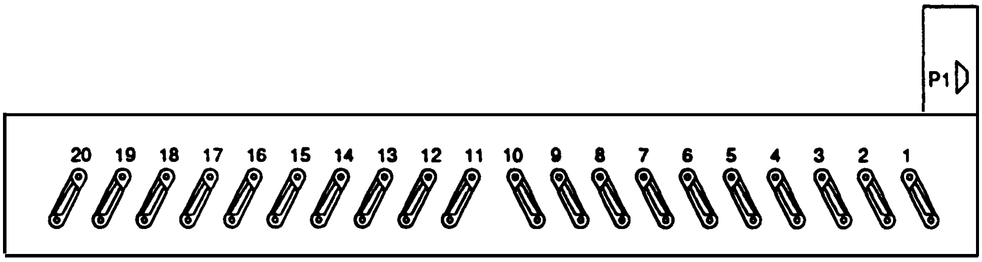


Figure 2-14. Port Carrier (J58890BB) — Rear Panel

Table 2-10. Functions of Port Carrier Rear Connectors

Connector	Function
1 to 20	Ports that are interfaces between the circuit pack slots and the crossconnect field
P1	Provides the following: Position indicator of port carrier Ringing voltage input to carrier Access to alarm and control circuits

Expansion Control Carrier (J58890AF)

Figure 2-15 shows the expansion control carrier and the circuit packs in its port slots. An expansion control carrier contains:

- EI circuit pack (TN570 in G3; TN776 in G1, G3i, and G3i-G) in port slot location 1, which is used in a fiber-optic cabling path to another cabinet or the CSS in the same cabinet
- Port slot locations 2 to 19, in which port circuit packs can be installed
- AC or DC power units located at each end of the carrier
- Tone-clock
- Maintenance

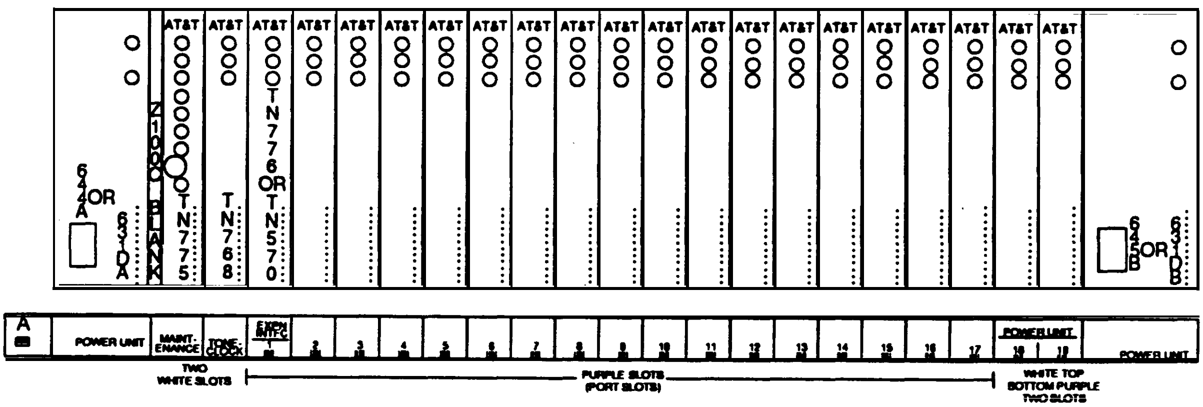


Figure 2-15. Expansion Control Carrier (J58890AF) — Front View

Table 2-11 lists the circuit packs and their slot locations in the expansion control carrier.

Table 2-11. Circuit Packs in Expansion Control Carrier (J58890AF)

Name	Code	Slot Location	Notes
Power Unit (AC, +5V)	631DA1	POWER UNIT (left side)	Required for AC
Power Unit (AC) (-48V/-5V)	631DB1	POWER UNIT (right side)	Required for AC
Power Unit (DC, +5V)	644A1	POWER UNIT (left side)	Required for DC
Power Unit (DC) (-48V/-5V)	645B1	POWER UNIT (right side)	Required for DC
Expansion Interface	TN570 (G3) TN776 (G1, G3i, G3i-G)	EXPN INTFC	Required
Call Classifier	TN744	POWER UNIT 18 and 19	Optional
Announcement	TN750B	POWER UNIT 18 to 19	Optional
Tone Detector	TN748C, D, TN420C (G3i-G)	POWER UNIT 18 to 19	Optional
Maintenance	TN775B	MAINTENANCE	Required in G3r
Power Unit, Neon	TN755B	POWER UNIT 18 to 19	Optional
Tone-clock	TN768, TN419B (G3i-G)	TONE-CLOCK	Required
Data Line	TN726B	2 to 19	Optional
ISDN BRI Line (G3)	TN556	2 to 19	Optional
Packet Data Line (G3r)	TN553	2 to 19	Optional
Packet Gateway (G3r)	TN577	2 to 19	Optional
Pooled Modem	TN758	2 to 19	Optional

(Continued on next page)

Table 2-11. Circuit Packs in Expansion Control Carrier — *continued*

Name	Code	Slot Location	Notes
Analog Line	TN746B, TN742, TN746, TN769	1 to 20	Optional
Analog Line (G3i-G)	TN467, TN468, TN2135, TN2144, TN2149	1 to 20	Optional
Digital Line	TN754, B	1 to 20	Optional
Digital Line (G3i-G)	TN2136	1 to 20	Optional
Hybrid Line	TN762B	1 to 20	Optional
MET Line	TN735	1 to 20	Optional
DS 1 Converter (G3r)	TN574	1 to 20	Optional
Expansion Interface	TN570 (G3) TN776 (G1, G3i, G3i-G)	1 to 20	Optional
Auxiliary Trunk	TN763D, TN417 (G3i-G)	1 to 20	Optional
CO Trunk	TN747B, TN438B (G3i-G)	1 to 20	Optional
CO Trunk (G3i-G)	TN438B, TN2147	1 to 20	Optional
DID Trunk	TN753	1 to 20	Optional
DID Trunk (G3i-G)	TN436B, TN459B, TN2146	1 to 20	Optional
DS1 Interface	TN767B	1 to 20	Optional
DS1 Tie Trunk	TN722B	1 to 20	Optional
Tie Trunk	TN760D	1 to 20	Optional
Tie Trunk (G3i-G)	TN437B, TN439, TN449 TN458, TN497, TN2140	1 to 20	Optional
DS1 Interface (G3r, G3i-G)	TN464C	1 to 20	Optional for G3r ISDN-PRI
DS1/E1 (G3i-G)	TN464D	1 to 20	Optional
DEFINITY AUDIX System	None	Rightmost 5 slots	Optional

Figure 2-16 and table 2-12 describe the connectors on the expansion control carrier rear panel.

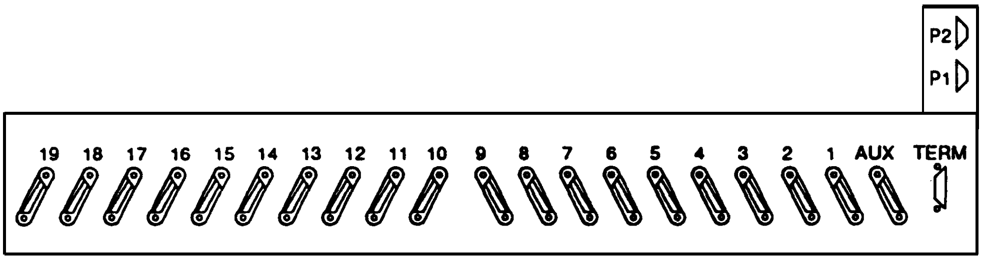


Figure 2-16. Expansion Control Carrier (J58890AF) — Rear Panel

Table 2-12. Functions of Expansion Control Carrier Rear Panel Connectors

Connector	Function
1	Provides a fiber-optic cable interface between an EI in slot 1 and an EI in a port carrier, control carrier (G1, G3i, and G3i-G) or a TN573 in an SN carrier, or for a DS1C.
2 to 19	Provides interfaces between port circuit packs and crossconnect field; an optional neon power unit can be in slots 18 and 19
AUX (auxiliary)	Connects a tip/ring pair to the crossconnect field for customer alarms, attendant console power, and emergency power transfer
TERM (terminal)	Connects an administration terminal to the maintenance circuit pack in an EPN cabinet
P1	Provides power to fans
P2	Connects ringing voltage from the ring generator to the carrier and produces control signals

A current limiter board (CFY1B) is plugged into the backplane of the expansion control carrier. The board supplies emergency transfer logic, and current-limited power: -48V to fans and ring generator; 5V to trip main circuit breaker in an over-temperature condition and to operate the ringing transfer relay.

SN Carrier (J58890SA) — G3r

Figure 2-17 shows an SN carrier and the circuit packs in its port slots. An SN carrier contains TN572 switch node clock and TN573 switch node interface (SNI) circuit packs that compose the CSS. A switch node carrier can contain from one to 16 TN573 SNIs. AC or DC power units, located at each end of the carrier, supply the power to the carrier.

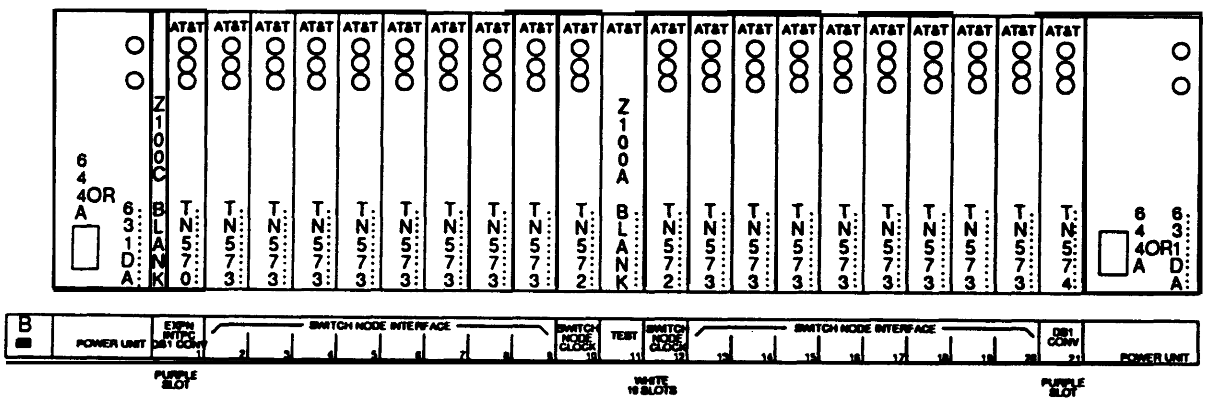


Figure 2-17. SN Carrier (J58890SA) — Front View

Table 2-13 lists the circuit packs and their slot locations in the SN carrier.

Table 2-13. Circuit Packs in SN Carrier (J58890SA)

Name	Code	Slot Location	Notes
Power Unit (AC, +5V)	631DA1	POWER UNIT (left side or both sides)	Required for AC
Power Unit (DC, +5V)	644A1	POWER UNIT (left side or both sides)	Required for DC
DS1 Converter	TN574	DS1 CONV	Optional
Expansion Interface	TN570	EXPN INTFC	Used when SN carrier is in critical reliability PPN
SN Clock	TN572	SWITCH NODE CLOCK 10 and 12 (required in SNs in critical reliability systems)	Required
SN Interface	TN573	SWITCH NODE INTERFACE 2 to 9, and 13 to 20	One per PN, or one per interSN-to-SN link

Figure 2-18 and table 2-14 describe the connectors on the switch node carrier rear panel.

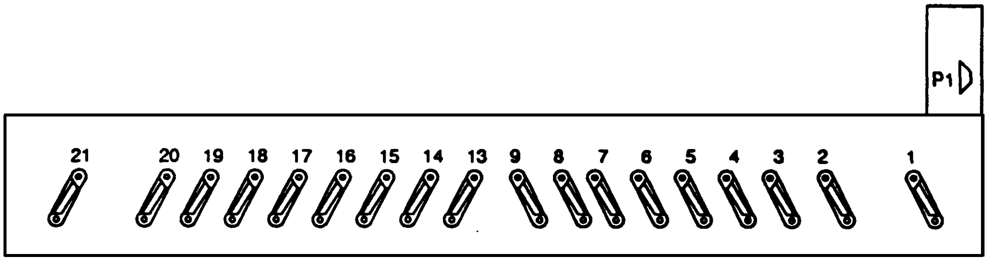


Figure 2-18. SN Carrier (J58890SA) — Rear Panel

Table 2-14. Functions of SN Carrier Rear Panel Connectors

Connector	Function
1	Expansion interface port that is an interface for the cable between the TN570 EI circuit pack in slot 1 and the TN573 SNI circuit pack in slot 2 for a duplicated PPN only. Also used for a DS1 converter.
2 to 9, and 13 to 20	Switch node ports that are fiber-optic cabling interfaces between TN573 SNI circuit packs and other TN573 circuit packs connected to SN ports or TN570 circuit packs in EPNs
10, 11, and 12	Do not exist
21	Port that is an interface to connect the TN574 DS1 Converter circuit pack to the crossconnect field and an SNI
P1	Provides the following: Position indicator of the SN carrier Access to alarm and control circuits

Carriers in Single-Carrier Cabinets

This section describes the circuit packs installed in the following single-carrier cabinets:

- Basic control cabinet (J58890L) in G1, G3i, and G3i-G (see page 2-36)
- Duplicated control cabinet (J58890M) in G1, G3i, and G3i-G (see page 2-41) .
- Expansion control cabinet (J58890N) (see page 2-45)
- Port cabinet (J58890H) (see page 2-48)

There are two types of circuit pack slots in single-carrier cabinets:

- Port, which is colored purple and can accept any purple-labeled (not white-labeled) circuit pack
- Dedicated, which is colored white and can accept only a circuit pack assigned to that slot

A 158J four-inch (9.2 cm) apparatus blank faceplate always covers the area to the left of slot one in port cabinets. Any unused slot is covered with a 158B blank faceplate.

Basic Control Cabinet (J58890L) — G1, G3i, and G3i-Global

Figure 2-19 shows a basic control cabinet, which contains dedicated white-colored circuit pack slots that house specific control circuit packs. Purple-colored slots can be equipped with any port circuit packs (see figure 2-19 and table 2-15).

An AC or DC power supply, located at the right side of the cabinet, supplies power to the cabinet. The tape drive is located in cabinet slot TAPE DRIVE (left side).

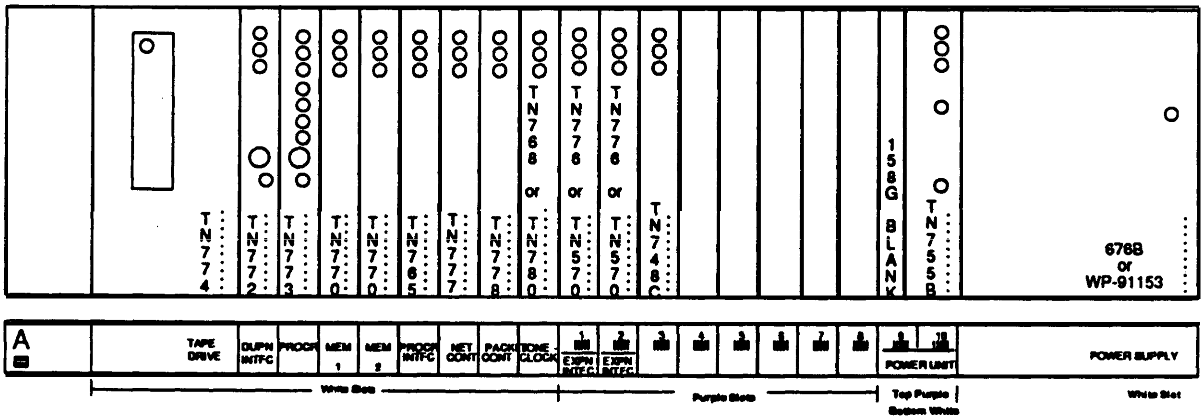


Figure 2-19. Basic Control Cabinet (J58890L-1) — Front View

Table 2-15 lists circuit packs and their locations in the basic control cabinet and references the associated notes on the following page.

Table 2-15. Circuit Packs in Basic Control Cabinet (J58890L-1)

Name	Code	Slot Location	Notes
Tape Drive	TN774	TAPE DRIVE	1
Processor	TN773	PROCR	1
Memory (G1)	TN770	MEMORY 1	1
Memory (G3i, G3i-G)	TN770	MEMORY 1,2	1
Processor Interface	TN765	PROCR INTRFC	2
Packet Control	TN778	PACKET CONT	15
Network Control	TN777	NET CONT	1
Tone-clock (G3i-G)	TN419B	TONE-CLOCK	1
Tone-clock	TN768	TONE-CLOCK	1
Tone-clock	TN780	TONE-CLOCK	3
Tone Detector (G3i-G)	TN420C	1 to 10	2
Tone Detector	TN748D	1 to 10	2
Tone Det. (G1, G3i, G3i-G)	TN756	TONE-CLOCK	4
Call Classifier	TN744	1 to 10	5
CO Trunk (G3i-G)	TN438B,TN2147	1 to 10	2
CO Trunk	TN747B	1 to 10	2
DID Trunk (G3i-G)	TN436B	1 to 10	2
DID Trunk (G3i-G)	TN459B	1 to 10	2
DID Trunk (G3i-G)	TN2146	1 to 10	2
DID Trunk	TN753	1 to 10	2
Tie Trunk (G3i-G)	TN437B	1 to 10	2
Tie Trunk (G3i-G)	TN439	1 to 10	2
Tie Trunk (G3i-G)	TN449	1 to 10	2
Tie Trunk (G3i-G)	TN458	1 to 10	2
Tie Trunk (G3i-G)	TN497	1 to 10	2
Tie Trunk	TN760D	1 to 10	2
Tie Trunk (G3i-G)	TN2140	1 to 10	2
Auxiliary Trunk (G3i-G)	TN417	1 to 10	2
Auxiliary Trunk	TN763D	1 to 10	2
DS1 Interface	TN767B, TN464D	1 to 10	2

Continued on next page

Table 2-15. Circuit Packs in Basic Control Cabinet (J58890L-1) — *continued*

Name	Code	Slot Location	Notes
Digital Line	TN754	1 to 10	2
Digital Line	TN754B	1 to 10	2, 6
Digital Line (G3i-G)	TN2136	1 to 10	2, 6
Hybrid Line	TN762B	1 to 10	2
Analog Line (8)	TN742, TN467 (G3i-G)	1 to 10	2
Analog Line (16)	TN746	1 to 10	2
Analog Line (16)	G3i-G: TN468, TN2135	1 to 10	2
Analog Line (16)	G3i-G: TN2144, TN2149	1 to 10	2
Analog Line (8) (neon)	TN769	1 to 10	2
Analog Line (16) (neon)	TN746B	1 to 10	2
Met Line	TN735	1 to 10	2
Pooled Modem	TN758	1 to 10	2
Data Line	TN726B	1 to 10	2
Speech Synthesizer (G3i-G)	TN433	1 to 10	2
Speech Synthesizer (G3i-G)	TN457	1 to 10	2
Speech Synthesizer	TN725B	1 to 10	2
Announcement	TN750B	1 to 10	2
ISDN BRI Line	TN556	1 to 10	2
Duplication Interface	TN772	DUPN INTFC	7
Expansion Interface	TN776	1/EXPN INTFC	8
Expansion Interface	TN776	2/EXPN INTFC	9
Expansion Interface	TN570	1/EXPN INTFC	10
Expansion Interface	TN570	2/EXPN INTFC	11
Maintenance/Test	TN771D	1 to 10	12, 13
DEFINITY AUDIX System	None	5 to 9	2
Power Unit	TN755B	9,10/POWER UNIT	2
Power Supply (AC)	WP-91153	POWER SUPPLY	1
Power Supply (DC)	676B	POWER SUPPLY	14

Notes:

1. One always required
2. Provided as required
3. Used in place of a TN768 tone-clock when connecting to a Stratum 3 Synchronizer or administering tones in G3i-G.
4. Used in place of a TN768 tone-clock in some single-carrier cabinet systems where there is no DS1, no EPN, and no duplication
5. Required for systems with call prompting or answer detection

6. Provides lightning protection for off-premises digital stations
7. Required when connecting to a J58890M-1 cabinet in a duplication option
8. Required when connecting to an expansion control cabinet (J58890N-1) in an EPN1
9. Required when connecting to an expansion control cabinet (J58890N-1) in an EPN2
10. Provided in place of TN776 when packet bus connections (ISDN-BRI/ASAI) are required. Required when connecting to an expansion control cabinet (J58890N-1) in an EPN1.
11. Provided in place of TN776 when packet bus connections (ISDN-BRI/ASAI) are required. Required when connecting to an expansion control cabinet (J58890N-1) in an EPN2.
12. Required with the duplication option and ASAI application, or for ISDN-PRI test calls. Provided in port slot 1 in systems without an EPN.
13. Required with the duplication option and ASAI application, or for ISDN-PRI test calls. Provided in port slot 2 in systems with an EPN. Provided in port slot 3 with systems having two EPNs.
14. Provided in place of WP-91153 in cabinets powered by -48 VDC
15. Provided as required for G3i and G3i-G to activate the packet bus for BRI/ASAI support

Figure 2-20 and table 2-16 describe connectors on control cabinet rear panel.

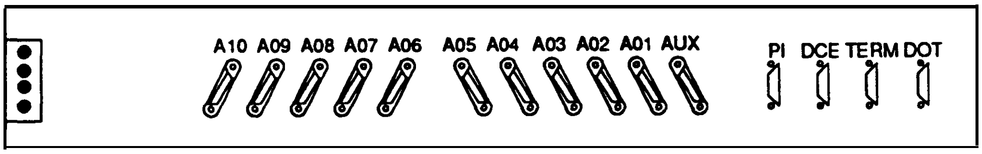


Figure 2-20. Basic Control Cabinet (J58890L-1) — Rear Panel

Table 2-16. Functions of Basic Control Cabinet (J58890L-1) Rear Panel Connectors

Connector	Function
1 to 10	25-pair connectors, which are interfaces between port circuit packs and cross-connect field or a cable access panel
AUX (auxiliary)	Connects a tip/ring pair to the cross-connect field, customer alarms, attendant console power, and emergency power transfer
PI (processor interface)	Connects directly to the processor interface circuit pack; this connector is used only in AC standard reliability systems
DCE (digital communications equipment)	Connects the processor to SMDR equipment
TERM (terminal)	Connects an admin. terminal to the maintenance circuit pack in standard reliability systems. Can be used to access standby SPE.
DOT (duplication option terminal)	Used in high reliability and critical reliability systems to connect an administration terminal to the duplication interface slot

Duplicated Control Cabinet (J58890M) — G1, G3i, and G3i-Global

Figure 2-21 shows a duplicated control cabinet. The cabinet contains dedicated white-colored circuit pack slots that are always equipped with specific control circuit packs. The purple-colored circuit pack slots can be equipped with any port circuit packs. An AC or DC power supply, located at right side of the cabinet, supplies power to the cabinet. The tape drive is located in cabinet slot TAPE DRIVE. The cabinet is equipped with a duplication interface circuit pack in slot DUPN INTFC.

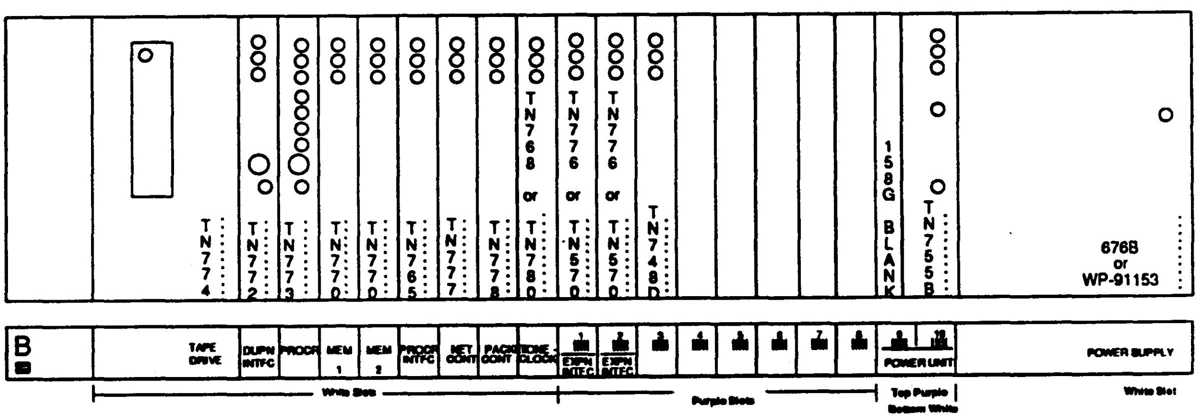


Figure 2-21. Duplicated Control Cabinet (J58890M-1) — Front View

Table 2-17 lists circuit packs and their locations in the duplicated control cabinet and references the associated notes on the following page.

Table 2-17. Circuit Packs in Duplicated Control Cabinet (J58890M-1)

Name	Code	Slot Location	Notes
Tape Drive	TN774	TAPE DRIVE	1
Processor	TN773	PROCR	1
Memory	TN770	MEMORY 1	1
Memory	TN770	MEMORY 2	1
Processor Interface	TN765	PROCR INTRFC	2
Packet Control	TN778	PACKET CONT	13
Network Control	TN777	NET CONT	1
Tone-clock (G3i-G)	TN419B	TONE-CLOCK	1
Tone-clock	TN768	TONE-CLOCK	1
Tone-clock	TN780	TONE-CLOCK	3
Tone Detector (G3i-G)	TN420C	1 to 10	2
Tone Detector	TN748D	1 to 10	2
Tone Detector/Gen. (G1)	TN756	TONE-CLOCK	4
Call Classifier	TN744	1 to 10	5
CO Trunk (G3i-G)	TN438B,TN2147	1 to 10	2
CO Trunk	TN747B	1 to 10	2
DID Trunk	TN436B	1 to 10	2
DID Trunk	TN459B	1 to 10	2
DID Trunk	TN753	1 to 10	2
DID Trunk (G3i-G)	TN2146	1 to 10	2
Tie Trunk (G3i-G)	TN437B	1 to 10	2
Tie Trunk (G3i-G)	TN439	1 to 10	2
Tie Trunk (G3i-G)	TN449	1 to 10	2
Tie Trunk (G3i-G)	TN458	1 to 10	2
Tie Trunk (G3i-G)	TN497	1 to 10	2
Tie Trunk	TN760D	1 to 10	2
Tie Trunk (G3i-G)	TN2140	1 to 10	2
Auxiliary Trunk (G3i-G)	TN417	1 to 10	2
Auxiliary Trunk	TN763D	1 to 10	2
DS1 Interface	TN767B, TN464D (G3i-G)	1 to 10	2
Digital Line	TN754	1 to 10	2

Continued on next page

Table 2-17. Circuit Packs in Duplicated Control Cabinet — *continued*

Name	Code	Slot Location	Notes
Digital Line	TN754B	1 to 10	2, 6
Digital Line (G3i-G)	TN2136	1 to 10	2, 6
Hybrid Line	TN762B	1 to 10	2
Analog Line (8)	TN742, TN467 (G3i-G)	1 to 10	2
Analog Line (16)	TN746	1 to 10	2
Analog Line (16)	G3i-G: TN468, TN2135	1 to 10	2
Analog Line (16)	G3i-G: TN2144, TN2149	1 to 10	2
Analog Line (8) (neon)	TN769	1 to 10	2
Analog Line (16) (neon)	TN746B	1 to 10	2
Met Line	TN735	1 to 10	2
Pooled Modem	TN758	1 to 10	2
Data Line	TN726B	1 to 10	2
Speech Synthesizer (G3i-G)	TN433	1 to 10	2
Speech Synthesizer (G3i-G)	TN457	1 to 10	2
Speech Synthesizer	TN725B	1 to 10	2
Announcement	TN750B	1 to 10	2
ISDN BRI Line	TN556	1 to 10	2
Duplication Interface	TN772	DUPN INTFC	7
Expansion Interface	TN776	1/EXPN INTFC	8
Expansion Interface	TN776	2/EXPN INTFC	9
Expansion Interface	TN570	1/EXPN INTFC	10
Expansion Interface	TN570	2/EXPN INTFC	11
Maintenance/Test	TN771D	1 to 10	12, 13
DEFINITY AUDIX System	None	5 to 9	2
Power Unit	TN755B	9,10/POWER UNIT	2
Power Supply (AC)	WP-91153	POWER SUPPLY	1
Power Supply (DC)	676B	POWER SUPPLY	11

Notes:

1. One always required
2. Provided as required
3. Used in place of a TN768 tone-clock when connecting to a Stratum 3 Synchronizer or administering G3i-G tones.
4. Required for systems with call prompting and answer supervision
5. Needed for an external premises digital station
6. Required when connecting to a J58890M-1 cabinet in a duplication option

7. Required when connecting to an EPN1 in G1
8. Required when connecting to an EPN2 in G1, G3i, and G3i-G
9. Provided in place of TN776 when packet bus connections (ISDN-BRI/ASAI) are required. Required when connecting to an EPN1.
10. Provided in place of TN776 when packet bus connections (ISDN-BRI/ASAI) are required. Required when connecting to an EPN2.
11. Provided in place of WP-91153 for cabinets powered by -48 VDC
12. Required in G3i only
13. Provided as required to activate the packet bus to support BRI/ASAI in G3i only

Figure 2-22 and table 2-18 describe the connectors on the duplicated control cabinet rear panel.

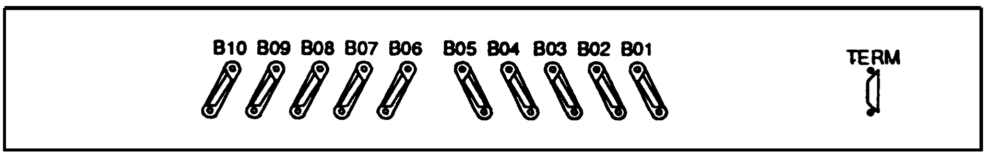


Figure 2-22 Duplicated Control Cabinet (J58890M-1) — Rear Panel

Table 2-18. Functions of Duplicated Control Cabinet (J58890M-1) Rear Panel Connectors

Connector	Function
1 to 10	25-pair connectors, which provide interfaces between port circuit packs and the cross-connect field or the cable access panel (if provided)
TERM (terminal)	Connects an administration terminal to the processor in the duplicated control cabinet if the duplication interface circuit pack fails in the control carrier

Expansion Control Cabinet (J58890N)

Figure 2-23 shows an expansion control cabinet. In an EPN stack of cabinets, an expansion control cabinet is the first cabinet in a stack of single carrier cabinets. The expansion control cabinet contains optional port circuit packs in port slots 2 to 17 (see table 2-19). The AC or DC power supply, located at the right side of the cabinet, supplies power to the cabinet.

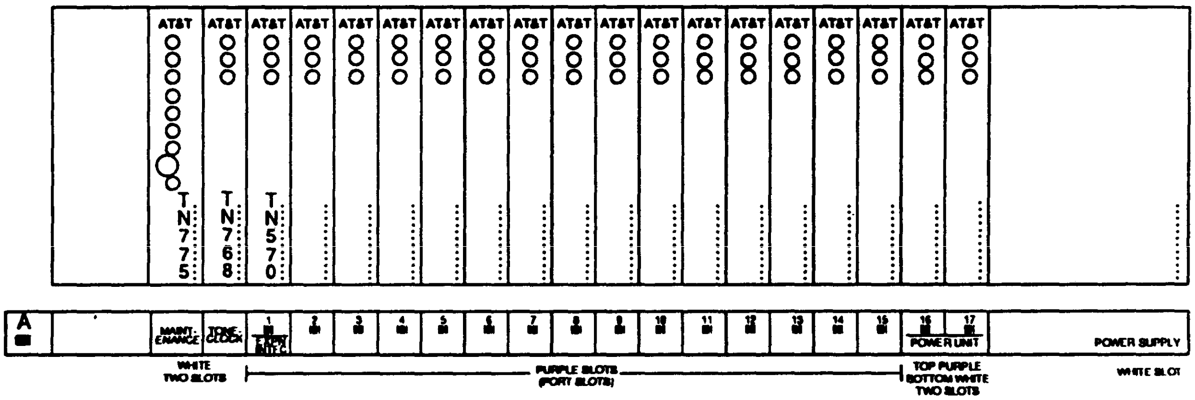


Figure 2-23. Expansion Control Cabinet (J58890N) — Front View

Table 2-19 lists circuit packs and their slot locations in the expansion control cabinet.

Table 2-19. Circuit Packs in Expansion Control Cabinet (J58890N)

Name	Code	Slot Location	Notes
Expansion Interface	TN570 (G3i, G3r) TN776 (G1, G3i, G3i-G)	1	Required
Maintenance	TN775B	MAINTENANCE	Required in G3r
Power Unit (neon)	TN755B	POWER UNIT (16 and 17)	Optional
Announcement	TN750, B	2 to 17	Optional
Speech Synthesizer	TN725B	2 to 17	Optional

Continued on next page

Table 2-19. Circuit Packs in Expansion Control Cabinet Port Slots — *continued*

Name	Code	Slot Location	Notes
Power Supply (+5V/-48V/-5V/+12V)	WP-91153	POWER SUPPLY	Required for AC
Power Supply (DC) {+5V/-48V/-5V/+12V)	676B	POWER SUPPLY	Required for DC
Tone-clock	TN419B (G3i-G), TN768	TONE-CLOCK	Required
Data Line	TN726B	2 to 17	Optional
ISDN BRI Line (G3i and G3r)	TN556	2 to 17	Optional
Packet Data Line (G3r)	TN553	2 to 17	Optional
Packet Gateway (G3r)	TN577	2 to 17	Optional
Pooled Modem	TN758	2 to 17	Optional
Analog Line	TN467 (G3i-G), TN746B, TN742 TN746, and TN769	2 to 17	Optional
Digital Line	TN754B, TN754, TN2136 (G3i-G)	2 to 17	Optional
Hybrid Line	TN762B	2 to 17	Optional
MET Line	TN735	2 to 17	Optional
DS1 Converter	TN574	2 to 17	Optional in G3r
El	TN570 (G3), TN776 (G1 and G3i)	2 to 17	Optional
Auxiliary Trunk	TN417 (G3i-G), TN763D	2 to 17	Optional
CO Trunk	G3i-G: TN438B and TN2147, TN747B	2 to 17	Optional
DID Trunk	TN436B, TN459B, TN753, TN2146 (G3i-G)	2 to 17	Optional
DIOD Trunk	TN429 (G3i-G)	2 to 17	Optional
DS1 Interface	TN767B	2 to 17	Optional
DS1 Tie Trunk	TN722B	2 to 17	Optional
Tie Trunk	G3i-G: TN437B, TN439, TN449, TN458 TN497, TN2140, TN760D (G1, G3i, G3r)	2 to 17	Optional
DS1 Interface (G3r, G3i-G)	TN464C	2 to 17	Optional
DS1/E1 (G3i-G)	TN464D	2 to 17	Optional in G3r for PRI
Call Classifier	TN744	2 to 17	Optional in G3r
Tone Detector	TN420C (G3i-G), TN748D	2 to 17	Required in G1 Optional in G3
DEFINITY AUDIX System	None	Rightmost 5 slots	Optional

Figure 2-24 and table 2-20 describe the connectors on the expansion control cabinet rear panel.

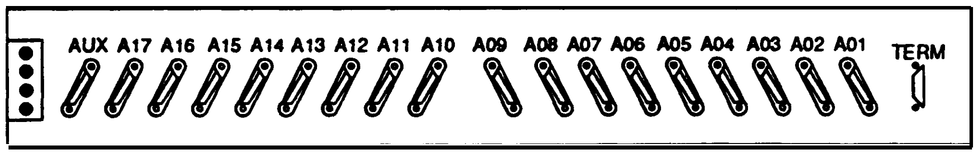


Figure 2-24. Expansion Control Cabinet (J58890N) — Rear Panel

Table 2-20. Functions of Expansion Control Cabinet Rear Panel Connectors

Connector	Function
1	Fiber-optic cable interface between an EI in slot 1 and an EI in a port carrier, control carrier (G1, G3i, G3i-G) or a TN573 in a switch node carrier, or used for a DS1C in slot 1
2 to 17	Ports that provide interfaces between circuit packs and the cross-connect field
AUX (auxiliary)	Connects a tip/ring pair to the cross-connect field, customer alarms, attendant console power, and emergency power transfer
TERM (terminal)	Connects an administration terminal to the maintenance circuit pack

Port Cabinet (J58890H)

Figure 2-25 shows a port cabinet, which contains a port carrier. The port cabinet contain optional port circuit packs in port slots 1 to 18 (see table 2-21), and any of the following circuit packs if they're required: tone-clock in slot 1, expansion interface in slot 2, and a neon power unit in slots 17 and 18. The AC or DC power supply, located at the right side of the cabinet, supplies power to the cabinet.

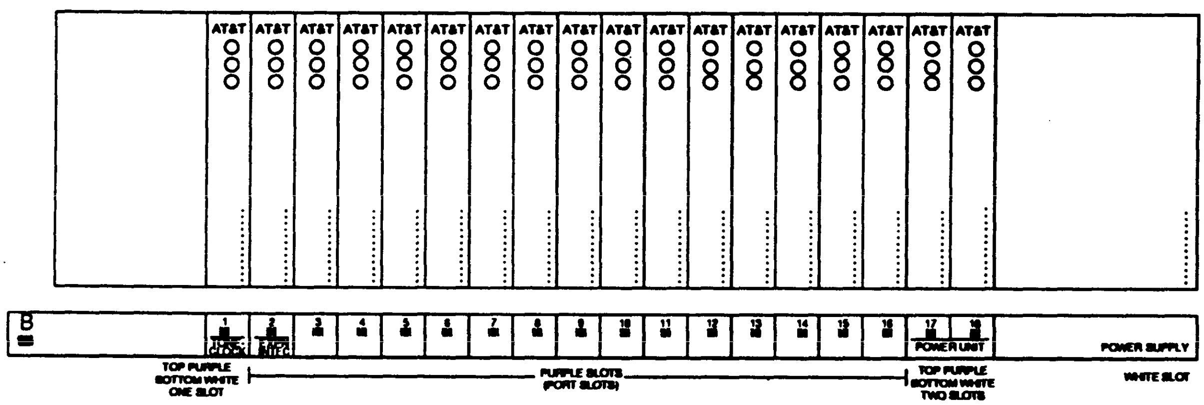


Figure 2-25. Port Cabinet (J58890H) — Front View

Table 2-21 lists circuit packs and their slot locations in the port cabinet.

Table 2-21. Circuit Packs in Port Cabinet (J58890H)

Name	Code	Slot Location	Notes
Power Unit (neon)	TN755B	POWER UNIT (17 and 18)	Optional
Power Supply (AC) (+5V/-48V/-5V/+12V)	WP-91153	POWER SUPPLY	Required for AC
Power Supply (DC) (+5V/-48V/-5V/+12V)	676B	POWER SUPPLY	Required for DC
Tone-clock	TN419B (G3i-G), TN768	1	Optional

Continued on next page

Table 2-21. Circuit Packs in Port Cabinet Port Slots — *continued*

Name	Code	Slot Location	Notes
Data Line	TN726B	1 to 18	Optional
ISDN BRI Line (G3)	TN556	1 to 18	Optional
Packet Data Line (G3r)	TN553	1 to 18	Optional
Packet Gateway (G3r)	TN577	1 to 18	Optional
Pooled Modem	TN758	1 to 18	Optional
Analog Line	TN467 (G3i-G), TN746B, TN742, TN746, and TN769	1 to 18	Optional
Digital Line	TN754B TN754, TN2136 (G3i-G)	1 to 18	Optional
Hybrid Line	TN762B	1 to 18	Optional
MET Line	TN735	1 to 18	Optional
DS1 Converter (G3r)	TN574	1 to 18	Optional
Expansion Interface	TN570 TN776	1 to 18	Optional in G3r Optional in G1, G3i, G3i-G
Auxiliary Trunk	TN417 (G3i-G), TN763D	1 to 18	Optional
CO Trunk	G3i-G: TN438B and TN2147, TN747B	1 to 18	Optional
DID Trunk	G3i-G: TN436B, TN459B and TN2146 (G3i-G), TN753	1 to 18	Optional
DS1 Interface	TN767B	1 to 18	Optional
DS1 Tie Trunk	TN722B	1 to 18	Optional
Tie Trunk	G3i-G: TN437B, TN439, TN449, TN458 TN497, TN2140, TN760D (G1 , G3i, G3r)	1 to 18	Optional
DS1/E1 Interface	TN464D	1 to 18	Optional in G3r
AUDIX System	None	Rightmost 5 slots	Optional

Figure 2-26 and table 2-22 describe the connectors on the port cabinet rear panel.

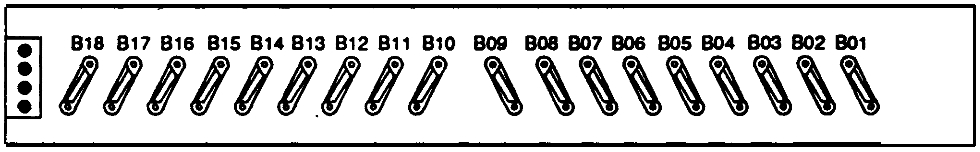


Figure 2-26. Port Cabinet (J58890H) — Rear Panel

Table 2-22. Functions of Port Cabinet Rear Panel Connectors

Connector	Function
2	Expansion interface port that provides an interface for the fiber-optic cable between the TN570 in slot 2 and a TN573 in a switch node carrier
1 to 18	Ports that provide interfaces between circuit packs and the cross-connect field

Circuit Packs

This section lists all circuit packs alphanumerically and by code. Each circuit pack is described briefly, and its input/output pin signals appearing on the carrier connectors are listed.

The circuit packs contain solid-state circuits mounted on printed wiring. All circuit packs are 8 in. (20 cm) by 13 in. (33 cm). The following connectors are attached to one end of a circuit pack: 200-pin connector to a TN-labeled pack; 300-pin connector to a UN-labeled pack. Faceplates on the circuit packs are sized to fill the width of a slot, which is typically .75 in. (1.9 cm). A color code on each faceplate identifies the circuit type. Each faceplate has has a standard pattern of three colored light-emitting diodes (LEDs) that indicate different circuit pack conditions:

- Red, which indicates a fault condition
- Green, which indicates a test condition
- Yellow, which indicates a busy condition

A special grounding latch on each pack protects it from electrostatic discharge during installation.

Types of Circuit Packs

Four types of circuit packs can be installed in carriers:

- Port circuit packs, which provide links between analog and digital lines, trunks, networks, and external communications equipment, and the system's TDM bus and packet bus. These circuit packs can be installed in any port slot.
- Control circuit packs, which include processor, memory, network control, disk control, tape control, protocol interfaces, and maintenance. These circuit packs are installed in dedicated slots in the control carrier and do not work in any other slots, including port slots.
- Service circuit packs, which produce and detect tones, synthesize speech, classify calls, record announcements, and allow the system to be accessed for administration and troubleshooting. These circuit packs are installed in service slots in G3r only, or any port slot in G1, G3i, and G3i-G.
- Power unit circuit packs, which supply DC voltages to the port, control, and maintenance circuit packs in the carriers and single-carrier cabinets. These required circuit packs are installed in indicated white slots in all carriers and single-carrier cabinets.

Port Circuit Packs

Figure 2-27 shows that port circuit packs have the following common parts:

- Bus buffers
- Sanity and control interface (SAKI)
- Microprocessor with external random access memory (RAM)
- Network processing elements (NPEs) or switch conferencing for TDM bus in concentration highway (SCOTCH NPE)

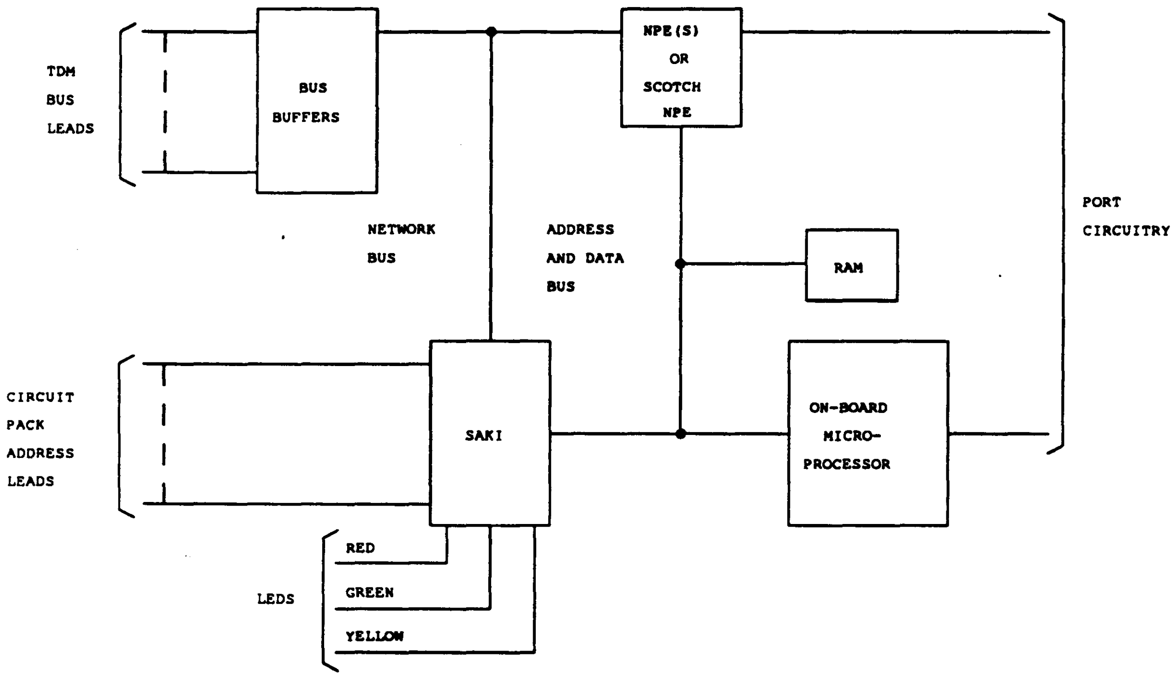


Figure 2-27. Common Parts of Port Circuit Packs

Bus Buffers

The bus buffers are the digital interface between the TDM bus wires on the back-plane and the circuitry on the circuit pack. They receive or transmit on either of the two 8-bit TDM buses.

SAKI

The SAKI is the circuit pack's interface to the TDM bus. It receives control channel information from the TDM bus and sends the information to the microprocessor. Conversely, the microprocessor sends control channel information to the SAKI, which sends it to the TDM bus.

The SAKI also does the following:

- Controls status indicator LEDs on the circuit pack
- Initiates startup procedures when power is turned on
- Checks the circuit pack's microprocessor for sanity, and reinitializes the microprocessor in case of problems
- Takes the circuit pack out of service:
  - On command from the SPE
  - When it determines that interference is present in control time slots on the circuit pack

Microprocessor With External RAM

The microprocessor performs all low-level functions such as scanning for changes and relay operations. In general, the microprocessor carries out commands received from the SPE and reports status changes to the SPE. Some port circuit packs contain more than one microprocessor.

The external RAM stores control channel information and port-related information.

NPEs

The NPEs or a high-density SCOTCH NPE, perform conference and gain-adjustment functions. An NPE (which is under control from the microprocessor) can connect a port circuit to any TDM bus time slot. Each port circuit pack has from one to six NPEs or a high-density SCOTCH NPE.

Descriptions

Tables 2-23, 2-24, 2-25, and 2-26 list the circuit packs in G1, G3i, G3r, and G3i-G, respectively.

Table 2-23. Circuit Packs in DEFINITY G1

Code	Name	Type	See Page
None	DEFINITY AUDIX System	Port	2-68
631DA1	Power Unit (AC)	Power	2-77
631DB1	Power Unit (AC)	Power	2-77
644A1	Power Unit (DC)	Power	2-77
645B1	Power Unit (DC)	Power	2-77
676B	Power Supply (DC)	Power	Chapter 3
982LS	Current Limiter	Power	2-66
CFY1B	Current Limiter	Power	2-67
TN722B	DS1 Tie Trunk	Port	2-71
TN725B	Speech Synthesizer	Service	2-80
TN726B	Data Line	Port	2-67
TN735	MET Line	Port	2-75
TN742	Analog Line	Port	2-61
TN746	Analog Line	Port	2-61
TN747B	CO Trunk	Port	2-66
TN748D	Tone Detector	Service	2-84
TN750, B	Announcement	Service	2-64
TN753	DID Trunk	Port	2-69
TN754, B	Digital Line	Port	2-69
TN755B	Power Unit, Neon	Power	2-78
TN756	Tone Det./Generator	Service	2-84
TN758	Pooled Modem	Port	2-76
TN760D	Tie Trunk	Port	2-83

Continued on next page

Table 2-23. Circuit Packs in DEFINITY G1 — *continued*

Code	Name	Type	See Page
TN762B	Hybrid Line	Port	2-73
TN763B, C, D	Auxiliary Trunk	Port	2-65
TN765	Processor Interface	Control	2-79
TN767B	DS1 Interface	Port	2-70
TN768	Tone-clock	Service	2-83
TN769	Analog Line	Port	2-61
TN770	Memory	Control	2-74
TN772	Duplication Interface	Control	2-71
TN773	Processor	Control	2-78
TN774	Tape Drive	Control	2-81
TN775B	Maintenance	Service	2-73
TN776	Expansion Interface	Port	2-73
TN777	Network Control	Control	2-75
WP-91153	Power Supply (AC)	Power	Chapter 3

Table 2-24. Circuit Packs in DEFINITY G3i and G3i-Global

Code	Name	Type	See Page
None	DEFINITY AUDIX System	Port	2-68
631DA1	Power Unit (AC)	Power	2-77
631DB1	Power Unit (AC)	Power	2-77
644A1	Power Unit (DC)	Power	2-77
645B1	Power Unit (DC)	Power	2-77
676B	Power Supply (DC)	Power	Chapter 3
982LS	Current Limiter	Power	2-66
CFY1B	Current Limiter	Power	2-67
TN556	ISDN BRI Line	Port	2-73
TN570	Expansion Interface (EI)	Port	2-72
TN722B	DS1 Tie Trunk	Port	2-71
TN725B	Speech Synthesizer	Service	2-80
TN726B	Data Line	Port	2-67
TN735	MET Line	Port	2-75
IN742	Analog Line	Port	2-61
TN744	Call Classifier	Service	2-65
TN746, B	Analog Line	Port	2-61
TN747B	CO Trunk	Port	2-66
TN748D	Tone Detector	Service	2-84
TN750, B	Announcement	Service	2-64
TN753	DID Trunk	Port	2-69
TN754, B	Digital Line	Port	2-69
TN755B	Power Unit, Neon	Power	2-78
TN758	Pooled Modem	Port	2-76
TN760D	Tie Trunk	Port	2-83
TN762B	Hybrid Line	Port	2-73
TN763B, C, D	Auxiliary Trunk	Port	2-65
TN765	Processor Interface	Control	2-79

Continued on next page

Table 2-24. Circuit Packs in DEFINITY G3i and G3i-Global — *continued*

Code	Name	Type	See Page
TN767B	DS1 Interface	Port	2-70
TN768	Tone-clock	Service	2-83
TN769	Analog Line	Port	2-61
TN770	Memory	Control	2-74
TN771D	Maintenance/Test	Service	2-74
TN772	Duplication Interface	Control	2-71
TN773	Processor	Control	2-78
TN774	Tape Drive	Control	2-81
TN775B	Maintenance	Service	2-73
TN776	Expansion Interface (EI)	Port	2-73
TN777	Network Control	Control	2-75
TN778	Packet Control	Control	2-75
TN780	Tone-clock	Service	2-84
WP-91153	Power Supply (AC)	Power	Chapter 3

Table 2-25. Circuit Packs in DEFINITY G3i-Global

Code	Name	Type	See Page
TN417	Auxiliary Trunk	Port	2-64
TN419B	Tone-clock	Service	2-83
TN420C	Tone Detector	Service	2-84
TN429	DIOD Trunk	Port	2-69
TN433	Speech Synthesizer	Service	2-79
TN436B	DID Trunk	Port	2-68
TN437B	Tie Trunk	Port	2-81
TN438B	CO Trunk	Port	2-65
TN439	Tie Trunk	Port	2-82
TN447	CO Trunk	Port	2-65
TN449	Tie Trunk	Port	2-82
TN457	Speech Synthesizer	Service	2-79
TN458	Tie Trunk	Port	2-82
TN459B	DID Trunk	Port	2-68
TN464C	DS1 Interface	Port	2-70
TN464D	DS1/E1	Port	2-71
TN465	CO Trunk	Port	2-65
TN467, TN468B	Analog Line	Port	2-61
TN479	Analog Line	Port	2-61
TN497	Tie Trunk	Port	2-82
TN2135	Analog Line	Port	2-64
TN2136	Digital Line	Port	2-70
TN2138	CO Trunk	Port	2-66
TN2139	DID Trunk	Port	2-69
TN2140	Tie Trunk	Port	2-83
TN2144	Analog Line	Port	2-64
TN2146	DID Trunk	Port	2-69
TN2147	CO Trunk	Port	2-66
TN2149	Analog Line	Port	2-64

Table 2-26. Circuit Packs in DEFINITY G3r

Code	Name	Type	See Page
None	DEFINITY AUDIX System	Port	2-68
631DA1	Power Unit (AC)	Power	2-77
631DB1	Power Unit (AC)	Power	2-77
644A1	Power Unit (DC)	Power	2-77
645B1	Power Unit (DC)	Power	2-77
676B	Power Supply (DC)	Power	Chapter 3
CFY1B	Current Limiter	Power	2-67
TN464C	DS1 Interface	Port	2-70
TN464D	DS1/E1	Port	2-71
TN553	Packet Data Line	Port	2-76
TN556	ISDN BRI Line	Port	2-73
TN570	Expansion Interface (EI)	Port	2-72
TN572	SN Clock	Service	2-79
TN573	SN Interface	Control	2-79
TN574	DS1 Converter	Port	2-70
TN577	Packet Gateway	Port	2-76
TN722B	DS1 Tie Trunk	Port	2-71
TN725B	Speech Synthesizer	Service	2-80
TN726B	Data Line	Port	2-67
TN735	MET Line	Port	2-75
TN742	Analog Line	Port	2-61
TN744	Call Classifier	Service	2-65
TN746, B	Analog Line	Port	2-61
TN747B	CO Trunk	Port	2-66
TN748C, D	Tone Detector	Service	2-84
TN750, B	Announcement	Service	2-64
TN753	DID Trunk	Port	2-69

Continued on next page

Table 2-26. Circuit Packs in DEFINITY G3r — *continued*

Code	Name	Type	See Page
TN754, B	Digital Line	Port	2-69
TN755B	Power Unit, Neon	Power	2-78
TN758	Pooled Modem	Service	2-76
TN760D	Tie Trunk	Port	2-83
TN762B	Hybrid Line	Port	2-73
TN763B, C, D	Auxiliary Trunk	Port	2-65
TN767B	DS1 Interface	Port	2-70
TN768	Tone-clock	Service	2-83
TN769	Analog Line	Port	2-61
TN771D	Maintenance/test	Service	2-74
TN775B	Maintenance	Service	2-73
TN780	Tone-clock	Service	2-84
TN1648	System Access/Maintenance	Service	2-81
TN1650B	Memory	Control	2-74
TN1655	Packet Interface	Control	2-76
TN1656	Tape Drive	Control	2-81
TN1657	Disk Drive	Control	2-70
UN330B	Duplication Interface	Control	2-72
UN331B	Processor	Control	2-78
UN332	Mass Storage/Network Control	Control	2-74
WP-91153	Power Supply (AC)	Power	Chapter 3

Analog Line (TN467) — G3i-G

The TN467 provides eight ports for an interface between analog voice terminals and the TDM bus. The TN467 has administrable A-law commanding, mu-law companding and complex input impedance. This circuit pack provides secondary lightning protection.

Analog Line (TN468B) — G3i-G

The TN468B provides 16 analog line ports. Each port has tip and ring signal leads. The TN468B is defaulted to A-law companding and allows a down-link message to override the default and choose mu-law companding. The TN468B has administrable ring patterns and secondary lightning protection.

Analog Line (TN479, TN742, TN746, TN746B, and TN769)

The TN742 and TN769 each has 8 ports. The TN746 and TN746B each has 16 ports. Each port has the following signal leads: tip (T) and ring (R).

The TN742 supports on-premises (in-building) or off-premises wiring (out-of-building only with AT&T-certified protection equipment) with either touch-tone or rotary dialing and with or without the LED message waiting indicators. The LED message waiting indicators are not supported off premises. The TN742 does not support neon message waiting indicators.

The TN746 (in-building only) meets the needs of most analog line applications requiring a single voice terminal. Each port supports one voice terminal with or without the LED message waiting indicators, such as AT&T 500 and 2500 terminals (rotary or DTMF dialing). The ringer load for this circuit pack is three. The TN746 along with a TN755B power unit per cabinet supports voice terminals equipped with neon message waiting indicators. Auxiliary equipment, such as line status indicators, answering machines, modems, and amplifier handsets, is not allowed with a TN746.

The TN746B supports on-premises (in-building) or off-premises wiring (out-of-building only with AT&T-certified protection equipment) with either touch-tone or rotary dialing and with or without the LED and neon message waiting indicators. A TN755B power unit per carrier or per single-carrier cabinet is required for neon message waiting indicators.

The TN769 supports on-premises (in-building) or off-premises wiring (out-of-building only with AT&T-certified protection equipment) with either touch-tone or rotary dialing and with or without the LED message waiting indicators and neon message waiting indicators. The LED message waiting indicators or neon message waiting indicators are not supported off premises. In addition to the TN769, a TN755B Power Unit per carrier or per single-carrier cabinet is required to support neon message waiting lamps.

The TN479, TN742, TN746B, and TN769 support three ringer loads, such as three voice terminals with one ringer load each. Only one voice terminal can have a LED or neon message waiting indicator. Two voice terminals maximum per port (TN742) can be simultaneously off-hook.

The TN479, TN742, TN746B, and TN769 also support the following conditions:

— Queue warning level lamps associated with the Direct Department Calling and Uniform Call Distribution features

— Recorded announcements associated with the Intercept Treatment feature

— Dictation machines associated with the Recorded Telephone Dictation Access feature

— Page Pac® Paging System for the Loudspeaker Paging feature

— External alerting devices associated with the Trunk Answer from Any Station (TAAS) feature

— Modems

The TN746B is an interface between analog voice terminal lines and the TDM/packet bus. The TN746B consists of a ringing application circuit and port input/output (I/O) circuits.

The TN746B supports the following:

- Queue warning level lamps associated with the Direct Department Calling (DDC) and Uniform Call Distribution (UCD) features
- Recorded announcements associated with the Intercept Treatment feature
- Page Pac paging system for the Loudspeaker Paging feature
- External altering devices associated with the TAAS feature
- Modems

A TN746B has 16 ports, each with the following signal leads: T and R.

Table 2-27 lists the characteristics of each analog line circuit pack.

Table 2-27. Analog Line Circuit Pack Characteristics

Feature	Analog Line Circuit Packs				
	TN742	TN769	TN746	TN746B	TN478
Number of Ports	8	8	16	16	16
Neon Message Waiting Indicators	No	Yes	Yes	Yes	Yes
LED Terminals	Yes	Yes	Yes	Yes	Yes
Feed Voltage	-48V	-48V	-24V	-48V	-24V
Hard Bridging	Yes	Yes	No	Yes	No
Station Adjunct	Yes	Yes	No	Yes	No
Secondary Lightning Protection	Yes	Yes	No	Yes	No
Same Premises-Out-of-Building	Yes	Yes	No	Yes	No
Terminals	500-Type 2500-Type 7100 series 8102-Type 8110-Type	500-Type 2500-Type 7100 series 8102-Type 8110-Type	500-Type 2500-Type 7102A* 8102-Type 8110-Type	500-Type 2500-Type 7100 Series 8102-Type 8110-Type	500-Type 2500-Type 7100 series 8102-Type 8110-Type
Range With 500-Type/ 2500-Type/7102A Terminals* (24-Gauge Wire)	20,000 Feet	20,000 Feet	3,100 Feet	20,000 Feet	3,000 Feet
Range With 7101A/7103A Terminals (24-Gauge Wire)	15,200 Feet	15,200 Feet	Not supported	15,200 Feet	Not Supported
Ringer Loads	3	3	3	3	3
Simultaneous Ports Ringing	4	4	4	8**	4

* The TN746 supports a 7102A terminal, but does not support 7101A or 7103A terminals.

** The TN746B allows ringing on four ports of each half of the circuit pack for a maximum of eight simultaneous ports ringing. A user attempting to ring one half of the circuit pack when all four ports are busy receives a busy tone.

Analog Line (TN2135) — G3i-G

The TN2135 provides 16 analog line ports and ground key detection. Each port has tip and ring signal leads. The TN2135 is defaulted to A-law companding and allows a down-link message to override the default and choose mu-law companding. The TN2135 has administrable ring patterns and secondary lightning protection.

Analog Line (TN2144) — G3i-G

The TN2144 provides 16 analog line ports and ground key detection. Each port has tip and ring signal leads. The TN2144 is defaulted to A-law companding and allows a down-link message to override the default and choose mu-law companding. The TN2144 has administrable ring patterns and secondary lightning protection.

Analog Line (TN2149) — G3i-G

The TN2149 provides 16 analog line ports. Each port has tip and ring signal leads. The TN2149 is defaulted to A-law companding and allows a down-link message to override the default and choose mu-law companding. The TN2149 has administrable ring patterns and secondary lightning protection.

Announcement (TN750 and TN750B)

The TN750 and TN750B record and store announcements that can be played back on demand as part of a calling feature. The TN750 has sampling rates of 16, 32, or 64 kbps. The TN750 records announcement times of up to four minutes and 16 seconds at 32 kbps and eight minutes and 32 seconds at 16 kbps. The TN750B can record messages from on-or off-premises voice terminals. The TN750B can store up to 128 recorded announcements of eight maximum minutes each. The TN750B has 16 channels, and each channel can play any announcement. Five call connections can listen to each channel, which means a total simultaneous call capacity of 80 calls in G3i. 255 callers can be connected to each channel in G3r.

Auxiliary Trunk (TN417) — G3i-G

The TN417 provides four ports for on-premises trunk applications such as Music-on-Hold, Loudspeaker Paging, Code Calling, and Recorded Telephone Dictation Access. The TN417 supports Audichron® announcement equipment. TN417 hardware and firmware is identical to that in the TN763C, except that the TN417 has A-law companding on the pulse code modulation (PCM) signal and the TN763C has mu-law companding on the PCM signal.

Each port has the following signal leads: T, R, SZ, SZ1, S, S1.

Auxiliary Trunk (TN763B, C, and D)

The TN763B, C and D hasfour ports used for on-premises applications such as: music-on-hold, loudspeaker paging, code calling, and recorded telephone dictation access. The TN763C supports recorded announcement equipment. The TN763D can be administered to select A-law or mu-law companding. Each port has the following signal leads: T, R, SZ, SZ1, S, and S1.

Call Classifier (TN744) — G3

The TN744 has eight detectors that detect tones in outgoing call management (OCM) and call prompting applications. The TN744 detects special intercept tones used in network intercept tone detection in the (OCM) application. The TN744 also detects tones when a CO answers a call. The TN744 has multifrequency-compelled (MFC) release 2 (R2) DID signaling in G3i-G.

CO Trunk Circuit Pack (TN438B) — G3i-G

The TN438B provides eight ports for loop-start CO trunks and has the following attributes:

- Detection of 12Khz and 50Hz periodic metering pulses sent from the CO
- Call still held timing
- Automatic guard fault detection circuitry

Each port has the following signal leads: T, R.

CO Trunk (TN447) — G3i-G

The TN447 provides eight analog central office (CO) trunk ports. Each port has tip and ring signal leads and connects to a two-wire analog line. The TN447 has the following attributes:

- Ground-start trunk signaling
- 50 Hz periodic pulse metering (PPM) detection and counting
- Administrable timers

CO Trunk (TN465) — G3i-G

The TN465 provides eight analog CO trunk ports and has the following attributes:

- Loop-start trunk signaling
- 16 kHz PPM detection and counting
- Administrable timers

CO Trunk (TN747B)

The TN747B has eight ports for loop-start or ground-start CO, foreign exchange (FX), and Wide Area Telecommunications (WATS) trunks. A port can also be connected to a Page Pac paging system. The TN747B supports the Abandoned Call Search feature in automatic call distribution (ACD) applications only if the CO has this feature.

Each port on a TN747B has the following signal leads: T and R.

CO Trunk (TN2138) — G3i-G

The TN2138 provides eight analog central office (CO) trunk ports. Each port has tip and ring signal leads. The TN2138 has 50Hz, 12kHz, and 16kHz PPM.

CO Trunk (TN2147) — G3i-G

The TN2147 provides eight analog CO trunk ports. Each port has tip and ring signal leads.

The TN2147 uses four (one for each pair of ports) dual subscriber line audio processing circuits (DSLACs) that can be administered to meet the following transmission and DC signaling requirements:

- Loop-start signaling
- Earth-calling and loop-calling guarded clearing signaling

The DSLACs convert analog signals to digital signals and digital signals to analog signals in order to interface the analog CO trunks to the system's digital TDM bus.

Current Limiter (982LS) — G1, G3i, and G3i-G

The 982LS connects to the back of the processor circuit pack slot and provides the following:

- Current-limited accessory 48 V
- Emergency transfer logic
- Current-limited 5 V to trip main circuit breaker when there's high temperature
- Duplicated 48 volts to fan units in the PPN cabinet

Current Limiter (CFY1B)

The CFY1B connects to the back of the maintenance board slot and provides the following:

- Current-limited accessory 48 V
- Emergency transfer logic
- Current-limited 5 V to trip main circuit breaker when there's high temperature
- Duplicated 48 V to fan units in an EPN cabinet

Data Line (TN726B)

The TN726B has eight serial asynchronous Electronic Industries Association (EIA) ports with modem interfaces that can be connected through asynchronous data units (ADUs) to EIA ports (such as RS232C) on data terminal equipment (DTE). The TN726B uses mode 2 or mode 3 data transfer protocol. The DTE can be adjuncts and peripheral equipment, such as: data terminals, printers, host computers, personal computers (PCs), graphics and facsimile systems, and call detail acquisition and processing systems (CDAPs).

With software-administered system access ports in G3r, a TN726B is connected through a wall field to a TN553 packet data line circuit pack. Using this connection, the TN553 converts mode 2 protocol to mode 3 protocol, which transfers the TN726B from the packet bus to the TDM bus for EIA connections.

Each port on a TN726B has the following signal leads: TXT (terminal, transmit, and tip), TXR (terminal, transmit, and ring), PXT (port, transmit, and tip), and PXR (port, transmit, and ring).

DEFINITY AUDIX System

The DEFINITY AUDIX system is a unit that allows a person to record and exchange voice messages over the phone when direct communication is inconvenient or unnecessary. The unit can be installed in five contiguous slots in a carrier. Preferably, the five rightmost slots on the carrier's front are used.

The unit contains the following hardware:

- TN566 multifunction circuit pack, which holds the central processing unit (CPU), controllers, memory devices, and signal processors
- TN2169 alarm circuit pack, which works with the TN566 to provide monitoring for system power and environmental status, -48 VDC to +12 VDC power conversion for the disk drive and tape drive, and remote terminal access
- Tape drive, which is a 160-Mbyte data cassette recorder used to distribute software onto a disk, store periodic backups of data, install new software releases, and remove core dumps and other maintenance information
- Disk drive, which is a 100-, 200-, or 400-Mbyte drive used to store customer data, boot the system, and log system error information. Software is loaded onto the disk from a tape.

Depending on the disk drive sizes, the unit can handle from 300 to 2,000 local and remotely administered subscribers. The unit has eight ports, in which two ports are used for each set. See the "DEFINITY™ AUDIX® System, System Description" (585-300-205) for more information.

DID Trunk (TN436B) — G3i-G

The TN436B provides eight ports that independently connect to a public network. Each port is an interface between a two-wire analog PBX line from a CO and the four-wire TDM network in the system. The TN436B has administrable timers.

DID Trunk (TN459B) — G3i-G

The TN459B provides eight ports for immediate-start or wink-start DID trunks. Each port is an interface between a two-wire analog PBX line from a CO and the four-wire TDM network in the system. The TN459B has administrable timers and a backward busy circuit that complies with signaling requirements. A TN495B has the following signal leads on each port: T, R.

DID Trunk (TN753)

The TN753 has eight ports that are used for immediate-start and wink-start DID trunks. Each port on a TN753 has T and R leads.

DIOD Trunk (TN429) — G3i-G

The TN429 provides eight ports for DIOD trunks. Each port has the following signal leads: T, R.

DID Trunk (TN2139) — G3i-G

The TN2139 provides eight analog DID trunk ports for analog DID signaling. Each port has tip and ring signal leads. The TN2139 has zero dB loss digital transmission.

DID Trunk (TN2146) — G3i-G

The TN2146 provides eight analog DID trunk ports. Each port has tip and ring signal leads. The TN2146 uses four (one for each pair of ports) dual subscriber line audio processing circuits (DSLACs) that can be administered to meet trunk transmission characteristics. The DSLACs can be set to either a resistive or complex balance impedance in the voice or AC talk path on the trunk interfaces. The DSLACs convert analog signals to digital signals and vice-versa in order to match the analog DID trunks to the system's digital TDM bus.

Companding in the TN2146 firmware is programmed to the default A-law, however, the firmware can be administered to select mu-law companding.

Digital Line (TN754 and TN754B)

The TN754 and TN754B each have eight asynchronous Digital Communications Protocol (DCP) ports that can be connected to the following equipment: 7400 series digital voice terminals, attendant consoles, 510D personal terminals, MT 515 business communications terminals (BCTs), and data modules. The TN754B has administrable A-law and mu-law companding.

Each port on a TN754 and a TN754B has the following signal leads: TXT, TXR, PXT, and PXR.

Digital Line (TN2136) — G3i-G

The TN2136 provides eight ports for connecting the system to the following DCP endpoints: data adaptor modules and digital telephone models one and two. Each port can be connected to a two-wire digital line. The TN2136 has administrable A-law and mu-law companding.

Disk Drive (TN1657) — G3r

The TN1657 contains a small computer system interface (SCSI) disk drive that stores 180Mbytes. The TN1657 reduces the boot time of the system.

DS1 Converter (TN574) — G3r

The TN574 in a PN terminates communication carried across a T1 facility from another PN. The TN574 can terminate from one to four full-duplex T1 links per PN. TN574s installed in two PNs allow communication distances up to 100 circuit miles (station-to-station) between them.

DS1 Interface (TN464C) — G3r and G3i-G

The TN464C acts as a DS1 interface and an ISDN-PRI interface in G3r and has the following attributes:

- 1.544-Mbps DS1 and 2.048-Mbps E1 (32-channel ISDN) transmission rates
- A-law to mu-law companding conversion
- Stratum 3 clock compatibility
- D-channel connectivity for ISDN-PRI

DS1 Interface (TN767B)

The TN767B allows DS1 and ISDN-PRI signaling to be carried over DS1 facilities. It also allows the ISDN-PRI signaling to be carried on any of the 24 trunk ports between the TDM bus and the DS1 facility. It performs robbed-bit signaling using CO, TIE, DID, and OPS signaling protocol in any remaining ports. It provides D- and B-channel connectivity in G1 and G3i, but only B-channel connectivity in G3r.

A TN767B has the following signal leads: LBACK1, LBACK2, LO, LO (high), LI, and LI (high).

DS1 Tie Trunk (TN722B)

The TN722B has 24 independent trunk connections to a 1.544-Mbps DS1 facility. Each trunk transmits data at 64 kbps common channel or 56 kbps robbed bit. The TN722B has three types of digital tie trunk interfaces:

- Voice-grade DS1
- Alternate Voice/Data (AVD) DS1 tie trunks
- Digital-Multiplexed Interface (DMI)

The TN722B provides bit-oriented signaling (BOS) on the following trunks: automatic, immediate-start, delay-dial, and release-link.

A TN722B has the following signal leads: LBACK1, LBACK2, LO, LO (high), LI, LI (high).

DS1/E1 (TN464D) — G3i-G

The TN464D provides a wide range of digital trunk application needs, and is a superset of the TN464C. The TN464D has the following attributes:

- 32 channels
- Administrable A-law companding and mu-law companding
- CRC-4 check
- 1.544-Mbps DS1 and 2.048-Mbps E1 transmission rates
- Supports digital release link tie trunks
- Supports MFC, R2 DID signaling

In addition to supporting tie trunk, CO trunk, and DID trunk protocols, the TN464D supports bit-oriented signaling protocols and bit-oriented DID signaling protocols. A TN464D has the following signal leads: LBACK2, LBACK1, LO, LO (high), LI, LI (high).

Duplication Interface (TN772) — G1, G3i, and G3i-G

The TN772 selects the active processing element (control complex) in high reliability and critical reliability systems and coordinates the interchange of processing elements.

The TN772 does the following:

- Controls the memory shadowing function with the duplication option
- Terminates the environmental sensors
- Controls the integrated battery supply and charging circuits

- Selects the active SPE
- Selects the active tone-clock circuit pack
- Provides an administration terminal interface in place of the processor

A second TN772 circuit pack resides in the duplicated control carrier/cabinet. The TN772 requires a cable connection to the Duplication Interface circuit pack in the basic control carrier/cabinet.

Duplication Interface (UN330B) — G3r

In a high reliability and critical reliability systems, which have two switch processing elements (SPEs), one UN330B resides in each SPE and is connected to the other UN330B. The UN330Bs provide control and communication paths between the SPEs to keep the redundant standby (inactive) SPE ready to assume control if the active SPE fails. The UN330Bs do the following:

- Select active/standby mode for the two SPEs
- Shadow (copy) the active SPE’s memory writes into the standby SPE memory
- Support inter-SPE communications

The memory shadowing is a bidirectional high-speed path between the two SPEs. When memory shadowing is activated, all shadowed memory writes on the active processor’s bus are sent across the link and written into the standby processor's memory. Standby memory writes are not sent to the active processor.

EI (TN570) — G3

The TN570 expansion interface (EI) is an interface between the TDM bus and packet bus, and fiber-optic links that interconnect cabinets. It is used in a PN in the following cabinet connections:

- Between a PN and another PN in a directly connected system
- Between a PN and an SNI in a switch node carrier in a CSS-connected system

The TN570 provides control channel connectivity and time-slot interchanging between the PPN and EPNs. It is used in G3i when ISDN-BRI and/or ASAI is connected in an EPN, and it is always used in G3r.

The TN570 carries the following information: circuit-switched data, packet-switched data, network control, timing control, and DS1 control.

The TN570 communicates with the TN775B maintenance circuit pack in an EPN to send the EPN’s environmental and alarm status to the SPE.

EI (TN776) — G1, G3i, and G3i-G

The TN776 connected to the TDM bus in one PN is an interface between that PN and the TDM bus extended to another PN. The TN776 packages the TDM control channel with link access procedure on the D-channel (LAPD) for transmission over the fiber link between cabinets. The TN776 provides the time-slot interchange between cabinets. A system with ASAI/BRI requires TN570 EI circuit packs in place of TN776 circuit packs.

Hybrid Line (TN762B)

The TN762B has eight ports that can be connected only to AT&T 7300 series, multi-appearance hybrid analog and digital voice terminals.

Each port on a TN762B has the following signal leads:

- VT and VR, which are used for analog voice
- CT, CR, P-, and P+, which are used for digital signals that control terminals

ISDN BRI Line (TN556) — G3

The TN556 has 12 ports that can be connected to ISDN-BRI terminals. Up to eight ports can be used for ASAI links. Each port operates at 192 kbps per second and has two B-channels and one D-channel (not used to carry data). The TN556 requires a packet control circuit pack (TN778).

The TN556 also has multipoint support; 24 terminals can be connected, where each terminal uses one B-channel and shares the D-channel. In multisupport connectivity, the following terminals can be connected to each port: two voice terminals, one voice terminal and one data terminal, or two data terminals.

Each port on a TN556 has the following signal leads: TXT, TXR, PXT, and PXR.

Maintenance (TN775 — G1, G3i, and G3i-G, and TN775B)

The TN775 and TN775B are used in maintenance and do the following:

- Monitors power failure signals in an EPN cabinet
- Monitors the clock
- Provides two serial links to communicate with EI circuit packs
- Contains a three-position switch that controls emergency power transfer
- Monitors and controls power supplies and battery charger
- Monitors airflow and high temperature sensors
- Provides an RS232C interlace for connection to an administration terminal

Maintenance/Test (TN771D) — G3

The TN771D performs the following maintenance functions:

- Packet bus reconfiguration, which allows diagnosis and correction of recoverable packet bus failures before the LAPD links, which use the bus, fail. LAPD is a link-layer protocol on the ISDN-BRI and ISDN-PRI data link layer (level 2). LAPD provides data transfer between two devices, and error and flow control on multiple logical links. It recovers packet bus failures involving up to three malfunctioning leads (one or two data or parity leads, and one control lead) by swapping spare leads with the malfunctioning leads.
- ISDN-PRI testing, which originates and terminates loop-back tests on ISDN facilities. It provides bit and block error rate information that indicates ISDN facility quality.

A TN771D is required in all: standard reliability G3r PPNs and duplicated G3r EPNs; G3i and G3i-G using the packet bus for BRI/ASAI.

Mass Storage/Network Control (UN332) — G3r

The UN332 does the following:

- Provides a small computer system interface (SCSI) between the processing element and the mass storage system (MSS), which consists of tape and disk drives
- Provides TDM network control for the PPN
- Terminates one end of the processor-multiplexed bus

Memory (TN770) — G1, G3i, and G3i-G

The TN770 contains system translations including addresses of equipment connected to the switch through the port circuit packs and call processing software. It provides 6 Mbytes of dynamic RAM with single-bit error correction and double-bit error detection. It contains a memory array, on-board refresh logic, and address decode logic. The G1.1 requires one TN770 per control carrier. G3i and G3i-G require two TN770s per control carrier.

Memory (TN1650B) — G3r

The TN1650B has 32 Mbytes of dynamic random access memory (RAM). It has error detection and correction circuitry to ensure information integrity. The TN1650B uses 4-Mbytes RAM chips.

MET Line (TN735)

The TN735 has four ports that connect to MET sets. Each port has the following signal leads:

- T and R, which handle analog voice
- BT, BR, LT and LR, which handle digital signals that control terminals

Network Control (TN777) — G1, G3i, and G3i-G

The TN777 does the following:

- Communicates control channel messages between the processor circuit pack and the distributed network of port circuit packs on the TDM bus.
- Controls the four data channels that process and route information directly from the processor circuit pack to customer-connected equipment. Some of the possible equipment connections are data services facilities, SMDR devices, an on-premises remote pooled modem or administration terminal, or an off-premises administration terminal. Some of these connections require modems such as a modular processor data module (MPDM) or a modular trunk data module (MTDM).
- Has the time-of-day clock with battery backup for power failure or low voltage conditions. This circuit pack also has a 24-hour clock used with record keeping and system maintenance.
- Monitors the status of the system clocks and alerts the processor circuit pack in the event of a failure of any clock.
- Supports the high reliability option and handles all the control channel messages from the PPN or EPN networks over the TDM.

Packet Control (TN778) — G3i and G3i-G

The TN778 interfaces the packet bus with the SPE and terminates LAPD links. The TN778 supports packet bus signaling for ISDN D-channel signaling for ASAI applications and for packet bus maintenance. Packet bus signaling occurs over the LAPD links and terminates (at level 2) on the packet control circuit pack. The TN778 provides the following:

- A protocol processing capability to interface the SPE with the packet bus
- Communications with the SPE using a message-based interface, a shared memory based interface, and a combination of these interfaces
- Packet bus loop-around testing
- Monitoring of the packet bus to detect packet bus faults in standard reliability systems
- Maintaining of signaling links during planned SPE interchanges with the duplication option

Packet Data Line (TN553) — G3r

The TN553 is connected through a wall field to a TN726B circuit pack and provides software-administered connections between the SPE and system access ports. Inside the system, the TN553 connects to the packet bus. The TN553 converts mode-2 protocol to mode-3 protocol, which connects the TN726B to the TDM bus for asynchronous EIA connections to adjuncts. The TN553 has 12 ports.

Packet Gateway (TN577) — G3r

The TN577 provides four ports for X.25 protocol interfaces between the system and adjuncts. For example, this circuit pack is the interface between the system and the following adjuncts and systems: Audio Information Exchange (AUDIX™), Call Management System (CMS), Message Server Adjunct (MSA), and DCS.

Packet Interface (TN1655) — G3r

The TN1655 provides the communication path between the SPE and the packet bus in the PPN. This path is used by the EPNs and the CSS, via EI circuit packs in the PPN, to communicate with the RISC processor.

The TN1655 also provides the LAPD (DMI mode-3) terminations of communication links across the packet bus that go to the RISC. The following major links are terminated:

- ISDN-BRI and ISDN-PRI signaling links
- Expansion archangel links that connect the RISC to the expansion archangels on EI circuit packs in each PN
- Center stage control network links that connect the RISC with SN interface circuit packs in the CSS
- DCS links — SMDR and adjuncts such as AUDIX
- Firmware downloading
- 8,192 LAPD links

Pooled Modem (TN758)

The TN758 has two conversion resources ports (such as a trunk data module) for switched connections between digital data endpoints (data modules) and analog data endpoints (modems).

Power Supply (AC) (WP-91153) — Single-Carrier Cabinet

See description in chapter 3, "Power and Fans."

Power Supply (DC) (676B) — Single-Carrier Cabinet

See description in chapter 3, "Power and Fans."

Power Unit (AC), +5V (631DA1) — Multicarrier Cabinet

The 631DA1 accepts 120-VAC 60 Hz and produces +5 VDC at 60A, which is available on the carrier backplanes.

During normal operation, the 631DA1 converts the 120-VAC input to +5 VDC. If the unit's AC input power fails, the unit converts 144 VDC supplied by optional batteries in the AC power distribution unit to +5 VDC. A circuit in the battery charger unit detects the highest equivalent AC or DC input voltage and switches in the correct input voltage.

Power Unit (AC), -48V/-5V (631DB1) — Multicarrier Cabinet

The 631DB1 accepts 120-VAC 60 Hz and produces -48 VDC at 8A and -5 VDC at 6A, which are available on the carrier backplanes. The -48 VDC also supplies power to the cabinet fans.

During normal operation, the 631DB1 converts the 120-VAC input to -48 VDC and -5 VDC. If the unit's AC input power fails, the unit converts 144 VDC supplied by optional batteries in the AC power distribution unit to -48 VDC and -5 VDC. A circuit in the optional battery charger unit detects the highest equivalent AC or DC input voltage and switches in the correct input voltage.

Power Unit (DC), +5V (644A1) — Multicarrier Cabinet

The 644A1 converts a -48-VDC input to a +5-VDC output at 60A. The +5 VDC is distributed on the carrier backplanes to circuit pack slots in the carriers.

Power Unit (DC), -48V/-5V (645B1) — Multicarrier Cabinet

The 645B1 converts a -48-VDC input to outputs of -48 VDC at 8A and -5 VDC at 6A. The -48 VDC and -5 VDC are distributed on the carrier backplanes to circuit pack slots in the carriers. The -48 VDC also powers the cabinet fans.

Power Unit, Neon (TN755B)

The TN755B produces 150 VDC that operates neon message waiting lamps on terminals connected to TN746B analog line circuit packs installed in the carriers.

Processor (TN773) — G1, G3i, and G3i-G

The TN773 manages a G1, G3i, and G3i-G by controlling the system and executing stored programs that perform call processing activity and maintenance tape processor (MTP) functions. The TN773 has 196,608 bytes of read-only memory (ROM)/erasable programmable ROM (EPROM), 32kbytes of RAM, and timers.

The TN773 provides the following:

- Programming in ROM to boot the system from tape in streaming mode
- Direct access to the tape drive through the MTP portion of the processor
- Continues update of a standby processor memory in high reliability and critical reliability systems to reflect the memory in the active processor; the MTP of the standby processor holds that processor in a reset condition during the memory shadowing operation
- Alarm LEDs for system status
- Monitors and controls circuit pack conditions
- Direct access to an administration terminal
- An asynchronous modem that originates alarms to a remote maintenance system and allows remote technicians to run maintenance and administrative commands
- An interface to an SMDR output device
- Control of the emergency transfer operation and monitoring of the environmental sensor and control leads for a single processor operation
- An external alarm closure

Processor (UN331B) — G3r

The UN331B is the main processor that manages a DEFINITY G3r. The processor operates at 33 MHz and uses a MIPS RISC 3000 central processing unit (CPU) chip. It uses 32-bit address and data buses to obtain and execute instructions. The processor's instruction set is stored in a 256-kbyte cache memory on the UN331B.

Processor Interface (TN765) — G1, G3i, and G3i-G

The TN765 has four data links to the TDM bus and a link through the memory bus to the processor. This circuit pack is an interface to the 3B2 MSA, DCS, ISDN, and AUDIX Interface service. The TN765 allows direct access to one data link from an EIA port on the circuit pack in AC standard reliability systems. The other data links connect to a digital line circuit and a PDM or TDM to access an MSA, DCS, CMS, ISDN, or AUDIX. Data links can connect to DS-1 tie trunks to access DCS or ISDN applications.

The TN765 terminates BX.25 and ISDN LAPD protocols. The multicarrier cabinet supports two TN765 circuit packs that have a total of eight data links. A single-carrier cabinet system supports only one TN765 circuit pack that has four data links. DCS hop channels between two TN765s in a multicarrier cabinet G1 are not allowed.

SN Clock (TN572) — G3r

The TN572 distributes the timing signals that synchronize the SN carrier in which it's installed. The TN572 also receives maintenance data.

SN Interface (TN573) — G3r

The TN573 is an interface (installed in an SN carrier in a CSS) that terminates a fiber-optic link from an SNI in an SN carrier to an:

- SNI in another switch node carrier
- EI in a PPN
- EI in an EPN

The TN573 routes circuit, packet, and control messages. One TN573 is used per PN.

Speech Synthesizer (TN433) — G3i-G

The TN433 provides four ports that retrieve fixed messages for Leave Word Calling, Automatic Wakeup, and Visually Impaired Attendant Console features. Examples of the the messages are: good morning, time-of-day, and extension number. Each of the ports has touch-tone detection. The TN433 has administrable mu-law companding and A-law companding.

Speech Synthesizer (TN457) — G3i-G

The TN457 provides four ports that retrieve fixed UK-accent spoken messages for Leave Word Calling, Automatic Wakeup, and Visually Impaired Attendant Console features. Examples of the the messages are: good morning, time-of-day, and extension number. Each of the ports has touch-tone detection. The TN457 has administrable mu-law companding and A-law companding.

Speech Synthesizer (TN725B)

The TN725B has four ports that send voice message information to voice terminals to activate Leave Word Calling, Automatic Wakeup, Voice Message Retrieval, and Do Not Disturb features. The ports can detect tones.

System Access and Maintenance (TN1648) — G3r

The TN1648 is an SPE component used for maintenance. A processor in the TN1648 runs control routines that connect to maintenance software in the RISC processor. The TN1648 has a five-LED alarm panel and a toggle switch that can manually inhibit automatic emergency transfer of PPN analog lines.

The TN1648 has two RS232C interfaces — one for a terminal and, when there's duplication, one for a terminal connected to the off-line processor.

A tip and ring port with a built-in modem on the TN1648 allows a remote administration terminal to access the system.

The TN1648 provides the following:

- Connection to an administration terminal
- Alarm monitors and outputs
- Power supply controls
- Reserve power monitors
- Emergency transfer control
- Sanity timer for SPE software sanity
- Time-of-day clock used for application software and timestamping
- Alarm panel
- Connection to and termination of one end of the processor bus

Tape Drive (TN774) — G1, G3i, and G3i-G

The TN774 stores the software information for the system. It contains a tape drive that has 32 Mbytes of storage space and a -48 volt to +12 volt DC converter used by the tape drive. It has an LED that monitors the tape drive.

Tape Drive (TN1656) — G3r

The TN1656 contains a small computer system interface (SCSI) tape drive that stores 3Mbytes to 120 Mbytes.

