AVAYA communication

DEFINITY® Communications System

Generic 1 and Generic 3
Main Distribution Field Design

555-230-630
Issue 1
April 1992

Disclaimer

Intellectual property related to this product (including trademarks) and registered to Lucent Technologies Inc., or AT&T Corporation, have been transferred or licensed to Avaya Inc.

Any reference within the text to Lucent Technologies Inc. or Lucent, American Telephone and Telegraph Corporation or AT&T, should be interpreted as references to Avaya Inc. The exception is cross references to books published prior to April 1, 2001, which may retain their original Lucent or AT&T titles.

Avaya Inc. formed as a result of Lucent's planned restructuring, designs builds and delivers voice, converged voice and data, customer relationship management, messaging, multi-service networking and structured cabling products and services. Avaya Labs is the research and development arm for the company.

AVAYA communication

DEFINITY® Communications System

Generic 1 and Generic 3
Main Distribution Field Design

555-230-630
Issue 1
April 1992

Notice
While reasonable efforts were made to ensure that the information in this document was complete and accurate at the time of printing, AT&T can assume no responsibility for any errors. Changes and corrections to the information contained in this document may be incorporated into future reissues.

Your Responsibility for Your System's Security
You are responsible for the security of your system. AT&T does not warrant that this product is immune from or will prevent unauthorized use of common-carrier telecommunication services or facilities accessed through or connected to it. AT&T will not be responsible for any charges that result from such unauthorized use. Product administration to prevent unauthorized use is your responsibility and your system administrator should read all documents provided with this product to fully understand the features available that may reduce your risk of incurring charges.

Federal Communications Commission (FCC) 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.

Trademarks
AUDIX™ is a trademark of AT&T.
Callmaster® is a registered trademark of AT&T.
CP/M® is a registered trademark of Digital Research Inc.
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.
DIMENSION® is a registered trademark of AT&T.
IBM® is a registered trademark of International Business Machines Corporation.
IBM Token Ring LAN® is a registered trademark of International Business Machines Corporation.
Linx® is a registered trademark of Illinois Tool Works Linx (ITW).
MS-DOS® is a registered trademark of Microsoft Corp.
UNIX® is a registered trademark of UNIX System Laboratories, Inc.

Ordering Information
The ordering number for this document is 555-230-630. 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).

Comments
To comment on this document, return the comment card at the back of the document.

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

TAB LOCATOR

Contents

Contents

Contents

Contents

Figures

1 G1/G3: System Overview

2 G1/G3: MDF/IDF Design

5 G3: BRI

Figures

8 Insert Labels

Tables

Tables

8 Insert Labels

About This Document

This document follows as closely as possible the guidelines of the AT&T premises distribution system (PDS) as presented in the *Premises Distribution Systems Phase 1*. While the PDS covers all distribution media (copper and fiber), this document is concerned primarily with the simplified design of the main distribution field (MDF) for DEFINITY® Communications System G1 and G3 (hereafter abbreviated as *G1, G3i, G3r*, or *G3*). The MDF as discussed in this document is the major cross-connect field for an installation and is located in or near the equipment room.

This document is intended as a supplement to the AT&T *Premises Distribution System Design Guide*, 555-400-602, and does not duplicate information in the PDS guide. This document supplies detail only where the PDS guide does not — that is, on the specifics of designing an MDF and intermediate distribution fields (IDFs) for G1/G3i/G3r. Therefore, the following topics that are covered in the *Premises Distribution System Design Guide* are not covered in this document:

- Information outlets (IO), or wall jacks, at the workstations
- Horizontal subsystem (installation cable)
- Riser subsystem (distribution cable)
- Campus subsystem (distribution cable)

Intended Audiences

This document is intended primarily for the wiring design specialist, account executive (AE), or technical system techniciansperson who is charged with designing an MDF and IDF for a G1 or G3 installation. It also may prove helpful to those who are charged with designing wiring installations for other systems that link to a G1 or G3, or for sales, marketing, and engineering personnel who want to familiarize themselves with these guidelines.

Prerequisite Skills and Knowledge

This document assumes that you are familiar with the PDS installation guidelines and hardware. If you are not, read the *Premises Distribution System Design Guide*, 555-400-602, before you read this document.

Organization of This Guide

This document consists of the following chapters and appendixes:

- Chapter 1, "G1/G3: System Overview" — An overview of the G1 and G3 system cabinets, carriers, components, and connectivity.
- Chapter 2, "G1/G3: MDF/IDF Design" — General guidelines for designing an MDF with type-1 and type-2 frames and general guidelines for designing an IDF.
- Chapter 3, "G1/G3: Electrical Protection" — A discussion of primary, enhanced primary, secondary, and combination electrical protectors for G1/G3i/G3r systems, including remote expansion port networks (EPNs) when distribution cabling is exposed to electrical hazards.
- Chapter 4, "G1/G3: Port Packs/DCP Repeaters" — Cross-references between G1/G3i/G3r port circuit packs, their terminations on the MDF, and the terminals that they serve, as well as a discussion of Digital Communications Protocol (DCP) repeaters for digital terminals.
- Chapter 5, "G3: BRI" — A brief overview of G3i/G3r basic rate interface (BRI) wiring principles, terminals, and power supplies.
- Chapter 6, "G1/G3: Adjunct Power Supplies" — Information and guidelines for G1/G3i/G3r adjunct power supplies, loop ranges, and applications.
- Chapter 7, "G1/G3: Fiber Optics" — A brief chapter explaining fiber optics as they apply to G1/G3i/G3r.
- Chapter 8, "Insert Labels" — Partial reproductions of the sheets of insert labels used to identify cable terminations on the MDF and IDFs.

Abbreviation, glossary, and index sections appear at the back of this document.

How to Use This Document

This document is one of three in the G1/G3 document set. The other two are *DEFINITY Communications System Generic 1 and Generic 3 — System Description and Specifications*, 555-230-200, and *DEFINITY Communications System Generic 1 and Generic 3 — Installation and Test*, 555-230-104. *Generic 1 and Generic 3 MDF Design* covers wall field preparation of G1 and G3 systems, whereas *Generic 1 and Generic 3 System Description and Specifications* is the reference volume and *Generic 1 and Generic 3 Installation and Test* is the task-oriented document needed to install a system and test it as a functioning switch.

Related Documents

Following are a list and brief descriptions of additional documents that you may find helpful.

- *Premises Distribution System Design Guide*, 555-400-602. A document for readers who are familiar with distribution systems and the hardware and cabling necessary for their construction. Provides step-by-step instruction in designing a PDS for a building or a campus of buildings even when the specific voice or data systems are not known, plus information on specific PDS components and methods. Not intended as a tutorial in PDS.

  NOTE:
  The *Premises Distribution System Design Guide*, 555-400-602, cannot be ordered from the AT&T Customer Information Center. Provided on a proprietary basis to select, certified PDS vendors and to PSCs who attend the PDS design training course.

- *DEFINITY Communications System Generic 1 and Generic 3 Planning and Configuration*, 555-230-600. An instruction document for preparing an equipment room floor plan for DEFINITY Generic 1 and Generic 3. Includes general requirements, environmental specifications, customer responsibilities, preparation of the layout, and guidelines for protecting equipment on construction sites.

- *Telecommunication Electrical Protection*, 350-060. Information and training material for engineers responsible for the electrical protection of personnel and users of telecommunication networks, systems, and equipment from lightning and power surges, power-line contacts, induction, and ground potential rise.

- *DEFINITY Communications System and System 75 and System 85 Terminals and Adjuncts Reference*, 555-015-201. Concise physical and functional descriptions of the voice terminals, voice-terminal adjuncts, data modules, and data terminals that can be used with a System 75 or System 85.
- *DEFINITY Communications System and System 75 and System 85 Terminal Installation and Tests*, 555-015-104. A procedural document for those who administer, install and test modules, voice terminals, and cross-connect equipment.
- *ISDN Terminal Installation and Tests*, 555-021-101. Point-to-point installation information between terminals and the satellite closet. This volume includes information about BRI installation.
- *Introduction to DEFINITY Communications System Generic 3*, 555-230-020. A general description for prospective customers, account teams, and others who need an overview of DEFINITY Communications System Generic 3. Included are the following major functions that are part of or associated with the system: principal voice and message features and peripherals for users; in-depth descriptions of system components and their capabilities; network features and configurations; available methods for managing the system; and AT&T's support for planning and installation, for training, and for maintenance.
- *DEFINITY Communications System Generic 1 and Generic 3 System Description and Specifications*, 555-230-200. A document intended primarily for sales and technical personnel to provide general technical information on G3 systems.
- *DEFINITY Communications System Generic 1 and Generic 3 Installation and Test*, 555-204-104. A document for service technicians to instruct them in the installation and connection of switching equipment.
- *800 Series DSX — General Description, DSX Systems* 365-301-102. Transition procedures explaining:
  - — The installation of new 800-series digital signals cross-connect (DSX) equipment in new lineups parallel to lineups of older DSX equipment

— The installation of new 800-series DSX equipment in new bays adjacent to older DSX equipment in the same lineup

— The installation of the new 800-series DSX equipment to replace older DSX equipment

How to Make Comments About This Document

Reader comment cards are in the back of this document. While we have tried to make this document fit your needs, we are interested in your suggestions for improving it and urge you to fill out a card.

If the reader comment cards have been removed from this document, please send your comments to:

AT&T
Technical Publications Department
Room 22 2C-11
11900 North Pecos Street
Denver, Colorado 80234

G1/G3: System Overview

1

This chapter identifies the fundamental elements of the DEFINITY® Communications System Generic 1, Generic 3i and Generic 3r (hereafter abbreviated to *G1*, *G3i*, and *G3r*). The system design rules that apply to to G1, G3i, and G3r configurations are similar. However, there are some size and component differences in the systems that must be accounted for when preparing the MDF.

For comprehensive information on G1 and G3i, see *DEFINITY Communications System Generic 1 and Generic 3 System Description and Specifications,* 555-230-200.

G1 and G3i are small-sized switches that use the Intel® processor to provide voice and data switching. A full-sized G1 or G3i can accommodate as many as 1600 digital and analog lines.

The G3r is an intermediate-sized switch that introduces the Reduced Instruction Set Computer (RISC) to provide fast voice and data switching. G3r systems in a typical direct-connect configuration with two EPNs accommodate a total of 2400 digital and analog lines. Maximum center stage switch (CSS) configurations with 21 EPNs accommodate up to 10,000 digital and analog lines.

Major Components of G1 and G3 Systems

A G1, G3i, or G3r consists of two major operating units: the processor port network (PPN) and the expansion port network (EPN). Each system also includes a SPE.

Multicarrier Cabinet Types

G1 and G3 have three main types of multicarrier cabinets: the PPN cabinet (J58890A), the EPN cabinet (also, J58890A), and the auxiliary cabinets (J58886N). Each PPN and EPN cabinet has the capacity for five carriers. There is no difference between PPN and EPN cabinets other than what they house.

All G1 systems must have a processor port network (PPN) cabinet and may contain zero or one expansion port network (EPN) cabinet, depending upon the size requirements of the system.

The G3i requires one PPN cabinet and may contain zero, one, or two EPNs.

The G3r requires one PPN cabinet. Direct-connect G3r systems have no CSS and a maximum of two EPNs.

The presence of one CSS allows up to 15 EPNs; two CSSs allow the system to expand to 21 EPNs.

Auxiliary cabinets (J58886N) are also available in G1 and G3 systems to house auxiliary equipment used in connections between a system and its adjuncts and peripherals.

Generally, the presence of an auxiliary cabinet does not affect the design decisions of the MDF.

G1/G3i Processor Port Network

The G1/G3i PPN is the basic system component that contains ports and SPE. It operates the system and performs voice and data call processing.

The G1/G3i PPN cabinet can house the control carrier (J58890AH), port carrier (J58890BB), and duplicated control carrier (J58890AJ).

The G1/G3i PPN cabinet contains:

- One control carrier (J58890AH)
- One duplicated control carrier (J58890AF) if the system is duplicated
- One to four port carriers (J58890BB) in the remaining carrier positions

G3r Processor Port Network

The G3r PPN is the basic system component that contains ports and the SPE. It operates the system and performs voice and data call processing. The G3r PPN cabinet has five carriers.

The G3r PPN cabinet can contain:

- One or two control carriers (J58890AP), depending on whether the system processor is duplicated
- Zero, one, or two switch node carriers (SNCs) (J58890SA), depending on the system requirements and presence of a CSS
- One to four port carriers (J58890BB) in the remaining carrier positions

G1/G3i Expansion Port Network

The EPN contains additional ports that increase the number of interfaces to trunks and lines. The EPN cabinet can house expansion control carriers (J58890AF) and up to four port carriers (J58890BB).

G1 can support one EPN; G3i can support two EPNs.

G3r Expansion Port Network

The G3r expansion port network contains additional ports that increase the number of interfaces to trunks and lines.

An EPN cabinet can contain:

- One or two expansion control carriers (J58890AF)
- Zero, one or two switch node carriers (J58890SA)
- One to four port carriers (J58890BB)

G1/G3i/G3r Auxiliary Cabinet

Treatment of the auxiliary cabinet in G1 and G3 systems is the same. An auxiliary cabinet is not actually a system adjunct but a cabinet used to house shelf- and rack-mounted peripheral equipment for the system. Auxiliary cabinets usually are located in the equipment room with the adjunct cabinets, but they can be located at other sites to serve equipment, such as a 3B2, that is remotely located.