Tie Trunk (TN437B) — G3i-G

The TN437B provides four ports for four-wire E&M lead signaling tie trunks. The TN437B has the following attributes:

- Selectable trunk type for outgoing calls and incoming calls — automatic (the default), immediate, wink start, and delay dial
- Administrable timers

2

- A-law companding
- Selectable standard reliability type 5 signaling or E&M type 5 signaling

Tie Trunk (TN439) — G3i-G

The TN439 provides four ports for two-wire tie trunks with loop disconnect signaling. The TN439 has administrable A-law companding, mu-law companding and timers.

Tie Trunk (TN449) — G3i-G

The TN449 provides four ports for four-wire E&M lead signaling tie trunks. The TN449 has administrable A-law companding, mu-law companding and timers. The TN449 can be administered on each port for connection to the following signaling formats:

- Type 1 E&M standard (unprotected)
- Type 1 E&M compatible (unprotected)
- Type 1 E&M compatible (protected)
- Type 5 simplex

Tie Trunk (TN458) — G3i-G

The TN458 provides four ports for four-wire E&M lead signaling tie trunks. The TN458 has administrable A-law companding, mu-law companding and timers. The TN458 can be administered on each port for connection to the following signaling formats:

- Type 1 E&M standard (unprotected)
- Type 1 E&M compatible (unprotected)
- Type 1 E&M compatible (protected)
- Type 5 simplex

Tie Trunk (TN497) — G3i-G

The TN497 provides four ports for two-wire tie trunks with loop disconnect signaling. Each port can be administered for:

- A-law companding and mu-law companding, and timers
- Traslatore giunzione uscente (TGU), which means “outgoing tie”
- Traslatore giunzione entrante (TGE), which means “incoming tie”
- Traslatore giunzione interno (TGI), which means “internal tie”

Tie Trunk (TN760D)

The TN760D has four ports used for type 1 or type 5 four-wire E&M lead signaling tie trunks, which can be automatic, immediate-start, wink-start, and delay-dial. The TN760D provides release link trunks required for centralized attendant service. The TN760D has administrable A-law and mu-law companding.

Option switches on each TN760D port can select connections to the following signaling formats:

- Type 1 E&M standard (unprotected)
- Type 1 E&M compatible (unprotected)
- Type 1 E&M compatible (protected)
- Type 5 simplex

Each port on a TN760D has the following signal leads: T, R, T1, R1, E, and M.

Tie Trunk (TN2140) — G3i-G

The TN2140 provides four ports for four-wire E&M lead signaling tie trunks. The TN2140 has the following attributes:.

- Continuous E&M signaling and discontinuous E&M signaling
- Administrable A-law companding and mu-law companding
- Zero dB digital loss
- Standard type 1 and type 5 signaling

Tone-Clock (TN419B) — G3i-G

The TN419B supplies call progress tones, touch tones, answer-back tones, and trunk transmission test tones. The TN419B provides 2-megahertz (MHz) and 160-kilohertz (kHz) clocks, and the 8-kilohertz (kHz) frame dock. This circuit pack can transmit the system clock and tones on either TDM bus A, TDM bus B, or both TDM bus A and TDM bus B. This circuit pack contains a ring voltage alarm detection circuit.

Tone-Clock (TN768)

The TN768 supplies timing, which includes Stratum 4 timing, to the PN in which it resides. It produces the following tones: call progress, touch tones, answer-back, and trunk transmission test. The TN768 has 2-MHz, 160-kHz, and 8-kHz clocks. The TN768 can transmit the system clock and tones on either TDM bus A, TDM bus B, or both buses.

Tone-Clock (TN780) — G3

The TN780 connects to an optional external Stratum 3 clock and monitors it. It also couples the Stratum 3 clock's output to local clocks. Only the control carrier, which supplies master timing to the system, uses this circuit pack.

The TN780 produces the following tones: call progress, touch tones, answer-back, and trunk transmission test. It has 2-MHz, 160-kHz, and 8-kHz clocks. This circuit pack can transmit the system clock and tones on either TDM bus A, TDM bus B, or both buses.

In G3i-G, the T780 can be adminstered to:

- Produce six customizable tones in five different tone plans (for use in countries outside the USA) other than the USA tone plan
- Operate in Mu-or A-law companding

Tone Detector (TN420C) — G3i-G

The TN420C can be administered to detect and analyze tones on the TDM bus. The TN420C has two network processing elements (NPEs) with eight channels that provide the following: four dual tone multi-frequency receiver (DTMF) ports, two general purpose tone detector (GPTD) ports, and two digital looparound ports.

Tone Detector (TN748C, TN748D)

The TN748C and TN748D have four touch-tone receivers and two general-purpose tone receivers that detect the following: call progress tones, modem answer-back tones, transmission test tones, and noise. The TN748C and TN748D provide tone detection required for the following: Automatic Route Selection (ARS) feature, off-premises (out-of-building) keyboard dialing, and off-premises abbreviated dialing.

Tone Detector/Generator (TN756) — G1 (Single-Carrier Cabinet)

The TN756 combines the functions of the TN768 tone-clock and TN748C and TN748D tone detectors in one circuit pack. The TN756 has four touch-tone receivers and two general-purpose tone receivers that detect the following: call progress tones, modem answer-back tones, transmission test tones, and noise. The TN756 provides tone detection required for the following: ARS, off-premises (out-of-building) keyboard dialing, and off-premises abbreviated dialing.

Power and Fans

3

This chapter describes power sources used for cabinets, power systems in cabinets, cabinet power and ground wiring, and fan units in DEFINITY® Generic 1 (G1) and DEFINITY Generic 3 (G3) under the following major topics:

Procedures used to plan a customer's power and grounding requirements in a system before installation are given in the following AT&T document: "DEFINITY Communications System Generic 1 and Generic 3 Planning and Configuration" (555-230-600).

Procedures used to connect a customer's system to power and ground sources during installation are given in the following AT&T document: "DEFINITY Communications System Generic 1 and Generic 3 Installation and Test" (555-230-104).

Power Sources

This section describes AC power and DC power sources used for cabinets.

AC Power

Power feeders from a dedicated AC power source (usually located outside the building where the system is installed) are connected to an AC load center. The feeders do not power other equipment. The AC load center distributes the power to receptacles. The power cord from the AC power distribution unit in each multicarrier cabinet and AC power supply in each single-carrier cabinet is plugged into a receptacle.

Either of the following types of AC power sources can supply 60 Hz power to the AC load center:

- Single-phase 240 VAC that supplies 120 VAC or 240 VAC, which is shown in figure 3-1.

  This source has three wires plus ground: two “hot” wires, one neutral wire, and one ground wire. A “hot” wire is a wire that has a voltage with respect to the neutral wire.

- Three-phase, Y, 208 VAC that supplies 120 VAC or 208 VAC, which is shown in figure 3-2.

  This source has four wires plus ground: three hot wires, one neutral wire, and one ground wire.

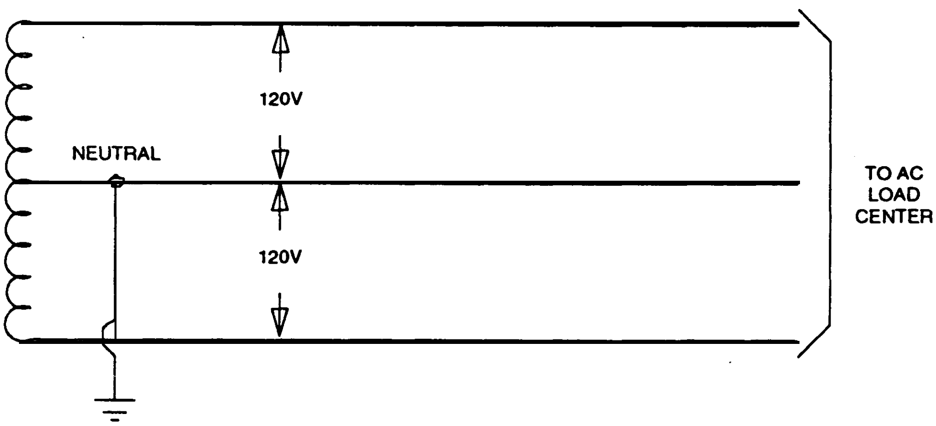


Figure 3-1. Single-Phase 240 VAC Source

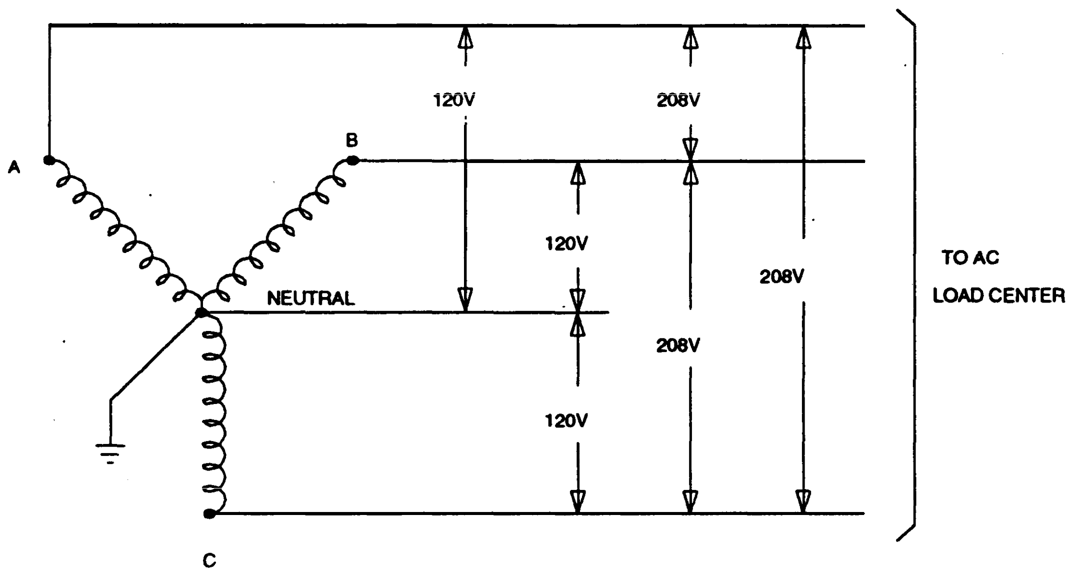


Figure 3-2. Three-Phase Y 208 VAC Source

Table 3-1 lists the 60 Hz AC power sources that can supply power to an AC load center. A National Electrical Manufacturers Association (NEMA) receptacle (identified by “R” in the table) is connected to the wires from the AC load center. The AC power cord from the power input of the distribution unit or power supply is plugged into a receptacle.

Table 3-1. AC Power Sources Used for Multicarrier Cabinets and Single-Carrier Cabinets

Unit Type	Power Input	Power Sources
AC power distribution (J58890CE-L3)	120 VAC at a NEMA 5-50R	Single-phase, 240 VAC, or one phase lead of 3-phase, Y 208 VAC
AC power distribution (J58890CE-L2)	208 VAC at a NEMA L6-30R	Three-phase 208 VAC
AC power distribution (J58890CE-L4)	208/240 VAC at a NEMA 5-20R	3-phase 208 VAC for 208 VAC input, or single-phase, 240 VAC for 240 VAC input
AC power supply (WP-91153) in a single-carrier cabinet	120 VAC at a NEMA 5-20R	Single phase 240 VAC, or one phase lead of three-phase, Y, 208 VAC

DC Power

DC-powered cabinets require a -42.5 VDC to -52.5 VDC source at up to 75A. All G3i-G multicarrier cabinets require this DC source.

Fused Current Drains

Table 3-2 lists fused current drains of AC-powered cabinets.

Table 3-2. Fused Current Drains of AC-Powered Cabinets

Cabinet	Fused Current Drain (A)
Multicarrier cabinet (120 VAC)	50
Multicarrier cabinet (208 VAC)	30
Multicarrier cabinet (240 VAC)	30
Single-carrier cabinet (120 VAC)	15 or 20
Auxiliary cabinet (120 VAC)	20

Table 3-3 lists fused current drains of DC-powered cabinets.

Table 3-3. Fused Current Drains of DC-Powered Cabinets

Cabinet	Fused Current Drain (Amps)
Multicarrier cabinet	75
Single-carrier cabinet	25
Auxiliary cabinet	20

Multicarrier Cabinet Power System

A multicarrier cabinet power system consists of the following parts:

- AC or DC power distribution unit in the bottom (G position) of each cabinet, and cabling that distribute AC and DC output voltages to power unit circuit packs in the carriers.

  G3i-G uses only the DC power distribution unit.

- Power unit circuit packs in the carriers, which supply DC power to the circuit pack slots. “Circuit Packs” in chapter 2, “Cabinets, Carriers, and Circuit Packs” describes the following power unit circuit packs:

  — Power unit (AC): 631DA1 and 631DB1

  — Power unit (DC): 644A and 645B

Table 3-4 lists the power inputs and power outputs of each power distribution unit that can reside in a multicarrier cabinet. A power cord with a NEMA plug is attached to each unit.

In the table, the AC power input voltage wires are in the power cord going to the unit. An auxiliary cabinet uses only the J58890CE-L3, 120 VAC unit listed in the table, but with a NEMA 5-20P plug for 20 A.

Table 3-4. Power Distribution Unit Inputs and Outputs in Multicarrier Cabinets

Unit Type	Power Input	Power Outputs
AC power distribution (J58890CE-L3)	120 VAC, 60Hz, 50A, three wires: one hot, one neutral, one ground, and a NEMA 5-50P plug	120 VAC (normal), 144 VDC (optional, emergency), and 75 VAC to 100 VAC at 20Hz from the ring generator
AC power distribution (J58890CE-L2)	208 VAC, 60Hz, 30A, three wires: two hot, one ground, and a NEMA L6-30P plug	Same as above
AC power distribution (J58890CE-L4)	208/240 VAC, 60Hz, 20A, four wires: two hot, one neutral, one ground, and a NEMA 5-20P plug	Same as above
DC power distribution (J58890CF-1)	-48 VDC at up to 75A	-48 VDC, and 75 VAC to 100 VAC at 20Hz from the ring generator

Table 3-5 lists the input and output voltages of power unit circuit packs in the carriers of multicarrier cabinets.

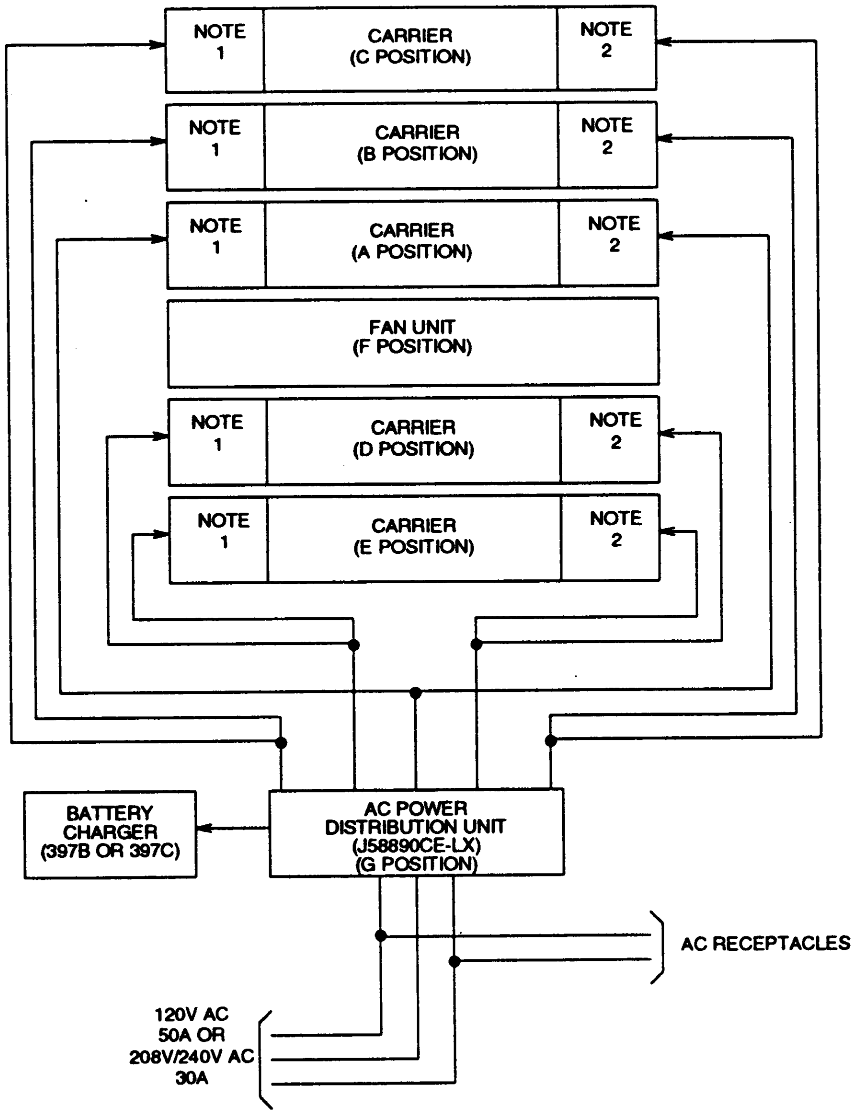
Table 3-5. Carrier Power Unit Inputs and Outputs in Multicarrier Cabinets

Unit Type	Power Inputs			DC Power Outputs		
	120 VAC	144 VDC	-48 VDC	+5V at 60A	-5V at 6A	-48V at 8A
AC 631DA1	Yes	Yes	No	Yes	No	No
AC 631DB1	Yes	Yes	No	No	Yes	Yes
DC 644A	No	No	Yes	Yes	No	No
DC 645B	No	No	Yes	No	Yes	Yes

Power Distribution in a Multicarrier Cabinet

Figure 3-3 shows AC power distribution in multicarrier cabinets. Five-conductor power distribution cables on each side of the cabinet connect the power distribution unit to the power unit circuit packs in each of the five carriers. The cables carry 120 VAC during normal operation and 144 VDC from optional batteries during power backup operation when AC power fails.

Another cable connects 120 VAC from the power distribution unit to the battery charger.

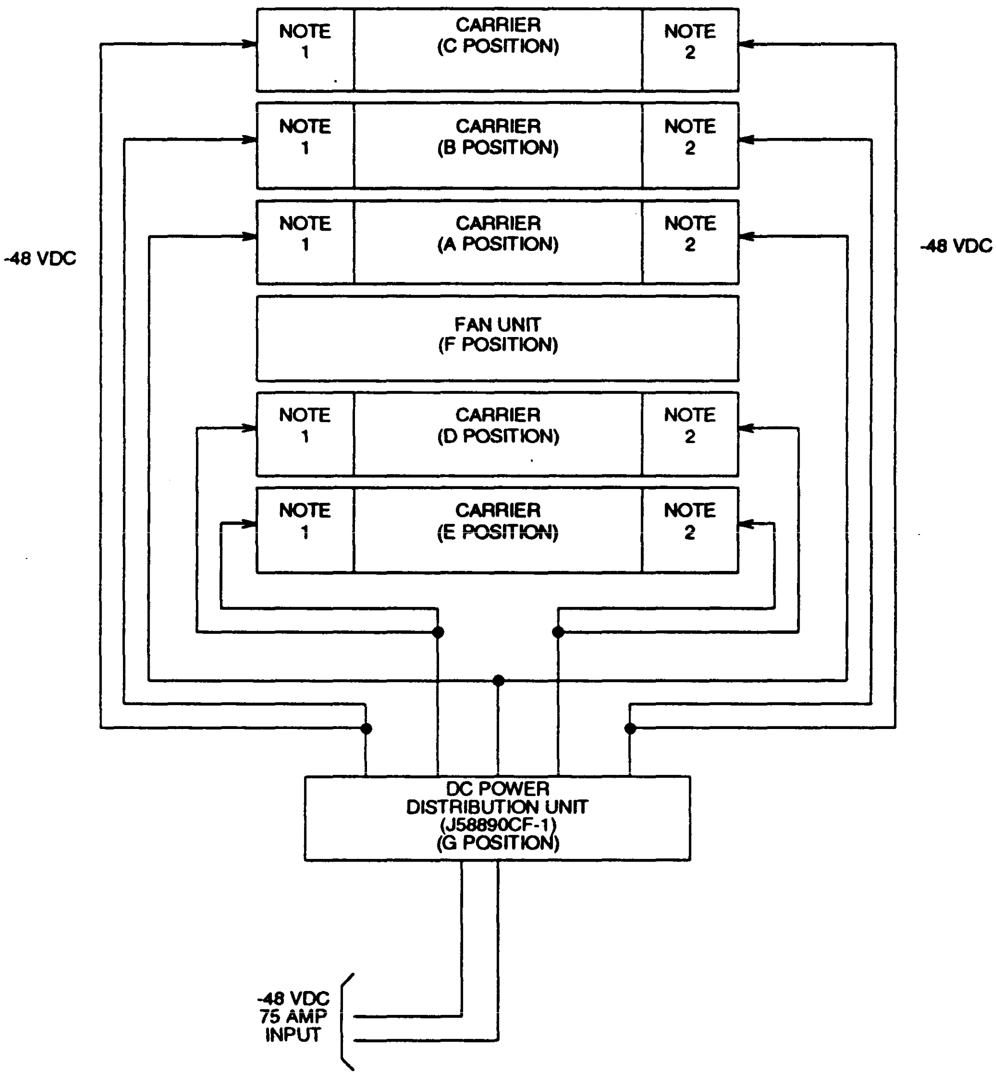


NOTES:

1. 631DA1 AC Power Unit in port, control, switch node, and expansion control carriers
2. 631DB1 AC Power Unit in port, control, and expansion control carriers; 631DA1 in switch node carrier
3. "LX" in the AC power distribution unit refers to the L-number that identifies a specific type of unit

Figure 3-3. AC Power Distribution in Multicarrier Cabinets

Figure 3-4 shows DC power distribution in multicarrier cabinets. Five-conductor cables on each side connect the DC power distribution unit to the power unit circuit packs in the carriers.



NOTES:
1. 644A DC Power Unit in port, control, switch node, and expansion control carriers
2. 645B DC Power Unit in port, control, and expansion control carriers

Figure 3-4. DC Power Distribution in Multicarrier Cabinets

AC Power Distribution Unit (J58890CE-1) in a Multicarrier Cabinet

Figure 3-5 shows the AC power distribution unit, which is located at the bottom of each multicarrier cabinet. Five-conductor cables connect the unit to the power units in the carriers. These cables carry 120 VAC to the carriers during normal operation and optional 144 VDC during emergency operation when the AC input power has failed.

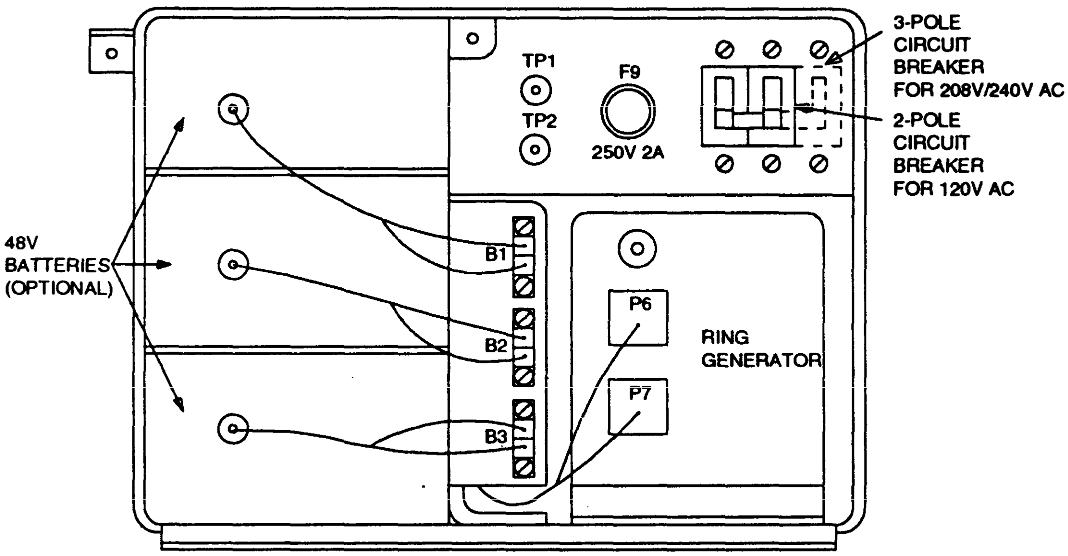


Figure 3-5. AC Power Distribution Unit (J58890CE-1) Without Front Cover

The unit contains the following electrical components:

- Circuit breaker
- Three optional 48V batteries (KS-21906, L9), which are used only without a UPS-powered cabinet and provide backup power to the cabinet
- DC power relay (used only without a UPS)
- Electromagnetic interference (EMI) filter
- Optional battery charger (397B or 397C power unit), used without UPS-powered cabinets
- Ring generator (124B2)
- 20-A fuses

Circuit Breaker

The circuit breaker protects the AC input power to the cabinet and serves as the main AC input disconnect switch. The circuit breaker has two poles for 120 VAC or three poles for 208 VAC/240 VAC. When the cabinet overheats, the circuit breaker automatically opens and removes the AC power input.

48V Batteries

The three 48V batteries (used only without a UPS) are connected in series to produce nominally 144 VDC, which is fused at 20A. The batteries are trickle-charged from the battery charger.

Battery Charger

When AC power is restored after an outage, the battery charger (used only without a UPS) converts a 120-VAC input to DC voltage that recharges the batteries. The charger should charge the batteries within 30 hours.

DC Power Relay

This relay disconnects the batteries (used only without a UPS) from a system when AC power is being used. This relay also disconnects the batteries if power fails for more than 10 minutes in a standard reliability system, five minutes in high reliability and critical reliability systems, and ten minutes in a G3 expansion port network (EPN). This protects the batteries from being overdischarged.

EMI Filters

The EMI filters suppress noise voltage on the AC input line to the unit.

Ring Generator

The ring generator converts the -48-VDC input to a 75-V to 100-V, 20-Hz AC output. The analog line circuit packs use this AC voltage output to ring voice terminals. The AC outputs are routed from the ring generator to port carriers, expansion control carriers, and control carriers in G1 and G3i.

20-A Fuses

20-A fuses protect the power on each cable going from the AC power distribution unit to power units in the carriers.

Power Backup

When AC power fails, the three 48V batteries (used without a UPS) power the system for the following times:

- 10 seconds for a PPN cabinet
- 15 seconds for an EPN cabinet
- 10 minutes for the control carrier in a standard reliability system
- Five minutes for the control carrier in high reliability and critical reliability systems
- 10 minutes for the expansion control carrier in the “A” position of an EPN cabinet in G3r

UPS

An external UPS (which has a longer backup time than holdover batteries) can replace the batteries and battery charger. A UPS is connected from the AC power source to a cabinet’s AC power cord. When AC power fails, the UPS senses the failure and then supplies its own AC power to the cabinet.

DC Power Distribution Unit (J58890CF-1) in a Multicarrier Cabinet

Figure 3-6 shows the DC power distribution unit, which is located at the bottom of each multicarrier cabinet. Five-conductor cables connect the unit to the power units in the carriers. These cables carry -48 VDC to the carriers. 20A circuit breakers protect the power on each cable.

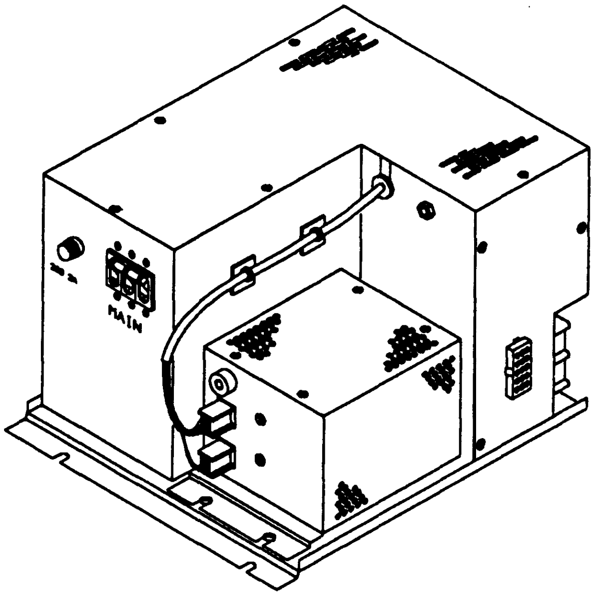


Figure 3-6. DC Power Distribution Unit (J58890CF-1)

The unit contains the following electrical components:

- Ring generator
- Filter circuits
- Circuit breakers
- Terminal blocks

Ring Generator

The ring generator converts the -48-VDC input to a 75-V to 100-V, 20-Hz AC output. The analog line circuit packs use this AC voltage output to ring voice terminals. The AC outputs are routed from the ring generator to the port and expansion interface carriers and the control carrier in G1 and G3i.

Filter Capacitor Circuits

Two filter capacitor circuits are in a list-2 unit. One filter capacitor circuit is in a list-3 unit.

Circuit Breakers

The main circuit breaker is located on the front of the unit and protects the AC input power to the cabinet and serves as the main AC input disconnect switch. When the cabinet overheats, the circuit breaker automatically opens and removes the AC power input.

The circuit breakers that control power to the carriers and filter circuits are located at the rear of the unit. In the CF list 2, 10 circuit breakers control the power units located in the carriers. Two circuit breakers control power to the filter circuits.

In the CF list 1 and CF list 3, five circuit breakers control the power units in the carriers. One circuit breaker controls power to the filter circuits.

Terminal Blocks

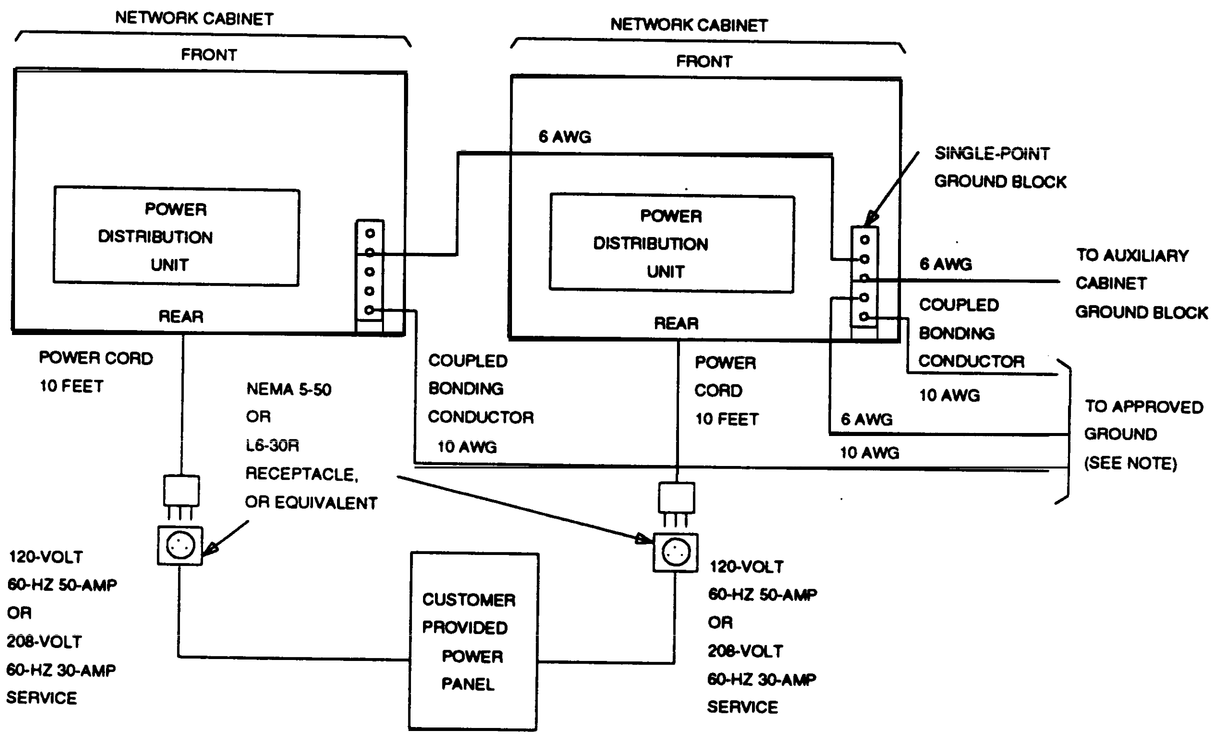
Terminal blocks on the rear of the unit are used to connect -48 VDC from the DC power source.

AC Power and Ground Wiring

This section describes AC power and ground wiring in G1 and G3 multicarrier cabinets.

DEFINITY G1 Multicarrier Cabinets

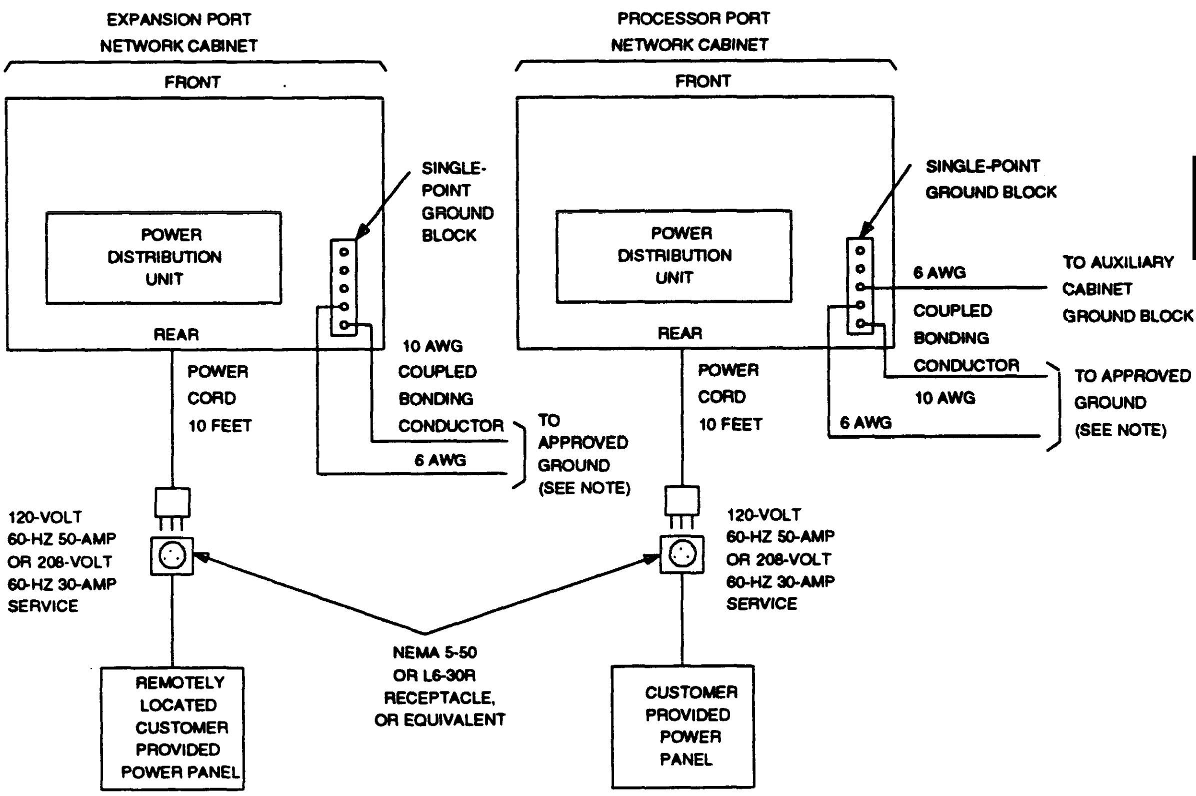
Figure 3-7 shows typical AC power and ground wiring in co-located G1 PPN and EPN cabinets. A 6-gauge ground wire from the ground block on the EPN cabinet connects to the cabinet ground block on the PPN cabinet. A 6-gauge ground wire connects the cabinet ground block on the PPN cabinet to the system single-point ground bar on the customer's AC power panel.



NOTE:
USE APPROVED GROUND LOCATED NEAREST THE TELEPHONE COMPANY OWNED PROTECTOR GROUND BLOCK AT THE BUILDING ENTRANCE FACILITY

Figure 3-7. Typical DEFINITY G1 Multicarrier Cabinet AC Power and Ground Wiring — Colocated EPN

Figure 3-8 shows typical AC power and ground wiring in a remote EPN cabinet. A ground wire is connected from the cabinet ground block of both the PPN and EPN cabinets to an approved external ground.



NOTE:
USE APPROVED GROUND LOCATED NEAREST THE TELEPHONE COMPANY OWNED PROTECTOR GROUND BLOCK AT THE BUILDING ENTRANCE FACILITY

Figure 3-8. Typical DEFINITY G1 Multicarrier Cabinet AC Power and Ground Wiring- Remote EPN

DEFINITY G3 Multicarrier Cabinets

Figure 3-9 shows typical AC power and ground wiring in co-located G3 PPN and EPN cabinets. A 6-gauge ground wire from the ground block on the EPN cabinet connects to the cabinet ground block on the PPN cabinet. A 6-gauge ground wire connects the cabinet ground block on the PPN cabinet to the system single-point ground bar on the customer's AC power panel.

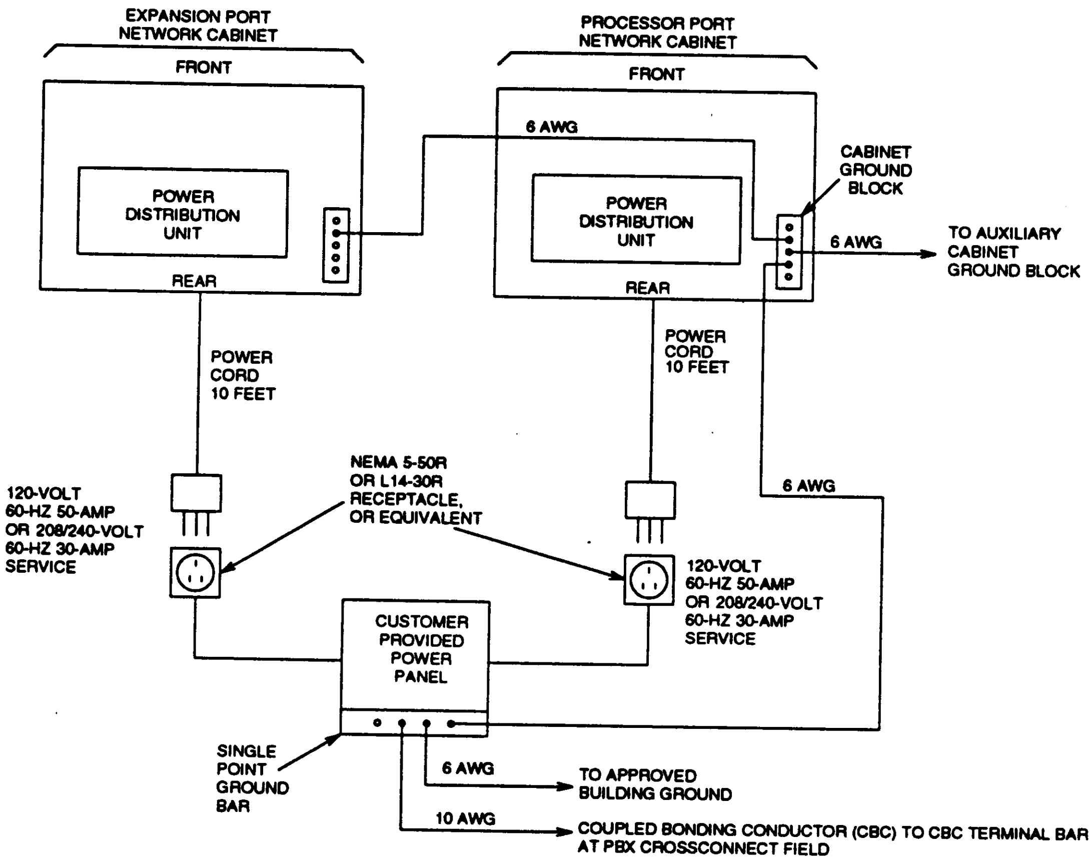


Figure 3-9. Typical DEFINITY G3 Multicarrier Cabinet AC Power and Ground Wiring — Colocated EPN

Figure 3-10 shows typical AC power and ground wiring in a remote EPN cabinet. A ground wire is connected from the cabinet ground block of both the PPN and EPN cabinets to an approved external ground.

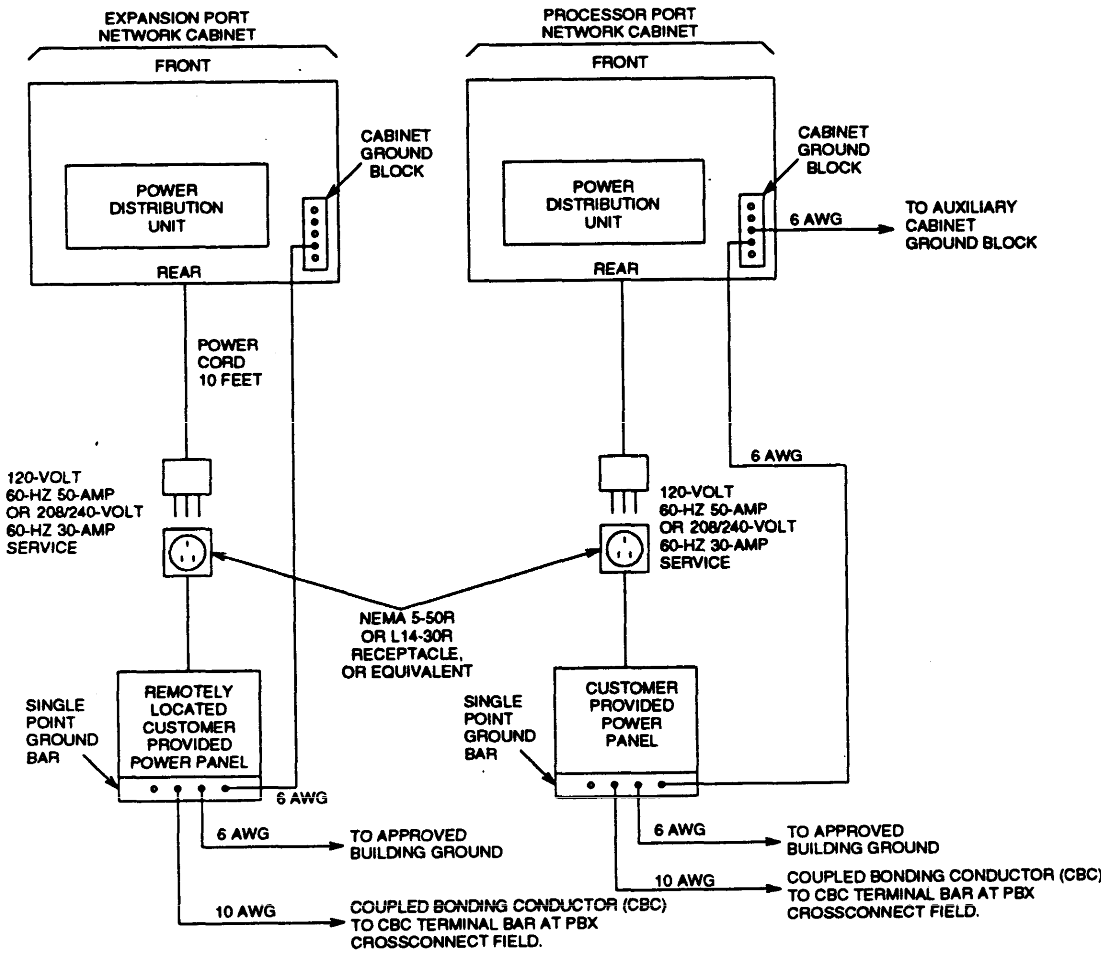


Figure 3-10. Typical DEFINITY G3 Multicarrier Cabinet AC Power and Ground Wiring — Remote EPN

DC Power and Ground Wiring

This section describes DC power and ground wiring in G1 and G3 multicarrier cabinets. Figure 3-11 shows typical DC-powered multicarrier cabinets. The power and ground leads are routed through ductwork or underneath the cabinets.

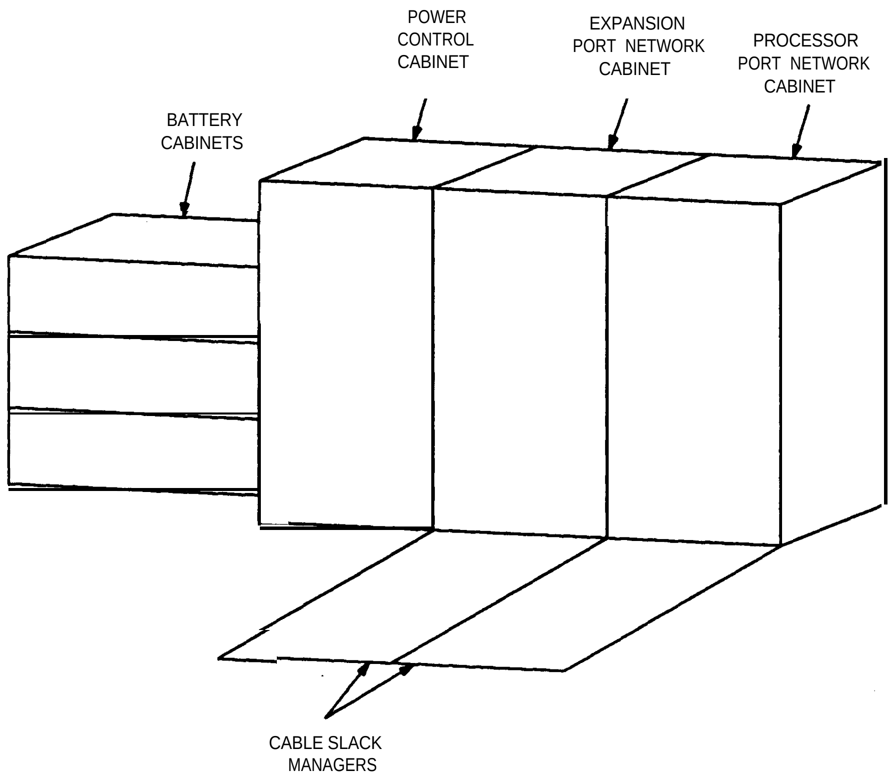
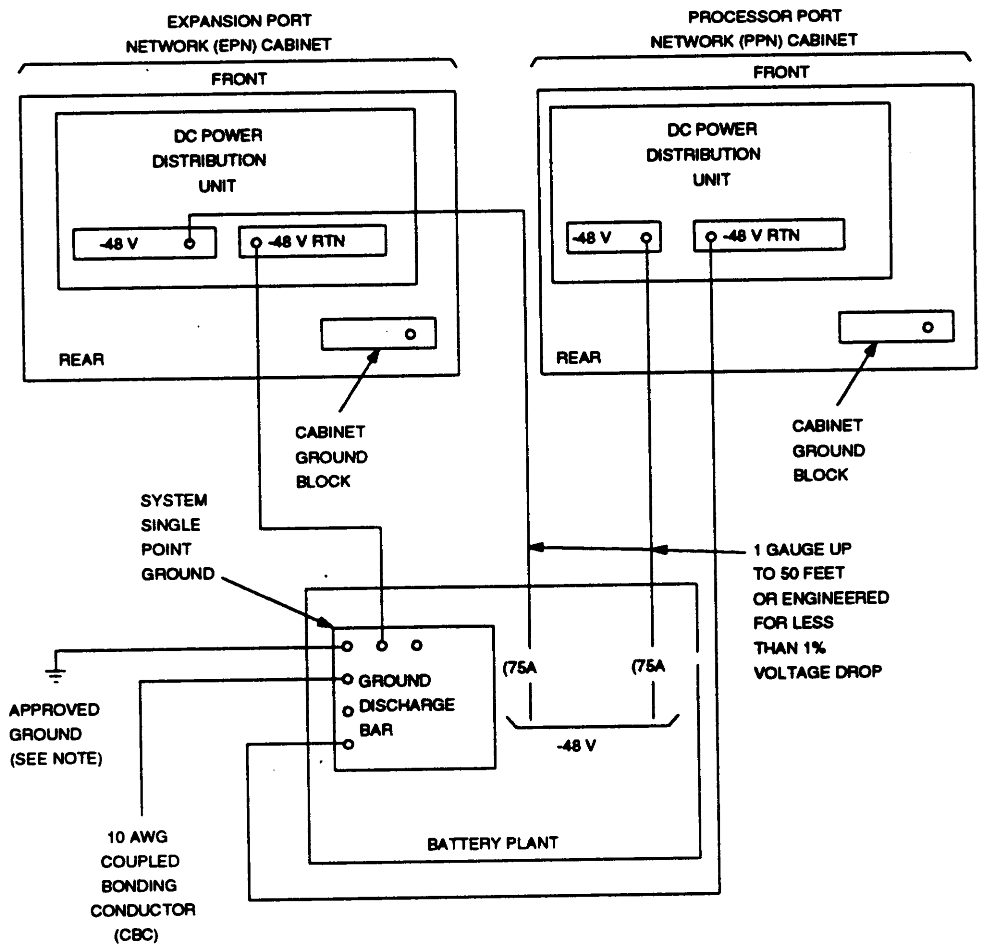


Figure 3-11. Typical Multicarrier Cabinet DC Power and Ground Wiring

DEFINITY G1 Multicarrier Cabinets

A DC power plant can be used to power G1 multicarrier cabinets. Figure 3-12 shows typical power and ground wiring in a DC-powered multicarrier cabinet.



NOTE:
USE APPROVED GROUND LOCATED NEAREST THE TELEPHONE COMPANY OWNED PROTECTOR GROUND BLOCK AT THE BUILDING ENTRANCE FACILITY

Figure 3-12. Typical DEFINITY G1 Multicarrier Cabinet DC Power and Ground Wiring — Colocated EPN

DEFINITY G3 Multicarrier Cabinets

A DC power plant can be used to power G3 multicarrier cabinets. Figure 3-13 shows typical power and ground wiring in a DC-powered multicarrier cabinet.

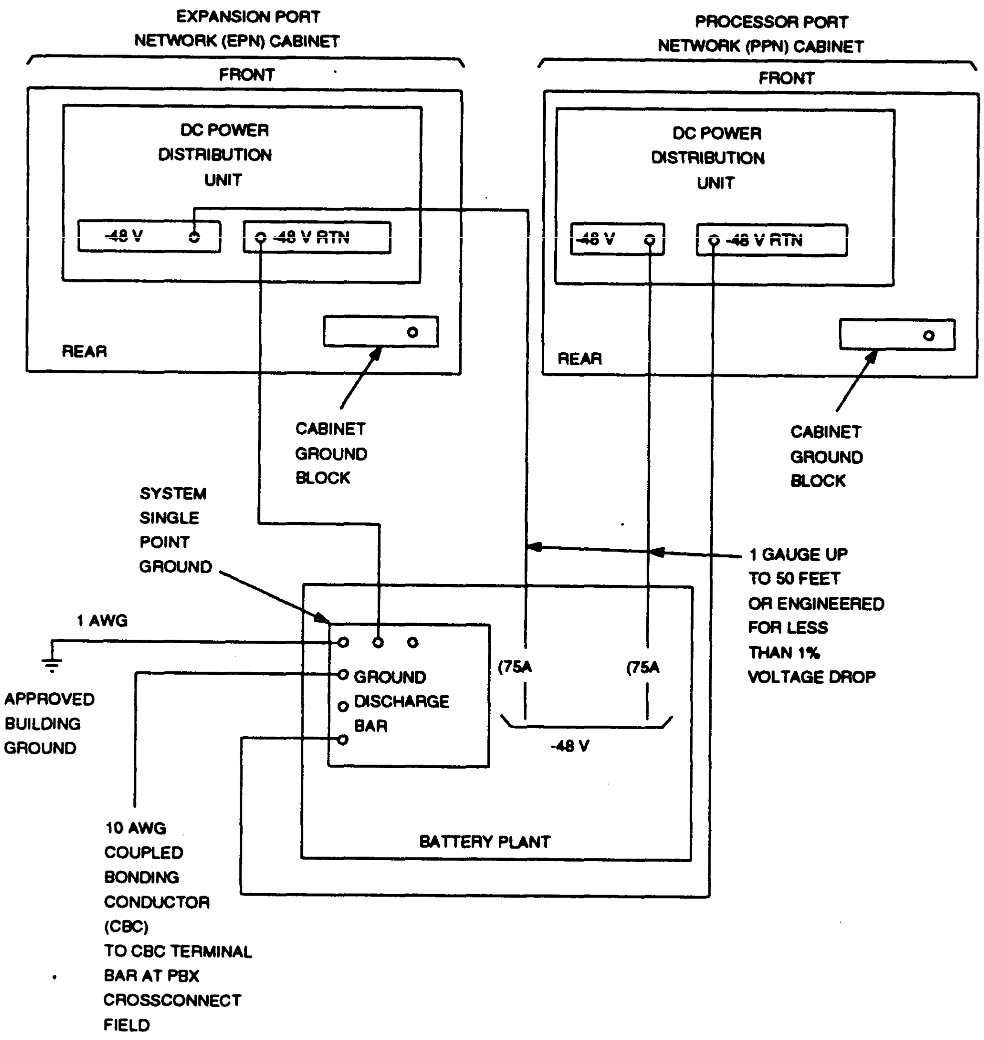


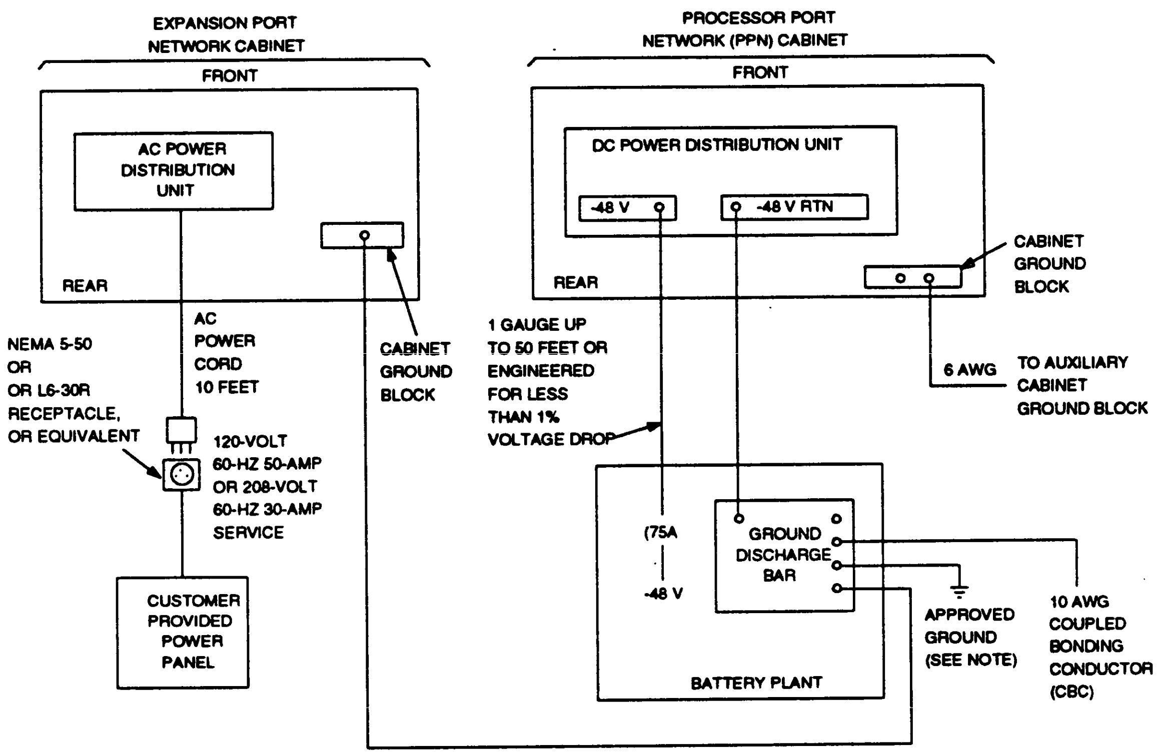
Figure 3-13. Typical DEFINITY G3 Multicarrier Cabinet DC Power and Ground Wiring — Colocated EPN

AC- and DC-Powered Multicarrier Cabinets

This section describes combined AC power and DC power and ground wiring in G1 multicarrier cabinets and in G3 multicarrier cabinets.

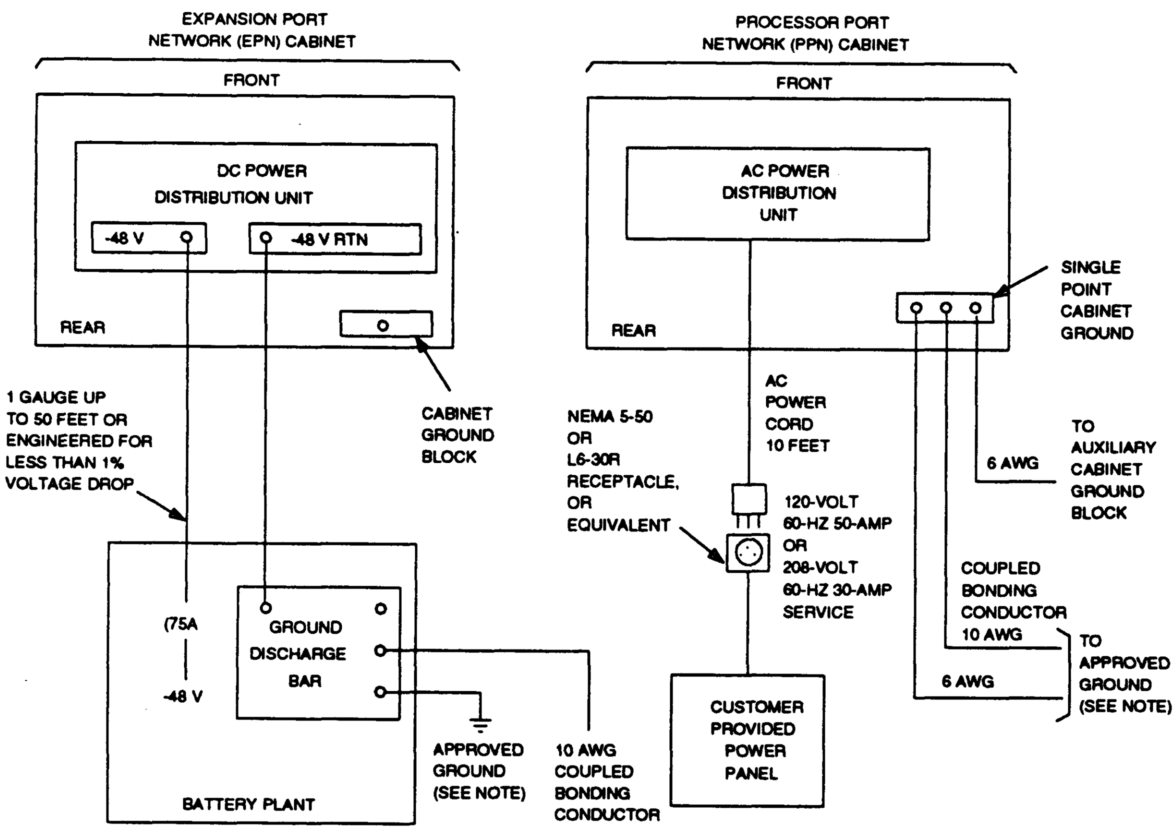
DEFINITY G1 Multicarrier Cabinets

Figures 3-14 and 3-15 show power and ground wiring in AC- and DC-powered G1 multicarrier cabinets. A 6-gauge ground wire is connected to the ground block in the bottom of each EPN cabinet. The ground wire is routed out of the cabinet and terminated at the ground discharge baron the battery plant.



NOTE:
USE APPROVED GROUND LOCATED NEAREST THE TELEPHONE COMPANY OWNED PROTECTOR GROUND BLOCK AT THE BUILDING ENTRANCE FACILITY

Figure 3-14. Typical DEFINITY G1 Multicarrier Cabinet System AC Power and DC Power and Ground Wiring — Colocated EPN



NOTE:
USE APPROVED GROUND LOCATED NEAREST THE
TELEPHONE COMPANY OWNED PROTECTOR GROUND BLOCK
AT THE BUILDING ENTRANCE FACILITY

Figure 3-15. Typical DEFINITY G1 Multicarrier Cabinet System AC and DC Power and Ground Wiring — Remote EPN

DEFINITY G3 Multicarrier Cabinets

Figures 3-16 and 3-17 show power and ground wiring for AC- and DC-powered G3 multicarrier cabinets. A 6-gauge ground wire is connected to the ground block in the bottom of each EPN cabinet. The ground wire is routed out of the cabinet and terminated at the ground discharge bar on the battery plant.

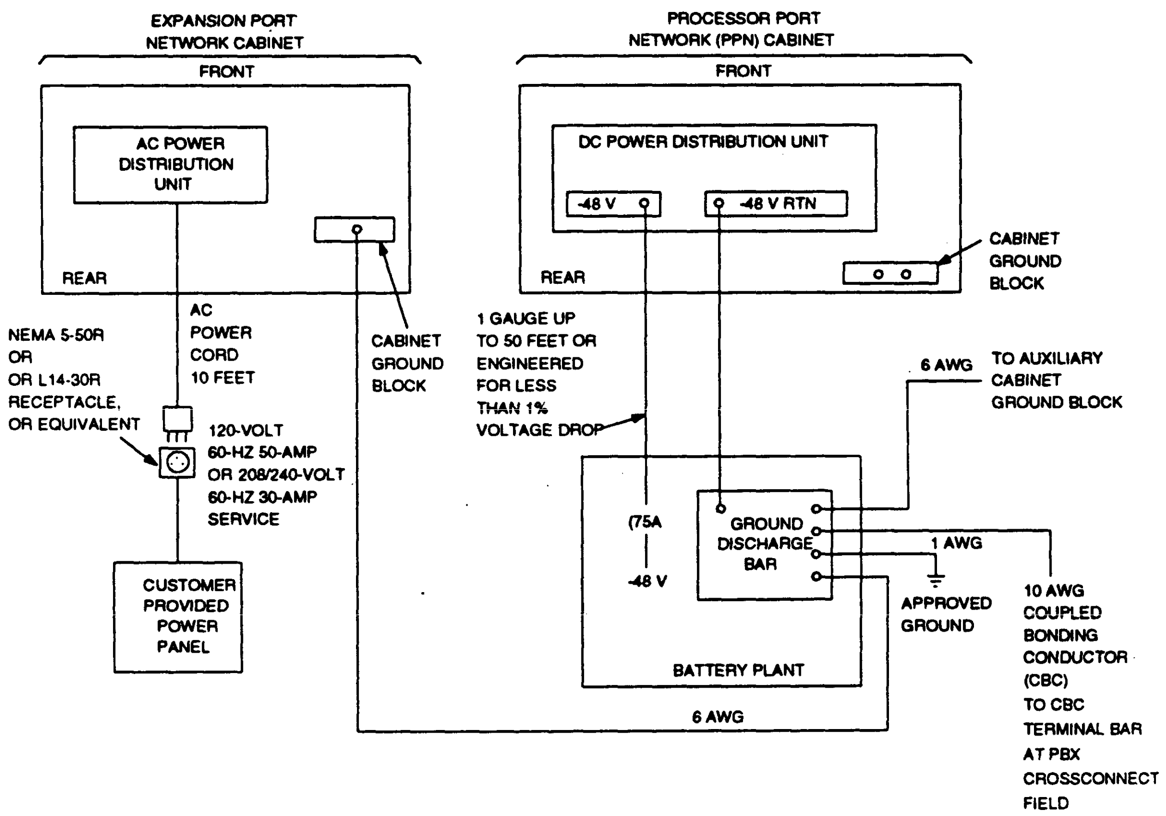


Figure 3-16. Typical DEFINITY G3 Multicarrier Cabinet System AC Power and DC Power and Ground Wiring — Colocated EPN

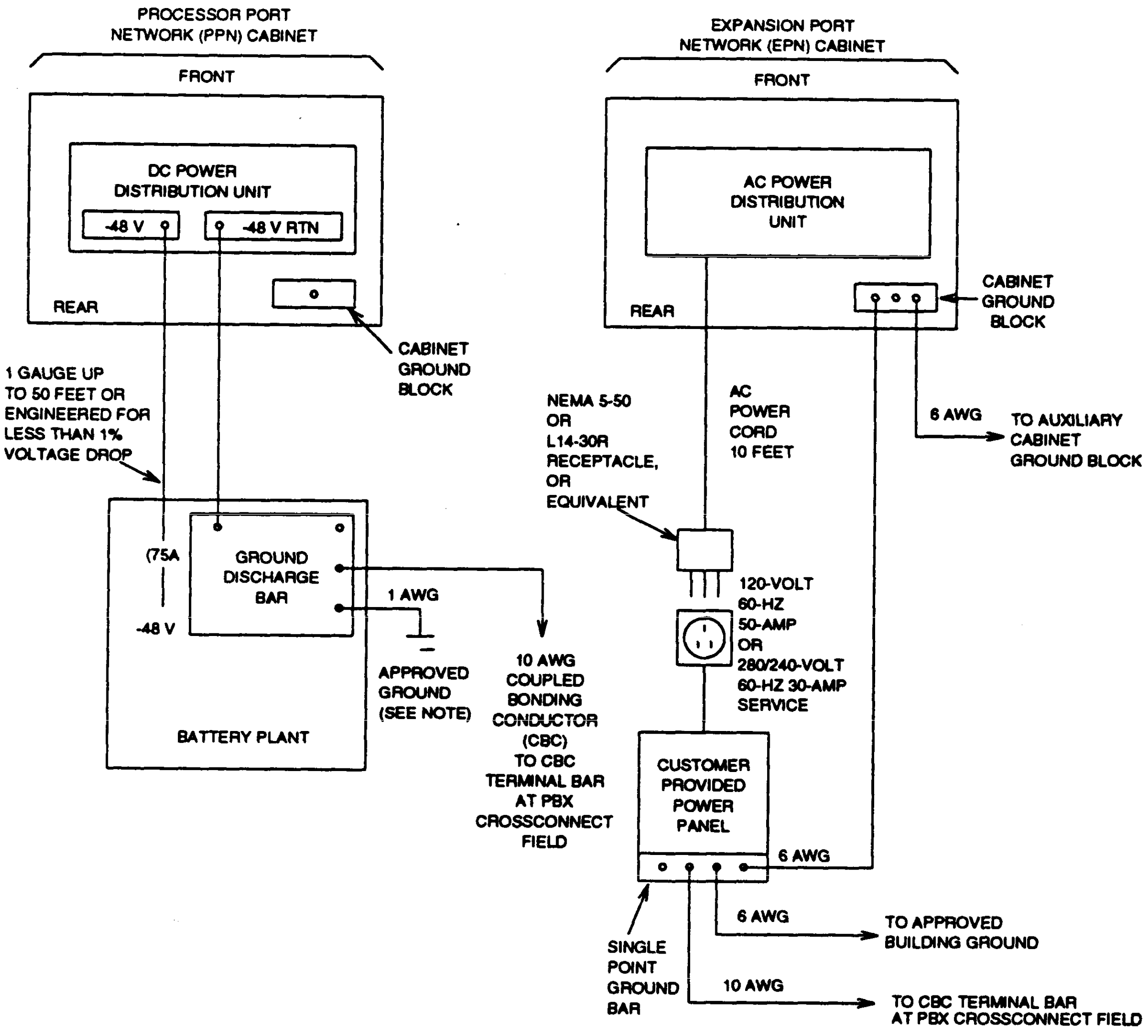
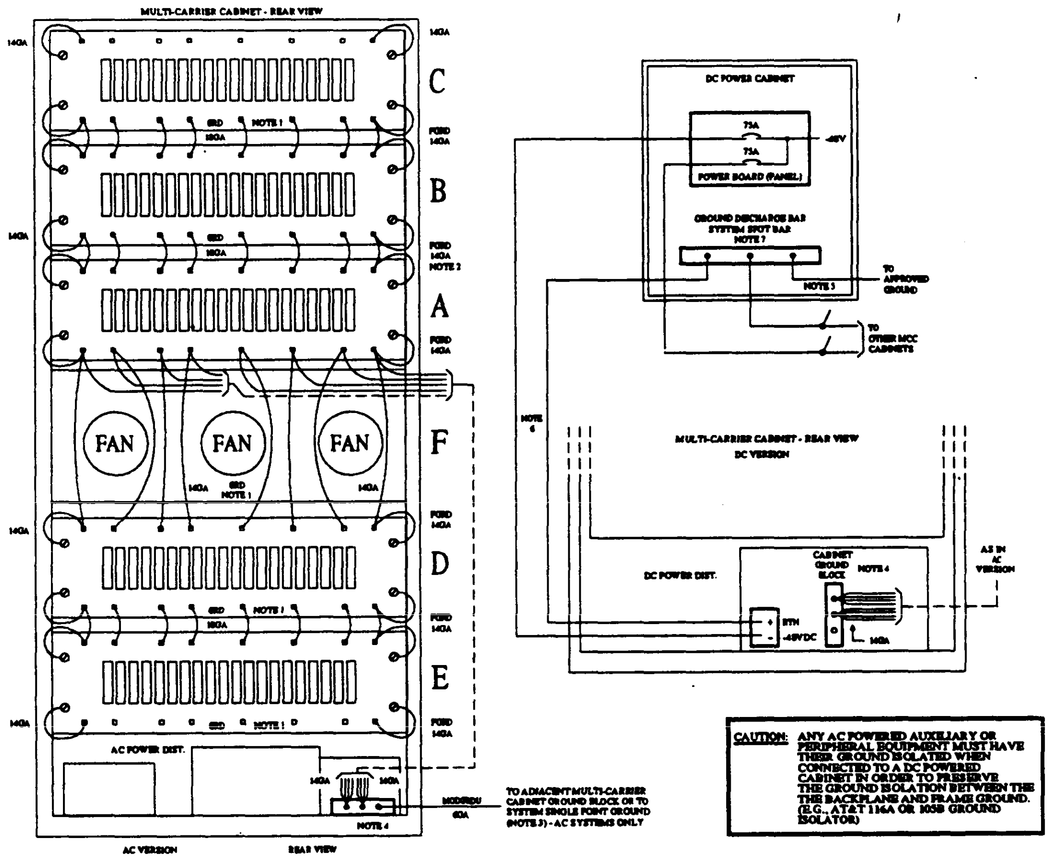


Figure 3-17. Typical DEFINITY G3 Multicarrier Cabinet System AC and DC Power and Ground Wiring — Remote EPN

Intracabinet Grounding

Figure 3-18 shows intracabinet grounding in AC- and DC-powered multicarrier cabinets.



NOTES:

1. GRD - REPRESENTS 14 & 18GA WIRE STRAPS USED TO ELECTRICALLY INTERCONNECT ADJOINING CARRIER BACKPLANES AND TO JOIN GRD TO THE CABINET SINGLE POINT GROUND BLOCK. GRD STRAPPING MUST BE CONTINUED BY SPANNING A VACANT CARRIER POSITION SUCH AS CABINET POSITION 'B' WITH 14GA STRAPS SIMILAR TO THOSE WHICH SPAN THE FAN ASSEMBLY UNIT.

2. FGRD - REPRESENTS 14 GA STRAPPING USED TO ELECTRICALLY INTERCONNECT EACH CARRIER BACKPLANE WITH THE CARRIER FRAME. FOR DC POWERED CABINETS, THE BACKPLANE CARRIER AND THE CABINET FRAME ARE ISOLATED FROM EACH OTHER (14GA STRAPS WHICH ARE REMOVED AT FACTORY). FOR AC POWERED CABINETS, THE BACKPLANE CARRIER IS CONNECTED TO THE CABINET FRAME WITH 14 GA STRAPS.

3. MODGRDU - REPRESENTS A 6 GA CIRCUIT GROUND WIRE THAT INTERCONNECTS THE CABINET GROUND BLOCK OF AN AC POWERED MODULE TO THE SYSTEM SINGLE POINT GROUND TERMINAL BAR. IF A SYSTEM HAS MORE THAN ONE CABINET, A 6GA WIRE MODGRDU, IS CONNECTED BETWEEN THE MULTI-CARRIER CABINETS AND THEN FROM THE PPN OR CABINET CLOSEST TO THE AC PROTECOR CABINET, OR AC LOAD CENTER, AS MODGRDU TO THE SYSTEM SINGLE POINT GROUND TERMINAL BAR. NOTE: DC POWERED CABINETS HAVE NO MODGRDU SINCE THE +DC RETURN SERVES THIS FUNCTION.

4. CABINET GROUND BLOCK - A COPPER BLOCK LOCATED AT THE BASE OF AC POWERED CABINETS THAT IS CONNECTED DIRECTLY TO THE CABINET FRAME. A COPPER BLOCK IS MOUNTED ON THE REAR OF THE DC DISTRIBUTION UNIT OF DC POWERED CABINETS. ONLY THE DC GROUND BLOCK IS INSULATED FROM THE CABINET FRAME. THESE GROUND BLOCKS SERVE AS THE CABINET'S SINGLE POINT GROUND.

5. FOR SYSTEMS FEATURING DC POWERED CABINETS, THE GAUGE OF THE GROUNDING CONDUCTOR FROM THE SYSTEM SINGLE POINT GROUND (GROUND DISCHARGE BAR) TO THE APPROVED BUILDING GROUND MUST BE THE SAME GAUGE OR LARGER THAN ANY CONDUCTOR IN THE SYSTEM AND NEVER SMALLER THAN 6 GAUGE.

6. THIS WIRE GAUGE IS DETERMINED BY THE VOLTAGE DROP OF THE WIRE. THE VOLTAGE DROP IN THE -48V FEEDERS BETWEEN THE POWER BOARD (PANEL) AND THE SYSTEM CABINET SHALL NOT EXCEED 0.5 VOLT ONE WAY OR 1.0 VOLT ROUND TRIP.

Figure 3-18. Intracabinet Grounding in AC- and DC-Powered Multicarrier Cabinets

Single-Carrier Cabinet Power System

Each single-carrier cabinet has one AC or one DC power supply, which distributes DC power and ringing voltage to the circuit pack slots in the cabinet.

AC Power Supply (WP-91153) in a Single-Carrier Cabinet

In a cabinet powered from an AC source, a single, plug-in, multioutput AC power supply is located in the power supply slot. A power cord with a three-prong plug on one end and a single connector on the other end connects the supply to a dedicated AC power source. Figure 3-19 shows the supply.

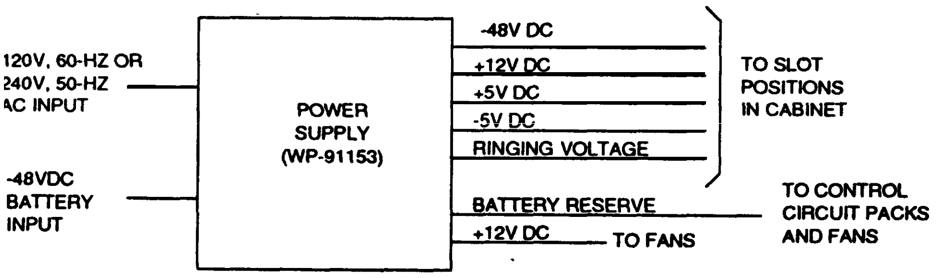


Figure 3-19. AC Power Supply (WP-91153) in Single-Carrier Cabinet

The inputs to the power supply can be:

- 120 VAC, 60 Hz, 15A to 20A; three wires in the power cord: one hot wire, one neutral wire, and one ground wire
- For G3i-G: 220 VAC or 240 VAC, 50 to 60 Hz, 10A; three wires in the power cord: one hot wire, one neutral wire, and one ground wire
- -48 VDC at up to 25A

The AC power supply produces the following DC outputs: +5V, -5V, -48V, +12V, a ringing voltage, and a battery charging voltage. The DC outputs are distributed on the cabinet backplane to the slots for the circuit packs. The power supply has a circuit breaker and EMI filtering.

A 250-ms holdover circuit in the power supply allows a system to operate normally during AC power interruptions. When AC input power fails, reserve batteries supply power to the memory and processor circuit packs and fans for two minutes. All port circuit packs are inactive during this time.

The power supply contains a battery charger that charges the holdover batteries located in the bottom of the control cabinet.

DC Power Supply (676B) in a Single-Carrier Cabinet

In a cabinet powered from a DC source, a single, plug-in multioutput DC power supply is located in the power supply slots. Figure 3-20 shows the DC power supply.

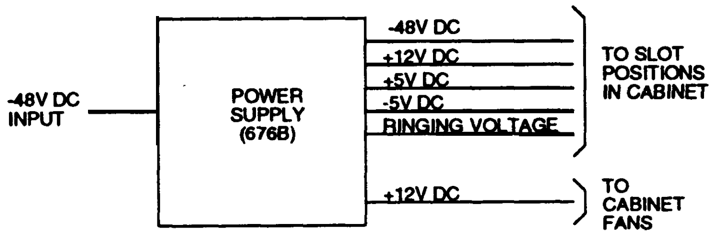


Figure 3-20. DC Power Supply (676B) in Single-Carrier Cabinet

A -48-VDC source supplies power to the DC power supply.

The DC power supply produces the following DC outputs: +5V, -5V, -48V, +12V, and a ringing voltage. The DC outputs are distributed on the cabinet backplane to the slots for the circuit packs. The power supply has circuit breakers and EMI filtering.

UPS

An external UPS (which has a longer backup time than holdover batteries) can replace the batteries. The UPS is connected from the AC power source to the cabinet's AC power cord. When AC power fails, the UPS senses the failure and supplies its own AC power to the cabinet.

AC Power and Ground Wiring

Figure 3-21 shows typical AC power and ground wiring in single-carrier cabinets used in the USA. Only the EPN cabinet shown in the figure is used in G3r. A ground wire from the ground block on the bottom cabinet of the EPN connects to the single-point ground block on the bottom cabinet of the PPN. A 6-gauge ground wire connects the single-point ground block to an approved external ground.

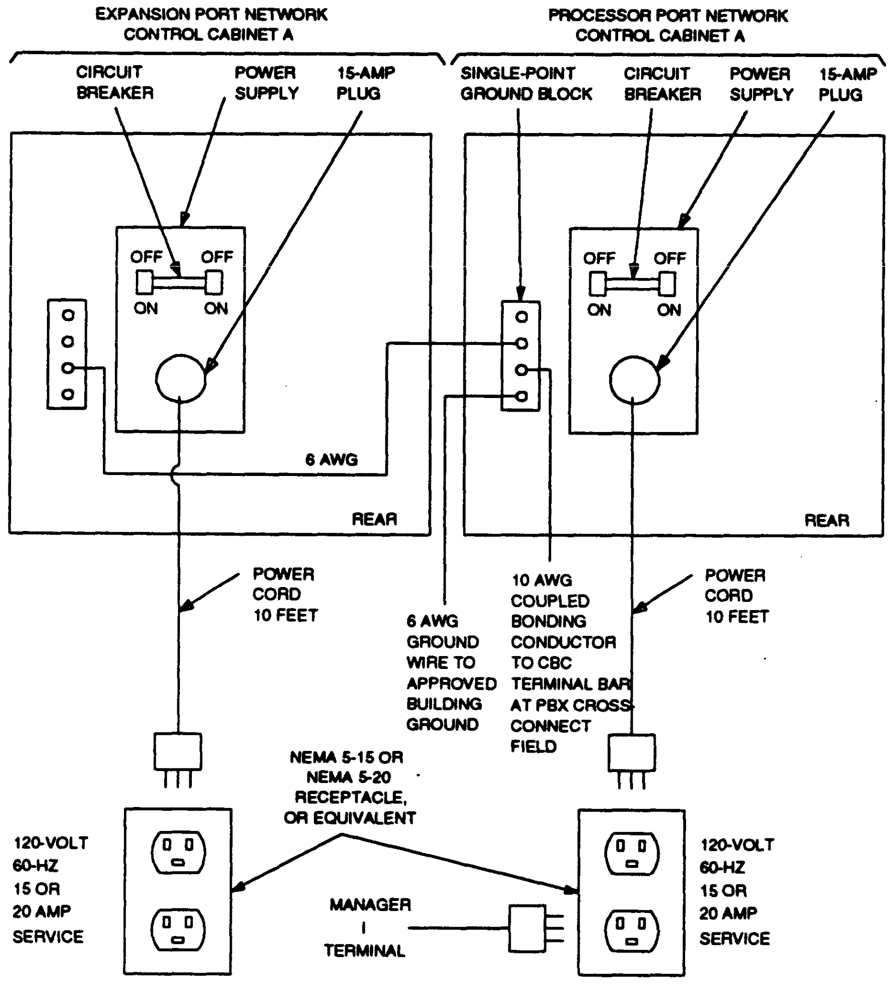


Figure 3-21. Typical USA Single-Carrier Cabinet Power and Ground Wiring — Colocated EPN

Figure 3-22 shows typical AC power and ground wiring in single-carrier cabinets with a remote EPN cabinet. A ground wire is connected from the cabinet ground block of the PPN cabinet and EPN cabinet to an approved external ground.

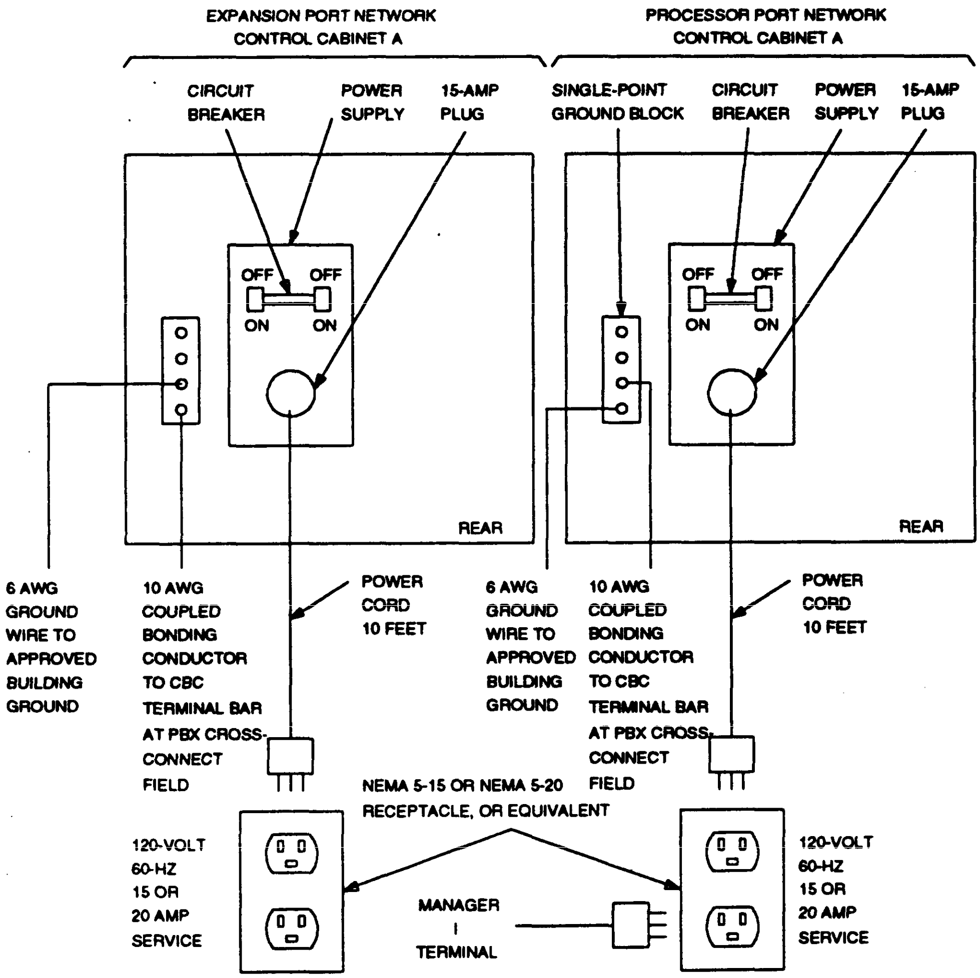


Figure 3-22. Typical USA Single-Carrier Cabinet AC Power and Ground Wiring — Remote EPN

DC Power and Ground Wiring

Each cabinet requires a separate DC power input. Figure 3-23 shows typical DC-powered and grounded single-carrier cabinets. A ground wire is connected to the ground block in the bottom cabinet. The wire is routed to the battery plant where it's terminated on the ground discharge bar. An approved external ground is terminated on the ground discharge bar.

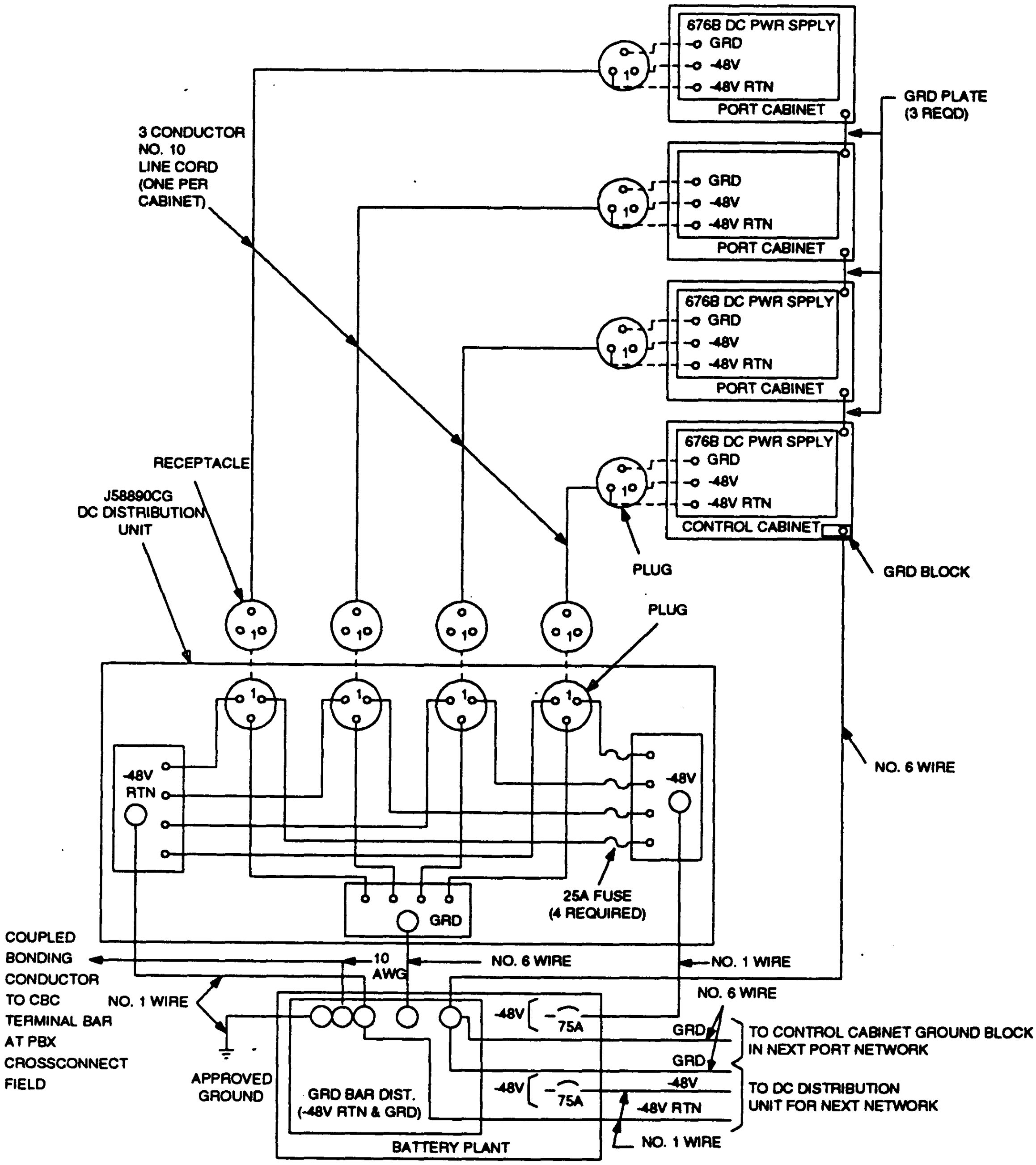


Figure 3-23. Typical Single-Carrier Cabinet DC Power and Ground Wiring

Lightning Protection

A coupled bonding conductor (CBC) in multicarrier cabinet and single-carrier cabinet ground wiring protects the system from lightning. A CBC runs adjacent to wires in a cable and causes mutual coupling between the CBC and the wires. The mutual coupling reduces the potential differences resulting from lightning surges. A CBC can be one of the following:

- 10 AWG ground wire
- Continuous cable sheath surrounding wires within a cable
- Six unused pairs of wire within a cable, which are twisted and soldered together

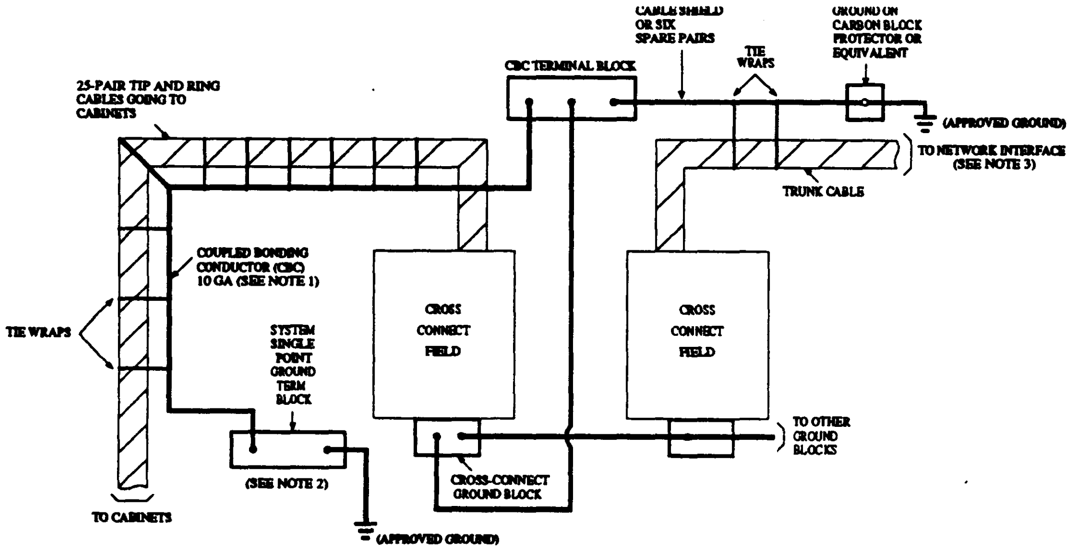
In G1, the CBC connects from the cabinet single-point ground block in an AC-powered cabinet or the ground discharge bar in a DC-powered cabinet to an approved ground located nearest the telephone company-owned protector ground block at the building entrance facility.