Remote Networks

Treatment of remote networks for G1 and G3i systems is the same.

G1/G3i/G3r systems can have remote EPNs located up to 25,000 ft away from the PPN using fiber interfaces. G3r EPNs can be up to 100 miles remote using DS1 facilities. The call control (including call processing, administration, and maintenance) is multiplexed onto the fiber-optic or DS1 link, making all system features available to remote locations.

The recommended fiber size for remote network links is the AT&T graded index multimode fiber with a 62.5-micron core and 125-micron outer diameter.

G1/G3i Single-Carrier Cabinet Types

In G1 and G3i systems, the single-carrier cabinets are stacked a maximum of four high. Each stack contains a basic control cabinet (J58890L) or expansion control cabinet (J58890N) that must reside on the bottom of the stacked system. A full single-carrier stack can have up to three port cabinets.

G3r Single-Carrier Cabinet Types

In G3r systems, the single-carrier cabinet can only be used as an EPN located remotely from the PPN cabinet. The maximum stack size is four cabinets: one single-carrier expansion control cabinet (J58890N) with three single-carrier port cabinets (J58890H). The expansion control cabinet must reside on the bottom of a single-carrier stacked system.

G1/G3i Multicarrier Cabinet Carriers

The G1 and G3i multicarrier cabinets includes control carriers (J58890AH), port carriers (J58890BB), expansion control carriers (J58890AF), and duplicated control carriers (J58890AJ).

Control Carrier (J58890AH)

The control carrier is housed in the PPN of both the G1 and G3i systems. The control carrier holds a number of system control circuit packs and up to nine port packs.

Port Carrier (J58890BB)

Port carriers can reside in the PPNs or EPNs of both the G1 and G3i systems. A port carrier can hold up to 20 port packs.

Expansion Control Carrier (J58890AF)

The expansion control carrier can reside in the EPN of the G1 and G3i systems. The ECC can hold up to 18 port slots.

Duplicated Control Carrier (J58890AJ)

The duplicated control carrier resides in the PPN of duplicated G1 and G3i systems. The duplicated control carrier can hold up to nine port packs.

G3r Multicarrier Cabinet Carriers

The G3r direct-connect system includes control carriers (J58890AP), port carriers (J58890BB), and expansion control carriers (J58890A).

The G3r CSS system includes control carriers (J58890AP), port carriers (J58890BB), expansion control carriers (J58890AF), and switch node carriers (J58890SA).

Control Carrier (J58890AP)

The G3r control carrier is housed in the PPN of both the direct-connect and CSS systems and contains system control circuit packs. The control carrier does not hold any port packs.

Port Carrier (J58890BB)

G3r port carriers can reside in the PPNs or EPNs of both the direct-connect and CSS systems. Port carriers can hold up to 20 port packs.

Expansion Control Carrier (J58890AF)

The G3r expansion control carrier can reside only in the EPN of the direct-connect and CSS systems and contains expansion control circuit packs. The expansion control carrier holds up to 18 port packs.

Switch Node Carrier (J58890SA)

The switch node carrier can reside only in the CSS system in the PPN (unduplicated) or EPN (duplicated). The switch node carrier contains elements of the stage switch. The switch node carrier does not hold any port packs.

G1/G3i Single-Carrier Cabinets

There are four types of single-carrier cabinets in the G1 and G3i systems: the basic control cabinet (J58890L), the duplicated control cabinet (J58890M), the expansion control cabinet (J58890N), and the port cabinet (J58890H).

G1/G3i Basic Control Cabinet (J58890L)

The basic control cabinet houses specific control circuit packs. It can hold up to 10 port packs.

G1/G3i Duplicated Control Cabinet (J58890M)

The duplicated control cabinet houses specific control circuit packs when the G1/G3i is duplicated. It can hold up to 10 port packs.

G1/G3i Expansion Control Cabinet (J58890N)

The expansion control cabinet houses the expansion control circuit packs. It can hold up to 16 port circuit packs.

G1/G3i Port Cabinet (J58890H)

The port cabinet houses port circuit packs. It can hold up to 18 port circuit packs.

G3r Single-Carrier Cabinets

There are two types of single-carrier cabinets in G3r systems: the expansion control cabinet (J58890N) and the port carrier cabinet (J58890H).

G3r Expansion Control Cabinet (J58890N)

The expansion control cabinet is the first and only required cabinet in the G3r systems. It does not hold any port pack circuit slots.

G3r Port Cabinet (J58890H)

The G3r single-carrier cabinet stack can have from one to three port cabinets. It can hold up to 18 port packs.

G1/G3i/G3r Port Packs

Port packs are circuit packs that are housed in the carriers in the PPN and EPN cabinets. These circuit packs provide the line and trunk circuits for G1, G3i, and G3r systems. Port packs are the most important element in determining the size and configuration of the MDF.

Messaging Adjuncts

The installation of most G1 and G3i systems is accompanied by one or more messaging adjuncts that provide the customer with administrative or application functions that do not reside on the switch. G1/G3i supports the Audio Information Exchange (AUDIX) systems, 3B2 Message Server, and Property Management System (PMS). Messaging adjuncts usually reside in the auxiliary cabinet.

- AUDIX systems allow subscribers to originate, send, receive, and store voice message and can be one-cabinet, two-cabinet, and embedded

  More detailed descriptions of AUDIX systems appear in the *AUDIX Reference Manual* (585-300-201).

- The 3B2 Message Server provides a set of messaging services allowing creation, transmission, storage, and retrieval of messages among users
- Property Management System provides a communications link between a system and a customer's computer used for services such as reservations, housekeeping, and billing

G1/G3 Cross-Connect Fields

Cross-connect fields are a major component in the installation of the G1 and G3 systems. They are the termination points for equipment cabling and distribution cabling. Cross-connect fields are also where the connections are made between those termination points in order to establish communications paths throughout the system.

Two major cross-connect fields are used for G1/G3 installations — the main distribution field (MDF) and the intermediate distribution field (IDF).

The MDF, called the *administration field* in some previous installation documents, can be either frame- or wall-mounted. It is located in, or sometimes near, the equipment room. The MDF is the field on which terminations and cross-connections for central office (CO) trunks, equipment cabling, and distribution cabling are made.

IDF is a term applied to any cross-connect field other than an MDF. The IDF is usually located in a satellite closet or at the building entrance facility (BEF). On the IDF the terminations and cross-connections are made for the distribution cabling from the MDF, from other IDFs, and from the installation cabling from the information outlets (IOs). IDFs are smaller than MDFs and are installed in quantities that are dictated by the overall wiring design.

See Chapter 2, "G1/G3: MDF/IDF Design," for detailed information on G1/G3 wall field designs.

Terminals and Terminal Adjuncts

Physical and functional descriptions for prospective customers, account teams, and others who need specific information on terminals and terminal adjuncts for G1 and G3i are listed in "About This Document" under "Related Resources."

A variety of terminals and terminal adjuncts connect to G1 and G3i systems. When you are designing the wiring installation according to the basic or enhanced PDS guidelines, the types of terminals and peripherals being installed at the workstations should have no effect on the overall wiring design. The basic guideline calls for two wiring pairs in the distribution cable, from the MDF to the IDF, and one 4-pair cable in the horizontal wiring, from the IDF to the IO for each workstation. The enhanced guideline calls for three wiring pairs in the distribution cable and two 4-pair cables in the horizontal wiring for each workstation.

When you are designing the wiring installation according to bid-specific requirements, the types and quantities of terminals and peripherals may affect the sizing of the distribution cables. See "About This Document," for information on where to find detailed information on wiring for specific terminals and peripherals.

Connectivity

Figure 1-1, *Typical G1/G3 Connectivity*, illustrates typical connectivity for a basic voice path. Connectivity for G1/G3 uses unshielded M-F B25A cables to connect the switch to the male-connectorized cross-connect field wherever possible. Previously installed systems may require M-M A25D connectorized cables.

The path flows from the point where the trunk enters the facility through the major components of the system's building wiring to its termination on a voice terminal at a workstation.

The path starts on a 1- or 2-pair circuit that runs from the CO to the equipment room. In the equipment room, the wire terminates at the network interface. A connection using jumper wire or patchcord is made from the network interface to the green field of the MDF. (Jumper wires are the preferred method of connection.)

A cross-connection is made from the green field to the trunk section of the purple field. From the purple field, the path travels along a 25-pair cable to the backplane of a trunk port circuit at the switch.

The switch establishes a talking path between the trunk port circuit and the line port circuit for the desired workstation. The path exits the switch from the line port circuit and proceeds along a cable from the backplane to the section of the purple field for lines on the MDF. The purple field is cross-connected to the white distribution field of the MDF.

The path leaves the MDF white field via a distribution cable that connects to the IDF white field in a satellite closet. The circuits on the white field of the IDF are cross-connected to the appropriate circuits on the blue field. From the blue field, a 4-pair, twisted wire runs to the IO at the workstation. The voice terminal plugs into the IO.

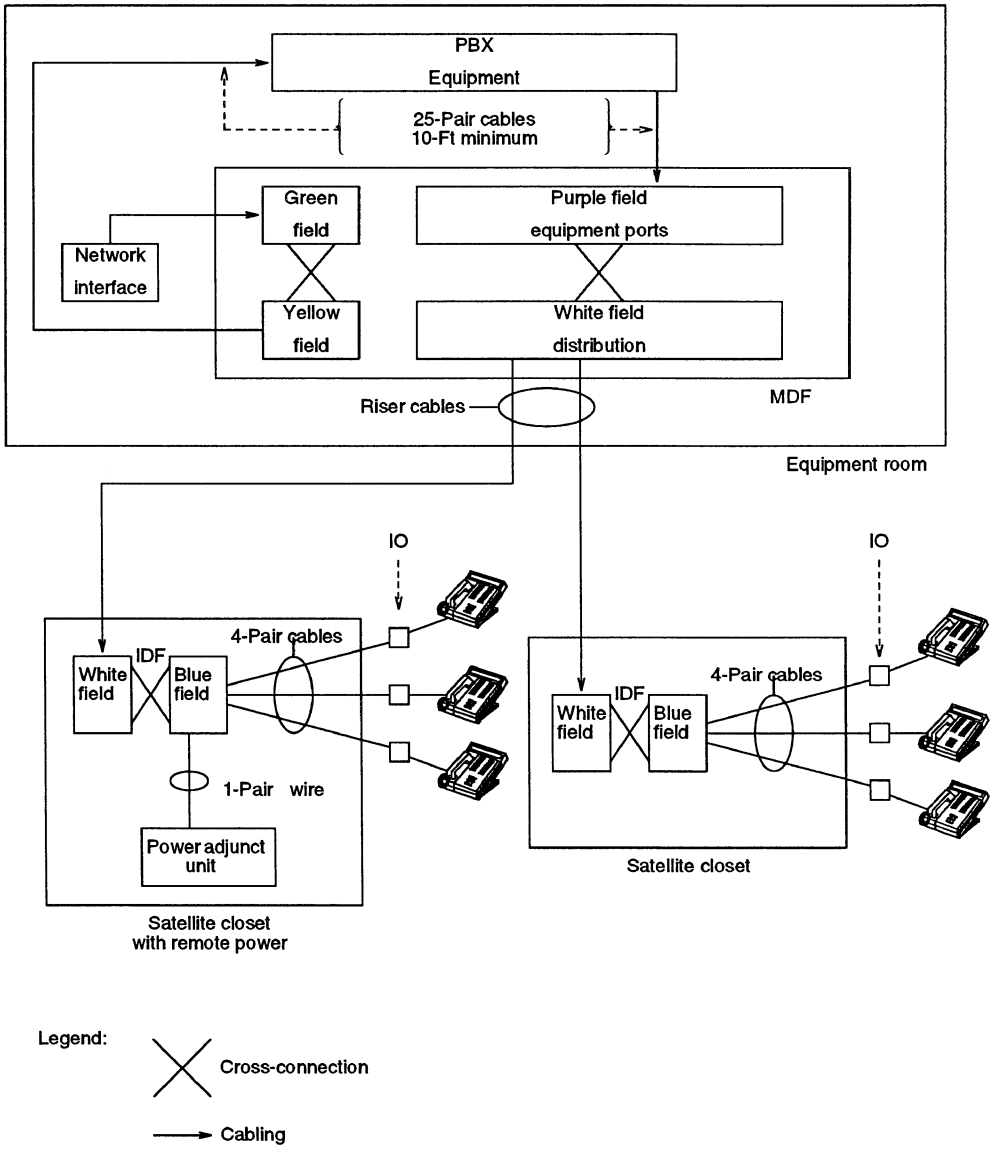


Figure 1-1. Typical G1/G3 Connectivity

G1/G3: MDF/IDF Design

2

This chapter recommends the terminal blocks and frames best suited for constructing a main distribution field (MDF) and intermediate distribution field (IDF) for the DEFINITY® Communications System Generic 1, Generic 3i, and Generic 3r (hereafter abbreviated to *G1, G3i,* or *G3r*) and briefly discusses labeling for the MDFs and IDFs. Keep in mind that MDFs and IDFs require on-site decisions that can dramatically affect their design and that the information in this document portrays possible wall field configurations. Adjust to the needs of your customer and site limitations as needed.

Recommended Terminal Blocks

The 110A system is the recommended type of AT&T cross-connect hardware for constructing G1/G3i/G3r MDF cross-connect fields.

The 110A comes in several models that are called terminal blocks. Each terminal block is composed of a wiring block and a unique combination of connecting blocks. A wiring block is where the equipment, distribution, or central office (CO) cables terminate. The connecting block, which snaps onto the front of the wiring block, is where the jumper wires are attached to establish a path from the pairs in one cable to the pairs in another cable.

In order to simplify the design of wiring installations, only two terminal blocks — the 110AB1-300 (300 pair terminal block) and the 110AB1-100 (100 pair terminal block) — are recommended for G1/G3. Generally, the 300-pair terminal block is preferred for the MDF. The IDF can be designed with the 100-pair or 300-pair blocks, or both.

The 110AB1-300 terminal block has a 300-pair wiring block, 60 4-pair connecting blocks, 12 5-pair connecting blocks, and six designation strips. You can order this terminal block in connectorized and field-terminated versions.

The 110AB1-100 terminal block has a 100-pair wiring block, 20 4-pair connecting blocks, four 5-pair connecting blocks, and two designations strips. You can order this terminal block in connectorized or field-terminated versions.

Table 2-1, *300-Pair Terminal Blocks,* and Table 2-2, *100-Pair Terminal Blocks,* give the ordering information for the 300- and 100-pair terminal blocks, respectively.

Table 2-1. 300-Pair Terminal Blocks

Product Code	Comcode	Height (in.)
110AB1-300FT*	104049051	10.79
110AB1-300CTM**	104409024	20.37
110AB1-300CBM‡	104408091	20.37

The meanings for the alphabetic suffixes to the model codes are as follows:

* Field terminated

** Connectorized w/male connector

‡ Connectorized bottom w/male connector

Table 2-2. 100-Pair Terminal Blocks

Product Code	Comcode	Height (in.)
110AB1-100FT*	103823845	3.59
110AB1-100CT**	104408992	13.29
110AB1-100CTM‡	104409008	13.29
110AB1-100CB§	104408026	13.29
110AB1-100CBM*	104408075	13.29

The meanings for the alphabetic suffixes to the model codes are as follows:

* Field terminated

** Connectorized w/female connector

‡ Connectorized w/male connector

§ Connectorized bottom w/female connector

** Connectorized bottom w/male connector

When you are enlarging an existing IDF or MDF constructed of terminal blocks other than those in Table 2-1, "300-Pair Terminal Blocks," and Table 2-2, "100-Pair Terminal Blocks," maintain uniformity in the field by using the same blocks for the expansion that were used for the initial installation. For new installations, use the previously described terminal blocks.

Height Requirement for Terminal-Block Columns

When you lay out the columns of terminal blocks for the MDF, place no more than 1500 pairs (five 300-pair blocks in a column) for either frame- or wall-mounted installations. (See Figure 2-1, "Maximum Column 1500 Pairs (Five 300-Pair Terminal Blocks.") Taller columns are hard to reach and make connecting and disconnecting jumper wires difficult. Also, if horizontal space is limited, you can use 1800-pair columns for small installations as long as height does not present problems.

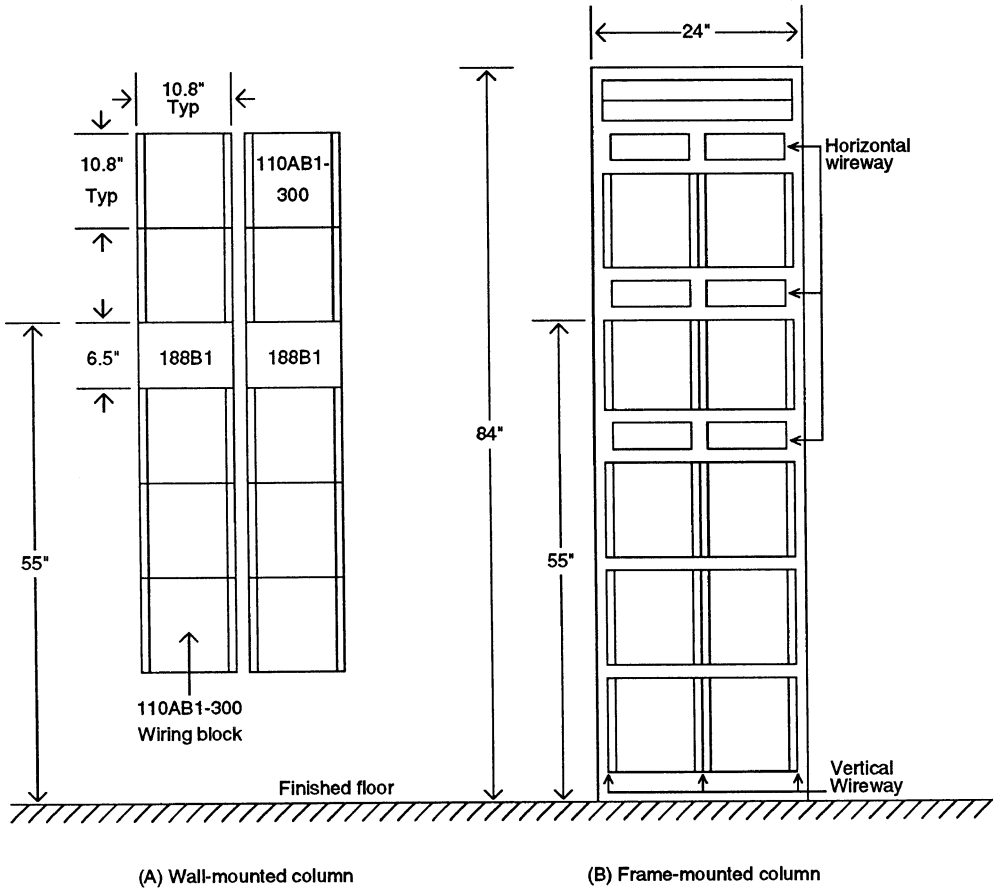
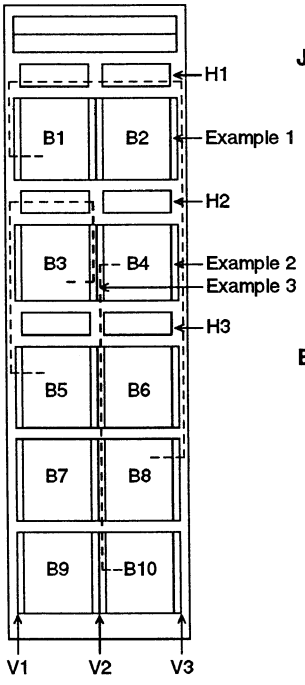


Figure 2-1. Maximum Column 1500 Pairs (Five 300-Pair Terminal Blocks)

Connecting Jumper Wires

To facilitate cross-connections, connect jumper wires as follows:

- Use the layout and instructions shown in Figure 2-2, "Jumper Placement," for the 110A terminal blocks. (Figure 2-2 also illustrates a layout for frame mounting, but the layout applies to wall mounting.)
- Use only the number of jumpers required for a connection. There is no advantage in using a 3-pair for a 2-pair circuit.
- Make sure that 80% of the jumpers are less than 20 ft long. This can be done in the largest of installations, as described under "Designing the MDF" later in this chapter.
- Maintain clean contacts on the terminal blocks by using a spudger tool (110 tool: comcode 405423260). Clean contacts by:
  - — Removing jumpers with a perpendicular motion from the connecting block
  - — Always using the spudger to clean the contacts immediately after you remove the jumper wires



Jumper Placement Rules:

- Index strips consist of a right and a left half. Dress pairs 1 to 12 to the left and dress pairs 13 to 25 to the right.
- Eliminate "spider webs" and use all horizontal wireways equally.
- Use small amounts of diagonal dress in the horizontal wireway system, if needed, but avoid diagonal dress during system installation.

Examples:

- Block B1, row 7, pair 10 to block B8, row 2, pair 24.

  B1 left, V1 up, H1 right, V3 down, B8 left.
- Block B4, row 6, pair 8 to block B10, row 2, pair 12.

  B4 left, V2 down, B10 right.
- Block B3, row 11, pair 16 to block B5, row 1, pair 1.

  B3 right, V2 up, H2 left, V1 down, B5 right.

Figure 2-2. Jumper Placement

Recommended Frames for Terminal Blocks

The extra-large building entrance terminal (XLBET) frame can be used for the MDF. The frame comes in single- and double-sided versions that are 84 in. high, 10 in. deep (single-sided) to front edge of wireway with rear foot removed, 20 in. deep (wireway-to-wireway), and 24 in. wide. (All frame illustrations shown in this document are the standard 84-in. high frame. You can use taller frames in special circumstances as explained below in "Customization.")

Several characteristics make the AT&T frames preferable when installing a system. They are:

- *Frontal connectorization.* AT&T frames have specially designed connector panels located at the front and top.

  NOTE:
  Connector mating on any type of trough or ladder rack is prohibited.

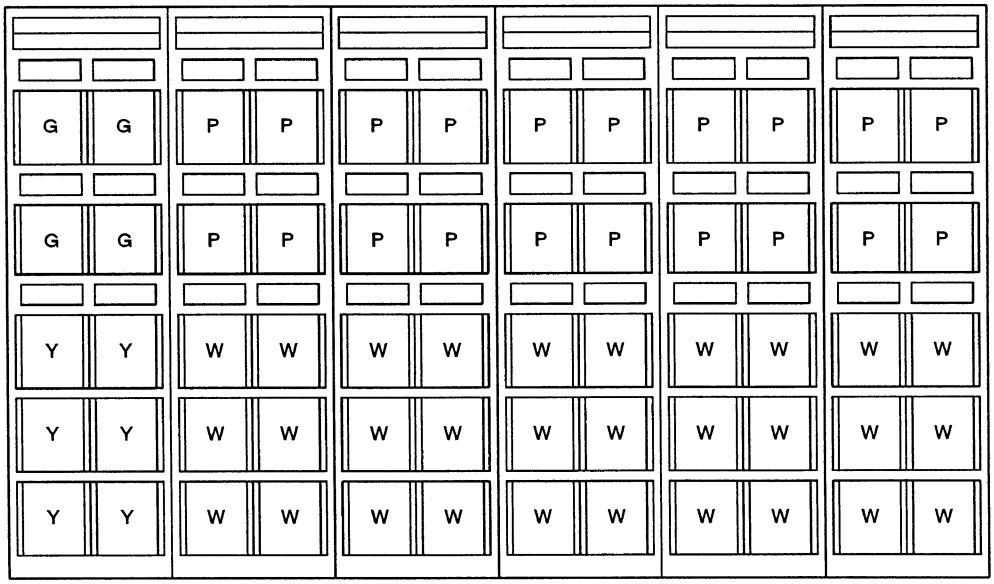
- *Color selection.* AT&T frames are manufactured in the same colors as AT&T equipment cabinets. The color match of the frames and cabinets considerably enhances the appearance of an installation.
- *Ordering simplicity.* AT&T frames are easy to order: you submit one comcode to obtain the frame and the terminal blocks, which come assembled as a complete unit. You order only ladder racks and insert labels separately.
- *Customization.* You can order AT&T frames in special heights to accommodate connector panels, equipment rooms with high ceilings, or equipment rooms with raised floors. Also, you also can order frames fitted with mountings for protector units.

Whenever possible, use the XLBET frames, either self-supported or wall-mounted, for the MDF. The benefits and advantages, for both the customer and AT&T, of easier ordering, better aesthetics, and easier connecting and disconnecting of jumper wires more than offset the slightly higher cost over wall modules. For systems larger than three port networks, try to design the MDF with self-supported frames. Self-supported frames allow the most flexibility for handling jumper wires and permit the most efficient cable terminations. But whether the frame is wall-mounted or self-supported, attempt to use one of the two types of XLBET frames discussed below.

Type-1 Frame

The type-1 frame shown in Figure 2-3, "Six Type-1 Frames with 18,000-Pair Capacity," is the most widely used. You can terminate 3000 cable pairs on each side. Cross-connections for type-1 frames are made between the top and the bottom of the frame. This means that all equipment cables are connected to the top half of the frame and all distribution cables to the bottom half. (This frame is useful when there are more MDF distribution requirements than equipment requirements.) Exceptions occur only at the green (CO) and yellow (miscellaneous) fields.

The type-1 frame is most suited for lineups not exceeding nine frames, although it can be used for larger lineups if necessary. (A discussion of its use in large lineups appears under "Designing the MDF" later in this chapter.)