In G3, the CBC is connected from the cabinet single-point ground bar in an AC-powered cabinet or the ground discharge bar in a DC-powered cabinet to the CBC terminal bar at the PBX crossconnect field.

When an auxiliary cabinet is provided with a MCC system, a six-AWG ground wire connects the cabinet single-point ground block to the auxiliary cabinet ground block. The ground wire is routed as close as possible to the cables connecting the system cabinet to the auxiliary cabinet.

If equipment is not mounted in the auxiliary cabinet, then the power supply for this equipment must be plugged into one of the two convenience outlets located on the back of the multicarrier cabinet to preserve ground integrity. The convenience outlet is fused at 5A. A dedicated G1 Manager I or G3-MT terminal is usually plugged into the other convenience outlet.

Figure 3-24 shows CBC grounding in a G3 AC-powered cabinet.



1. A MINIMUM 1 FOOT SPACING IS MAINTAINED BETWEEN CBC AND OTHER POWER AND GROUND LEADS.
2. THE SYSTEM SINGLE POINT GROUND TERMINAL (SPGT) BLOCK IS LOCATED ON THE AC LOAD CENTER OR AC PROTECTOR CABINET FOR AC POWERED SYSTEMS OR IS THE GROUND DISCHARGE BAR (GRDDB) AT THE DC POWER CABINET FOR DC POWERED SYSTEMS.
3. SNEAK CURRENT PROTECTION PROTECTS BUILDING WIRING BETWEEN THE NETWORK INTERFACE AND TRUNK CIRCUITS WHEN EXPOSED TO POWER. SNEAK CURRENT FUSES ARE USED WHEN THIS CONDITION EXISTS.

Figure 3-24. CBC Grounding in a DEFINITY G3 AC-Powered Cabinet

Sneak Current Protection

Sneak fuses protect the building wiring and circuit packs from “foreign potential” by providing a current interruption capability. Sneak fuse panels, when provided, are installed on the switch side of the network interface. All incoming and outgoing trunks and off-premises station lines pass through the sneak fuses. Sneak current protection is required for installations in Canada. Sneak fuses must be CSA-certified.

Cabinet Fan Units

This section describes the fan units in multicarrier cabinets and single-carrier cabinets.

Multicarrier Cabinet Fan Unit (ED-67077-30)

Figure 3-25 shows a cross-sectional side view of the fan unit in a multicarrier cabinet. The figure shows: fan and air filter positions; air flow directions from the front and rear fans.

In G1, the fan unit number is ED-67077-30, G1; in G3, the fan unit number is ED-67077-30, G-4.

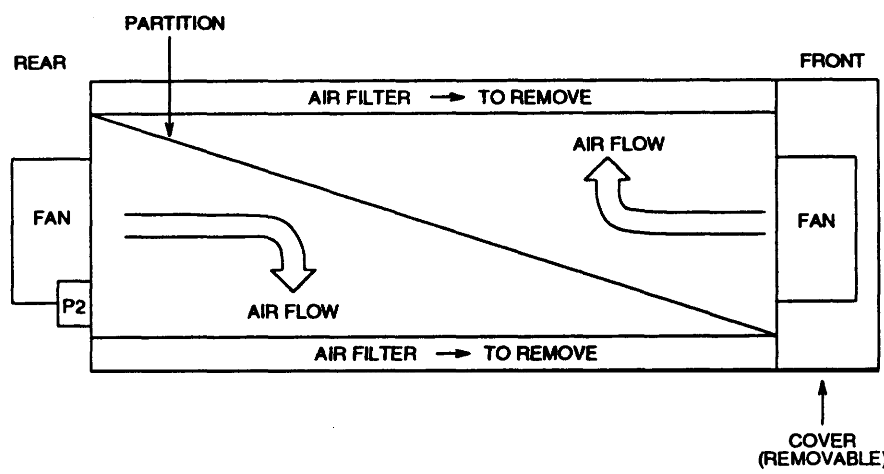


Figure 3-25. Fan Unit (ED-67077) in Multicarrier Cabinet

The fan unit is mounted in the cabinet's "F" position and consists of the following equipment:

- Fans — six (three in the front and three in the rear) that operate at three speeds
- Air filters (removable foam type) — one filter is located above the fan unit and one filter below it
- Thermistor sensors — four that monitor the cabinet temperature. Two sensors are inside the cabinet's top and two sensors are inside the cabinet's bottom. The top sensors affect the speeds of the front fans and the bottom sensors affect the speeds of the rear fans.

- In G1, a fan speed control and thermal alarm circuit pack (AHD1) attached to the left-front inside of the fan unit monitors the thermal sensors. When the sensors indicate a change in cabinet temperature, the circuit pack changes the fan speeds accordingly. If the temperature in the top of the cabinet increases, the front fans increase speed. If the temperature in the bottom of the cabinet increases, the rear fans increase speed.
- In G3, a speed control and thermal alarm circuit in each fan monitors the thermal sensors. Each circuit is equivalent to the AHD1 circuit pack in G1. When a sensor indicates a change in cabinet temperature, the circuit in a fan changes that fan's speed accordingly.
- P2 connector on the lower right rear side of the unit, which connects the fans to a power cable that supplies:
  - -48 VDC to the AHD1 circuit pack in G1 and each fan in G3
  - +5 VDC to the speed control and thermal alarm circuit in each fan in G3
  - Temperature sensor signals to the AHD1 circuit pack in G1 or to the equivalent circuit in each fan in G3. One pair of wires goes to each circuit in G3.
  - Alarm signals from the AHD1 circuit pack in G1 or to the equivalent circuit in each fan in G3. One pair of wires goes to each circuit in G3.

The power cable branches from the cabinet harness on the right rear side of the cabinet.

The fans receive -48 VDC from the 631DB1 AC power unit located on the front right side of the "A" position carrier in PPN and EPN cabinets. In a PPN cabinet containing duplicated control carriers, the fans normally receive power from the control carrier in the "A" position. If the control carrier in the "A" position fails, then the control carrier in the "B" position supplies fan power.

The AHD1 circuit pack in G1 or its equivalent circuit in each fan in G3 sends a major or minor alarm to the processor circuit pack in the PPN cabinet and the maintenance circuit pack in an EPN cabinet for the following reasons:

- Reduced airflow in the cabinet
- Intake air and exhaust air temperatures differ greatly

A minor alarm is sent when the intake versus the exhaust temperatures differ by more than 30°F (17°C). A major alarm is sent if the exhaust temperature reaches 149°F (65°C). If the exhaust temperature reaches 158°F (70° C), the system shuts down.

Single-Carrier Cabinet Fan Unit

Four fans are mounted at the top, rear of the cabinet. An air filter is located below the fan unit. Air flows down through the fitter over the circuit packs. This filter can be removed and cleaned or replaced when the cabinet door is removed. If the cabinet temperature reaches 158°F (70°C), the temperature sensor in the power supply causes the system to shut down.

Cabinet and Carrier Configurations

4

4

This chapter describes various cabinet and carrier configurations that compose DEFINITY Generic 1 (G1) and DEFINITY Generic 3 (G3). The configurations are described relative to combinations of cabinet interconnection options and system duplication options in the following order:

- Sequence of installing carriers in cabinets (see page 4-2)
- Minimum cabinet configurations (see page 4-4)
- Cabinet configurations in directly connected systems (see page 4-14)
- Cabinet configurations in CSS-connected G3r (see page 4-20)

Procedures used to configure cabinets and carriers in a system before installation are given in the following AT&T document: “DEFINITY Communications System Generic 1 and Generic 3 Planning and Configuration” (555-230-600).

Sequence of Installing Carriers in Cabinets

The following tables list the sequential positions of carriers installed in the processor port network (PPN) cabinet and expansion port network (EPN) cabinets.

Table 4-1 lists the positions of the carriers installed sequentially in the PPN cabinet. The installation of switch node (SN) carriers displaces port carriers.

Table 4-1. Carrier Positions in the PPN Cabinet

Carrier Type	Carrier Position
Port	First “B” if there’s no control carrier duplication; “C” if there’s control carrier duplication or no control carrier duplication; then “D,” and then “E”
Control	“A” if there’s no control carrier duplication; “A” and “B” if there’s control carrier duplication
SN	First “E” if no duplication; if there’s duplication, “D” and “E”. The “D” duplicate SN can also go in the “E” position of an EPN.

Table 4-2 lists the positions of the carriers installed sequentially in an EPN cabinet.

Table 4-2. Carrier Positions in an EPN Cabinet

Carrier Type	Carrier Position
Port	First "B"; then "C", "D", and then "E"
Expansion control	"A" only
SN	First "E" if no duplication; "D" and "E" if there's duplication

Table 4-3 lists the positions of the carriers installed sequentially in an EPN cabinet with two port networks (PNs).

Table 4-3. Carrier Positions in an EPN Cabinet with Two PNs

Carrier Type	Carrier Position
Port	"B", then "C" for first PN; "E," then "D" for second PN
Expansion control	"A" for the first PN only

Minimum Cabinet Configurations

Minimum cabinet configurations in multi-carrier cabinets and in stacks of single-carrier cabinets serve as the foundations on which to build cabinets in directly connected systems and CSS-connected systems. Also described are the carrier and cabinet locations of the following minimum required circuit packs:

- Tone-clock (TN768 and TN780)
- Expansion Interface (EI, TN570 in G3, and TN776 in G1, G3i, and G3i-G)
- DS1 converter (TN574 in G3r)
- EPN maintenance (TN775B)

A minimum cabinet configuration is determined by the following criteria:

- Cabinet interconnection options (directly connected and CSS-connected)
- System duplication options — standard reliability, high reliability, and critical reliability
- Traffic engineering, which determines the number of PNs

Tables 4-4 through 4-6 list the minimum required carriers and circuit packs in PPN and EPN cabinets.

Table 4-4. Minimum Required Carriers and Circuit Packs in PPN Cabinet

Duplication Option	Connection Option	Control Carriers	SN Carriers	Tone-Clocks	EIs
Standard reliability	Direct	1	0	1	Equals number of EPNs
	CSS	1	0 or 1*	1	1
High reliability	Direct	2	0	2	Equals number of EPNs
	CSS	2	0 or 1*	2	2
Critical reliability	Direct	2	0	2	Twice number of EPNs
	CSS	2	0 or 2*	2	2

Table 4-5. Minimum Required Carriers and Circuit Packs in Each EPN Cabinet

Duplication Option	Connection Option	Control Carriers	SN Carriers	Tone-Clocks	EIs
Standard reliability	Direct	1	0	1	Equals number of EPNs
	CSS	1	0 or 1*	1	1
High reliability	Direct	1	0	1	Equals number of EPNs
	CSS	1	0 or 1*	1	1
Critical reliability	Direct	1	0	2	Twice number of EPNs
	CSS	1	0 or 2*	2	2

* The first SN is normally located in the PPN. The second SN is normally located in an EPN to support up to 22PNs. However, it is possible for the first SN to be in an EPN.

Table 4-6. Minimum Required Carriers and Circuit Packs in Two-Port Network Multicarrier Cabinet EPN Cabinets — G3r

Duplication Option	Connection Option	Control Carriers	Switch Node Carriers	Tone-Clocks	EIs
Standard reliability	Directly connected	1	0	2	4
	CSS	1	0	2	2
High reliability	Directly connected	1	0	2	4
	CSS	1	0	2	2
Critical reliability	Directly connected	1	0	4	8
	CSS	1	0	4	4

Minimum Cabinet Configurations in Standard Reliability Systems

Figure 4-1 shows a standard reliability directly connected system with a single PN. The EI circuit pack shown in the port carrier is used in G3r and is not required in systems with only one PN (which is a PPN) because no inter-PN connectivity is needed. In this case, the PPN cabinet does not have a duplicate +5-VDC power unit.

In G1, G3i, and G3i-G, the EI circuit pack is installed in the control carrier.

The optional carriers shown in the multi-carrier cabinets are port carriers or switch node carriers in G3r that can be added as required. A switch node carrier can be added to position E as required. Added optional port carriers result from PNs required by traffic engineering.

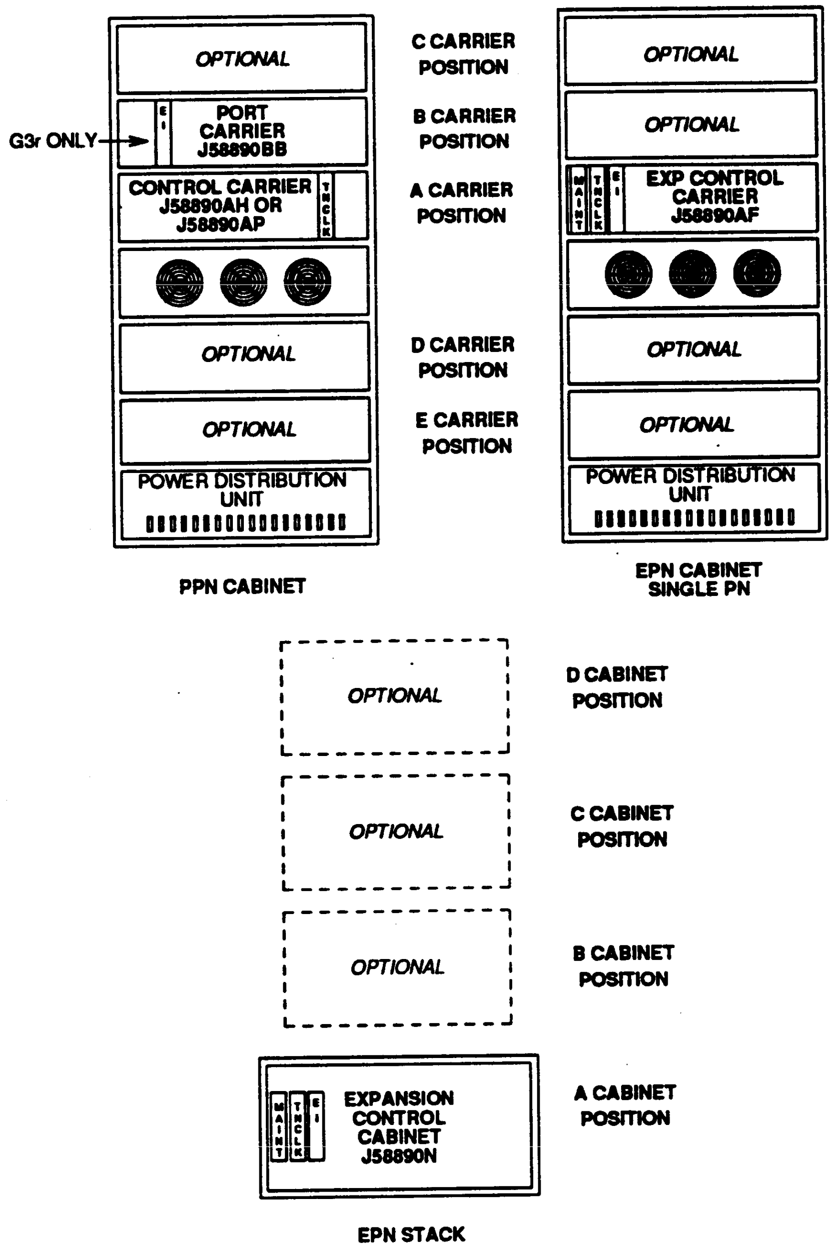


Figure 4-1. Minimum Single PN Cabinet Configurations — Standard Reliability Systems

Figure 4-2 shows the only two-PN cabinet configuration in G3r standard reliability systems.

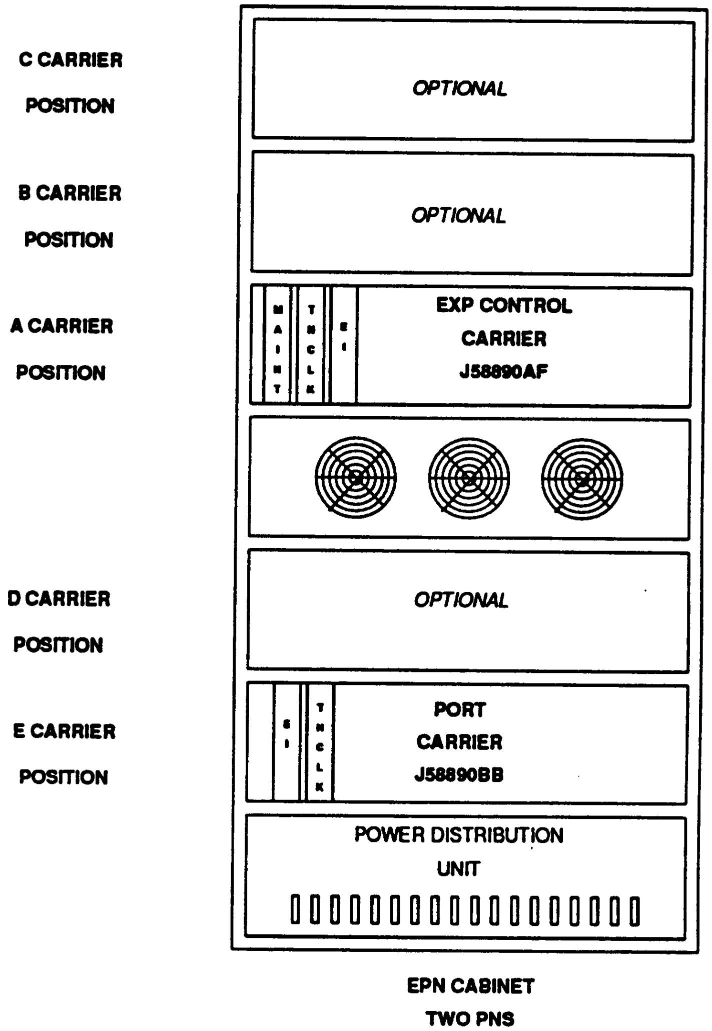


Figure 4-2. Minimum Two PN Cabinet Configuration — G3r Standard Reliability Systems

Minimum Cabinet Configurations in High Reliability Systems — G3r

A duplicate control carrier affects only the PPN cabinet. The other cabinets used in high reliability systems are the EPN cabinets or stacks shown in figure 4-6. High reliability systems require two control carriers in the PPN cabinet.

Figure 4-3 shows a high reliability system. Added optional port carriers result from PNs required by traffic engineering analysis. The switch node carrier is shown in the PPN cabinet for a high reliability CSS-connected G3r.

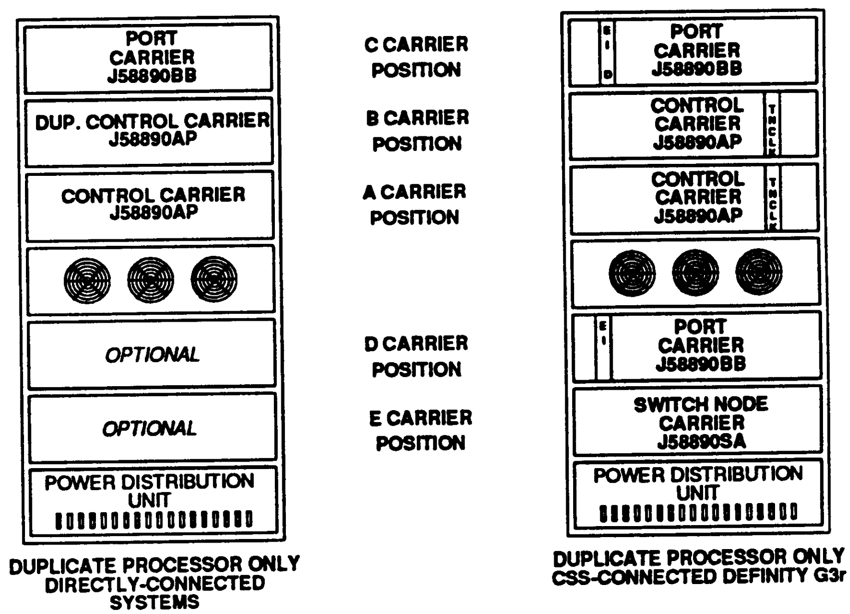


Figure 4-3. Minimum PPN Cabinet Configuration — High Reliability G3r Systems

Minimum Cabinet Configurations in Critical Reliability Systems — G1, G3i, and G3i-G

Critical reliability G1, G3i, and G3i-G systems require the duplication of the control carrier in the PPN cabinet. Figure 4-4 shows the minimum PPN cabinet configuration in critical reliability G1, G3i, and G3i-G systems.

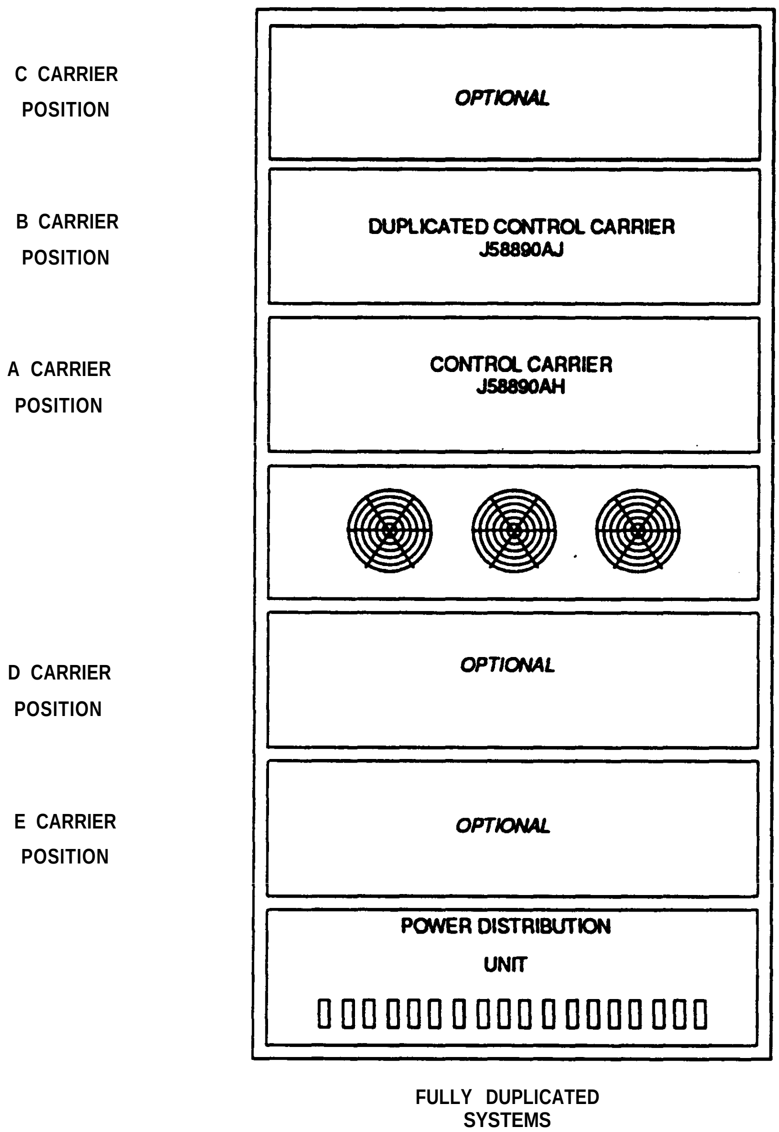


Figure 4-4. Minimum PPN Cabinet Configuration — Critical Reliability G1, G3i, and G3i-G Systems

Minimum Cabinet Configurations in Critical Reliability Systems — G3r

Critical reliability G3r systems require the duplication of carriers in PPN and EPN cabinets, as well as EPN stacks. Figure 4-5 shows the minimum PPN cabinet configurations in critical reliability, directly connected systems and CSS-connected G3r.

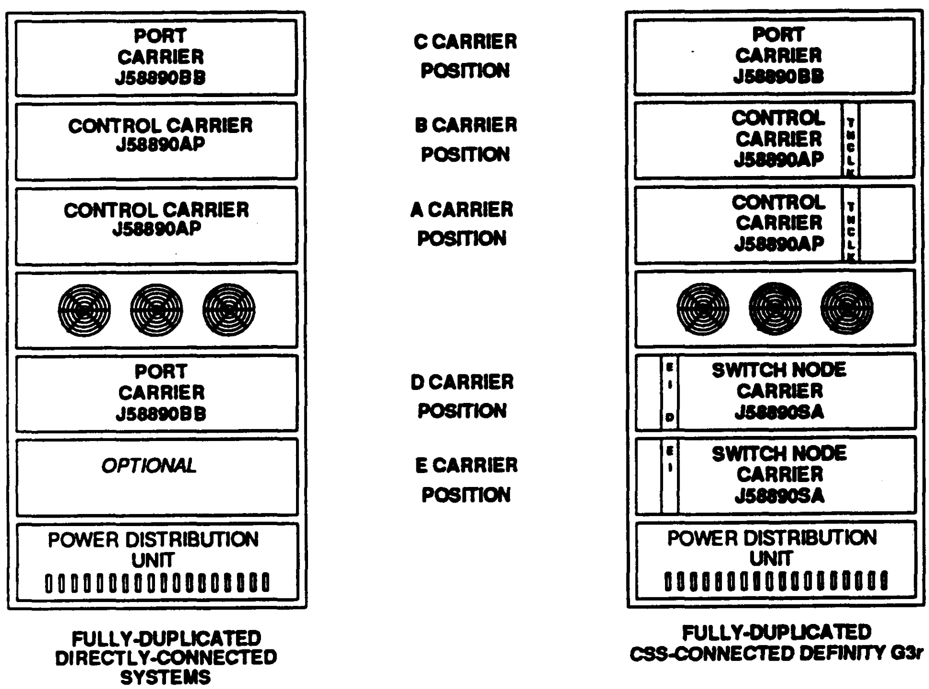


Figure 4-5. Minimum PPN Cabinet Configurations — Critical Reliability G3r Systems

Minimum Cabinet Configurations in Single PN EPN Cabinets in Critical Reliability Systems

Figure 4-6 shows the minimum cabinet configurations in single PN EPN cabinets in a critical reliability system. Included in the figure is a multi-carrier EPN cabinet and a single-carrier cabinet EPN stack.

In G3r, the multicarrier EPN cabinet can have optional duplicate SN carriers in carrier positions D and E.

Added optional port carriers result from PNs required by traffic engineering analysis.

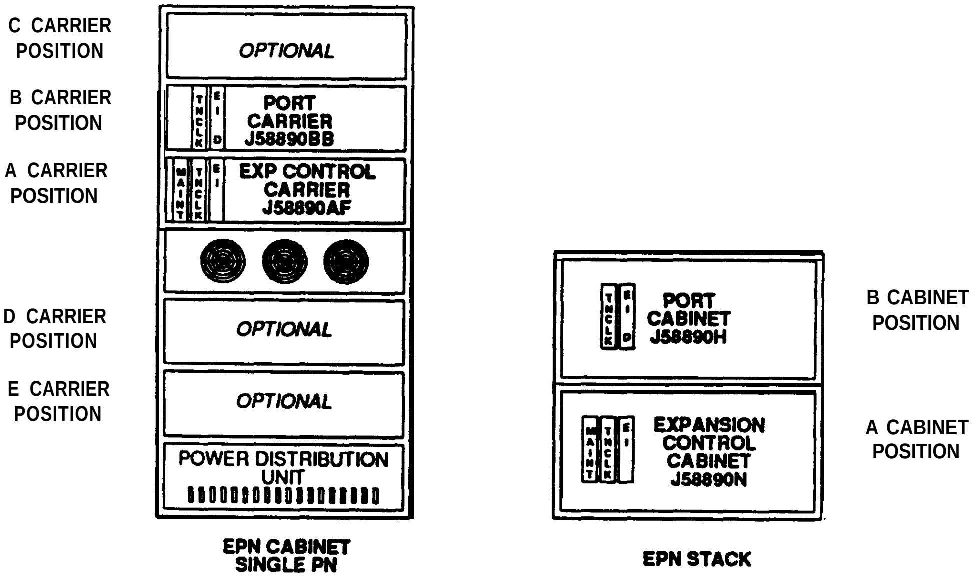


Figure 4-6. Minimum Single PN EPN Cabinet Configurations — Critical Reliability Systems

Minimum Cabinet Configurations in Two PN EPN Cabinets in Critical Reliability Systems — G3r

Figure 4-7 shows the minimum cabinet configurations in an EPN cabinet with two separate PNs in a G3r critical reliability system.

In a G3r, only the multicarrier cabinet without an SN carrier is arranged as a two-PN cabinet.

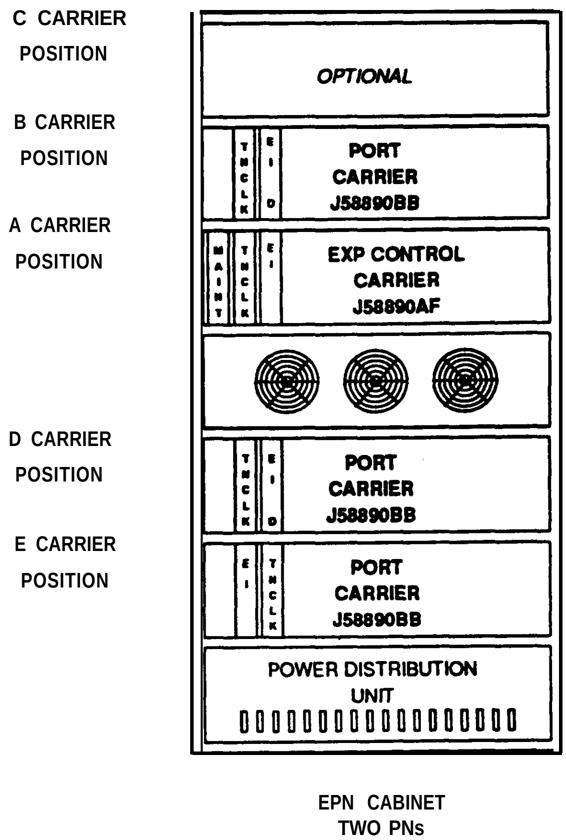


Figure 4-7. Minimum Two PN EPN Cabinet Configuration — G3r Critical Reliability Systems

Cabinet Configurations in Directly Connected Systems

A directly connected G1 has a maximum of two cabinets. Each directly connected G3i and G3i-G has a maximum of three cabinets. The locations of TN570 EI or TN776 EI circuit packs are shown in figures 4-8 to 4-10. The suffix number after “EI” on an EI circuit pack indicates the fiber-optic connection between cabinet numbers. For example, a fiber optic connection is made between “EI 1” in cabinet 1 and “EI 1” in cabinet 2. The “D” suffix indicates a duplicate pair of fiber optic connections between cabinet numbers. For example, the “EI 2 D” pair is the duplicate connection of the “EI 2” pair.

Standard Reliability Directly Connected Systems

Table 4-7 lists the required EI slots, tone-clock slots, and remaining port slots in a standard reliability directly connected G1.

Table 4-7. Standard Reliability Directly Connected DEFINITY G1 PNs and Circuit Pack Slots

PNs	EIs	Tone-Clocks	Remaining Port Slots
1 (PPN only)	0	1	89
2 (One PPN and one EPN)	2	2	186

Table 4-8 lists the required EI slots, tone-clock slots and maintenance slots, and remaining port slots in a standard reliability directly connected G3.

Table 4-8. Standard Reliability Directly Connected DEFINITY G3 PNs and Circuit Pack Slots

PNs	EIs	Tone-Clocks	Remaining Port Slots	Maintenance Slots (G3r)
1 (PPN only)	0	1	89 (G3i, G3i-G) 80 (G3r)	4
2 (One PPN and one EPN)	2	2	186 (G3i, G3i-G) 177 (G3r)	8
3 (One PPN and two EPNs)	6	3	281 (G3i, G3i-G) 272 (G3r)	12

Figure 4-8 shows the cabinet configurations in standard reliability directly connected systems. In cabinet 1 shown in the figure, the EI is not required in a single PN (PPN only) system because no connection to another cabinet is required.

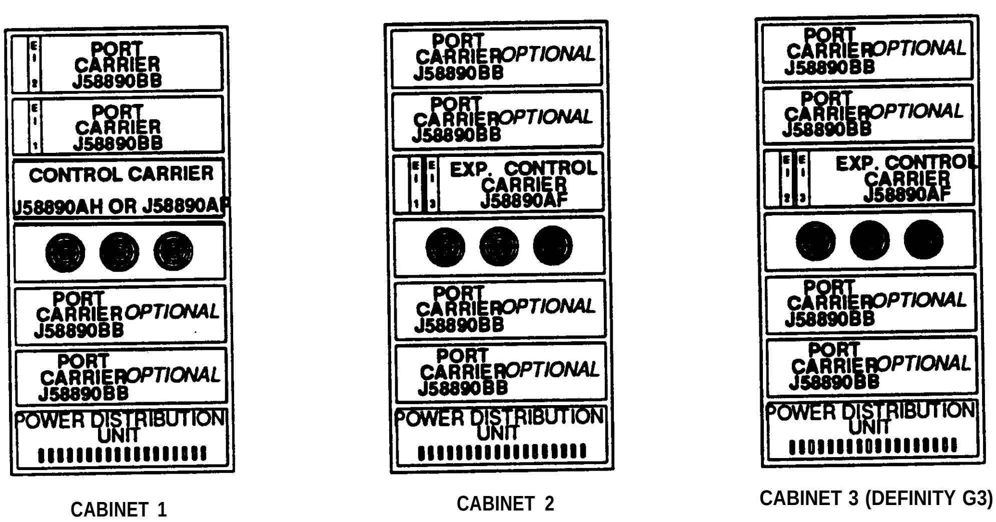


Figure 4-8. Standard Reliability Directly Connected Systems

High Reliability Directly Connected Systems

Table 4-9 lists the required EI, tone-clock and maintenance slots, and remaining port slots in a high reliability, directly connected G3.

Table 4-9. High Reliability Directly Connected DEFINITY G3 PNs and Circuit Pack Slots

PNs	EIs	Tone-Clocks	Remaining Port Slots	Maintenance Slots (G3r)
1 (PPN only)	0	2	78 (G3i-G) 60 (G3r)	2
2 (One PPN and one EPN)	2	3	175 (G3i, G3i-G) 157 (G3r)	3
3 (One PPN and two EPNs)	6	4	270 (G3i, G3i-G) 252 (G3r)	4

Figure 4-9 shows the cabinet configurations in high reliability, directly connected G3r systems. In cabinet 1 shown in the figure, the EI is not required in a single PN (PPN only) system because no connection to another cabinet is required.

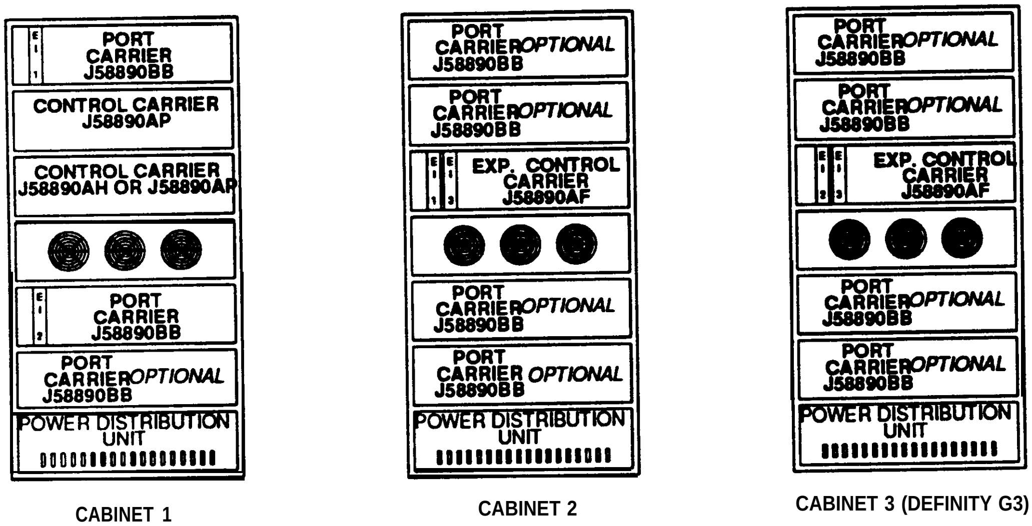


Figure 4-9. High Reliability, Directly Connected G3r Systems

Critical Reliability, Directly Connected Systems

Table 4-10 lists the required EI slots and tone-clock slots, and remaining port slots in critical reliability, directly connected G3 systems.

Table 4-10. Critical Reliability, Directly Connected DEFINITY G3 PNs and Circuit Pack Slots

PNs	EIs	Tone-Clocks	Remaining Port Slots
1 (PPN only)	0	2	78
PPN and EPN	4	4	172
PPN and two EPNs	12	6	262 (G3i, G3i-G) 244 (G3r)

Figure 4-10 shows the cabinet configurations in a critical reliability, directly connected system. The port carrier in cabinet 1 is optional in systems with only one PN (PPN only), but is required in systems with two or three PNs. All EIs are not required for systems with only a PPN, because no connection is required from the PPN to another cabinet. The EIs shown in cabinet 1 in the figure are used only in G3r.

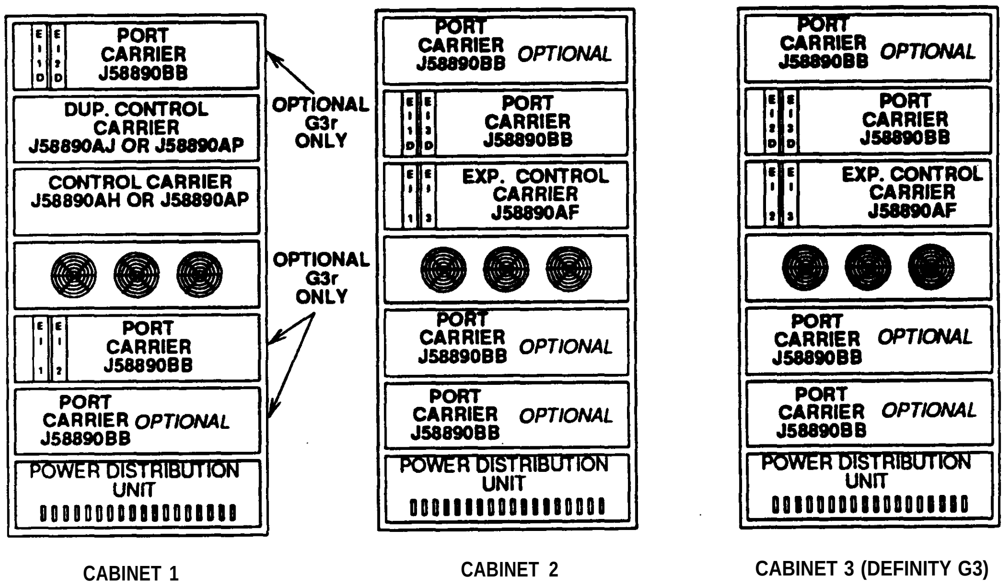


Figure 4-10. Critical Reliability, Directly Connected Systems

Cabinet Configurations in a CSS-Connected DEFINITY G3r

A CSS-connected G3r supports from one to 22 PNs.

The locations of TN570 EI circuit packs are shown in figures 4-10 to 4-15. The suffix number after “EI” on an EI circuit pack indicates the fiber-optic connection between cabinet numbers. For example, a fiberoptic connection is made between '“EI 1” in cabinet 1 and “EI 1” in cabinet 2. The “D” suffix indicates a duplicate pair of fiber optic connections between cabinet numbers. For example, the “EI 2 D)” pair is the duplicate connection of the “EI 2” pair.

Standard Reliability CSS-Connected DEFINITY G3r

Table 4-11 lists from one to 22 PN cabinets for a standard reliability CSS-connected G3r. Also in the table are the required EI, tone-clock, DS1 converter and maintenance slots, and remaining port slots.

Table 4-11. Standard Reliability CSS-Connected DEFINITY G3r PNs, SNs, and Circuit Pack Slots

PNs	SNs	EIs (TN570s)	Tone-Clocks	Remaining Port Slots	DS1C in SN	Maintenance Slots
2	1	2	2	157	2	2
3	1	3	3	255	2	3
4	1	4	4	353	2	4
5	1	5	5	451	2	5
6	1	6	6	549	2	6
7	1	7	7	647	2	7
8	1	8	8	745	2	8
9	1	9	9	843	2	9
10	1	10	10	941	2	10

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Table 4-11. Standard Reliability CSS-Connected DEFINITY G3r PNs, SNs, and Circuit Pack Slots — *continued*

PNs	SNs	EIs (TN570s)	Tone-Clocks	Remaining Port Slots	DS1C In SN	Maintenance Slots
11	1	11	11	1039	2	11
12	1	12	12	1137	2	12
13	1	13	13	1235	2	13
14	1	14	14	1333	2	14
15	1	15	15	1431	2	15
16	1	16	16	1529	2	16
17	2	17	17	1607	4	17
18	2	18	18	1705	4	18
19	2	19	19	1803	4	19
20	2	20	20	1901	4	20
21	2	21	21	1999	4	21
22	2	22	22	2097	4	22

Figures 4-11 and 4-12 show the cabinet configurations in a standard reliability CSS-connected G3r.

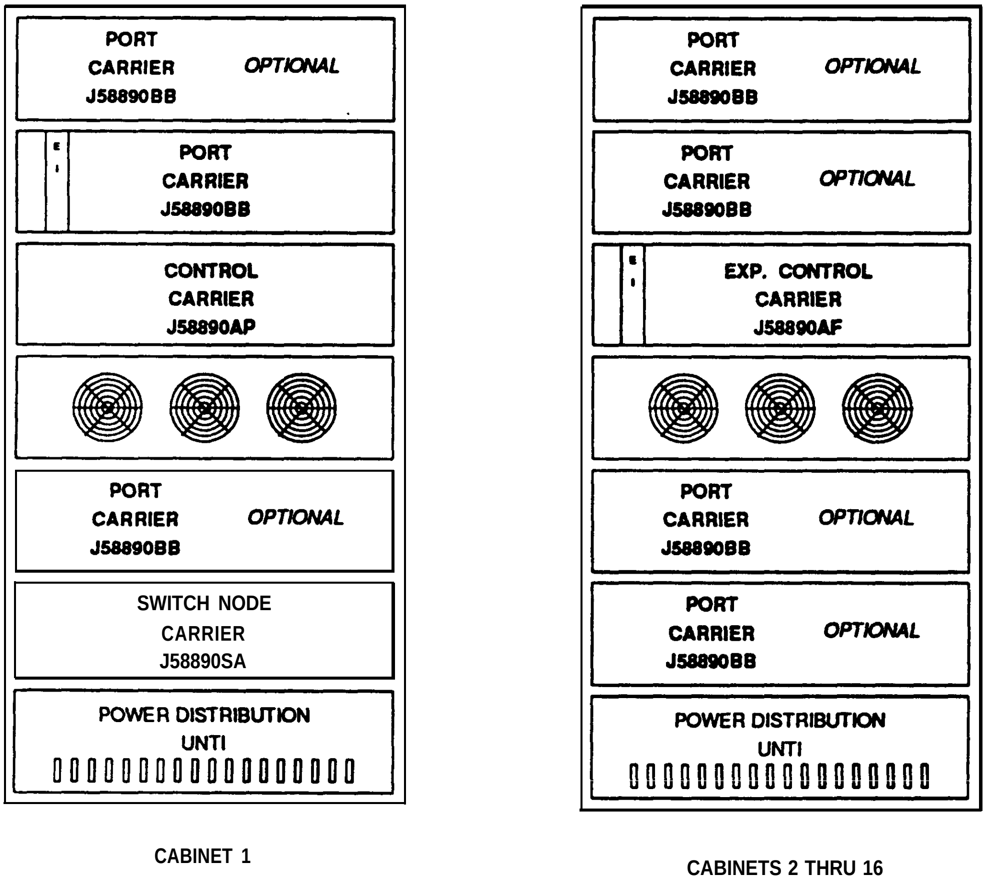

Figure 4-11. Standard Reliability CSS-Connected DEFINITY G3r — One SN

In figure 4-12, the two-SN CSS can have one to seven inter-SN fiber-optic links to support up to 22 maximum PNs. The following numbers of links are used with the associated maximum number of PNs:

- One to five links support 22 PNs
- Six links support 20 PNs
- Seven links support 18 PNs

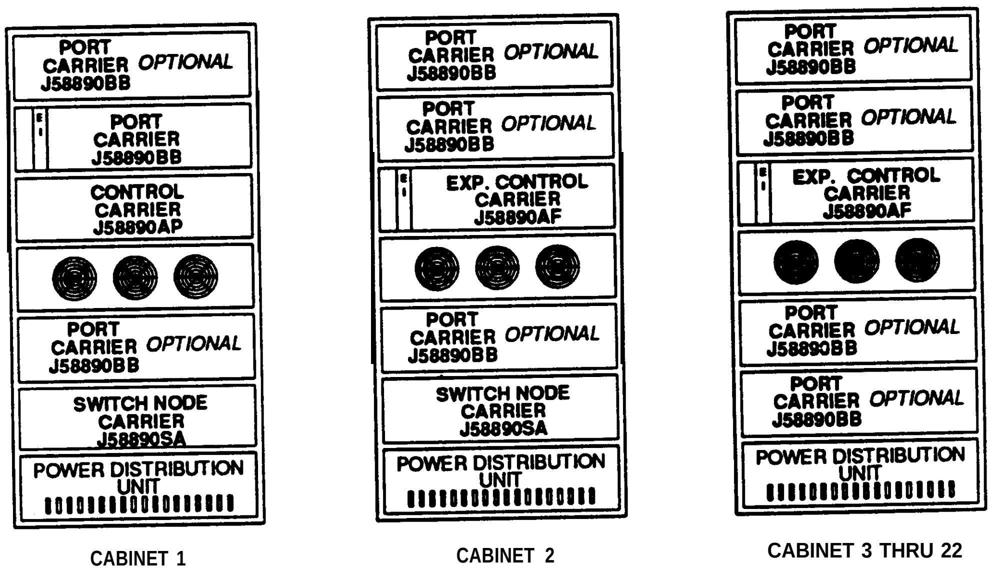

Figure 4-12. Standard Reliability CSS-Connected DEFINITY G3r — Two SNs

High Reliability, CSS-Connected DEFINITY G3r

Table 4-12 lists from one to 22 PN cabinets for a high reliability CSS-connected G3r. Also in the table are the required El, tone-clock, DS1 converter, and maintenance slots, and remaining port slots.

Table 4-12. High Reliability, CSS-Connected DEFINITY G3r PNs, SNs, and Circuit Pack Slots

PNs	SNs	EIs (TN570s)	Tone-Clocks	Port Slots	DS1C In SN	Maintenance Slots
2	1	3	3	136	2	3
3	1	4	4	234	2	4
4	1	5	5	332	2	5
5	1	6	6	430	2	6
6	1	7	7	528	2	7
7	1	8	8	626	2	8
8	1	9	9	724	2	9
9	1	10	10	822	2	10
10	1	11	11	920	2	11
11	1	12	12	1018	2	12
12	1	13	13	1116	2	13
13	1	14	14	1214	2	14
14	1	15	15	1312	2	15
15	1	16	16	1410	2	16
16	2	17	17	1488	4	17

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Table 4-12. High Reliability, CSS-Connected DEFINITY G3r PNs, SNs, and Circuit Pack Slots — *continued*

PNs	SNs	EIs (TN570s)	Tone-Clocks	Port Slots	DS1C In SN	Maintenance Slots
17	2	18	18	1586	4	18
18	2	19	19	1684	4	19
19	2	20	20	1782	4	20
20	2	21	21	1880	4	21
21	2	22	22	1978	4	22
22	2	23	23	2056	6	23

Figures 4-13 and 4-14 show the cabinet configurations in a high reliability, CSS-connected G3r.

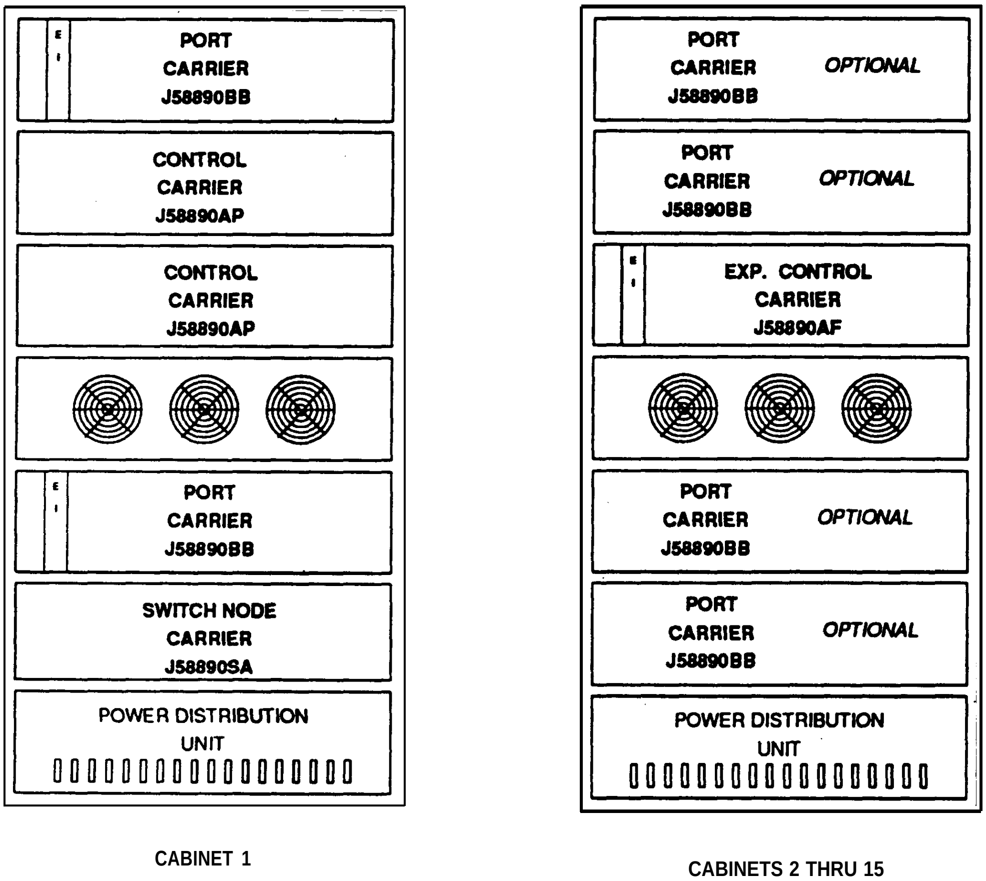

Figure 4-13. High Reliability, CSS-Connected DEFINITY G3r — One SN

In figure 4-14, the two-SN CSS is assumed to have five inter-SN fiber-optic links to support 21 maximum PNs. The following numbers of links are used with the associated maximum number of PNs:

- One to four links support 22 PNs
- Five links support 21 PNs
- Six links support 19 PNs
- Seven links support 17 PNs

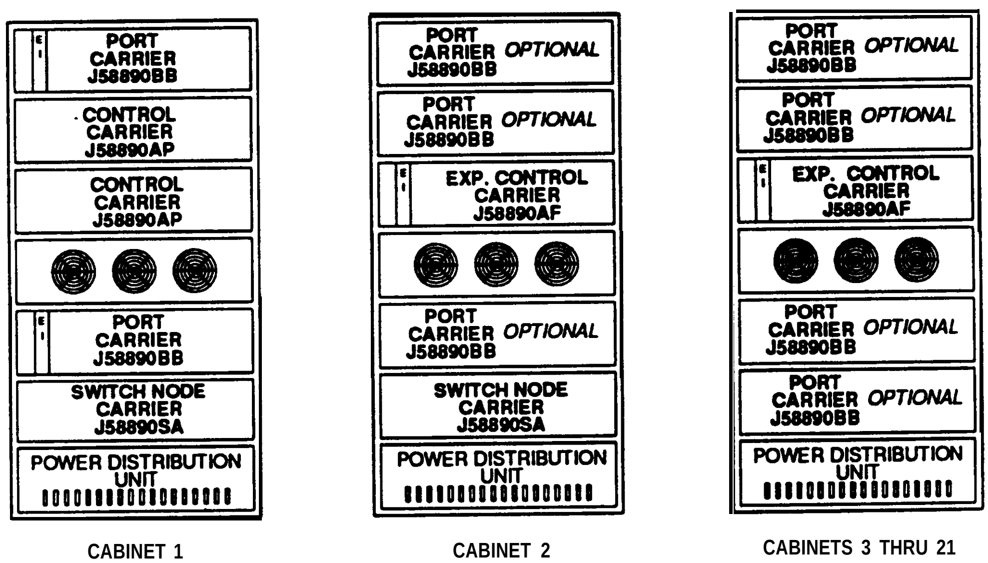

Figure 4-14. High Reliability, CSS-Connected DEFINITY G3r — Two SNs

Critical Reliability, CSS-Connected DEFINITY G3r

Table 4-13 lists from one to 22 PN cabinets for a critical reliability, CSS-connected G3r. Also in the table are the required EI, tone-clock, DS1 converter, and maintenance slots, and remaining port slots.

Table 4-13. Critical Reliability, CSS-Connected DEFINITY G3r PNs, SNs, and Circuit Pack Slots

PNs	SNs	EIs (TN570s)	Tone-Clocks)	Port Slots	DS1C In SN	Maintenance Slots
2	1	4	4	116	2	3
3	1	6	6	212	2	4
4	1	8	8	308	2	5
5	1	10	10	404	2	6
6	1	12	12	500	2	7
7	1	14	14	596	2	8
8	1	16	16	692	2	9
9	1	18	18	788	2	10
10	1	20	20	884	2	11
11	1	22	22	980	2	12
12	1	24	24	1076	2	13
13	1	26	26	1172	2	14
14	1	28	28	1268	2	15
15	1	30	30	1364	2	16
16	1	32	32	1460	2	17

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Table 4-13. Critical Reliability, CSS-Connected DEFINITY G3r PNs, SNs, and Circuit Pack Slots — *continued*

PNs	SNs	EIs (TN570s)	Tone-Clocks	Port Slots	DS1C In SN	Maintenance Slots
17	2	34	34	1516	6	18
18	2	36	36	1612	6	19
19	2	38	38	1708	6	20
20	2	40	40	1804	6	21
21	2	42	42	1900	6	22
22	2	44	44	1996	6	23

4

Figures 4-15 and 4-16 show the cabinet configurations in a critical reliability, CSS-connected G3r.

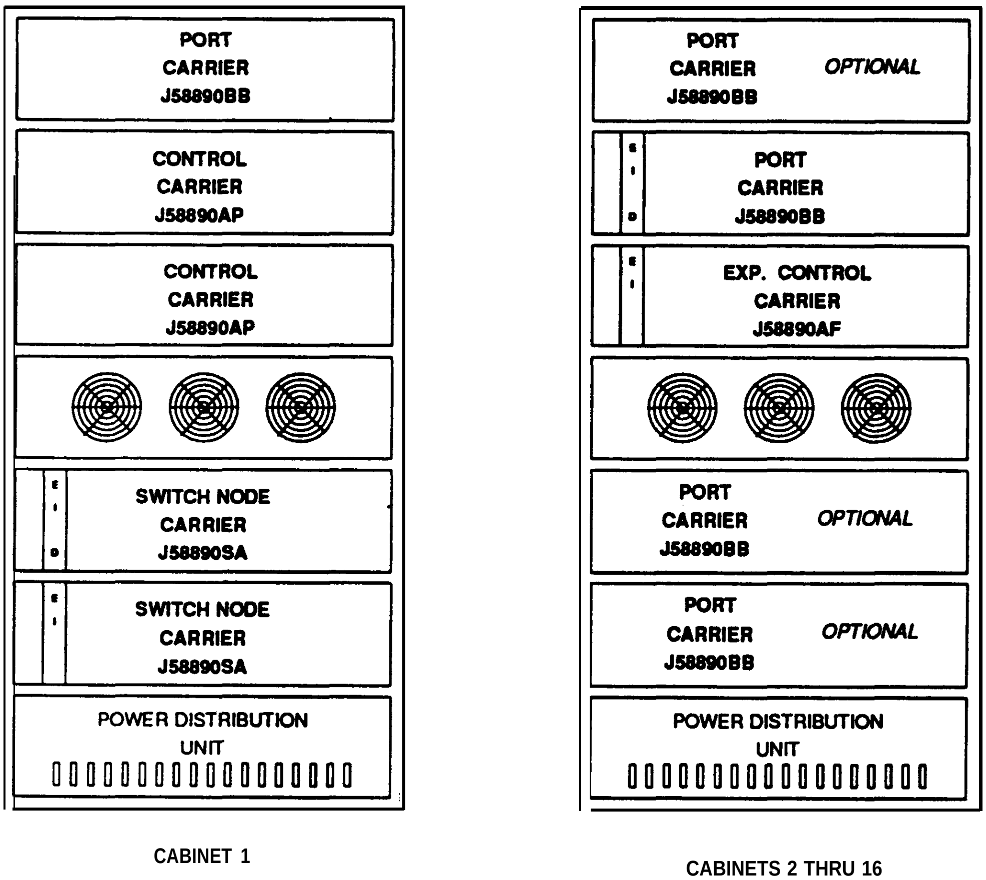


Figure 4-15. Critical Reliability, CCS-Connected DEFINITY G3r — One SN

In figure 4-16, the two-SN CSS can have one to seven inter-SN fiber-optic links to support up to 22 maximum PNs. The following numbers of links are used with the associated maximum number of PNs:

- One to five links support 22 PNs
- Six links support 20 PNs
- Seven links support 18 PNs

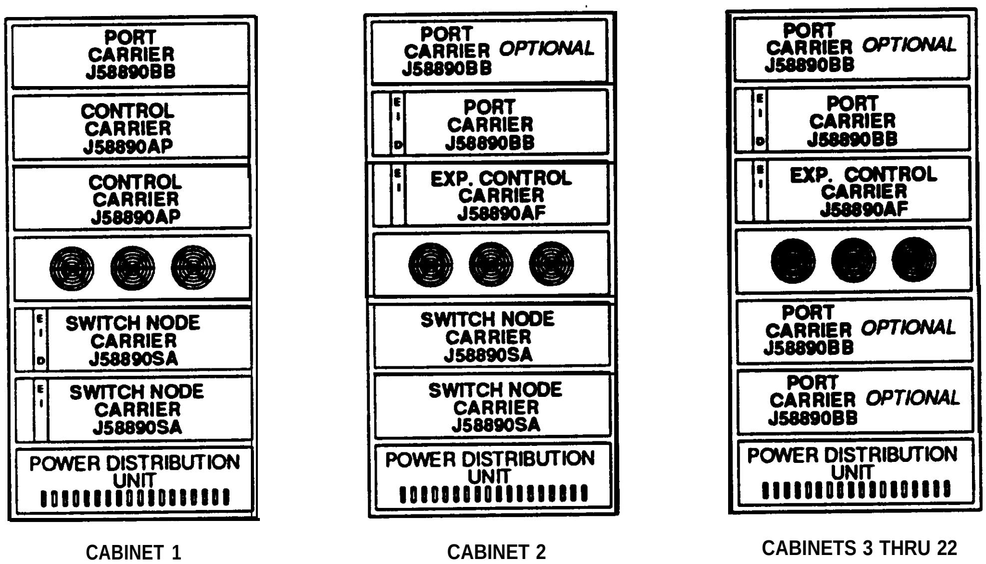


Figure 4-16. Critical Reliability, CSS-Connected DEFINITY G3r — Two SNs

Cabling

5

This chapter describes the cabling in DEFINITY Generic 1 (G1) and DEFINITY Generic 3 (G3) in the following order:

All cabling between carriers and between cabinets is connected to the back-planes and rear panels of the carriers and cabinets. Cable nomenclature identifying the cables appears in parentheses in the text.

Procedures used to connect cables between cabinets during installation are given in the following AT&T document: “DEFINITY Communications System Generic 1 and Generic 3 Installation and Test” (555-230-104).

Types of Cabling

Two types of cabling are used in the system:

- Metallic, which is traditional copper cable
- Fiber-optic, which is glass cable that transports light

Metallic Cabling

Metallic cabling is used within multicarrier cabinets and single-carrier cabinets to:

- Connect the TDM bus and packet bus (also called “LAN bus” in some figures in this chapter) between carriers
- Distribute AC and DC power from power distribution units to the carriers in multicarrier cabinets
- Intraconnect carriers, such as duplicated control carriers

Fiber-Optic Cabling

Fiber-optic cabling interconnects the following cabinets:

- Multicarrier cabinet to another multicarrier cabinet
- Single-carrier cabinet to a multicarrier cabinet
- Single-carrier cabinet to another single-carrier cabinet

In a directly connected three-PN standard reliability system, shown in figure 5-1, fiber-optic cabling is connected from:

- The PPN cabinet to both EPN cabinets
- One EPN cabinet to the other EPN cabinet

In directly connected, critical reliability systems, fiber-optic cabling is duplicated between the PPN and each EPN. Fiber-optic cabling is also doubled between EPNs. One of the doubled fiber-optic links is active while the other link is in standby.

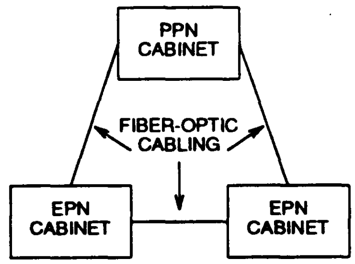


Figure 5-1. Fiber-Optic Cabling in a Directly Connected System

In a CSS-connected standard reliability system, shown in figure 5-2, fiber-optic cabling is connected from:

- The PPN to the CSS
- The CSS to the EPNs

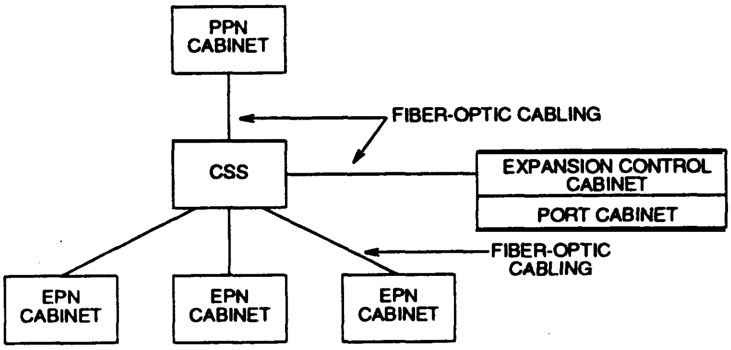


Figure 5-2. Fiber-Optic Cabling in a CSS-Connected System

In CSS-connected, critical reliability systems, one fiber-optic cable is connected from the PPN to the CSS, and one fiber-optic cable is connected from the PPN to the duplicate CSS. Each one of the EPNs has one fiber-optic cable connected to the CSS and another fiber-optic cable connected to the duplicate CSS. Only one of the fiber-optic links is active between the PPN and a CSS and between an EPN and a CSS, while the other link is in standby. Depending on the cabinet configuration, the following carriers in each cabinet can be interconnected by fiber-optic cabling: port, expansion control, and SN.

Figure 5-3 shows an example of fiber-optic cabling between carriers in separate cabinets. Each cable connects, through transceivers and interface circuit packs, one cabinet's TDM bus and packet bus to that in another cabinet.

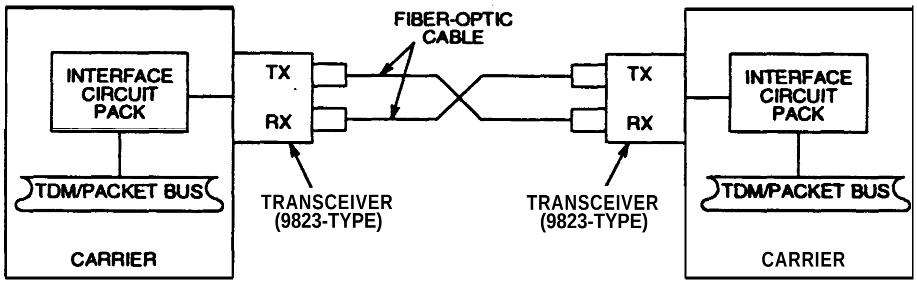


Figure 5-3. Example of Fiber-Optic Cabling Between Cabinets

The following components are used in interconnections between cabinets:

- Interface circuit packs:
  - — TN776 EI in port and exp. control carriers: G1, G3i, G3i-G
  - — TN570 EI in port and expansion control carriers in G3
  - — TN573 SNI in an SN carrier in G3r

  The first EI in a carrier is always inserted in the port slot marked EXPN INTFC. If a second EI is required, it is always inserted in the port slot (also marked EXPN INTFC) adjacent to the first EI. In a G3r, according to a loading sequence, TN573 SNIs are inserted in slots marked SWITCH NODE INTERFACE in an SN carrier.
- Cable from each interface circuit pack to each lightwave transceiver
- Lightwave transceivers, which are 9823As or 9823Bs that transmit light up to 4,900 ft. (1.495 km) or 25,000 ft. (7.6 km), respectively, each connected to a port slot connector (which goes to a TN776, TN570, or TN573) in a carrier. The transceivers convert light signals to electric signals and vice-versa. The transmit (TX) output on one transceiver is connected to the receive (RX) input on the other transceiver to allow full duplex (simultaneous bidirectional) transmission.
- Fiber-optic cable (FL2P-P-XX, where XX denotes cable length) connected from the lightwave transceiver on one carrier to the lightwave transceiver on the other carrier. Two separate 62.5-micron diameter fiber-optic cables surrounded by a sheath compose the overall cable.

Cabling between Carriers in Multicarrier Cabinets

This section covers the following cabling:

- TDM and packet (TDM/LAN) bus

  NOTE
  In the TDM/LAN bus cabling described in this section, the “LAN” portion of TDM/LAN cable designations refers to “packet bus.”

- Cabinet harness
- Control carrier
- Switch node (SN) carrier
- Digital signal-1 (DS1)

TDM/LAN Bus Cabling

TDM/LAN extension cables (WP-91716) connect the carriers in each multicarrier cabinet. These cables are flat ribbon types going to connectors marked TDM/LAN on each carrier backplane. The cable length is 15 ft. (4.6m) across five carriers in a cabinet. The cable (WP-91716 L7) connected across the fans between the carrier in position A and the carrier in position D is longer than the other cables (WP-91716 L6).

TDM/LAN cabling is identical across carriers in PPN and EPN cabinets, in all systems except CSS-connected systems.

Each end of the TDM/LAN bus in a cabinet is terminated on a carrier backplane by a TDM/LAN bus terminator (ZAHF4) installed in a TDM/LAN connector. If a carrier is not in place, such as a port carrier in position E for example, the terminator is installed in the previous carrier, which is the port carrier in position D.

The TDM/LAN bus is only connected to an SN carrier and the duplicate SN carrier. Consequently, an SN carrier has a terminator in a critical reliability PPN only.

Figures 5-4 through 5-10 show how the TDM/LAN extension cables are connected between backplanes on carriers in different PPN cabinet and EPN cabinet configurations.

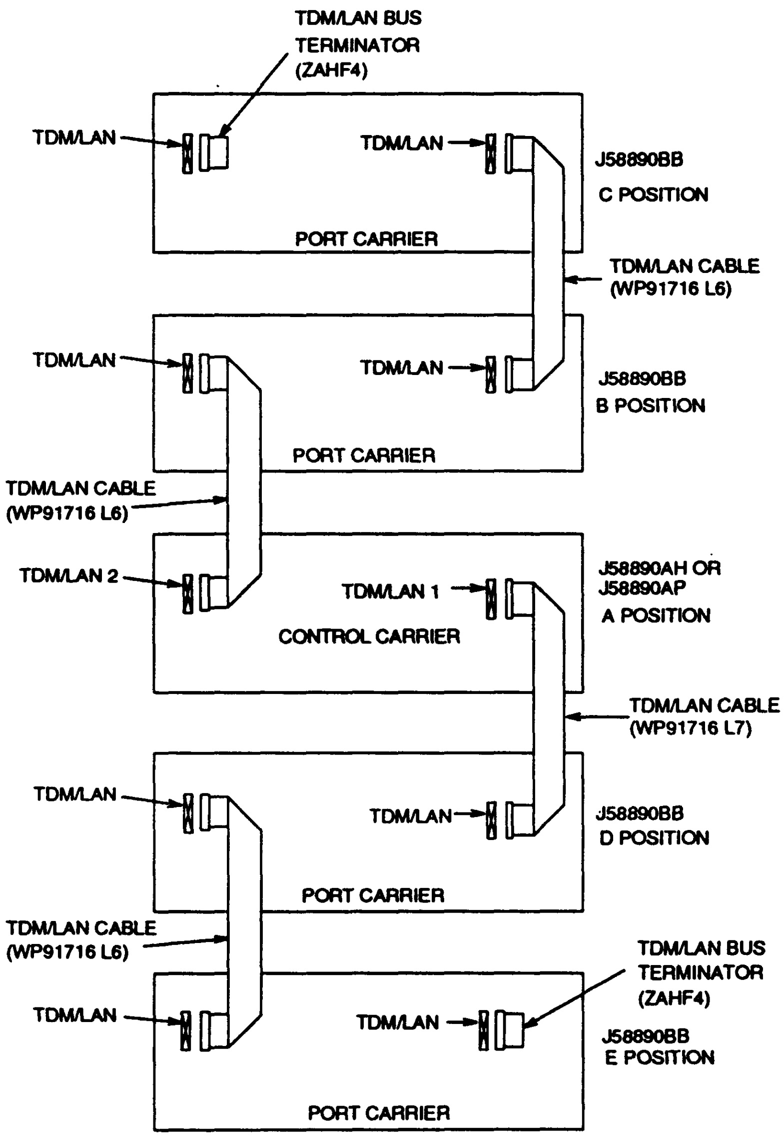


Figure 5-4. TDM/LAN Bus Cabling — Rear View of Fully Loaded PPN Cabinet Configuration — Multicarrier Cabinet

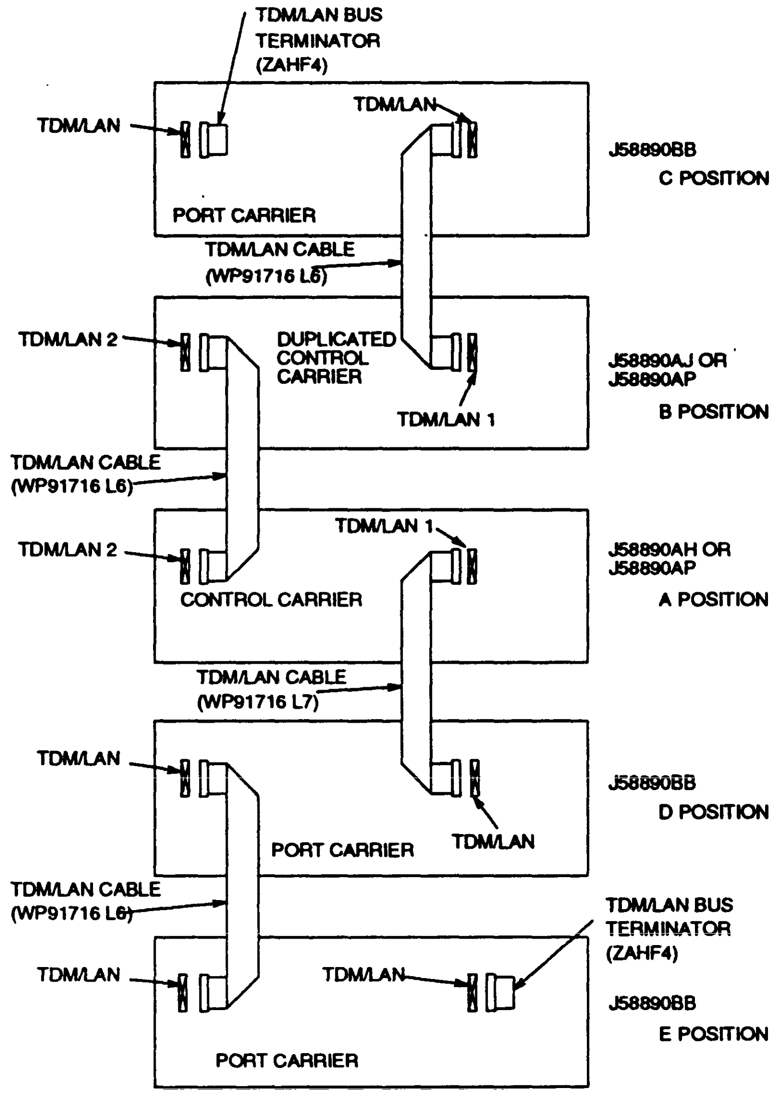


Figure 5-5. TDM/LAN Bus Cabling —Rear View of Fully Loaded PPN Cabinet Configuration with High or Critical Reliability Option—Multicarrier Cabinet

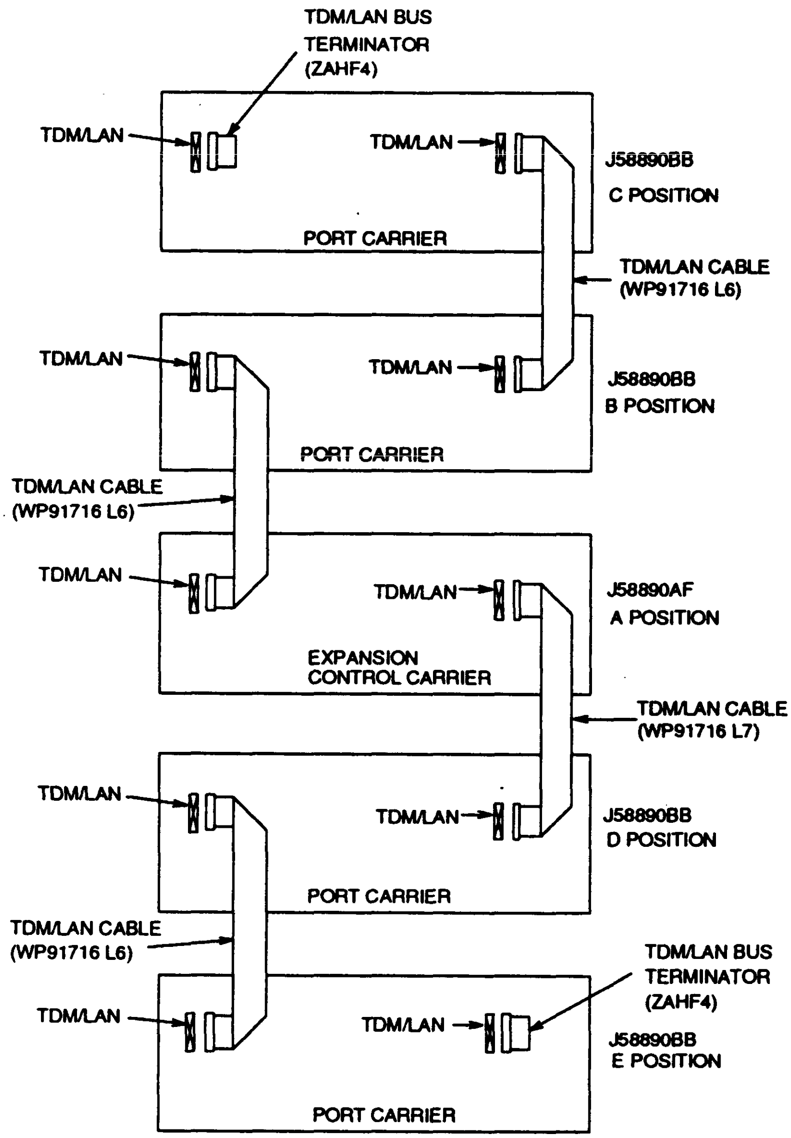


Figure 5-6. TDM/LAN Bus Cabling —Rear View of Fully Loaded EPN Cabinet Configuration—Multicarrier Cabinet

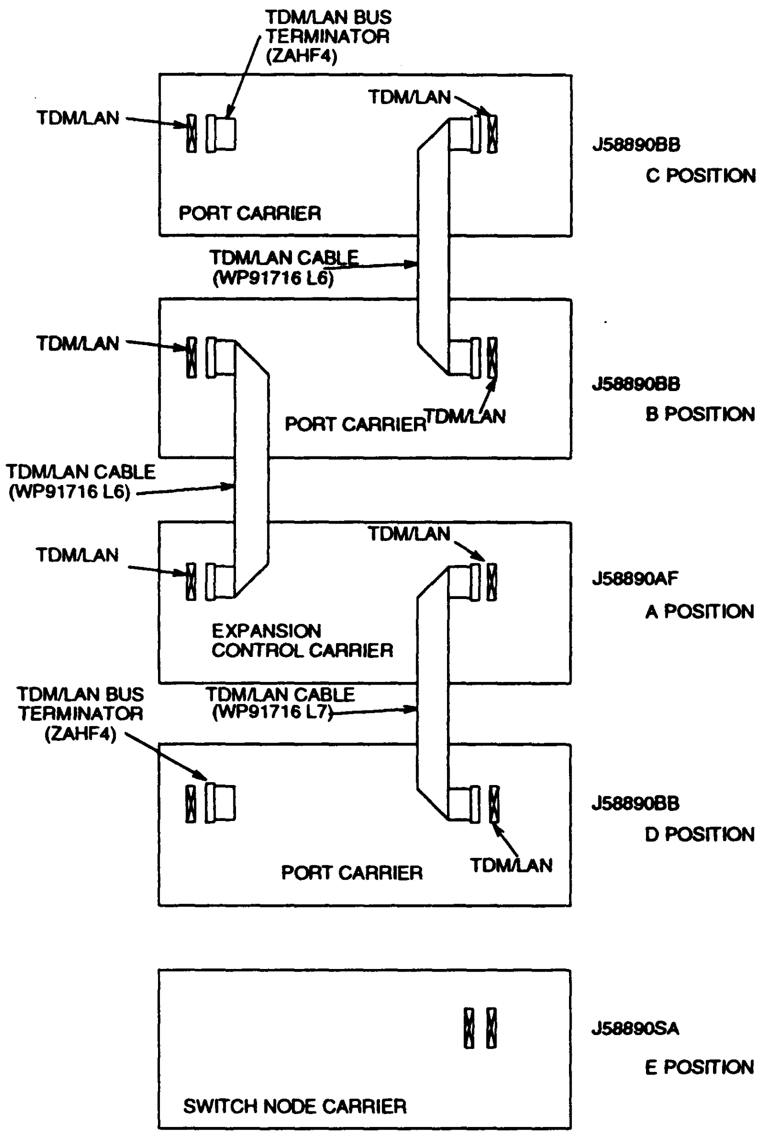


Figure 5-7. TDM/LAN Bus Cabling — Rear View of Fully Loaded EPN Cabinet 2 Configuration with High Reliability CSS-Connected Multicarrier Cabinet (two SNs) in DEFINITY G3r

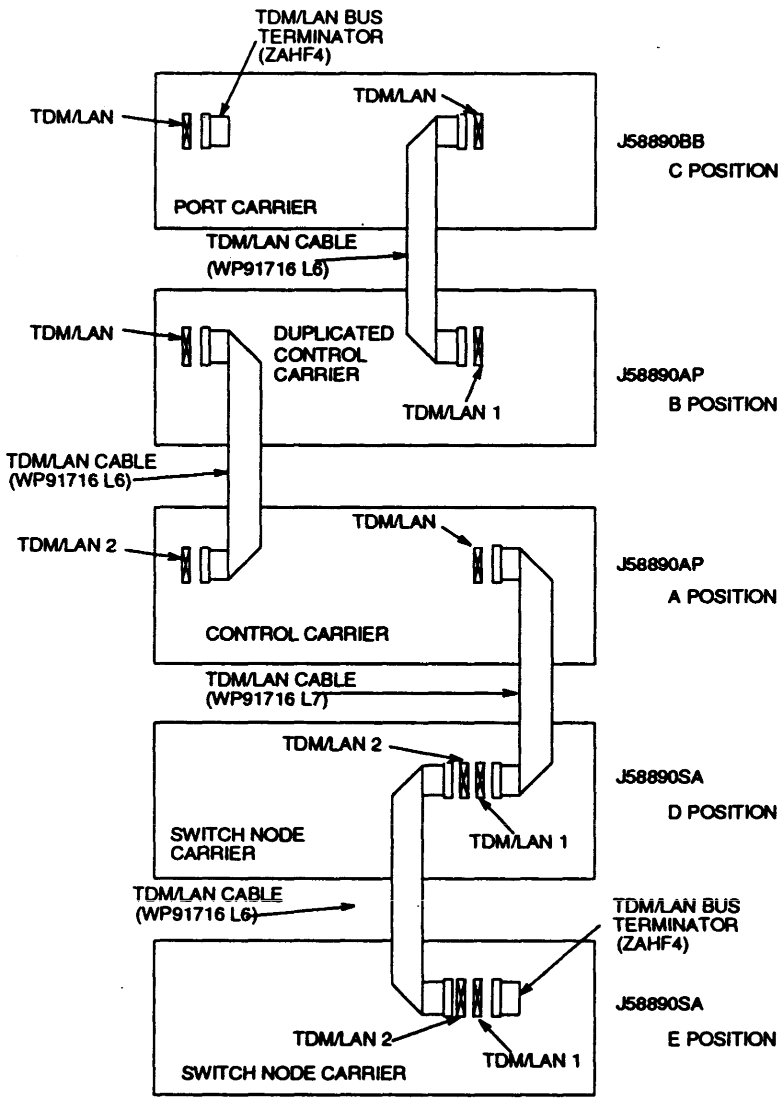


Figure 5-8. TDM/LAN Bus Cabling — Rear View of Fully Loaded PPN Cabinet Configuration in a Critical Reliability, CSS-Connected Multicarrier Cabinet in DEFINITY G3r

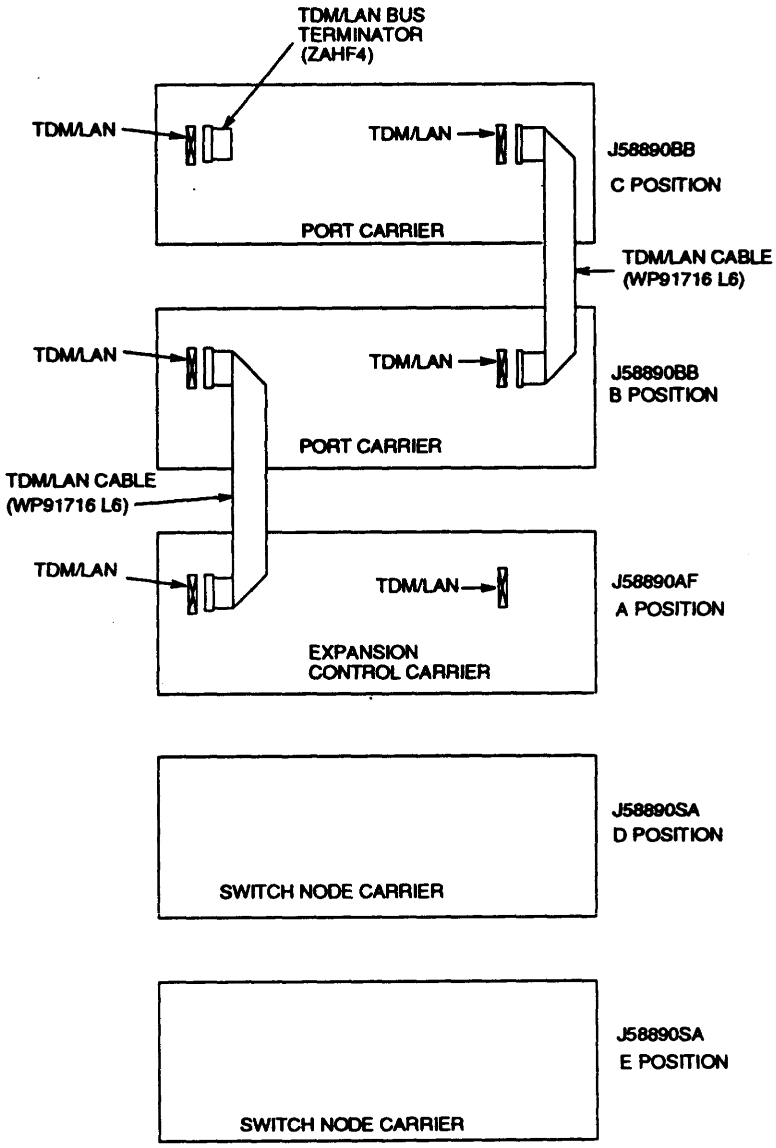


Figure 5-9. TDM/LAN Bus Cabling — Rear View of Fully Loaded EPN Cabinet 2 Configuration in a Critical Reliability, CSS-Connected Multicarrier Cabinet in DEFINITY G3r

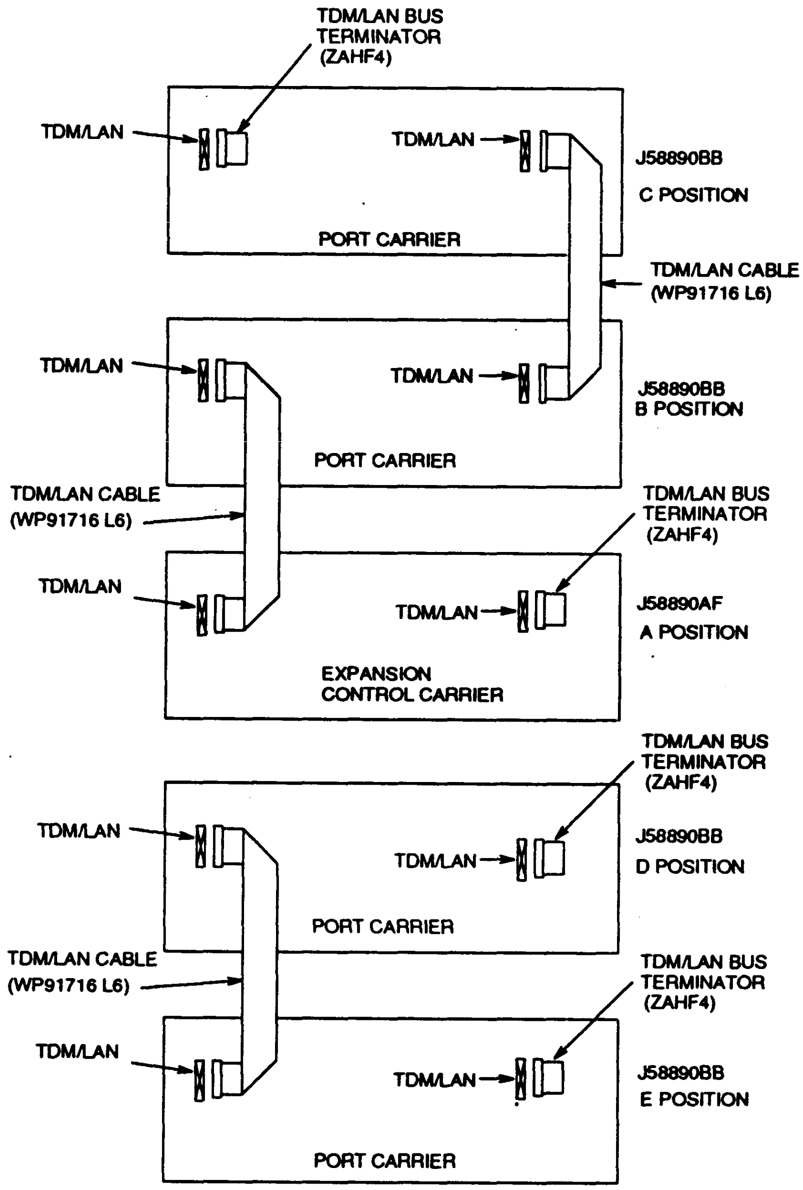


Figure 5-10. TDM/LAN Bus Cabling — Rear View of Fully Loaded Two-PN EPN Cabinet Configuration in a Multicarrier Cabinet in DEFINITY G3r

Cabinet Harness

The cabinet harness (LCJ58890A) shown in figure 5-11 runs vertically on the right rear side of each cabinet. The lower end of the harness is connected to the P2 connector on the top right side (when viewed from the rear) of the power distribution unit in the bottom of the cabinet. Branch cables run from the harness to the P1 connector on each carrier located in the A through E carrier positions.