Legend:

G — Green, network field

Y — Yellow, auxiliary and miscellaneous field

W — White, distribution field

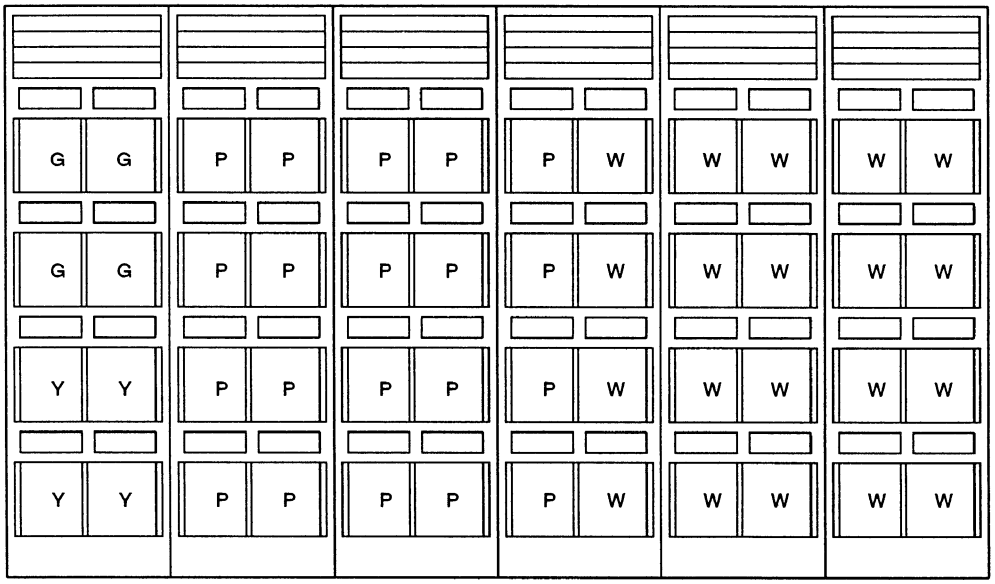
P — Purple, equipment field

Figure 2-3. Six Type-1 Frames with 18,000-Pair Capacity

Type-2 Frame

The type-2 frame shown in Figure 2-4, "Six Type-2 Frames with 14,400-Pair Capacity," has added jumper capacity. You can terminate 2400 pairs on each of its sides. Cross-connections on the type-2 frame can be made either from top to bottom or from side to side, depending on the size and shape of the installation.

Use the type-2 frame for large installations that require more than nine frames in a lineup. (This frame is useful when there are roughly equal MDF distribution requirements and equipment requirements.)



Legend:

G — Green, network field

Y — Yellow, auxiliary and miscellaneous field

W — White, distribution field

P — Purple, equipment field

Figure 2-4. Six Type-2 Frames with 14,400-Pair Capacity

Ordering

The service ships all frames with terminal blocks as one comcode. Frames ordered for 110A hardware come with 110AB1-300 terminal blocks, clear designation strips, and wireways installed. You must order insert labels and ladder racks separately.

Order type-1 and type-2 frames and connectors according to Table 2-3, "Type-1 Frame Ordering Information," and Table 2-4, "Type-2 Frame Ordering Information."

Table 2-3. Type-1 Frame Ordering Information

Comcode	Top	Bottom	Remarks
105 639 561	1200-pair connectorized with male tops	1800-pair field field terminated.	Single sided.
105 639 538	2400-pair connectorized with male tops	3600-pair field field terminated.	Double sided.
105 174 148	600-pair connectorization	—	Kit for the above frames. Order one for single-sided and two for double-sided.
105 689 475	3000-pair field terminated	—	110C connector must be ordered separately.
105 728 414	6000-pair field terminated	—	110C connector must be ordered separately.

Table 2-4. Type-2 Frame Ordering Information

Comcode	Style	Remarks
105 689 491	2400-pair male connectorized	Single sided.
105 689 483	2400-pair field terminated	Single sided.
105 730 212	4800-pair male connectorized	Double sided.
105 730 113	4800-pair field terminated	Double sided.

Designing the MDF

Designing the MDF is a two-step process. First, determine the size of the MDF. Second, construct the MDF. As you proceed with the design, keep in mind that function is more important than cost in reaching a final decision since it is possible for the final installation to be inexpensive but nonfunctional. A design that imposes operational limits to save costs may prove less desirable in the long run. Use your site analysis to compare alternatives and arrive at the best solution in terms of both function and cost.

Since the design of the MDF affects the design of the equipment room, be sure that your completed design for the MDF is compatible with your equipment room plans or with the room that you have selected for the MDF location. (When designing the MDF for a raised-floor installation, follow the instructions under "Designing the MDF for a Raised Floor" later in this chapter.)

For systems with over three port networks, overhead ductwork is recommended over cable slack managers.

Sizing the MDF

The MDF is the largest cross-connect field of the wiring installation. It is where the incoming trunk cables terminate and cross-connect to the trunk ports of the switch and where the building distribution cables cross-connect to the line ports of the switch. The MDF consists of four fields: network services and CO trunks (green), auxiliary and miscellaneous (yellow), distribution (white), and equipment (purple). Two factors govern the size of the MDF: the number of cable pairs to be terminated and the type of cross-connect hardware used. Since the recommended cross-connect hardware for G1/G3 is the 110A, you need only to calculate the number of cable pairs that must terminate on the MDF and the number of 110A cross-connect blocks needed to terminate those pairs to arrive at the size of the MDF.

This section helps you calculate the number of cable pairs terminating at the MDF by determining what effect the four major fields of the MDF have on its size. These four fields are as follows:

- Network services (CO trunks) field with green labels
- Auxiliary equipment and miscellaneous field with yellow labels
- Equipment (switch) port field with purple labels
- Distribution field with white labels

A fifth field, with blue labels, may be required for some installations. This field terminates 4-pair installation cables that connect the MDF directly to the information outlets (IOs) at workstations.

The guidelines for sizing each field follow.

Network Services (CO Trunks) Field

The network services field uses green labels; it terminates CO cables. Cabling for analog network services is cross-connected to the green field from an RJ21X or an RJ2GX interface. This cabling requires sneak-current protection in addition to the standard electrical protection that the telephone company provides.

The total number of pairs in the network services cable is governed by the number of pairs that the customer needs to connect to the network. It is also governed by the number of pairs that the telephone company supplies. For example, if the customer needs to connect 750 pairs to the network, and the telephone company supplies a 900-pair cable, the green field must be sized to terminate 900 pairs.

For some installations, digital signal level-1 (DS1) transmission capabilities also may be needed. When the DS1 connection is part of the installation, then a digital signal cross-connect (DSX) may be required. If a DSX is required, use the 800 series DSX as described in *800 Series DSX — General Description, DSX Systems*, 365-301-102.

Auxiliary Equipment and Miscellaneous Field

The auxiliary field uses yellow labels; it terminates auxiliary equipment cables. This includes emergency transfer units, recorded announcement units, recorded dictation units, loudspeaker paging units, and radio paging units. The auxiliary field also accommodates miscellaneous cabling that is not associated with ports, such as console cables and alarm cables. Therefore, the size of the yellow field varies depending on the amount of auxiliary equipment installed and the number of miscellaneous cables terminated.

Allocate space on the yellow field for the termination of a minimum of 300 pairs. Allocate additional space in 300-pair groups for each auxiliary cabinet installed with the system. Increase the field size beyond these minimums as actual needs dictate.

Equipment (Switch) Port Field

The equipment port field uses purple labels; it terminates equipment port cables. Two factors govern its size. The first is the type, usage, and number of port carriers. The second is network needs, since all ports from an equipment network must be colocated.

Networks usually contain the same number of port carriers. Where expansion is imminent, it is a good idea to leave unused 110A blocks on the wall field to accommodate a consecutive port network numbering scheme.

To calculate the number of wiring blocks required for the entire port field, multiply the number of networks by the number of wiring blocks required to serve one network.

G1/G3i/G3r Port Field Sizing

Each port carrier requires allotting twenty 25-pair cables (500 pairs total) at the cross-connect field. Since the 110A blocks recommended for the MDF support 300 pairs, two blocks are needed to accommodate the 500 pairs of each port carrier. Figure 2-5, "Port Carrier Wall Field Configuration," shows the recommended configuration of 110A blocks for each port carrier. This configuration leaves 100 unused pairs that can be used as needed.

A G1/G3i processor port network (PPN) has from one to four port carriers and the capacity for additional port packs in the control and duplicated control carriers. Space should be provided to serve all five carriers in the PPN whether they are used initially or not.

A G1/G3i expansion port network (EPN) has from one to four port carriers and the capacity for additional port packs in the expansion control carrier (ECC). Space should be provided to serve all five carriers in the EPN whether they are used or not.

Following is a list of G1 and G3i PPN and EPN carriers for multicarrier cabinets that can hold port packs:

- Control carrier (9 packs)
- Duplicated control carrier (9 packs)
- Expansion control carrier (18 packs)
- Port carrier (20 packs)

When designing the system, be sure to account for the extra number of 110A-300 blocks and design adjustments that are needed. Carriers that hold one to ten port circuit packs will require one 110A-300 block for the equipment field. Carriers that hold 11 to 20 port circuit packs will require two 110A blocks for the equipment field.

Allow for the termination of 2700 pairs maximum for the PPN and 3000 pairs maximum for each EPN. Increase or decrease the number in 300-pair increments according to actual needs.

NOTE:
Use the same rules for designing a G1/G3i single-carrier cabinet (SCC) installations.

Following is a list of G1 and G3i carriers for SCC that can hold port packs:

- Control carrier (10 packs)
- Duplicated control carrier (10 packs)
- Expansion control carrier (16 packs)
- Port carrier (18 packs)

The SCC expansion control and port carriers contain 16 and 18 25-pair cables, respectively. These cables will translate into two 110A-300 blocks at the cross-connect field for each port and expansion control carrier. Since all SCCs can house port circuit packs, be sure to install enough 110A blocks to serve the port pack capacity of all four carriers of the SCC stack, whether they are used or not. That is, allow for termination of 2100 pairs for a stack with a basic control cabinet. Allow for the termination of 2400 pairs for a stack with an ECC. This configuration leaves 100 unused pairs that can be used as needed.

A G3r PPN has from one to four port carriers. Space must be provided to serve all four carriers, whether they are used or not.

A G3r EPN has from one to four port carriers and the capacity for additional port packs in the expansion control carrier (ECC). Space should be provided to serve all five carriers, whether they are used or not.

Allow for the termination of 2400 pairs for the PPN and a maximum 3000 pairs for each EPN. Increase or decrease the number in 300-pair increments according to actual needs.

NOTE:
Use the same rules for designing G3r single-carrier cabinet (SCC) installations, but note that there will be 18 25-pair cables from each port cabinet. 18 cables will translate into 450 pairs on two 110A-300 blocks at the cross-connect field, plus 150 spare pairs. Be sure to install enough 110A blocks to serve all three port carriers in the cabinet stack whether they are used or not; that is, allow for termination of 1800 pairs on the port field.

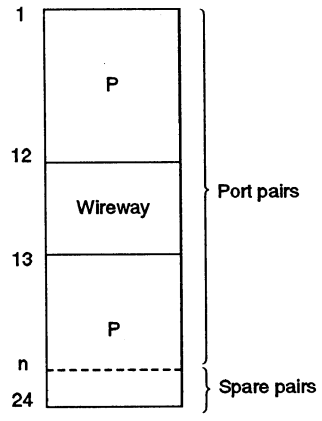


Figure 2-5. Port Carrier Wall Field Configuration

Distribution Field

The distribution field uses white labels; it is where all distribution cables terminate. Distribution cables are the cables that run from the MDF in the equipment room to the IDF in the closets. (They are sometimes called "house," "backbone," "riser," "campus," or "black" cables. This document calls them "distribution" cables.)

The *Premises Distribution System Design Guide*, 555-400-602, presents several approaches to sizing the distribution cables based upon the needs of the customer. Keep the following design elements in mind:

- Size the distribution cable so that each workstation is allotted a minimum of two cable pairs.
- Allow the 25th pair in each 25-pair bundle to serve as a spare.
- Allot three cable pairs for each workstation if the customer requests single-point administration.
- It is recommended that you terminate large numbers of spare pairs requested by the customer on a specially designated area of the MDF. This guideline is recommended for efficiency since the spare pairs artificially increase the size of the distribution field.

Installation Cable Field

The installation cable field uses blue labels; it is where IO cables terminate directly on the MDF. (Remote-network MDFs require fields labeled purple and blue when installation cables are connected directly to them.) When the installation cable terminates in the equipment room, size it and plan for its termination as you would for closet terminations. Allotting one 4-pair D-inside-wiring (DIW) cable for each workstation. Allot two 4-pair DIW cables for those workstations that use a separate IO for a data connection.

NOTE:
When a blue field is used, the blue field cross-connects directly to the purple field and not to the white field.

Terminate only six 4-pair DIW cables to each index strip of a 110AB1-300 wiring block (the 25th pair is unused), which means that you can terminate a maximum of 72 4-pair DIW cables on each 300-pair wiring block.

Although the termination of 72 4-pair DIW cables leaves 12 unused pairs, you must add an additional block to terminate more pairs. For example, to terminate 75 4-pair DIW cables, you would use two blocks instead of one.

Constructing the MDF

Once you have calculated the number of cable pairs needed for each of the MDF areas and converted them to the number of 300-pair blocks needed, decide the following:

- Where to locate the MDF
- How to mount the terminal blocks
- How to arrange the terminal blocks
- How to connect to the terminal blocks

Locating the MDF

Locate the MDF as close to the switch cabinets as possible. The preferred location is in the equipment room, but if space is not available, locate it in a separate area within 20 to 30 ft of the equipment room.

Orient the MDF so that the distribution cables can be routed to it as directly as possible.

If there are one to three PNs, cable slack managers are recommended. In this configuration, standard guidelines state that the MDF should be within 38 in. of the switch cabinet lineup. If there are more than three PNs, overhead ductwork is recommended.

Mounting the Terminal Blocks

You can mount the MDF hardware in one of the following three ways:

- Directly to a wall
- On a wall-mounted frame
- On a self-supported frame

Table 2-5, "Mounting Methods," is a mounting guide for the number of port networks appropriate for each mounting method. Remember to factor in available space with the number of networks when you select your mounting method.