A branch cable also runs from the harness to the P2 connector on the following carriers located in the A carrier position only: processor carrier in the PPN cabinet and expansion control carrier in an EPN cabinet. The branch cables provide the following electrical functions to each carrier and the fan unit in a cabinet:

- Carrier identification (addressing)
- Cabinet alarms
- Power distribution control signals
- Power supply control signals
- Circuit ground connection from the A carrier position to the cabinet ground block in the bottom of the cabinet
- -48 VDC to the fan unit to operate the fans
- +5 VDC to the fan unit to power the speed control and alarm circuit in each fan in G3

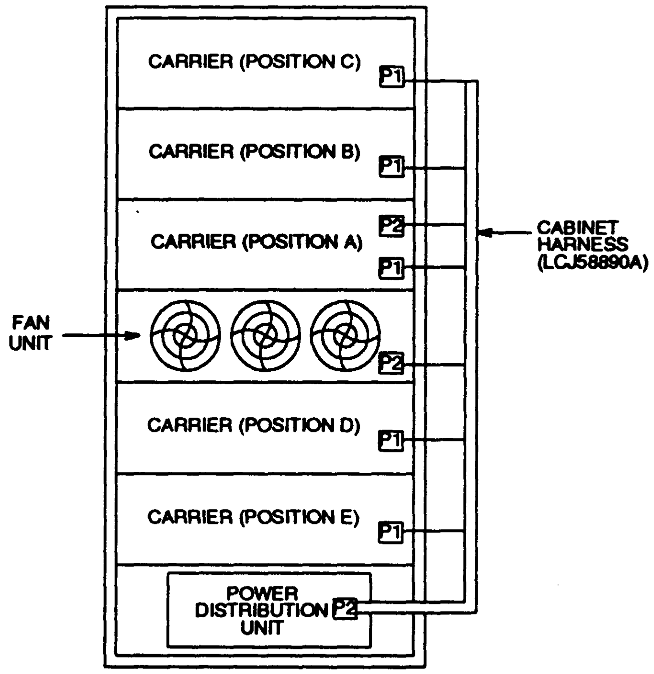


Figure 5-11. Cabinet Harness and Branch Cabling — Rear View

Control Carrier Cabling in DEFINITY G1, G3i, and G3i-G

The following connectors are on the backplane located behind the rear panel of a control carrier in G1, G3i, and G3i-G:

- ICCA and ICCB connectors, which connect the shadowing and data control leads between the control carrier and the duplicated control carrier
- Cabinet harness connector, which allows a connection to the ring generator and to all the environmental and power supply signals
- -48-V connector, which connects -48v to the fans

The following connectors are on the backplane located behind the rear panel of a duplicated control carrier in G1, G3i, and G3i-G:

- ICCA and ICCB connectors, which connects the shadowing and data control leads between the duplicated control carrier and the control carrier.
- Cabinet harness connector, which allows connection to the ring generator and to all the environmental and power supply signals.

Figure 5-12 shows the control carrier and duplicated control carrier ICCA and ICCB cabling in the PPN multicarrier cabinet of control carrier and duplicated control carrier backplanes in G1, G3i, and G3i-G.

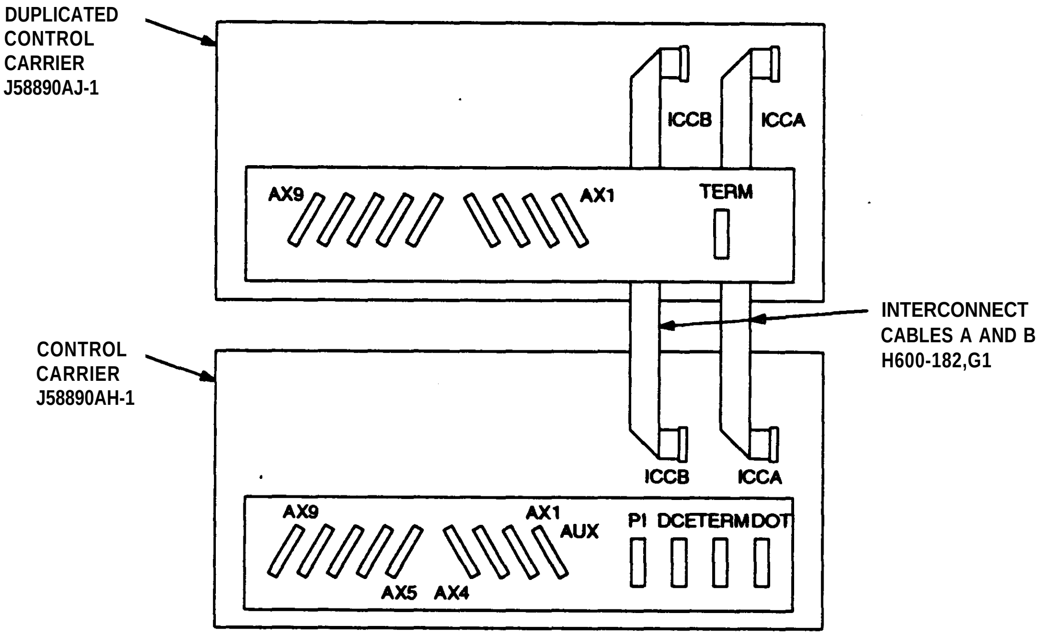


Figure 5-12. Control Carrier Backplane Interconnections in DEFINITY G1, G3i, and G3i-G

Control Carrier Cabling in DEFINITY G3r

Figure 5-13 shows the control carrier cabling in the PPN cabinet of a high reliability and critical reliability G3r and the PPN cabinet of a standard reliability DEFINITY G3r. The following intercarrier cables (ICCs) are connected between the backplane of control carrier A and the backplane of control carrier B in high reliability and critical reliability systems:

- ICCA (H600-198), which connects -48 VDC, +5 VDC, and -5 VDC to either control carrier when DC power fails in the other control carrier
- ICCC (H600-182), which connects all signals from the AUX connector and the TERMINAL connectors on the rear panel to control carrier B when control carrier A fails
- ICCD (WP-91954), which carries memory bus signals and data bus signals between the UN330B duplication interface circuit pack in control carrier A and the UN330B in control carrier B to let the inactive processor shadow the active processor

In a standard reliability G3r only, ICCB (H600-204) is connected between control carrier A and port carrier B to duplicate the power.

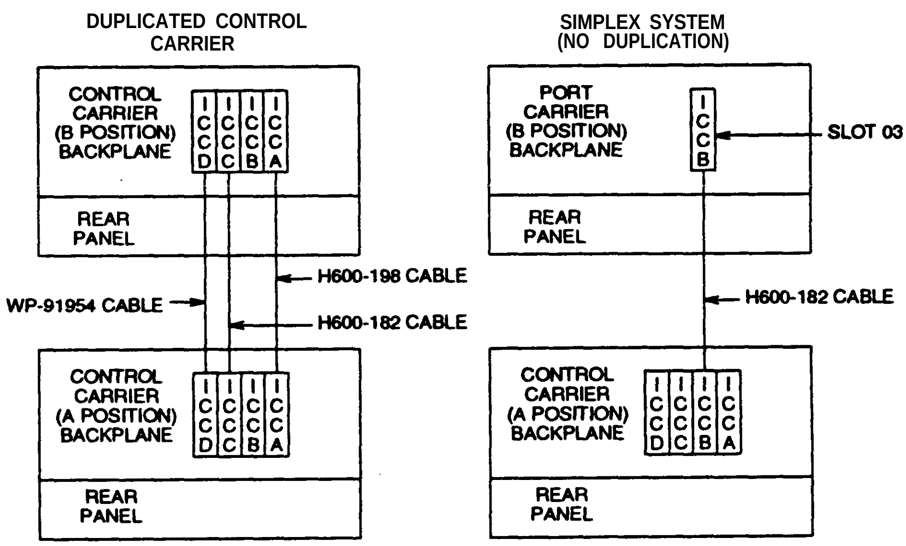


Figure 5-13. Control Carrier Backplane Interconnections in DEFINITY G3r

SN Carrier Cabling in DEFINITY G3r

In a CSS-connected G3r, with one or two SN carriers, the following shielded metallic cabling (which replaces fiber-optic cabling when possible) is used:

- Intraconnecting cable — cable (H600-278,G1) connects a TN570 EI circuit pack in slot one of the SN carrier to a TN573 SN interface circuit pack in slot two of the same carrier.
- Cable (H600-278,G2) connects a TN753 in slot two of an SN carrier to a TN570 in slot two of a port carrier in the same cabinet.

Table 5-1 lists the H600-278 cable lengths.

Table 5-1. SN Metallic Cable Lengths

Cable Number	Length
H600-278,G1 (used for connections in the same carrier)	13 in. (39 cm)
H600-278,G2 (used to connect two different carriers)	5.5 ft. (1.7m)

DS1 Remoting in DEFINITY G3r

DS1 remoting provides connectivity between two PNs, which extends the distance beyond the 25,000-ft. (7.6 km) limit of fiber-optic cable between them. DS1 remoting can be used between two PNs that are up to 100 circuit miles (161 km) apart. DS1 is not a trunk-type interface. DS1 remoting hardware is used in the CSS and in directly connected systems. A maximum of 20 EPNs can be connected to the PPN via DS1 remoting.

Standard metallic T1 transmission line cabling is assumed to exist between the PNs. This type of cabling produces a 2-ms echo delay across 100 circuit miles, which is the worst case. Other transmission media, such as fiber-optics, have less than a 2-ms delay across 100 miles. However, the 100-circuit mile limit is specified.

As an example of how the specification is applied, suppose that two EPNs use DS1, and one EPN is 75 circuit miles from the CSS. Therefore, the other EPN can be a maximum of 25 circuit miles away from the CSS.

A maximum of 20 EPNs can be connected remotely via DS1 to the PPN cabinet and EPN cabinet 2, because cabinet 2 contains one or two SN carriers that must be connected by fiber-optic cable to the PPN cabinet. The DS1 cabling between the PNs involves connections from the PNs to a public network.

A TN574 DS1 converter (DS1C) circuit pack is used with the cabling. DS1C protection switching requires that any of the four DS1 facilities be capable of carrying wide-band packet data, circuit-switched data, or voice at any given time. The DS1C can reside in the following carriers: port (slot 3 to slot 20), SN (slot 1 or slot 21), and expansion control (port slots 2 through 19).

Cabling on a Carrier for DS1C

As shown in a CSS-connected G3r in figure 5-14, cabling on a carrier connects a DS1C to an appropriate EI or SNI and also provides a second connector to connect it to a public network. The DS1C to EI/SNI cable is a shielded cable held in place at the EI/SNI port connector by a 4B retainer and at the DS1C port connector by a 4C retainer. Table 5-2 lists the DS1 cables on a carrier.

Table 5-2. TN574 DS1 Cable Lengths on a Carrier

Connection Type	Length	Comcode Number
On same carrier	1 ft. (.305m)	846448637
Between two carriers in same cabinet	5.5 ft. (1.7m)	846448645
Between two adjacent cabinets	1 ft. (.305 m), used with 2 9823As, and and 1 20-ft. (6.1-m) fiber-optic cable	846448652, and 1 846885259 bracket

Cabling to a Public Network for DS1C

Figure 5-14 shows the cabling and the network between the remote PNs in a directly connected or CSS-connected G3r. TN574 DS1C circuit packs are plugged into the expansion control carrier in the EPN cabinet and into an SN carrier in the PPN cabinet, as shown in figure 5-14. An H600-348 cable is connected from each DS1C port to a channel service unit (CSU). The CSU is connected to a wall field, providing from one to four DS1 connections.

The H600-348 cable is plugged into the 846448637-52 cable connected to the DS1C port connector. The other end of the H600-348 cable has four 15-pin subminiature D-type connectors that plug into up to four CSUs. The PNs communicate across DS1 facilities in the public network between the wall fields.

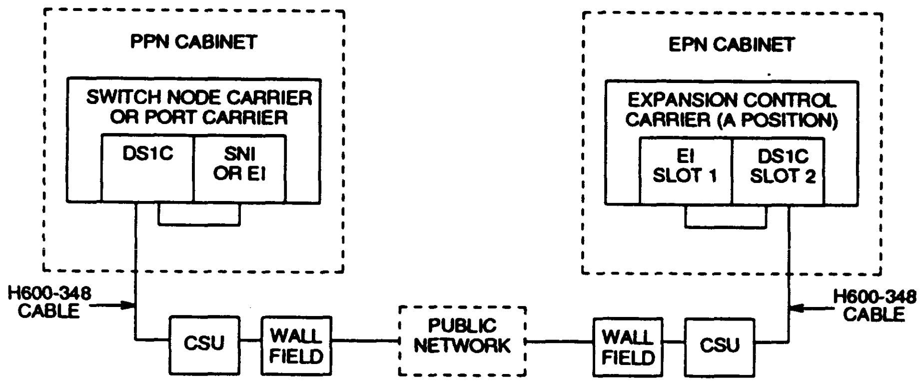


Figure 5-14. DS1 Connectivity between Remote PNs in DEFINITY G3r

Cabling between Multicarrier Cabinets

Table 5-3 lists the figures that show fiber-optic cabling between cabinets in different configurations. Included in the figures are carrier positions, types of carriers, and EI port slots used to terminate cabling between cabinets.

NOTE
Intracabinet cabling in the figures listed in table 5-3 is not fiber-optic.

Table 5-3. Fiber-Optic Cabling Between Multicarrier Cabinet

Fiber-Optic Cabling In	See Figure
Standard reliability directly connected system	5-15
High reliability directly connected G3r	5-16
Critical reliability, directly connected systems	5-17
Two-port network cabinet G3r	5-18
Standard reliability DS1C remote directly connected G3r	5-19
Standard reliability CSS-connected G3r with one SN	5-20
Standard reliability CSS-connected G3r with two SNs	5-21
High reliability CSS-connected G3r with one SN	5-22
High reliability CSS-connected G3r with two SNs	5-23
Critical reliability CSS-connected G3r with one SN	5-24
Critical reliability CSS-connected G3r with two SNs	5-25, 5-26
CSS-connected G3r with a two-PN cabinet	5-27
DS1C remote CSS-connected G3r	5-28, 5-29, 5-30, and 5-31

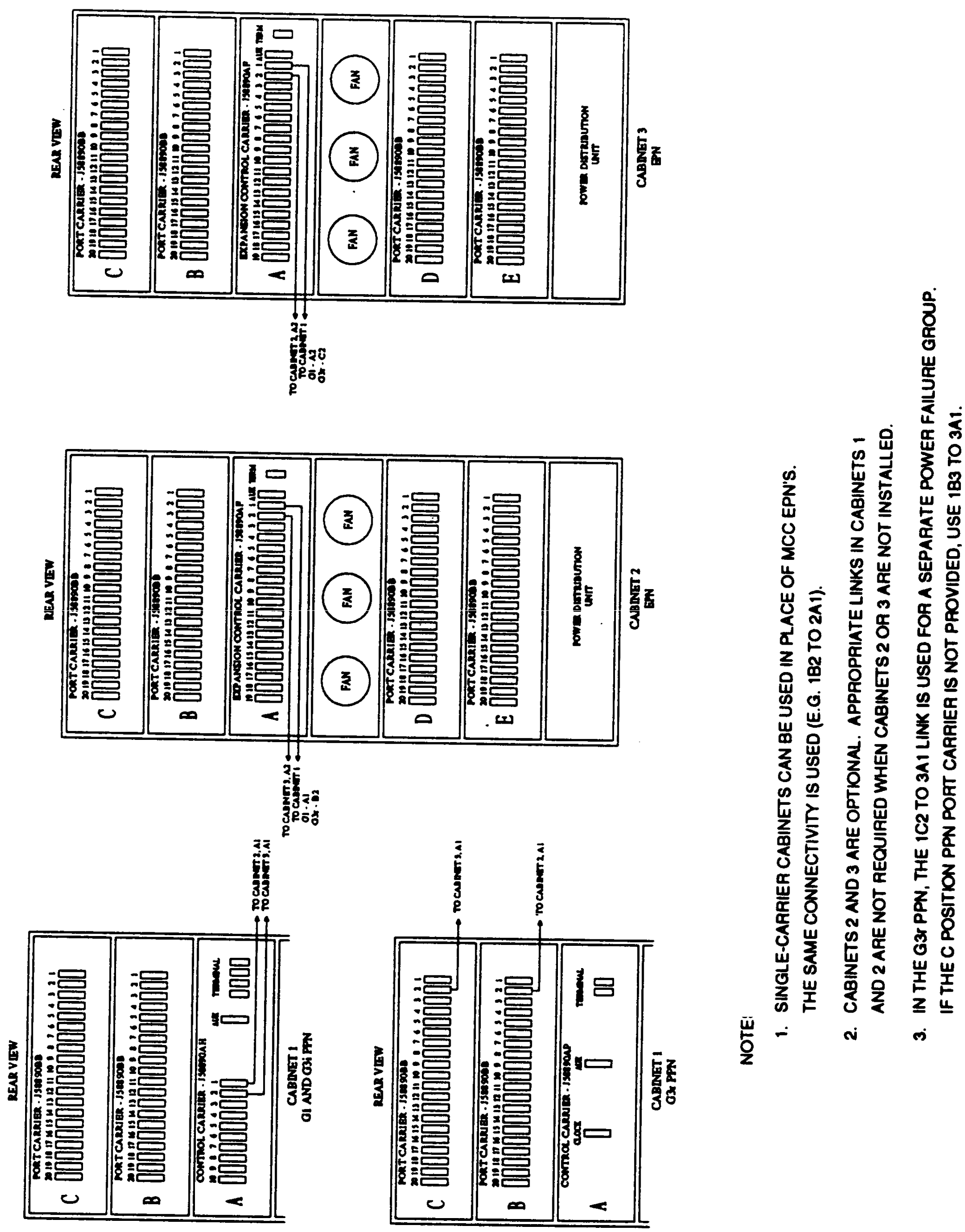
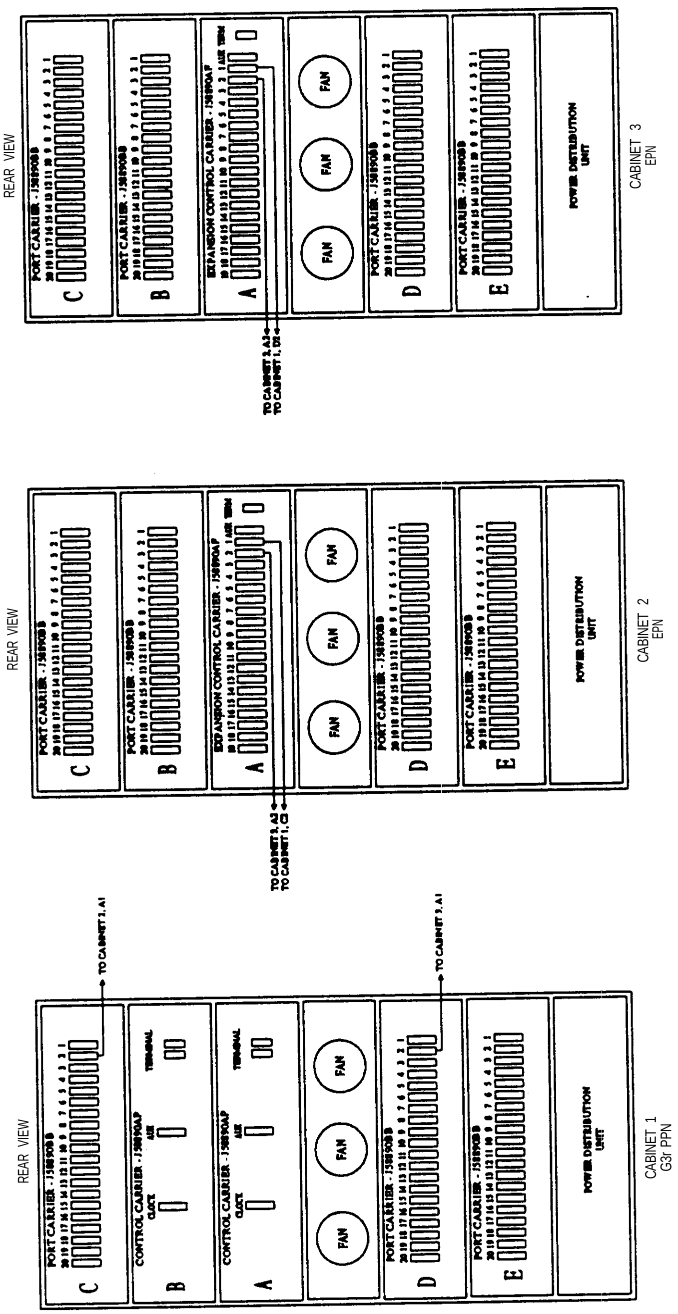


Figure 5-15. Fiber-Optic Cabling in Standard Reliability Directly Connected Systems



NOTES:

1. SINGLE-CARRIER CABINETS CAN BE USED IN PLACE OF MCC EPN'S. THE SAME CONNECTIVITY IS USED (E.G.1C2 TO 2A1).
2. CABINETS 2 AND 3 ARE OPTIONAL. APPROPRIATE LINKS IN CABINETS 1 AND 2 ARE NOT REQUIRED WHEN CABINETS 2 OR 3 ARE NOT INSTALLED.
3. IN THE G3r PPN, THE 1D2 TO 3A1 LINK IS USED FOR A SEPARATE POWER FAILURE GROUP. IF THE D POSITION PPN PORT CARRIER IS NOT PROVIDED, USE 1C3 TO 3A1.

Figure 5-16. Fiber-Optic Cabling in High Reliability, Directly Connected G3r

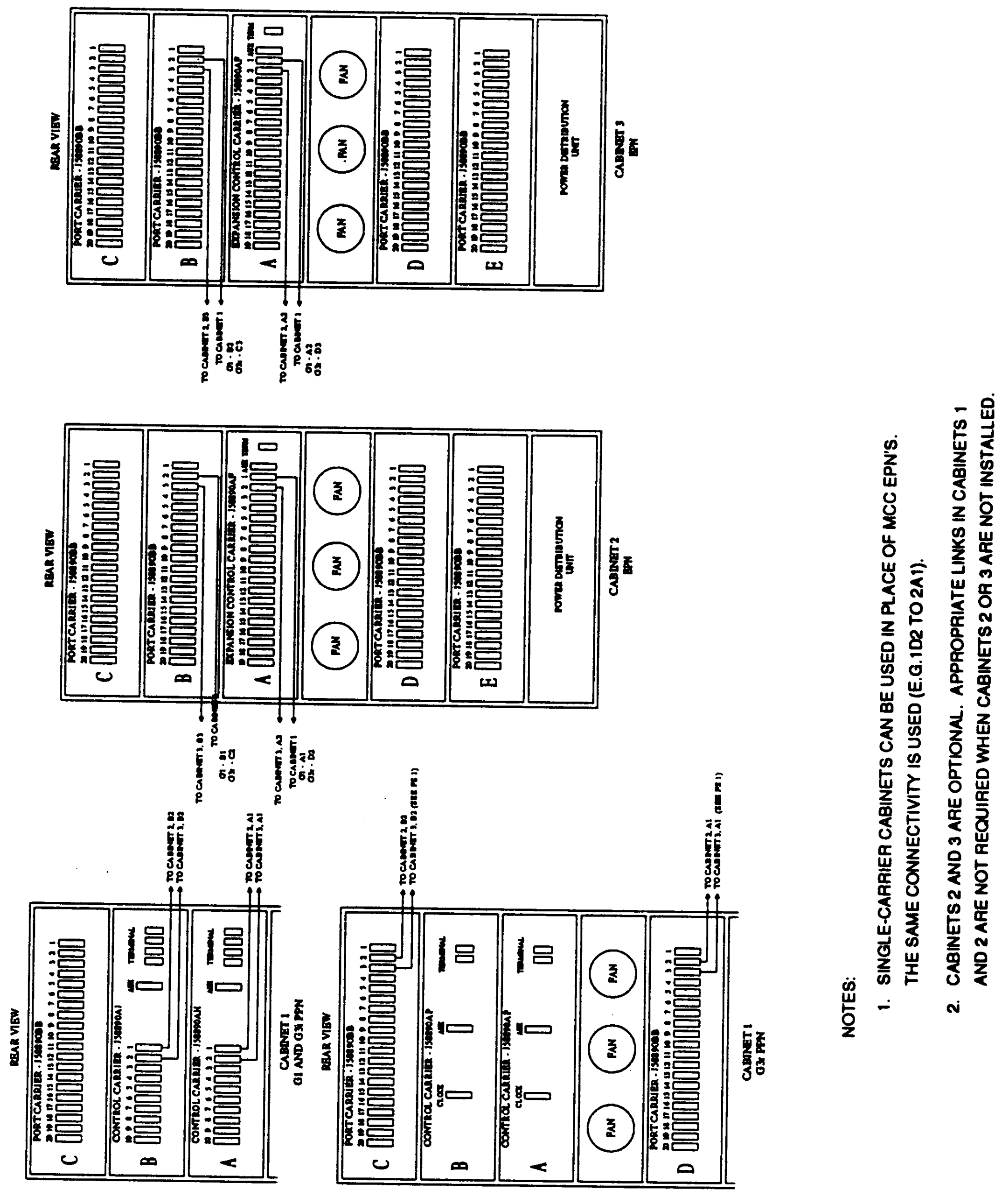


Figure 5-17. Fiber-Optic Cabling in Critical Reliability, Directly Connected Systems

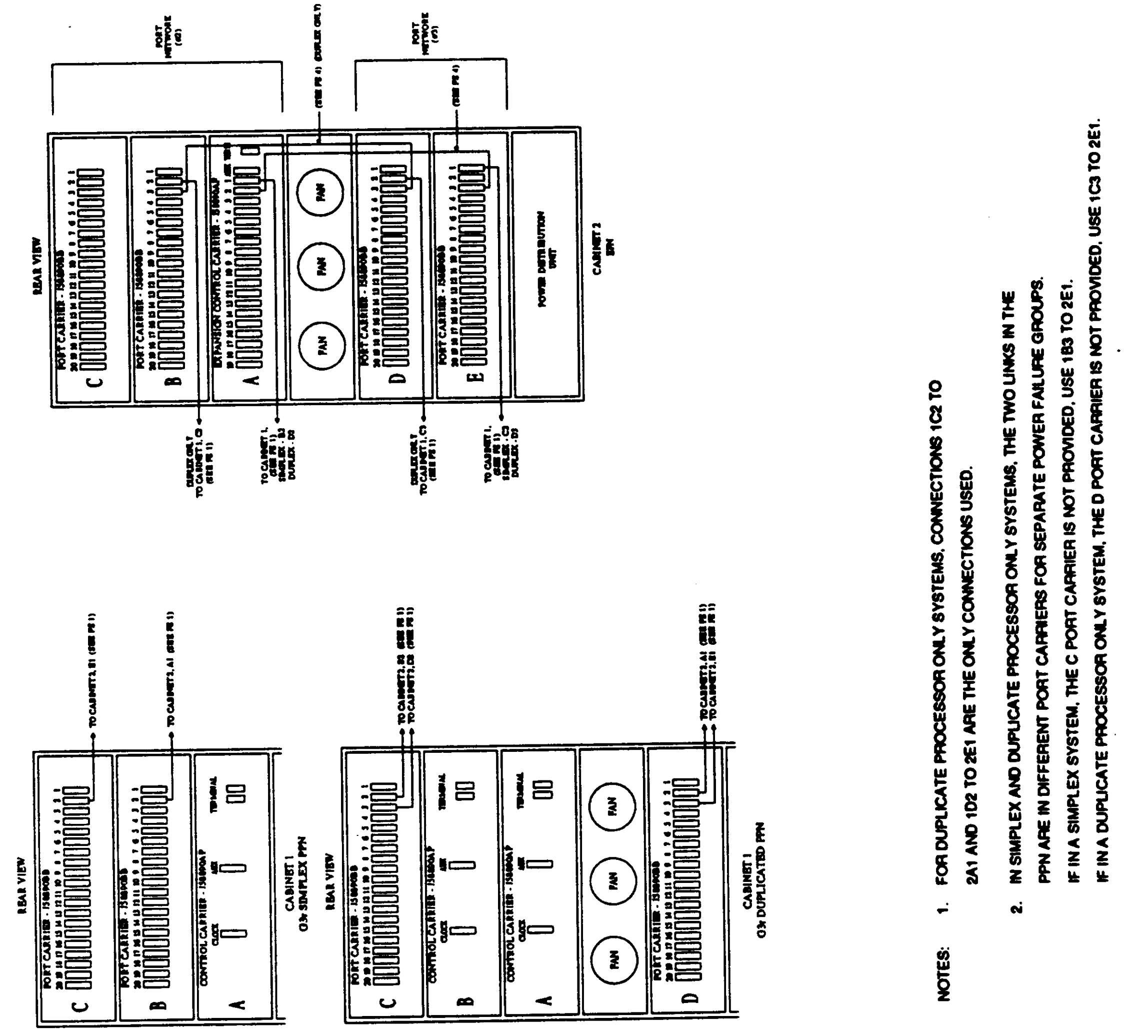


Figure 5-18. Fiber-Optic Cabling in a Two-Port Network Cabinet

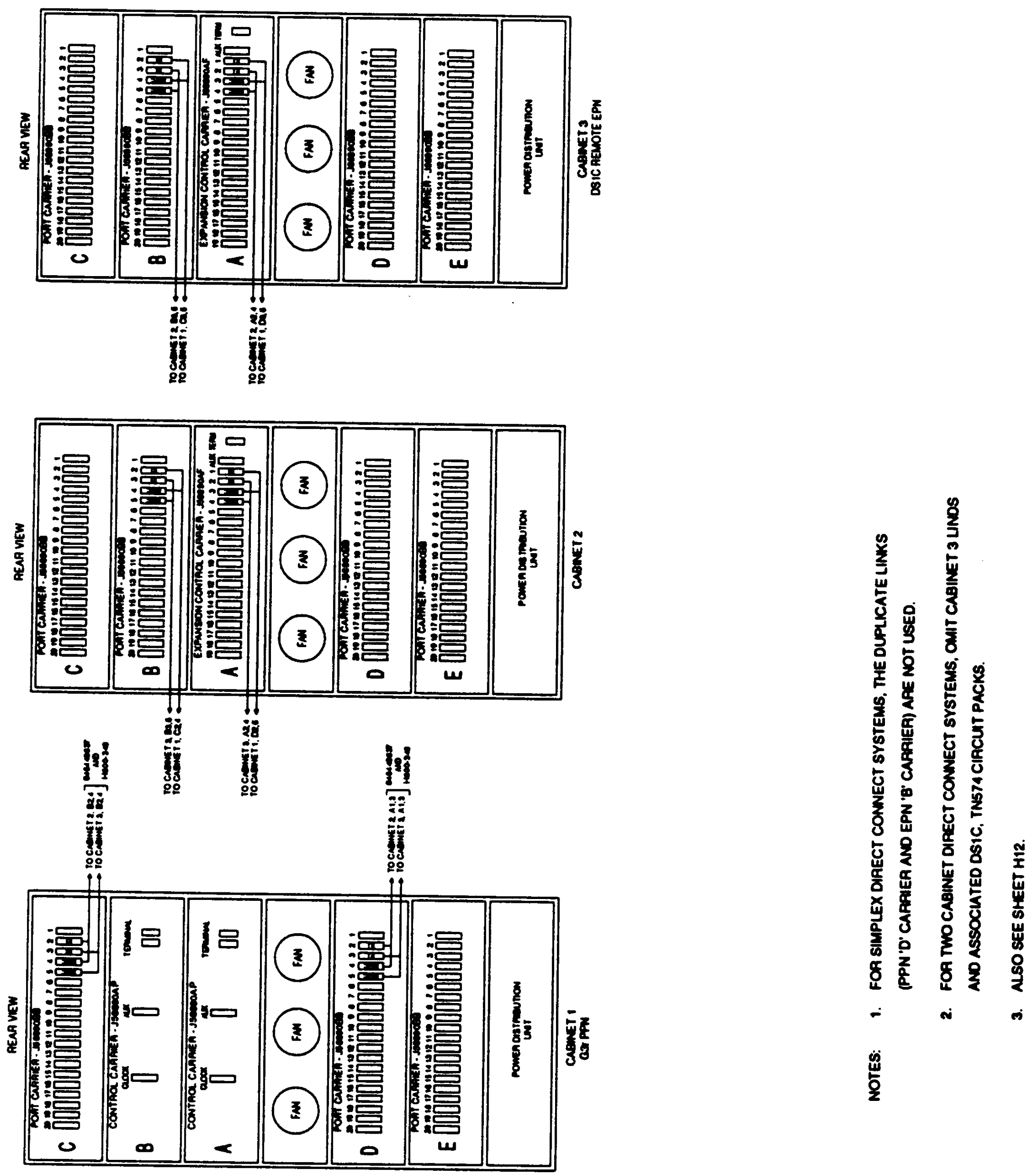


Figure 5-19. Fiber-Optic Cabling in a Standard Reliability DS1C Remote Directly Connected G3r

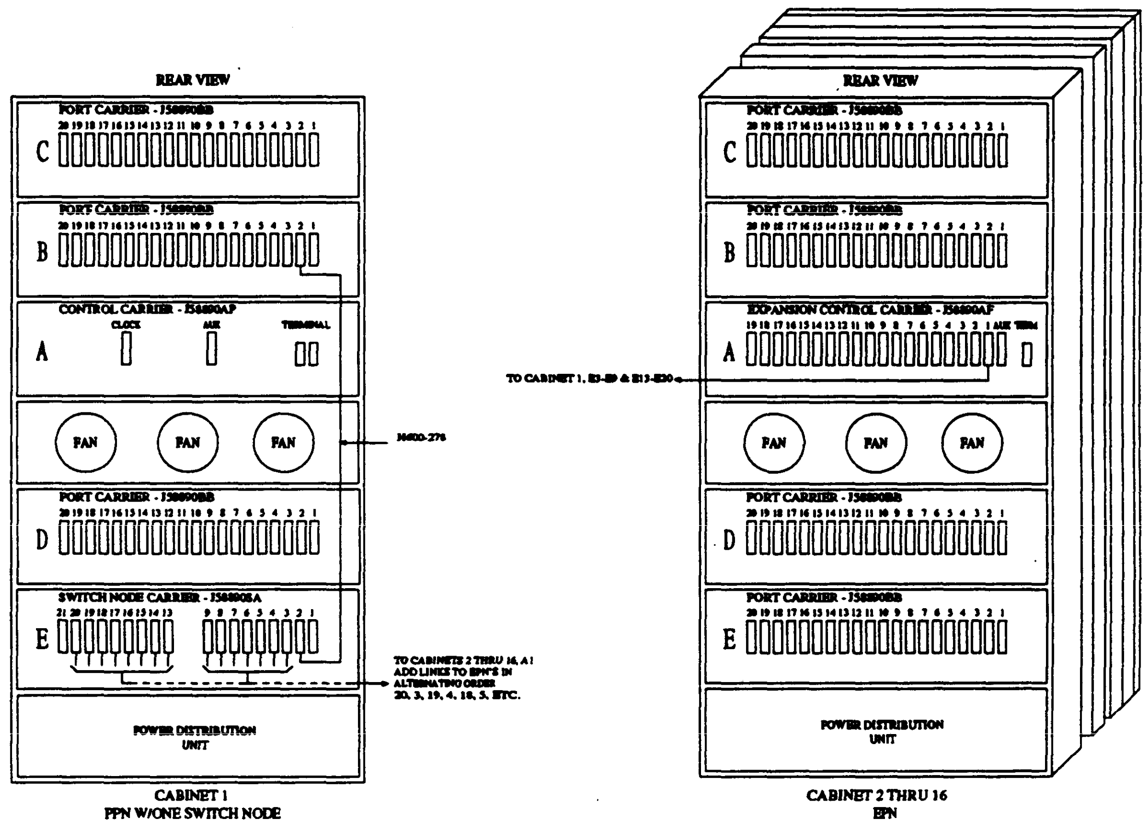


Figure 5-20. Fiber-Optic Cabling in a Standard Reliability CSS-Connected G3r with One SN

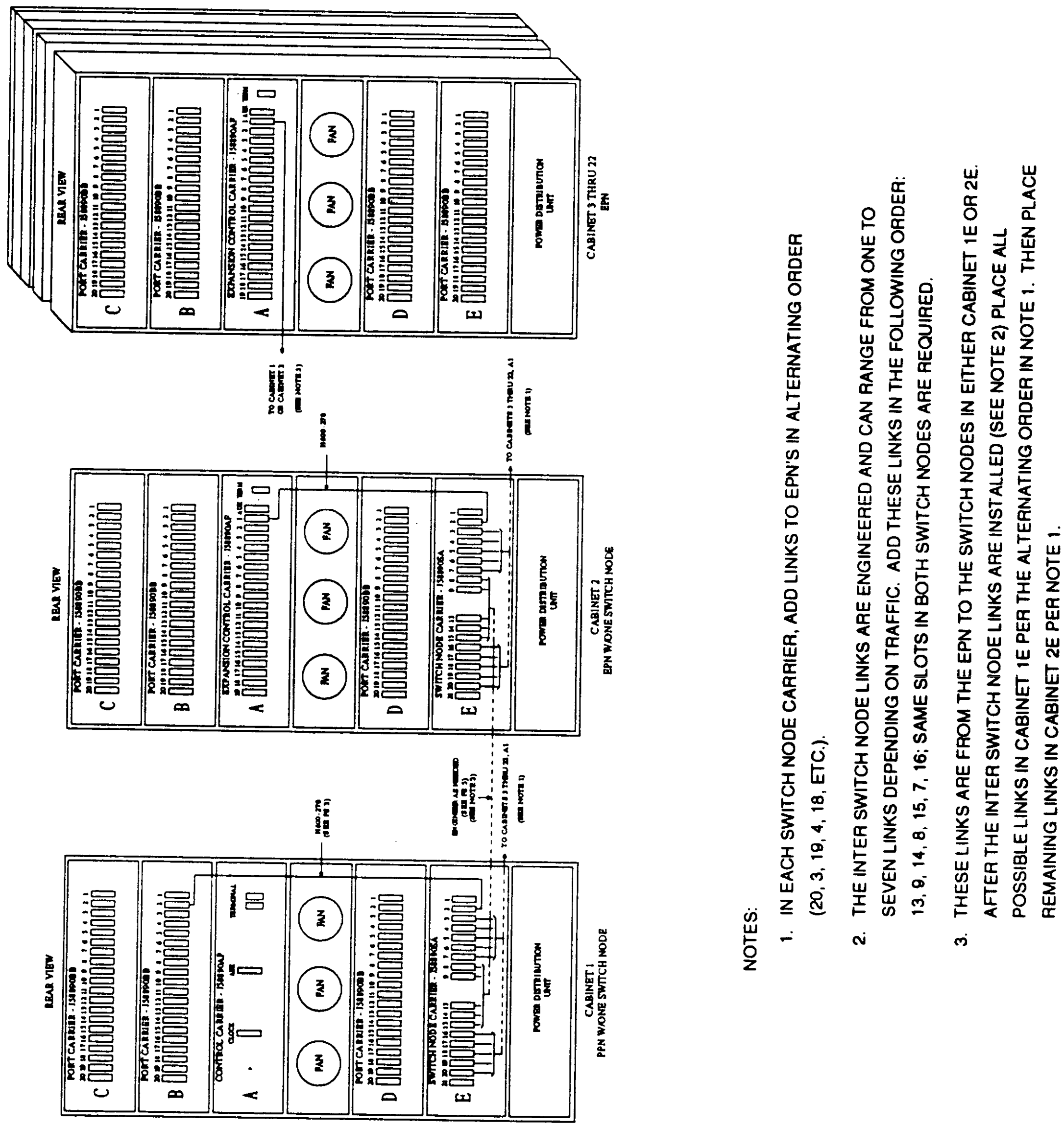
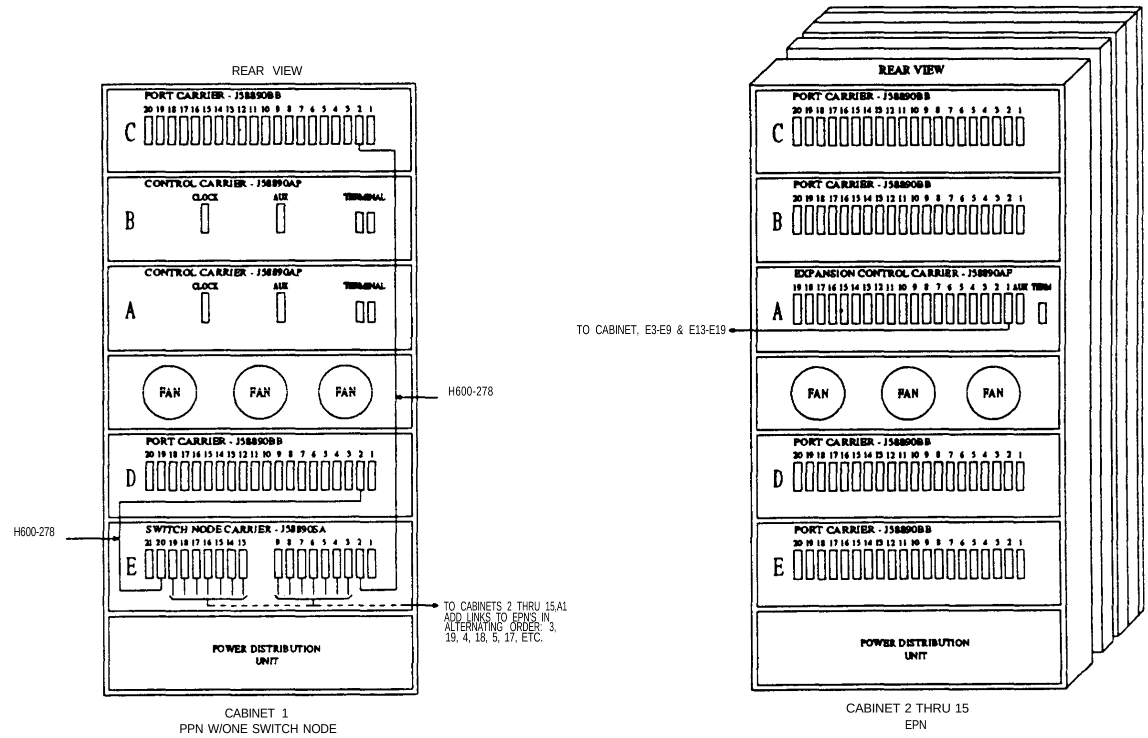


Figure 5-21. Fiber-Optic Cabling in a Standard Reliability CSS-Connected G3r with Two SNs



NOTES:

1. IN EACH SWITCH NODE CARRIER, ADD LINKS TO EPN'S IN ALTERNATING ORDER (20, 3, 19, 4, 18, ETC.).

2. THE INTER SWITCH NODE LINKS ARE ENGINEERED AND CAN RANGE FROM ONE TO SEVEN LINKS DEPENDING ON TRAFFIC. ADD THESE LINKS IN THE FOLLOWING ORDER: 13, 9, 14, 8, 15, 7, 16: SAME SLOTS IN BOTH SWITCH NODES ARE REQUIRED. THESE LINKS ARE FROM THE EPN TO THE SWITCH NODES IN EITHER CABINET 1E OR 2E. AFTER THE INTER SWITCH NODE LINKS ARE INSTALLED (SEE NOTE 2) PLACE ALL POSSIBLE LINKS IN CABINET 1E PER THE ALTERNATING ORDER IN NOTE 1. THEN PLACE REMAINING LINKS IN CABINET 2E PER NOTE 1.

Figure 5-22. Fiber-Optic Cabling in a High Reliability CSS-Connected G3r with One SN

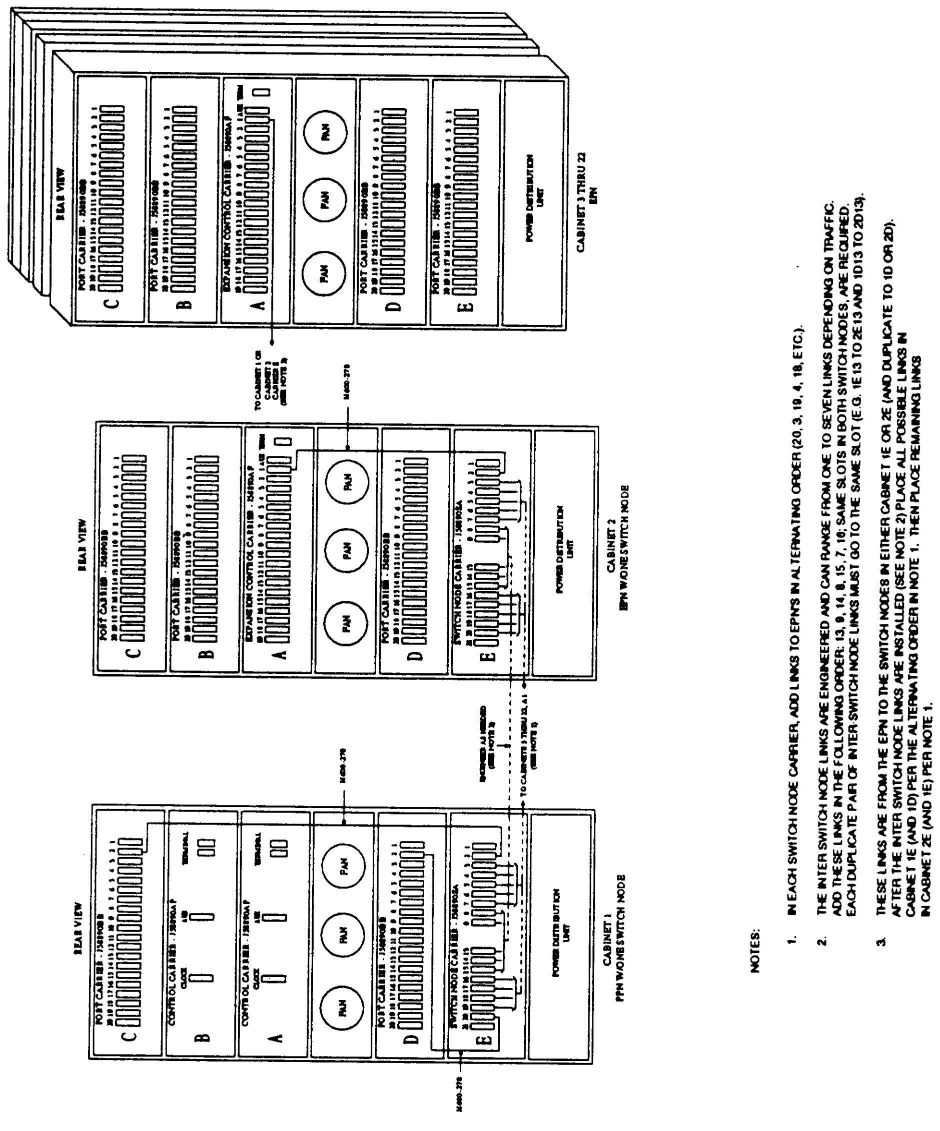


Figure 5-23. Fiber-Optic Cabling in a High Reliability CSS-Connected G3r with Two SNs

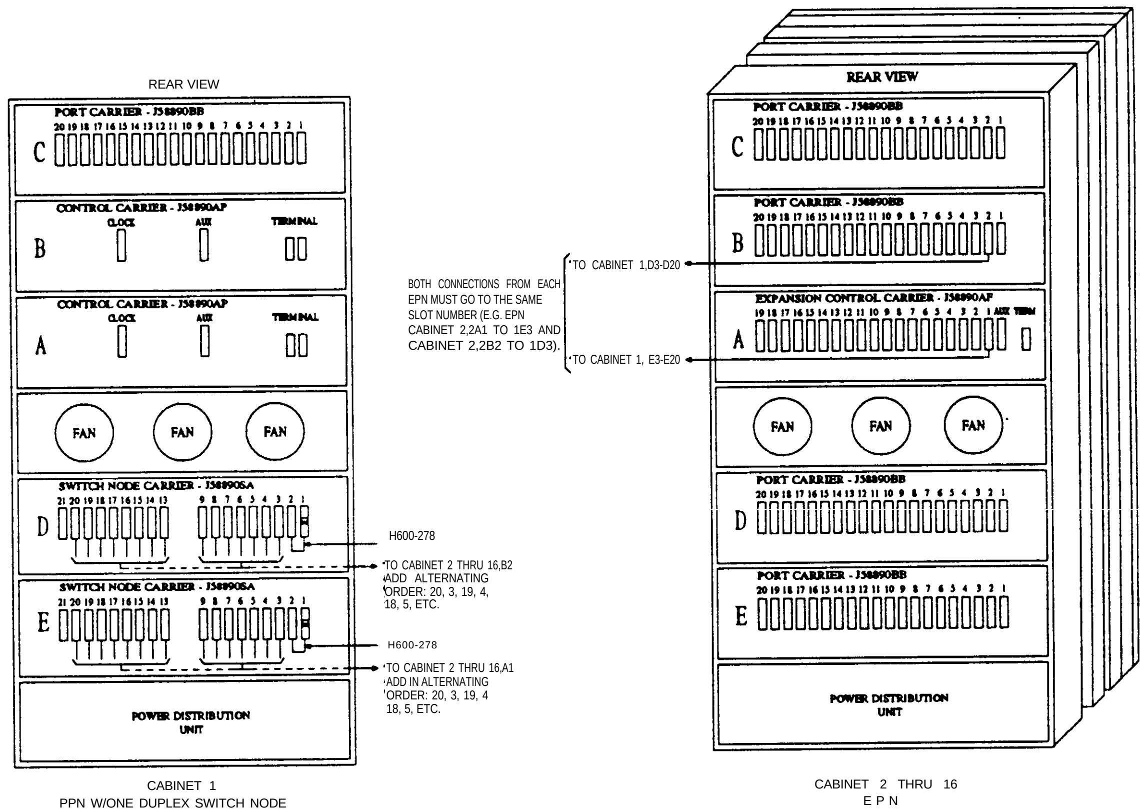
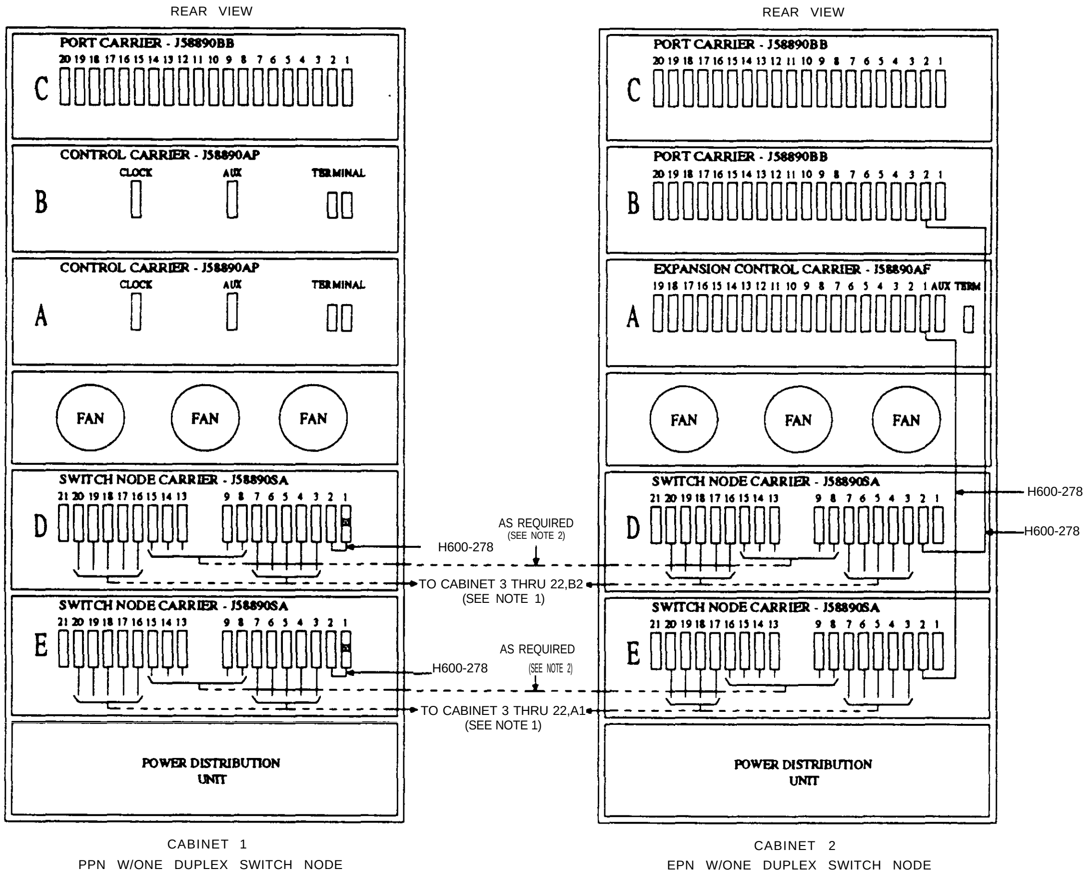


Figure 5-24. Fiber-Optic Cabling in a Critical Reliability CSS-Connected G3r with One SN

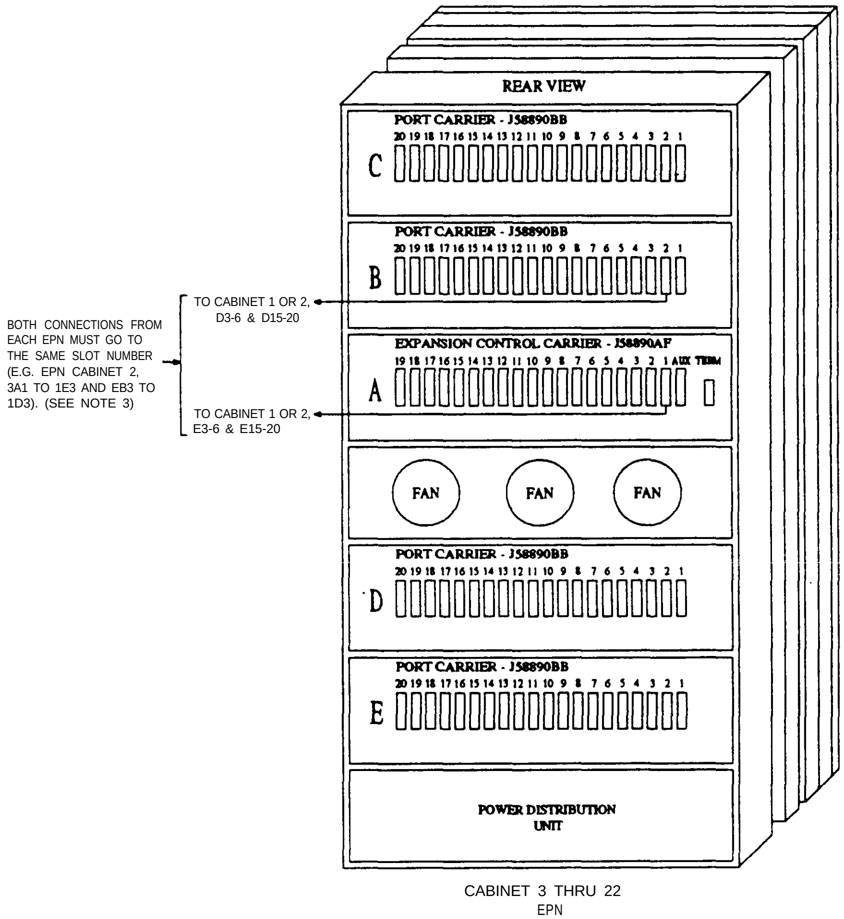


NOTES:

1. IN EACH SWITCH NODE CARRIER, ADD LINKS TO EPN'S IN ALTERNATING ORDER (20, 3, 19, 4, 18, ETC.)

2. THE INTER SWITCH NODE LINKS ARE ENGINEERED AND CAN RANGE FROM ONE TO SEVEN LINKS DEPENDING ON TRAFFIC. ADD THESE LINKS IN THE FOLLOWING ORDER 13, 9, 14, 8, 15, 7, 16; SAME SLOTS IN BOTH SWITCH NODES, AS REQUIRED. EACH DUPLICATE PAIR OF INTER-SWITCH NODE LINKS MUST GO TO THE SAME SLOT (E.G. 1E13 TO 2E13 AND 1D13 T0 2D13).

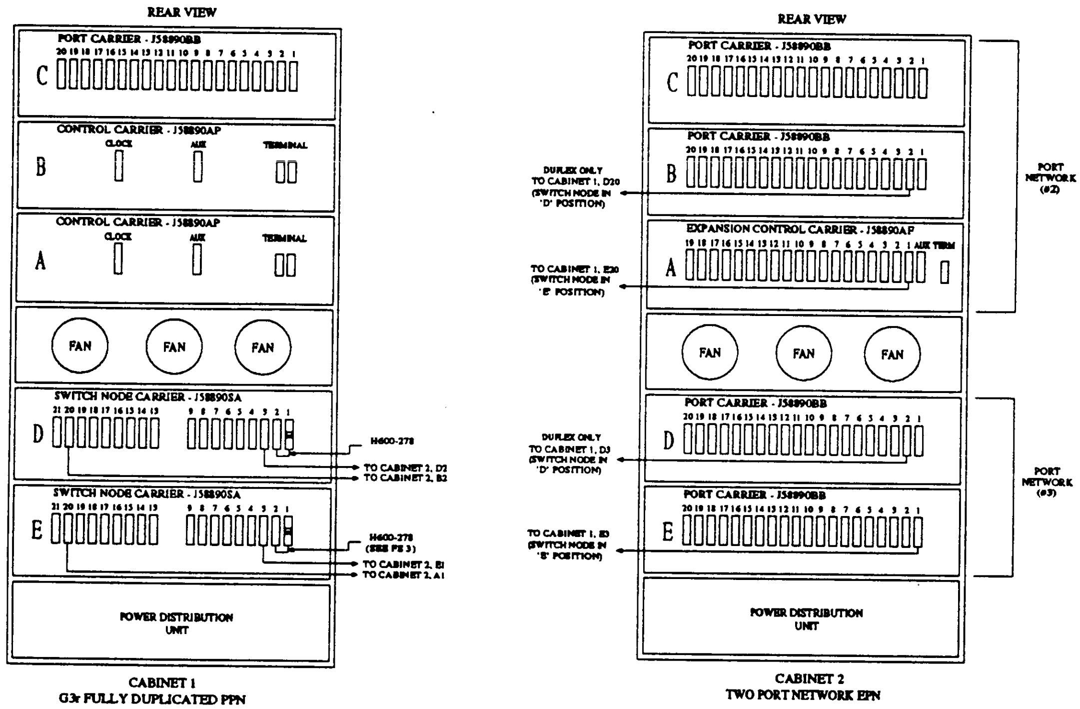
Figure 5-25. Fiber-Optic Cabling in a Critical Reliability CSS-Connected G3r with Two SNs



NOTES:

1. THESE LINKS ARE FROM THE EPN TO THE SWITCH NODES IN EITHER CABINET 1E OR 2E (AND DUPLICATE TO 1D OR 2D). AFTER THE INTER-SWITCH NODE LINKS ARE INSTALLED (SEE NOTE2, ON SHEET GB13) PLACE ALL POSSIBLE LINKS IN CABINET 1E (AND 1D) PER THE ALTERNATING ORDER IN NOTE 1 ON SHEET GB13 THEN PLACE REMAINING LINKS IN CABINET 2E (AND 2D) PER NOTE 1 ON SHEET GB13.

Figure 5-26. Fiber-Optic Cabling in a Critical Reliability CSS-Connected G3r with Two SNs



NOTES:

1. FOR MULTIPLE 2 PORT NETWORK MCC CABINETS, CONTINUE TO ADD LINKS TO THE SWITCH NODE SIMILAR TO SHEETS GB8 THRU GB13. TREAT THE 2 PORT NETWORK CABINET AS ONE PN IN A, B, C AND ONE PN IN E, D SIMILAR TO ADDING TWO SINGLE PN CABINETS (AS IN SHEETS GB8 THRU GB13).

Figure 5-27. Fiber-Optic Cabling in a CSS-Connected G3r with a Two-PN Cabinet

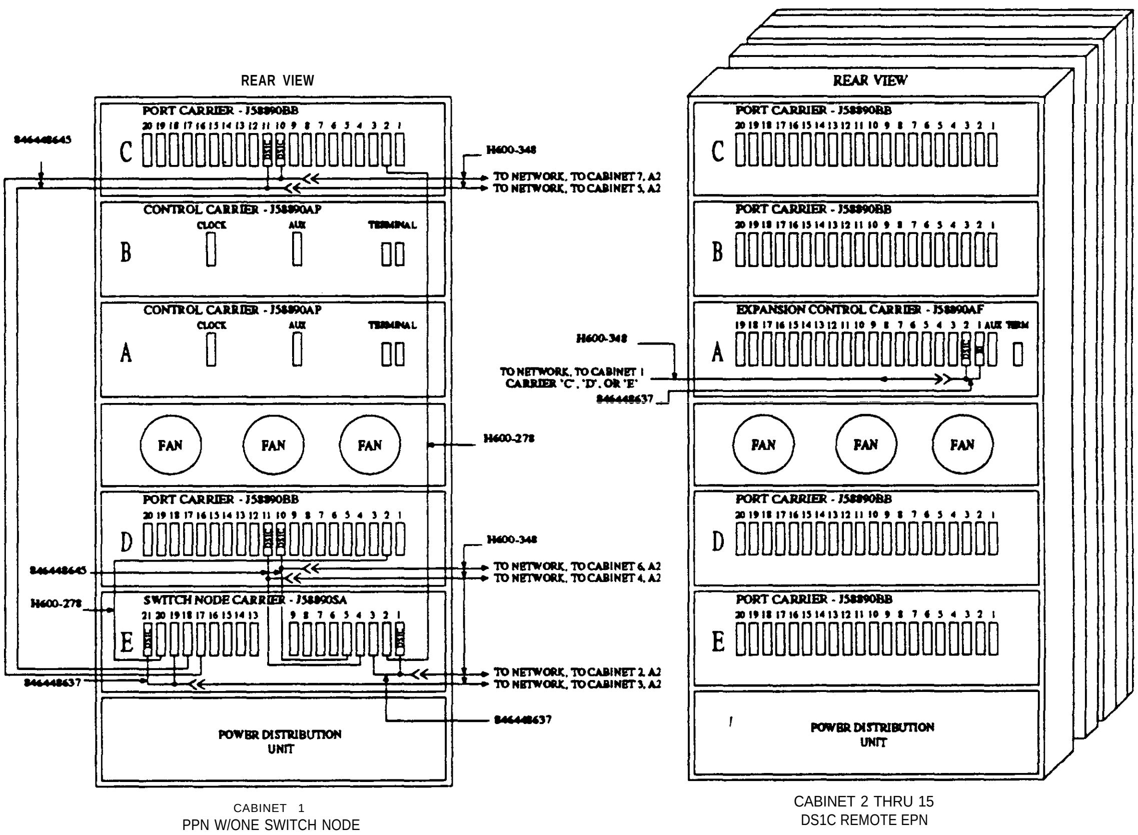


Figure 5-28. Fiber-Optic Cabling in a DS1C Remote CSS-Connected G3r

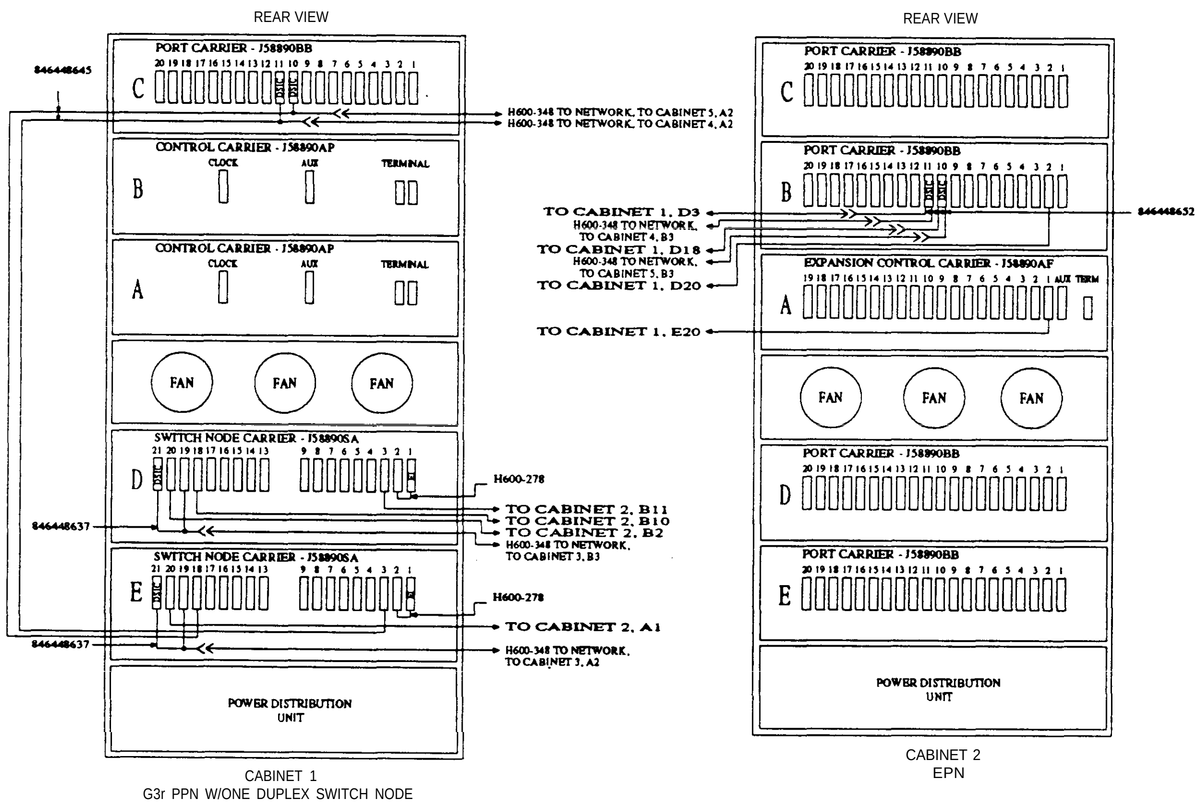
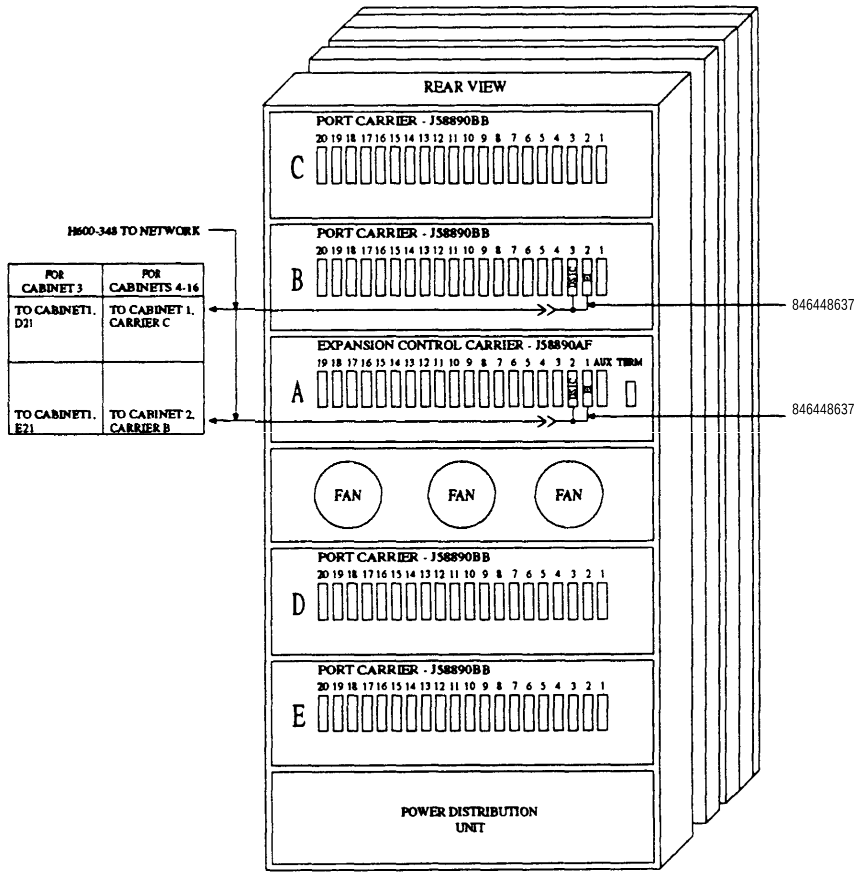
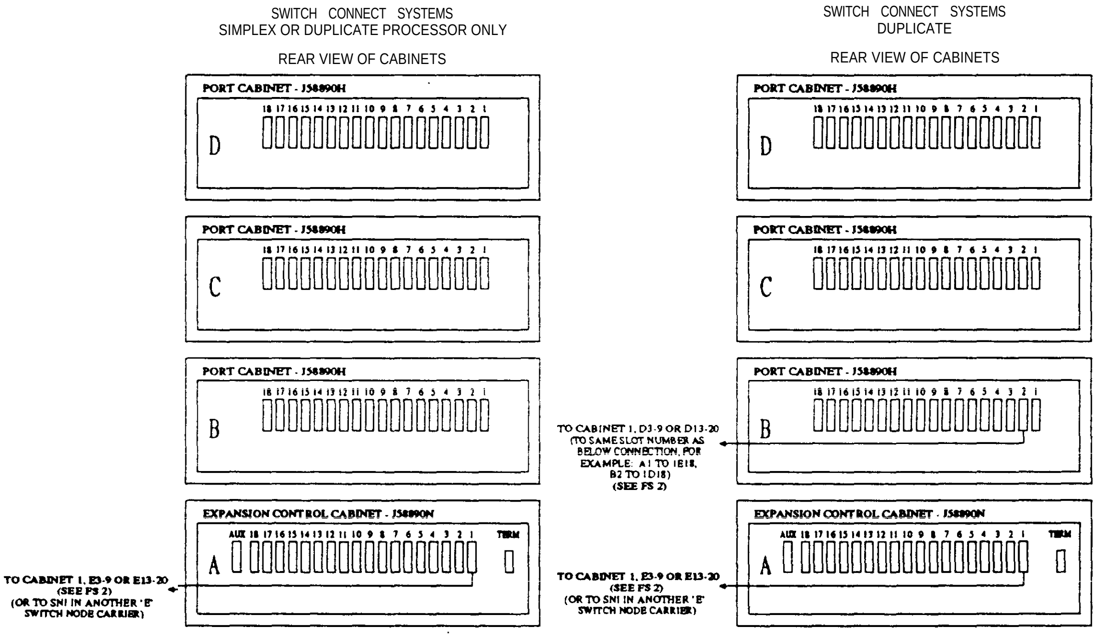


Figure 5-29. Fiber-Optic Cabling in a DS1C Remote CSS-Connected G3r



CABINET 3 THRU 16
DS1C REMOTE EPN

Figure 5-30. Fiber-Optic Cabling in a DS1C Remote CSS-Connected G3r



NOTES:

1. SINGLE CARRIER CABINETS CAN BE USED OFF OF THE MCC G3r EPN. CONNECTIONS ARE TO THE SAME SLOTS AS SHOWN ON SHEETS GB1, GB2, AND GB3. THE J58890AF EXPANSION CONTROL CARRIER IS REPLACED WITH THE J58890N EXPANSION CONTROL CABINET, AND THE J58890BB PORT CARRIER IS REPLACED WITH THE J58890H PORT CABINET.

Figure 5-31. Fiber-Optic Cabling in a DS1C Remote CSS-Connected G3r

Cabling Between Single-Carrier Cabinets

This section covers the following cabling:

- TDM/LAN bus
- Expansion control cabinet to port cabinet

TDM/LAN Bus Cabling

TDM/LAN extension cables (WP-91716 L3) connect the carriers in each cabinet. These cables are flat ribbon types going to connectors marked TDM/LAN on each cabinet's backplane. The cable length is 25 ft. (7.6m) through four stacked cabinets.

Each end of the TDM/LAN bus running across the cabinets is terminated on a cabinet's backplane by a TDM/LAN bus terminator (ZAHF4) installed in slot 01 of the bottom expansion control cabinet and slot 17 of the top port cabinet.

Figures 5-32 and 5-33 show how the TDM/LAN bus is connected between single-carrier cabinets.

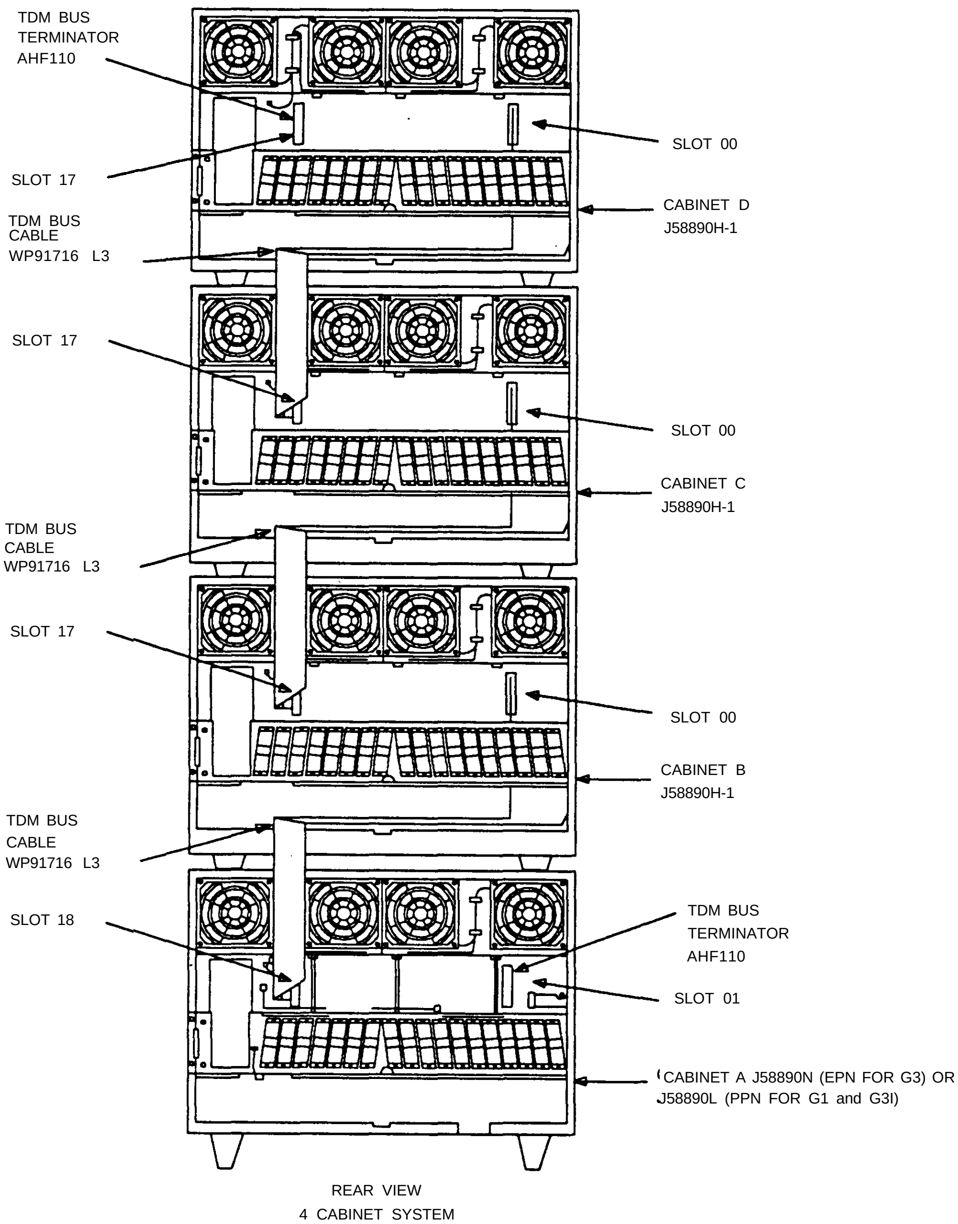


Figure 5-32. TDM/LAN Bus Cabling — Fully Loaded EPN Cabinet Configuration in Single-Carrier Cabinet Systems

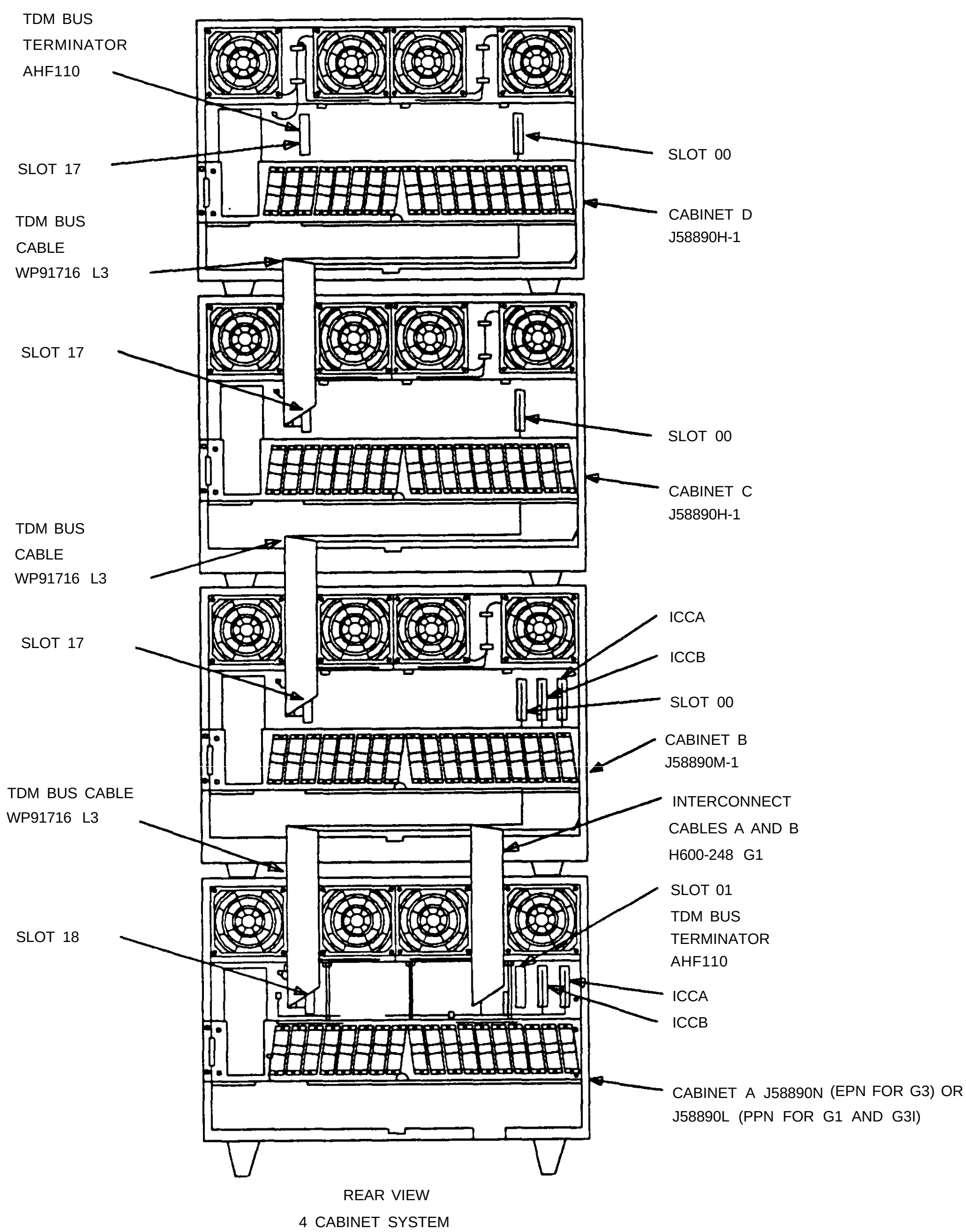


Figure 5-33. TDM/LAN Bus Cabling — Fully Loaded EPN Cabinet Configuration with High or Critical Reliability Option in Single-Carrier Cabinet Systems

Basic Control Cabinet to Duplicated Control Cabinet Cabling in DEFINITY G1, G3i, and G3i-G

Control cabinet backplanes have intercabinet cable (ICC) connectors (ICCA, ICCB, and ICCC connectors), which connect shadowing and data control leads to the duplicated control cabinet.

Duplicated control cabinet backplanes have ICC connectors, which are ICCA, ICCB, or ICCC connectors used to connect shadowing and control data leads to the basic control cabinet.

Figure 5-34 shows the cabling between the basic control cabinet and the duplicated control cabinet in a critical reliability system. An interconnect cable (H600-259 G1) is connected between the respective ICCA, ICCB, and ICCC connectors on the basic control cabinet's backplane and the duplicated control cabinet's backplane.

In a standard reliability system, there is no interconnect cable between the basic control and duplicated control cabinets.

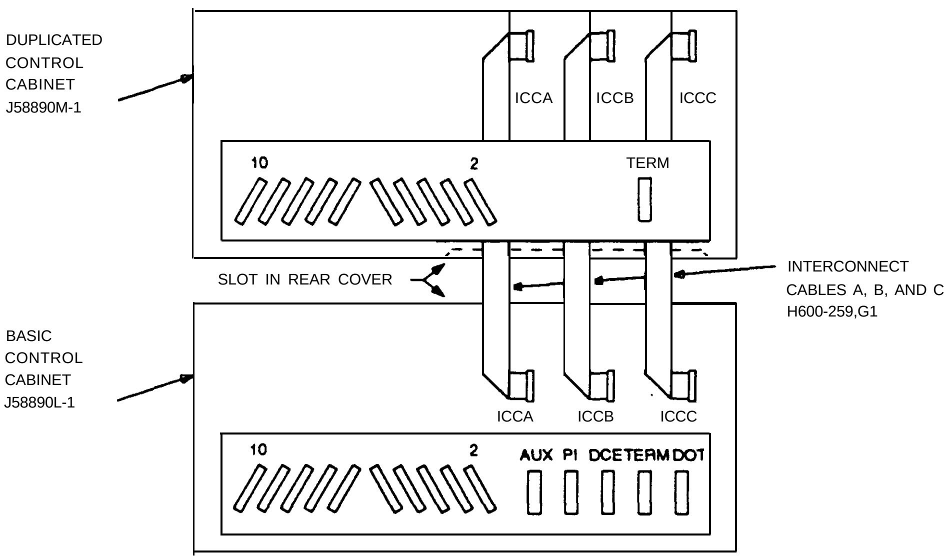


Figure 5-34. ICC Cabling between Basic Control Cabinet and Duplicated Control Cabinet in DEFINITY G1, G3i, and G3i-G Single-Carrier Cabinet Systems

Cabling Between Single-Carrier Cabinets in Standard Reliability and Critical Reliability Systems

Figure 5-35 shows fiber-optic cabling between single-carrier cabinets in standard reliability directly connected systems. Figure 5-36 shows fiber-optic cabling between single-carrier cabinets in critical reliability directly connected systems. Included in the figures are carrier positions, types of carriers, and EI port slots.

Connections between single-carrier cabinets are identical to connections between multicarrier cabinets. Single-carrier cabinets also have port slot locations identical to multicarrier cabinets.

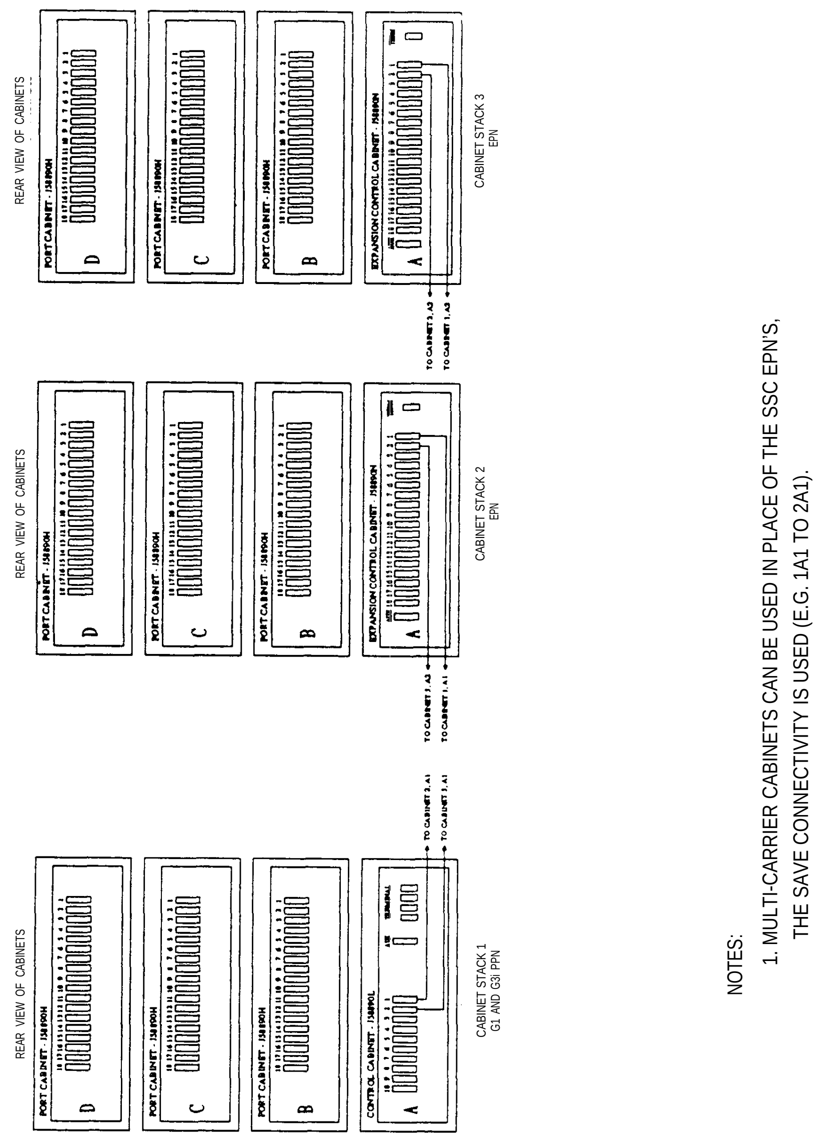


Figure 5-35. Fiber-Optic Cabling in Standard Reliability Single-Carrier Cabinets

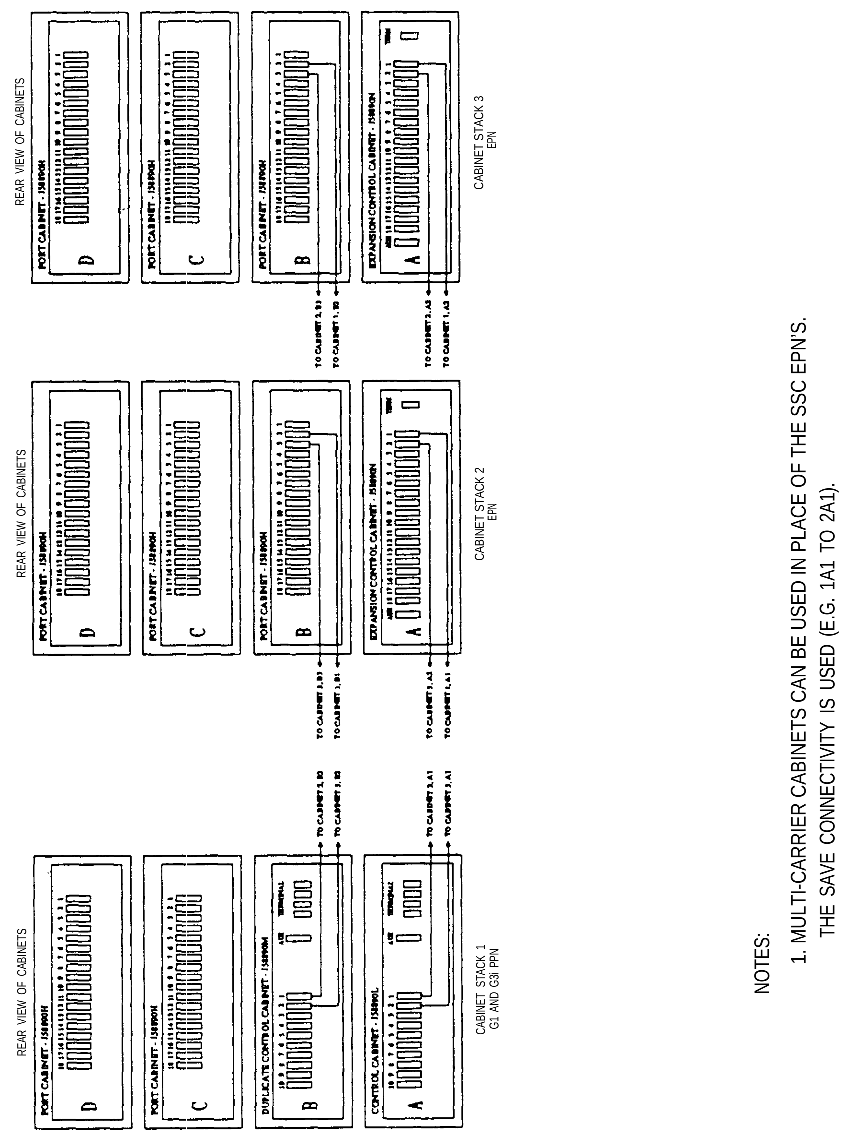
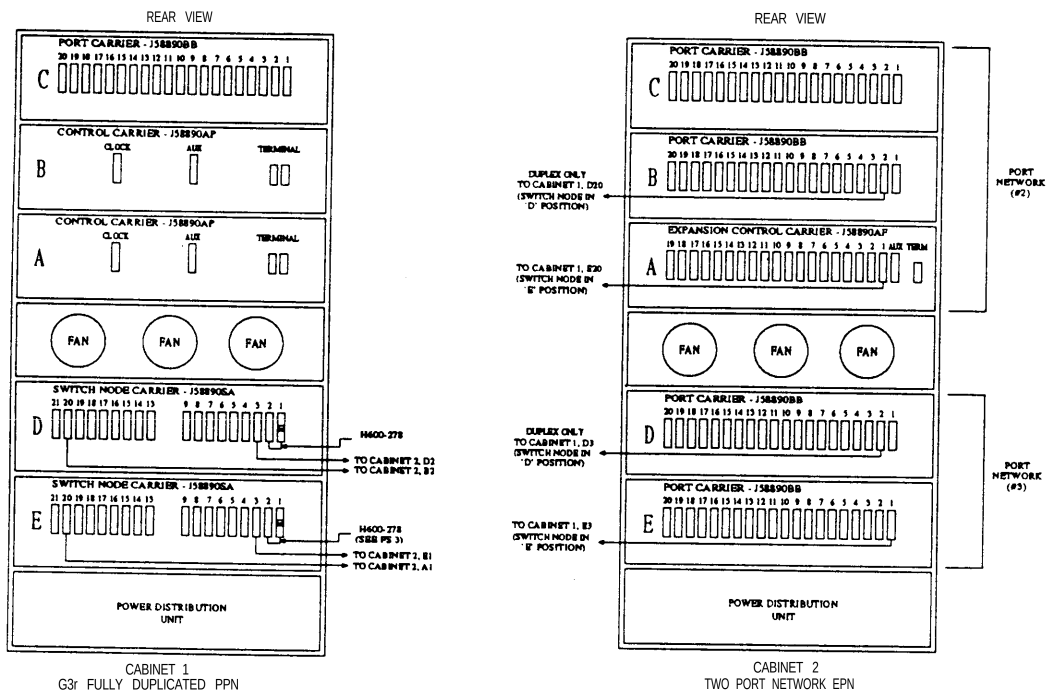


Figure 5-36. Fiber-Optic Cabling in Critical Reliability G1, G3i, and G3i–G Single-Carrier Cabinets

Cabling Between Single-Carrier Cabinets in Remote Applications

Figure 5-37 shows fiber-optic cabling between single-carrier cabinets in remote applications. Included in the figures are carrier positions, types of carriers, and EI port slots.



NOTES:

1. FOR MULTIPLE 2 PORT NETWORK MCC CABINETS, CONTINUE TO ADD LINKS TO THE SWITCH NODE SIMILAR TO SHEETS GB8 THRU GB13. TREAT THE 2 PORT NETWORK CABINET AS ONE PN IN A, B, C AND ONE PN IN E, D SIMILAR TO ADDING TWO SINGLE PN CABINETS (AS IN SHEETS GB8 THRU GB13).

Figure 5-37. Fiber-Optic Cabling Between Single-Carrier Cabinets in remote Applications

Cabling Between Single-Carrier Cabinets and Multicarrier Cabinets

Fiber-optic cables connect single-carrier cabinets to multicarrier cabinets. Connections between single-carrier cabinets and multicarrier cabinets are identical to connections between multicarrier cabinets. Single-carrier cabinets also have port slot locations identical to those in multicarrier cabinets.

Depending on the system configuration, the following fiber-optic cables are connected between single-carrier cabinets and multicarrier cabinets:

- Directly-connected system — expansion control cabinet TN570 EI in slot 1 to:
  - TN570 EI in a port carrier (position B or C) in the PPN cabinet in a two-PN G3r system
  - TN776 EI in the control carrier in the PPN cabinet in a two-PN G1, G3i or G3i-G system
  - TN570 EI in an expansion control carrier (position A) in an EPN cabinet in a three-PN system
- CSS-connected system with one SN carrier — expansion control cabinet TN570 EI in slot 1 to a TN573 SNI in the SN carrier
- CSS-connected system with two SN carriers:
  - Expansion control cabinet TN570 EI in slot 1 to a TN573 SNI in one SN carrier
  - Port cabinet TN570 EI in slot 2 to a TN573 SNI in the other SN carrier

  The cables from EI slot 1 in cabinet A and EI slot 2 in cabinet B always go to identical slot numbers in the SN carriers.

The cabling between single-carrier cabinets and multicarrier cabinets is shown in the figures associated with the following configurations:

- Standard reliability, two-PN directly connected system (cabinets 1 and 2), shown in figure 5-15
- Standard reliability, three-PN directly connected system, shown in figure 5-15
- Standard reliability, CSS-connected system with single-carrier cabinet and multicarrier cabinet, shown in figure 5-20
- Critical reliability, CSS-Connected system with single-carrier cabinets, shown in figure 5-24
- Three-PN, critical reliability, directly connected system with single-carrier cabinets (figure not shown)

Cabling from the System to On- and Off-Premises Systems

Cabling from the system to on-premises and off-premises systems is used to establish communications paths between the system's line port circuits and trunk port circuits to external trunks, lines, and data terminal equipment (DTE). Figure 5-38 shows the cabling from the system to the following places:

- Through the network interface to off-premises trunks and lines going to the central office (CO) and remote equipment
- Premises (house) wiring (data lines) going to information outlets (modular jacks) used for data terminal equipment

As shown in figure 5-38, cross-connect fields are termination points for equipment cabling and distribution cabling. At a cross-connect field, connections are made between those termination points to establish communications paths throughout the system.

Two major cross-connect fields are used:

- Main distribution frame (MDF), which is the field on which terminations and cross-connections for CO trunks, equipment cabling, and distribution cabling are made An MDF is the largest cross-connect field.
- Intermediate distribution frame (IDF), which is any cross-connect field other than an MDF. On an IDF (an example of which is shown in figure 5-38), the terminations and cross-connections are made for the distribution cabling from the MDF, from other IDFs, and from the house wiring from information outlets.

The following AT&T documents describe cabling from the system to on-premises and off-premises systems:

- *DEFINITY Communications System G1 Wiring* (555-204-111)
- *DEFINITY Communications System Generic 1 and Generic 3 Main Distribution Field Design Reference* (555-230-630)

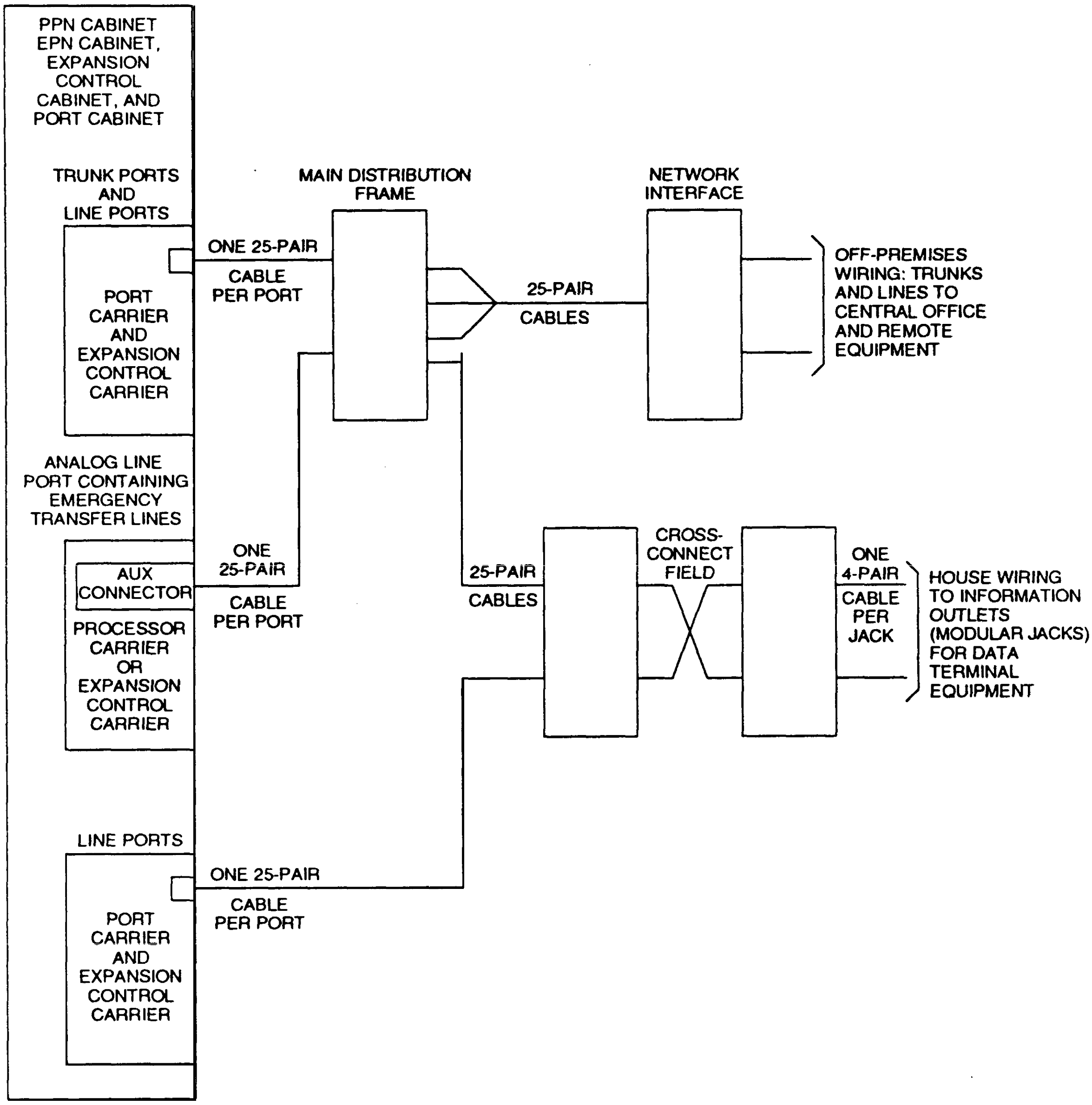


Figure 5-38. Cabling from System to Off-Premises Wiring and House Wiring

Architecture

6

This chapter describes the following parts of DEFINITY Generic 1 (G1) and DEFINITY Generic 3 (G3) architecture:

- Functional overview of:
  - — Operating system layer (see page 6-1)
  - — Applications layer (see page 6-2)
- Internal connectivity — logical links spanning cables and optical fibers between system components (see page 6-11)
- Protocols handled by the system (see page 6-22)

The G3 architecture evolved from the G1 architecture. Code in G3 supports a center stage switch (CSS), processor connectivity, multiple port networks per cabinet, integrated provisioning, and the World Class Core (WCC) features. Except for the logical links that link system components, the architecture is equivalent in both G1 and G3.

The system architecture is divided into two layers — an operating system layer and an applications layer.

Operating System Layer

Oryx/Pecos, the operating system used in G3, is a proprietary real-time system supporting multiprocessing applications with message-passing between processes. Drivers are provided for interfacing to the system network, mass storage, and other peripherals.

Applications Layer

The applications layer is composed of three major subsystems:

- Call processing
- Management (administration)
- Maintenance

Call Processing

Call processing is the sequence of actions needed to connect, disconnect, and otherwise manage voice and data calls in a communications system. Figure 6-1 shows the actions to connect a call.

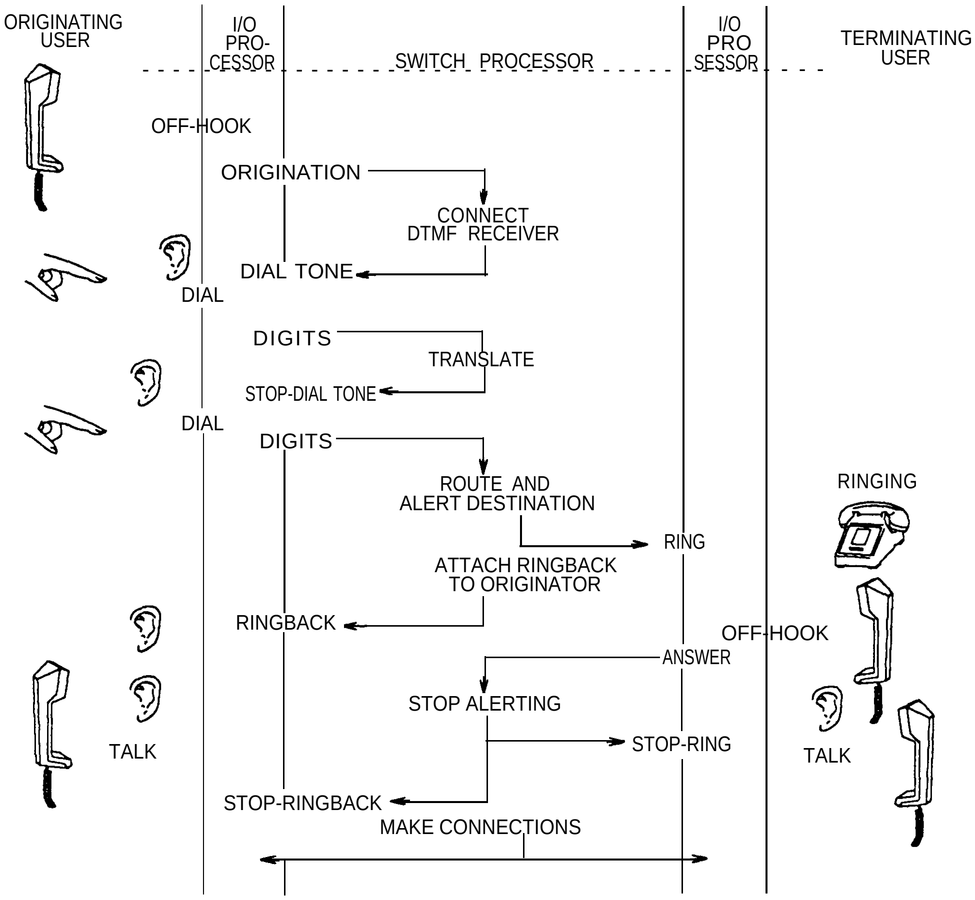


Figure 6-1. Basic Call Example

Management functions employed in processing a call are:

- Terminal handling — G3 use of voice terminals ranging from a single-line analog set to a simultaneous voice/data station with display, multiple call appearances, feature buttons, and data module. Various trunks interconnect the terminals with other switching systems or a central office (CO) switch.
- Resource management — management of resources such as dual tone multifrequency (DTMF) receivers, the time slots for circuit connections, tone generators, and internal software records for call processing, messaging, measurements, and call detail recording.
- Call sequencing control — control of the sequencing logic that takes a call (such as a conference call) from one state to another.
- Routing and termination selection — controls the selection of a terminating endpoint or set of endpoints for a call. Some of the areas covered by routing and termination selection are hunting, bridging, coverage, least-cost routing, and routing data calls through modem-pooled resources.

A basic call model consists of these components:

- The *call* ties all the parties of a connection together. It is defined by a record of these parties and the sequencing control logic that controls a call from origination to termination.
- The *group* appears as a party on the call and contains a set of users. The hunt group, for example, specifies how a user should be selected from a group to receive a call. The group is realized by a group manager in the layered software architecture discussed below.
- The *user* is one who uses a terminal or a set of terminals. The user is realized by the user manager in the layered software architecture discussed below.

Processes that provide messaging and station services, and network and resource management functions are organized into a layered set of cooperating processes as described below and shown in figure 6-2:

- The *service control layer* contains a service dispatcher (SD) process and a process for each of the different services of the switch. In the service control layer are the following:
  - — Call process (CP) — provides the control and sequencing logic for call setup and takedown, and for a variety of feature operations in the system.
  - — Message service (MSG) — provides control for messaging services (such as Leave Word Calling).
  - — Station service (SSV) — provides miscellaneous station services such as integrated directory service, time-of-day display, and the programming of some translation data from the user's terminal.
- The *resource control layer* provides general resource management for the services, service-specific functions, and the line-to-terminal signaling. System resources managed include the switch network, DTMF receivers, tones, trunks, voice terminals, data terminals, groups and databases such as the system dial plan, and the name and number directory. Service-specific functions provided are call routing, queuing, terminal administration and maintenance. In the resource layer are the following:
  - — The group manager (GM) contains all translation data for group membership and group properties, and maintains the state of the group and its members.
  - — The user manager (UM) contains both the user and terminal management software, and status information. It presents an abstract user or virtual terminal interface to the upper layers of software while handling the signaling with terminals at the Driver Layer. It also arbitrates terminal access contention among switch services, maintenance, and system administration.
  - — The dial-plan manager (DPM) provides access to and interpretation of translation databases, including the system dial plan, the name/number directory, user permissions, least-cost routing patterns, and speed-calling numbers.
  - — The connection manager (CM) manages network resources and network control signaling and arbitrates among switch services, system maintenance, and administration for network resources.
- The *driver layer* encompasses the operating system drivers and the firmware in the intelligent port circuits of the communications network. Drivers include the switch-control channel driver (SCD), packet control driver, a timer driver, and maintenance circuit pack driver.

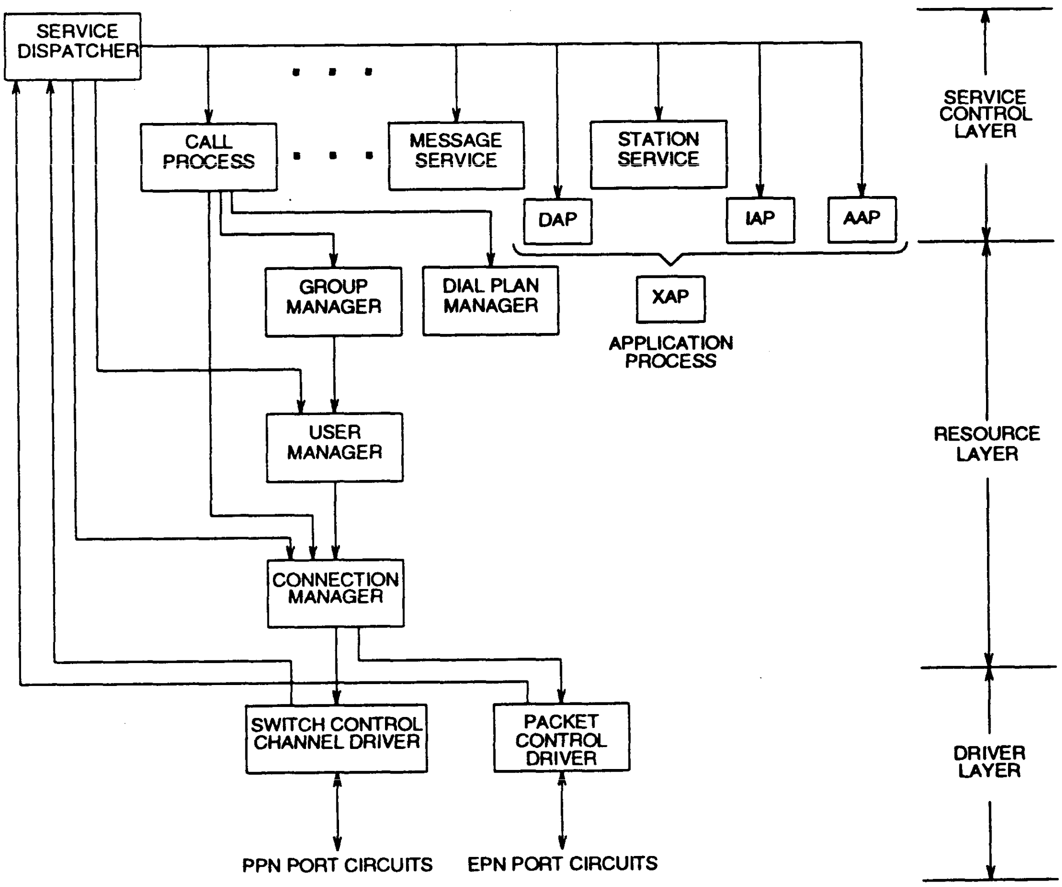


Figure 6-2. Switch Services Software Structure

Call processing features can be classified as follows:

- Voice management — voice communications capabilities available with the system.
- Data management — data communications and management capabilities available with the system. Data communications is the process of transferring data from one point to another; data management is the process of planning, controlling, and effectively using data.
- Network services — capabilities that assure efficient interconnection of the private network (the trunks and switching facilities dedicated for use by a business or organization)
- System management — capabilities needed to administer, control, and maintain the system and to generate system usage reports.
- Hospitality services — for the lodging and health industries. Hotels, motels, and hospitals use the features to better manage the property and provide services to their guests/patients.
- Call management services — for industries that receive many similar calls and allow balanced call distribution to a group of voice terminals.

Management

Management software controls the internal processes to install, administer, and maintain the system. A layered software architecture presents capabilities to the user in as simple and straightforward a manner as possible while the internal complexity of the system remains transparent.

Through the use of an online video display terminal, management software permits a customer or technician to install, test, rearrange, and change equipment and services, and select user and system options.

Enhanced administration features are available through a personal computer (PC) or through terminals attached to other support systems, such as the Single Site Management (SSM) and Network Management (NM) modules of Modular System Management (MSM).

System management software provides four functions, all of which are available through a terminal:

- *Measurement collection and reporting* — formatted reports of hourly traffic data on engineered resources such as trunk groups.
- *Maintenance testing and reporting* — demand testing of circuit packs, terminal equipment, and the display of system error and alarm logs.
- *Translation data backup* — translation data backup on tape.

- *Translation database management* — provides four functions:
  - *Data view mapping* allows a user to display and change all translaion data related to a station, trunk, or feature as a single task.
  - *Database validation* ensures that data entered into the system is individually correct and consistent with other data, for example, that extensions assigned to stations are consistent with the dialing plan.
  - *Form transactions* ensure that all the translation data entered on a system form are either accepted as valid or rejected as inconsistent.
  - *Concurrency control* allows for multiple terminal users and ensures that switch services software does not use critical data that is being changed.

System management software consists of the three layers shown in figure 6-3:

- The *user interface and control* layer provides users with access to the system through a terminal or through the X.25 remote link.
- The *command execution and validation* layer consists of the following software modules:
  - Measurement collection and storage
  - Administration database update and validation
  - Maintenance command execution
  - Translation backup on tape

  Each module supports the four management software functions: maintenance collection and reporting, maintenance testing and reporting, translation data backup on tape, and translation database management.
- The *data access and storage* layer consists of the administration database access module and processes that store translation data.

6

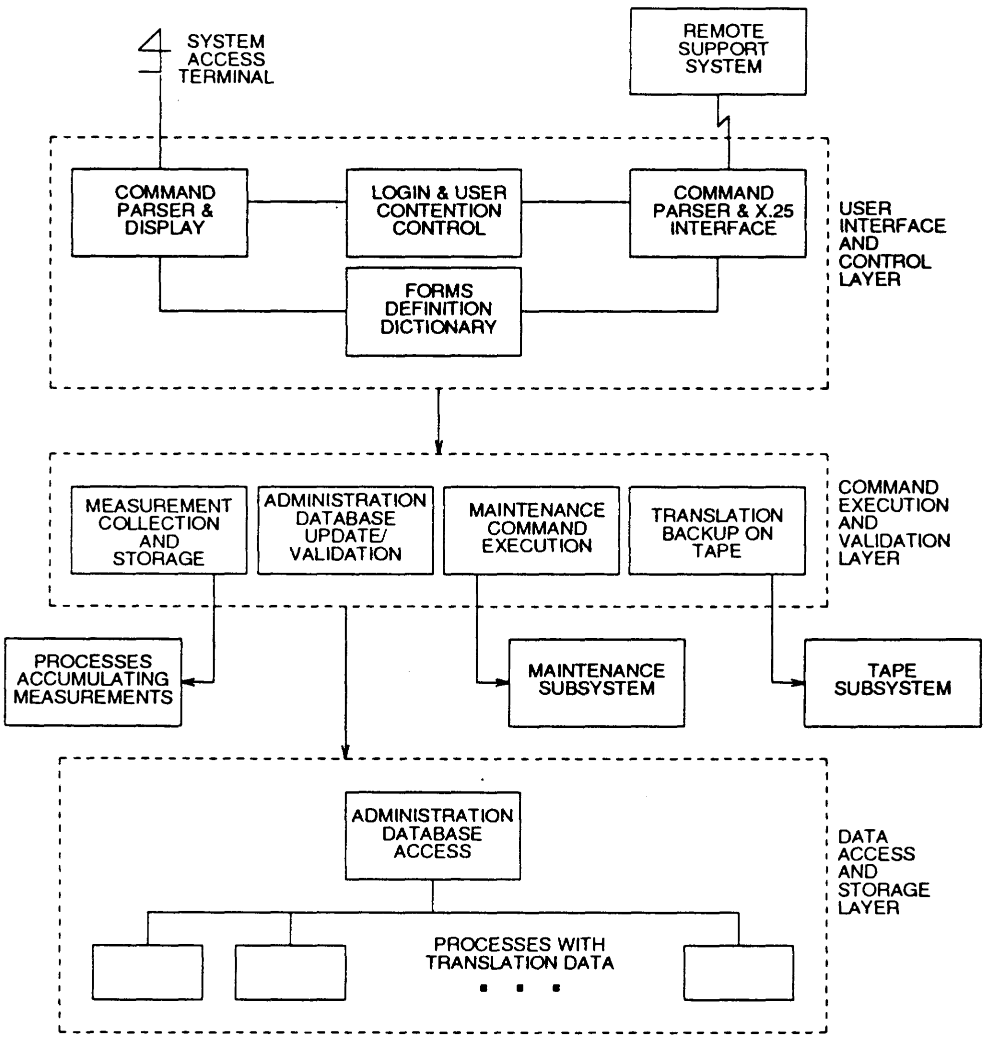


Figure 6-3. System Management Layered Software

To support larger line size switches, management software provides the following capabilities:

- The ability of the system administrator or technician to address a circuit pack with a cabinet number, carrier letter, and slot number to accommodate multiple port networks (PNs)
- The support of multiple simultaneous administrators to allow high translation change activity associated with large switches
- A protocol to ensure reliable data transfer for PC and Operations Support System Interfaces (OSSIs). OSSI is a system that performs provisioning and maintenance functions on the switch.

OSSI supplies the following:

- Provisioning features to minimize services installation costs and support of a large line switch including:
  - — Administration without Hardware (AWOH), which allows terminal translations to be entered before the hardware ports are assigned, so that port assignment can be done later either manually or automatically. AWOH also provides for the support of additional terminal types such as attendant consoles, voice data terminals, data modules, distributed digital-port multiplexer (DDPM) end-points, basic rate interface (BRI) sets, analog queue warning ports, and announcement circuit packs.
  - — Terminal Translation Initialization (TTI), which associates the terminal translation data with a specific port location through the entry of special codes and an extension number from a connected but untranslated terminal. Labor for system initialization, major additions, rearrangements, and changes is greatly reduced.
- PC-based enhancements such as bulk station administration, which allows the user to perform global changes or edits for stations on the PC before downloading to the switch and for stations already downloaded to the switch. It is used to make rapid changes to large amounts of station data.

Maintenance

Maintenance software offers a high level of service availability with minimum disruption to the system. Its interface with other software and hardware provides a quick and highly reliable fault-detection system and recovery action if possible. If a problem occurs that cannot be solved by recovery action, LEDs on the circuit packs and/or alarm and error logs quickly indicate isolatable component faults to the system technician.

Because there will probably be more equipment at a G3r site than at a G3i or G3i-G site, G3r maintenance software supports multiple concurrent administration and maintenance user sessions. This allows the connection of two or more terminals to the switch to perform simultaneous administration and maintenance tasks. Commands such as test, busyout, and release on different hardware elements can be administered at the same time from more than one terminal (as long as the commands are not conflicting, that is, they do not act on the same data).

Each of the following areas contributes to the overall reliability of the system:

- Initialization — each software or hardware component maintained must be "initialized" (processes started, stations supplied power, etc.). Maintenance software initializes the system at boot time, including creating and starting processes, and inserting the circuit packs and ports.
- Switch processing element (SPE) recovery — recovery restart levels aid in maintaining SPE stability over transient SPE hardware or software errors. The SPE is the control complex that runs call processing, maintenance and, administration software.
- Hardware background testing — extensive background testing is done by firmware and hardware on the circuit packs; when problems are found, inline error messages are sent to maintenance software on the SPE.
- Maintenance software periodic and scheduled testing — periodic tests (nondestructive tests) are typically run once an hour. Scheduled tests (including destructive tests) are run once a day. Whenever appropriate, maintenance software runs either periodic or scheduled tests to ensure that all errors are found and recover or alarming can take place.
- Error analysis — maintenance software increments software counters, performs tests, and/or recovery actions when the following situations occur:
  - Inline errors are reported (typically by firmware)
  - Other errors are reported from software processes
  - When periodic, scheduled, or demand testing for maintenance objects is performed

  When software error counters go over threshold, additional testing and/or recovery is performed as appropriate.
- Demand testing — various demand tests can be run to check on the sanity of the system and individual maintenance objects. A "test long" command that includes destructive tests and a "test short" command that has only nondestructive tests can be used for most hardware maintenance objects.
- Busyout and release — this allows system technicians to remove components from normal service for testing and troubleshooting and to bring them back into normal service after testing.
- Duplication — for system elements that require high reliability, the high reliability and critical reliability options provide a spontaneous interchange to a duplicate component if a serious failure occurs.
- Other miscellaneous activity — these include control and manipulation of emergency transfer, power and environmental sensing, and treatment of the whole system as a maintained component.

Internal Connectivity

This section describes the logical links that traverse the physical links of the system, that is, wires, cables, and fiber-optic cables that connect system components. The major differences in the software architecture between G3i and G3i-G, and G3r are in the internal connectivity.

The following abbreviations are used for circuit packs shown in figures 6-4 through 6-12 in this section:

- *BRI* for basic rate interface
- *DS1* for digital signal level-1
- *EI* for expansion interface
- *MAINT* for maintenance
- *MEM* for memory
- *MSSNET* for mass storage/network control
- *PACCON* for packet control
- *PGATE* for packet gateway
- *PKTINT* for packet interface
- *PROCR* for processor
- *SNI* for switch node interface
- *SYSAM* for system access and administration

G3r Connectivity

In G3r there are two kinds of links into the SPE: system links and application links. The endpoints for both system links and application links can be ports on either the PPN or any EPN.

System Links

System links are established for internal system control. The general types of system links to the SPE are:

- ISDN signaling
- EALs
- CSCN

ISDN Signaling

For ISDN connectivity, the D-channel goes over the packet bus through BRI circuit packs to stations or through DS1 interface circuit packs to PRI trunks, as shown in figure 6-4. Connectivity is directly between the SPE and the endpoint; signals do not terminate at the EAL if they travel between the SPE and the EPN.

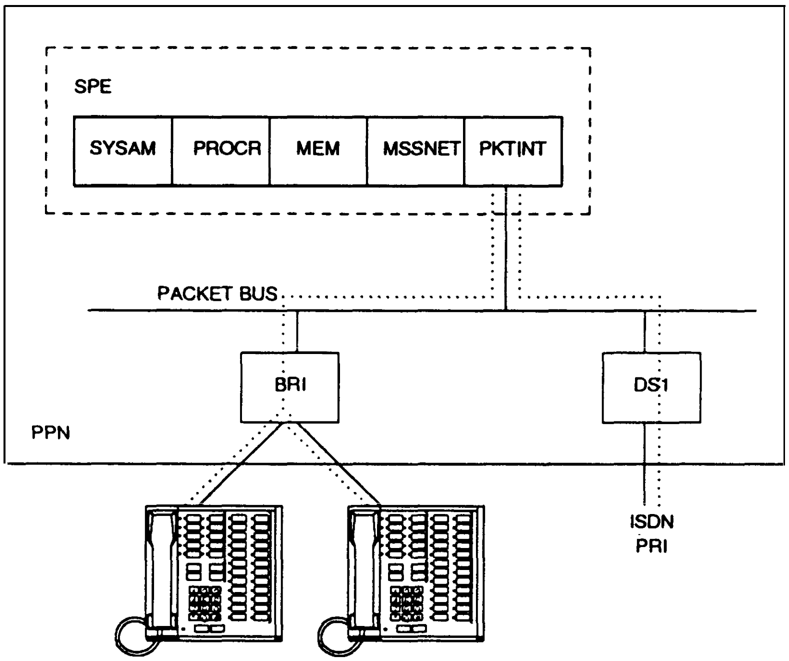


Figure 6-4. G3r ISDN Connectivity on a PPN

If the BRI or DS1 interface circuit packs are in an EPN, the link goes over the packet bus in the PPN, through the EI in the PPN and CSS, through the EI in the EPN, onto the EPN packet bus, and finally to the appropriate port circuit pack.

Again, connectivity is directly between the SPE on the PPN and the endpoint (station or trunk), as shown in figure 6-5.

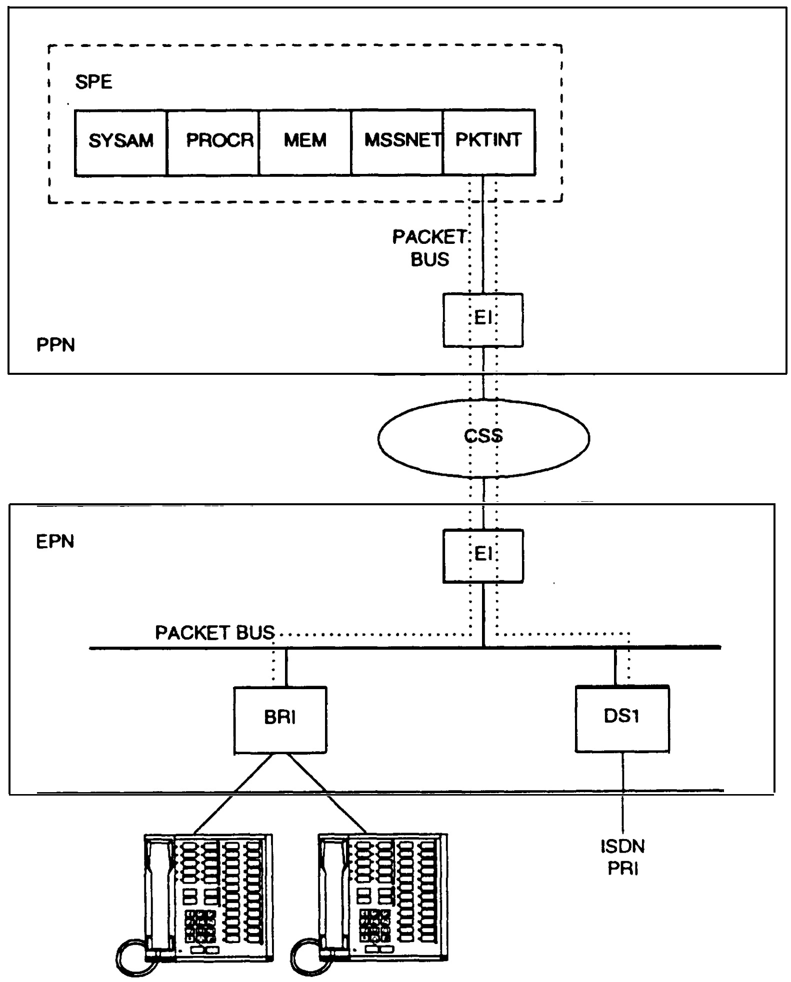


Figure 6-5. G3r ISDN Connectivity between a PPN and an EPN

EALs

In the PPN, communication between the SPE and the ports takes place over a control channel in the TDM bus through a network control microprocessor called the archangel (AA). The AA communicates with microprocessors (called angels) located on each port card in a PPN. The AA controls operation of the control channel by granting bus usage to a specific angel or group of angels.

In EPNs the AA is called the expansion archangel (EAA), as shown in figure 6-6. The EAA communicates with all the ports in the EPN in the same way that the AA does in the PPN.

EALs are links between an EI serving as an AA to the SPE via the PKTINT. The protocol, format, and content of the messages received from port circuit packs in an EPN are transferred over these links. The EAL goes from the PKTINT circuit pack, across the packet bus through the EI and the CSS, and terminates in the EAA. Messages sent to ports on the EPN are first sent to the EAA which, in turn, sends them over the TDM bus control channel in the EPN to the ports, as shown in figure 6-6.

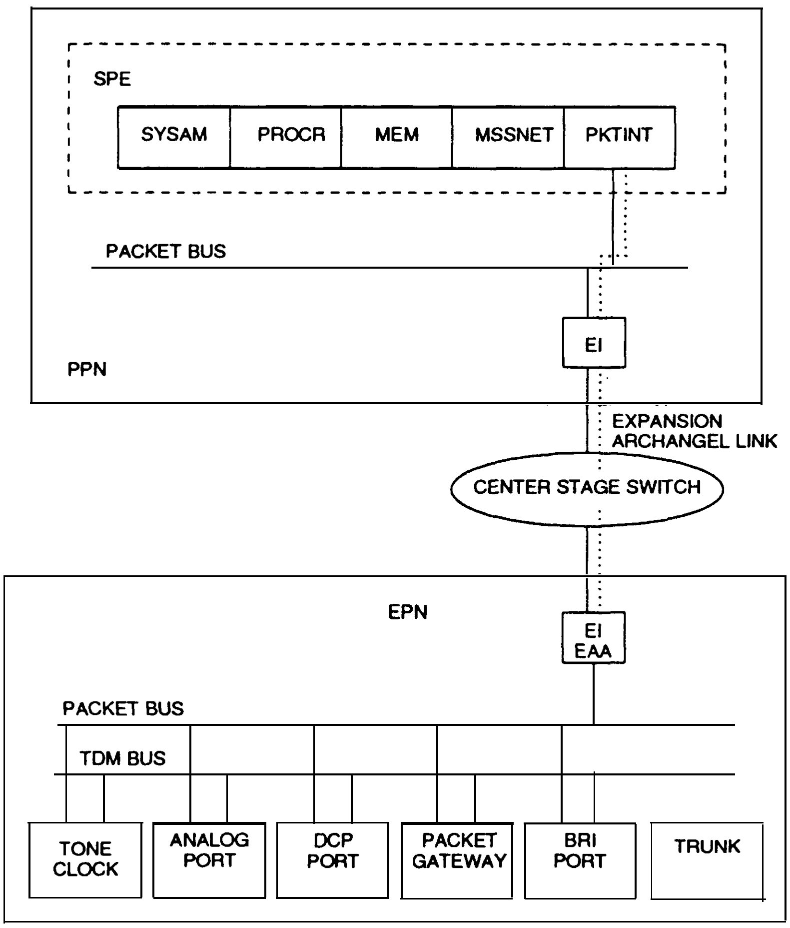


Figure 6-6. G3r EAL

CSCN

CSCN links are packet bus connections between the SPE and a CSS switch node interface (SNI) used for call setup and maintenance.

Local indirect neighbor links (LINLs) are center stage control network links between the SPE and an SNI connected to the PPN. Remote indirect neighbor links (RINLs) are center stage control network links between the SPE and an SNI with an EPN connected to it, as shown in figure 6-7.

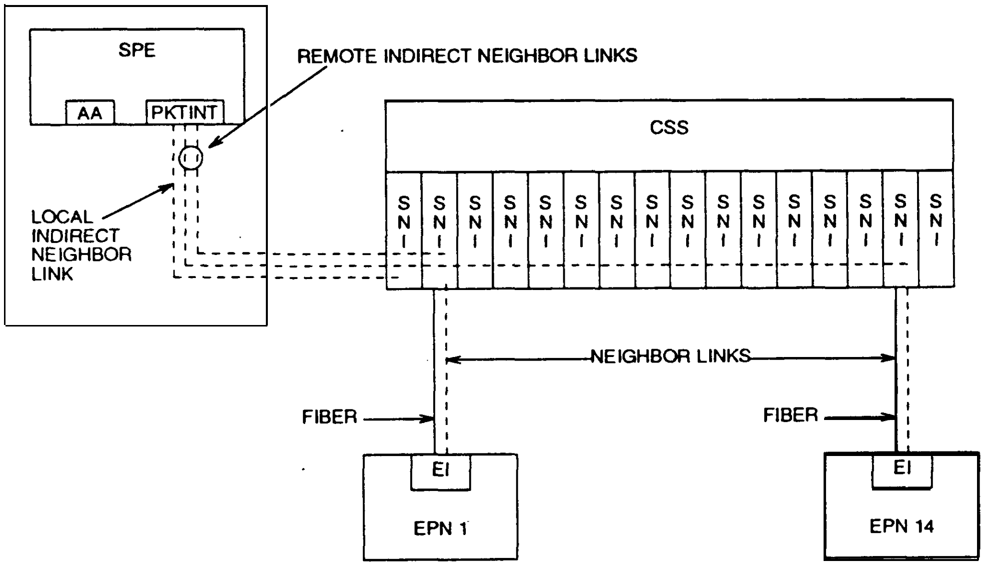


Figure 6-7. G3r CSCN Links

To set up a circuit connection between two PNs, messages are sent from the SPE over the CSCN links to each SNI connected to the PNs. This causes the appropriate connections to be made in the CCS, resulting in a voice path between a time slot on each of the respective fiber-optic cables.

Application Links

Application links are used by peripherals such as X.25 AUDIX adjuncts, printers, and call detail recording utility (CDRU) adjuncts.

Adjunct Links

In G3r, communication between the SPE and adjuncts such as AUDIX, DCS, and CMS occurs through a logical link on the packet bus to a circuit pack called the packet gateway interface. This circuit pack converts the link access procedure process on the D-channel (LAPD) protocol used internally by the switch to X.25 protocol used by the adjuncts.

In certain cases, data coming from the PGATE interface circuit pack can go to a DS1 trunk to get DCS connectivity over DS1 facilities, as shown in figure 6-8.

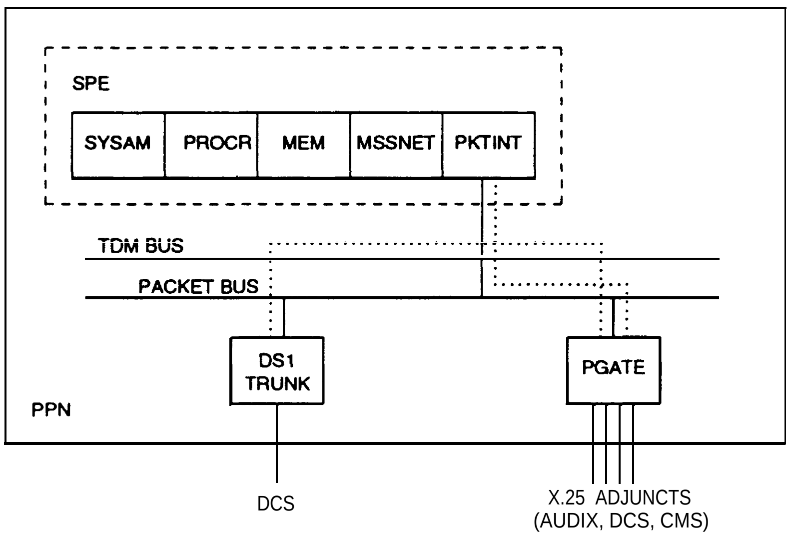


Figure 6-8. G3r Adjunct Links

In G3i and G3i-G, communication between the SPE and adjuncts such as AUDIX, DCS, and CMS occurs through a data line circuit pack or a digital line circuit pack and a data module. DCS is also supported over and under ISDN-PRI through a DS1 circuit pack. Communications between the SPE and an adjunct-switch application interface (ASAI) occurs through a logical link on the packet bus and an ISDN-BRI circuit pack.

Application Adjuncts

Connection between the SPE and RS232C devices such as printers, property management system (PMS), CDRU, and remote terminals is through a data line circuit or a digital line circuit connected to a data module (DTDM). Both of these circuits are connected only to the TDM bus, while the SPE has connectivity only to the packet bus. Therefore, signals passing between the SPE and the digital line circuit or between the SPE and the data line circuit must be converted from mode-3 protocol to mode-2 and vice versa, as shown in figure 6-9.

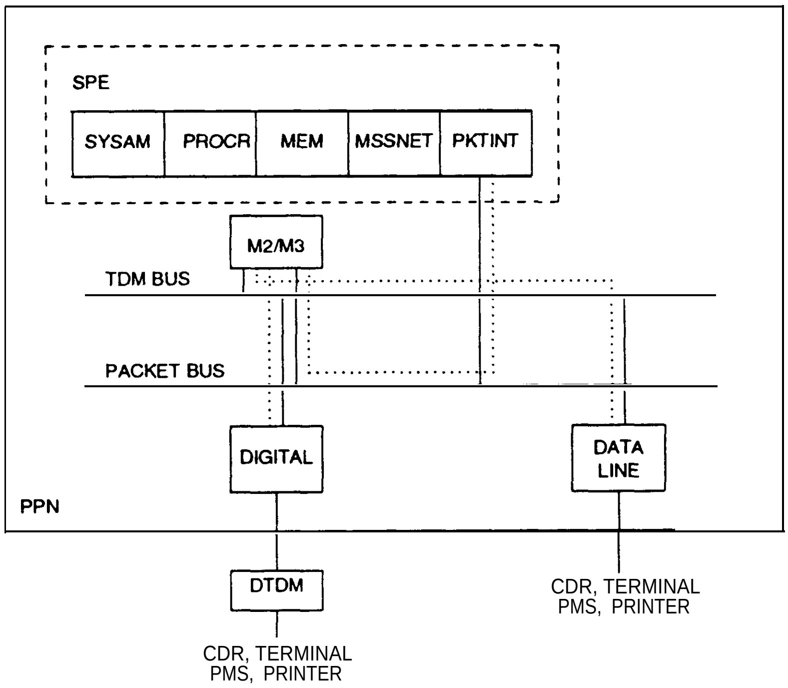


Figure 6-9. Application Adjuncts Connectivity

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Internal G3i and G3i-G Connectivity

As in G3r, G3i and G3i-G also have two kinds of links into the SPE: system links and application links. System links such as ISDN signaling links and expansion links are established for internal system control. Application links are used by peripherals such as AUDIX and CDRU adjuncts, and printers. The endpoints for both system links and application links can be ports on either the PPN or any EPN.

System Links

The general types of G3i and G3i-G system links to the SPE are:

- ISDN signaling
- Expansion neighbor

ISDN Signaling

For ISDN connectivity, the D-channel goes over the packet bus through BRI circuit packs to stations or through DS1 circuit packs to PRI trunks. If the BRI circuit pack is in the EPN, the link goes from the PACCON in the PPN, over the packet bus in the PPN through the EI in the PPN, through the EI in the EPN, onto the packet bus in the EPN, and finally to the BRI circuit pack.

If the DS1 circuit pack is in the EPN, the link goes from the processor interface (Pi) in the PPN, over the TDM bus in the PPN, through the EI in the PPN, to the TDM bus in the EPN, and over the TDM bus to the DS1 circuit pack, as shown in figure 6-10.

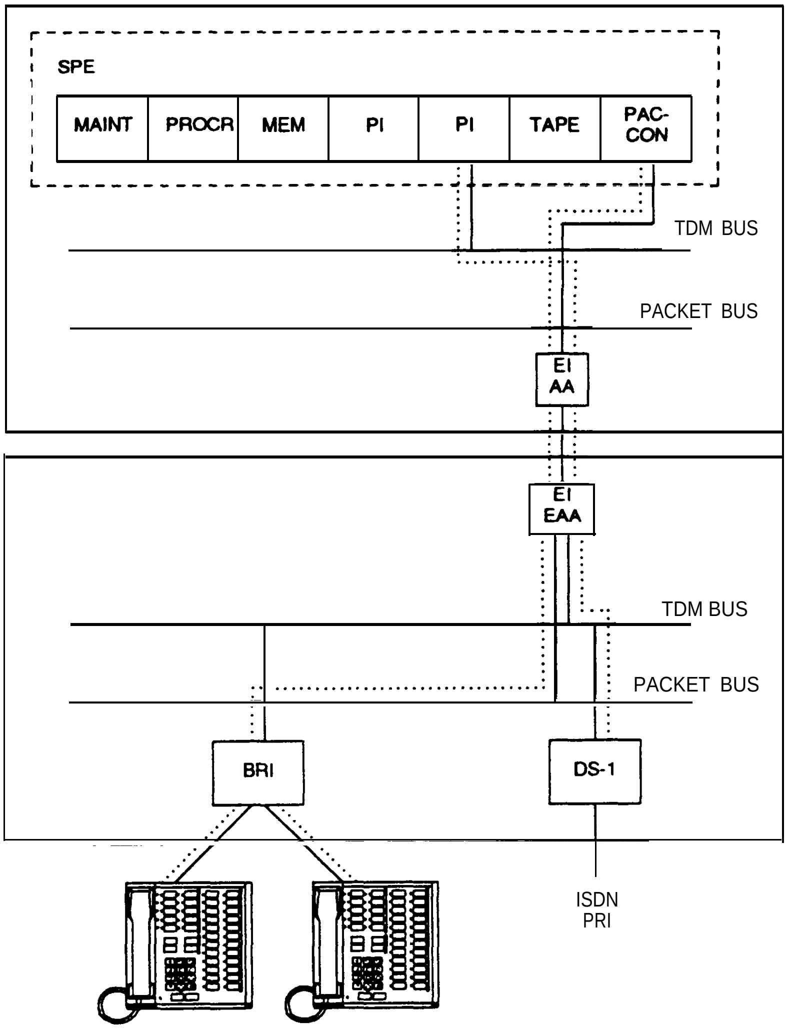


Figure 6-10. G3i and G3i-G ISDN Connectivity between a PPN and an EPN

Expansion Neighbor

The AA function in each EPN is provided by the EI that is connected to the PPN. The SPE controls the EPN through an extended control-channel message set (CCMS) sent across an expansion neighbor link, as shown in figure 6-11.

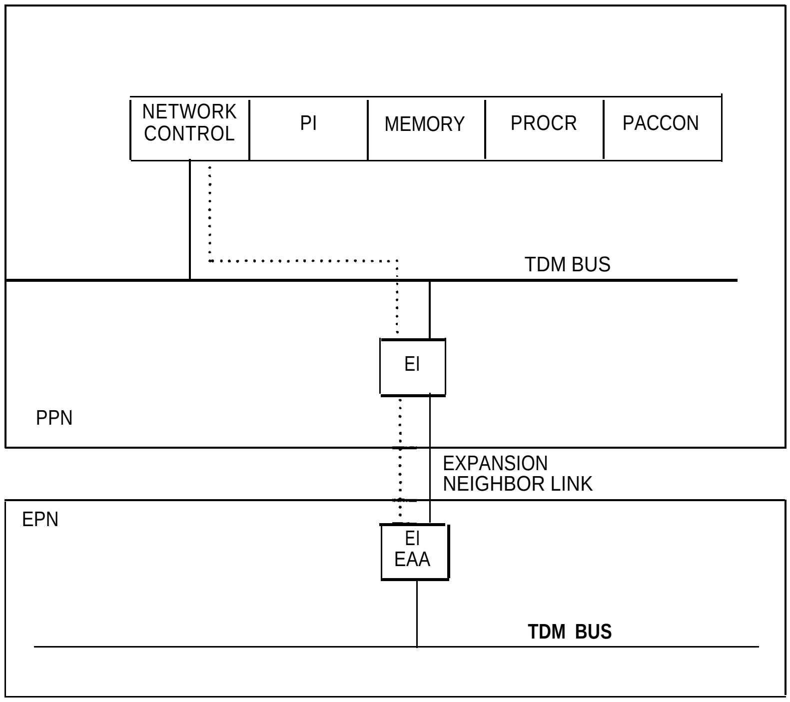


Figure 6-11. G3i and G3i-G Expansion Neighbor Link

Traffic flows between the PPN processor and its destination on the EPN through the network control to the EI in the PPN via the CCMS channel. It travels across the optical fiber on an LAPD link to the EI in the EPN where it is unbundled by the AA and sent to its destination over the EPN's CCMS channel.

Figure 6-12 shows a typical G3i or G3i–G PPN and EPN configuration.

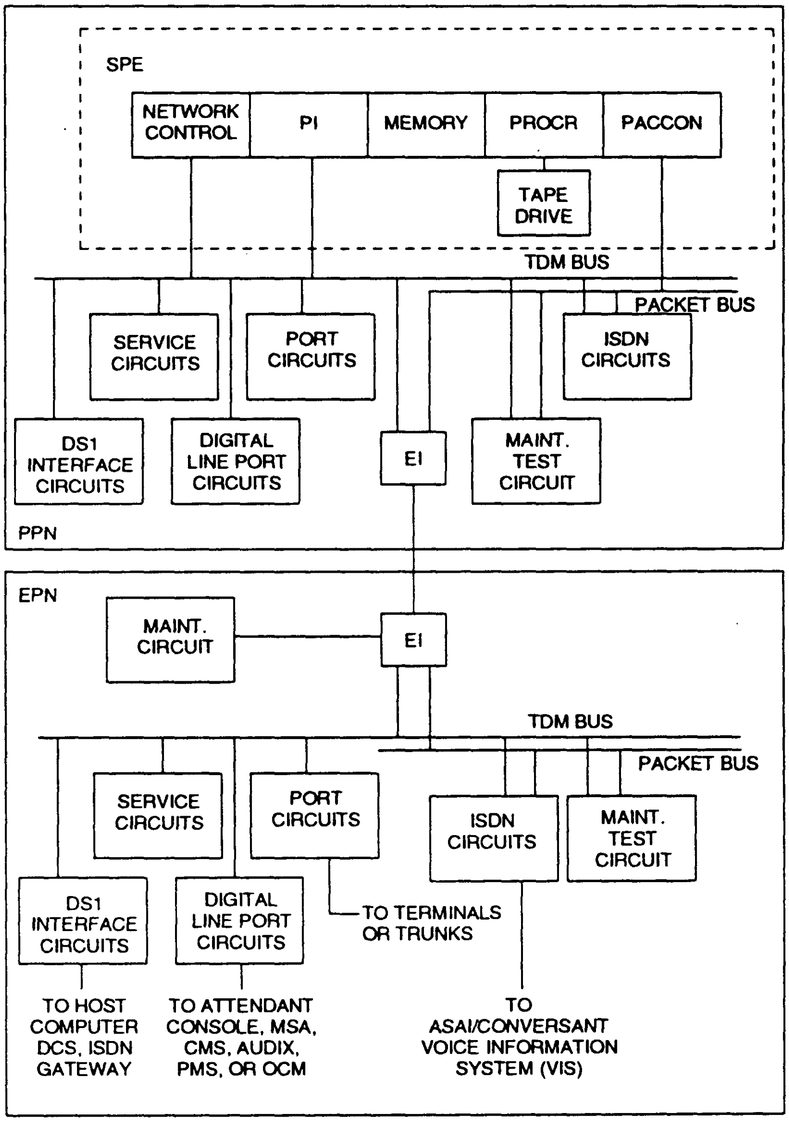


Figure 6-12. Typical G3i or G3i-G PPN and EPN Configuration

Protocols

This section describes the protocols handled by the system and the points at which these protocols change. Figure 6-13 is a pictorial guide through data-transmission state changes. The figure illustrates the flow of data from data terminal equipment (DTE), like a terminal or host, through data communications equipment (DCE), like a modem or data module, into a communications port on the system. In the figure, the data flow is shown by solid lines. Below these lines are the protocols used at particular points in the data stream.

Layers

The Open System interconnect (OSI) model for data communications contains seven layers, each with a specific function. Communications to and through the system concern themselves only with layers 1 and 2 of the model.

- Layer 1, or the *physical layer,* covers the physical interface between devices and the rules by which bits are passed. Among the physical layer protocols are RS232C, RS449, X.21, DCP, DS1, and others.
- Layer 2, or the *data-link layer,* here refers to code created and interpreted by the DCE. Using this layer, the originating DCE can send blocks of data with the necessary codes for synchronization, error control, or flow control. With these codes, the destination DCE checks the physical-link reliability, corrects any transmission errors, and maintains the link. When a transmission reaches the destination DCE, the DCE strips any layer-2 information that the originating DCE may have inserted. The destination DCE, therefore, passes to the destination DTE only the information sent by the originating DTE.[1] The originating DTE can also add layer-2 code to be analyzed by the destination DTE. The DCE treats this layer as data, and passes it along to the destination DTE as it would any other binary bits.

Layers 3 to 7 (and the DTE-created layer 2) are embedded in the transmission stream and are meaningful only at the destination DTE. Therefore, they are shown in the figure as “user defined,” with no state changes until the transmission stream reaches its destination.

1. Not shown in figure 6-13 is the treatment of D-channels in ISDN PRI and BRI transmissions. PRI and BRI D-channels transport information elements (IEs) that contain call-signaling and caller information. These IEs conform to ISDN level-3 protocol. In the case of BRI, the IEs are created by the terminal or data module; for PRI, the IEs are created by the system, which inserts them into the D-channel at the DS1 port. For ISDN transmissions, therefore, BRI terminals and data modules, and DS1 ports insert, interpret, and strip both layer-2 DCE information and layer-3 IEs. Also, the DS1 port passes layer-3 IEs to the system for processing.

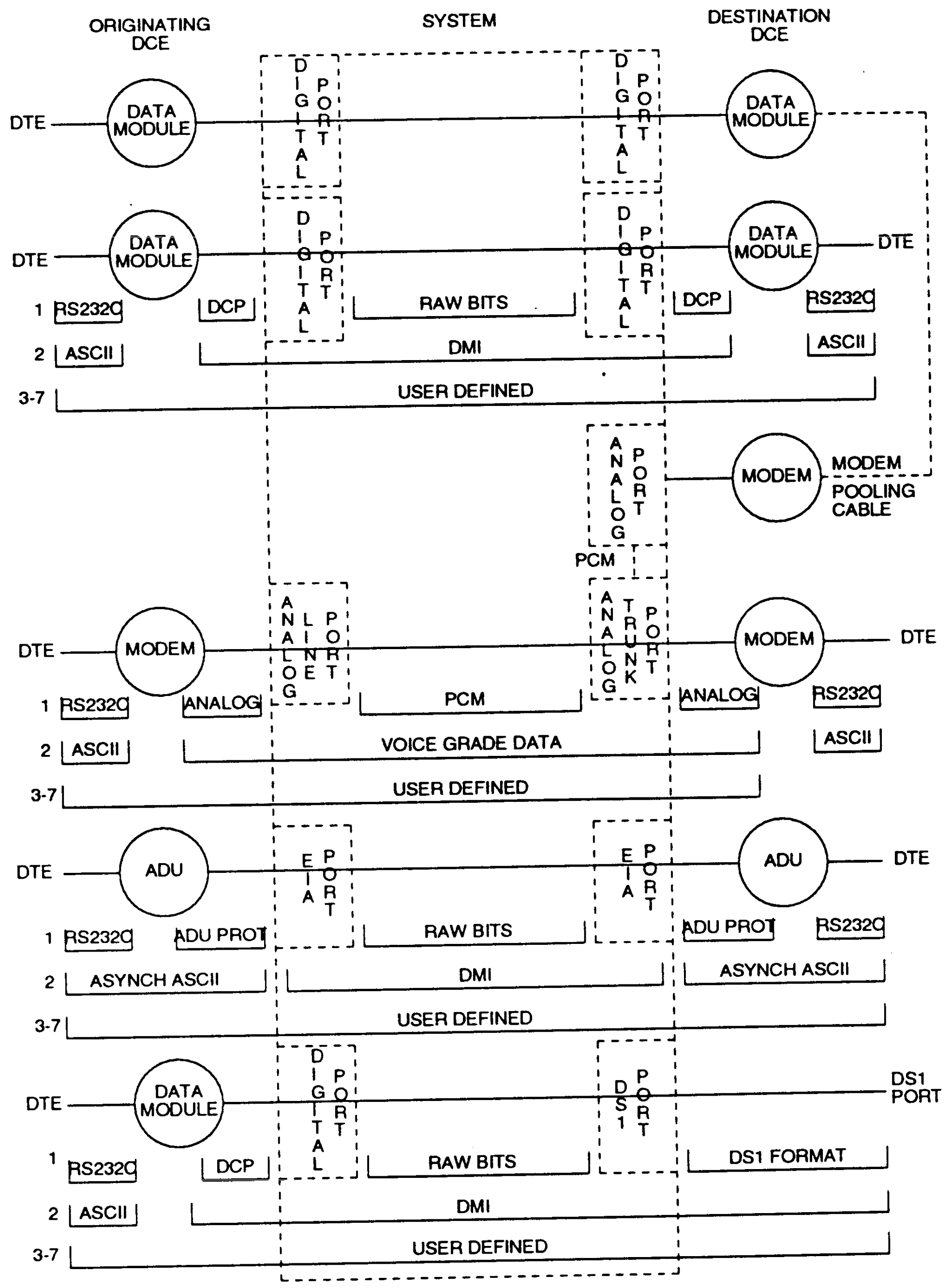


Figure 6-13. Data Transmission States

Usage

The following is a list of the protocols that are meaningful when data is transmitted to and through the system. The list is organized by protocol layers. As you read through the list, follow the protocol changes through the transmission paths shown in figure 6-13.

Layer-1 Protocols

Layer-1 protocols include those used between the terminal or host DTE and the DCE, those used between the DCE and the system port, and those used inside the system.

The following are the layer-1 protocols used between the DTE and the DCE. DCEs can be data modules, modems, or data service units (DSUs).[2]

- *RS232C* — A common physical interface used to connect a DTE to a DCE. This protocol is typically used for communicating up to 19.2 kbps.
- *RS449* — A replacement specification for RS232C. RS449 was devised to overcome the RS232C distance and speed restrictions, and the lack of modem control offered by RS232C.
- *V.35* — A physical interface used to connect a DTE to a DCE. This protocol is typically used for transmissions at 56 or 64 kbps.

The following protocols constitute the conventions used at layer 1 to govern communication between the DCE and the port. These protocols consist of codes that are inserted at the originating DCE and stripped at the port. The DS1 protocol can be inserted at the originating, outgoing trunk port and stripped at the destination port.

- *DCP* — An AT&T proprietary standard for a 3-channel link. DCP sends digitized voice and digital data in frames at 160 kbps. Each frame consists of four channels. The DCP channel structure consists of two information channels and one signaling channel (2I+1S). Each I channel provides 64 kbps of voice and/or data communication and the S-channel provides 8 kbps of signaling communication between the system and DTE. DCP is similar to ISDN BRI.
- *BRI* in G3 — An ISDN standard for a 3-channel link, consisting of two 64-kbps bearer (B) channels and one 16-kbps signaling (D) channel. For the AT&T implementation of this standard, see *DEFINITY Communications System and System 75 and System 85 ISDN BRI Reference* (555-025-103).

2. A DSU is a device that transmits digital data to a particular digital endpoint over the public network without processing the data through any intervening private network switches.

PRI — An ISDN standard that sends digitized voice and digital data in T1 frames at 1.544-Mbps or, for countries outside the USA, in E1 frames at 2.048-Mbps. Layer 1 (physical layer), layer 2 (link layer), and layer 3 (network layer) ISDN PRI protocols are defined in “AT&T System 75 and 85 — DS1/DMI/ISDN-PRI — Reference Manual” (555-025-101). At 1.544 Mbps, each frame consists of 24 64-kbps channels plus 8 kbps for framing. This represents 23 B-channels plus 1 D-channel. The maximum user rate is 64 kbps for voice and data. The maximum distances are based on T1 limitations.

At 2.048 Mbps, each E1 frame consists of 32 64-kbps channels.

- *Analog* — A modulated carrier signal.
- *ADU Proprietary* — A signal generated by an asynchronous data unit (ADU). The signal is for communication over limited distances and can be understood only by a destination ADU or destination system port with a built-in ADU.
- *DS1* — A protocol that dictates the line coding, signaling, and framing used on a 24-channel line. Many types of trunk protocols (for example, PRI and 24th-channel signaling) use DS1 protocol at layer 1.
- *European conference of postal and telecommunications rate 1 (CEPT1)* — A protocol that dictates the line coding, signaling, and framing used on a 32-channel line. Countries outside the USA use CEPT1 protocol.

Inside the system, data transmission appears in one of two forms. It can be raw digital data, where the physical layer protocols, like DCP, are stripped at the incoming port and reinserted at the outgoing port. Or, it can be PCM-encoded analog signals (analog transmission by a modem), the signal having been digitized by an analog-to-digital coder/decoder (CODEC) at the incoming port.

Layer-2 Protocols

Layer-2 protocols are given below:

- *8-bit character code* between the DTE and the DCE. Depending upon the type of equipment used, the code can be ASCII, EBCDIC, or any proprietary code set. ASCII code can be sent asynchronously (one character at a time), or synchronously (one transmission unit, or frame, at a time). EBCDIC is transmitted synchronously.
- *Digital multiplexed interface* (DMI) proprietary family of protocols between the originating DCE and the destination DCE for digital transmission. (For a description of this protocol, see appendix D; *DEFINITY Communications System and System 75 and System 85 DS1/DMI/ISDN PRI Reference* (555-025-101); and *Digital Multiplexed Interface [DMI] Technical Specification,* Issue 3.2, (555-025-204).
- *Voice-grade data* between the originating DCE and the destination DCE for analog transmission.

States

Table 6-1 summarizes the protocols used at various points in the data transmission stream, which are shown in figure 6-13.

Table 6-1. Protocol States for Data Communication

Transmission Type	Incoming DCE	DS1 Layer	Protocols: DTE to DCE	Protocols: DCE to Switch Port	Protocols: Inside Switch
Analog	Modem	1	RS232C, RS449, or V.35	analog	PCM
		2	8- or 10-bit code	voice-grade data	voice-grade data
	ADU	1	RS232C	ADU proprietary	raw bits (digital data)
		2	asynch 8-bit code	asynch 8-bit code	DMI
Digital	Data Module	1	RS232C, RS449, or V.35	DCP or BRI	raw bits (digital data)
		2	8-bit code	DMI	DMI
	DS1	1	any	DS1	PCM or raw bits (digital data)
		2	8-bit code	DMI or voice-grade data	DMI or voice-grade data

Both the physical-layer protocol and the DMI mode used in the connection are dependent upon the type of 8-bit code used at layer 2 between the DTE and DCE, as listed in tables 6-2 and 6-3.

Table 6-2. Physical-Layer Protocol Versus Character Code

Protocol	Code
RS232C	Asynchronous 8-bit ASCII, and synchronous
RS449	Asynchronous 8-bit ASCII, and synchronous
V.35	Synchronous

Table 6-3. DMI Mode Versus Character Code

DMI Mode	Code
0	Synchronous (64 kbps)
1	Synchronous (56 kbps)
2	Asynchronous 8-bit ASCII (up to 19.2 kbps), and synchronous
3	Asynchronous 8-bit ASCII, and private proprietary

Connectivity Rules

Figure 6-13 implies the following connectivity rules:

- In the figure, only the DS1 port and the analog trunk port are trunking facilities (all other ports shown are line ports). For communication over these facilities, the destination DCE can be a hemisphere away from the system, and the signal can traverse any number of intervening switching systems before reaching the destination DCE.
- Data originating at any type of digital device, whether DCP or BRI, can exit the system at any type of digital port — BRI, digital-line, GPP, PRI, DS1, and soon — as long as the call destination is equipped with a data module using the same DMI mode as that used at the call origin. This is because once the data enters the system through a digital port its representation is uniform (raw bits — that is, digital data — at layer 1, and DMI at level 2), regardless of where it originated.
- Although data entering the system through an EIA port has not been processed through a data module, the EIA port itself has a built-in data module. This means that, inside the system, EIA-port data is identical to digital-line or GPP data. Therefore, data entering the system at a DCP-line port (digital-line or GPP) can exit at an EIA port. Conversely, data . entering the system at an EIA port can exit at any DCP-line port. The only caveat is that the destination data module must be set for mode-2 DMI communication.
- Voice-grade data can be carried over a DS1 facility as long as the destination DCE is a modem compatible with the originating modem.
- When a mismatch exists between the types of signals used by the endpoints in a connection (for example, the DCE at one end of the connection is an analog modem, and the DCE at the other end is a digital data module), a modem-pool member must be inserted in the circuit. When the endpoints are on different switches, the best place to insert the modem-pool member depends upon the transmission medium, but it is recommended that the modem-pool member be put on the origination or destination switch. (Note that a modem-pool member is always inserted automatically for calls to off-premises sites via analog or voice-grade trunking. For internal calls, however, the systems are capable of automatically inserting a modem-pool member.)

- Data can not be carried over analog facilities unless inside the system it is represented as a PCM-encoded analog signal. To do this for data originating at a digital terminal, the signal enters the system at a digital port and exits the system at a digital port. The signal then reenters the system through a modem-pool connection (data-module to modem to analog-port) and exits the system again at an analog port.
- Although DS1 is commonly called a trunk speed, here it names the protocol used at layer 1 for digital trunks. There are trunks that use different signaling methods but use DS1 protocol at layer 1 (for example, PRI and 24th-channel signaling trunks). The “Trunks” section in chapter 7, “Connections to Trunks, Data Lines, and Networks,” describes these trunk types.

Connections to Trunks, Data Lines, and Networks

7

This chapter describes the following trunks, data lines, and networks, and how DEFINITY Generic 1 (G1) and DEFINITY Generic 3 (G3) are connected to them:

Trunks

Trunks are the transmission medium through which voice and data signals travel between switches. Calls needing a trunk are routed to the appropriate trunk group. An idle trunk, if available, is selected from the group. The system can be connected to the following trunk groups:

- *Local exchange trunks* carry transmissions between the system and the switch at a central office (CO).
- *Tie trunks* carry transmissions between private communications systems.
- *Special-access trunks* carry transmissions between a system and the point-of-presence (POP) of the inter-exchange carrier (IXC).
- *Auxiliary trunks* link peripheral equipment (such as alarms and announcements) to the system.
- *Miscellaneous trunks* perform functions that do not neatly fit with the above applications. Included among miscellaneous trunks are release link trunks (RLTs), remote-access trunks, and host-access trunks.

Trunks are connected to the system via port circuit packs in port carriers and expansion control carriers in multicarrier cabinets, and in single-carrier port cabinets and expansion control cabinets. Table 7-1 lists trunk circuit packs that can be installed in port slots of G1 and G3. Chapter 2, “Cabinets, Carriers, and Circuit Packs,” describes the trunk circuit packs.

Table 7-1. Trunk Circuit Packs in Port Slots of G1 and G3

Name	Code
Auxiliary trunk	TN763B, C, D, TN417 (G3i-G)
CO trunk	TN747B, G3i-G: TN438B, TN447, TN2138, TN2147
DID trunk	TN753, G3i-G: TN414, TN429 TN436B, TN459B, TN2139, TN2146
DS1 interface	TN464C (G3r), TN767B (G3)
DS1 tie trunk	TN722B
DS1/E1	TN464D (G3i-G)
Tie trunk	TN760D, G3i-G: TN437B, TN439 TN449, TN458, TN497, TN2140

Local Exchange Trunks

Among local exchange trunks are the following varieties:

- *CO trunks* — one-way outgoing, one-way incoming attendant-completing, or two-way trunks connecting the switch to a CO.
- *Foreign exchange (FX) trunks* — one-way outgoing, one-way incoming attendant-completing, or two-way trunks connecting a system to a CO that is outside the local exchange area. These trunks give a caller direct access to a CO outside the local exchange area without using the public network.
- *Wide Area Telecommunications Service (WATS) trunks* — One-way outgoing trunks connecting a system to a CO equipped to handle WATS calls. The outgoing trunks allow a customer, for a monthly charge, to place outgoing station-to-station calls to telephones in a defined service area. The service area has one or more geographic areas called WATS bands. Incoming trunk calls are completed by an attendant or Automatic Call Distribution (ACD) agents.
- *800-service trunks* — one-way incoming trunks connecting the switch to a CO equipped to handle 800-service calls (also called INWATS). These trunks allow a customer, for a monthly charge, to receive incoming station-to-station calls from telephones in a domestic or international service area without charge to the caller.
- *Direct inward dialing (DID) trunks* — one-way incoming trunks connecting a system to a local CO. These trunks allow calls from the public network to complete to terminals (stations) assigned to a private network switch without attendant assistance.
- *Direct outward dialing (DOD) trunks* — one-way outgoing trunks for outgoing calls connecting the switch to a CO. These trunks allow terminal (station) users to place calls to a public network CO directly without attendant assistance.
- *Direct inward-outward dialing (DIOD) trunks* — two-way trunks used to connect G3i-G to a CO
- *Remote access trunks* — these trunks connect a PBX to a CO to provide off-premises PBX users with access to outgoing PBX trunks. Remote access trunks offer this service by providing off-premises users with PBX dial tone through the CO.
- *Postal telephone and telegraph (PTT) trunks* — analog trunks used to connect G3i-G to a CO for local loop (within a country) and long-distance communication (between countries) outside the USA

Tie Trunks

Tie trunks can be of the following types:

- *Tandem tie trunk (TTTN) network* — A network of switches linked by dial-repeating trunks. In this type of network, calls are not automatically routed to the final destination. To call a distant switch, the user steps the call through all the switches in the connection by repeatedly entering the dial access code (DAC) of the trunk group to the next switch as soon as he or she receives dial tone from the newest switch along the path. When all the switches in the connection have been traversed and a connection is made with the destination switch, the user dials the extension number.
- *Main-satellite/tributary (MS/T) network* — A network of switches in which one switch is designated as the main, while subtending switches are *satellites* or *tributaries.* The main switch is fully functional; each satellite uses the trunks and attendants at the main switch. Tributary switches differ from satellite switches in that they have their own listed directory number (LDN) and may have their own attendant and public network facilities. MS/T users reach other users by dialing their extension numbers.
- *Electronic tandem network (ETN)* — A network of switches in which one switch at each location is designated as the tandem switch through which all communications must travel to reach the tandem at another location. Switches that communicate with the tandem at the same location are called *main* switches. ETN switches reach other nodes in an ETN by sending a location code, followed by an extension number and, sometimes, a traveling class mark (TCM).
- *Distributed communications systems (DCS)* — An information system that provides a messaging overlay for ETN or MS/T networks that are designed for DCS implementations. This overlay provides communication among the network nodes so that the operation of a limited number of features is transparent across the network.

The tie trunks between the switches in these networks are in one or more of the following categories:

- *Inter-machine trunks (IMTs)* — one-way incoming, one-way outgoing, and two-way trunks that connect the tandem switches of private communications systems with each other. TCMs can be sent only over IMTs.
- *Access trunks* — one-way outgoing and two-way trunks that connect main switches to tandem switches in an ETN. They can also connect satellite or tributary switches with a main switch. Typically, extension numbers (without their accompanying location code) are sent over access trunks to identify a call destination.
- *Bypass access trunks* — one-way outgoing trunks that connect a tandem switch to a main switch that is “homed on” another tandem.

Special-Access Trunks

IXCs, both within and outside the USA, offer some services through special-access arrangements.

Outside the USA

Outside the USA, the country's PTT determines which special access services are available through local and l2ng-distance telephone networks.

Inside the USA

Inside the USA and between the USA and other countries, these special-access services are installed to bypass the local exchange company (LEC) and directly access the IXC point-of-presence (POP). "Nodal services" is the name AT&T has given the services it offers through special access trunks. AT&T nodal services include:

- *AT&T MEGACOM®* — Permits outward calling to diverse domestic and international geographical areas at reduced rates.
- *AT&T MEGACOM 800* — Permits inward 800-number calling from diverse domestic and international geographical areas. Dialed number identification service (DNIS) is a MEGACOM 800 option wherein the IXC switch sends the private switch the number of the destination extension. This allows MEGACOM callers to directly dial a station number.
- *AT&T ACCUNET® services* — Provide high-capacity terrestrial digital transmission services, such as ACCUNET T1.5, ACCUNET Spectrum of Digital Services, ACCUNET Switched Digital Services, ACCUNET Switched Digital International, and voice-grade private lines. ACCUNET services can be used for data transmission, bulk data transmission, video teleconferencing, and so forth.
- *AT&T Software-Defined Network (SDN)* — Provides connections through the AT&T network so that geographically dispersed user domestic (through SDN) and international (through Global SDN) locations can function as though they were on the same private network.
- *MultiQuest* service — Provides Automatic Alternate Routing (AAR)-like services over SDN. Included in the service are features that route calls to different destinations based upon the time of day, the area code or exchange dialed, predetermined traffic ratios, and dialer input.

Special-access services can be arranged with the IXC over dedicated trunks. In addition, switched services (including all services except ACCUNET T1.5 and ACCUNET Spectrum of Digital Services) can share the ISDN PRI trunk that links the PBX with the IXC POP. In fact, MEGACOM and MEGACOM 800 services to and from the system are available only over a shared ISDN-PRI link. To share the link, the trunk must be administered for call-by-call selection. Note that at the switch end of the connection, special-access trunks are administered identically to private network tie trunks.

Auxiliary Trunks

Auxiliary trunks connect units in the auxiliary cabinet with the switch. Among the features used with this type of connection are Recorded Announcements, Telephone Dictation Service, Malicious Call Trace (MCT), and Loudspeaker Paging.

Miscellaneous Trunks

The following miscellaneous trunks are described.

RLTs

Release link trunks (RLTs) are used between a main location and a satellite/tributary location to provide Centralized Attendant Service (CAS) or Automatic Call Distribution (ACD) group availability. Like tie trunks, RLTs connect communications systems. Unlike tie trunks, which carry calls from their initiation to completion, RLTs provide only a temporary service for the call. That is, RLTs carry calls from their originating switches to the switch where the attendants or agents are located. Upon receiving the call, the attendant or agent identifies the call destination, returns the call to the switch of origin for routing and processing, and then disengages the RLT, readying it for another call.

APLT Trunks

Advanced private line (APLT) trunks handle calls between private switches on customer premises and private switches on central office premises.

Remote-Access Trunks

Remote access trunks connect a PBX to a CO to provide off-premises PBX users with access to outgoing PBX trunks. Remote access trunks offer this service by providing off-premises users with PBX dial tone through the CO.

Host-Access Trunks

Although a system’s line ports can access a host computer’s ports, one type of trunk can also provide host access: digital multiplexed interface (DMI) trunks — connect remote or local hosts to a system. Signaling over these trunks is either message-oriented (MOS) or bit-oriented (BOS).

Data Lines

Data lines from the system can be connected through digital interfaces to data terminal equipment (DTE). Figure 7-1 shows a digital data communications connection from the system through an asynchronous data unit (ADU) to DTE. A TN726B data line enhancement circuit pack containing an ADU is the system's EIA interface.

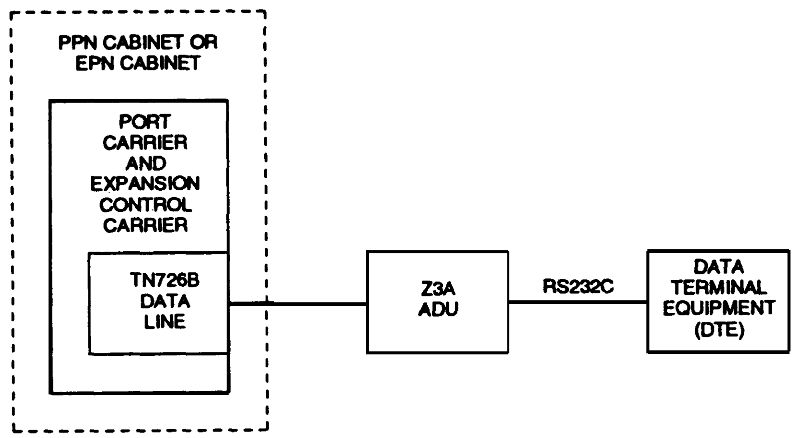


Figure 7-1. Digital Data Communications Connection from a System to DTE

DS1 Facilities

Digital signal level-1 (DS1) facilities are digital trunks that interconnect switches. G3r port networks (PNs) up to 100 circuit miles apart can be connected by DS1 facilities. DS1 multiplexes up to 24 digitized voice and/or data communications links onto a single T1 carrier, which is an industry standard used for interconnecting digital systems. DS1 facilities allow data calls to be transmitted at speeds up to 64kbps.

The DS1 facilities can provide three types of digital tie trunk interfaces:

- Voice-grade DS1, which is an alternative to 2-wire analog E&M tie trunks and connects a system to other switches
- Alternate voice/data (AVD), which permits alternate voice and data calling between a G1 or G3 and a System 75 or System 85
- DMI, which specifies the interface requirements for multiplexed data communications, over DS1 digital facilities, between a host computer and a private switch system. A G1 and G3 supports the DMI by using BOS with the DS1 circuit pack optioned for common channel signaling.

DS1 facilities can be expanded to increase capacity or add dedicated data channels by using channel expansion multiplexing (CEM) and channel division multiplexing (CDM).

D-channel backup with DS1 facilities provides a duplicated D-channel that takes over when the normal D-channel fails.

G3 uses both facility-associated signaling (FAS), administered as 23B + 1 D, and nonfacility-associated signaling (NFAS). With FAS, the D-channel and associated B-channels are carried over the same facility. With NFAS, one D-channel can carry the signaling for up to 479 B-channels or 20 T1 trunks in a G3r. In G3i and G3i-G, a D-channel can carry the signaling for up to 400 trunks.

Figure 7-2 shows a DS1 connection from a G3r through a channel service unit (CSU) to a T1 carrier link. The CSU functions as follows:

- Terminates T1 transmission lines at the user's premises
- Ensures that the signals entering the public network from DTE comply with the requirements of the T1 transmission system
- Provides rnaintenance, diagnostics, and testing

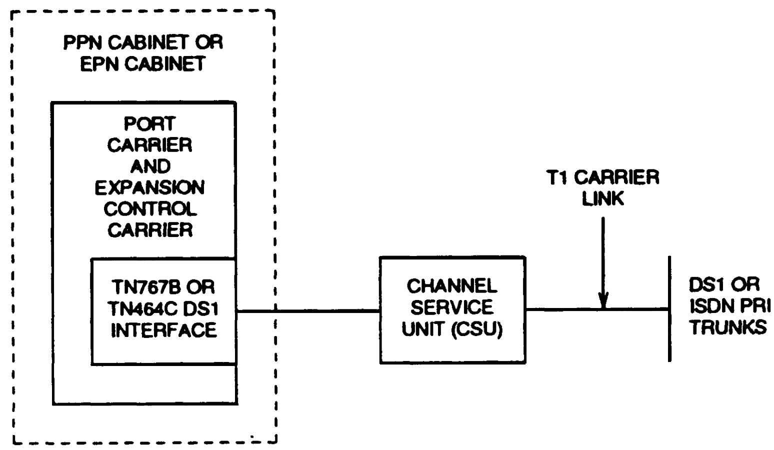


Figure 7-2. DS1 Connection from a DEFINITY G3r to a T1 Carrier Link

ACCUNET Packet Service

The system connects to the ACCUNET Packet Service through a Memotec X.25 packet assembler/disassembler (PAD). ACCUNET packet service (APS) is an X.25 packet switch public data network (PSPDN). The Memotec X.25 PAD SP-830 allows a system to access the APS, any X.25 PSPDN, or any X.25 hosts. The Memotec PAD can be connected directly to a system by a TN726B data line circuit pack and an ADU. ACCUNET packet service delivers packetized data throughout the USA at digital speeds of 2.4 kbps to 56 kbps and analog speeds of 2.4 kbps, 4.8 kbps, and 9.6 kbps.

A system user can access remote X.25 hosts connected to the APS through the Memotec PAD as shown in figure 7-3.

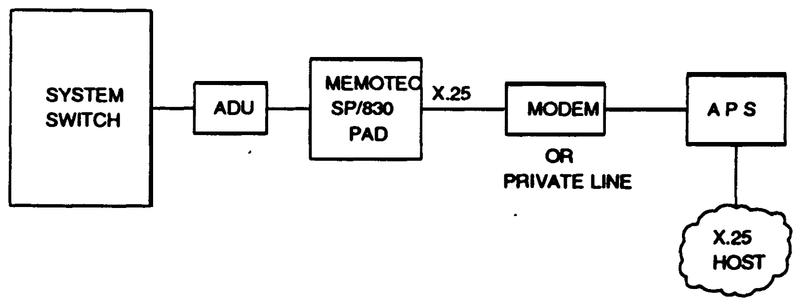


Figure 7-3. Connections from a System to APS

Figure 7-4 shows direct access to a X.25 host.

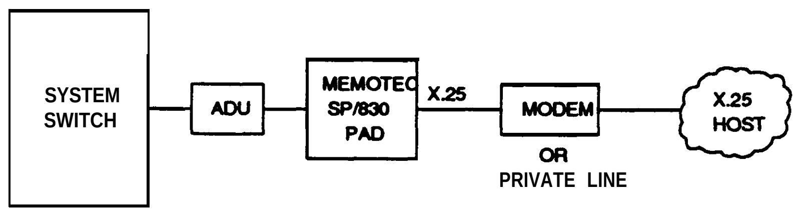


Figure 7-4. Connections from a System to X.25 Host

Administered Connections

G3 provides data communication by means of “administered connection” and access endpoint features. An administered connection is a connection between the system and a peripheral that is enabled by an entry from a terminal. Instead of administered connections between G1 and endpoints, there are only wired connections.

The administered connection feature automatically establishes an end-load connection between two access (data) endpoints. Access endpoints are either a nonsignaling channel on a DS1 interface or a nonsignaling port on an analog tie trunk board that is assigned a unique extension.

An access endpoint supports devices, switches, or services that terminate on a trunk port without requiring any signaling capability on that port. These features enhance data networking and increase the effectiveness of the AT&T Network Service Software-Defined Data Network (SDDN).

For a detailed description of administered connections, refer to “AT&T Network and Data Connectivity” (555-025-201).