Table 2-5. Mounting Methods

Number of Port Networks	Method of Mounting		
	Wall	Wall Frame	Self-Supporting
1 - 3	X	X	
3 - 5		X	X
5 & up			X

Frame mounting of the terminal blocks for installations of all network sizes is desirable, but it is highly recommended that those of five networks or more be fram mounted.

Arranging the Terminal Blocks

Arrange the terminal blocks with the following factors in mind:

- Cable terminations to the fields and how the fields cross-connect
- The type of port fields and the necessity for short jumper lengths
- Possible zone configurations

These factors are discussed in the sections that follow.

Cable Terminations and Cross-Connections

Terminate the equipment port cables close to the distribution cables, as suggested in Figure 2-6, "Four-Area MDF," to make connecting and disconnecting the jumper wires as easy as possible. Figure 2-6 is only a possible configuration; vary the field design if it is more useful for a particular application.

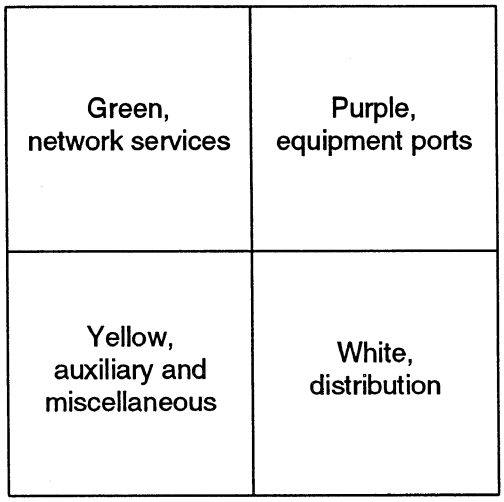


Figure 2-6. Four-Area MDF

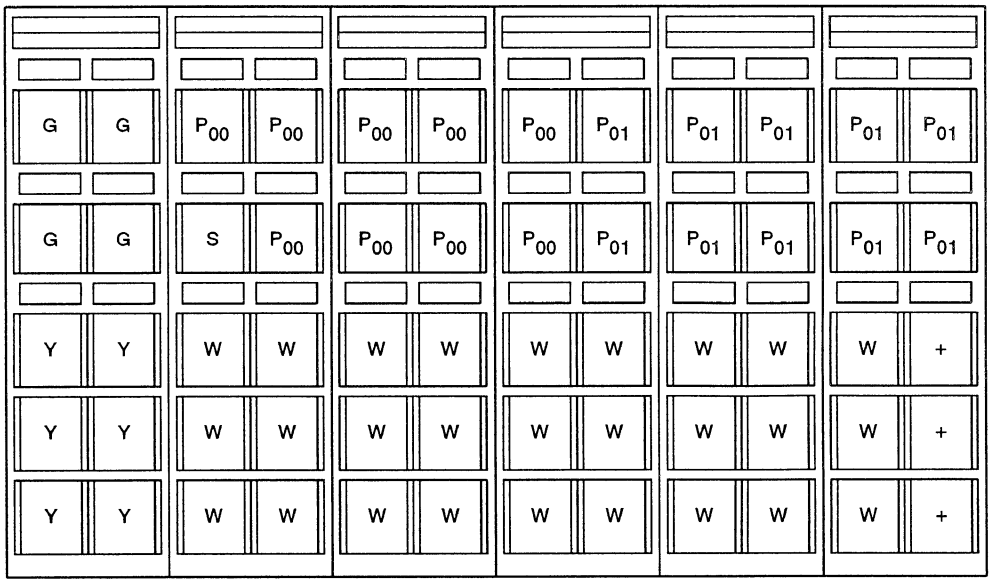
When 4-pair installation cables and spare cables or cables dedicated to systems terminated on the MDF other than G1/G3 are terminated on the MDF, add two more fields to the arrangement.

Port Fields and Short Jumper Lengths.

Usually, port carriers contain a mixture of lines and trunks. For most installations, combine the line and trunk fields to accommodate the port carrier, as shown in Figure 2-7, "Combined Trunk and Line Ports."

All G1/G3i carriers can hold port packs, although only the port carriers carry enough port packs to warrant dedicating two 110A-300 blocks on the wall field for each carrier. Dedicate one 110A-300 block for other carriers.

For G3r systems, only port carriers and expansion control carriers (in the EPN) can hold port packs. The PPN and EPN can hold four port carriers maximum, but the EPN expansion control carrier can hold port packs as well, requiring the dedication of two 110A-300 for its complement of 18. If wall field symmetry is important in your configuration, you may choose to design your equipment field to account for this cabinet port asymmetry as shown.



Legend:

- G — Green, network field
- Y — Yellow, auxiliary and miscellaneous field
- W — White, distribution field
- P — Purple, equipment field
- \+ — Spare without terminal blocks
- S — Spare with terminal blocks

Figure 2-7. Combined Trunk and Line Ports

Zone Configurations

When a large number of frames are required to construct an MDF, the task of connecting and disconnecting jumper wires can become difficult for two reasons. First, jumper wires of awkwardly long lengths are needed to make cross-connections between the extreme ends of the frame lineup. Second, the necessity to make cross-connections between the ends of the frame lineup can cause an overflow of jumper wires in the wireways of the middle frames.

To avoid these problems, frame lineups that exceed 20 ft and terminate more than four networks are divided into zones. A zone is a section of the MDF that has a maximum horizontal distance of about 20 ft. Cross-connections can be made only between the cables that terminate within the same zone. This keeps the jumper wires short and easily manageable.

Type-1 frames (described earlier in this chapter under "Recommended Frames for Terminal Blocks") can be used for a zoned MDF. Engineer the wall field according to the relative ratio of equipment-to-distribution pairs. Each type-1 frame can accommodate 3000 jumper pairs per side. Figures 2-8, "Zone Arrangement of Type-1 Frame — Plan View," and Figure 2-9, "Zone Arrangement of Type-1 Frame — Front View, Zone 2," show an example of a type-1 frame used in a zone arrangement of a system with eight port networks. This is a case where there are more distribution pairs than switch pairs.

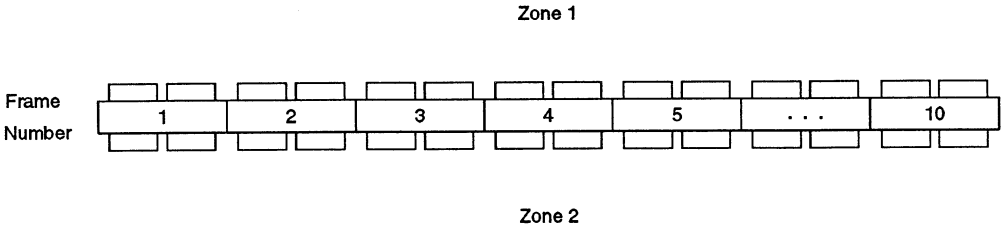
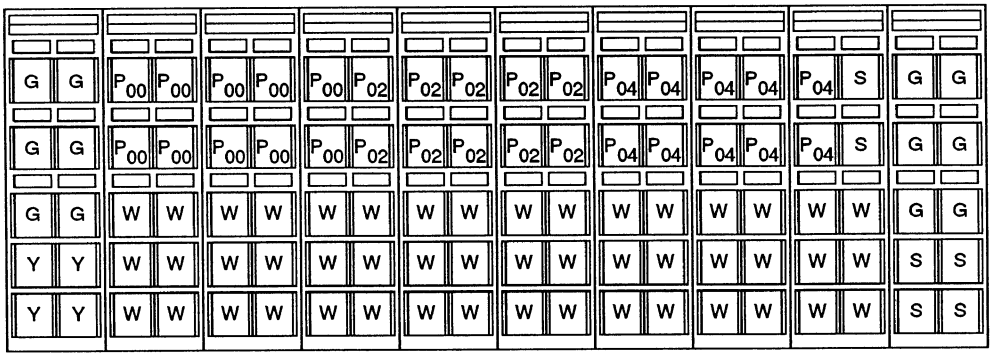


Figure 2-8. Zone Arrangement of Type-1 Frame — Plan View



Legend:

- G — Green, equipment field
- Y — Yellow, auxiliary and miscellaneous field
- W — White, distribution field
- P — Purple, equipment field
- S — Spare with cross-connect blocks

Figure 2-9. Zone Arrangement of Type-1 Frame — Front View, Zone 2

Figures 2-10, "Zone Arrangement of Type-2 Frame — Plan View, Zone 2", and 2-11, "Zone Arrangement of Type-2 Frame — Front View, Zone 2," show an example of a zone arrangement for a system with eight port networks using type-2 frame hardware.

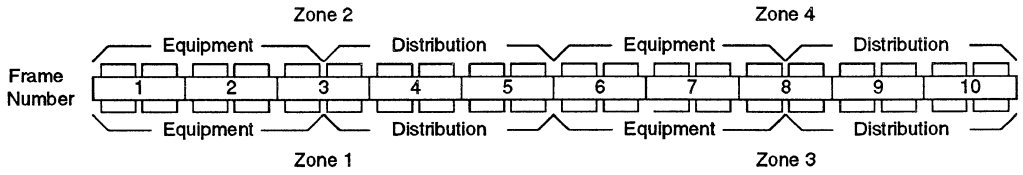
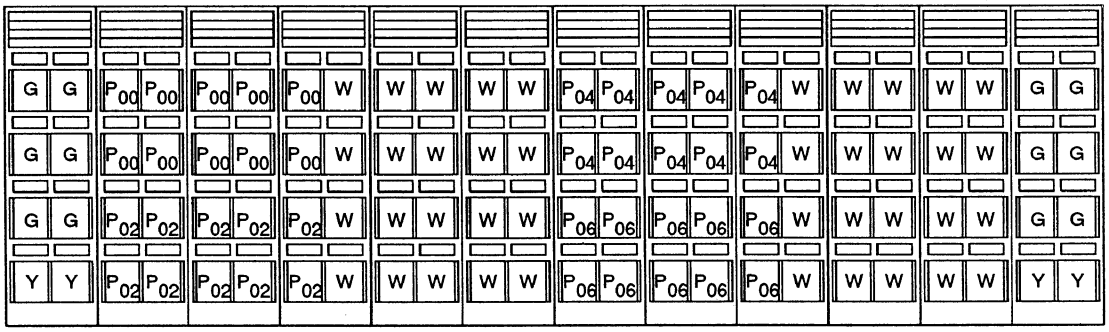


Figure 2-10. Zone Arrangement of Type-2 Frame — Plan View



Legend:

- G — Green, equipment field
- Y — Yellow, auxiliary and miscellaneous field
- W — White, distribution field
- P — Purple, equipment field
- S — Spare with cross-connect blocks

Figure 2-11. Zone Arrangement of Type-2 Frame — Front View, Zone 2

In addition to the preceding guidelines, observe these rules when designing zones:

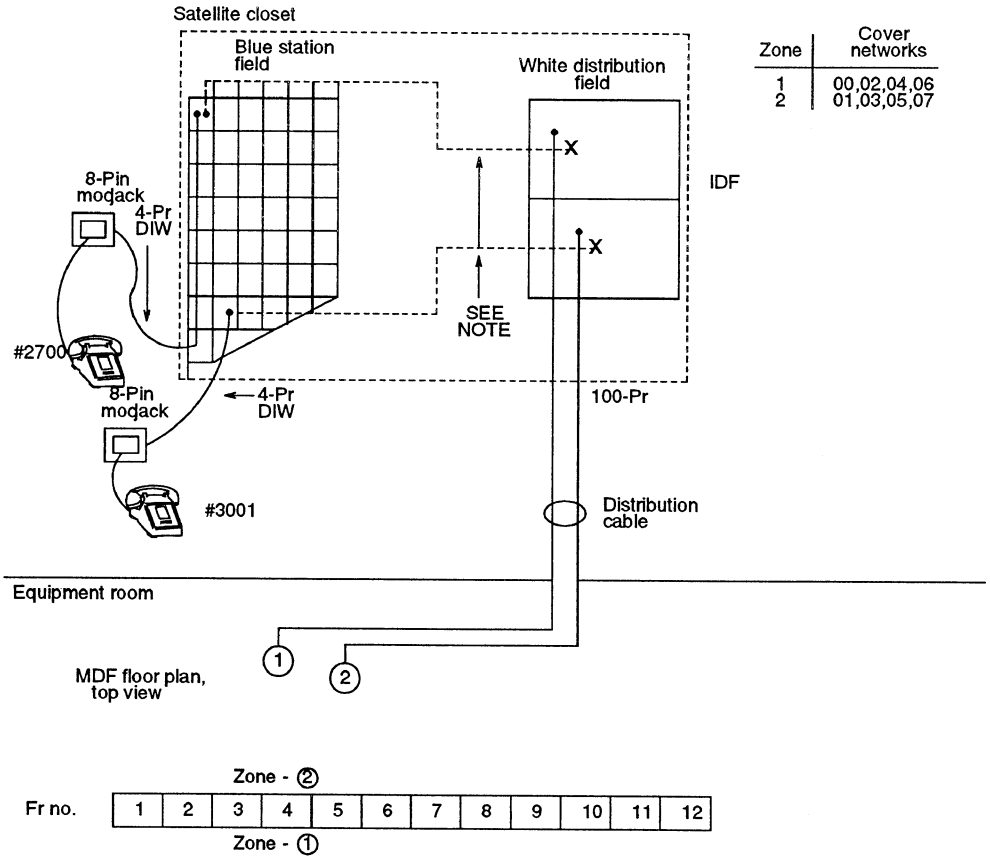
- Mount the hardware on frames. For 1-zone installations, wall-mounted frames can be used. For 2-zone installations, double-sided, self-supporting frames are recommended.
- Divide the distribution cables (in 100-pair increments) as equally between zones as possible. For example, assume that an installation has two

zones and a 300-pair distribution cable. You would terminate 100 pairs at one zone and 200 pairs at the other.