Private Networks

A private network is a configuration of trunk and switching facilities dedicated to the use of a business or organization. The network can have as few as two switches or as many as hundreds of switches located throughout the country. This section describes connections between a system and the following private networks:

- MS/T
- ETN
- Software-defined network (SDN)
- ETN/SDN hybrid network
- Distributed communications system (DCS)

MS/T

MS/T serves the needs of customers with a few locations in a small geographic area. This network normally serves moderate to heavy calling between locations. Figure 7-5 shows a MS/T configuration that can function independently or serve as an ETN access arrangement. For a main/satellite configuration, attendant positions and public network trunk facilities are concentrated at the main, and calls to or from satellite locations pass through the main. To a caller outside the main/satellite complex, a system appears to be a single switch with one LDN.

A tributary location is similar to a satellite location with the following exceptions:

- A tributary has one or more attendant positions
- A tributary has its own LDN

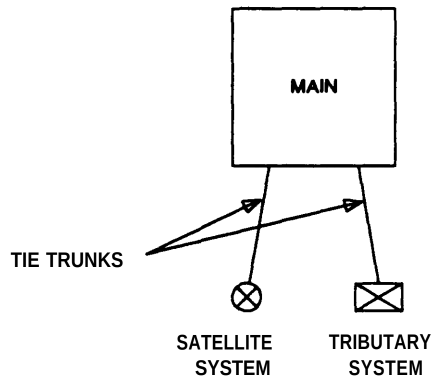


Figure 7-5. MS/T Configuration

ETN

ETN serves customers with many locations in a large geographic area. This network normally serves moderate to heavy calling between locations without accessing toll facilities.

An ETN consists of tandem switches, intertandem tie trunks that interconnect them, access or bypass access tie trunks from a tandem switch to a main switch, and the capability to control call routing over these facilities.

Figure 7-6 shows a typical ETN configuration. As shown in the figure, a MS/T configuration can be served by an ETN. Although not shown in the figure, a DCS can also provide feature transparency for all or part of an ETN.

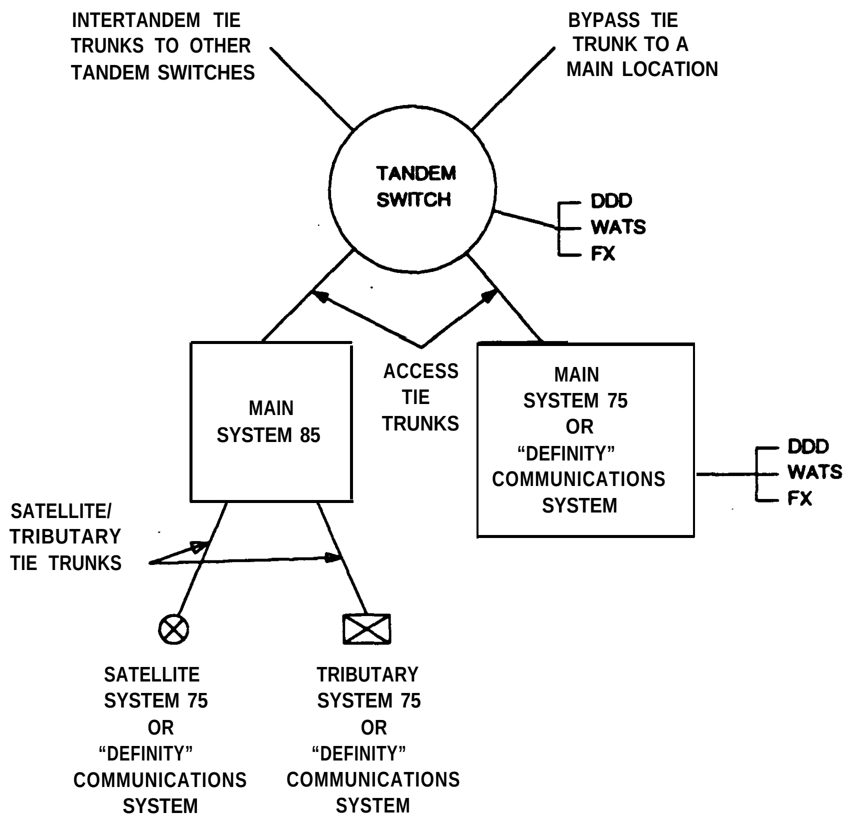


Figure 7-6. Typical ETN Configuration

Within an ETN, each location is identified by a unique private network office code (RNX). An RNX (R=2-9, N=2-9, X=0-9) never matches an area code, except in G3, so there are 640 possible RNXs available for each ETN. After accessing the ETN by dialing a feature access code, a user simply dials the RNX plus the desired extension number. At most, seven digits are required.

Public network office codes (NXXs) are unique within an area code, whereas RNXs are unique within an ETN. The RNXs are assigned when the ETN is established and may match NXXs (although this is not always possible). When DID is provided by the local CO, the extension numbers (last four or five digits of the number) will usually match. Network inward dialing (NID) is the ETN equivalent of DID and can be provided without DID.

SDN

SDN provides a virtual private network using the public-switched network. An SDN handles voice and data between customer locations and off-net locations.

ETN/SDN Hybrid Network

ETN/SDN is a network in which users served by the public network are integrated into a private ETN. When users are scattered geographically, this may be a viable alternative to additional private network switches in dispersed locations or public network toll calls from remote locations.

DCS — G3

A DCS is a cluster of two to 63 maximum AT&T switches connected via ISDN PRI, or 20 maximum AT&T switches otherwise, that make it seem as if the cluster were a single switch in certain attendant and voice terminal features. Therefore, a user at one switch can call or activate a feature toward a user at a different switch and notices no difference in operation.

A DCS requires uniform dialing so that DCS users can dial a 4- or 5-digit extension to reach any extension in the cluster. The uniform dialing provides simplified dialing procedures between locations. DCS offers the convenience of using some of a system's features between locations. A DCS is suitable for frequent interlocation calling.

The DCS switches are interconnected by analog or digital tie trunks for voice communications and also by data links (also called DCS signaling links) for control and feature information. The voice network arrangement of the switches is either an ETN, a main/satellite network, or an ETN/SDN hybrid.

Some of the applications of DCS configurations are in a:

- "Campus environment" that has two or more separate buildings and the switches are connected by local cable
- Larger area such as a city, several states, or even the entire country, where the switches are separated by distances too great for local cable and can be connected to different COs

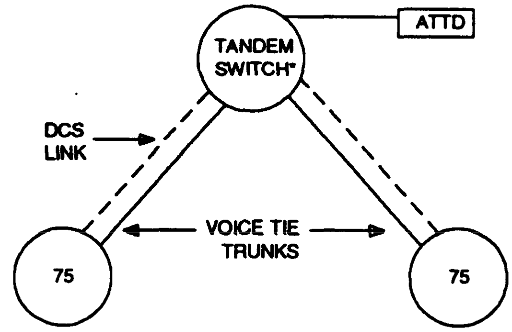
The following AT&T documents describe DCS:

- "DEFINITY® Communications System Generic 1 and Generic 3i Feature Description" (555-230-201)
- "AT&T—Network and Data Connectivity" (555-025-201)
- "DCS Application Note" (555-209-003)

DCS plus sends signaling over ISDN PRI links on the D-channel. The signaling can be switched across a public network when temporary signaling connections (TSCS) are provided.

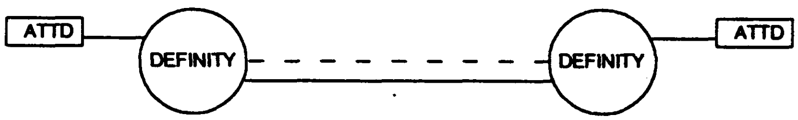
Figure 7-7 shows examples of DCS configurations.

SYSTEM 85, SYSTEM 75 (V3), OR “DEFINITY” COMMUNICATIONS SYSTEM TANDEM;
CENTRALIZED ATTENDANTS



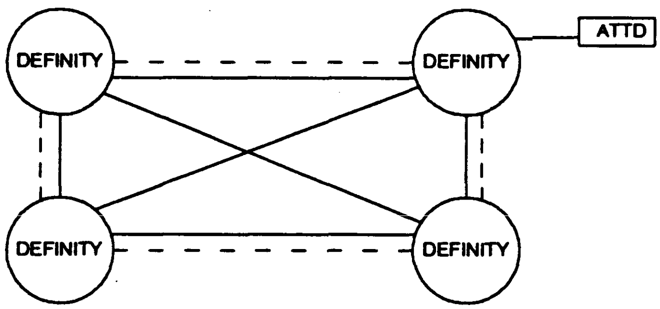
* THE SYSTEM 85, SYSTEM 75 (V3), OR “DEFINITY” COMMUNICATIONS IS SERVING AS A DCS TANDEM SWITCH AND AS A CENTRALIZED ATTENDANT SERVICE MAIN; ALL OTHER SYSTEMS ARE ENDPOINT NODES.

“DEFINITY” COMMUNICATIONS SYSTEM WITH NO TANDEM; SEPARATE ATTENDANTS



EACH “DEFINITY” COMMUNICATIONS SYSTEM HAS ITS OWN ATTENDANT POSITION(S).

“DEFINITY” COMMUNICATIONS SYSTEM WITH NO TANDEM
CENTRALIZED (IAS) ATTENDANT



NOTE THAT EACH SWITCH HAS A TIE TRUNK GROUP TO EVERY OTHER SWITCH, BUT NOT NECESSARILY A DCS SIGNALING LINK. MESSAGE HOPPING IS BEING USED TO TAKE ADVANTAGE OF EXISTING FACILITIES. THE SWITCH WITH THE ATTENDANT IS AN INTER-PBX ATTENDANT SERVICE (IAS) MAIN; THE OTHERS ARE IAS BRANCHES.

Figure 7-7. Examples of DCS Configurations

ISN

The AT&T information system network (ISN) is a packet-switched local area network (LAN) that links mainframe computers, minicomputers, word processors, storage devices, personal computers (PCs), printers, and terminals into a single system.

Connections between a system and an ISN provide the following:

- Users on an ISN, in addition to having access to other endpoints directly connected to ISN, can have access to any endpoint connected to the system or addressable from the system.
- Users who either connect to or have access to the system can also access endpoints connected to an ISN.

An ADU or MPDM interface connects to an asynchronous interface module (AIM) on a packet controller or terminal concentrator, an example of which is shown in figure 7-8. This interface allows the system and the ISN to share data capabilities.

The "DEFINITY Communications System Generic 1 and Generic 3i Feature Description" (555-230-201) describes ISN.

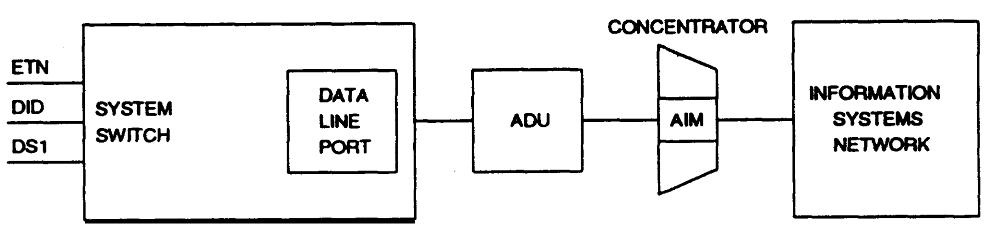
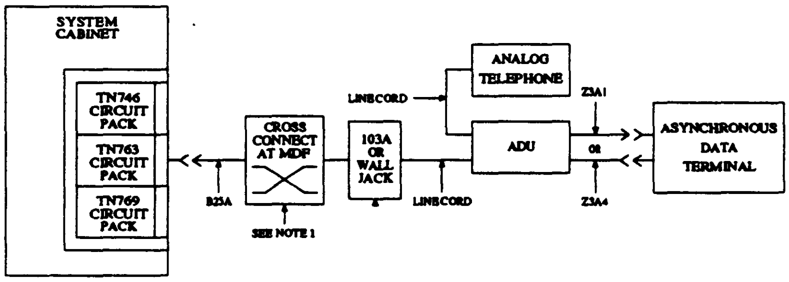


Figure 7-8. Example of Connections from a System to an ISN

Figure 7-9 shows an ISN interface between a system and an asynchronous data terminal.



NOTES:

1. PAIR 1 (VOICE PAIR) CONNECTS TO THE TN746, TN763, AND TN769. PAIRS 2 AND 3 (DATA PAIRS) CONNECT TO AN "AIM" LOCATED IN AN "ISN" CONCENTRATOR OR THE "ISN" PACKET CONTROLLER

Figure 7-9. ISN Interface Between a System and an Asynchronous Data Terminal

STARLAN

A 1-Mbit or 10-Mbit AT&T star-based local area network (STARLAN) interconnects small numbers of PCs, data terminals, resource units, and printers. When a STARLAN and a system are colocated, voice and data can be shared at the same information outlet, as shown in figure 7-10.

The voice pair that connects to a TN746B analog line circuit pack port occupies the first pair of the information outlet. The data pairs that connect to the STARLAN occupy the second and third pairs of the information outlet. The voice and data pairs must be separated at the blue or white field located in the equipment room or at the blue field located in a satellite location.

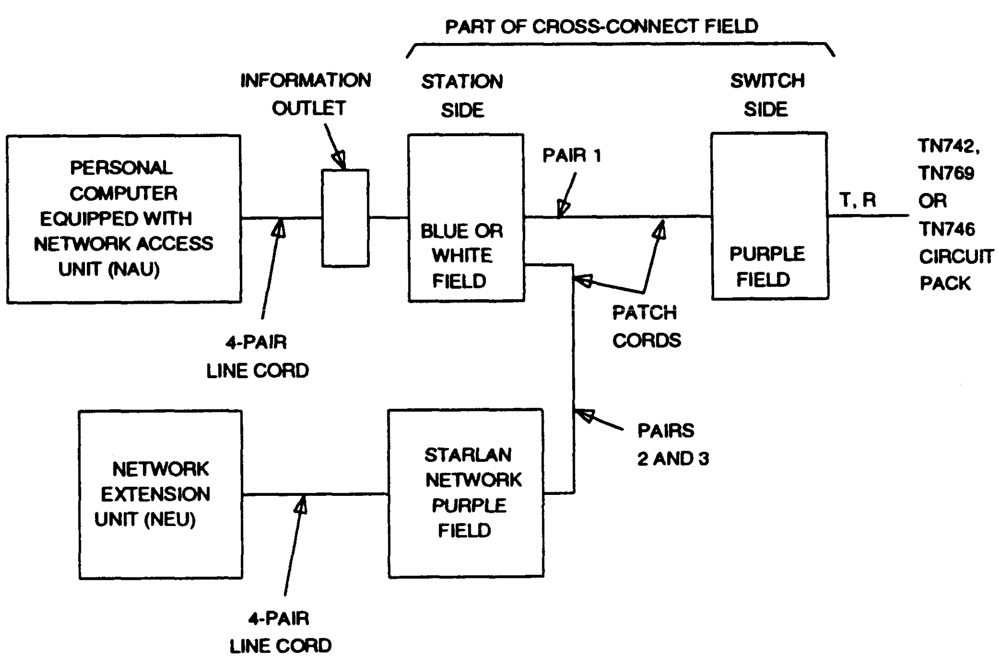


Figure 7-10. Connections from the System to AT&T STARLAN

Connections to Peripherals

8

This chapter describes how DEFINITY Generic 1 (G1) and DEFINITY Generic 3 (G3) are connected to peripherals, which include adjuncts. Adjuncts are optional external components, not residing in a system, that provide administrative and application functions.

The following peripherals and adjuncts are covered:

Procedures used to connect a system to peripherals are given in the following AT&T document: "DEFINITY Communications System Generic 1 and Generic *3* Installation and Test" (555-230-104).

DTE

DTE described in this chapter has EIA (Electronic Industries Association) RS232C, RS449, RS366, V.35, and Category A coaxial interfaces, and CCITT (Consultative Committee for International Telephone and Telegraph) interfaces. DTE includes the following types of equipment:

- Data terminals and consoles
- Printers
- Graphics and facsimile (FAX) equipment
- Computers — hosts and personal computers (PCs)

DCE

DCE described in this chapter are devices such as data modules, ADUs, and modems that are connected between the system and DTE. DCE does the following:

- Provides analog-to-digital and digital-to-digital interfaces between the system and DTE
- Converts protocols between the system and DTE, and isolates the system electrically from DTE

Data Modules

Data modules link DTE with a system's basic rate interface (BRI) and digital communications protocol (DCP) digital ports. The system can be connected to the following types of data modules:

- Asynchronous data module (ADM), which is used with a 7505, 7506, or 7507 ISDN BRI voice terminal to support integrated voice and data
- Data stands (Z702A and Z703A), which provide an RS232C interface to a system for data terminals and personal computers (PCs) attached to a 7406D or 7407D digital voice terminal
- Digital terminal data module (DTDM), which transmits and receives serial data across a DCP interface; a DTDM has an RS232C interface that connects to DTE
- Modular processor data module (MPDM), which provides a serial data DCP interface between a system, DTE, host computers, and other switches
- 7400A and 7400B data modules, which provide full-duplex asynchronous voice and data connectivity in DCP applications
- 3270A, T, and C data modules, which convert DCP protocol to coax-A protocol and allow PC equipped with the PC/PBX 3270 emulation package to communicate with an IBM 3270 cluster controller through a system

ADUs

The system can be connected to the following types of ADUs:

- ADU, which extends the 50-foot limit of an RS232C cable up to 40,000 feet and provides full-duplex asynchronous operation
- Modular asynchronous data unit (MADU), which is an eight-port ADU

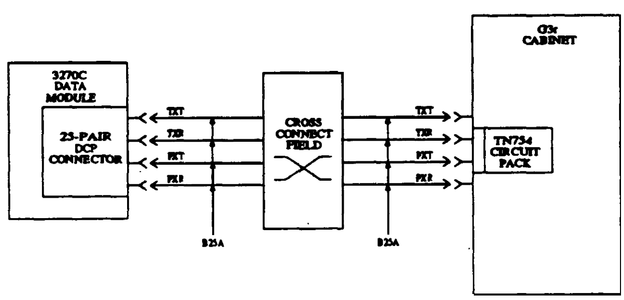
Modems

Modems link DTE with the systems' analog ports. Many AT&T and customer-supplied modems work with the system. A data service unit (DSU) is used as a modem with the system.

CSU

A channel service unit (CSU) is a full-duplex device that provides DTE with access to synchronous DS1 1.544-Mbps lines

Figure 8-1 shows a G3 connected to a 3270C data module.



NOTES:

1. THE DATA MODULE IS LOCATED IN THE AUXILIARY CABINET, IF ONE IS AVAILABLE.

Figure 8-1. Connections from DEFINITY G3 to a 3270C Data Module

Figure 8-2 shows a G3 connected to a 3270A or 3270C data module.

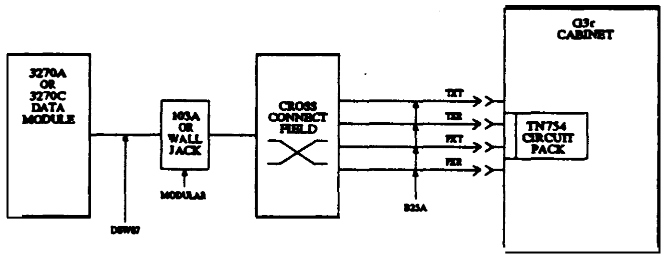


Figure 8-2. Connections from DEFINITY G3 to a 3270A or 3270C Data Module

Terminals

The system can be connected to all terminals that are DTE and have RS232C or DCP interfaces.

Voice and Data Terminals

Table 8-1 lists voice and data terminals that can be connected to the system.

Table 8-1. Voice and Data Terminals

Terminal	Type
Multi-button electronic telephone (MET) sets: 10, 20, 30 Button	Voice
Analog: 500, 2500/2554, 2500 DMGC, 2500YMGK, S203A Speakerphone	Analog voice
71XXX series: 7101A, 7102A, 7103A, 7104A	Analog voice
72XXX series (G1): 7203H, 7205H	Hybrid voice
73XXX series: 7302H, 7303H, 7303S, 7305S, 7305H	Hybrid voice
74XXD series: 7401D, 7403D, 7404D, 7405D, 7406D 7407D, 7410D, 7434D, 7444	Digital voice
81XX series 8102, 8110	Analog voice
BRI series (G3): 7505-, 7506-, 7507-VOM/T, 8503	BRI voice
Workstation series: 510D BCT, 513 BCT, 515 BCT PC/PBX platform (digital, G3) G3r. PC/ISDN platform (BRI)	Data
Consoles 301A Attendant Console 302A1 Enhanced Generic 1 Console 602A1 ACD Console (CallMaster™ data communications terminal)	Data and voice

Administration Terminals

Table 8-2 lists the administration terminals that can be connected to the system.

Table 8-2. Administration Terminals

Administration Terminal	Application
510D	Remote administration
610D, 513BCT, 610BCT (G1 and G3i) 4410, and 4425	DEFINITY Communications System Generic 3 Management Terminal (G3-MT) (formerly System Access Terminal (SAT)/Manager I): administration and general purpose
515BCT	Remote administration, general purpose
615MT (G1 and G3i)	Manager I system administration and maintenance terminal
715 BCS (G3)	G3-MT system administration and maintenance terminal

Figure 8-3 shows typical connections from a system to data terminals.

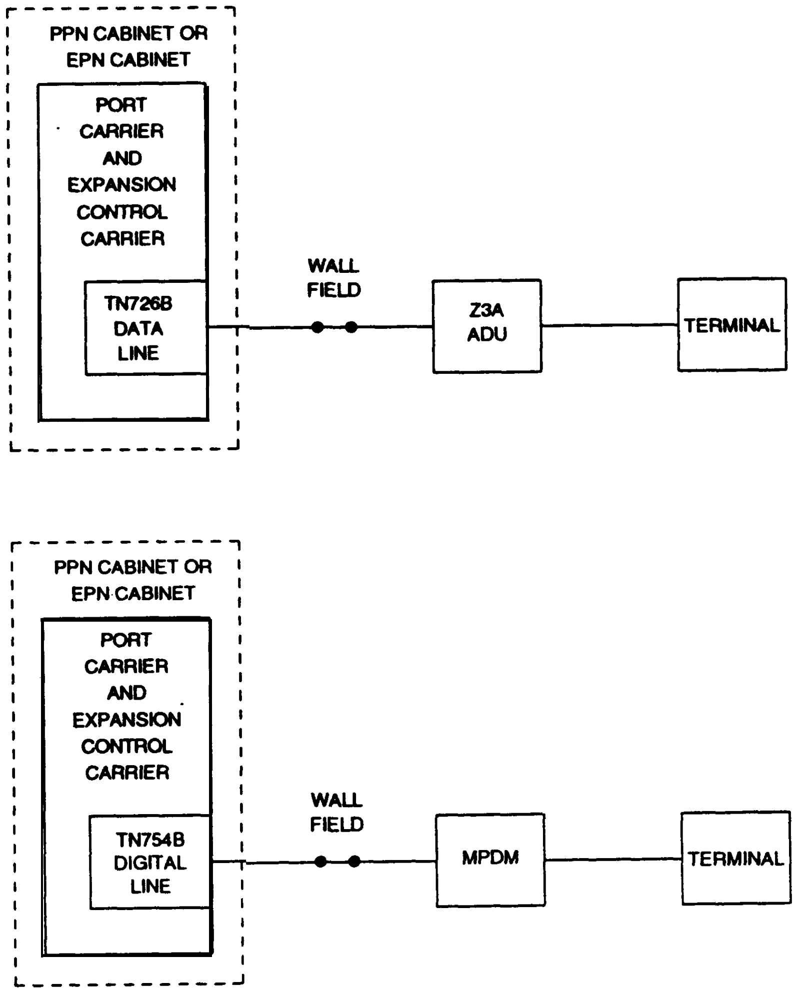


Figure 8-3. Typical Connections from the System to Data Terminals

Printers

The following printers can be connected to a system:

- System printer: models 443, 450, 460, 470, 475, 476, 477, 478, 479, 495, 5310, and 5320
- Station Message Detail Recording (SMDR) printer — prints call records

Figure 8-4 shows a G3r connected to a system printer and an SMDR printer with EIA and DCP interfaces. The TN553s connected to the TN726Bs in the figure are used for system access ports. A TN553 converts mode-2 protocol to mode-3 protocol, which connects the TN726B to the TDM bus for the EIA interfaces.

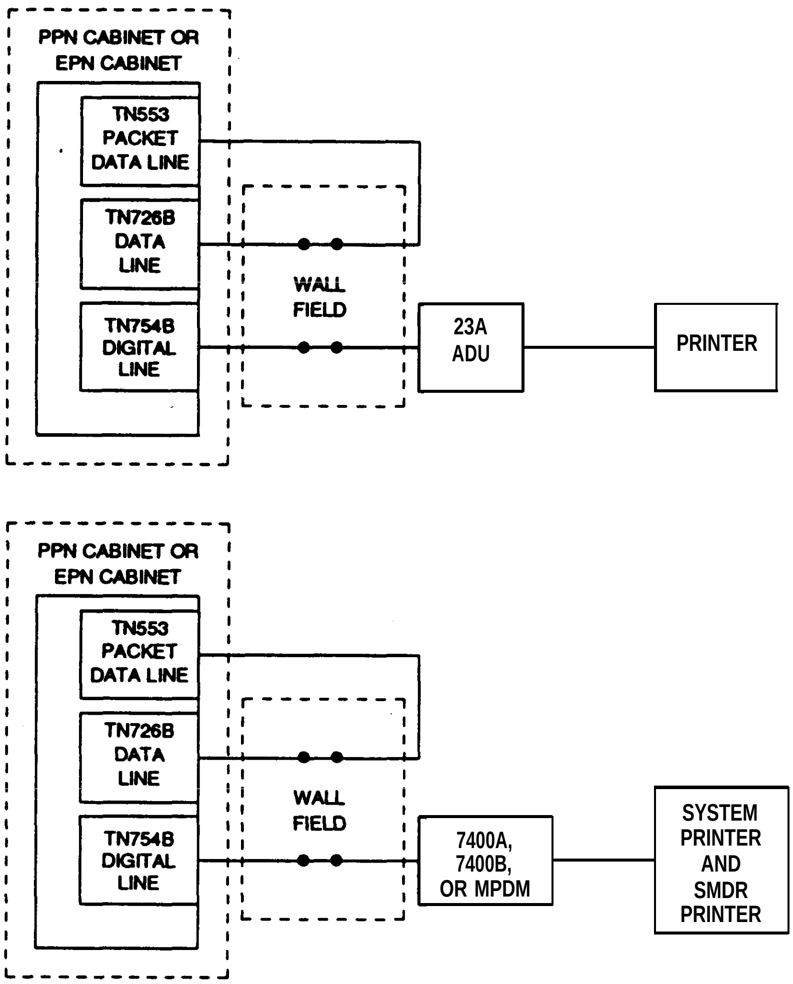


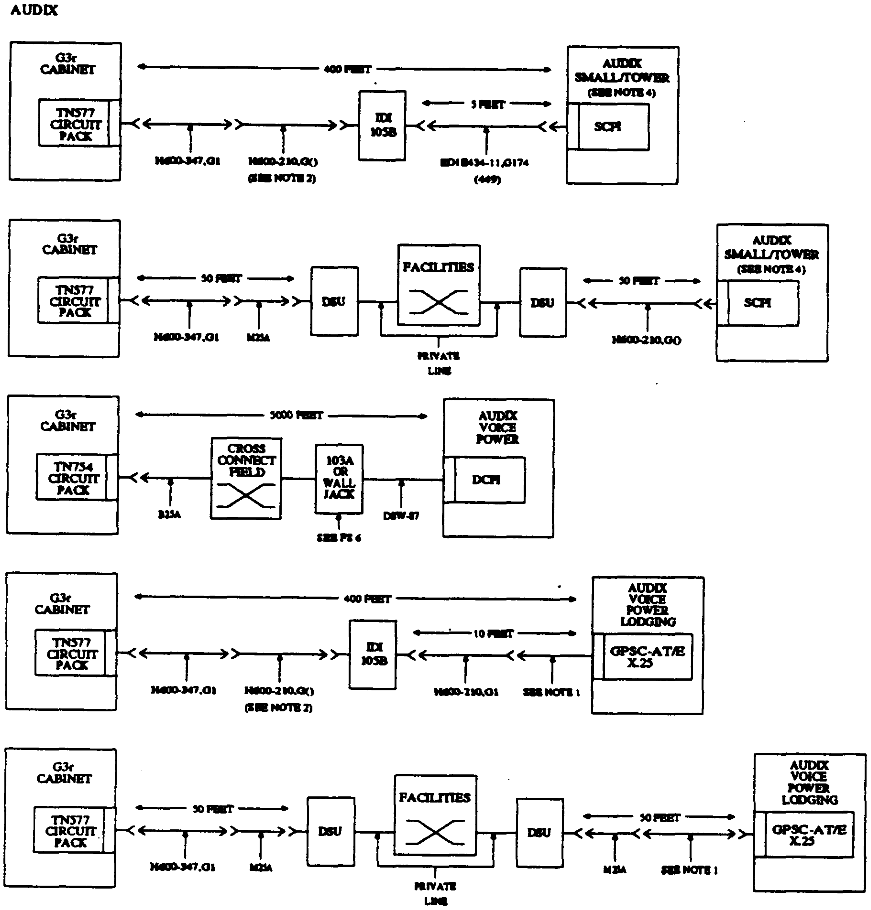
Figure 8-4. Connections from DEFINITY G3r to Printers

Messaging Adjuncts

The following list includes messaging adjuncts that can be used with a system:

- Audio Information Exchange (AUDIX), which allows subscribers to originate, send, receive, and store voice messages
- 3B2 Message Server Adjunct (MSA), which provides a set of messaging for services allowing the creation, transmission, storage, and retrieval of messages among users
- Property Management System (PMS), which provides a communications link between a system and a customer's computer used for services such as reservations, housekeeping, and billing
- Call Management System (CMS), which collects and processes Automatic Call Distribution (ACD) information sent from a system
- ISDN Gateway (IG), which provides incoming call management (ICM) telemarketing capabilities by monitoring and controlling system call-handling via a high-speed system-to-adjunct communications channel

Figures 8-5 and 8-6 show a G3r connected to AUDIX.



NOTES:

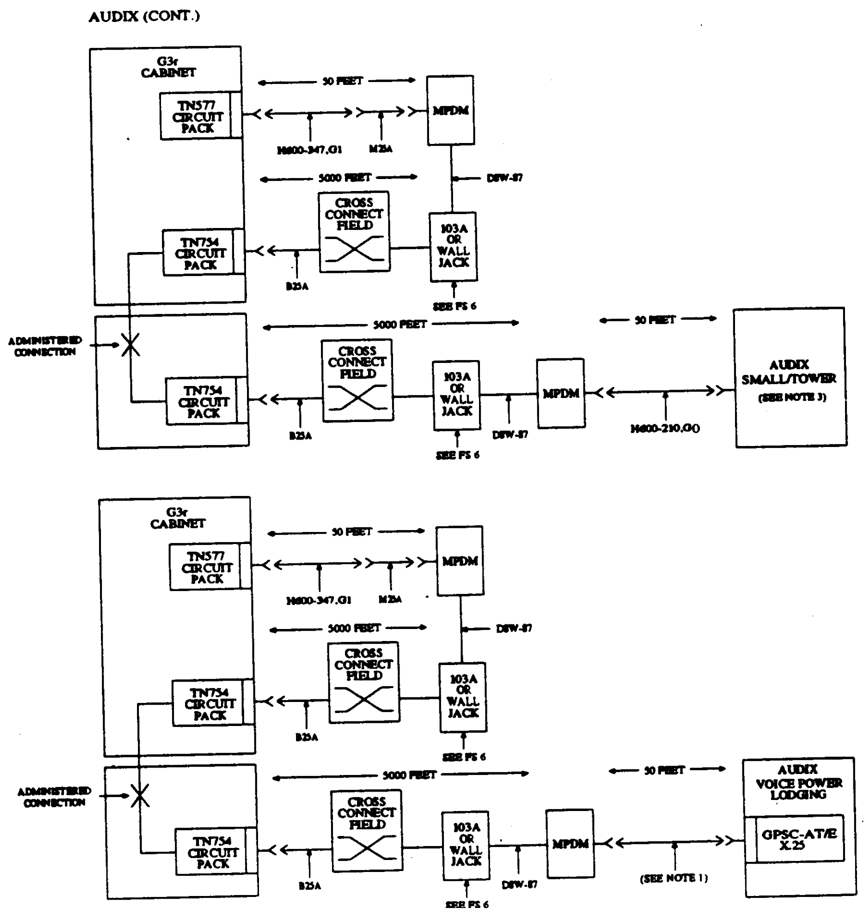
1. USE GPSC-AT/EX.25 CONNECTION ON THE GPSC-AT/EX.25 BOARD IN THE 6386 TOWER.

2. WHEN USING H600-362, G(1) IN PLACE OF THE H600-210, USE ED1E434-11, G174 IF RS449 IS ON THE AUDIX SIDE OR ED1E434-11, G175 IF RS232 IS ON THE AUDIX SIDE

3. THERE ARE OPTIONAL ALARM LEADS FROM AUDIX TO G3r. USE CONNECTIONS TO AUX CONNECTOR (AUXMN, AUXMJ).

4. AUDIX SMALL IS ONE CABINET SYSTEM. AUDIX TOWER IS A TWO CABINET SYSTEM.

Figure 8-5. Connections from DEFINITY G3r to AUDIX



NOTES:

1. USE GPSC-AT/EX.25 CONNECTION ON THE GPSC-AT/EX.25 BOARD IN THE 6386 TOWER.

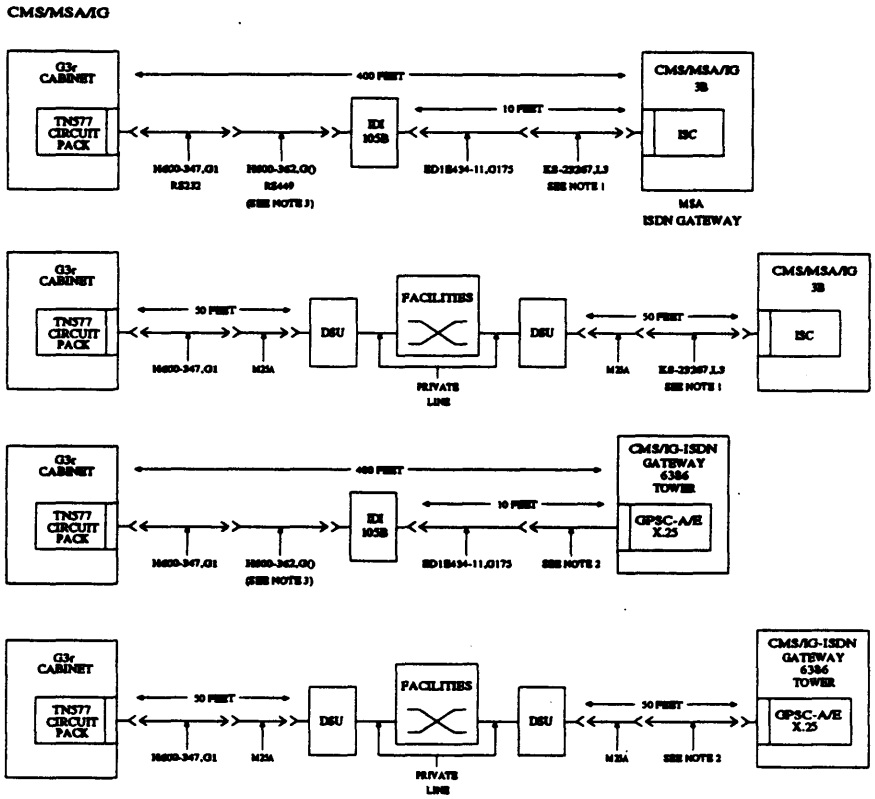
2. WHEN USING H600-362, G(1) IN PLACE OF THE H600-210, USE ED1E434-11, G174 IF RS449 IS ON THE AUDIX SIDE OR ED1E434-11, G175 IF RS232 IS ON THE AUDIX SIDE

3. THERE ARE OPTIONAL ALARM LEADS FROM AUDIX TO G3r. USE CONNECTIONS TO AUX CONNECTOR (AUXMN, AUXMJ).

4. AUDIX SMALL IS ONE CABINET SYSTEM. AUDIX TOWER IS A TWO CABINET SYSTEM.

Figure 8-6. Connection from DEFINITY G3r to AUDIX

Figures 8-7 and 8-8 show a G3 connected to the CMS, MSA, and IG messaging adjuncts.



NOTES:

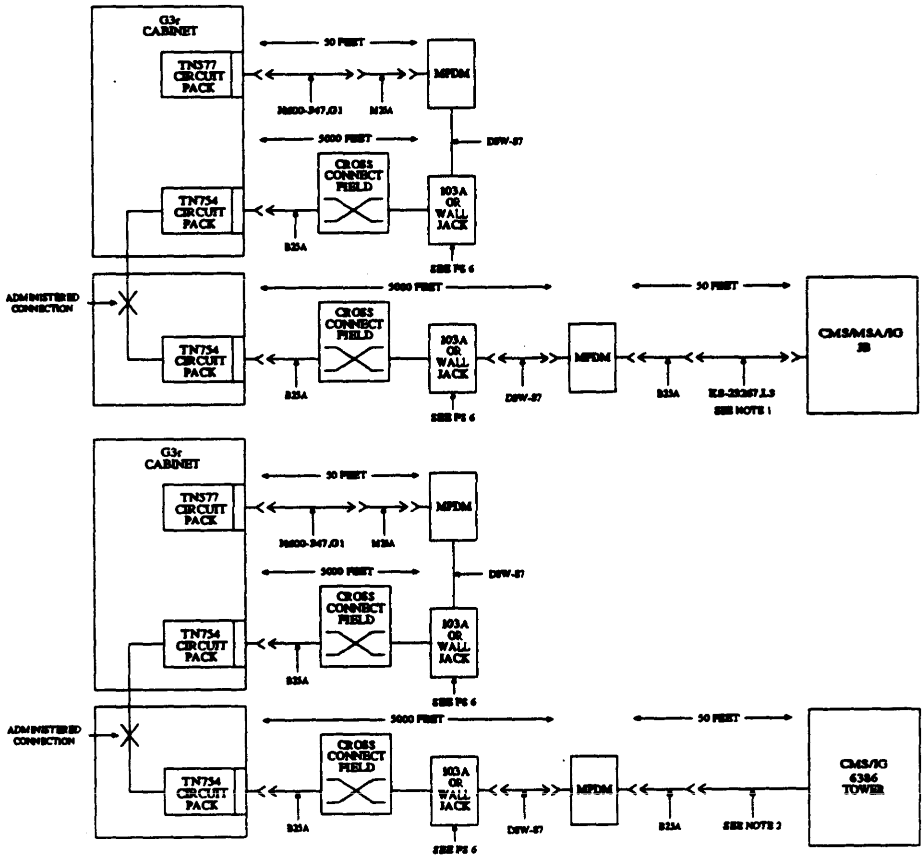
1. KS-23267,L3 COMES WITH THE ISC BOARD IN THE 3B.

2. USE GPSC-AT/EX.25 CONNECTION ON THE GPSC-AT/EX BOARD IN THE 6386 TOWER.

3. WHEN USING H600-210, G() IN PLACE OF THE H600-362 USE H600-210 IF RS449 IS ON THE CMS SIDE.

Figure 8-7. Connections from DEFINITY G3 to CMS, MSA and IG

CMS/MSA/IG (CONT.)



NOTES:

1. KS-23267,L3 COMES WITH THE ISC BOARD IN THE 3B.

2. USE GPSC-AT/EX.25 CONNECTION ON THE GPSC-AT/EX BOARD IN THE 6386 TOWER.

Figure 8-8. Connections from DEFINITY G3 to CMS, MSA and IG

Telemarketing Adjuncts

The following list includes telemarketing adjuncts supported by a system:

- External queue-status indicator lamp, which provides status information concerning the number of calls and the time of the oldest call in an ACD queue
- Recorded announcement, which is used with ACD and non-ACD hunt groups to provide recorded announcements for incoming calls that have been queued for a longer time than the administered “delay announcement” time (0 to 999 seconds) or for calls that have been directed to an announcement.

  G3r supports integrated announcement, auxiliary announcement, and analog announcement. G1, G3i, and G3i-G support integrated announcement and analog announcement.
- Conversant® Voice Inquiry Service (WS), which provides ICM features such as Voice Messaging and Automated Attendant

Figure 8-9 shows a G3 connected to a queue-status indicator lamp.

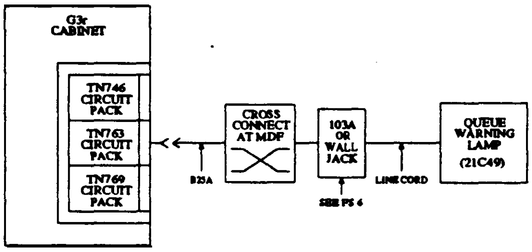
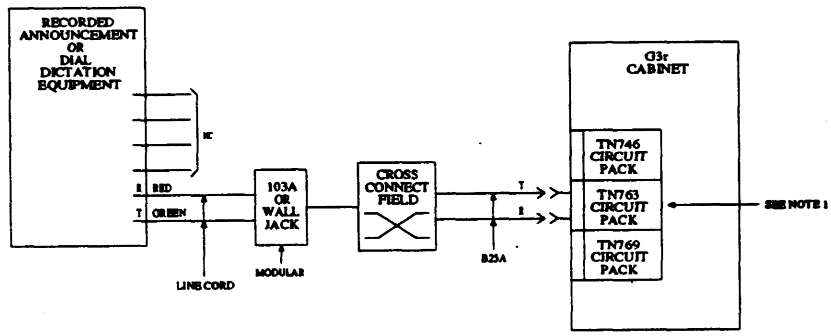


Figure 8-9. Connections from DEFINITY G3 to CMS, IG, and a Queue-Status Indicator Lamp

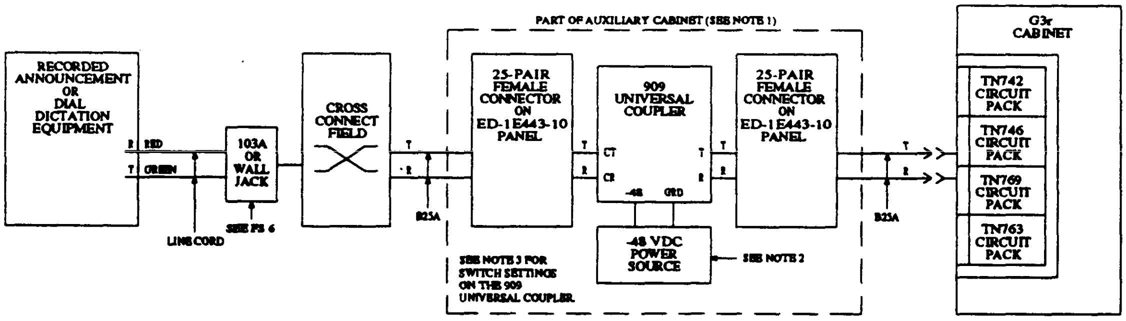
Figures 8-10 and 8-11 show a G3r connected to recorded announcement and dictation equipment.



NOTES:

1 TN763 CAN BE USED ONLY FOR RECORDED TELEPHONE DICTATION.

Figure 8-10. Recorded Announcement or Dictation Equipment Connection



NOTES:

1. AUXILIARY CABINET IS OPTIONAL

2. USE -48V AND -48VRET FROM THE CABINET OR WALL FIELD OR A KS-22911L2 OR OTHER APPROVED -48VDC POWER SUPPLY

3. SET S1 TO THE C1 POSITION. SET S2 SWITCH POSITION 3 T0 -9dBm OR -15dBm AS REQUIRED BY THE CENTRAL OFFICE. SET S2 SWITCH POSITION 6 OPEN. ALL OTHERS ARE "DON'T CARE".

4. OTHER ANALOG-LINE CIRCUIT PACKS MAY BE USED IN SOME COUNTRIES

Figure 8-11. Recorded Announcement or Dictation Equipment Connection

Administration Adjuncts

Administration adjuncts, which also includes operation support systems (OSSs), are used to administer and maintain a system. The following list includes administration adjuncts that can be used with a system:

- PC-based DEFINITY Communications System Generic 3 Management Applications (G3-MA)
- DEFINITY Communications System G3-MT
- Trouble Tracker (R1V3), which is a remote maintenance OSS system
- Facility diagnostics
- Network reconfigurator
- Modular system management (MSM)

Figure 8-12 shows a system connected to a G3-MA and a G3-MT. The G3-MA or G3-MT connected to the TN775 in the EPN is used only for maintenance.

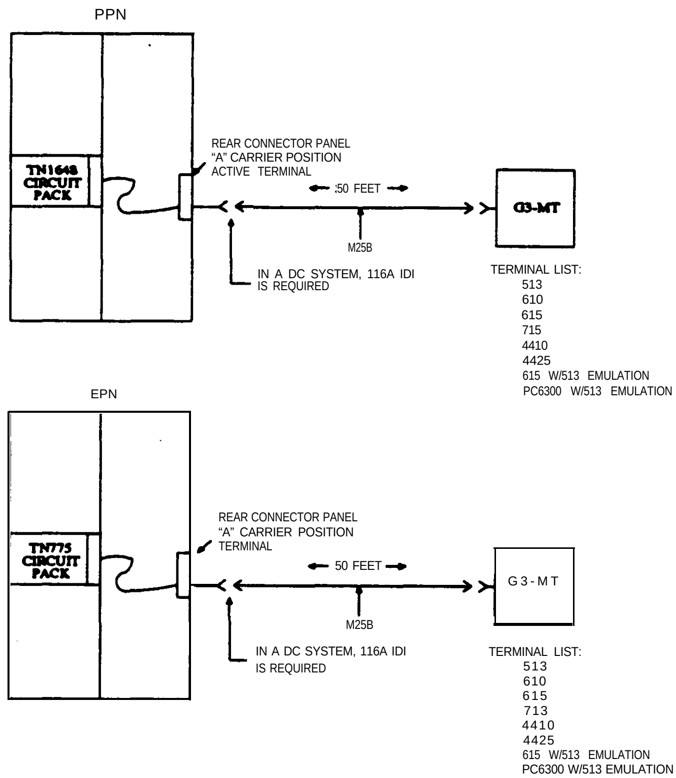
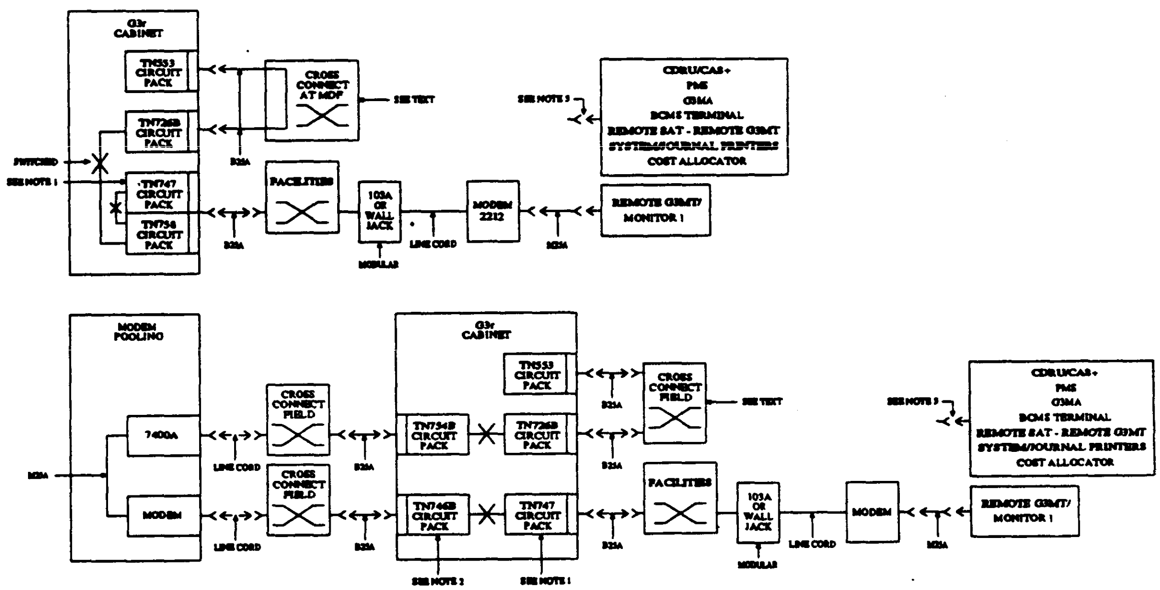


Figure 8-12. Connections from a System to a G3-MT (SAT/Manager 1) and G3-MA (SAT PC)

Figure 8-13 shows a system connected to a remote SAT PC, G3-MT, and Monitor 1 (in G1 only).



NOTES:

1. THIS CIRCUIT PACK CAN BE ANY OF THE FOLLOWING TRUNK PACKS: TN747, TN753, TN760, TN767, OR TN464.

2. THIS CIRCUIT PACK CAN BE ANY ANALOG LINE PACK TN769, TN742, TN746, ETC.

3 WHEN A DB9 IS USED ON THE BACK OF A PC, USE A ED3P001-70, G115 TO CONVERT DB9 TO DB25.

Figure 8-13. Connections from a System to a Remote G3-MT (SAT/Monitor 1)

Figure 8-14 shows a G3r connected to the Trouble Tracker.

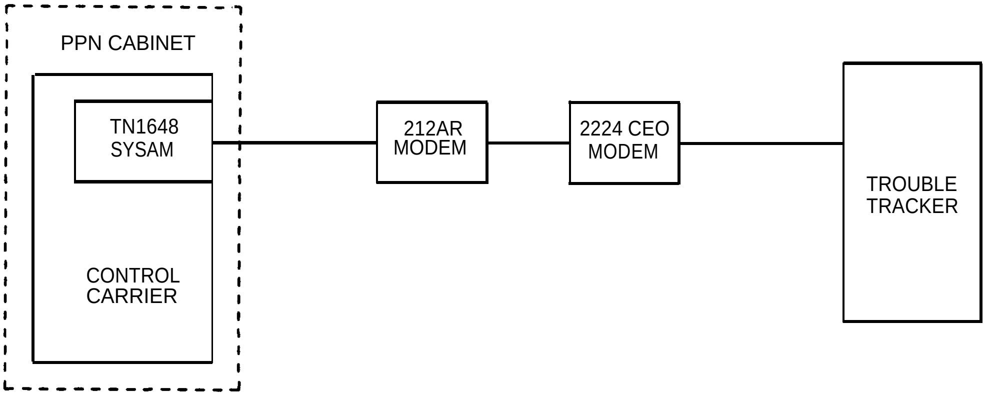


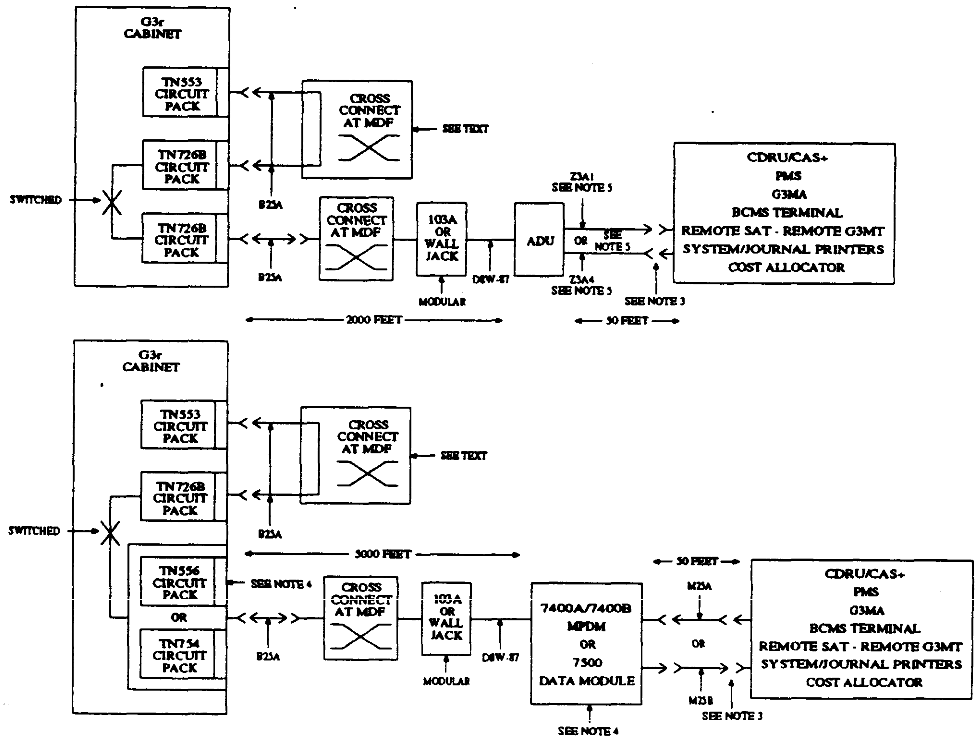
Figure 8-14. Connection from DEFINITY G3r to the Trouble Tracker

Call Record Acquisition Adjuncts

Call record acquisition adjuncts collect call records produced by a system when calls are connected. These adjuncts store and process records, and send them to other systems such as data processing equipment, tape drives, and printers. The following list includes call record acquisition adjuncts used with a system:

- Call Detail Recording Utility (CDRU): 3B2 CDRU, 6386 CDRU, CDRU/small (CDRU/S), and CDRU/SE which collects CDR records sent from G1 and G3
- Call Accounting System (CAS) Plus
- Cost Allocator

Figure 8-15 shows a G3r connected to a CDRU and a CDRU/S. The TN553s connected to the TN726Bs in the figure are used for system access ports. A TN553 converts mode-2 protocol to mode-3 protocol, which allows the TN726B to communicate with the TDM bus for the EIA interfaces.



NOTES:

1. USE Z3A4 AND M25A ON CDRU/CAS+, PMS, SAT PC, BCMS TERMINAL AND REMOTE SAT.
2. USE Z3A1 AND M25B ON SYSTEM/JOURNAL PRINTERS.
3. WHEN A DB9 IS USED ON THE BACK OF A PC, USE A ED3P001-70, G115 TO CONVERT DB9 TO DB25.
4. A TN556 ISDN BRI CIRCUIT PACK IS USED WITH THE 7500 DATA MODULE.
5. Z3A1 AND Z3A4 ARE CODES OF SPECIFIC AT&T ADU'S WITH CONNECTIVITY (PLUG OR SOCKET) AS INDICATED.

Figure 8-15. Connections from DEFINITY G3r to a CDRU and CDRU/S

Miscellaneous Adjuncts

A system can be connected to the following miscellaneous adjuncts:

- Incoming call management (ICM)
- Office application servers
- Industry-specific application servers
- Stratum 3 external synchronization clock (G3r), which provides the clock that synchronizes system timing and has a maximum of 2.5 minutes of allowable error per year
- Music-on-Hold, which provides customer-furnished music or other audible information to the held party when any single-party call is held by a station or an attendant. Only a single music source can be installed in the system, and the system's TDM bus extends the music source throughout all PNs.
- Loudspeaker Paging equipment
- Recorded announcement equipment
- Malicious call trace (MCT) equipment
- Digital announcement equipment
- CallVisor™ host

Figure 8-16 shows a G3 connected to a Stratum 3 external synchronization clock.

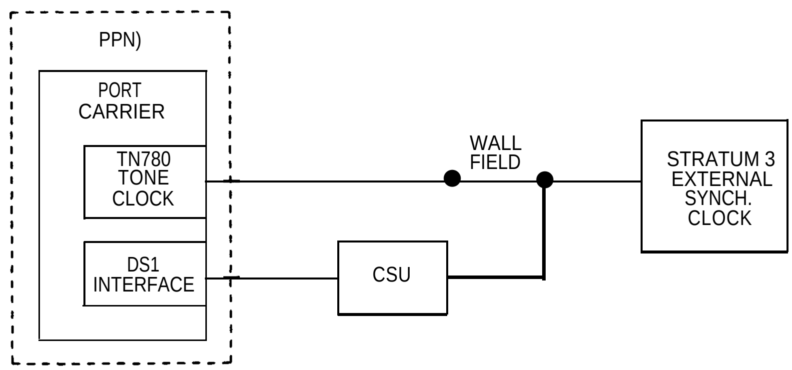
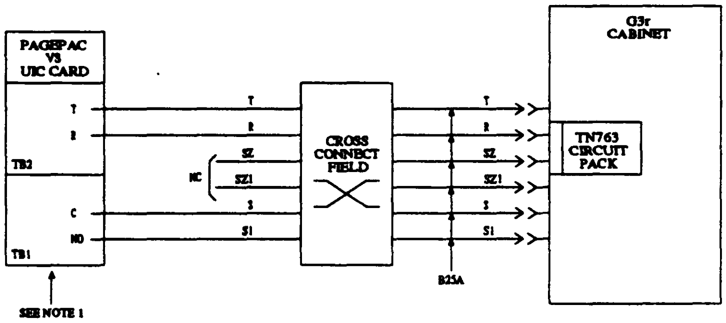


Figure 8-16. Connections from DEFINITY G3 to a Stratum 3

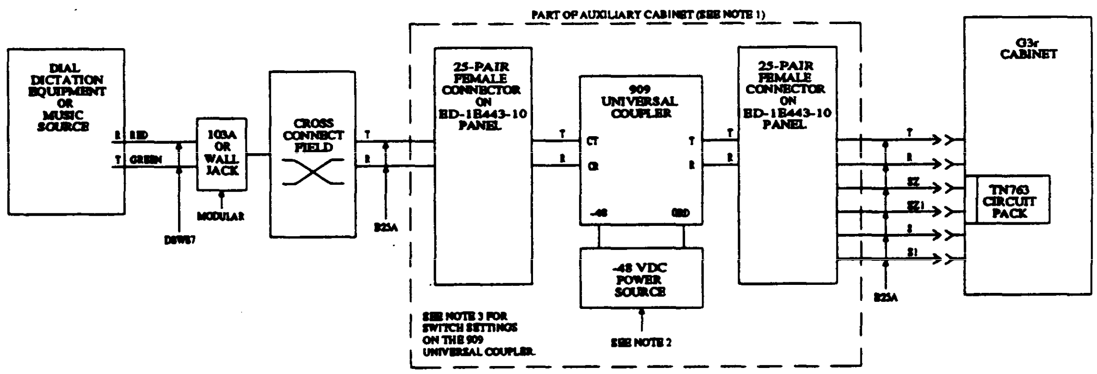
Figures 8-17 and 8-18 show a G3 connected to Music-On-Hold equipment.



NOTES:

1. IF UIC CARD IS NOT PROVIDED, ALL CONNECTIONS ARE MADE TO THE TB2 ON THE PAGEPAC VS.
2. THIS CIRCUIT PACK CAN BE ANY ANALOG LINE PACK TN769, TN742, TN746, ETC.
3. WHEN A DB9 IS USED ON THE BACK OF A PC, USE A ED3P001-70 G115 TO CONVERT DB9 TO DB25.
4. TN763D MAY BE REQUIRED IN SOME COUNTRIES

Figure 8-17. Connections from DEFINITY G3 to Music-On-Hold Equipment



NOTES:

1. AUXILIARY CABINET IS OPTIONAL

2. USE -48V AND -48VRET FROM THE CABINET OR WALL FIELD OR A KS-22911L2 OR OTHER APPROVED -48VDC POWER SUPPLY

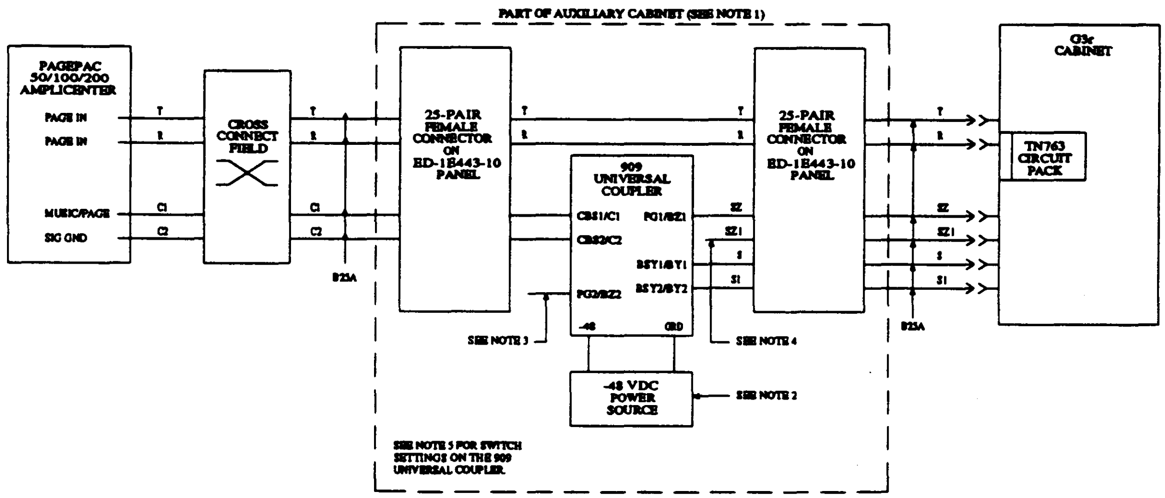
3. SET S1 TO THE C1 POSITION. SET S2 SWITCH POSITION 3 TO -9dBm OR -15dBm AS REQUIRED BY THE CENTRAL OFFICE. SET S2 POSITION 6 OPEN. ALL OTHER SWITCHES ARE "DON'T CARE".

4. TN763D REQUIRED IN SOME COUNTRIES

Figure 8-18. Connections from DEFINITY G3 to Music-On-Hold Equipment

8

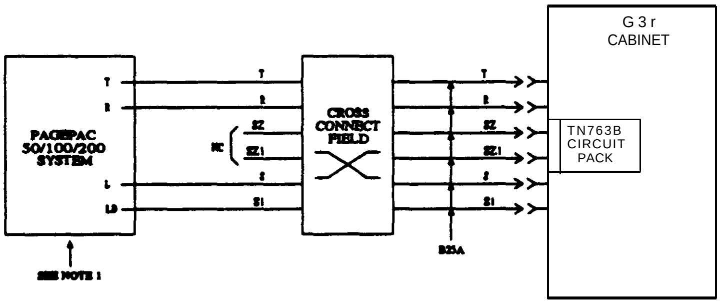
Figures 8-19 to 8-27 show a G3 connected to Loudspeaker Paging equipment.



NOTES:

1. AUXILIARY CABINET IS OPTIONAL
2. USE -48V AND -48VRET FROM THE CABINET OR WALL FIELD OR A KS-22911L2 OR OTHER APPROVED -48VDC POWER SUPPLY
3. CONNECT PG/BZ2 TO AN AVAILABLE DC POWER SOURCE OF -9.5 TO -60VDC.
4. C0NNECT SZ1 TO THE GROUND OF THE DC POWER SOURCE USED FOR PG2/BZ2.
5. SET S1 TO THE C2 POSITION. SET THE S2 POSITION 6 OPEN. ALL OTHERS ARE “DON’T CARE”.
6. TN763D REQUIRED IN SOME COUNTRIES

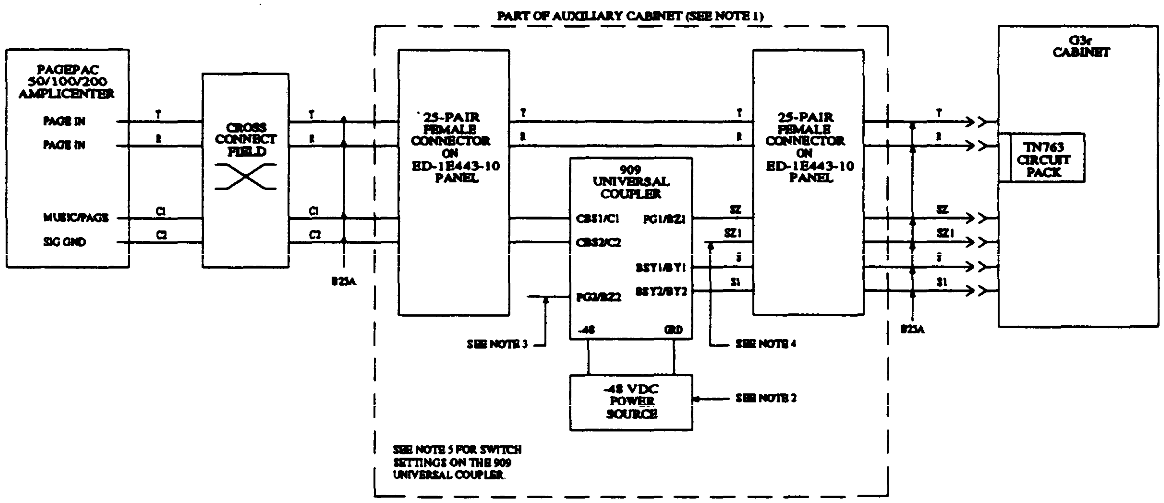
Figure 8-19. Connections from DEFINITY G3 to PagePac for Loudspeaker Paging



NOTES:

1. OPTION C APPLIQUE FOR LOOP START WITH 24V BATTERY MUST BE PROVIDED.

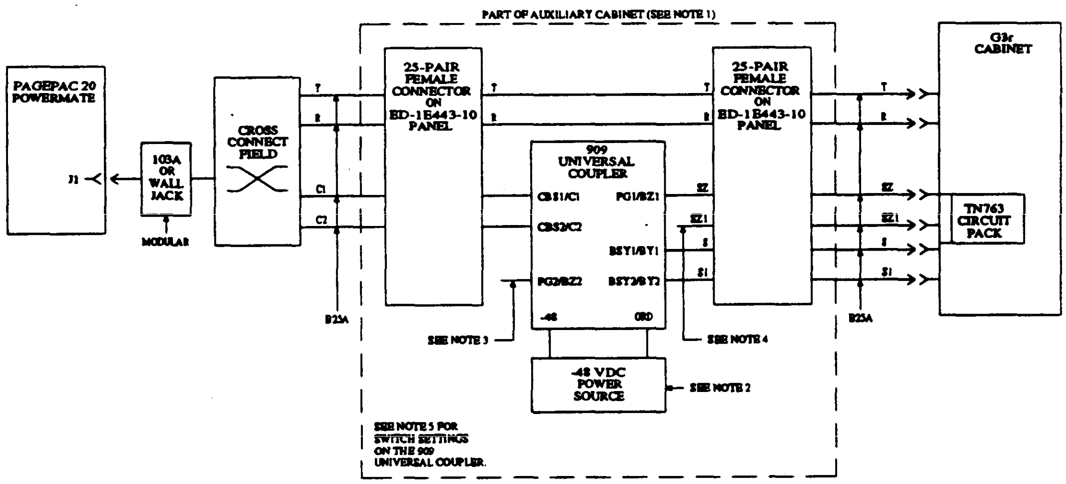
Figure 8-20. Connections from DEFINITY G3 to PagePac for Loudspeaker Paging



NOTES:

1. AUXILIARY CABINET IS OPTIONAL
2. USE -48V AND -48VRET FROM THE CABINET OR WALL FIELD OR A KS-22911L2 OR OTHER APPROVED -48VDC POWER SUPPLY
3. CONNECT PG2/BZ2 TO AN AVAILABLE DC POWER SOURCE OF -9.5 TO -60VDC.
4. CONNECT SZ1 TO THE GROUND OF THE DC POWER SOURCE USED FOR PG2/BZ2
5. SET S1 TO THE C2 POSITION. SET S2 POSITION 6 OPEN. ALL OTHERS. ARE "DON'T CARE".
6. TN763D REQUIRED IN SOME COUNTRIES

Figure 8-21. Connections from DEFINITY G3 to PagePac for Loudspeaker Paging



NOTES:

1. AUXILIARY CABINET IS OPTIONAL

2. USE -48V AND -48VRET FROM THE CABINET OR WALL FIELD OR A KS-22911L2 OR OTHER APPROVED -48VDC POWER SUPPLY

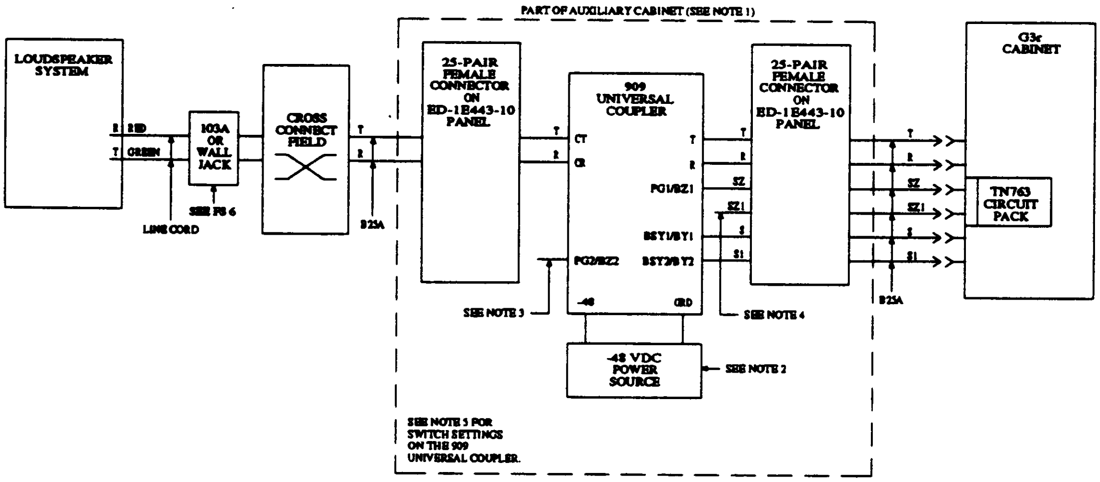
3. CONNECT PG2/BZ2 TO AN AVAILABLE DC POWER SOURCE OF -9.5 T0 -60VDC.

4. CONNECT SZ1 TO THE GROUND OF THE DC POWER SOURCE USED FOR PG2/BZ2.

5. SET S1 TO THE C2 POSITION. SET S2 SWITCH POSITION 6 OPEN. ALL OTHER SWITCHES ARE "DON'T CARE".

6. TN763D REQUIRED IN SOME COUNTRIES

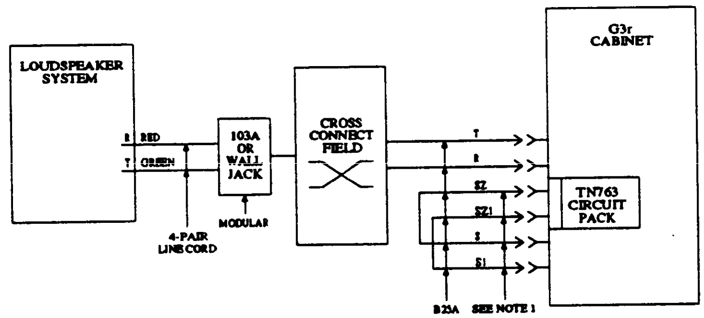
Figure 8-22. Connections from DEFINITY G3 to PagePac for Loudspeaker Paging



NOTES:

1. AUXILIARY CABINET IS OPTIONAL
2. USE -48V AND -48VRET FROM THE CABINET OR WALL FIELD OR A KS-22911L2 OR OTHER APPROVED -48VDC POWER SUPPLY
3. CONNECT PG2/BZ2 TO AN AVAILABLE DC POWER SOURCE OF -9.5 TO -60VDC.
4. CONNECT SZ1 TO THE GROUND OF THE DC POWER SOURCE USED FOR PG2/BZ2.
5. SET S1 TO THE C2 POSITION. SET S2 SWITCH POSITION 3 TO -9dBm OR -15dBm AS REQUIRED BY THE CENTRAL OFFICE. SET S2 SWITCH POSITION 6 OPEN. ALL OTHERS ARE "DON'T CARE".

Figure 8-23. Connections from DEFINITY G3 to Loudspeaker Paging Equipment with Paging Adapter

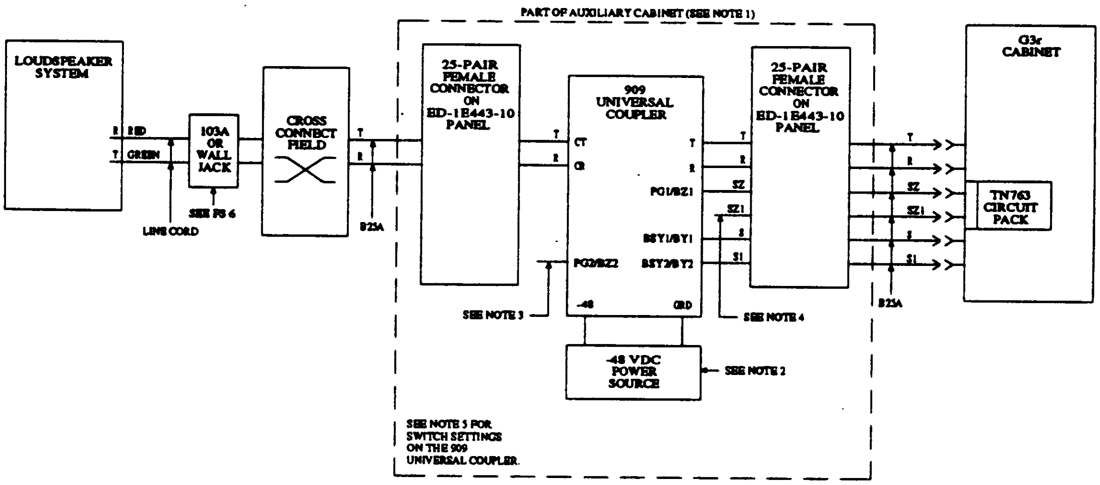


NOTES:

1. STRAP SZ TO S AND SZ1 TO S1 ON THE CONNECTING BLOCK.

2. TN763D REQUIRED IN SOME COUNTRIES

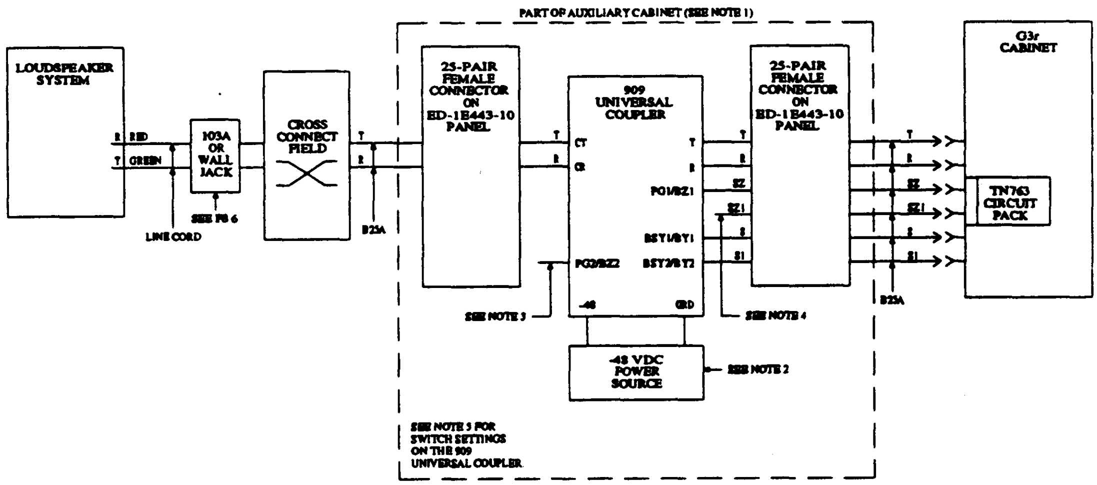
Figure 8-24. Connections from DEFINITY G3 to Loudspeaker Paging Equipment without Paging Adapter



NOTES:

1. AUXILIARY CABINET IS OPTIONAL
2. USE -48V AND -48VRET FROM THE CABINET OR WALL FIELD OR A K3-22911L2 OR OTHER APPROVED -48VDC POWER SUPPLY
3. CONNECT PG2/BZ2 TO AN AVAILABLE DC POWER SOURCE OF -9.5 TO -60VDC.
4. CONNECT SZ1 TO THE GROUND OF THE DC POWER SOURCE USED FOR PG2/BZ2.
5. SET S1 TO THE C2 POSITION. SET S2 SWITCH POSITION 3 TO -9dBm OR -15dBm AS REQUIRED BY THE CENTRAL OFFICE. SET S2 SWITCH POSITION 6 OPEN. ALL OTHERS ARE "DON'T CARE".

Figure 8-25. Connections from DEFINITY G3 to Loudspeaker Paging Equipment with 89A Control Units



NOTES:

1. AUXILIARY CABINET IS OPTIONAL

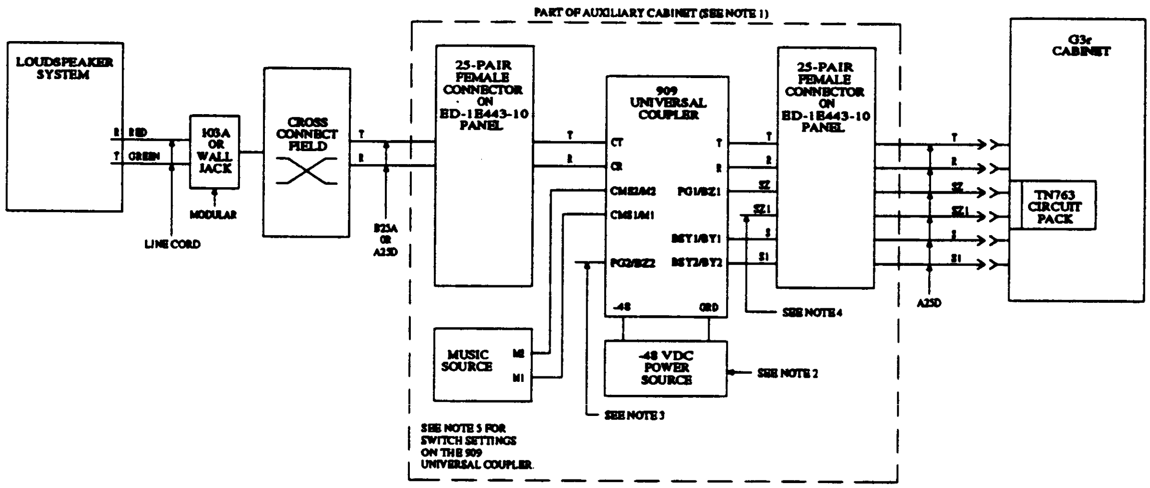
2. USE -48V AND -48VRET FROM THE CABINET OR WALL FIELD OR A KS-22911L2 OR OTHER APPROVED -48VDC POWER SUPPLY

3. CONNECT PG2/BZ2 TO AN AVAILABLE DC POWER SOURCE OF -9.5 TO -60VDC.

4. CONNECT SZ1 TO THE GROUND OF THE DC POWER SOURCE USED FOR PG2/BZ2.

5. SET S1 TO THE C2 POSITION. SET S2 SWITCH POSITION 3 TO -9dBm OR -15dBm AS REQUIRED BY THE CENTRAL OFFICE. SET S2 SWITCH POSITION 6 OPEN. ALL OTHERS ARE "DON'T CARE".

Figure 8-26. Connections from DEFINITY G3 to Loudspeaker Paging Equipment with Background Music



OPTION DESCRIPTION	SWITCH POSITIONS					
	1	2	3	4	5	6
8 OHM BACKGROUND MUSIC INPUT	C	O	X	X	X	X
1.5K OHM BACKGROUND MUSIC INPUT	O	C	X	X	X	X
>50K OHM BACKGROUND MUSIC INPUT	O	O	X	X	X	X
-9dBm 600 OPTION	X	X	C	X	X	X
-15dBm 600 OPTION	X	X	O	X	X	X
COUPLER AVAILABLE	X	X	X	X	X	O
LOCAL BUSY-OUT	X	X	X	X	X	C

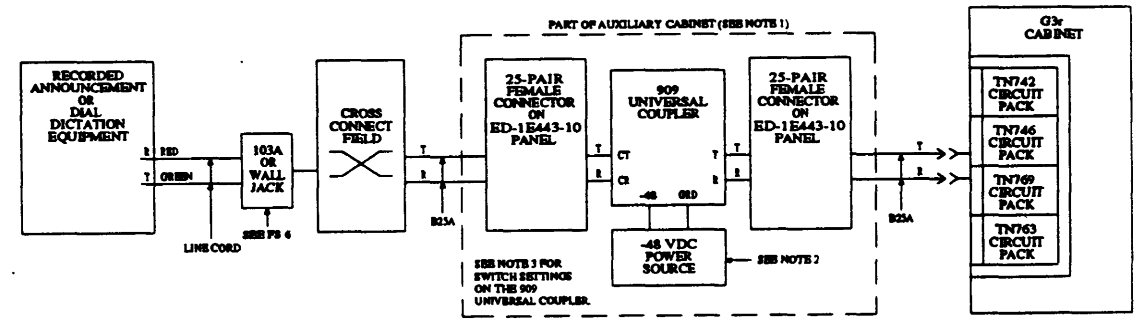
X - 'DON'T CARE'
O - OPEN
C - CLOSED

NOTES:

1. AUXILIARY CABINET IS OPTIONAL
2. USE -48V AND -48VRET FROM THE CABINET OR WALL FIELD OR A KS-22911L2 OR OTHER APPROVED -48VDC POWER SUPPLY
3. CONNECT PG2/BZ2 TO AN AVAILABLE DC POWER SOURCE OF -9.5 TO -60VDC.
4. CONNECT SZ1 TO THE GROUND OF THE DC POWER SOURCE USED FOR PG2/BZ2.
5. SET S1 TO THE C2 POSITION. SET S2 ACCORDING TO THE TABLE ABOVE.
6. TN763D REQUIRED IN SOME COUNTRIES.

Figure 8-27. Connections from DEFINITY G3 to Loudspeaker Paging Equipment with Background Music

Figures 8-28 and 8-29 show a G3 connected to recorded announcement equipment.



NOTES:

1. AUXILIARY CABINET IS OPTIONAL

2. USE -48V AND -48VRET FROM THE CABINET OR WALL FIELD OR A KS-22911L2 OR OTHER APPROVED -48VDC POWER SUPPLY

3. SET S1 TO THE C1 POSITION. SET S2 SWITCH POSITION 3 TO -9dBm OR -15dBm AS REQUIRED BY THE CENTRAL OFFICE. SET S2 SWITCH POSITION 6 OPEN. ALL OTHERS ARE "DON'T CARE".

4 OTHER ANALOG-LINE CIRCUIT PACKS MAY SE USED IN SOME COUNTRIES

Figure 8-28. Connections from DEFINITY G3 to Recorded Announcement Equipment

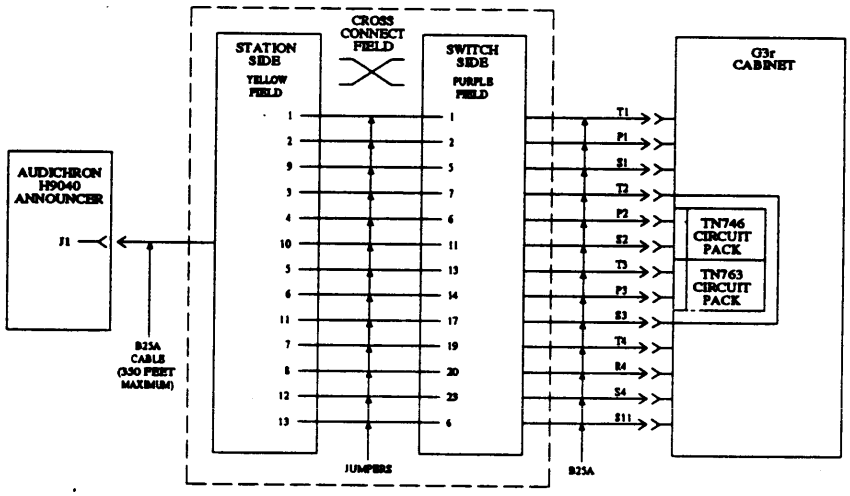
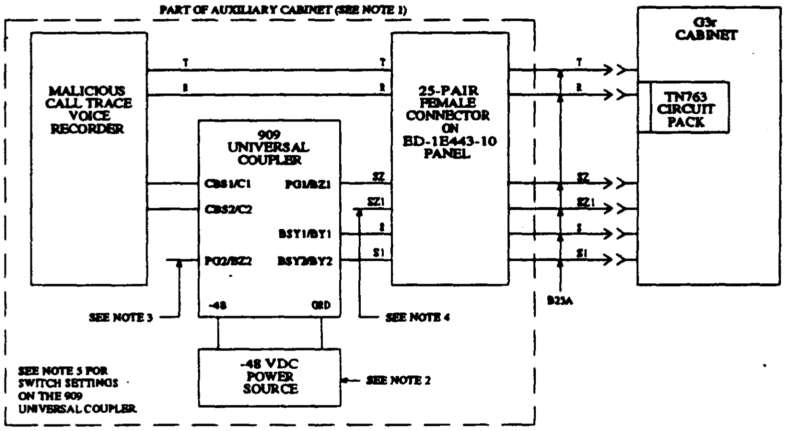


Figure 8-29. Connections from DEFINITY G3 to Recorded Announcement Equipment

Figure 8-30 shows a G3 connected to MCT equipment.



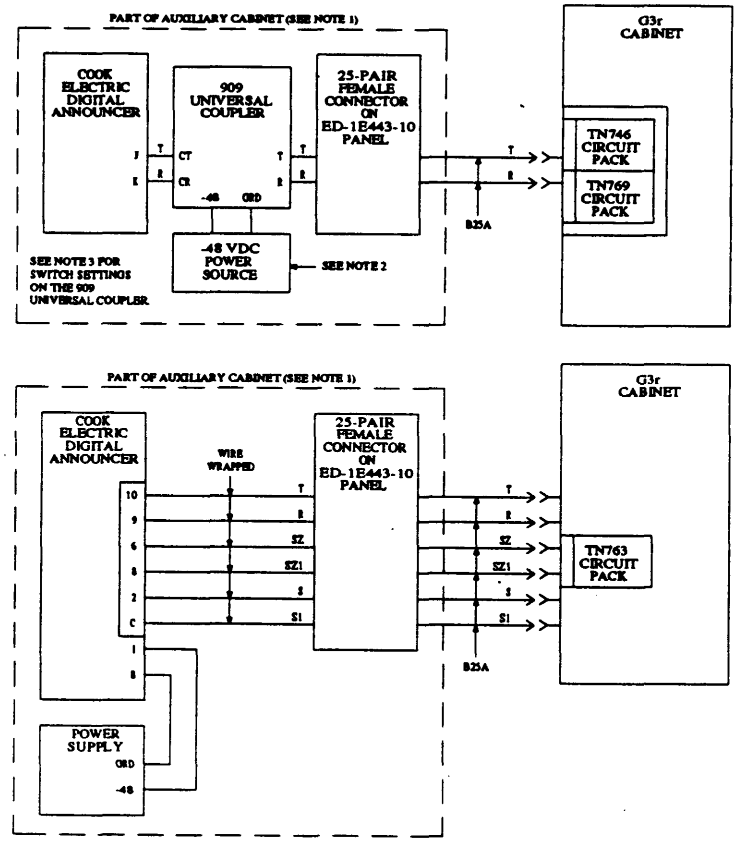
NOTES:

1. AUXILIARY CABINET IS OPTIONAL
2. USE -48V AND -48VRET FROM THE CABINET OR WALL FIELD OR A KS-22911L2 OR OTHER APPROVED -48VDC POWER SUPPLY
3. CONNECT PG2/BZ2 TO AN AVAILABLE DC POWER SOURCE OF -9.5 TO -60VDC.
4. CONNECT SZ1 TO THE GROUND OF THE DC POWER SOURCE USED FOR PG2/BZ2.
5. SET S1 TO THE C2 POSITION. SET S2 SWITCH POSITION 6 OPEN. ALL OTHER SWITCHES ARE "DON'T CARE".
6. OTHER AUX-TRUNK CIRCUIT PACKS MAY BE USED IN SOME COUNTRIES

Figure 8-30. Connections from DEFINITY G3 to MCT Equipment

8

Figure 8-31 shows a G3 connected to digital announcement equipment.

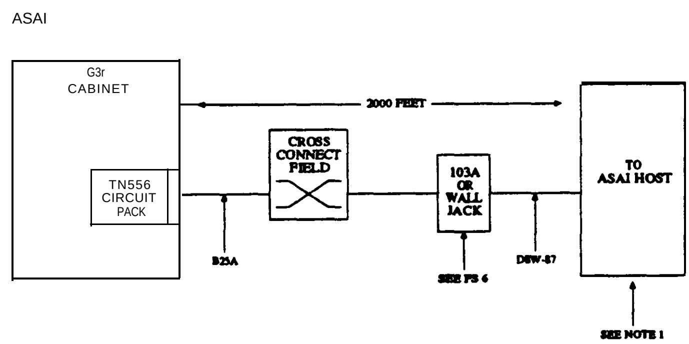


NOTES:

1. AUXILIARY CABINET IS OPTIONAL
2. USE -48V AND -48VRET FROM THE CABINET OR WALL FIELD OR A KS-22911L2 OR OTHER APPROVED -48VDC POWER SUPPLY
3. SET S1 TO THE C1 POSITION. SET S2 SWITCH POSITION 3 TO -9dBm OR -15dBm AS REQUIRED BY THE CENTRAL OFFICE. SET S2 SWITCH POSITION 6 OPEN. ALL OTHERS ARE "DON'T CARE".
4. OTHER ANALOG-LINE CIRCUIT PACKS MAY BE USED IN SOME COUNTRIES
5. OTHER AUX-TRUNK CIRCUIT PACKS MAY BE USED IN SOME COUNTRIES

Figure 8-31. Connections from DEFINITY G3 to Digital Announcement Equipment

Figure 8-32 shows a G3 connected to a CallVisor ASAI host.



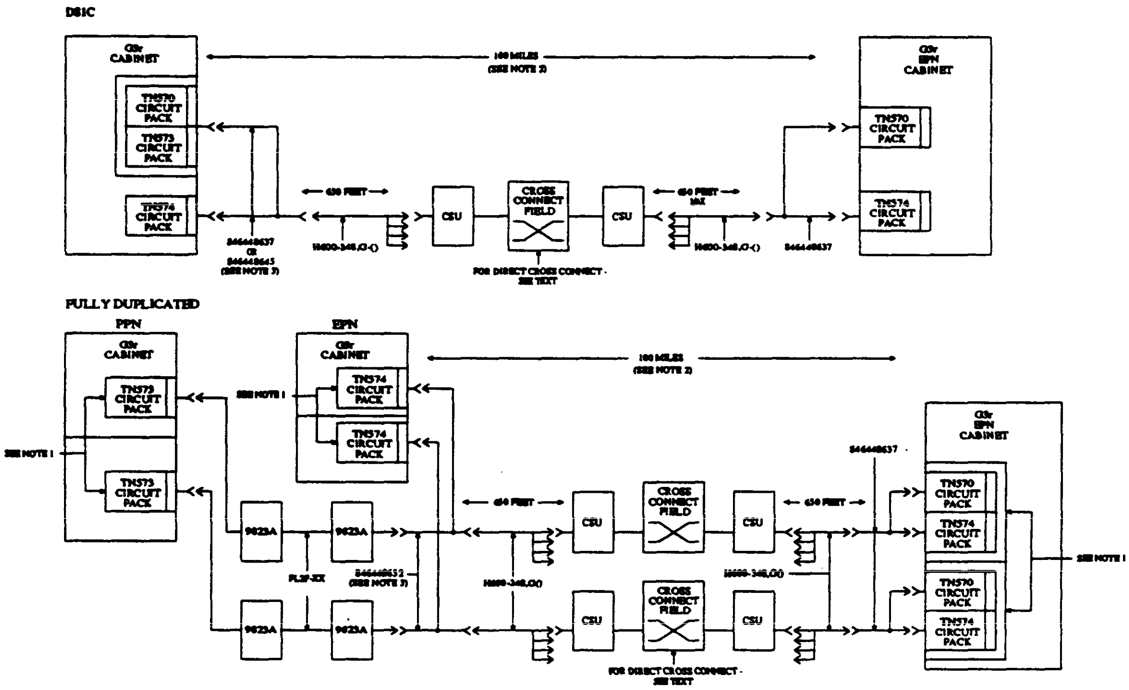
NOTES:

1. NEEDS TO BE COMPATIBLE WITH ISDN-BRI

Figure 8-32. Connections from DEFINITY G3 to a CallVisor ASAI Host

DCS Links

Figures 8-33 to 8-38 show a G3r connected through DCS links to other switches.



NOTES:

1. PLACE DUPLICATE PAIRS IN DIFFERENT CARRIERS.

2. WHEN REMOTING TWO (2) OR MORE, THE MAXIMUM CABLE DISTANCE BETWEEN ANY TWO (2) REMOTED END POINTS IS 100 MILES. FOR EXAMPLE, IF EPN 1 IS 75 MILES FROM THE PPN, THEN EPN2 CAN ONLY BE 25 MILES FROM THE PPN.

3. 846447637 IS USED IN A CARRIER. 846448645 IS USED IN A CABINET BETWEEN CARRIERS.

Figure 8-33. Connections from DEFINITY G3 to Other Systems, Using DCS Links

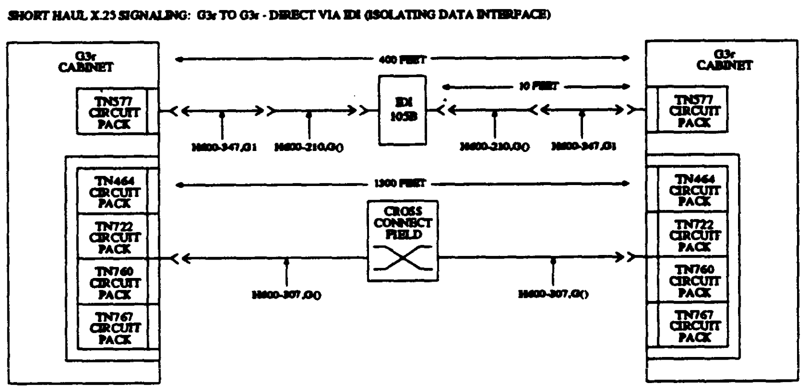
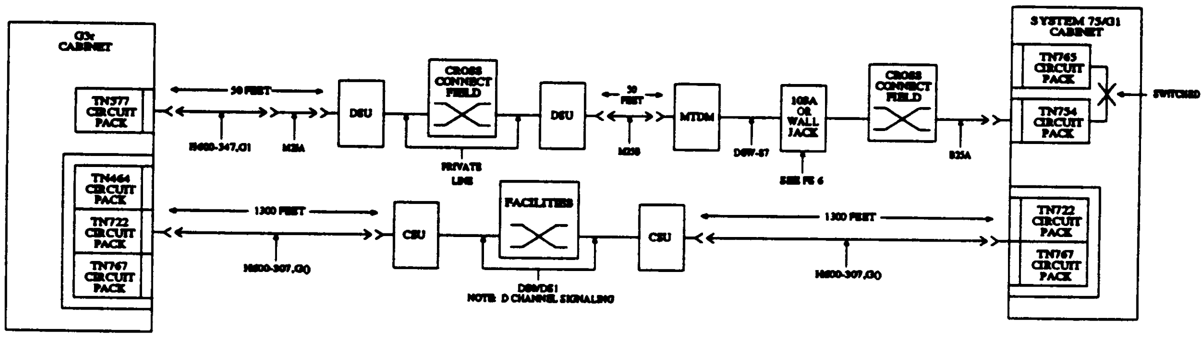


Figure 8-34. Connections from DEFINITY G3 to Other Systems, Using DCS Links

8

LONG HAUL X.25 SIGNALING: G3r TO SYSTEM 75/G1 VIA DSU



SHORT HAUL X.25 SIGNALING: G3r TO SYSTEM 75/G1 VIA MPDM

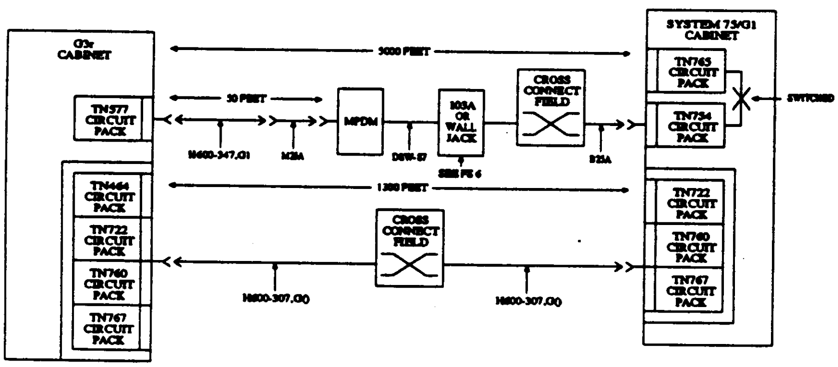


Figure 8-35. Connections from DEFINITY G3 to Other Systems, Using DCS Links

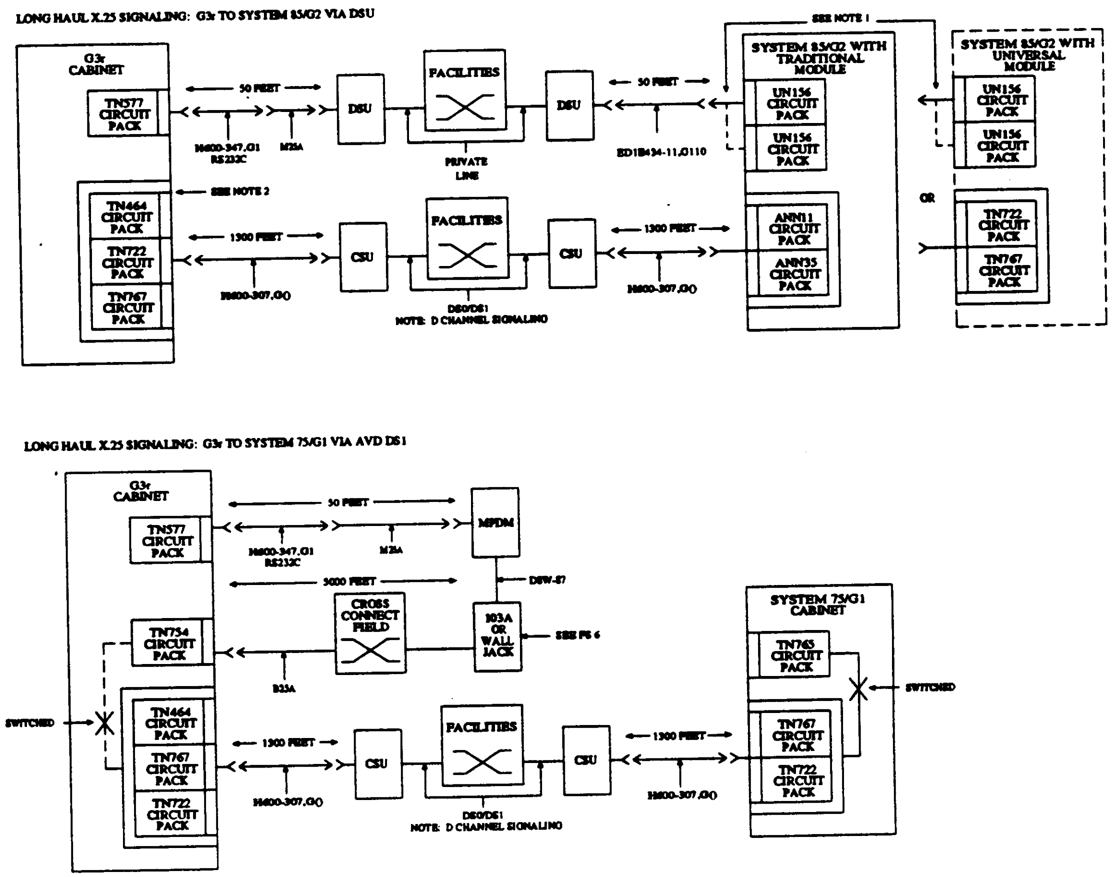
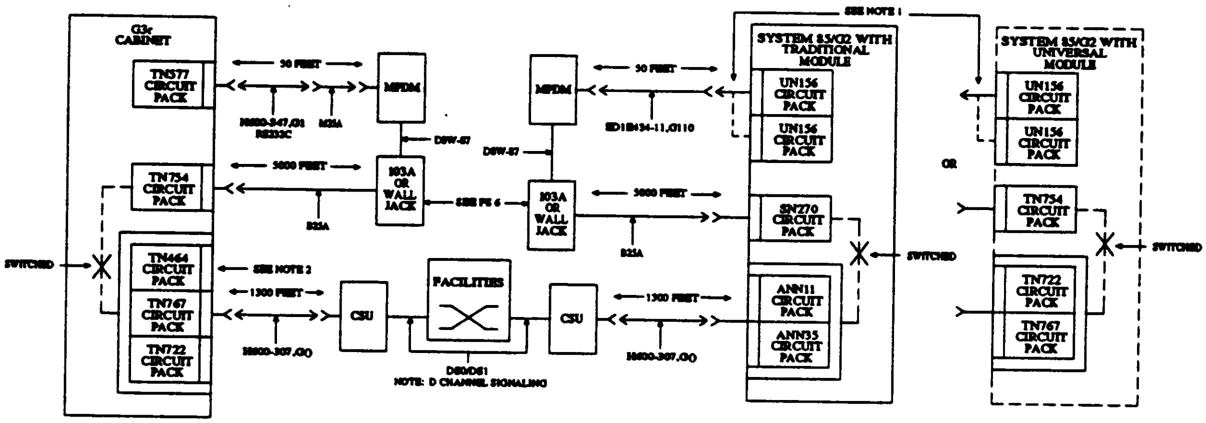
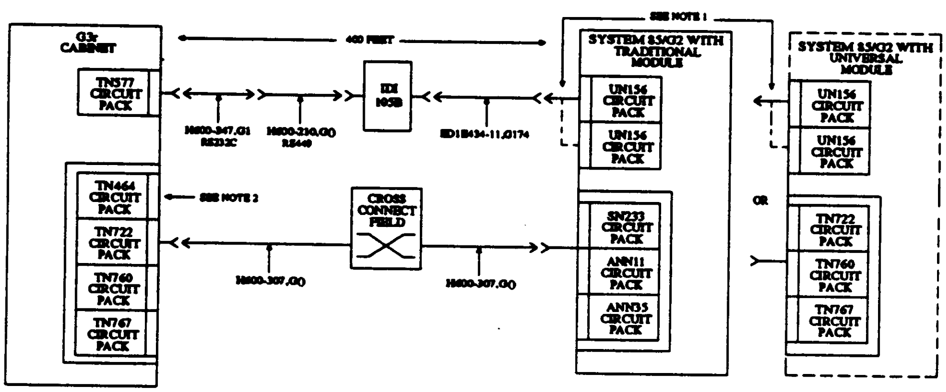


Figure 8-36. Connections from DEFINITY G3 to Other Systems, Using DCS Links

LONG HAUL X.25 SIGNALING: G3r TO SYSTEM 85/G2 VIA AVD DS1



SHORT HAUL X.25 SIGNALING: G3r TO SYSTEM 85/G2 - DIRECT VIA IDI (ISOLATION DATA INTERFACE)

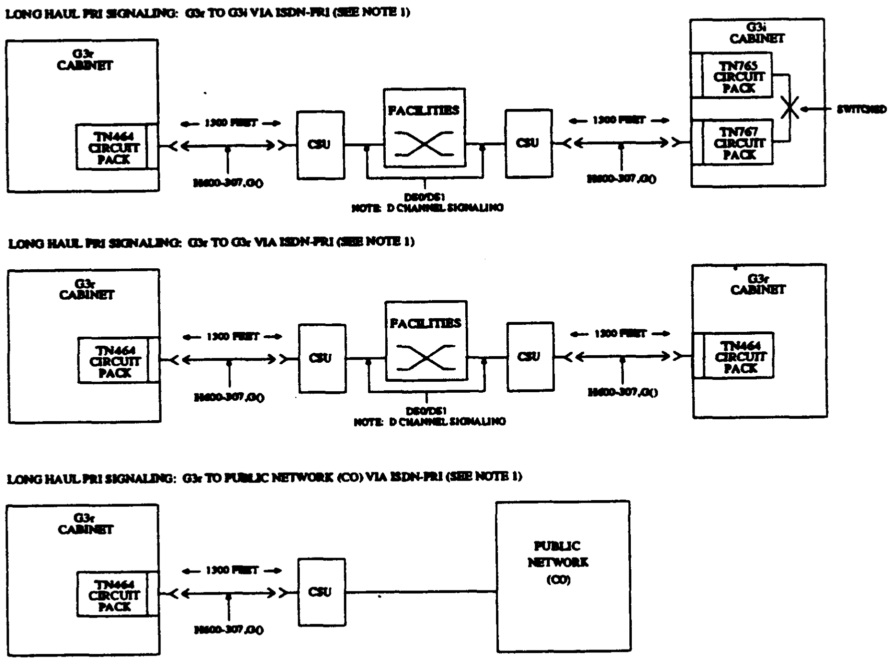


NOTES:

1. WHEN DUPLICATING UN156'S, CONNECT ED1E434-11,G342 TO BOTH UN156'S AND ED1E434-11,G174.

2. WHEN USING TN464, USE ANN35 ON G2 TRADITIONAL MODULE SIDE.

Figure 8-37. Connections from DEFINITY G3 to Other Systems, Using DCS Links



NOTES:

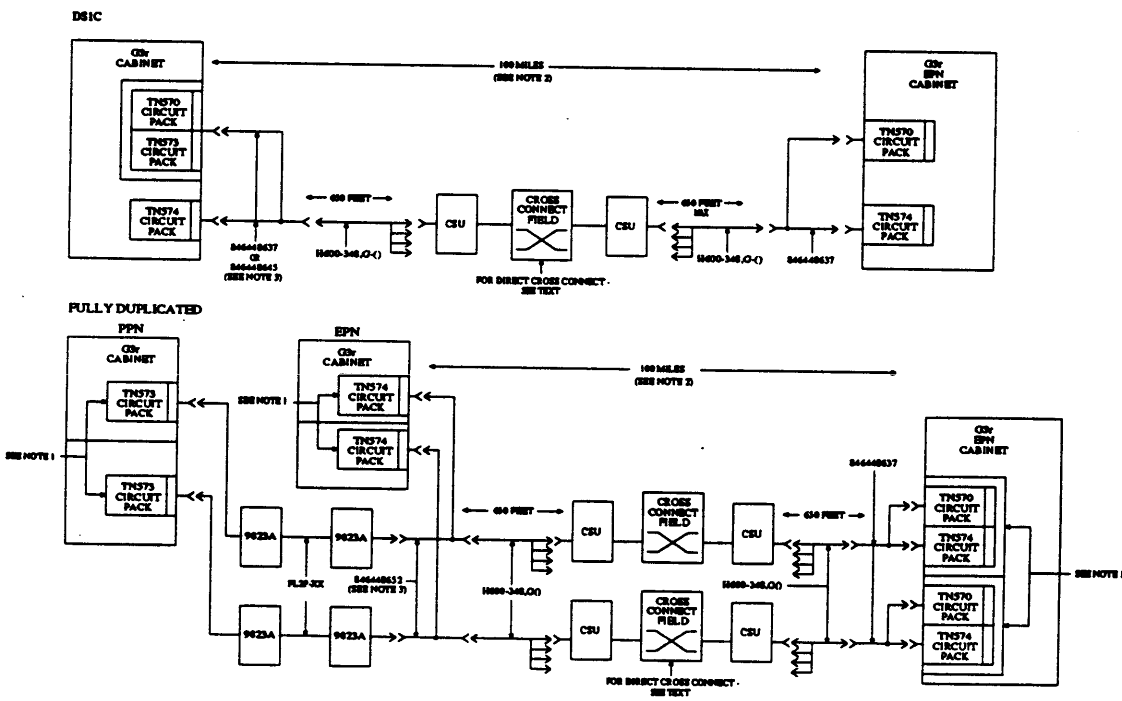
1 TYPICAL DCS OVER ISDN PRI D CHANNEL LINK CONNECTION

Figure 8-38. Connections from DEFINITY G3 to Other Systems, Using DCS Links

8

DS1C Connections

Figure 8-39 shows a G3 connected to remote systems by using DS1C.



NOTES:

1. PLACE DUPLICATE PAIRS IN DIFFERENT CARRIERS.

2. WHEN REMOTING TWO (2) OR MORE, THE MAXIMUM CABLE DISTANCE BETWEEN ANY TWO (2) REMOTED END POINTS IS 100 MILES. FOR EXAMPLE, IF EPN 1 IS 75 MILES FROM THE PPN, THEN EPN2 CAN ONLY BE 25 MILES FROM THE PPN.

3. 846447637 IS USED IN A CARRIER. 846448645 IS USED IN A CABINET BETWEEN CARRIERS.

Figure 8-39. Connections from DEFINITY G3 to Other Systems, Using DS1C

DEFINITY G1 Connections

Figures 8-40 through 8-43 show connections from a G1 to peripherals.

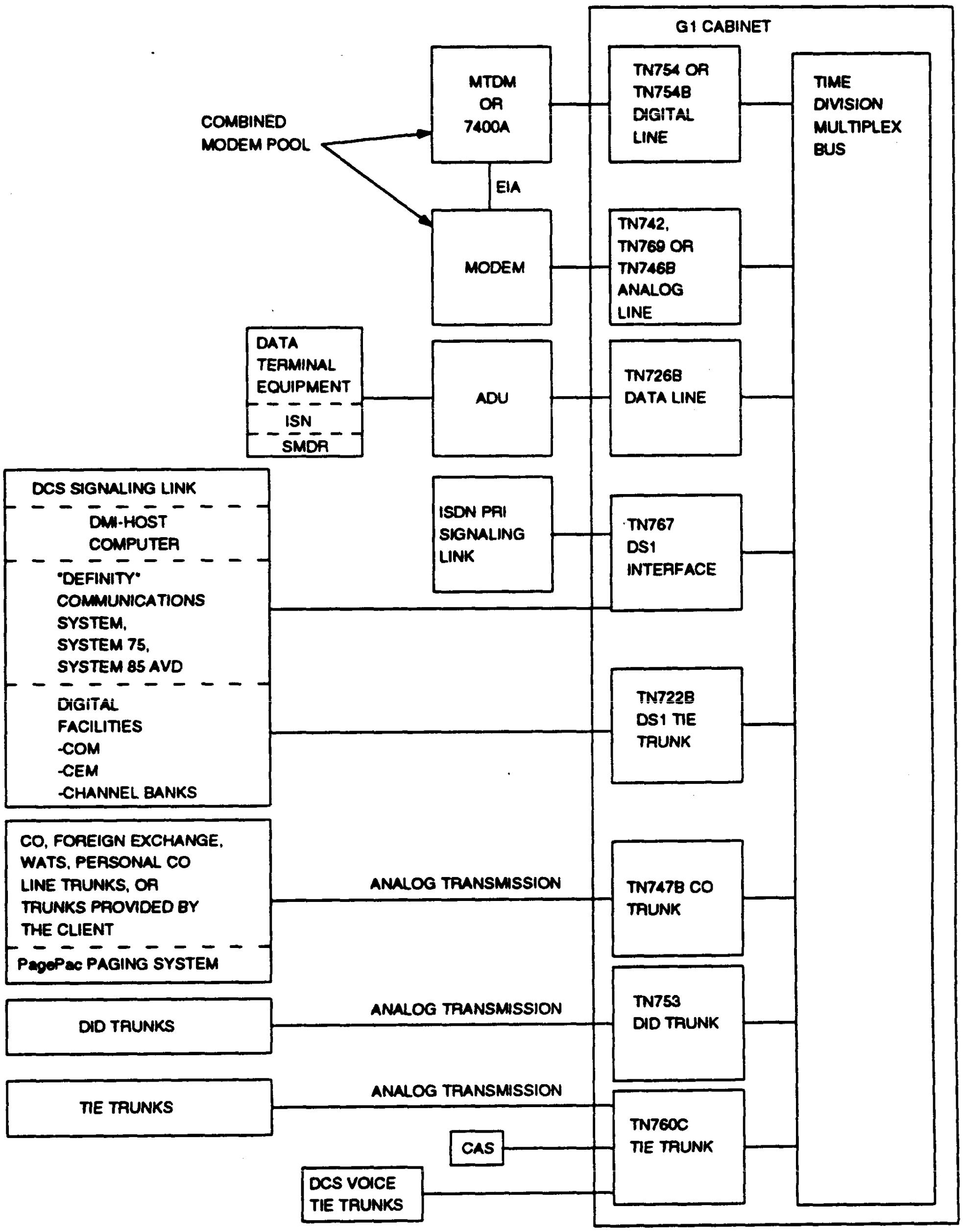
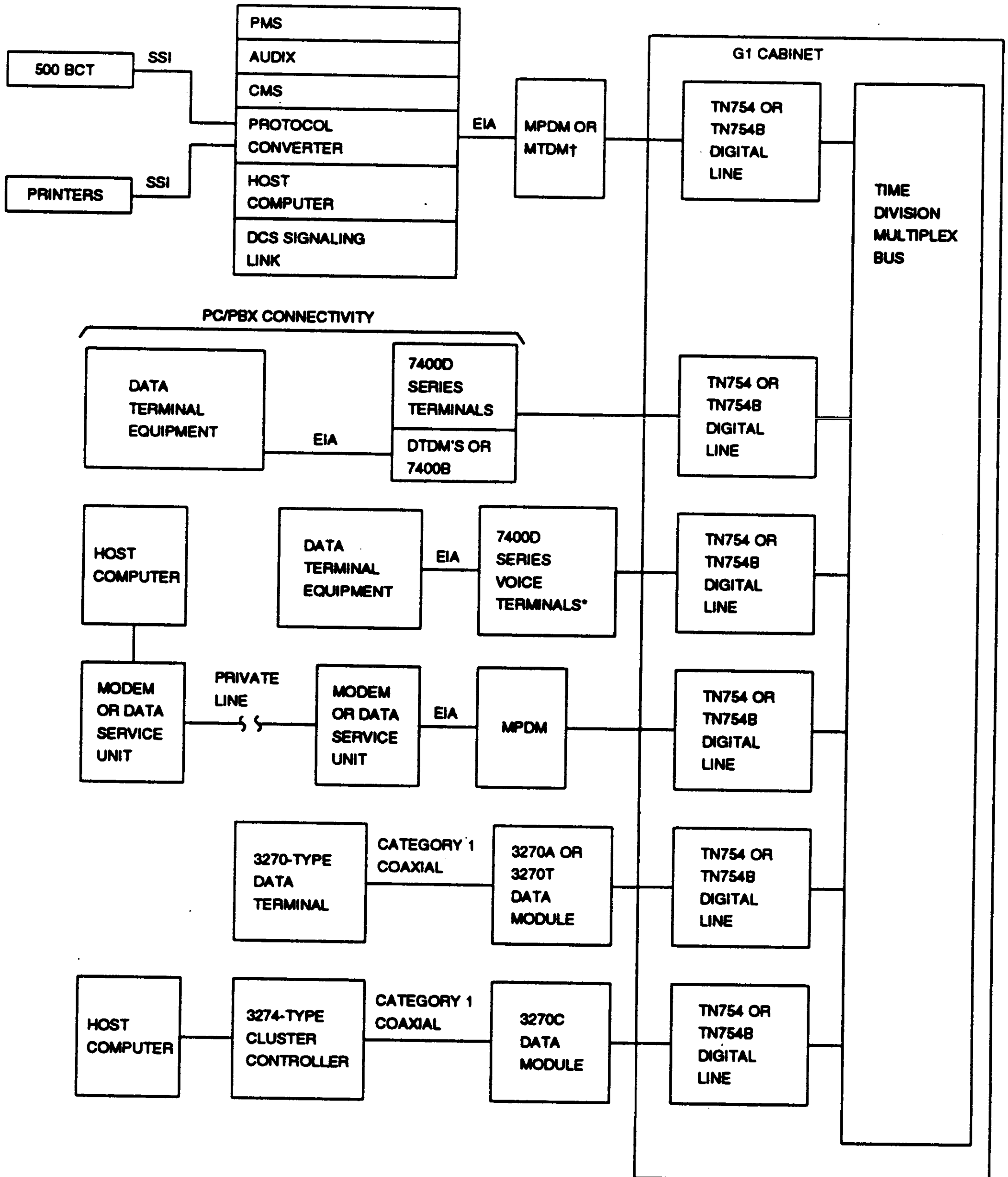


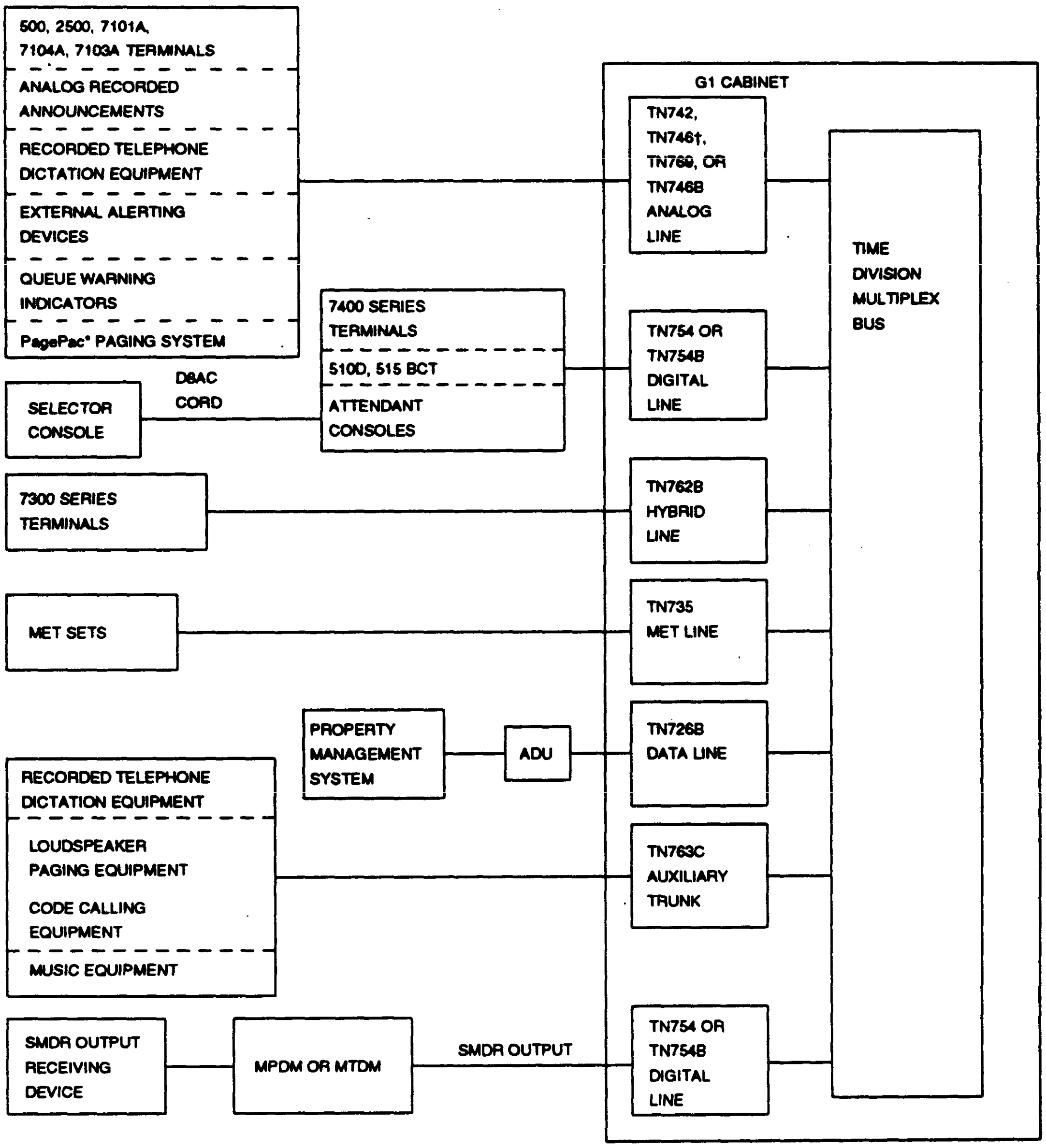
Figure 8-40. Connections from DEFINITY G1 to Peripherals



* 7407D MUST BE EQUIPPED WITH OPTIONAL DATA MODULE BASE

† MTDM IS REQUIRED FOR A LARGE AUDIX

Figure 8-41. Connection from DEFINITY G1 to Peripherals



* REGISTERED TRADEMARK OF HARRIS CORPORATION DRACON DIVISION

† THE TN746 CONNECTS ONLY TO 500 AND 2500 TERMINALS. CONNECTION TO AUXILIARY EQUIPMENT SUCH AS RECORDED TELEPHONE DICTATION IS NOT RECOMMENDED

Figure 8-42. Connections from DEFINITY G1 to Peripherals

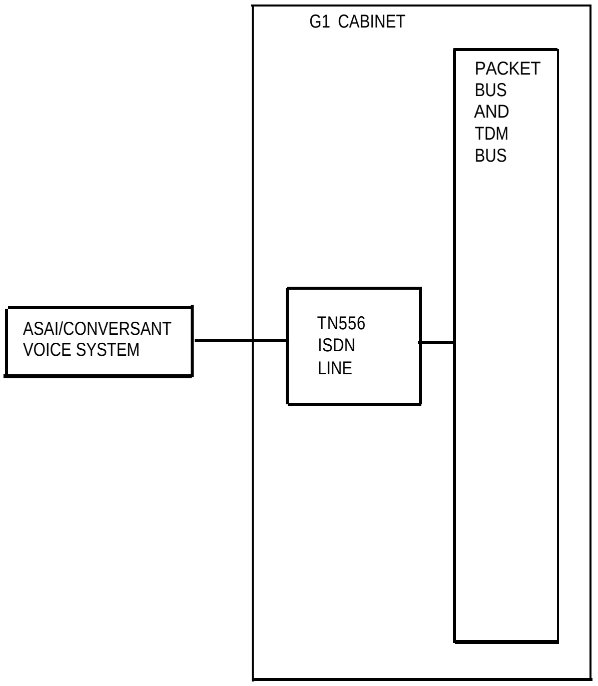


Figure 8-43. Connections from DEFINITY G1 to Peripherals

Maintenance

9

The primary objective of maintenance in the system is to detect, report, and clear troubles as quickly as possible and with minimum disruption of normal service. Periodic tests, automatic software diagnostic programs, and fault detection hardware support the objective and allow most troubles to be traced to a circuit pack in the system.

The system hardware is maintained as a group of independent units that are separately replaceable. The units include circuit packs, power units, fans, the tape drive, and voice terminals.

The two general categories within maintenance are: system-alarmed troubles and user-reported troubles. For alarmed troubles, both a remote maintenance facility (if provided), a local terminal, and any customer-premises-equipment (CPE) alarm are automatically alerted. Most alarms are also reported by lights on the circuit packs in the system. User-reported troubles usually result from service problems at individual voice and data terminals and are often related to alarmed conditions.

The major part of maintenance is directed toward system-alarmed troubles. The system detects and reports most problems automatically. The system automatically retires alarms. After an alarmed trouble has been cleared, the system retests the previously faulty area. When the trouble is no longer detected, the alarm is removed. It is not necessary for personnel to retire alarms after a problem has been fixed. However, testing a fixed condition and manually retiring the alarm is faster than allowing the system to automatically retire the alarm.

Hardware Used for Maintenance

The following hardware is used in fault detection diagnosis and repair:

- Maintenance circuit located on the processor circuit pack in the PPN cabinet, which functions as follows:
  - — Sends alarm information to a terminal
  - — Indicates system status by alarm lights
  - — Provides emergency transfer switching and control
  - — Monitors and controls the reset condition and operation of the SPE
  - — Monitors and controls the power units
  - — Provides direct access to a terminal
  - — Provides an asynchronous modem that allows personnel to enter maintenance and administration commands at a remote terminal
  - — Displays alarms remotely
- Maintenance/test circuit pack in the PPN, which functions as follows:
  - — Provides ISDN PRI trunk test calls
  - — Provides packet bus reconfiguration for systems with the critical reliability option and the CallVisor ASAI.
- Maintenance circuit pack in an EPN, which functions as follows:
  - — Controls emergency transfer switch for EPN cabinet
  - — Monitors and controls the cabinet environment and power signals
  - — Provides two serial links for communication with El circuit packs
  - — Provides direct access from EPN to a terminal
- G3-MT terminal, which provides a maintenance interface for personnel
- Two red lights on the attendant console, which are labeled “Alm” and “Ack.” The left light is lit steadily when there is a major or minor alarm at the switch cabinet. The right light is lit steadily if the alarm has been successfully reported to a remote location. If the system is unable to report the alarm to the location, the right light flashes, which is a signal for the attendant to call the location and report the alarm. Both lights are unlit after the alarm is cleared or if there is no alarm.

- Duplication interface circuit pack with the high reliability and critical reliability options, which functions as follows:
  - Monitors the status of each processor
  - Controls the state of the standby processor
  - Allows maintenance to be performed on the standby processor and the results recorded in the active processor
  - Provides access to a terminal
  - Has memory shadowing to update the memory of the standby SPE
- Multifunction voice terminals — major, minor, and warning buttons can be administered
- Circuit pack lights indicate the following when lit:
  - Red (for alarm), which indicates the system has detected a fault in that circuit pack
  - Green (for test), which indicates the system is running tests on that circuit pack
  - Amber (for busy), which indicates that circuit pack is operating
- In-line error detection circuitry, which checks for correct operation

Tests

Maintenance tests are divided into two groups: periodic and demand. The periodic tests run automatically at fixed intervals on a specific schedule. The short tests run hourly, and the long tests run every 24 hours. Heavy call processing extends the interval of these tests.

Demand tests are run by the system when it detects a need for them or by personnel when required during trouble- clearing activities. Demand tests include the periodic tests and others that are required only when trouble occurs. Some of the nonperiodic tests may be disruptive to system operation. Using a terminal, personnel can initiate the same tests that the system initiates, and the results are displayed on the terminal screen.

With the high reliability and critical reliability options, maintenance tests on the standby SPE are initiated by the active SPE. The active SPE transfers the standby SPE to the maintenance test mode before proceeding with any tests. When testing is completed, the active SPE places the standby SPE back in the standby mode.

Procedures

If part of the system fails some of the periodic tests a preset number of times, the system automatically generates an alarm. This alarm alerts personnel that action is required to restore the system to a normal condition. The system supports three levels of alarms:

- Major alarms, which are failures that cause critical degradation of service and require immediate attention
- Minor alarms, which are failures that cause marginal degradation of service while not rendering a crucial portion of the system inoperable. This condition requires action, but its consequences are not immediate. Problems that cause minor alarms might be impaired service in a few trunks or stations or interference with one feature across the entire system.
- Warning alarms, which are failures that are localized and cause no noticeable degradation of service. Warning alarms are not reported to the attendant console or a remote location.

The system sends an alarm to any CPE device such as a light, an automatic dialer, a bell, or other CPE. The CPE alarm activation level field on the system parameters maintenance screen must be administered to indicate the alarm level (major, minor, warning, or none) that activates the CPE device. Some alarm levels are adjustable by the Set Options feature.

Error and Alarm Logs

A record of system errors is recorded on an error log, which can be displayed on a terminal. The log is useful for analyzing problems that have not caused an alarm or when alarms cannot be retired by replacement of hardware.

When errors result in alarms, the alarms are listed on another record called the alarm log. The alarm log can also be displayed on a terminal. If a number of alarms are active, the alarm log can be used to determine which alarms should be cleared first.

The alarm log and the error log list current unresolved conditions and past alarms and errors that provide a profile of system maintenance. Both logs are saved on tape after a major system failure or restart.

Local and Remote Testing

A terminal connected directly to the system or a remote terminal can be used to do the following:

- Display error and alarm logs
- Test circuit packs
- Test system functions
- Turn off (busyout) and release system equipment
- Reset the system

Port Circuit Pack Replacement and Testing

A port circuit pack can be replaced without turning off power or interrupting service except in the area directly affected by the replacement. Verification tests are automatically run on the circuit pack when it is plugged in.

Documents

For maintenance information, see the following AT&T documents:

- For G1, G3i, and G3i-G: “DEFINITY Communications System Generic 1 and Generic 3i — Maintenance” (555-204-105)
- For G3r: “DEFINITY Communications System Generic 3r — Maintenance” (555-230-105)

Environmental Requirements

10

This chapter describes the floor area and wall area required for the system and associated peripheral equipment installed in the equipment room. Also included are specifications for temperature, humidity, air purity, and lighting levels in the equipment room.

Floor Area

Floor area requirements in the equipment room vary between multicarrier cabinets and single-carrier cabinets.

Multicarrier Cabinets

The following system equipment and optional peripheral equipment occupies the following floor area in the equipment room:

- System Cabinet and Cable Slack Manager—The system cabinet is 32 inches (81 cm) wide and 28 inches (71 cm) deep. The cabinet is 70 inches (1.8 m) high. The cable slack manager requires 38 inches between the cabinet and wall. Each cabinet (including the door opening) and cable slack manager occupy about 22 square feet (2 square m) of floor area.
- Auxiliary Cabinet—The auxiliary cabinet is 32 inches (81 cm) wide, 28 inches (71 cm) deep, and 70 inches (1.8 m) high. This cabinet (including the door opening and maintenance area behind the cabinet) occupies about 22 square feet (2 square m) of floor area.

Single-Carrier Cabinets

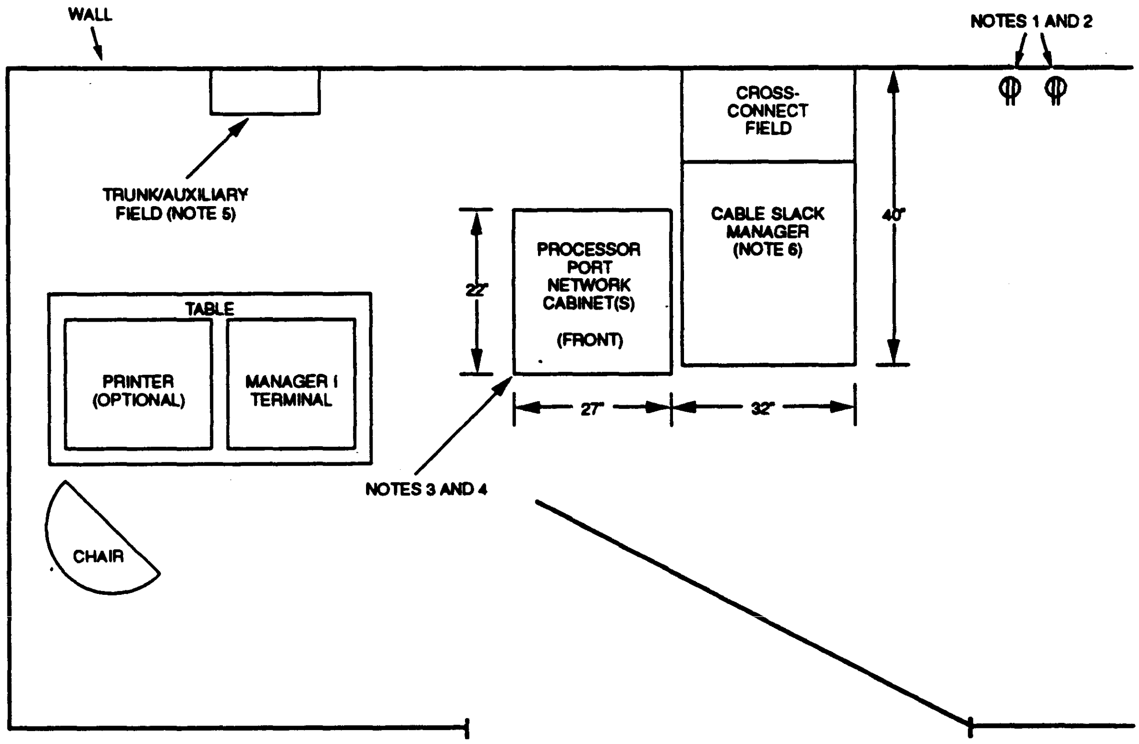
The following system equipment and optional peripheral equipment occupies the following floor area in the equipment room:

- System Cabinet and Cable Slack Manager—The system cabinet is 27 inches (69 cm) wide and 22 inches (56 cm) deep. A single cabinet is about 20 (51 cm) inches high, a 2-cabinet system is 39 inches (99 cm) high, a three-cabinet system is 58 inches (1.5 m) high, and a four-cabinet system is 77 inches (2 m) high. The cable slack manager requires 38 inches between the cabinet and wall. The system cabinets and cable slack manager occupy about 8 square feet (.74 square m) of floor area.

Floor Plans

Floor plans of the system and peripheral equipment vary depending on the size and shape of the equipment room and the extent of growth planned for the system. The wall behind a system cabinet must be clear of all objects (pictures, shelves, or windows) that are not required in the system installation. The entire area behind a cabinet must be reserved for the crossconnect field and the cable access panel (when provided). Also, room for system growth should be considered.

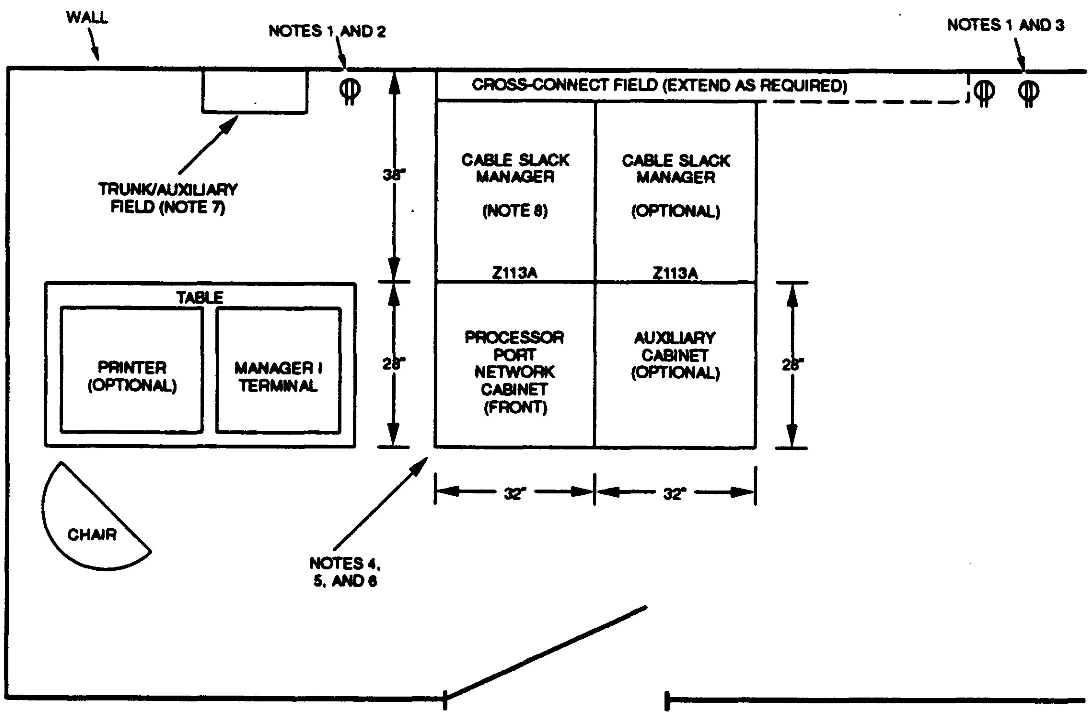
Figures 10-1 through 10-4 show typical floor plans.



NOTES:

1. POWER OUTLETS SHOULD BE LOCATED OUTSIDE THE CROSS-CONNECT FIELD AREA. POWER OUTLET(S) MUST NOT BE UNDER SWITCH CONTROL AND MUST NOT BE SHARED WITH OTHER EQUIPMENT.
2. PROCESSOR PORT NETWORK CABINETS REQUIRE A SPECIAL 120-VOLT 60-HZ, 15-AMP OR 20-AMP POWER OUTLET (NEMA 5-15 OR NEMA 5-20 RECEPTACLE, OR EQUIVALENT).
3. SYSTEM MUST BE GROUNDED BY ONE OF THE APPROVED METHODS LISTED IN THIS SECTION.
4. EARTHQUAKE PROTECTION MAY BE REQUIRED.
5. THE TRUNK/AUXILIARY FIELD MAY BE LOCATED WITHIN THE CROSS-CONNECT FIELD.
6. EACH SCC USES 10-FOOT B25A CABLES FROM THE A AND B CABINET POSITIONS AND 15-FOOT B25A CABLES FROM THE C AND D CABINET POSITIONS. FIBER CONNECTIONS BETWEEN PORT NETWORKS USE 20-FOOT (FL2P-P-20) FIBER CABLE.

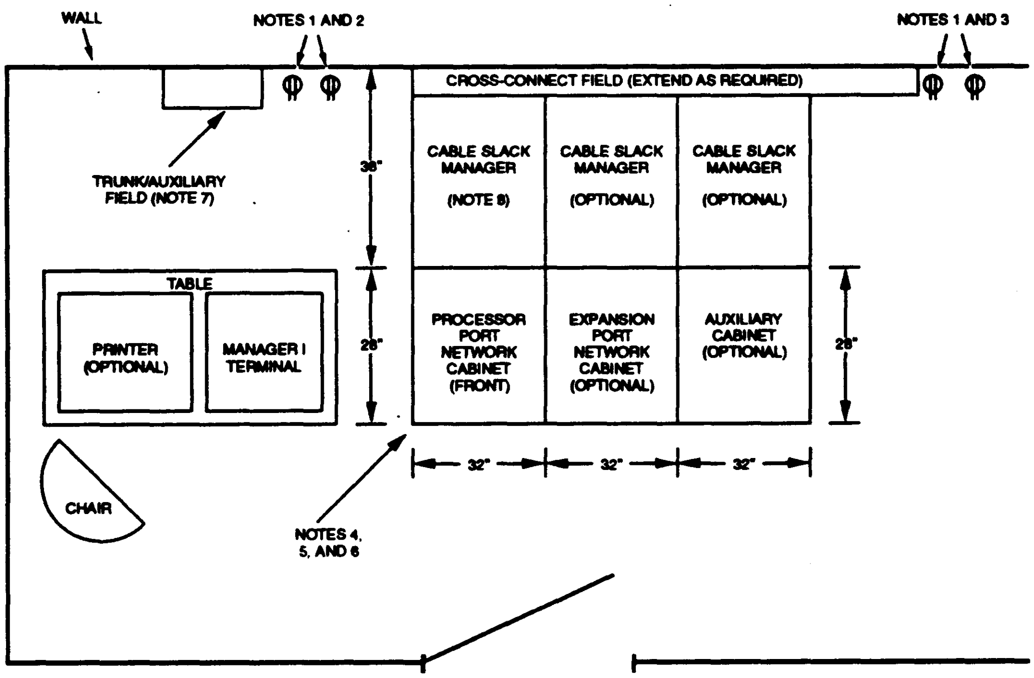
Figure 10-1. Typical Single-Carrier Cabinet Floor Plan



NOTES:

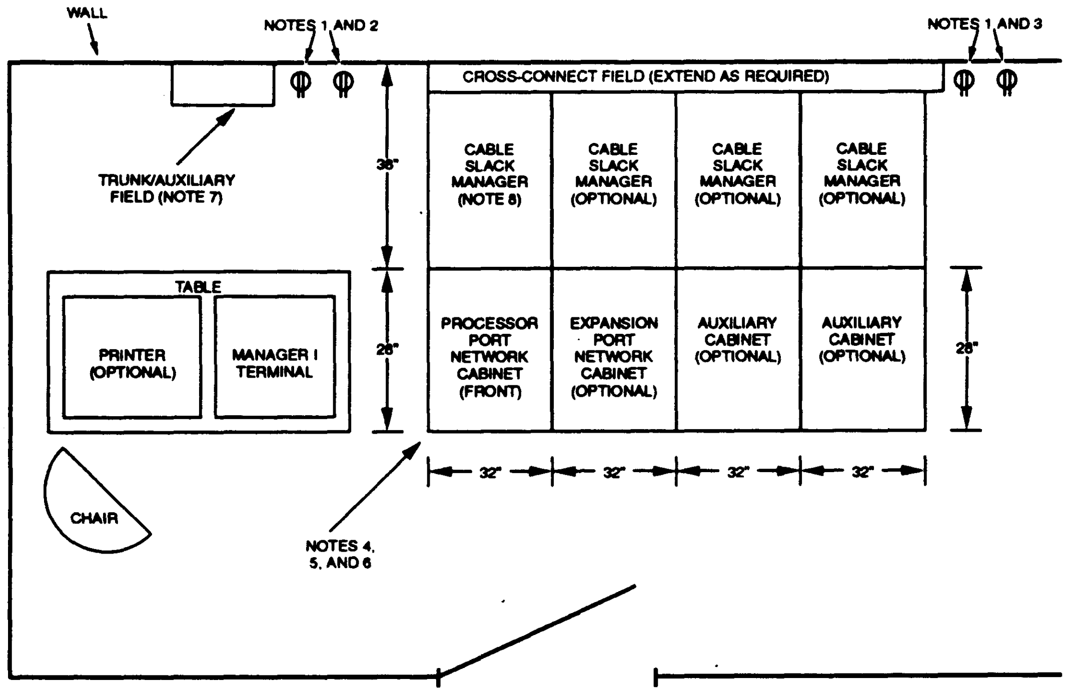
1. POWER OUTLETS MUST NOT BE UNDER SWITCH CONTROL, MUST NOT BE SHARED WITH OTHER EQUIPMENT, AND SHOULD BE LOCATED OUTSIDE THE CROSS-CONNECT FIELD AREA.
2. PROCESSOR PORT NETWORK CABINET REQUIRES A SPECIAL 120-VOLT, 60-HZ, 50-AMP POWER OUTLET (NEMA 5-50R RECEPTACLE, OR EQUIVALENT).
3. AUXILIARY CABINET REQUIRES A SPECIAL 120-VOLT, 60-HZ, 20-AMP POWER OUTLET (NEMA 5-20R RECEPTACLE, OR EQUIVALENT).
4. ALLOW AT LEAST 36 INCHES (91.4CM) OF SPACE IN FRONT OF CABINET TO PERMIT DOOR TO SWING OPEN.
5. SYSTEM MUST BE GROUNDED BY ONE OF THE APPROVED METHODS.
6. EARTHQUAKE PROTECTION MAY BE REQUIRED.
7. THE TRUNK/AUXILIARY FIELD MAY BE LOCATED WITHIN THE CROSS-CONNECT FIELD.
8. EACH MCC CABINET USES 10-FOOT B25A CABLES FROM THE D AND E CABINET POSITIONS AND 15-FOOT B25A CABLES FROM THE A, B, AND C CABINET POSITIONS. FIBER CONNECTIONS BETWEEN PORT NETWORKS USE 20-FOOT (FL2P-P-20) FIBER CABLE.

Figure 10-2. Typical Multicarrier PPN Cabinet and Auxiliary Cabinet Floorplan



NOTES:
1. POWER OUTLETS MUST NOT BE UNDER SWITCH CONTROL, MUST NOT BE SHARED WITH OTHER EQUIPMENT AND SHOULD BE LOCATED OUTSIDE THE CROSS-CONNECT FIELD AREA.
2. PROCESSOR PORT NETWORK AND EXPANSION PORT NETWORK CABINETS REQUIRE SPECIAL 120-VOLT, 60-HZ, 50-AMP POWER OUTLETS (NEMA 5-50R RECEPTACLE, OR EQUIVALENT).
3. AUXILIARY AND AP CABINETS REQUIRE A SPECIAL 120-VOLT, 60-HZ, 20-AMP POWER OUTLET (NEMA 5-20R RECEPTACLE, OR EQUIVALENT).
4. ALLOW AT LEAST 36 INCHES (91.4CM) OF SPACE IN FRONT OF CABINET TO PERMIT DOOR TO SWING OPEN
5. SYSTEM MUST BE GROUNDED BY ONE OF THE APPROVED METHODS.
6. EARTHQUAKE PROTECTION MAY BE REQUIRED.
7. THE TRUNK/AUXILIARY FIELD MAY BE LOCATED WITHIN THE CROSS-CONNECT FIELD.
8. EACH MCC CABINET USES 1O-FOOT B25A CABLES FROM THE D AND E CABINET POSITIONS AND 15-FOOT B25A CABLES FROM THE A, B, AND C CABINET POSITIONS. FIBER CONNECTIONS BETWEEN PORT NETWORKS USE 20-FOOT (FL2P-P-20) FIBER CABLE.

Figure 10-3. Typical Multicarrier PPN Cabinet, EPN Cabinet, and Auxiliary Cabinet Floorplan

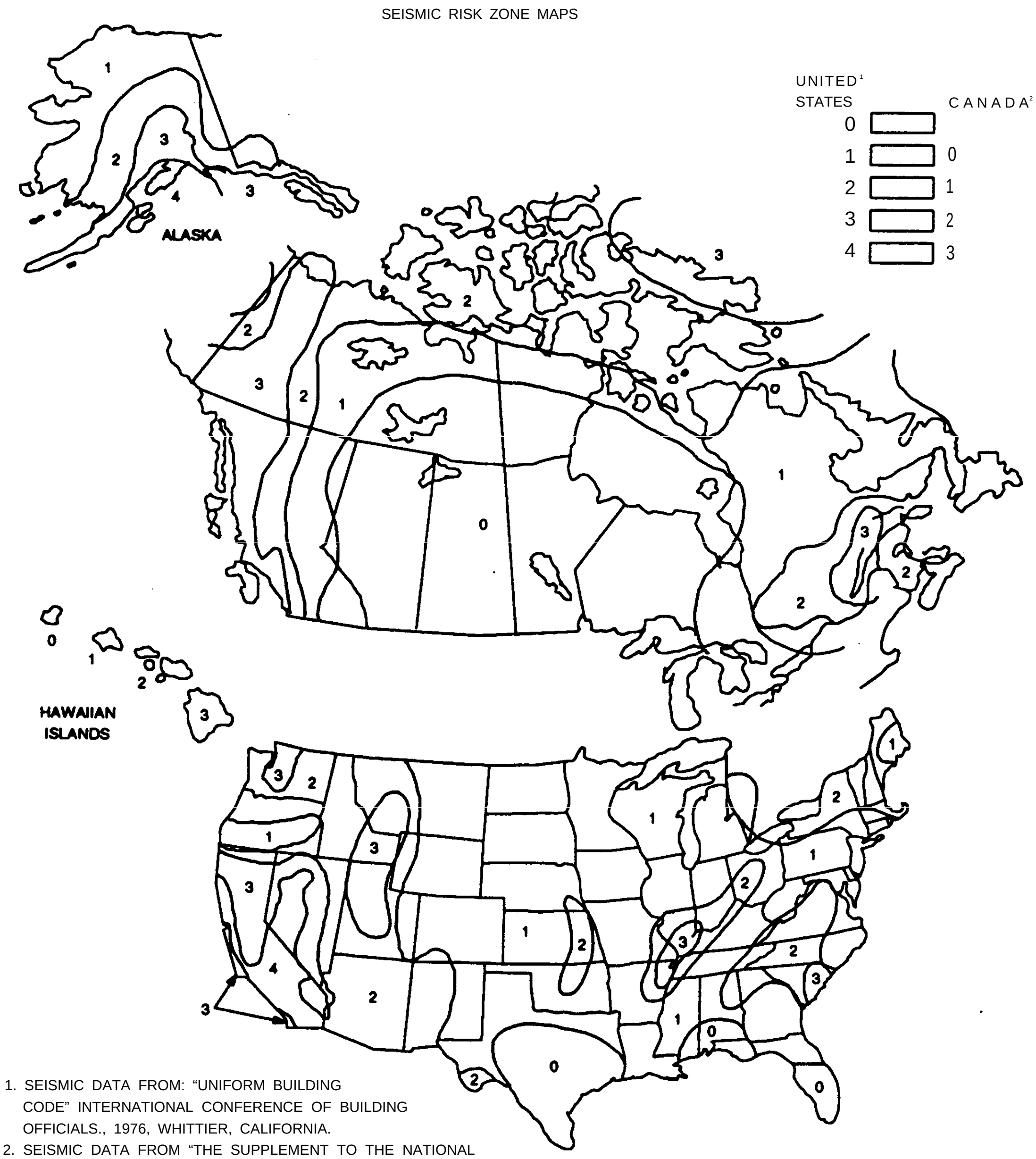


NOTES:
1. POWER OUTLETS MUST NOT BE UNDER SWITCH CONTROL, MUST NOT BE SHARED WITH OTHER EQUIPMENT, AND SHOULD BE LOCATED OUTSIDE THE CROSS-CONNECT FIELD AREA.
2. PROCESSOR PORT NETWORK AND EXPANSION PORT NETWORK CABINETS REQUIRE SPECIAL 120-VOLT, 60-HZ 50-AMP POWER OUTLETS (NEMA 5-50R RECEPTACLE, OR EQUIVALENT).
3. AUXILIARY AND AP CABINETS REQUIRE A SPECIAL 120-VOLT, 60-Hz, 20-AMP POWER OUTLET (NEMA 5-20R RECEPTACLE, OR EQUIVALENT).
4. ALLOW AT LEAST 36 INCHES (91.4CM) OF SPACE IN FRONT OF CABINET TO PERMIT DOOR TO SWING OPEN.
5. SYSTEM MUST BE GROUNDED BY ONE OF THE APPROVED METHODS.
6. EARTHQUAKE PROTECTION MAY BE REQUIRED.
7. THE TRUNK/AUXILIARY FIELD MAY BE LOCATED WITHIN THE CROSS-CONNECT FIELD.
8. EACH MCC CABINET USES 10-FOOT B25A CABLES FROM THE D AND E CABINET POSITIONS AND 15-FOOT B25A CABLES FROM THE A, B, AND C CABINET POSITIONS. FIBER CONNECTIONS BETWEEN PORT NETWORKS USE 20-FOOT (FL2P-P-20) FIBER CABLE

Figure 10-4. Typical G3r Multicarrier PPN Cabinet, EPN Cabinet, and Auxiliary Cabinets Floorplan

Earthquake Protection

When earthquake or disaster bracing is required by law or when local engineering feels that bracing is necessary, the cabinets can be bolted to the floor. Figure 10-5 shows US and Canadian earthquake zones where bracing may be needed. A greater susceptibility of an area to earthquakes is indicated by a higher number in figure 10-5. In the United States, 0 represents the lowest susceptibility and 4 represents the highest. In Canada, 0 represents the lowest susceptibility and 3 represents the highest. "DEFINITY® Communications System Generic 1 and Generic 3—Installation and Test" (555-204-104) includes earthquake protection installation procedures.



1. SEISMIC DATA FROM: "UNIFORM BUILDING CODE" INTERNATIONAL CONFERENCE OF BUILDING OFFICIALS., 1976, WHITTIER, CALIFORNIA.
2. SEISMIC DATA FROM "THE SUPPLEMENT TO THE NATIONAL BUILDING CODE OF CANADA", 1980, NRCC NO.17724.

Figure 10-5. United States and Canada Earthquake Environment

Desktop Area

The 510A or 510D personal terminal, and 513, 515, 610, 615, 715, 4410 and 4425 terminals can be located in the equipment room and require area on a desk or table.

The 513, 515, 610, 615, 715, 4410 and 4425 terminals each require approximately 3.2 square feet (.3 square m) of area. The 510A or 510D with optional keyboard each requires approximately 2.1 square feet (.2 square m) of area.

Optional Printers

The following AT&T printer documents include information on optional printers that require floor or desk area:

- 445 Printer 999-700-023
- 443 Printer 999-700-024
- 450 Printer 999-700-025
- 460 Printer 999-700-022
- 470 Printer and 475 Printer 999-300-285IS
- 572 Printer and 573 Printer 999-300-562

Wall Area

Wall area required in the equipment room depends on the type of crossconnect hardware installed, such as Z100-type (modular) or 110-type. The area required also depends on the size of the system. The following AT&T documents provide details on crossconnect hardware:

- "DEFINITY® Communications System Generic 1 and Generic 3i — Wiring" (555-204-111)
- "DEFINITY® Communications System Generic 1 and Generic 3 Main Distribution Field Design" (555-230-630)

If existing crossconnect hardware is reused, the space requirements and hardware requirements are detailed in the system floor plan.

Floor Loading

This section presents the floor-loading requirements for multicarrier cabinet and single-carrier cabinet systems.

Multicarrier Cabinets

The floor must have a commercial floor loading code of at least 50 pounds per square foot (242 kg per square meter). A fully loaded multicarrier cabinet weighs about 800 pounds (360 kg). Thus, a free maintenance area of at least 16 square feet (1.5 square m) is required for each cabinet.

Single-Carrier Cabinets

A single cabinet weighs about 130 pounds (59 kg), a fully loaded two-cabinet system weighs about 255 pounds (115 kg), a fully loaded three-cabinet system weighs about 360 pounds (171 kg), and a four-cabinet system weighs about 500 pounds (225 kg). Since the floor must have a commercial floor loading code of at least 50 pounds per square foot (242 kg per square meter), a free maintenance area of at least 10 square feet (.93 square m) is required for a four-cabinet system.

Temperature and Humidity

The system equipment is installed in a well-ventilated area. Maximum equipment performance is obtained at an ambient temperature between 40 and 120 degrees Fahrenheit (4 and 49 degrees Celsius) for short term operation and up to 110 degrees Fahrenheit (43 degrees Celsius) for continuous operation. The relative humidity range is 10 to 95 percent up to 84 degrees Fahrenheit (29 degrees Celsius). Above 84 degrees Fahrenheit (29 degrees Celsius), maximum relative humidity decreases from 95 percent down to 32 percent at 120 degrees Fahrenheit (49 degrees Celsius). Installations outside these limits may reduce system life or impede operation.

Table 10-1 correlates room temperature with allowable relative humidity.

Table 10-1. Allowable Relative Humidity

Room Temperature	Allowable Relative Humidity
40 °F to 84 °F	10% to 95%
86 °F	10% to 89%
88 °F	10% to 83%
90 °F	10% to 78%
92 °F	10% to 73%
94 °F	10% to 69%
96 °F	10% to 65%
98 °F	10% to 61%
100 °F	10% to 58%
102 °F	10% to 54%
104 °F	10% to 51%
106 °F	10% to 48%
108 °F	10% to 45%
110 °F	10% to 43%
112 °F	10% to 40%
114 °F	10% to 38%
116 °F	10% to 36%
118 °F	10% to 34%
120 °F	10% to 32%

The system equipment can operate at the maximum short-term operational limits for a period not to exceed 72 consecutive hours or a total of more than 15 days in a year. At altitudes above 5,000 feet (1,525m), the maximum short-term temperature limit is reduced by 1 °F for each 1,000 feet (305m) of elevation above 5,000 feet (1,525m). At 10,000 feet (3,050m), for example, the maximum short-term temperature limit is 115 °F.

Air Purity

The cabinet should not be installed in a place where the air may be contaminated by:

- Excessive dust, lint, carbon particles, paper fiber contaminants, or metallic contaminants
- Corrosive gases, such as sulfur and chlorine.

Lighting

Lighting should be bright enough to allow personnel to perform their tasks. The recommended light intensity is 50 to 70 footcandles, which meets Occupational Safety and Health Act (OSHA) standards.

RF Noise

In most cases, noise is introduced into the system through trunk or station cables, or both. However, electromagnetic fields near the system control equipment may also cause noise in the system. Therefore, the system and cable runs should not be placed in areas where a high electromagnetic field strength exists. Radio transmitters (AM or FM), television stations, induction heaters, motors with commutators of 0.25 horsepower (187 watts) or greater, and similar equipment are leading causes of interference. Small tools with universal motors are generally not a problem when they operate on separate power lines. Motors without commutators generally do not cause interference.

Field strengths below 1.0 volt per meter are unlikely to cause interference. These weak fields can be measured by a tunable meter. Field strengths greater than 1.0 volt per meter can be measured with a broadband meter.

The field strength produced by radio transmitted can be estimated by dividing the square root of the emitted power in kilowatts by the distance from the antenna in kilometers. This yields the approximate field strength in volts per meter and is relatively accurate for distances greater than about half a wavelength (150 meters for a frequency of 1000 kHz).

Acoustic Noise Levels

Acoustic noise levels are given for multicarrier cabinets and single-carrier cabinets.

Multicarrier Cabinets

The noise produced by a system with a 5-Carrier Cabinet is 51, 53, and 56 dBA at low, medium, and high fan speeds, respectively, at a distance of five feet (1.5 m). If the system cabinet door is open, there is an additional 1 dBA of noise. The tape drive also causes additional noise. When the tape drive is reading data, there is an additional 1 dBA of noise. When the tape recorder is rewinding or fast winding, there is an additional 2 dBA of noise.

Single-Carrier Cabinets

The noise produced by the system is as follows at a distance of five feet (1.5 m):

- 1 cabinet — 48 dBA
- 2 cabinets — 50 dBA
- 3 cabinets — 52 dBA
- 4 cabinets — 53 dBA

If the system cabinet door is open, there is an additional 1 dBA of noise. The tape recorder also causes additional noise. When the tape recorder is reading data, there is an additional 2 dBA of noise. When the tape recorder is rewinding or fast winding, there is an additional 4 dBA of noise.

Technical Specifications

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This chapter provides technical specifications on the capabilities, performance, and feature capacities of DEFINITY Generic 1 (G1) and DEFINITY Generic 3 (G3). The following specifications are covered:

Representative Number of Lines

Table 11-1 lists a representative number of lines for each configuration of processor port networks (PPNs), expansion port networks (EPNs), and center stage switches (CSSs) in G1 and G3. The actual number of lines depends on the features and characteristics of the configuration.

Table 11-1. Representative Number of Lines for DEFINITY G1 and G3 Configurations

Configuration	Representative Number of Lines			
	G1	G3i	G3i-G	G3r
Direct with 1 PPN and 2 EPNs	1,600	1,600	2,400	2,400
1 SN in the CSS with 1 PPN and 15 EPNs	None	None	None	8,000
2 SNs in the CSS with 1 PPN and 21 EPNs	None	None	None	10,000

Performance

Table 11-2 lists G1 and G3 busy hour call capacities.

Table 11-2. DEFINITY G1 and G3 Busy Hour Call Capacities

System Type	Busy Hour Call Capacity G1	G3i, G3i-G	G3r
Basic	7,200	10,000	100,000
Integrated Services Digital Network (ISDN)	Not available	4,000	40,000
Automatic Call Distribution (ACD)	Not available	7,000	70,000
Inbound call management (ICM)	Not available	3,000	30,000
Outbound call management (OCM)	Not available	4,000	44,000
Adjunct switch applications interface (ASAI) desk top	None	7,000	70,000

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Table 11-3 lists G3 response times (not available for G1).

Table 11-3. DEFINITY G3 Response Times

Attribute	Response Time
Call processing	General voice path cut-through: 750 ms Attendant ring tip: 260 ms Direct extension selection (DXS) lamp update: one second Announcement circuit pack upload (no call processing load): 40 minutes
System management	Four to six seconds mean response time
Maintenance	High-priority periodic tests must be completed within one hour. High-priority scheduled tests must be completed once each day, but not during the busy hour.
Booting and recovery	11 minutes

System Capacity Limits

Table 11-4 lists the hardware and software capacity limits of G1 and G3. The numbers in the G1, G3i, G3i-G, and G3r columns are the maximum capacities for the listed items.

Table 11-4. System Capacity Limits

Line	Item	G1	G3i	G3i-G	G3r
1	Abbreviated Dialing (AD)				
1.1	AD lists per system	1,600	1,600	2,400	5,000
1.2	AD list entry size	24	24	24	24
1.3	AD entries per system	8,000	10,000	12,000	25,000
1.3	Personal Lists	1,600	1,600	2,400	5,000
1.3.1	Max. entries	10	10	10	10
1.3.2	Per extension	3	3	3	3
1.4	Group lists	100	100	100	1,000
1.4.1	Max. entries	90	90	90	90
1.4.2	Per extension	3	3	3	3
1.5	System Lists	1	1	1	1
1.5.1	Max. entries	90	90	90	90
1.6	Enhanced Lists	1	1	1	1
1.6.1	Max. entries	1,000	1,000	1,000	1,000
1.7	Alphanumeric Dialing	No	Yes	Yes	Yes
1.7.1	Max. entries	None	200	200	1,250
2	Applications Adjuncts				
2.1	BX.25 Links: single-carrier cabinet (SCC) and multicarrier cabinet (MCC)	4/8	4/8	4/8	16
2.1.1	application processors (3B2-MCS, etc.)	1	1	1	7
2.1.2	AUDIX adjuncts	1	1	1	8
2.1.3	CMS adjuncts	1	1	1	1
2.1.4	ICM adjuncts	None	1	1	1
2.1.5	ISDN Gatevvay	1	1	1	1
2.1.6	MSA adjuncts	1	1	1	7
2.2	ASAI Adjuncts	None	8	8	8
2.3	Asynchronous Links (RS232)	5	5	5	10
2.3.1	SMDR output devices	2	2	2	2
2.3.2	Journal printer	2	2	2	2
2.3.2	System printer	2	2	2	2
2.3.3	Property Management System	1	1	1	1
2.4	BX.25 Processor Channels	64	64	64	128
2.5	Hop Channels	64	64	64	128

Continued on next page

Table 11-4. System Capacity Limits — *continued*

Line	Item	G1	G3i	G3i-G	G3r
3	Attendant Service				
3.1	Attendant positions (day/night)	6/1	6/1	6/1	27/1
3.2	Switched loops/consoles	6	6	6	6
3.3	Attendant control restriction groups	64	64	64	96
3.4	100's groups/attendant console	20	20	20	20
3.5	Queue length	30	30	30	300
3.7	Other access queues				
3.7.1	Maximum number of queues	1	1	1	12
3.7.2	Maximum number of queue slots	50	50	50	80
3.7.3	Size range of reserved queue	None	2-75	2-75	2-75
3.7.4	Reserved queue default size	None	5	5	5
3.8	Centralized Attendant Service				
3.8.1	Release link trunk groups at branch	1	1	1	1
3.8.2	Release link trunks at branch	99	99	99	99
3.8.3	Release link trunk groups at main	99	99	99	99
3.8.4	Release link trunks at main	400	400	400	4,000
3.8.5	Branches per main	99	99	99	99
4	Automatic Route Selection (ARS)/ Automatic Alternate Routing (AAR)				
4.1	AAR/ARS patterns	254	254	254	640
4.2	ARS patterns for measurement	20	20	20	25
4.3	Trunk groups in an ARS pattern	6	6	6	16
4.4	Entries in RNX table	640	None	None	None
4.5	Entries in FNPA table	200	None	2,000	None
4.6	Toll tables	32	32	32	32
4.7	RHNPA tables	32	32	32	32
4.8	UDP (entries)	240	240	240	50,000
4.9	Choices per RHNPA table	12	12	12	12
4.10	Entries in TOLL table	800	800	800	800
4.11	Entries in HNPA and RHNPA tables	800	1,000	1,000	1,000
4.12	FRLs	8	8	8	8
4.13	Inserted digit strings1	1,200	1,200	1,200	3,000
4.14	Digits inserted for ARS/AAR	36	36	36	36
4.15	Digits deleted for ARS/AAR	11	18	18	18
4.16	Routing plans	8	8	8	8
4.17	TOD charts	8	8	8	8
4.18	ARS/AAR table entries (NPA, NXX, RXX, HNPA, FNPA)	None	2,000	2,000	2,000
4.19	Digit conversion entries	180	300	300	300

1. This is the number of available 12 character inserted-digit-strings available for AAR/ARS preferences.

Continued on next page

Table 11-4. System Capacity Limits — *continued*

Line	Item	G1	G3i	G3i-G	G3r
5	Adjunct Switch Applications Interface (ASAI)				
5.1	Number of ASAI links	None	8	8	8
5.2	Number of BX.25 OCM adjuncts	None	1	1	1
5.3	Notification requests	None	170	170	460
5.4	Simultaneous active adjunct controlled calls	None	300	300	3,000
5.5	Active controlling associations	None	2,000	2,000	3,000
5.6	Switch to adjunct associations	None	127	127	127
5.7	Extension controllers per station domain	None	2	2	2
5.8	Call controllers per call	None	1	1	1
5.9	Call monitors per call	None	1	1	1
5.10	Number of adjunct users	None	40	40	100
5.11	Maximum adjunct controlled agents	None	200	200	200
5.12	OCM agent move (maximum agents)	80	80	80	80
6	Authorization				
6.1	Classes of restriction	64	64	96	96
6.2	Classes of service	16	16	16	16
6.3	Authorization codes	5,000	5,000	5,000	90,000
6.4	Length of authorization code	4-7	4-7	4-7	4-7
6.5	Remote access barrier codes	10	10	10	10
6.6	Length of barrier code	4-7	4-7	4-7	4-7
6.7	Toll call lists	None	1	1	1
6.8	Restricted call lists	None	1	1	1
6.9	Account code digits	1-15	1,15	1-15	1-15
6.10	Unrestricted/allowed call fists	10	10	10	10
6.11	Total call list entries	1,000	1,000	1,000	1,000
7	Automatic Callback Calls	160	160	240	1,000
8	Automatic Wakeup				
8.1	Wakeup requests per system	1,600	1,600	2,400	10,000
8.2	Wakeup requests per extension	1	1	1	1
8.3	Wakeup requests per 15-minute interval	300	300	300	950
8.4	Advance wakeup request time:				
8.4.1	Hours	23	23	23	23
8.4.2	Minutes	55	55	55	55
8.5	Simultaneous display requests	10	10	10	10
9	Basic Call Management System (CMS)				
9.2	Measured agents per system	30	200	200	200
9.3	Measured trunk groups	30	32	32	32
9.4	VDNs	None	512	512	512
9.5	Measured trunk group members	400	400	400	400
9.6	Reporting periods (30 min. or 60 min.)	25	25	25	25
9.7	Daily summary reports	7	7	7	7

Continued on next page

Table 11-4. System Capacity Limits — *continued*

Line	Item	G1	G3i	G3i-G	G3r
10	Call Appearances				
10.1	Call appearances/station1	54	54	54	54
10.2	Bridged images/appearances	7	7	7	15
10.3	Total bridged appearances	1,600	1,600	1,600	10,000
11	Cabinets				
11.1	PPN				
11.1.1	MCC	1	1	1	1
11.1.2	Single-carrier control (basic)	1	1	1	None
11.1.3	Single-carrier control cabinet (duplicated)	2	2	2	None
11.1.4	Single-carrier port cabinet (basic)	3	3	3	None
11.1.5	Single-carrier port cabinet (duplicated)	2	2	2	None
11.2	EPN				
11.2.1	MCC	1	2	2	21
11.2.2	Single-carrier exp. cont. cabinet (basic)	1	2	2	20
11.2.3	Single-carrier exp. cont. cabinet (duplicated)	2	4	4	None
11.2.4	Single-carrier port cabinet (basic)	2	9	9	60
11.2.5	Single-carrier port cabinet (duplicated)	2	8	8	None
11.3	Inter-port network connectivity				
11.3.1	Port networks	2	3	3	22
11.3.2	Maximum number of port networks/cabinet	1	1	1	2
11.3.3	Switch nodes (simplex)	None	None	None	2
11.3.4	Switch nodes (duplicated)	None	None	None	4
11.3.5	DS1 oonverter complex (simplex)	None	None	None	20
11.3.6	DS1 converter complex (duplicated)	None	None	None	40
	Call Coverage				
12.1	Coverage paths	600	600	600	5,000
12.1.1	With hospitality parameter reduction	5	5	5	None
12.2	Coverage points in a path	3	3	3	3
12.3	Coverage path lists	4	4	4	4
12.4	Coverage paths linked together	4	4	4	4
12.5	Coverage paths included in call coverage report	100	100	100	100
12.6	Coverage answer groups (CAG)	200	200	200	500
12.7	Members per CAG	8	8	8	8
12.8	Maximum users per coverage path	2,500	2,900	3,500	2,187
13	Call Detail Recording (CDR)				
13.1	CDRU capacity (calls per hour)	10,000	10,000	10,000	40,000
13.2	Number of CDRUs per system	1	1	1	1
13.3	CDRU trackable extensions	1,600	1,600	2,400	10,000
14	Call Forwarding				
14.1	Call forwarded numbers	1,600	1,600	2,400	10,000
14.2	Call forwarded digits	16	16	16	16

1. The number of call appearances is the sum of primary and bridged appearances; at most 10 can be primary.

Continued on next page

Table 11-4. System Capacity Limits — *continued*

Line	Item	G1	G3i	G3i-G	G3r
15	Call Park				
15.1	Number of parked calls	482	723	723	723
15.2	Attendant group common shared extension numbers	10	10	10	40
16	Call Pickup Groups				
16.1	Number of groups	800	800	800	5,000
16.1.1	With hospitality parameter reduction	5	5	5	5
16.2	Call pickup members per system	1,600	1,600	2,400	10,000
16.3	Call pickup members per group	50	60	60	50
	Call Vectoring/Call Prompting				
17.1	Vectors per system	None	266	256	512
17.2	Vector directory numbers	None	500	500	3,000
17.3	Steps per vector	None	15	15	15
17.4	Priority levels	None	4	4	4
17.5	Multiple split queuing splits/call	None	3	3	3
17.6	Multiple splits for agent logins	None	3	3	3
18	Carriers in MCCs				
18.1	Control carrier in standard reliability system	1	1	1	1
18.2	Control carriers in duplicated system	2	2	2	2
18.3	Port carrier in standard reliability PPN cabinet	4	4	4	4
18.4	Port carrier in standard refinability CSS PPN cabinet	None	None	None	3
18.5	Port carrier in high reliability PPN cabinet	3	3	3	3
18.6	Port carrier in high reliability CSS PPN cabinet	None	None	None	2
18.7	Port carrier in critical reliability PPN cabinet	3	3	3	3
18.8	Port carrier in critical reliability CSS PPN cabinet	None	None	None	1
18.9	Expansion control carrier in EPN cabinet	1	1	1	1
18.10	Port carrier in EPN cabinet	4	4	4	4
18.11	Port carr. in standard reliability CSS EPN cabinets 2-16	None	None	None	4
18.12	Port carr. in CSS EPN cabinet 2 of 22	None	None	None	3
18.13	Port carr. in CSS EPN cabinet 2 of 22	None	None	None	2
18.14	Port cart. in CSS EPN cabinets 3-22	None	None	None	4
18.15	Switch node in standard reliability PPN cabinet	None	None	None	1
18.16	Switch node in high reliability PPN cabinet	None	None	None	1
18.17	Switch node in critical reliability PPN cabinet	None	None	None	2
19	Communication Interface Links				
19.1	MCC	8	8	8	8
19.2	SCC	4	4	4	4
20	Conference Parties	6	6	6	6
20.1	Simultaneous 3-way conf. calls	241	483	483	3,542
20.2	Simultaneous 6-way conf. calls	240	240	240	1,771

Continued on next page

Table 11-4. System Capacity Limits — *continued*

Line	Item	G1	G3i	G3i-G	G3r
21	Data Parameters				
21.1	Access endpoints	None	400	400	5,000
21.2	Administered connections1	18	128	128	126
21.3	Alphanumeric dialing	No	Yes	Yes	Yes
21.3.1	Maximum entries	None	200	200	600
22	Dial Plan				
22.1	Expansions	2,500	2,900	3,500	21,875
22.1.1	Number portability	None	None	None	Yes
22.2	Feature Dial access codes				
22.2.1	Number of access codes	70	70	70	70
22.2.2	Number of digits	1-3	1-3	1-3	1-4
22.3	Trunk dial access codes				
22.3.1	Number of access codes	197	197	197	1,331
22.3.2	Number of digits	1-4	1-4	1-4	1-4
22.4	Names				
22.4.1	Number of names	3,406	3,406	4,215	19,111
22.4.2	Number of characters in a name	15	15	15	15
22.5	Integrated directory entries	1,600	1,600	2,400	10,000
22.6	Minimum extension size	1	1	1	1
22.7	Maximum extension size	5	5	5	5
22.8	DID listed directory numbers	8	0	8	20
22.9	Non-DID listed directory numbers	50	50	50	666
22.10	Prefix extensions	Yes	Yes	Yes	Yes
22.11	Phantom extensions (admin. without hardware)		1,600	1,600	10,000
23	Digital Data Endpoints	800	800	800	5,000
24	Do Not Disturb (DND)				
24.1	DND requests per system (3)	1,600	1,600	2,400	10,000
24.2	Simultaneous display requests	10	10	10	30
25.8	External CMS				
25.8.1	Measured agents per system	400	400	400	1,023
25.8.2	Measured agents per split	30	30	30	999
25.8.3	Measured splits	32	99	99	255
25.8.4	Measured trunk groups	99	99	99	666
25.8.5	Agents simultaneously entering Call work codes	None	40	40	40

1. These are permanent switched connections in G1.

Continued on next page

Table 11-4. System Capacity Limits — *continued*

Line	Item	G1	G3i	G3i-G	G3r
26	Facility Busy Indicators				
26.1	Number of indicators	2,400	4,000	3,600	8,725
26.2	Buttons per tracked resource	100	100	100	100
27	Hunt Groups or Splits				
27.1	Groups or splits	99	99	99	255
27.1.1	With hospitality parameter reduction	5	5	5	None
27.2	Group members per system	500	500	500	3,000
27.3	Group members per group or split	200	200	200	989
27.4	Measured groups or splits	99	99	99	255
27.5	Queue slots per group	200	200	200	999
27.6	Queue slots per system	1,000	1,000	1,000	6,000
27.7	Announcements per group	2	2	2	2
27.8	Measured ACD agents				
27.8.1	Agents logged in per system measured by CMS	400	400	400	1,023
27.8.2	Agents fogged in per split measured by CMS	200	200	200	999
27.9	ACD supervisors per system	99	99	99	255
	Intercom Translation Table (ICOM)				
28.1	Automatic/manual and dial				
28.1.1	ICOM groups per system	32	32	32	511
28.1.2	Members per ICOM group	32	32	32	32
28.1.3	Members per system	1,024	1,024	1,024	16,352
29	Last Number Dialed				
29.1	Entries per system	2,400	2,400	2,400	15,028
29.2	Number of digits	16	16	16	16
30	Leave Word Calling (SPE based)				
30.1	Messages stored	2,000	2,000	2,000	2,000
30.2	Messages per user	10	10	10	16
30.3	Simultaneous message retrievers	60	60	60	400
30.4	System-wide message retrievers	10	10	10	10
30.5	Remote message waiting indicators				
30.5.1	Per extension	80	80	80	80
39.5.2	Per system	80	80	80	500
31	Modem Pool Groups				
31.1	Mode 2/analog	5	5	5	63
31.1.1	Members per group	32	32	32	32
31.1.2	Group members per system	160	160	160	2,016
32	Networking				
32.1	CAS nodes	99	99	99	99
32.2	DCS nodes	20	63	63	63
32.3	UDP nodes	240	240	240	1,000
33	Paging				
33.1	Loudspeaker zones	9	9	9	9
33.2	Code calling IDs	125	125	125	125

Continued on next page

Table 11-4. System Capacity Limits — *continued*

Line	Item	G1	G3i	G3i-G	G3r
34	Personal Central Office Lines (PCOL)				
34.1	PCOL trunk groups	40	40	40	100
34.3	PCOL lines	40	40	40	100
34.3	PCOL trunks per trunk group	1	1	1	1
34.4	PCOL appearances	4	4	4	16
35	Port Circuit Pack Slots1				
35.1	Per PPN				
35.1.1	Multicarrier simplex	89	89	89	80
35.1.2	Multicarrier duplicated	78	78	78	60
35.1.3	Single-carrier simplex	64	64	64	None
35.1.4	Single-carrier duplicated	56	56	56	None
35.2	Per EPN				
35.2.1	MCC simplex	99	99	99	99
35.2.2	MCC duplicated	98	98	98	98
35.2.3	SCC simplex	71	71	71	71
35.2.4	SCC duplicated	70	70	70	70
36	Recorded Announcements				
36.1	Recorded announcements	64	128	128	256
36.2	Analog queue slots per system	150	150	150	300
36.3	Analog queue slots per announcement	150	150	150	300
36.4	Integrated queue slots per system	50	50	50	300
36.5	Calls connected per announcement				
36.5.1	Announcement	80	80	80	255
36.5.2	Auxiliary trunk	None	None	None	255
36.5.3	Analog port	5	5	5	128
36.6	Announcement circuit packs	1	1	1	1
36.7	Channels per announcement circuit pack	16	16	16	16
36.8	Announcement recording time (min.:seconds)				
36.8.1	16 KB recording	None	8:32	8:32	8:53
36.8.1	32 KB recording	4:16	4:16	4:16	4:16
37	Speech Synthesis Circuit Packs	6	6	6	40
37.1	Channels per speech circuit pack	4	4	4	4
38	System Administration				
38.1	RS232C asynchronous links	7	8	8	8
38.2	Simultaneous administration sessions	3	5	5	8
38.3	Simultaneous administration commands	1	1	1	5
38.4	Simultaneous maintenance commands	1	1	1	3
38.5	Administration history file entries	250	250	250	1,250
38.6	Printer queue size	50	50	50	50

1. Only port slots are included in this count. There are 100 port slots per EPN cabinet of which one is dedicated for the tone-clock circuit pack. There may be other service related slots required which would further reduce the number of port slots available. In G3 carriers, a 21st slot may be equipped with auxilliary circuit packs that do not require tip and ring connections.