- Do not add extra cable pairs to a distribution cable to achieve an equal number of terminations at all zones. That is, in the preceding rule you would not add 100 pairs to the 300-pair cable in order to terminate 200 pairs at both zones.

When you use zones in the equipment room, the proper cross-connections at the IDF are crucial. Figure 2-12, "Closet Cross-Connects Using Type-1 Frames," illustrates IDF cross-connections of distribution cables originating from two different zones in the equipment room. Make sure that you label the IDF cross-connections as follows:

- IO number for an extension
- Equipment line location (ELL) number for that extension
- Module number for that ELL



NOTE:
If station #2700 is located in module 04,
the cross-connection in the closet goes to a pair in zone 1.
Similarly, if #3001 is in network 07, the cross-connection in the closet goes to a pair in zone 2.
Using this rule, it is possible to
keep the jumpers short at the equipment room cross-connect field.

Figure 2-12. Closet Cross-Connects Using Type-1 Frames

Connecting to Terminal Blocks

The 110A cross-connect hardware is available with connectors or without connectors. The determination of whether to use connectorized or field terminated cross-connect hardware is best made at the site.

NOTE:
The connector gender of the unshielded B25A cables supplied with G1/G3i/G3r networks is male-to-female (M-F) with the male end connecting to the switch. To connect networks to a wall-field with female plugs already installed, use the A25D male-to-male (M-M) connector.

Designing the MDF for a Raised Floor

A modern communications system is perceived by the customer to look like a computer installation. For this reason, some customers request that the communications systems installed in the equipment rooms be installed on raised flooring to conceal unsightly cabling and over-the-cabinet racks or ducts. Also, where communications systems are installed beside computer installations, the communications systems wiring must conform to the computer's installation wiring, which must be out of sight.

Using the raised-floor design may make installation time longer for systems of two networks or more and the same amount of time for single-network systems. Changes and additions also may take more time than the normal installations if cabling is involved. Several factors contribute to the increased time: some are logistical (such as removing tiles), some are engineering (such as detail design or structural considerations for frame mounting), and some relate to the installation of cables (such as storage of cable slack or dressing of cables via holes in the floor).

If you are required to design a raised-flooring MDF, use the following guidelines.

Before designing the layout of an MDF over a raised floor, take into account the following three issues that can affect the design:

- The use of raised floor space as an air plenum. The National Electric Code (NEC) prohibits the placement of cables that use ordinary covering materials, such as polyvinyl chloride (PVC) or polyethylene, in the building air plenums. However, when the raised floor is used as an air plenum, the plenum typically serves only the raised-floor room, which permits the use of cables with ordinary cover materials in that space. On the other hand, if the local codes forbid the use of ordinary covering materials for the installation that you are planning, use ducts for such cables as the input/output (I/O) cables (which connect the switch to the MDF) or plenum I/O cables.
- Space availability under the floor. Is there adequate space for ducts and cables to be installed, and what is under the raised floor — for example, electrical conduits, air conditioning ducts, water pipes?
- Modification of the floor tiles. Cutouts in floor tiles will have to be made to accommodate the MDF. Discuss this with the customer. Contact the BCSystems Design Center regarding final requirements for cutouts in floor tiles. See Figure 2-13 "Floor Template — 18 Inch Tile (L472366)," Figure 2-14 "Floor Template — 24 Inch Tile (L472367)," and Figure 2-15, "Floor

Template — Cabinet Lineup (L472368)."

The G1/G3 switch uses only the "Common" marks on template L472368 for floor mounting. Ignore the "Traditional" marks because they are applicable to a different system.

Once you have resolved these issues, use the following guidelines for designing cable routings, frame installations, and the floor plan.

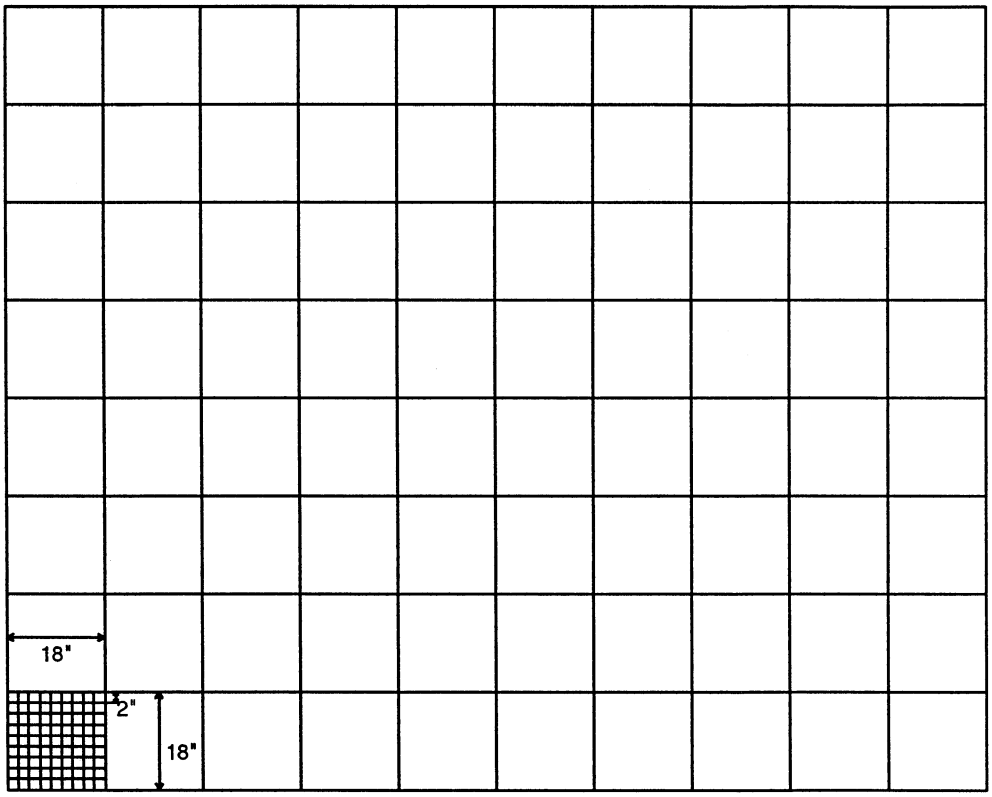


Figure 2-13. Floor Template — 18-Inch Tile (L472366)

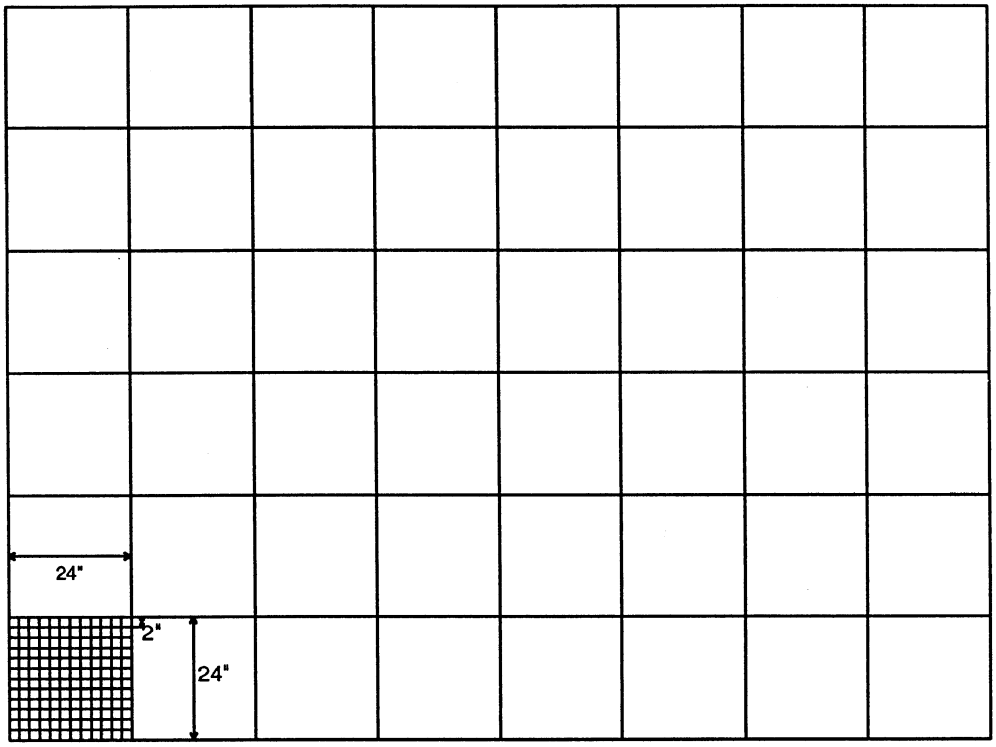


Figure 2-14. Floor Template — 24-Inch Tile (L472367)

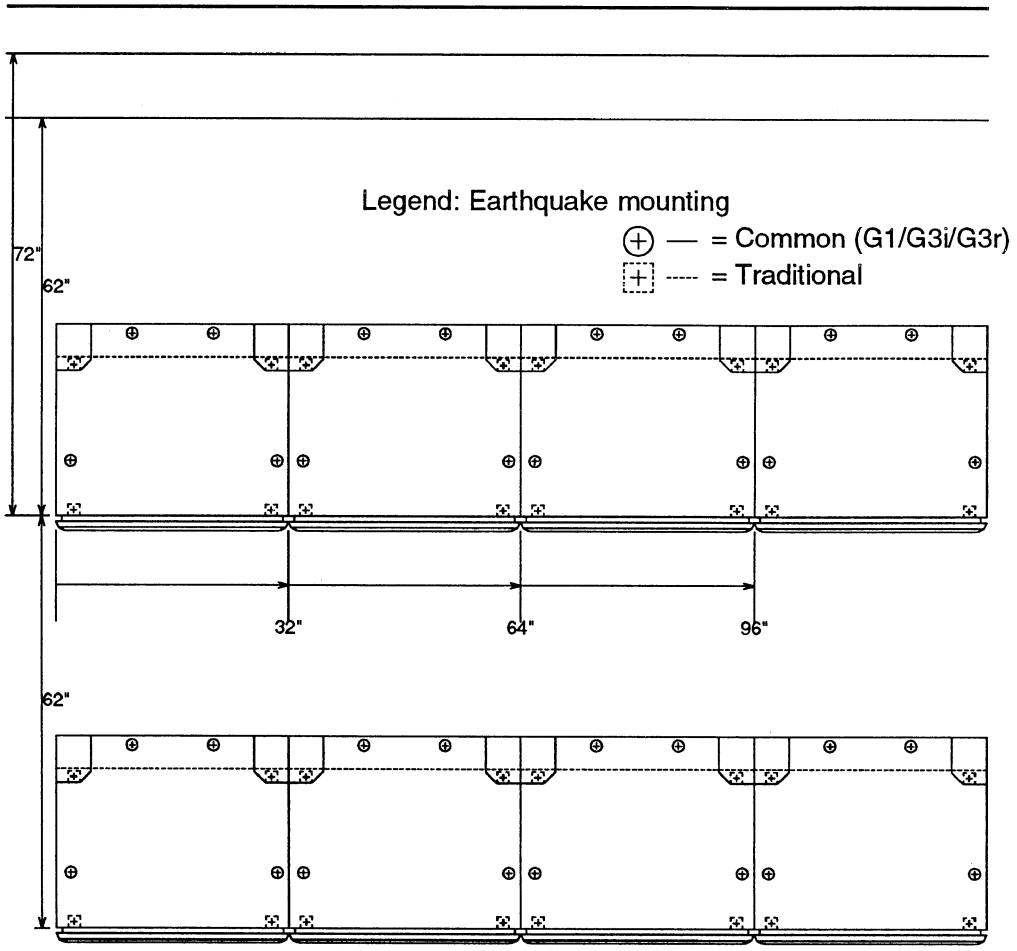


Figure 2-15. Floor Template — Cabinet Lineup (L472368)

Cable Routing

Take special care to ensure that cables from different modules do not cross at the MDF and that distribution cables are not crossed over network cables. Make sure that the cables routed under the raised floor are dressed and that they are done so with a minimum of slack to prevent tangled cables that can obstruct access to other under-floor equipment. The routing of cables beneath a computer or raised floor should be coordinated with the BCSystems Design Center.