Continued on next page

Table 11-4. System Capacity Limits — *continued*

Line	Item	G1	G3i	G3i-G	G3r
39	Terminating Extension Groups (TEG)				
39.1	TEGs	32	32	32	32
39.2	Users that may share a TEG	4	4	4	4
40	Time Slots				
40.1	Total slots	1,024	1,536	1,536	11,264
40.2	Slots for voice and data	966	1,449	1,449	10,604
40.3	Simultaneous circuit-switched calls	482	723	723	5,291
41	Tone Classifiers				
41.1	Tone detector circuit packs	20	20	20	50
41.1.1	General purpose tone detectors	40	40	40	100
41.1.2	Touchtone receivers	80	80	80	200
41.2	Call classifier circuit packs	None	10	10	25
41.2.1	Call classifier tone queue size	80	80	80	80
41.2.2	Call progress touch-tone receivers	None	80	80	400
41.3	TTR queue size	4	4	4	4
42	Trunks				
42.1	Trunks in system (also remote access)	400	400	400	4,000
42.1.1	With hospitality parameter reduction	50	50	50	None
42.2	Trunk members in a trunk group	99	99	99	255
42.3	Trunk groups in the system	99	99	99	666
42.3.1	Trunk group hourly measurements	None	None	None	75
42.4	Queue slots for trunks	198	198	198	1,332
42.5	Ringback queue slots	120	120	120	1,000
42.6	DS1 circuit packs	30	30	30	166
42.7	PRI Interfaces (D-channels)	8	8	8	166
43	Voice Terminals				
43.1	Stations1	1,600	1,600	2,400	10,000
43.2	Associated data modules (DTDMs, etc)	800	800	800	5,000
43.3	Digital stations2	1,600	1,600	2,400	10,000
43.4	ISDN BRI stations3	1,000	1,000	1,000	5,000
43.5	Display Stations	1,600	1,600	1,600	10,000

1. This includes extensions administered without associated hardware.
2. All digital stations can be display stations, but not in G1.
3. All ISDN BRI stations can be display stations.

Maximum Port Slot Capacities

Tables 11-5, 11-6, 11-7, and 11-8 list the maximum number of carrier slots in PPN cabinets, EPN cabinets, and single-carrier cabinets that accept port circuit packs as a consequence of:

- Duplication options: simplex, duplicate processor-only, and fully duplicated
- Cabinet interconnection options: directly connected and CSS-connected

The different slot types in the following tables are in three categories:

- Port slots (purple-labeled), which accept any port and service circuit pack
- Additional service slots, which are located only in port carriers that accept only service circuit packs
- Extra DS1C slots (in G3r only), which are located in SN carriers that accept TN574 DS1C circuit packs

Table 11-5. Maximum Port Slots in G1, G3i, and G3i-G Multicarrier PPN Cabinet

Duplication Option	Maximum Port slots	Extra Service Slots
Directly connected	Simplex	89
Directly connected	Fully duplicated	78

Table 11-6. Maximum Port Slots in G3r Multicarrier PPN Cabinet

System Configuration	Duplication Option	Maximum Port Slots	Extra Service Slots	Extra DS1C Slots
Directly connected	Simplex	80	4	None
CSS-connected	Simplex	60	3	2
Directly connected	Duplicate processor	60	3	None
CSS-connected	Duplicate processor	40	2	2
Directly connected	Fully duplicated	60	3	None
CSS-connected	Fully duplicated	20	1	4

Table 11-7. Maximum Port Slots in Multicarrier EPN Cabinets

EPN Cabinet Configuration	Maximum Port Slots	Extra Service Slots (G3r only)	Extra DS1C Slots (G3r only)
Single PN, no SN carriers	99	4	None
Single PN, simplex SN carrier	79	3	2
Single PN, duplicate SN carriers	59	2	4
Two PNs, PN above fans	59	2	None
Two PNs, PN below fans	40	2	None

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Table 11-8. Maximum Port Slots in Single-Carrier EPN Stacks

Cabinet Stack	Maximum Port Slots
One cabinet	17
Two cabinets	35
Three cabinets	53
Four cabinets	71

Additional Hardware to Use Features

Table 11-9 lists additional hardware needed to use features. The hardware consists of circuit packs installed in carriers and devices installed in an auxiliary cabinet.

Table 11-9. Additional Hardware to Use Features

Feature	Hardware
Abandoned Call Search	TN747B CO trunk circuit pack
Abbreviated Dialing	Requires additional 748B tone detectors if the special “wait” character is used frequently.
ACCUNET® Service	Modular processor data module (MPDM) AP Demand Print+An AP, an MPDM, and a printer
Administered Connections	Access endpoint circuit packs used: TN767 DS1 interface or TN760B tie trunk Data endpoint circuit packs used: TN726 data line or TN754 digital line Trunk circuit packs used: TN767 DS1 interface and TN760 tie trunk TN758 pooled modem circuit pack Data modules used 700A or 700D PDM or MPDM, 700B, C, or E TDM or MTDM, 7400D series voice terminal or 7400B with PC/PBC
Answer Detection	TN744 call classifier circuit pack
Applications Processor Features (G1 only)	AP/A: Depending on whether the AP/A is used for one or both applications — one or two ports on digital line interface; one or hruo AP interfaces; and one or two MPDMs. This feature is limited to one AP/A per system. AP/T: One port on digital line interface; one MPDM. This feature is limited to eight AP/Ts.
Attendant Direct Extension Selection With Busy Lamp Field	A selector console is used.
Audio Information Exchange (AUDIX)	TN742 or TN748B analog line circuit pack. TN765 processor interface, MPDM for 2CA6 AUDIX. If PI is used, one port on a TN754 digital line, and an MTDM and MPDM.

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Table 11-9. Additional Hardware to Use Features — *continued*

Feature	Hardware
Automatic Call Distribution (ACD)	One port on a TN742, TN746B, or TN769 analog line circuit pack per auxiliary queue warning level lamp Each analog announcement requires announcement equipment and one port on an Analog Line circuit pack. Each integrated announcement, which is accessed by a call, requires one port on a TN750 integrated announcement circuit pack. If music is to be heard after the delay announcement, a music source and a port on a TN763B auxiliary trunk circuit pack is required.
Automatic Circuit Assurance	Display-equipped voice terminal. If the destination is not a the terminal, a TN725 speech synthesis circuit pack is used.
Automatic Incoming Call Display	A display-equipped voice terminal, or a voice terminal capable of displaying information through an attached data terminal
Automatic Route Selection	When this feature is used in a private network, additional TN748C tone detectors, as well as tie trunks can be required.
Automatic Wakeup	If voice prompting is used, a TN725B voice synthesizer circuit pack is required. Each circuit pack has four ports to provide voice prompting. If voice synthesis announcements are used, two ports must be reserved for announcements. A Cook Electric Recorder/Announcer or an Audichron Company model HQD614B Recorder/Announcer and power supply is installed in the auxiliary cabinet. Either recorder/announcer requires a TN763B.
BCMS	Any of the following connections can be used to connect an asynchronous printer to the system: the EIA port on the processor circuit pack; PDM to a digital port; ADU to a data line port.
Call-by-Call Service Selection	A TN767 DS1 interface circuit pack is used for a signaling link, and up to 23 ISDN-PRI trunk group members. A TN741 or TN768 tone-clock circuit pack, and a TN765 processor interface circuit pack are used.

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Table 11-9. Additional Hardware to Use Features — *continued*

Feature	Hardware
Call Detail Recording (CDR)	Hardware requirements depend on the type of output device used for SMDR. A printer, personal computer or tape unit (Data Terminal Equipment) — An MPDM to a port on a TN754 digital line circuit pack or a 212A-type modem to a port on a TN742 analog line circuit pack. In the latter case, a standard pooled modem is required for the data path. Host computer — A private line terminated at the System 65 with a trunk data module (TDM). Also, a private line modem if the computer is off-premises. A TN726 data line circuit pack can be used in conjunction with an Asynchronous Data Unit (ADU) to connect a printer.
Call Prompting	Each announcement requires a port on a TN750 integrated announcement circuit pack or announcement equipment and a port on a TN742 or TN746B analog line. A maximum of 10 TN744 call classifier circuit packs can be used.
CallVisor ASAI Interface	The following circuit packs are used: TN748C or TN744 tone detectors; TN7556 ISDN-BRI for use with an ASAI BRI link; TN778 packet control. A TN750 EI is used if there is an EPN.
Centralized Attendant service (CAS) (Branch or Main)	A TN760D tie trunk circuit pack is used. Either a TN722B DS1 tie trunk circuit pack or a TN767B DS1 interface circuit pack can also be used for the release link trunks of the CAS network
Code Calling Access	Loudspeaker paging equipment and one port on a TN763B auxiliary trunk circuit pack per zone. These hardware requirements oan be shared with the Loudspeaker Paging Access feature. A 278A adapter is used if the customer's equipment is not FCC-registered.

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Table 11-9. Additional Hardware to Use Features — *continued*

Feature	Hardware
Data Call Setup	Each data module requires one port on a TN754 digital line circuit pack. A digital terminal data module (DTDM) shares the port with a voice terminal. Each AT&T personal computer (PC) requires one port on a TN754 digital fine circuit pack for shared use of voice and data. Each 7401D, 7404D, 7406D, or 7407D voice terminal requires one port on a TN754 digital line circuit pack for shared use of voice and data. Each modem requires one port on a TN742 analog fine circuit pack Modem pooling requires either a TN758 modem pool circuit pack or one digital port with a TDM or MTDM, and one analog port with analog modem for each conversion resource. Keyboard Dialing to off-premises (out-of-building) data endpoints requires the use of a TN748C tone detector circuit pack. Extensive use of features and services using tone detection may require additional TN748C circuit packs. Several other features also use a TN748C.
Data-Only Off-Premises Extensions	A TDM and one port on a TN754 digital line-circuit pack
Distributed Communications System (DCS) Features	DCS interface hardware
Digital Multiplexed Interface (DMI)	One of the following can be used: TN722B DS1 circuit pack per 24 DMI trunks; one TN767B; one TN464.
Direct Department Calling and Uniform Call Distribution	One port on a TN742 analog fine circuit pack per queue warning level lamp is used with announcement equipment. If music is to be heard after the delay announcement, a music source and a port on a TN763B auxiliary trunk circuit pack is used. A TN750 announcement circuit pack provides up to 64 different announcements, and a TN750B circuit pack provides up to 128 different announcements.
Direct Inward Dialing (DID)	One port on a TN753 DID trunk circuit pack for each DID trunk
Direct Outward Dialing (DOD)	One port on a TN747B CO trunk circuit pack or TN767B DS1 interface circuit pack (used for ground and loop-start trunks) for each assigned trunk
Do Not Disturb	If voice prompting is used, a TN725B voice synthesizer circuit pack is required. Each circuit pack has four ports.

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Table 11-9. Additional Hardware to Use Features — *continued*

Feature	Hardware
DS1 Tie Trunk Service	One TN722B DS1 tie trunk, TN767B DS1 interface, or TN464C DS1 interface (Universal) circuit pack per 24 voice-grade DS1 tie trunks required or per 23 AVD DS1 tie trunks. A TN768 tone generator/clock circuit pack for synchronization of the DS1 tie trunks.
Electronic Industries Association (EIA) Interface	One TN726 data line circuit pack per eight EIA interfaces. One ADU per port on the circuit pack.
Information System Network (ISN) Interface	One TN726 data line circuit pack per eight ISN interfaces
Intercept Treatment	Announcement equipment and one port on a TN742, TN746B or TN769 analog line circuit pack per analog announcement. A TN750 announcement circuit pack can provide up to 64 different announcements, which can be recorded directly onto the TN750 circuit pack. A TN750B can also provide up to 128 different announcements.
Inter-PBX Attendant Calls	A tie trunk group between the branch and main locations
Loudspeaker Paging Access	Loudspeaker paging equipment and one port on a TN763B auxiliary trunk circuit pack per zone. Paging interface equipment, consisting of a 278A adapter (only if equipment is not FCC-registered) and a 24-V power supply, per zone. This hardware can be shared with the Code Calling Access feature. The paging equipment can be: PagePac® 20, Power Mate®, Talk Mate®, Music Mate®, Zone Mate® 9 (optional), Zone Mate 10 (optional), and Common Control Unit® (used when Zone Mate 9 or Zone mate 10 is used)
Loudspeaker Paging Access (continued)	If PagePac paging system equipment is used, one port on a TN747B CO trunk circuit pack, one port on a TN742 or TN746B analog fine circuit pack, or one port on a TN763B auxiliary trunk circuit. (depending on the PagePac arrangement) is used.
Malicious Call Trace (MCT)	16 maximum voice recorders (audio cassette decks with remote start/stop), one 278A adapter, one D0181321 power kit per voice recorder, and a TN763 auxiliary trunk circuit pack.
Modem Pooling	One TN758 pooled modem circuit pack per two integrated conversion resources is provided. Each combined conversion resource requires one port on the Digital Line circuit pack and one port on an Analog Line circuit pack, along with an analog modem and MTDM. The following modems are supported: 103JR, 202SR, 201CR, 208BR, 212AR, 2224A, 2224G, 2248A, and 2296A

Continued on next page

Table 11-9. Additional Hardware to Use Features — *continued*

Feature	Hardware
Move Agents From CMS	A CMS vehicle.
Music-on-Hold Access	A music source and one port on a TN763B auxiliary trunk circuit pack. Also, a 36A voice coupler if the system is not FCC-registered.
Names Registration	A PMS is connected to either of the following: an MPDM and a digital line circuit pack, or an ADU and a port on a data line circuit pack.
Network Access - Private	One port on a TN760D tie trunk, TN722B DS1 tie trunk, TN767B DS1 interface, or TN464C DS1 interface circuit pack for each assigned trunk
Network Access - Public	One port on a TN747B CO trunk circuit pack is used for each assigned trunk.
Night Service	A ringing device and one port on a TN742, TN746B, or TN769 analog line
Off-Premises Station	Cross-connecting capabilities and one port on a TN742, TN746B, or TN769 analog line circuit pack, or a TN767 DS1 interface circuit pack
PC PBX Connection	A port on a TN754 digital line circuit pack for each PC.
Personal Central Office Line	One port on a TN747B CO trunk circuit pack or TN767B DS1 interface circuit pack for each CO, FX, or WATS trunk assigned as a PCOL
Power Failure Transfer	One emergency transfer panel per five or six trunks assigned to Power Failure Transfer. Two panels are available: ■ Z1A panel — Each unit serves up to six power failure transfer terminals. A ground-start key is required at each preselected voice terminal when ground-start trunks are used. ■ PORTA SYSTEMS® model 574-5 panel — Each unit serves up to five failure transfer terminals and provides ground-start or loop-start ■ 808A emergency transfer unit
Property Management System	Either a TN726 data line circuit pack with an ADU or a data module (MPDM, DTDM, 7400A, and 7400B) port on a TN754 digital line circuit pack
Queue Status Indication	One port on a TN742, TN746B or TN769 analog line circuit pack for each auxiliary queue warning lamp (such as a 21C-49)
Recorded Announcement	Announcements are either analog or integrated. Each analog announcement requires announcement equipment (such as a Cook Electric recorded announcement device) and a port on a TN742 or TN746B analog line circuit pack. Each integrated announcement accessed by a call uses a port on a TN750 or TN750B announcement circuit pack. The following number of announcements can be recorded: up to 64 on a TN750 and up to 128 on a TN750B.

Continued on next page

Table 11-9. Additional Hardware to Use Features — *continued*

Feature	Hardware
Recorded Telephone Dictation Access	Telephone dictation machines and, depending on the type of machine, one port on a TN742 analog line circuit pack or one port on a TN763B auxiliary trunk circuit pack for each machine assigned.
Remote Access	Dedicated trunks, if Remote Access is not available via DID
Report Scheduler/System Printer	An asynchronous printer is connected to any of the following: directly to the EIA port on the processor circuit pack; via an MPDM or 7400A data module and a port on a TN754 digital line circuit pack; via an ADU end a port on a TN726 data line circuit pack.
Station Message Detail Recording (SMDR)	MPDM (with a TN754B digital line circuit pack in a PPN or EPN cabinet) connected to an AT&T Call Detail Recording Utility (CDRU) MTDM (with a TN754B digital line circuit pack in a PPN or EPN cabinet) connected to a host computer
Subnet Trunking	Additional TN748C circuit packs, if Routing Patterns containing “wait” symbols are used heavily, and if dial tone detection is preferable to waiting for interval time-out
Uniform Dial Plan	DCS interface hardware for DCS applications
Voice Message Retrieval	A TN725B speech synthesizer circuit pack. Each circuit pack has four ports to provide Voice Message Retrieval. Traffic engineering is required to determine the number of circuit packs.
Voice Terminal Display	A display-equipped voice terminal and one port on a TN754B digital line circuit pack

Allocation of Buttons

Table 11-10 lists the allocation of buttons by the station type. The "Required Records and Button Units" column assumes three call appearances per station in button 1-3 with all other available buttons assigned. For call appearances other than 3, the total units are adjusted by the following: adjustment=(Nca-3)*((10*Ndisp)+(6*Nbri)), where:
Nca=number of call appearance(assumes first Nca button is CA)
Ndisp=total number of display stations in system
Nbri=total number of BRI station in system

The following legend defines the notation in table 11-10:

Notation	Meaning	G1	G3i	G3i-G	G3r
A	Attendant record	7	7	7	7
S	Basic station record	1,600	1,600	1,600	1,600
B	Large button module	1,000	2,000	2,000	None
M	Data module record	800	800	800	800
I	ISDN-BRI endpoint record	None	None	None	1,000
#	Button memory units	None	None	None	547,200

Table 11-10. Allocation of Buttons by Station Type

Station Type	Required Records	Required Records and Button Units
Analog sets: 500, 2500, 7101A, 7103A, and 7104A	S	S+62
10MET set -10 buttons	S	S+52
20 MET set - 20 buttons	S+[B]	S+152
30 MET set - 30 buttons	S+[B]	S+252
Hybrid set - 7303S	S	S+102
Hybrid set - 7305S	S+[B]	S+342
Hybrid set - 7309S	S	S+102
510BCT	S+B+[B]+M	S+322
515BCT	S+B+M	S+232
Basic Attendant Console	A+2B	A
Enhanced Attendant Console	A+2B	A
Attendant Selector Console	A+2B	A

Continued on next page

Table 11-10. Station Allocation Characteristics — *continued*

Station Type	Required Records	Required Records and Button Units
Digital set - 7401	S	S+92
Digital set - 7403D	S	S+102
Digital set - 7404D	S+M	S+62
Digital set - 7404D w/display	S+B+M	S+192
Digital set - 7405D	S+[B]	S+342
Digital set - 7405D w/display	S+B+[B]	S+472
Digital set - 7406D	S+[B]	S+282
Digital set - 7406D w/display	S+B+[B]	S+342
Digital set - 7407D (w/display)	S+B+[B]	S+472
Digital set - 7410D	S	S+102
Digital set - 7434D	S+[B]	S+342
Digital set - 7434D w/call coverage module	S+B+[B]	S+542
Digital set - 7434D w/display	S+2B+[B]	S+472
602A1	S+B+[B]	S+342
Personal computer (PC)	S+B+[B]	S+472
Feature Module	[B]	240
Display	B	*
DTDM	M	M
MPDM/MTDM/7400A/7400B	M	M
Call Coverage Module	B	200
EIA (PI-Simplex)	M	M
SMDR	M	M
Netcon Data Channel	2M	2M
Processor Interface Link	2M	2M
[ISDN sets for G3 only]		
ISDN BRI UDM -7500		M+I
ISDN BRI set - 7505D		S+I+190
ISDN BRI set - 7506D w/display		S+I+250
ISDN BRI set - 7507D w/display		S+I+480
ISDN BRI set - 8503D		S+I+50
ISDN BRI set - 8510D w/display		S+I+180
ISDN BRI set - 8520D w/display		S+I+280

* For G1, the number of button memory units required for a display depends on the station type. The number of button memory units required for a display is indicated for each station type in table 11-10.

The following notes apply to the button modules and data module records in table 11-10:

- For G3r and G1, [B] is equivalent to B. For G3i, [B] indicates large button modules that are allocated only when a button on that module is administered.
- Any digital communications protocol (DCP) station can add a 7400B, requiring one data module record.
- A digital terminal data module (DTDM) can be added to a 7403D or 7405D, requiring one data module record.
- The 6504-T is administered as a 7505D and the 6508-T is administered as a 7507D in G3 only.
- A data module (ADM-T) can be added to a 7505D, 7506D, or 7507D, requiring one data module record in G3 only.
- The PC/ISDN is administered as a 7506D or 7507D with ADM in G3 only.
- An ISDN-BRI endpoint record is required for each distinct ISDN-BRI endpoint. Thus each voice-only, data-only, or voice-data endpoint uses one of these records.

Initialization and Recovery

The time needed to initialize a system or recover from a system reset depends on the system line size, features activated, trunks used, and adjuncts connected to the system. A system needs several minutes for initialization or recovery from a reset condition.

Cabling Distances

When the system layout is determined, maximum cabling distances to the system cabinet must be considered. Table 11-11 lists the allowable intrapremises cabling distances. In case of mixed wire sizes, the table columns for 26-gauge wire are used. These cabling distances are based on a minimum of -42.5 V at the equipment connecting to the system.

Table 11-11. Allowable Intrapremises Cabling Distances

Equipment	24-Gauge Wire 0.5106 mm)		26-Gauge Wire (0.4049 mm)	
	Feet	Meters	Feet	Meters
Attendant console (301A)	2400	732	1500	457
Enhanced attendant console (302A)				
With selector console				
Phantom powered	800	244	3400	1037
Locally powered	5000	1524	500	152
Without selector console				
Phantom powered	1400	427	3400	1037
Locally powered	5000	1524	900	274
510D or 515 terminals	3000	914	2200	670
513, 610 BCT, or 615 MT, 4410 or 4425 terminals (see also “data module” or “EIA interface”) 50-ft. maximum distance from terminal or BCT to module or ADU	-	-	-	-
Data modules:				
Z702AL1-DSU data module base	5000	1524	4000	1219
Z703AL1-DSU data module base	5000	1524	4000	1219
7404D data module	5000	1524	4000	1219
DTDM	3400	1037	2200	670
MPDM	5000	1524	4000	1219
MTDM	5000	1524	4000	1219
3270 data module	5000	1524	4000	1219
EIA interface (data line circuit pack and ADU):				
19.2 kbps	2000	610	2000	610
9.6 kbps	5000	1524	4000	1219
4.8 kbps	7000	2130	6000	1827
2.4 kbps	12000	3654	10000	3050
1.2 kbps	20000	6100	16000	4875
0.3 kbps	40000	12200	30000	9150

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Table 11-11. Allowable Intrapremises Cabling Distances — *continued*

Equipment	24-Gauge Wire (0.5106 mm) Feet	24-Gauge Wire (0.5106 mm) Meters	26-Gauge Wire (0.4049 mm) Feet	26-Gauge Wire (0.4049 mm) Meters
Voice terminals:				
Analog				
8-port circuit pack (TN742, TN769), on-premises or out-of-building — same premises (notes 1 and 2)				
500- or 2500- type (note 3)	20000	6100	13000	3962
7100 series	15200	4633	10000	3050
16-port circuit pack (TN746), on-premises only — no out-of-building or bridging (note 1)				
AT&T 500 or 2500 type terminals without adjuncts	3100	945	2000	610
16-port circuit pack (TN746B), on-premises or out-of-building — same premises (notes 1 and 2)				
500- or 2500-type (note 3)	20000	6100	13000	3962
7100 series	15200	4633	10000	3050
Hybrid (TN762)				
7300 series (without aux power)	1000	305	750	229
7300 Series (with aux power)	2000	610	2000	610
Digital (TN754B) (Note 4)				
7400D series				
Phantom powered	3400	1037	2200	670
Locally powered	5000	1524	4000	1219
Digital (TN754)				
7400D series				
On-premises-only terminals	3000	914	2200	670
Out-of-bldg. same premises terminals (note 4)	2400	732	1300	396
ISDN (TN556) (note 5)				
7500 series (point-to-point)				
Termination resistor (3 feet)	1900	579	1600	488
Termination resistor (250 feet)	1600	488	1300	396
MET sets (TN735)	1000	305	650	198

Notes:

1. An out-of-building, same-premises, analog terminal installation requires a carbon block, gas tube, or equivalent solid state device at each end of the interbuilding cable.
2. Only AT&T 500- or 2500-type terminals can be used off-premises to a CO.
3. Point-to-point connections and terminals are within 33 feet of the jack.

Fiber-Optic Cabling Distances

The requirements that determine the maximum fiber-optic cabling distances for a system are:

- The mean loss and the length of the outside plant fiber cable
- The mean loss and the length of fiber cable shipped with the cabinet (including any fiber riser cable)
- The mean loss of an ST connector and the number of ST connections
- The mean loss of a rotary mechanical splice and the number of splices
- Higher-order mode loss.

Fiber-optic cable is terminated at 9823A lightwave transceivers when the distance between cabinets is equal to or less than 4,900 feet (1.5 km).

Fiber-optic cable is terminated at 9823B lightwave transceivers when the distance between cabinets is greater than 4,900 feet (1.5 km) and less than 25,000 feet (7.6 km).

The transmission speed across a fiber optic cable link between the PPN and an EPN is 32.788 Mbps.

DS1 Remoting Transmission Distance — G3

When the distance between cabinets is greater than 25,000 ft., DS1 remoting is used in place of fiber-optic cabling for distances up to 100 circuit miles. Chapter 5, “Cabling,” describes DS1 remoting and the reasons for the 100-mile limit.

Tones

This section lists tones generated in G1 and G3.

Call-Progress Tones in DEFINITY G1, G3i, and G3r

Table 11-12 lists the call-progress tones generated in G1, G3i, and G3r.

Table 11-12. Call-Progress Tones in DEFINITY G1, G3i, and G3r

Tone	Frequency	Pattern (ms)
Answerback 3 tone	2225 Hz	3000 on followed by silence; not repeated
Answerback 5 tone	2225 Hz	5000 on followed by silence; not repeated
Bridging warning tone*	440 Hz	1750 on, 12000 off, 650 on; repeated
Busy tone	480 Hz + 620 Hz	500 on, 500 off; repeated
Call waiting tones:		
Internal	440 Hz	200 on followed by silence; not repeated
External or handled by attendant	440Hz	200 on, 200 off, 200 on followed by silence; not repeated
Priority call	440 Hz	200 on, 200 off, 200 on, 200 off, 200 on followed by silence: not repeated
Call waiting ringback tone	440 Hz+ 480 Hz; 440 Hz	900 on (440 Hz + 480 Hz), 200 on (400 Hz), 2900 off; repeated
Centralized attendant call: incoming call identification	480 Hz& 440 Hz &480 Hz	100 on (480 Hz), 100 on (440 Hz), 100 on (480 Hz) followed by silence; not repeated

* Used with the Busy Verification and Executive Override features, and Service Observing feature when the warning tone is enabled.

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Table 11-12. Call-Progress Tones in DEFINITY G1, G3i, and G3r — *continued*

Tone	Frequency	Pattern (ms)
Dial zero, attendant transfer, and test calls	440 Hz	100 on, 100 off, 100 on followed by silence; not repeated
Recall on don't answer, audible ringing	440 Hz	300 on followed by silence; not repeated
Hold recall, hold confirmation	440 Hz	50 on, 50 off, 50 on, 50 off, 50 on, 50 off, 50 on, 50 off, 50 on followed by silence; not repeated
Camp-on recall, camp-on confirmation	440 Hz	100 on followed by silence; not repeated
Coverage tone	440 Hz	600 on, followed by silence; not repeated
Confirmation tone	350 Hz + 440 Hz	100 on, 100 off, 100 on, 100 off, 100 on followed by silence; not repeated
Continuous confirmation tone	350 Hz + 440 Hz	100 on, 100 off; repeated
Dial tone	350 Hz + 440 Hz	continuous
Executive override tone	440 Hz	3000 on followed by silence; not repeated
Intercept tone	440 Hz & 620 Hz	250 on (440 Hz), 250 on (620 Hz); repeated
Precedence audible alert tone	440 Hz + 480 Hz	1600 on, 300 off; repeated
Recall dial tone	350 Hz + 440 Hz	100 on, 100 off, 100 on, 100 off, 100 on, 100 off followed by continuous dial tone
Reorder tone	480 Hz + 620 Hz	250 on, 250 off; repeated
Remote hold tone	440 Hz	50 on, 50 off; repeated
Ringback tone	440 Hz + 480 Hz	1000 on, 3000 off; repeated
Voice signaling tone	440 Hz	1000 on followed by silenced; not repeated
Zip tone	480 Hz	500 on followed by silenced; not repeated

Audible Ringing Signals in DEFINITY G1, G3i, and G3r

Table 11-13 lists the audible ringing signals generated on analog lines in G1, G3i, and G3r.

Table 11-13. Ringing Tones in DEFINITY G1, G3i, and G3r

Ringing Tone	Pattern (ms)
1	1200 on, 4000 off; repeated
2	400 on, 200 off, 600 on, 4000 off; repeated
3	200 on, 100 off, 200 on, 100 off, 600 on, 4000 off; repeated

MFC Tones in DEFINITY G3i-G

With multifrequency-compelled signaling (MFC) used on DID and DOD trunks in countries outside the USA, a G3i-G responds to the frequencies generated by the CO with answering frequencies. The sequence of tones generated by the CO for incoming calls is chosen from among the following tones: 540, 660, 780, 900, 1020, and 1980 Hz. A G3i-G chooses from among the following tones for outgoing calls: 1380, 1500, 1620, 1740, 1860, and 1980 Hz.

Call Progress Tones in DEFINITY G3i-G

Table 11-14 lists call progress tones generated by a TN780 tone-clock circuit pack in G3i-G. The tones are used in the five administrable tone plans. In the table, “Number” is the hexadecimal address of a tone and “Level” is the tone amplitude in decibels per meter (dbm).

Table 11-14. Call Progress Tones in DEFINITY G3i-G

Number (Hex.)	Frequency	Level (dbm)	Comments
0	Null	None	Call progress tone and transmission test tone components
1	350Hz	-17.25	
2	425Hz	-4.0	
3	425Hz	-11.0	
4	425Hz	-17.25	
5	440Hz	-17.25	
6	350Hz + 425Hz	-4.0	
7	350Hz + 440Hz	-13.75	
8	480Hz	-17.25	
9	620Hz	-17.25	
a	440Hz + 480Hz	-19.0	
b	404Hz	-11.0	
c	404Hz	-16.0	
d	480Hz + 620Hz	-24.0	
e	404Hz + 425Hz	-11.0	
f	375Hz + 425Hz	-15.0	
10	404Hz + 450Hz	-11.0	
11	Chimes (860Hz)	-3.0	0.525s exp. decay
12	DMW (1000HZ)	0.0	
13	Square (1000Hz)	+3.0	Max. amplitude square
14	525Hz	-11.0	Call progress tone components
15	1400Hz	-11.0	
16	1004HZ	0.0	
17	1004Hz	-16.0	
18	2804Hz	-16.0	
19	697Hz or 700Hz	-8.5/-8.0	DTMF or MF tone components
1a	770Hz or 900Hz	-8.5/-8.0	
1b	852Hz or 1100Hz	-8.5/-8.0	
1c	941Hz or 1300Hz	-8.5/-8.0	
1d	1209Hz or 1500Hz	-7.5/-8.0	
1e	1336Hz or 1700Hz	-7.5/-8.0	
1f	1477Hz or 2600Hz	-7.5/-8.0	
20	1633Hz or 1004Hz	-7.5/0.0	
21	2025Hz	-12.1	Answerback CCITT modem tones
22	2100HZ	-12.1	
23	2225Hz	-12.1	
24	Count	None	

Indicator Lamp Signals

Table 11-15 lists the lamp signals generated by the system for the attendant console and multiappearance voice terminals.

Table 11-15. Lamp Signals Generated by the System

Lamp Signal	Pattern (ms)
Dark	Off
Lighted	On
Flashing	500 on, 500 off; repeated
Fluttering	50 on, 50 off; repeated
Broken Flutter	5 cycles of 50 on, 50 off, followed by 500 off; repeated
Wink	350 on, 50 off; repeated

Protocols

Table 11-16 lists the various protocols used in the system, with applications and maximum limitations.

Table 11-16. Protocols Used in the System

Protocol	Applications	Maximum Data Rate	Maximum Distance
DCP	Digital switch to data endpoints	64 kbps 3000 ft (915 m) for voice	5000 ft (1524 m) for data
RS232C	PDM to AP Switch to administration terminal. PDM to host computer. AP to data set (M) PDM to printer	19.2 kbps	50 ft (15.2 m)
	MPDM to AP	64 kbps	17 ft (5.9 m)
	MTDM for downloading and high-speed data transfer	64 kbps	17 ft (5.9 m)
	EIA interface (Data line to ADU)	19.2 kbps 9.6 kbpS 4.8 kbpS 2.4 kbpS 1.2 kbps 0.3 kbps	2000 ft (610 m) 5000 ft (1524 m) 7000 ft (2130 m) 12000 ft (3654 m) 20000 ft (6100 m) 40000 ft (12200 m)
RS449	AP to AP	19.2 kbps 9.6 kbps 4.8 kbps 2.4 kbps	200 ft (61 m) 400 ft (122 m) 800 ft (244 m) 1600 ft (488 m)

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Table 11-16. Protocols Used in the System — ***continued***

Protocol	Applications	Maximum Data Rate	Maximum Distance
SSI	500 BCT to AP 400 series printers to AP	56 kbps	5000 ft (1524 m)
BISYNC	AP line controller to host computer for terminal Emulation (9.6 kbps)	2.4 kbps 4.8 kbps 9.6 kbps	
BX.25	Communication interface to MSA, DCS, ISDN, or AUDIX	9.6 kbps	
SDCPI	(M)PDM to AP	64 kbps	17 ft (5.9 m)
RS366	Host computer to ACU MTDM to ACU	 64 kbps	50 ft (15.2 m) 17 ft (5.9 m)
V.35	MPDM to data endpoints	56 kbps	50 ft (15.2 m)
Category A	3270 data modules to coaxial 3270-type terminals or cluster controller 3270A data module in ASCII emulation mode	64 kbps 9.6 kbps	500 ft (152 m)
ISDN BRI (G3)	Communication interface to ISDN BRI	64 kbps	655 ft (199.3 m) to network interface or repeater 1310 ft (399.3 m) PBX to PBX
ISDN PRI	Communication interface to ISDN PRI	64 kbps	655 ft (199.3 m) to network interface or repeater 1310 ft (399.3 m) PBX to PBX

Transmission Characteristics

The system transmission characteristics comply with the American National Standards Institute/Electronic Industries Association (ANSI/EIA) PBX standard RS464A (SP-1378A). The following tables list some general switch transmission characteristics.

Frequency Response

Table 11-17 lists the analog-to-analog frequency response of the system for station-to-station or station-to-CO trunk, relative to loss at 1 kHz.

Table 11-17. Analog-to-Analog Frequency Response of the System

	Analog-to-Analog	
Frequency (Hz)	Max. Loss (dB)	Min. Loss (dB)
60	-	20
200	5	0
300 to 3000	1	-0.5
3200	1.5	-0.5
3400	3	0

Table 11-18 lists the analog-to-digital frequency response of the system for station or CO-trunk-to-digital Interface (DS0), relative to loss at 1 kHz.

Table 11-18. Analog-to-Digital Frequency Response

	Analog-to-Digital	
Frequency (Hz)	Max. Loss (dB)	Min. Loss (dB)
60	-	20
200	3	0
300 to 3000	0.5	-0.25
3200	0.75	-0.25
3400	1.5	0

Insertion Loss for Port-to-Port; Analog or Digital Port Types

Table 11-19 lists the insertion loss in the system for different connection types.

Table 11-19. Insertion Loss

Typical Connections	Nominal Loss (dB) at 1 kHz
On-premises station to on-premises station	6
On-premises station to off-premises station	3
Off-premises station to off-premises station	0
On-premises station to 4-wire trunk	3
Off-premises station to 4-wire trunk	2
Station-to-trunk	0
Trunk-to-trunk	0

Table 11-20. Overload and Crosstalk

Overload level: +3 dBm0

Crosstalk loss: ≥ 70 dB

Intermodulation Distortion

Table 11-21 lists the intermodulation distortion in the system for analog-to-analog and analog-to-digital, up to 9.6 kbps data

Table 11-21. Intermodulation Distortion

Four-Tone Method	
Second-order tone products	>46 dB
Third-order tone products	>56 dB

Quantization Distortion Loss

Table 11-22 lists the quantization distortion loss in the system for analog port to analog port.

Table 11-22. Analog Port-to-Analog Port Quantization Distortion Loss

Analog Port-to-Analog port	
Signal Level	Distortion Loss
0 to -30 dBm0	>33 dB
-40 dBm0	>27 dB
-45 dBm0	>22 dB

Table 11-23 lists the quantization distortion loss in the system for analog port to digital port and digital port to analog port.

Table 11-23. Analog Port-to-Digital Port Quantization Distortion Loss

Analog Port-to-Digital Port or Digital Port-to-Analog Port	
Signal Level	**Distortion Loss**
0 to -30 dBm0	>35 dB
-40 dBm0	>29 dB
-45 dBm0	>25 dB

Terminating Impedance: 600 ohms nominal

Trunk balance impedance (selectable): 600 ohms nominal or complex Z [350 ohms + (1 kohms in parallel with 0.21 µF)]

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Impulse Noise

On 95% or more of all connections the impulse noise is 0 count (hits) in 5 minutes at +55 dBm0 during the busy hour.

ERL and SFRL Talking State

Echo-return loss (ERL) and single-frequency return loss (SFRL) performance is usually dominated by termination and/or loop input impedances. The system provides an acceptable level of echo performance if the ERL and SFRL are met.

Station-to-station	ERL should meet or exceed 18 dB, SFRL should meet or exceed 12 dB
Station to 4-wire trunk connection	ERL should meet or exceed 24 dB, SFRL should meet or exceed 14 dB
Station to 2-wire trunk connection	ERL should meet or exceed 18 dB, SFRL should meet or exceed 12 dB
4-wire to 4-wire trunk connection	ERL should meet or exceed 27 dB, SFRL should meet or exceed 20 dB

Peak Noise Level

Analog to analog — 20 dBrnC
Analog to digital — 19 dBrnC
Digital to analog — 13 dBrnC

Echo Path Delay

Analog port to analog port — ≤ 3 ms
Digital interface port to digital interface port — ≤ 2 ms

Service Codes

Service codes (for the USA only) are issued by the Federal Communications Commission (FCC) to equipment manufacturers and registrants. These codes denote the type of registered terminal equipment and the protective characteristics of the premises wiring of the terminal equipment ports.

Private line service codes are as follows:

- 7.0Y — totally protected private communications (microwave) systems
- 7.0Z — partially protected private communications (microwave) systems
- 8.0X — port for ancillary equipment
- 9.0F — fully protected terminal equipment
- 9.0P — partially protected terminal equipment
- 9.0N — unprotected terminal equipment
- 9.0Y — totally protected terminal equipment

The system product line service code is 9.0F, which indicates it is terminal equipment that has fully protected premises wire at the private line ports.

FICs

A facility interface code (FIC) is a five-character code (for the USA only) that provides the technical information needed to order a specific port circuit pack for analog private lines, digital lines, MTS lines, and WATS lines in the USA. Tables 11-24, 11-25, and 11-26 list the FICs used to order analog private line, digital line, and MTS and WATS port circuit packs. Included with the FICs are service order codes, ringer equivalency numbers (RENs), and types of network jacks that connect a line to a rear panel connector on a carrier.

Table 11-24. FICs Used to Order Analog Private Line, Port Circuit Packs

Circuit Pack	FIC	Service Order Code	Network Jack
TN742 and TN747B OPS port, and TN746B OPS or on-premises station (ONS) port	0L13C	9.0F	RJ21X
TN760, TN760B, and TN760D tie trunk	TL31M	9.0F	RJ2GX

Table 11-25. FICs Used for Digital Line, Port Circuit Packs

Circuit Pack	FIC	Service Order Code	Network Jack
TN574 DS1 converter, TN722 and TN722B DS1 tie trunk, and TN767 DS1 interface	04DU9B,C	6.0P	RJ48C and RJ48M

Table 11-26. FICs Used to Order MTS and WATS, Port Circuit Packs

Circuit Pack	FIC	REN	Network Jack
TN742 and TN746B analog line	02LS2	NoneRJ21X and	RJ11C
TN747 and TN747B CO trunk	02GS2	1.0A	RJ21X
TN753 DID trunk	02RV2-T	0,0B	RJ21X
TN773 processor	02LS2	0.5A	RJ21X
TN1648 system access and maintenance	02LS2	0.5A	RJ21X

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Abbreviations

AA	archangel
AAR	Automatic Alternate Routing
AC	alternating current
ACA	automatic circuit assurance
ACD	Automatic Call Distribution
ACU	automatic call unit
ACW	after call work
AD	Abbreviated Dialing
ADU	asynchronous data unit
AE	access endpoint
AIM	asynchronous interface module
ALM-ACK	alarm acknowledge
AMW	Automatic Message Waiting
AN	analog
ANI	Automatic Number Identification
AP	applications processor
APLT	advanced private line termination
ARS	Automatic Route Selection
ASCII	American Standard Code for Information Interchange
ASAI	Adjunct Switch Applications Interface
ATB	all trunks busy
ATD	attention dial
AUDIX	Audio Information Exchange
AUX	auxiliary
AVD	alternate voice/data
AWT	average work time
BCC	bearer capability class
BCMS	Basic Call Management System
BCT	business communications terminal

AB

BHCC	busy hour calls completions
BLF	busy lamp field
BOS	bit-oriented signaling
BRI	basic rate interface
CACR	cancellation of authorization code request
CAG	coverage answer group
CAMA	Centralized Automatic Message Accounting
CA-TSC	call-associated temporary signaling connection
CAS	Centralized Attendant Service and Cost Accounting System
CBC	call-by-call and coupled bonding conductor
CC	country code
CCIS	common channel interoffice signaling
CCITT	Consultative Committee for International Telephone and Telegraph
CCMS	control-channel message set
CCS	hundred call seconds
CCSA	common control switching arrangement
CDM	channel division multiplexing
CDOS	customer-dialed and operator-serviced
CDRP	call detail record poller
CDRU	call detail recording utility
CEM	channel expansion multiplexing
CEPT1	European conference of postal and telecommunications rate 1
CI	clock input
CM	connection manager
cm	centimeters
CMDR	Centralized Message Detail Recording
CMS	Call Management System
CO	central office
COR	Class of Restriction
COS	Class of Service
CP	call process
CPE	customer premises equipment
CPN/BN	calling party number/billing number
CPTR	call progress tone receiver
CRC	cyclical redundancy checking
CSA	Canadian Safety Association
CSCN	center stage control network
CSD	customer service document
CSM	Centralized System Management
CSS	center stage switch
CSU	channel service unit
CTS	clear to send
CWC	call work codes
DAC	dial access code or direct agent calling
dB	decibel
DC	direct current
DCE	data communications equipment
DCP	Digital Communications Protocol

DCS	distributed communications system
DDC	direct department calling
DDD	direct distance dialing
DID	Direct Inward Dialing
DIOD	Direct Inward and Outward Dialing
DLC	data line circuit
DLDM	data line data module
DMI	digital multiplexed interface
DND	Do Not Disturb
DNIS	dialed number identification service
DOD	Direct Outward Dialing
DOT	duplication option terminal
DPM	dial plan manager
DS1	digital signal level-1
DS1C	digital signal level-1 converter
DSI	digital signal interface
DSU	data service unit
DTDM	digital terminal data module
DTE	data terminal equipment
DTGS	direct trunk group select
DTMF	dual-tone multifrequency
DXS	Direct Extension Selection
E&M	ear and mouth (receive and transmit)
EAA	expansion archangel
EAL	expansion archangel link
EBCDIC	Extended Binary-Coded Decimal Interexchange Code
ECC	error correct code
EI	expansion interface
EIA	Electronic Industries Association
EMI	electro-magnetic interference
EPN	expansion port network
EPROM	erasable programmable read-only memory
EPSCS	Enhanced Private Switched Communications Services
ESF	extended superframe format
ETN	electronic tandem network
FAC	feature access code
FAS	Facility-Associated Signaling
FAT	facility access trunk test
FAX	facsimile
FCC	Federal Communications Commission
FEAC	Forced Entry of Account Codes
FIC	facility interface codes
FNPA	foreign numbering-plan area
FRL	Facilities Restriction Level
FX	foreign exchange
G1	Generic 1
G3i	Generic 3, Intel

AB

G3i-G	Generic 3, global
G3-MA	Generic 3 management applications
G3-MT	Generic 3 management terminal
G3r	Generic 3, RISC (reduced instruction set computer)
GM	group manager
GPTR	general-purpose tone receiver
GRS	Generalized Route Selection
HNPA	home numbering plan area code
Hz	Hertz
IAS	Inter-PBX Attendant Service
IC	intercabinet
ICC	intercarrier cable
ICDOS	international customer dialed operator service
ICHT	incoming call-handling table
ICI	incoming call identifier
ICM	Inbound Call Management
IDDD	international direct distance dialing
IDF	intermediate distribution frame
IE	information element
IMT	intermachine trunk
in	inches
INADS	Initialization and Administration System
INS	ISDN network service
INWATS	Inward Wide Area Telephone Service
IO	information outlet
ISDN	Integrated Services Digital Network
ISN	Information System Network
ITP	installation test procedures
IXC	interexchange earner code
kbps	kilobits per second
kbyte	kilobytes
kg	kilograms
kHz	kilohertz
LAN	local area network
LAPD	link-access procedure on the D-channel
LATA	local access and transport area
lb	pounds
LDN	listed directory number
LDS	long-distance service
LED	light-emitting diode
LINL	local indirect neighbor link
LSU	local storage unit
LWC	Leave Word Calling
MADU	modular asynchronous data unit
MA-UUI	message-associated user-to-user signaling

M-Bus	memory bus
Mbps	megabits per second
Mbyte	megabytes
MCC	multicarrier cabinet
MCS	Message Center Service
MDF	main distribution frame
MDM	modular data module
MDR	message detail recording
MEM	memory
MET	multibutton electronic telephone
MHz	megahertz
MIM	management information message
MIS	management information system
MISCID	miscellaneous identification
MMS	material management services
MOS	message-oriented signaling
MPDM	modular processor data module
MS	message server
ms	milliseconds
MSA	Message Servicing Adjunct
MSG	message service
MSM	modular system management
MSS	mass storage system
MSSNET	mass storage/network control
MS/T	main satellite/tributary
MT	management terminal
MTDM	modular trunk data module
MTP	maintenance tape processor
MTT	multi-tasking terminal
MWL	message waiting lamp
NANP	North American numbering plan
NAU	network access unit
NCA/TSC	non-call associate/temporary signaling connection
NCOSS	Network Control Operations Support Center
NCSO	National Customer Support Organization
NEC	National Engineering Center
NEMA	National Electrical Manufacturer's Association
NFAS	non-facility-associated signaling
NID	Network Inward Dialing
NM	network management
NN	national number
NPA	numbering plan area
NPE	network processing element
NQC	number of queued calls
NSE	night service extension
NSU	network-sharing unit
NXX	public network office code
OA	operator assisted

OCM	Outbound Call Management
ONS	on-premises station
OPS	Off-Premises Station
OQT	oldest queued time
OSS	operations support system
OSSI	operations support system interface
OTQ	Outgoing Trunk Queuing
PACCON	packet control
PBX	private branch exchange
PC	personal computer
PCOL	Personal Central Office Line
PCOLG	personal central office line group
PCM	pulse code modulation
PCS	Permanent Switched Calls
PDM	processor data module
PDS	premises distribution system
PEI	processor element interchange
PGATE	packet gateway
PGN	partitioned group number
PI	processor interface
PIB	processor interface board
PKTINT	packet interface
PL	Private Line
PMS	Property Management System
PN	port network
POP	point-of-presence
PPN	processor port network
PRI	primary rate interface
PROCR	processor
PSDN	packet-switched public data network
PTT	postal telephone and telegraph
RAM	random access memory
RBS	robbed-bit signaling
RCL	Restricted Call List
RHNPA	remote home numbering plan area
RINL	remote indirect neighbor link
RISC	reduced instruction set computer
RLT	release link trunk
RNX	private network office code
ROM	read-only memory
RPN	routing plan number
RS232C	recommended standard 232C
RS449	recommended standard 449
RSC	Regional Support Center
SABM	set asynchronous balance mode
SAKI	sanity and control interface
SCC	single-carrier cabinet

SCD	switch-control driver
SCI	switch communications interface
SCO	system control office
SCOTCH	switch conferencing for TDM bus in concentration highway
SCSI	small computer system interface
SDN	software-defined network
SDDN	software-defined data network
SID	station identification number
SIT	special information tones
SMDR	Station Message Detail Recording
SN	switch node
SNI	switch node interface
SPE	switch processing element
SPID	service profile identifier
SSI	standard serial interface
SSM	single site management
SSV	station service
ST3	stratum 3 clock board
STARLAN	Star-Based Local Area Network
SVN	security violation notification
SXS	step-by-step
SYSAM	system access and administration
TAAS	Trunk Answer from Any Station
TAC	trunk access code
TCM	traveling class mark
TDM	time-division multiplex(ing)
TDR	Time-of-Day Routing
TEG	Terminating Extension Group
TEI	terminal endpoint identifier
TOD	time of day
TOP	task-oriented protocol
TSC	Technical Service Center
TTR	touch-tone receiver
TTT	terminating trunk transmission
TTTN	tandem tie trunk network
TTY	teletypewriter
UAP	usage allocation plan
UCD	Uniform Call Distribution
UCL	Unrestricted Call List
UDP	Uniform Dial Plan
UL	Underwriter Laboratories
UM	user manager
UNP	uniform numbering plan
UPS	uninterruptible power supply
USOP	user service-order profile
VDN	vector directory number

WATS	Wide Area Telecommunications Service
WCC	World Class Core
WSA	Waiting Session Accept
ZCS	zero code suppression

Glossary

3B2 Message Server
An AT&T software application that combines voice and data messaging services for voice terminal users whose extensions are connected to a DEFINITY G1 or DEFINITY G3.

800 service
A service in the USA, which allows incoming calls from a certain area or areas to an assigned number for a flat-rate charge based on usage.

A

access code
A 1-, 2-, or 3-digit dial code used to activate or cancel a feature, or access an outgoing trunk. The star (*) and pound (#) can be used as the first digit of an access code.

access endpoint
Either a nonsignaling channel on a DS1 interface or a nonsignaling port on an analog tie trunk circuit pack that is assigned a unique extension.

access tie trunk
A trunk that connects a main communications system with a tandem communications system in an electronic tandem network (ETN). An access tie trunk can also be used to connect a system or tandem to a serving office or service node. Also called “access trunk.”

ACCUNET®
A trademarked name for a family of digital services offered by AT&T in the USA.

adjunct
A processor that does one or more tasks for another processor and that is optional in the configuration of the other processor.

Adjunct-Switch Application Interface (ASAI)
An AT&T recommendation for interfacing adjuncts and communications systems, based on the CCITT Q.932 specification for layer 3.

administer
To access and change parameters associated with the services or features of a system.

administration terminal
A terminal used to administer and maintain a system. See also **terminal.**

American National Standard Code for Information Interchange
See **ASCII.**

analog
The representation of information by means of continuously variable physical quantities such as amplitude, frequency, and phase.

analog data
Data that is transmitted over a digital facility in analog (pulse code modulation) form. The data must pass through a modem either at both ends or at a modem pool at the distant end.

analog telephone
A telephone that receives acoustic voice signals and sends analog electrical signals along the telephone line. Analog telephones are usually served by a single wire pair (tip and ring). The model-2500 telephone set is a typical example of an analog telephone.

analog-to-digital converter (ADC)
A device that converts an analog signal to digital form. See also **digital-to-analog converter.**

angel
A microprocessor located on each port card in a processor port network (PPN). The angel uses the control-channel message set (CCMS) to manage communications between the port card and the archangel on the controlling switch processing element (SPE). The angel also monitors the status of other microprocessors on a port card and maintains error counters and thresholds. See also **archangel.**

answerback code
An assigned number used to respond to a page from a code-calling or loudspeaker-paging system, or to retrieve a parked call.

appearance
A software process that is associated with an extension and whose purpose is to supervise a call. Also called “call appearance”, “line appearance” and “occurrence”.

applications processor
A minicomputer used with several user-controlled applications such as traffic analysis and electronic documentation.

architecture
The organizational structure of a system, including hardware and/or software.

ASCII (American National Standard Code for Information Interchange)
The standard code, using a coded character set consisting of 7-bit coded characters (eight bits, including parity check), used for information interchange among data processing systems, data communications systems, and associated equipment. The ASCII set consists of control characters and graphic characters.

asynchronous data transmission
A method of transmitting data in which each character is preceded by a start bit and followed by a stop bit, thus permitting data characters to be transmitted at irregular intervals. This type transmission is advantageous when transmission is not regular (characters typed at a keyboard). Also called “asynchronous transmission”. See also **synchronous data transmission.**

asynchronous data unit (ADU)
A data communications equipment (DCE) type device that allows direct connection between RS232C equipment and a digital switch.

attendant
A person at a console on a customer’s premises who provides personalized service for incoming callers and voice-services users by performing switching and signaling operations. See also **attendant console.**

attendant console
The workstation used by an attendant. The attendant console allows the attendant to originate a call, answer an incoming call, transfer a call to another extension or trunk, put a call on hold, and remove a call from hold. Attendants using the console can also manage and monitor some system

operations. Also called “console.” See also **attendant.**

Audio Information Exchange (AUDIX)
A fully integrated voice-mail system that can be used with a variety of communications systems to provide call-history data, such as subscriber identification and reason for redirection.

automatic restoration
A service that restores disrupted connections between access endpoints (nonsignaling trunks) and data endpoints (devices that connect the switch to data terminal and/or communications equipment). This restoration is done within seconds of a service disruption so that critical data applications can remain operational.

automatic trunk
A trunk that does not require the sending or receiving of addressing information because the destination is predetermined. A request for service on the trunk, called a “seizure”, is sufficient to route the call. The normal destination of an automatic trunk is the communications-system attendant group. Also called “automatic incoming trunk” and “automatic tie trunk.”

auxiliary equipment
Equipment used for optional system features, such as Loudspeaker Paging and Music-on-Hold.

auxiliary trunk
A trunk used to connect auxiliary equipment, such as radio-paging equipment, to a communications system.

B

bandwidth
The difference, expressed in Hertz, between the highest and lowest frequencies in a range of frequencies.

barrier code
A security code used with the Remote Access feature to prevent unauthorized access to the system.

baud
In telecommunications applications, a unit of transmission speed equal to the number of signal events per second. See also **bit rate** and **bits per second.**

bit rate
The speed at which bits are transmitted, usually expressed in bits per second. Also called “data rate.” See also **baud** and **bits per second.**

bits per second (bps)
The number of binary units of information that are transmitted or received per second. See also **baud** and **bit rate.**

bit (binary digit)
One unit of information in binary notation having two possible states or values, zero or one.

bridged appearance
A call appearance on a voice terminal that matches a call appearance on another voice terminal for the duration of a call.

bridge (bridging)
The appearance of a voice terminal's extension at one or more other voice terminals.

buffer
1. In hardware, a circuit or component that isolates one electrical circuit from another. Typically, a buffer holds data from one circuit or process until another circuit or process is ready to accept the data. 2. In software, an area of memory used for temporary storage.

bus
A multiconductor electrical path used to transfer information over a common connection from any of several sources to any of several destinations.

business communications terminal (BCT)
An integrated digital data terminal used for business applications. A BCT can function via a digital terminal data module (DTDM) or a processor data module (PDM) as a special-purpose terminal for services provided by an applications processor (AP) or, as a terminal for data entry and retrieval.

BX.25
An AT&T version of the CCITT X.25 protocol for data communications. BX.25 adds a fourth level to the standard X.25 interface. This uppermost level combines levels 4, 5, and 6 of the International Standards Organization (ISO) reference model.

bypass tie trunks
A one-way, outgoing tie trunk from a tandem switch to a main switch in an electronic tandem network (ETN). Bypass tie trunks, provided in limited quantities, are used as a "last-choice" route when all trunks to another tandem switch are busy. Bypass tie trunks are used only if all applicable intertandem trunks are busy.

byte
A sequence of (usually eight) bits processed together.

C

cabinet
Housing for racks, shelves, or carriers that hold electronic equipment.

cable
The physical connection between two pieces of equipment — for example, cable from a data terminal to a modem — or between a piece of equipment and a termination field — for example, circuit pack I/O cables.

cable connector
A cable connector is either a jack (female) or plug (male) on the end of a cable. A cable connector connects wires on a cable to specific leads on telephone or data equipment.

call appearance, attendant console
Six buttons, labeled "a" through "f," and used to originate, receive, and hold calls. Each button has two lights to show the status of the call appearance.

call appearance, voice terminal
A button labeled with an extension number and used to place outgoing calls, receive incoming calls, or hold calls. Two lights next to the button show the status of the call appearance or the status of the call.

callback call
A call that is automatically returned to a voice terminal user who activated the Automatic Callback or Ringback Queuing feature.

Call Detail Recording Utility (CDRU)
Applications software that collects, stores, optionally filters, and outputs call detail records for direct or polled output to peripheral devices.

Call Management System (CMS)
An application, running on an adjunct processor, that collects information from an Automatic Call Distribution (ACD) unit. CMS enables customers to monitor and manage telemarketing centers by generating reports on the status of agents, splits, trunks, trunk groups, vectors, and vector directory numbers (VDNs), and enables customers to partially administer the ACD feature for a communications system.

call vector
A set of up to 15 vector commands to be performed for an incoming or internal call.

call work code
A number, up to 16 digits, entered by Automatic Call Distribution (ACD) agents to record the occurrence of customer-defined events (such as account codes, social security numbers, or phone numbers) on ACD calls.

call-waiting ringback tone
A low-pitched tone identical to ringback tone except that the tone decreases in the last 0.2 second. A call-waiting ringback tone notifies the attendant that the Attendant Call Waiting feature has been activated and that the called user is aware of the waiting call.

carrier
An enclosed shelf containing vertical slots that hold circuit packs.

CCITT (Comitte Consultatif International Telephonique et Telegraphique)
An international body that sets universal standards for data communications, including Integrated Services Digital Network (ISDN). CCITT members are from telecommunications companies and organizations around the world. See also **BX.25.**

center stage switch (CSS)
The central interface between the processor port network (PPN) and expansion port networks (EPNs) in a CSS-connected system.

central office (CO)
The location housing telephone switching equipment that provides local telephone service and access to toll facilities for long-distance calling.

central office (CO) codes
The first three digits of a 7-digit public network telephone number. CO codes are numbered from 200 through 999.

central office (CO) trunk
A telecommunications channel that provides access from the system to the public network through the local CO.

channel
A communications path for transmitting voice and/or data.

circuit
1. An arrangement of electrical elements through which electric current flows, providing one or more specific functions. 2. A channel or transmission path between two or more points.

circuit pack
A card on which electrical circuits are printed, and integrated circuit (IC) chips and electrical components are installed. A circuit pack is installed in a switch carrier.

Class of Restriction (COR)
A feature that allows up to 64 classes of call-origination and call-termination restrictions for voice terminals, voice terminal groups, data modules, and trunk groups. See also **Class of Service (COS).**

Class of Service (COS)
A feature that uses a number (zero through 15) to specify if voice terminal users can activate the Automatic Callback, Call Forwarding—All Calls, Data Privacy, or Priority Calling features.

Common Control Switching Arrangement (CCSA)
A private telecommunications network using dedicated trunks and a shared switching center for interconnecting company locations.

communications system
The software-controlled processor complex that interprets dialing pulses, tones, and/or keyboard characters and makes the proper interconnections both within the system and external to the system. The communications system itself consists of a digital computer, software, storage device, and carriers with special hardware to perform the actual connections. A communications system provides voice and/or data communications services, including access to public and private networks, for telephones and data terminals on a customer's premises. See also **switch.**

confirmation tone
Three short bursts of tone followed by silence to confirm that a feature activation, deactivation, or cancelation has been accepted.

connectivity
The connection of disparate devices within a single system.

console
See **attendant console.**

control cabinet
See **control carrier.**

control carrier
A carrier in a multicarrier cabinet that contains the switch processing element (SPE) circuit packs and, unlike a G3r control carrier, port circuit packs. Also called "control cabinet" in a single-carrier cabinet. See also **switch processing element.**

Coverage Answer Group
A group of up to eight voice terminals that ring simultaneously when a call is redirected to it by Call Coverage. Any one of the group can answer the call.

coverage call
A call that is automatically redirected from the called party's extension number to an alternate answering position when certain coverage criteria are met.

coverage path
The order in which calls are redirected to alternate answering positions.

coverage point
An extension or attendant group, vector directory number (VDN), or Automatic Call Distribution (ACD) split designated as an alternate answering position in a coverage path.

covering user
A person at a coverage point who answers a redirected call.

D

data channel
A communications path between two points used to transmit digital signals.

data communications equipment (DCE)
The equipment — usually a modem, data module, or packet assembler/disassembler — on the network side of a communications link that provides the functions to make the binary serial data from the source or transmitter compatible with the communications channel.

data link
The configuration of physical facilities enabling end terminals to communicate directly with each other.

data module
An interconnection device between a basic rate interface (BRI) or Digital Communications Protocol (DCP) interface of DEFINITY Generic 1 and DEFINITY Generic 3 and data terminal equipment (DTE) or data circuit-terminating equipment (DCE).

data path
The end-to-end connection used for a data-communications link. A data path is the combination of all the elements of an interprocessor communication in a distributed communications system (DCS).

data port
A point of access to a computer that uses trunks or lines for transmitting or receiving data.

data rate
See **bit rate.**

data service unit (DSU)
A device designed to transmit digital data on transmission facilities.

data terminal
An input/output (I/O) device that has either switched or direct access to a host computer or to an applications processor (AP).

data terminal equipment (DTE)
Equipment consisting of the endpoints in a connection over a data circuit. For example, in a connection between a data terminal and a host, the terminal, the host, and their associated modems or data modules make up the DTE. DTE usually consists of the following functional units: control logic, buffer store, and one or more input or output devices or computers. DTE can contain error control, synchronization, and telephone-identification capabilities.

delay-dial trunk
A trunk that allows dialing directly into a communications system — that is, the digits are received as they are dialed.

designated voice terminal
The specific voice terminal to which calls, originally directed to a certain extension number, are redirected. Commonly used to mean the "forwarded-to" terminal when Call Forwarding All Calls is active.

dial-repeating tie trunk
A tie trunk that transmits called-party addressing information between two communications systems.

Digital Communications Protocol (DCP)
An AT&T proprietary protocol used to transmit both digitized voice and digitized data over the same communications link. A DCP link is made up of two 64-kbps information (I-) channels and one 8-kbps signaling (S-) channel.

digital data endpoints
In DEFINITY Generic 1 and Generic 3i, digital data endpoints include devices such as the 510D terminal or the 515-type business communications terminal (BCT).

digital multiplexed interface (DMI)
An interface that provides connectivity between a communications system and a host computer or between two communications systems using digital signal level-1 (DS1) 24th-channel signaling. DMI provides 23 64-kbps data channels and 1 common signaling channel over a twisted-pair connection. DMI is offered through two capabilities: bit-oriented signaling (DMI-BOS) and message-oriented signaling (DMI-MOS).

digital terminal data module (DTDM)
An integrated or adjunct data module that shares with a digital telephone the same physical port for connection to a communications system. The function of a DTDM is similar to that of a processor data module (PDM) and modular processor data module (MPDM) in that it converts RS232C signals to DCP signals.

digital transmission
A mode of transmission in which the information to be transmitted is first converted to digital form and then transmitted as a serial stream of pulses.

digital trunk
A circuit in that carries digital voice and/or digital data in a telecommunications channel.

digital-to-analog converter
A device that converts data in digital form to the corresponding analog signals. See also **analog-to-digital converter.**

digit conversion
A process used to convert specific dialed numbers into other dialed numbers.

Direct Extension Selection (DXS)
A feature on an attendant console that allows an attendant direct access to voice terminals by pressing a group select button and a DXS button.

Direct Inward Dialing (DID)
A feature that allows an incoming call from the public network (not FX or WATS) to reach a specific telephone without attendant assistance. DID calls to DID-restricted telephone lines are routed to an attendant or recorded announcement, depending on the option selected.

direct inward dialing (DID) trunk
An incoming trunk used for dialing directly from the public network into a communications system without help from the attendant.

disk drive
A mechanical device that stores data on and retrieves data from one or more disks.

distributed communications system (DCS)
A network configuration linking two or more communications systems in such a way that selected features appear to operate as if the network were one system.

duplicated common control
Two processors ensuring continuous operation of a communications system. While one processor is on-line, the other functions as a backup. The backup processor goes on-line periodically or when a problem condition occurs.

duplicate processor-only system
A system having the following: two control carriers, duplicate expansion interface (EI) circuit packs in the PPN (in G3r with CSS), and duplicate switch node clock circuit packs in the switch node (SN) carriers. See also **duplicated common control, duplication, duplication option,** and **fully duplicated system.**

duplication
The use of redundant components to improve availability. When a duplicated subsystem fails, its backup redundant system automatically takes over.

duplication option
A system option that duplicates the following:

- Control carrier, which contains the switch processing element (SPE)
- Expansion interface (EI) circuit packs in carriers
- Fiber-optic cabling between port networks (PNs)
- Center-stage switch (CSS) in a CSS-connected system

E

ear and mouth (E&M) signaling
Trunk supervisory signaling, used between two communications systems, whereby signaling information is transferred through two-state voltage conditions (on the E and M leads) for analog applications and through a single bit for digital applications.

Electronics Industries Association (EIA)
A trade association of the electronics industry that establishes electrical and functional standards.

electronic tandem network (ETN)
A tandem tie trunk network that has automatic call routing capabilities based on the number dialed and the most preferred route available at the time the call is placed. Each switch in the network is assigned a unique private network office code (RNX), and each voice terminal is assigned a unique extension number.

emergency transfer
If a major system failure occurs, the automatic transfer within a communications system of a predefined set of central office (CO) lines to a group of answering telephones with at least one telephone capable of making outgoing calls. The system operates in this mode until the failure is repaired and the system automatically returns to normal operation. Also called “power-failure transfer.”

end-to-end signaling
The transmission of touch-tone signals generated by dialing from a voice terminal user to remote computer equipment. A connection must first be established over an outgoing trunk from the calling party to the computer equipment. Then additional digits can be dialed to transmit information to be processed by the computer equipment.

Enhanced Private Switched Communications Service (EPSCS)
An analog private telecommunications network based on the No. 5 Crossbar and 1A ESS™ that provides advanced voice and data telecommunications services to companies with many locations.

expansion archangel (EA)
A network-control microprocessor located on an expansion interface (EI) port circuit pack in an expansion port network (EPN). The EA provides an interface between the EPN and its controlling switch processing element (SPE).

expansion control cabinet
See **expansion control carrier.**

expansion control carrier
A carrier in a multicarrier cabinet that contains extra port circuit packs and a maintenance interface. Also called “expansion control cabinet” in a single-carrier cabinet.

expansion interface (EI)
A port circuit pack in a port network (PN) that provides the interface between a PN’s time-division multiplex (TDM) bus and packet bus, and a fiber-optic link. The EI carries circuit-switched data, packet-switched data, network control, timing control, and DS1 control. in addition, an EI in an expansion port network (EPN) communicates with the master maintenance circuit pack to provide the EPN’s environmental and alarm status to the switch processing element (SPE).

expansion port network (EPN)
A port network (PN) that is connected to the TDM bus and packet bus of a processor port network (PPN). Control is achieved by indirect connection of the EPN to the PPN via a port-network link (PNL). See also **port network.**

expansion-archangel link (EAL)
A link-access function on the D-channel (LAPD) logical link that exists between a switch processing element (SPE) and an expansion archangel (EA). The EAL carries control messages from the SPE to the EA and to port circuit packs in an expansion port network (EPN).

extension number
A 1- to 5-digit number by which calls are routed through a communications system or, with a Uniform Dial Plan (UDP) or main-satellite dialing plan, through a private network. Extension numbers are primarily used for telephones and data terminals but can also be used with specific features.

external call
A connection between a communications system user and a party on the public network or on another communications system in a private network.

F

facility
A general term used for a telecommunications transmission pathway and associated equipment.

feature
A specifically defined function or service provided by the system.

feature button
A labeled button on a telephone or attendant console used to access a specific feature.

fiber optics
A technology using materials that transmit ultrawideband electromagnetic light-frequency ranges for high-capacity carrier systems.

foreign exchange trunk
A telecommunications channel that directly connects the system to a central office (CO) other than its local CO.

foreign exchange (FX)
A central office (CO) other than the one providing local access to the public telephone network.

foreign numbering-plan area code (FNPAC)
An area code other than the local area code. The FNPAC must be dialed to call outside the local geographical area.

fully duplicated system
A system that has the following duplicated items: control carriers, tone-clock circuit packs, expansion interface (EI) circuit packs, and cabling between port networks (PNs) and center stage switch (CSS) in a CSS-connected system. See also **duplicated common control, duplicate processor-only system, duplication,** and **duplication option.**

G

ground-start trunk
A trunk on which, for outgoing calls, the system transmits a request for services to a distant switching system by grounding the trunk ring lead. To receive the digits of the called number, that system grounds the trunk tip lead. When the system detects this ground, the digits are sent.

H

handshaking logic
A format used to initiate a data connection between two data module devices.

Hertz (Hz)
A unit of frequency equal to one cycle per second.

home numbering-plan area code
The local area code. The area code does not have to be dialed to call numbers within the local geographical area.

hop
Nondirect communication between two switch communications interfaces (SCIs) whereby the SCI message passes automatically without intermediate processing through one or more intermediate SCIs.

host computer
A computer, connected to a network, that processes data from dataentry devices.

hunt group
A group of extensions that are assigned the Station Hunting feature so that a call to a busy extension will reroute to an idle extension in the group.

I

immediate-start tie trunk
A trunk on which, after making a connection with a distant switching system for an outgoing call, the system waits a nominal 65 ms before sending the digits of the called number. This allows time for the distant system to prepare to receive digits. On an incoming call, the system has less than 65 ms to prepare to receive the digits.

information exchange
The exchange of data between users of two different systems (such as DEFINITY G1 or DEFINITY G3 and a host computer) over a local area network (LAN).

Information Systems Network (ISN)
A wide area network (WAN) and local area network (LAN) with an open architecture combining host computers, minicomputers, word processors, storage devices, PCs, high-speed printers, and nonintelligent terminals into a single packet-switching system.

inside call
A call placed from one telephone to another within the local communications system.

Integrated Services Digital Network Basic Rate Interface (ISDN-BRI)
The interface between a communications system and terminal that includes two 64-kbps B-channels for transmitting voice or data and one 16-kbps D-channel for transmitting associated B-channel call control and out-of-band signaling information — an arrangement called “2B+1D”. ISDN-BRI also includes 48 kbps for transmitting framing and D-channel contention information, for a total interface speed of 192 kbps. ISDN-BRI serves ISDN terminals and digital terminals fitted with ISDN terminal adapters. See also **Integrated Services Digital Network Primary Rate Interface.**

Integrated Services Digital Network Primary Rate Interface (ISDN-PRI)
The interface between multiple communications systems that in North America includes 24 64-kbps channels, corresponding to the North American digital signal level-1 (DS1) standard rate of 1.544 Mbytes per second.

The most common arrangement of channels in ISDN-PRI is 23 64-kbps B-channels for transmitting voice and data and 1 64-kbps D-channel for transmitting associated B-channel call control and out-of-band signaling information — an arrangement called “23B+1D”, although with nonfacility-associated signaling (NFAS) ISDN-PRI can include 24 B-channels and no D-channel. See also **Integrated Services Digital Network** and **Integrated Services Digital Network Basic Rate**

Interface.

Integrated Services Digital Network (ISDN)
A public or private network that provides end-to-end digital communications for all services to which users have access by a limited set of standard multipurpose user-network interfaces defined by the CCITT. Through internationally accepted standard interfaces, ISDN provides digital circuit-switched or packet-switched communications within the network and links to other ISDNs to provide national and international digital communications. See also **Integrated Services Digital Network Basic Rate Interface** and **Integrated Services Digital Network Primary Rate Interface.**

intercept tone
An alternating high and low tone that indicates a dialing error or denial of the service requested.

interface
A common boundary between two systems or pieces of equipment.

internal call
A connection between two users within a system.

International Telegraph and Telephone Consultative Committee
See **CCITT.**

in-use lamp
A red light on a multiappearance voice terminal that is illuminated to show which call appearance will be selected when the handset is lifted or which call appearance is active when a user is off-hook.

ISDN Gateway (IG)
A feature allowing integration of DEFINITY Generic 1 and Generic 3 and a host-based telemarketing application via a link to a gateway adjunct. The gateway adjunct is a 3B-based product that notifies the host-based telemarketing application of call events.

ISDN trunk
A trunk administered for use with Integrated Services Digital Network primary rate interface (ISDN-PRI). Also called “ISDN facility.”

L

lightwave transceiver
Hardware that provides an interface to fiber-optic cable from port circuit packs and digital signal level-1 (DS1) converter circuit packs. Lightwave transceivers convert electrical signals to light signals and vice versa.

light-emitting diode (LED)
A semiconductor device that produces light when voltage is applied. LEDs provide a visual indication of the operational status of hardware components, the results of maintenance tests, and the alarm status of circuit packs, and the activation of telephone features.

line
A transmission path between a communications system or central office (CO) switching system and a voice terminal or other terminal.

line port
The hardware that provides the access point to a communications system for each circuit associated with a telephone and/or data terminal.

link
A transmitter-receiver channel that connects two systems.

link-access procedure on the D-channel (LAPD)
A link-layer protocol on the Integrated Services Digital Network basic rate interface (ISDN-BRI) and primary rate interface (ISDN-PRI) data-link layer (level 2). LAPD provides data transfer between two devices, and error and flow control on multiple logical links. LAPD is used for signaling and low-speed packet data (X.25 and mode 3) on the signaling (D-) channel and for mode-3 data communications on a bearer (B-) channel.

local area network (LAN)
A networking arrangement designed for a limited geographical area. Generally, a LAN is limited in range to a maximum of 6.2 miles and provides high-speed carrier service with low error rates. Common configurations include daisy chain, star (including circuit-switched), ring, and bus.

logical link
The communications path between a processor and a basic rate interface (BRI) terminal.

loop-start trunk
A trunk on which, after establishing a connection with a distant switching system for an outgoing call, the system waits for a signal on the loop formed by the trunk leads before sending the digits of the called number.

M

maintenance
The activities involved in keeping a telecommunications system in proper working condition: the detection and isolation of software and hardware faults, and automatic and manual recovery from these faults.

main/satellite/tributary
A private network configuration that can either stand alone or access an electronic tandem network (ETN). A “main” switch provides interconnection, via tie trunks, with one or more subtending switches, called “satellites”; all attendant positions for the main/satellite configuration; and access to and from the public network. To a user outside the complex, a main/satellite configuration appears as one switch, with one listed directory number (LDN). A “tributary” switch is connected to the main switch via tie trunks, but which has its own attendant positions and LDN.

major alarm
An indication of a failure that has caused critical degradation of service and requires immediate attention. Major alarms are automatically displayed on LEDs on the attendant console and maintenance or alarming circuit pack, logged to the alarm log, and reported to a remote maintenance facility, if applicable.

memory
A device into which information can be copied and held, and from which the information can be obtained at a later time.

message center
An answering service that supplies agents to and stores messages for later retrieval.

message center agent
A member of a message center hunt group who takes and retrieves messages for voice terminal users.

minor alarm
An indication of a failure that could affect customer service. Minor alarms are automatically displayed on LEDs on the attendant console and maintenance or alarming circuit pack, sent to the alarm log, and reported to a remote maintenance facility, if applicable.

modern
A device that converts digital data signals to analog signals for transmission over telephone circuits. The analog signals are converted back to the original digital data signals by another modem at the other end of the circuit.

modem pooling
A capability that provides shared conversion resources (modems and data modules) for cost-effective access to analog facilities by data terminals. When needed, modem pooling inserts a conversion resource into the path of a data call. Modem pooling serves both outgoing and incoming calls.

modular processor data module (MPDM)
A processor data module (PDM) that can be configured to provide several kinds of interfaces (RS232C, RS449, and V.35) to customer-provided data terminal equipment (DTE). See also **processor data module.**

modular trunk data module (MTDM)
A trunk data module (TDM) that can be configured to provide several kinds of interfaces (RS232C, RS449, and V.35) to customer-provided data terminal equipment (DTE).

modulator/demodulator
See **modem.**

multiappearance voice terminal
A terminal equipped with several call appearance buttons for the same extension number, allowing the user to handle more than one call, on that same extension number, at the same time.

multicarrier cabinet
A structure that holds one to five carriers. See also **single-carrier cabinet.**

multifrequency-compelled (MFC), release 2 (R2) DID signaling
A signal consisting of two frequency components, such that when a signal is transmitted from a switch, another signal acknowledging the transmitted signal is received by the switch. “R2” designates signaling used in the USA and countries outside the USA, and “R1” (for no compelled signaling) designates signaling used only in countries outside the USA.

multiplexer
A device used to combine a number of individual channels into a single common bit stream for transmission.

multiplexing
A process whereby a transmission facility is divided into two or more channels, either by splitting the frequency band into a number of narrower bands or by dividing the transmission channel into successive time slots. See also **time-division multiplexing.**

N

network
A series of points, nodes, or stations connected by communications channels.

network interface
A common boundary between two systems in an interconnected group of systems.

node
A switching or control point for a network. Nodes are either “tandem” — they receive signals and pass them on — or “terminal” — they originate or terminate a transmission path.

P

packet
A group of bits — including a message element, which is the data and a control information element (IE), which is the header — used in packet switching and transmitted as a discrete unit. In each packet, the message element and control IE are arranged in a specified format. See also **packet bus** and **packet switching.**

packet bus
A wide-bandwidth bus that transmits packets.

packet switching
A data-transmission technique whereby user information is segmented and routed in discrete data envelopes called “packets,” each with its own appended control information, for routing, sequencing, and error checking. Packet switching allows a channel to be occupied only during the transmission of a packet; on completion of the transmission, the channel is made available for the transfer of other packets. See also **BX.25** and **packet.**

paging trunk
A telecommunications channel used to access an amplifier for loudspeaker paging.

personal computer (PC)
A personally controllable microcomputer.

pickup group
A group of individuals authorized to answer any call directed to an extension number within the group.

port
A data- or voice-transmission access point on a device that is used for communicating with other devices.

port carrier
A carrier in a multicarrier cabinet or a single-carrier cabinet containing port circuit packs, power units, and service circuits. Also called a “port cabinet” in a single carrier cabinet.

port network (PN)
A cabinet containing a TDM bus and packet bus to which the following components are connected: port circuit packs, one or two tone-clock circuit packs, a maintenance circuit pack, service circuit packs, and (optionally) up to four expansion interface (EI) circuit packs in G3. Each PN is controlled either locally or remotely by a switch processing element (SPE). See also **expansion port**

network and **processor port network.**

port-network connectivity
The interconnection of port networks (PNs), regardless of whether the configuration uses direct or switched connectivity.

Primary Rate Interface (PRI)
A standard Integrated Services Digital Network (ISDN) frame format that specifies the protocol used between two or more communications systems. PRI runs at 1.544 Mbps and, as used in North America, provides 23 64-kbps B-channels (voice or data) and one 64-kbps D-channel (signaling). The D-channel is the 24th channel of the interface and contains multiplexed signaling information for the other 23 channels.

principal (user)
A person to whom a telephone is assigned and who has message center coverage.

private network
A network used exclusively for the telecommunications needs of a particular customer.

private network office code (RNX)
The first three digits of a 7-digit private network number. These codes are numbered 220 through 999, excluding any codes that have a 0 or 1 as the second digit.

processor carrier
A phrase used for “control carrier” in DEFINITY G3r. See also **control carrier.**

processor data module (PDM)
A device that provides an RS232C data circuit-terminating equipment (DCE) interface for connecting to data terminals, applications processors (APs), and host computers and provides a Digital Communications Protocol (DCP) interface for connection to a communications system. See also **modular processor data module.**

processor port network (PPN)
A port network (PN) controlled by a switch processing element (SPE) that is directly connected to that PN’s time-division multiplex (TDM) bus and local area network (LAN) bus. See also **port network.**

processor port network (PPN) control carrier
A carrier containing the maintenance circuit pack, tone/clock circuit pack, and switch processing element (SPE) circuit packs for a processor port network (PPN) and, optionally, port circuit packs.

Property Management System (PMS)
A stand-alone computer used by lodging and health services organizations use for services such as reservations, housekeeping, and billing.

protocol
A set of conventions or rules governing the format and timing of message exchanges to control data movement and correction of errors.

public network
The network that can be openly accessed by all customers for local or long-distance calling.

pulse-code modulation (PCM)
An extension of pulse-amplitude modulation (PAM) in which carrier-signal pulses modulated by an analog signal, such as speech, are quantized and encoded to a digital, usually binary, format.

Q

queue
An ordered sequence of calls waiting to be processed.

queuing
The process of holding calls in order of their arrival to await connection to an attendant, to an answering group, or to an idle trunk. Calls are automatically connected in first-in, first-out sequence.

R

random access memory (RAM)
A storage arrangement whereby information can be retrieved at a speed independent of the location of the stored information.

read-only memory (ROM)
A storage arrangement primarily for information retrieval applications.

recall dial tone
Three short bursts of tone followed by steady dial tone signaling that the system has completed a function (such as holding a call) and is ready to accept dialing.

redirection criteria
The information administered for each voice terminal's coverage path that determines when an incoming call is redirected to coverage.

remote home numbering-plan area code (RHNPA)
A foreign numbering-plan area code that is treated as a home area code by the Automatic Route Selection (ARS) feature. Calls can be allowed or denied based on the area code and the dialed central office (CO) code rather than just the area code. If the call is allowed, the ARS pattern used for the call is determined by these six digits.

removable mass storage subsystem (RMSS)
A tape storage device that stores the software information for the system.

reorder tone
A fast-busy tone repeated 120 times a minute to signal that at least one of the facilities, such as a trunk or a digit transmitter, needed for the call was not available at the time the call was placed.

RS232C
A physical interface specified by the EIA RS232C transmits and receives asynchronous data at speeds of up to 19.2 kbps over cable distances of up to 50 feet.

S

sanity-and-control interface (SAKI)
A custom, very-large-scale-integration (VLSI) microchip located on each port circuit pack. The SAKI provides address recognition, buffering, and synchronization between the angel and the five control time slots that make up the control channel. The SAKI also scans and collects status information for the angel on its port circuit pack and, when polled, transmits this information to the archangel.

simplex system
A system that has no redundant hardware.

single-carrier cabinet
A combined cabinet and carrier unit that contains one carrier. See also **multicarrier cabinet.**

single-line voice terminal
A voice terminal served by a single-line tip and ring circuit (models 500, 2500, 7101A, 7103A).

small computer system interface (SCSI)
An ANSI bus standard that provides a high-level command interface between host computers and peripheral devices.

software
A set of computer programs that do one or more tasks.

split
A condition whereby a caller is temporality separated from a connection with an attendant. A split condition automatically occurs when the attendant, active on a call, presses the start button.

standard serial interface (SSI)
A communications protocol developed by AT&T Teletype Corporation for use with the 500 business communications terminals (BCTs) and the 400-series printers.

status lamp
A green light that shows the status of a call appearance or a feature button by the state of the light (lit, flashing, fluttering, broken flutter, or unlit).

stroke counts
A method used by Automatic Call Distribution (ACD) agents to record up to nine customer-defined events per call when the Call Management System (CMS) is active.

switch
Any kind of telephone switching system. See also **communications system.**

switchhook
The buttons located under the receiver on a voice terminal.

switch node interface (SNI)
The basic building block of a switch node. An SNI circuit pack controls the routing of circuit, packet, and control messages.

switch node link (SNL)
The hardware that provides a bridge between two or more switch nodes. The SNL consists of the two switch node interface (SNI) circuit packs residing on the switch nodes and the hardware connecting the SNIs. This hardware can include lightwave transceivers that convert the SNI's electrical signals to light signals, the copper wire that connects the SNIs to the lightwave transceivers, a

full-duplex fiber-optic cable, digital signal level-1 (DS1) converter circuit cards and DS1 facilities if a company does not have rights to lay cable, and appropriate connectors.

switch node (SN) carrier)
A carrier containing a single switch node, power units, and, optionally, one or two digital signal level-1 (DS1) converter circuit packs. An SN carrier is located in a center stage switch (CSS).

switch node (SN) clock
The circuit pack in a switch node (SN) carrier that provides clock and maintenance alarm functions and environmental monitors for an SN.

switch processing element (SPE)
A complex of circuit packs — processor, memory, disk controller, and bus-interface cards — mounted in a processor-port-network (PPN) control carrier. The SPE serves as the control element for that PPN and, optionally, for one or more expansion port networks (EPNs).

synchronous data transmission
A method of sending data in which discrete signal elements are sent at a fixed and continuous rate and specified times.

system manager
A person responsible for specifying and administering features and services for a system.

system reload
A process that allows stored data to be written from a tape into the system memory (normally after a power outage).

T

tandem switch
A switch within an electronic tandem network (ETN) that provides the logic to determine the best route for a network call, possibly modifies the digits outpulsed, and allows or denies certain calls to certain users.

tandem through
The switched connection of an incoming trunk to an outgoing trunk without human intervention.

tandem tie-trunk network
A private network that interconnects several customer switching systems by dial-repeating tie trunks. Access to the various systems is dictated by codes that must be individually dialed for each system.

terminal
A device that sends and receives data within a system. See also **administration terminal.**

tie trunk
A telecommunications channel that directly connects two private switching systems.

time-division multiplexing (TDM)
Multiplexing that divides a transmission channel into successive time slots. See also **multiplexing.**

time-division multiplex (TDM) bus
A bus that is time-shared regularly by preallocating short time slots to each transmitter. In a PBX, all port circuits are connected to the TDM bus, permitting any port to send a signal to any other port.

tone ringer
A device with a speaker, used in electronic voice terminals to alert the user.

trunk
A dedicated telecommunications channel between two communications systems or central offices (COs).

trunk data module
A device that provides the interface for connection between off-premises private-line trunk facilities and a DEFINITY Generic 1 or DEFINITY Generic 3. The trunk data module provides conversion between the RS232C and the Digital Communications Protocol (DCP), and can connect to direct distance dialing (DDD) modems as the DCP member of a modem pool.

trunk group
Telecommunications channels assigned as a group for certain functions that can be used interchangeably between two communications systems or central offices (COs).

U

Uniform Dial Plan
A feature that allows a unique 4- or 5-digit number assignment for each terminal in a multiswitch configuration such as a distributed communications system (DCS) or main-satellite-tributary configuration.

V

voice terminal
A single-line or multiappearance telephone.

W

Wide Area Telecommunications Service (WATS)
A service that allows calls to a certain area or areas for a flat-rate charge based on expected usage.

wink-start tie trunk
A trunk with which, after making a connection with a distant switching system for an outgoing call, the system waits for a momentary signal (wink) before sending the digits of the called number. Similarly, on an incoming call, the system sends the wink signal when ready to receive digits.

write operation
The process of putting information onto a storage medium such as magnetic tape.

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