Frames

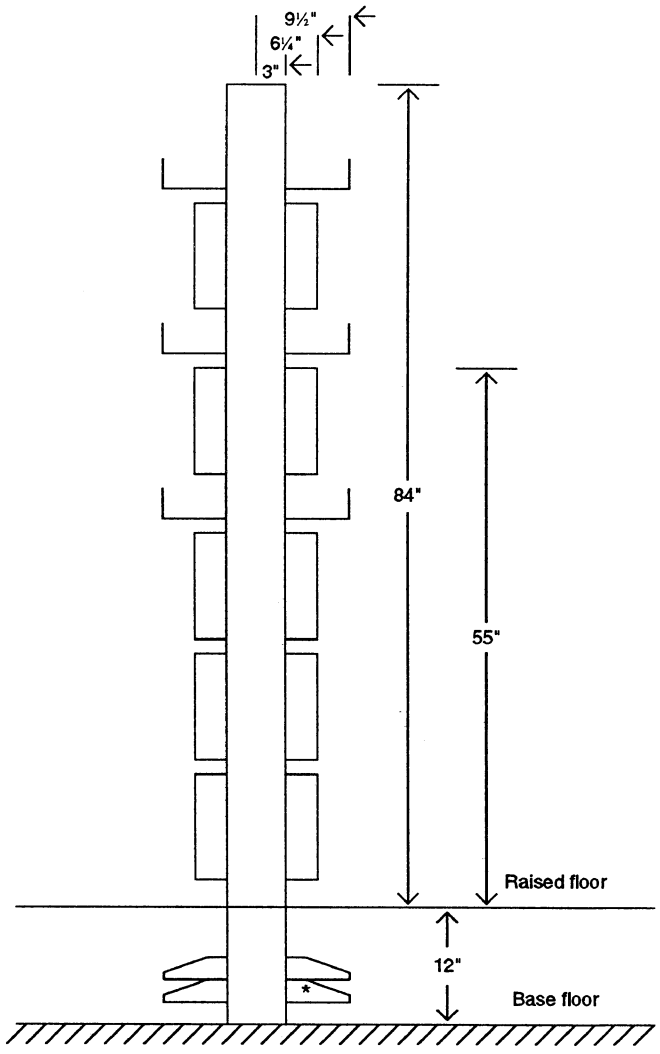
Use wall-mounted or self-supporting frames for MDFs that you install with raised floors. Terminal blocks mounted directly to the wall require cables to be fed from both the top and bottom, exposing the cables to view and defeating the purpose of the raised-floor installation. (However, if the customer does not object to the exposed cabling, wall mount the wiring blocks directly, that is, without frames.)

Self-supporting frames are usually bolted directly to the base floor as shown in Figure 2-16, "Floor-Secured Frame Installation." This method of installation requires the removal of the raised floor stringers. Obtain the cooperation of the floor installer to install frames. Use a frame whose height has been increased to fit the raised floor, and make sure you include the increased height when ordering them.

You also can install self-supporting frames by bolting them to the top of the stringer system. Before planning this approach, confer with the customer and the manufacturer of the raised-floor system. Brace all self-supporting frames at their tops whether you have anchored them to the base floor or to the top of the stringer system.

Floor Plan

Contact the BCSystems Design Center to obtain a detailed floor plan for the G1/G3 installation. This includes cable distances, tile cutouts, the relationship of the network equipment to the stringer system, and the relationship of the MDF to the stringer system.



*NOTE: Connector brackets may be placed on the floor for ease of connecting.

Figure 2-16. Floor-Secured Frame Installation

Recommendations for IDF Designs

For G1/G3 networks, IDFs serve as secondary cross-connect points between distribution cables and inside wiring cables, which connect to the IOs. The IDFs are usually housed in closets. Along with the IDF, these closets frequently house the auxiliary power units that some telephones require.

Although the design of an IDF depends upon the site, it should conform as closely as possible to the Premises Distribution System (PDS) guidelines. The recommendations in this section supplement the PDS guidelines and are essential to the design of IDFs. Beyond these recommendations, use your experience and best judgement in designing IDFs.

Recommended Terminal Blocks

Use 110AB1-100 or 110AB1-300 terminal blocks for both the blue and white fields of the IDF.

Mounting the Terminal Blocks

If you are terminating fewer than 1200 cable pairs (riser and installation cables combined) on an IDF, wall mount the terminal blocks directly, without a frame. If you are terminating more than 1200 pairs on an IDF, use a wall-mounted type-1 frame as discussed earlier in this chapter under "Recommended Frames for Terminal Blocks."

Insert Labels

Insert labels identify the origins of cables that terminate on the MDF and on the IDFs. The labels are color-coded and come in sheets with 18 labels per sheet. The labels slip into the 12-in.-by-8-in. clear plastic holders that snap between the horizontal index strips of the terminal blocks. Many different types of labels are available.

The color coding of the labels indicates the source of terminating leads, as follows:

- Green: network services (CO trunks)
- Purple: equipment ports
- Yellow: auxiliary cabinet and miscellaneous switch cables
- Blue: IOs
- Gray: connections between IDFs
- White: connections between the MDF and the IDFs

The color coding of the labels is also used to set off specific fields on the MDF and IDFs, as follows:

- On the MDF:
  - — Green for the network services (CO trunks) field
  - — Yellow for the auxiliary field
  - — Purple for the equipment ports field
  - — White for the building distribution field (cables coming from the IDFs)
  - — Blue for the installation field
- On the IDFs:
  - — White for the building distribution field (cables coming from the MDF)
  - — Blue for the IO field
  - — Gray for the tie cable field (cables coming from another IDF)
  - — Purple for remote equipment ports terminated at the IDF

In addition to being color coded, the labels are printed in various pair combinations to match the pairings that can occur on the fields. They also contain spaces to fill in according to the following convention for "cabinet-carrier-port":

- Cabinet:
  - — G1: 1 or 2
  - — G3i: 1 through 3
  - — G3r: 1 through 22
- Carrier: G1/G3i/G3r — A through E
- Port: G1/G3i/G3r — 1 through 20

Figure 2-17, "Example of Label Filled In," shows an example of a label with this information filled in.

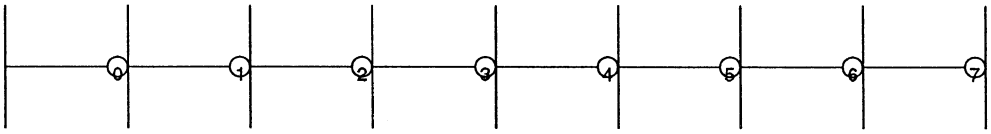


Figure 2-17. Example of Label Filled In

The label sheets are stocked at the AT&T Customer Information Center and can be obtained by calling (800) 432-6600 or by writing to:

AT&T Customer Information Center
P.O. Box 19901
Indianapolis, Indiana 46219

Include the following information when ordering:

- Name and address
- Geographic location number (such as CO8100)
- Organization number (such as 20052119)
- Account code (such as 123-4567)
- Select code of sheets needed (upper righthand corner of each sheet)
- Number of sheets needed

A partial reproduction of each label sheet is shown in Chapter 8, "Insert Labels."

Customer Participation

Customer participation in wiring administration allows the customer to set up, tear down, and alter cross-connections on the building distribution field of the MDF and on the IDFs. Because 110A cross-connect hardware is used with jumper wires and require the use of a punchdown tool to make cross-connections, customers who wish to handle their own wiring administration can have their technician instructed on the use of a punchdown tool, and connecting and disconnecting jumper wires.

G1/G3: Electrical Protection

3

This chapter describes the protection scheme for the G1/G3i/G3r communications systems. There are six primary, two enhanced primary, and one secondary protector that can serve the needs of in-range, out-of-building (IROB) terminal installations. The primary protectors all provide protection in the standard analog voltage range of 220V to 300V and may include a heat coil for sneak-current protection. The 4C3S-75 enhanced primary protector is installed in place of the primary protector and operates at 75V. The secondary protector is used with primary protection to protect equipment and is installed on the equipment (terminal or port) side of the primary protector.

Required Protectors

Following are electrical protectors that are used for primary, enhanced primary, and secondary applications. With the exception of ITW protectors, all of the following primary and enhanced primary protector units plug into 188 panels.

Primary Protectors

There are several primary protection devices available for circuit packs, terminals, and trunk lines.

- 3B1A — carbon block device
- 3B1E-W — wide-gap gas tube
- 3C1S — solid-state device
- 4B1C — carbon block device that includes a heat coil, providing primary and sneak-current protection
- 4B1E-W — wide-gap gas tube that includes a heat coil, providing primary and sneak-current protection
- 4C1S — solid-state device that includes a heat coil, providing primary and sneak-current protection

Enhanced Primary Protector

The 4C3S-75 (PEC 65543 and 65543A) and ITW LP2-100-068 (PEC 65541 and 65541A) are the two devices available for providing vulnerable port packs with enhanced primary protection. (See Table 3-1, "G1/G3 Protection Matrix.")

Select the ITW LP2-100-068 for installations with a type-66 mounting.

Sneak-Current Protectors

The 79A and the ITW SCP-1 are the two approved dedicated sneak-current protectors.

Primary protectors 4C3S-75, 4B1C, 4B1E-W, and 4C1S all contain sneak-current protection. Primary and sneak-current protection can be provided simultaneously by using a protector with a "4" prefix, such as "4C3S-75"4 or "4B1E-W." See Table 3-1, "G1/G3 Protection Matrix" for additional information on electrical protection.

Secondary Protector — DLP

The DLP is used when additional protection is desired or when Digital Communications Protocol (DCP) repeaters are in use. The DLP must be used in conjunction with primary protection. DLPs used with 7400 sets are isolation transformers and require the terminal to be locally powered.

The data link protector (DLP) is available in either the 8-circuit version (1201A) or the single-circuit version (1203A).

Protection Matrix

Table 3-1, "G1/G3 Protection Matrix," shows the overall protection matrix for G1/G3i/G3r port packs, terminals, and trunks.

Table 3-1. G1/G3 Protection Matrix

Line	Circuit Packs/ Circuit	Port Type	Building Wiring and Interconnection		Protection Required for Off-Premises Wiring and Interconnection				Notes
							Enhanced Primary	Secondary	
			On Prem Only	Potentially Off Prem	Sneak Current	Primary	4C3S-75 or ITW	DLP	
1	TN742/8	Analog Line		X	79A or SCP1	Yes	Yes	NA	1,5
2	TN746/16	Analog Line	X		NA	NA	NA	NA	
3	TN746B/16	Analog Line		X	79A or SCP1	Yes	Yes	NA	1,5
4	TN762B/8	730X-MFAT	X		NA	NA	NA	NA	
5	TN754/8	740X-Dig		X	Yes	Yes	Yes	Yes	2
6	TN754B/8	740X-Dig		X	Yes	Yes	Yes	Yes	2
7	TN747B/8	CO Trk		X	79A or SCP1	Yes	No	NA	1
8	TN753/8	DID Trk		X	79A or SCP1	Yes	No	NA	1
9	TN760D/4	Tie Trk		X3	79A or SCP1	Yes	No	NA	3
10	TN763C/4	Auxiliary	X		NA	NA	NA	NA	
11	TN735/4	MET	X		NA	NA	NA	NA	
12	TN726B/NA	Data Line		X	79A or SCP1	Yes	No	NA	9
13	TN556/12	750X/85XX-ISDN BRI		X	Yes	Yes	4C3S-75	NA	7
14	TN767B/1	DS1		X3	79A or SCP1	Yes	NA	NA	3,5
15	TN769/8	Analog Line		X	79A or SCP1	Yes	Yes	NA	
16	TN464C/NA	DS1 including PRI		X3	79A or SCP1	Yes	No	NA	3,5
17	TN553/NA	Packet Data Line	X		NA	NA	No	NA	
18	TN574/NA	DS1 Converter		X3	79A or SCP1	Yes	No	NA	3,5
19	TN1648/NA	SYSAM		X	79A or SCP1	Yes	No	NA	
20	TN771/NA	Processor		X	79A or SCP1	Yes	No	NA	9

Notes for the above table are given on the next page.

NOTES:

1. Gas tube can be substituted for carbon block as primary protection to increase protection and lower maintenance cost.
2. If the DLP protector is provided, then primary protection is required on the network (out-of-building) side of the facilities. The DLP is always required when DCP repeaters are used.
3. Off-premises only if a TL31M, channel service unit (CSU), or equivalent is provided. Primary protection must be provided on the network side of the facilities. The TN760D, TN767B, TN464C, and TN574 cannot be directly connected to exposed facilities.
4. "Off-premises" refers to wiring that could be exposed to environmental or electrical hazards. This usually means, but is not limited to, out-of or between buildings.
5. Primary and secondary sneak-current protection can be provided simultaneously by using a protector with a "4" prefix, such as "4C3S-75" or "4B1E-W."
6. Primary and sneak-current protection can be provided simultaneously by using carbon blocks (4B1C), wide-gap gas tubes (4B1E-W), or solid-state protectors (4C1S). Primary protector with a "4" prefix are preferred but not required. 3B/3C protector series can be used after a thorough site investigation that determines there is no need for sneak-current protection no chance of a power cross.
7. The 75XX/85XX ISDN-BRI (integrated services digital network-basic rate interface) requires a 4C3S-75 be placed on the switch end and a carbon block on the terminal end.
8. For TN754 circuit packs, the 4C3S-75 protector is only appropriate for vintage 15.
9. Protection required for INADs port. Data port cannot go off premises.

G1/G3: Port Packs/DCP Repeaters

4

This chapter presents information on G1/G3i/G3r port circuit packs and terminal loop distances that you may find useful in designing a wiring installation. A brief section on Digital Communications Protocol (DCP) repeaters is included toward the end of the chapter.

Port Circuit Packs

Table 4-1, "Port Circuit Pack Cabling," identifies the circuit packs that are housed in the PPNs and EPNs. Table 4-1 also identifies the fields on the MDFs where cables from those packs terminate. There are up to 20 port circuit packs per carrier, and one 25-pair cable serves each pack. The table also gives the number of ports for each circuit pack. There are 4 or 8 ports for each digital pack and 4, 8, or 16 ports for each analog pack.

Table 4-2, "Terminals and Peripherals Served by Port Packs," lists the voice terminals that each circuit pack can serve, and Table 4-3, "Voice Terminal Loop Ranges," lists the loop ranges for voice terminals.

The design of the MDF must allow for the termination of 20 carrier cables, even if the carrier is not slated for a full complement of circuit packs. The design should not allow for vacant carrier positions unless such an allowance is specifically requested.

Table 4-1. Port Circuit Pack Cabling

Circuit Pack	Port Function	Number of Ports	Field for Term	Ckt Packs per 25-Pair Cable
TN767	DS1 PRI (G3i only) DS1 (G1 and G3)	23(24)	Trunk/AUX	1
TN556	ISDN-BRI	12	BLDG DIST	1
TN553	Packet data line	12 EIA	BLDG DIST	1
TN726B	Data line	8	BLDG DIST	1
TN735	MET line	4	BLDG DIST	1
TN742	On-site (ONS) analog line or off-site (OFS) analog line	8 8	BLDG DIST Trunk/AUX	1 1
TN746	Analog line ONS	16	BLDG DIST	1
TN464C	DS1 PRI (G3r only)	24	Trunk AUX	1
TN746B	Analog line ONS	16	BLDG DIST	1
TN747B	CO trunk	8	Trunk/AUX	1
TN753	DID trunk	8	Trunk/AUX	1
TN754	Digital line	8	BLDG DIST	1
TN754B	Digital line	8	BLDG DIST	1
TN760D	Tie trunk/attendant interface	4	Trunk/AUX	1
TN762B	Hybrid line	8	BLDG DIST	1
TN763C	AUX trunk ONS	4	Trunk/AUX	1
TN722B	DS1 tie trunk	23(24)	Trunk/AUX	1
TN769	Analog ONS	8	BLDG DIST	1

Table 4-2. Terminals and Peripherals Served by Port Packs

Ckt Pack	Port Function	Term or Periph Served
TN556	ISDN-BRI	750X-BRI — 7500, 7505, 7506, 7507 85XX-BRI — 8503 PC/ISDN
TN726B	EIA data line	ASD terminal with RS232 interface
TN735	MET line	Multibutton electronic terminal (MET) sets
TN742	Analog line ONS/OFS	Analog phones — 71XX, 2500 81XX
TN746B	Analog line ONS	Analog phone — 71XX 81XX
TN760D	Tie trunk/attendant console	Attendant console
TN762B	Hybrid line	730X-MFAT
TN742	Analog	500 type rotary dial telephone
TN754B	Digital line Data and voice	74XXD-Digital telephone 301A attendant console 302A1 enhanced G1 console Callmaster®

Table 4-3. Voice Terminal Loop Ranges

Terminal Type	Distance (ft)		Comments
	24 AWG	26 AWG	
Analog			
500/2500	20000	13000	On-premises or out-of-building — same premises (TN742, TN746B)
500/2500	3100	2000	On-premises only — no bridging terminals without adjuncts (TN746)
710X	15200	10000	
Hybrid			
730X	1000	750	Without adjunct power
	2000	2000	With adjunct power
Digital			
740X	3000	2200	On premises
	2400	1300	Out-of-building same premises
BRI			
750X/8503	1900	1600	Adjunct power is required on all 750X terminals. All BRI terminals require a terminating resistor. These figures assume the resistor is installed within 33 ft of the terminals in a point-to-point configuration. The 8503 is phantom powered.

DCP Repeaters

When a digital voice terminal must be installed at a loop-length distance in excess of 5000 ft, a DCP repeater must be installed in its wiring path. The DCP repeater is a circuit board designed for mounting on a 100-pair, 110A wiring block. It boosts and cleans up the signals to and from the terminal, and extends a terminal's loop length 5000 ft. A maximum of six repeaters can be linked together. Repeaters are intended to serve small numbers of terminals.

Repeaters are not hermetically sealed, which prevents their use in manholes and on utility poles. Install the repeaters in a closet that has 110 VAC. If a repeater is exposed to electrical hazards, install primary protection between the repeater and the potential hazard.

Ensure that the circuit breaker to the 110 VAC for the repeaters is labeled with a notice cautioning personnel not to disrupt power to the repeaters. However, the repeaters do contain a reserve battery that permits them to operate for about two hours after AC power has been shut off or disrupted. When multiple repeaters are linked together, each one requires a 110 VAC power source and each source must be labeled to prevent accidental disruption of power to any repeater. If the AC power to any repeater in a chain is disrupted, the voice terminal stops operating (once that repeater's reserve battery expends itself).

Exposed DCP repeaters require a DLP. See Chapter 3, "Secondary Protectors," for DLP information.

The price element code (PEC) for the DCP repeater is 9601-017. The comcode for the DCP repeater is 105 276 026.

G3: BRI

5

The Integrated Services Digital Network (ISDN) basic rate interface (BRI) provides ISDN service between voice and data terminals and the switch.

The TN556 is the BRI port pack; it provides 12 ISDN ports for both G3i and G3r communications systems.

BRI Terminals

G3i and G3r uses the 7500 and 8500 series voice terminals for BRI applications and the 7500 Universal Data Module (UDM) for data-only applications:

- The 7505 is an ISDN-BRI digital voice terminal (VOM-T) with an optional asynchronous data module (ADM-T) for simultaneous voice and data operations. When used, the optional ADM-T is part of the 7505 voice terminal base. The 7505 also contains a speakerphone.
- Model 7506 is functionally identical to the 7505 except it includes a built-in two-line digital display with 24 characters per line. The 7506 also has an optional ADM-T for simultaneous voice and data operations.
- The 7507 is a VOM-T equipped with a two-line 40-character display. The display gives access to the Display — Voice Terminal feature. The 7507 also has an optional ADM-T for simultaneous voice and data operations.
- The 7500 UDM connects unattended data terminal or communications equipment to the ISDN network. The 7500 has no voice functions and cannot be linked to the voice terminal.
- The 8503 is an ISDN-BRI voice only terminal with many standard terminal features. It is phantom powered only. However, 8503 adjuncts may require adjunct power.

PC/ISDN Workstation

The PC/ISDN workstation uses a standard BRI connecting scheme to the MDF. PC/ISDN can be used with any 75XX or 85XX series terminal and draws no additional current from BRI power sources.

BRI Terminal Configurations

750X voice terminals must be powered by either local or satellite closet power. (See Chapter 6, "G1/G3: Adjunct Power Supplies.")

BRI circuits require a terminating resistor (TR) as part of their configuration. Single terminating resistors such as 440A4, 440B4, and 440C4 can be placed on the cross-connect field or in-line with the phone cord at the workstation.

A bulk terminating resistor junction can be provided in a satellite wiring closet (IDF).

The 110RA-12 is designed to mount on a standard 110A-100 pair mounting base in a satellite closet (IDF). TRs are already in place on the 110RA1-12 terminating resistor block. The 110RA1-12 is designed to handle multiple connections. If multipoint is used on each of the TR block's 12 ports, as many as 24 BRI phones (two per port) can be connected as shown in Figure 5-1, "Multipoint Connections for 110RA1-12 Block." All new system installations should use the termination resistor arrangement shown in this figure.

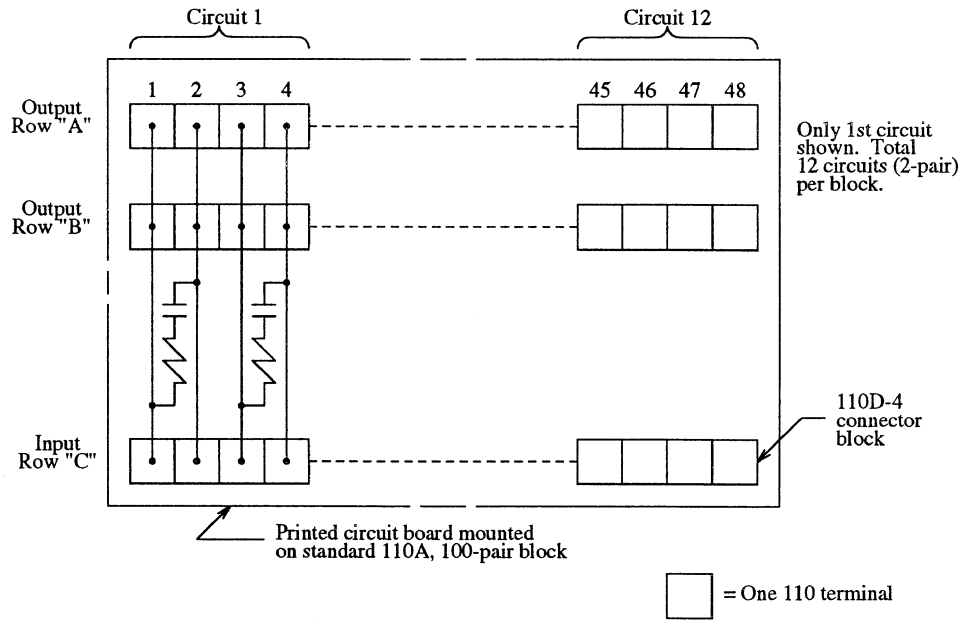


Figure 5-1. Multipoint Connections for 110RA1-12 Block

Figure 5-2, "BRI Multipoint Cross-Connections," shows the proper multipoint cross-connect method for BRI installations.

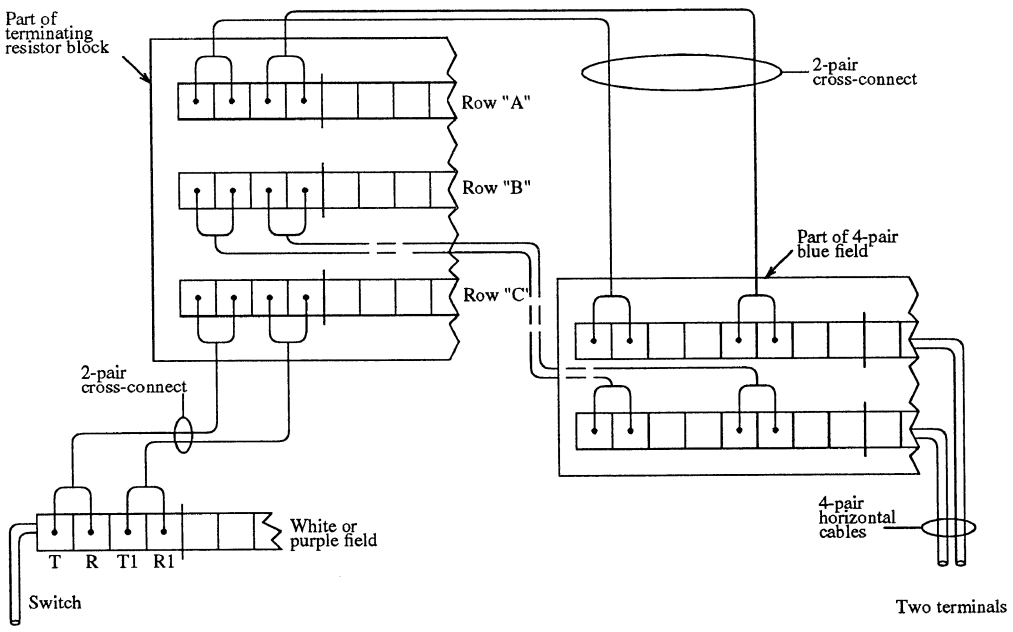


Figure 5-2. BRI Multipoint Cross-Connections

The maximum multipoint cabling distances for the 110RA1-12 are 1600 ft from the switch to the wall jack, 250 ft from the IDF to the wall jack, and 33 ft from the wall jack to the phone. These distances assume 24 AWG wire. For detailed multipoint connection information, see *DEFINITY Communications System Generic 1 and Generic 3 — Installation and Test*, 555-230-104.

TR blocks do not have to be dedicated to consecutive port pack outputs.

BRI uses pairs 1 and 3 of the DIW cable as shown in Figure 5-3, "Special ISDN Wiring for Satellite Closet."

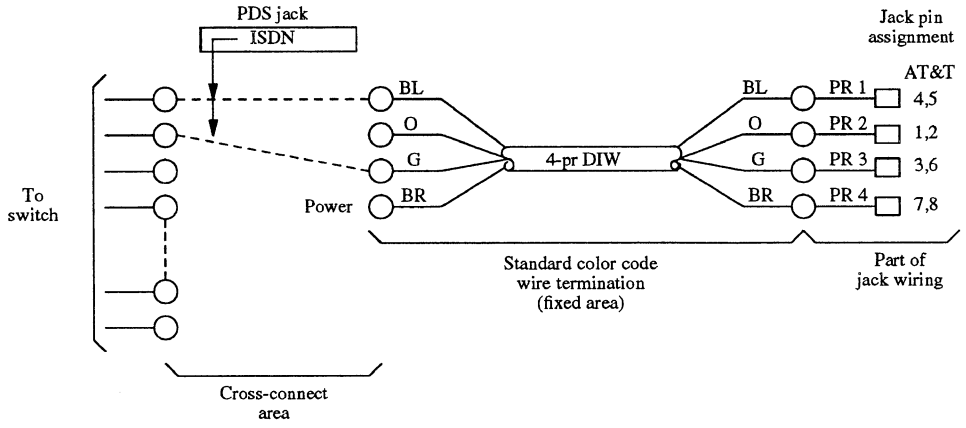


Figure 5-3. Special ISDN Wiring for Satellite Closet

5

BRI Power Supplies

Some BRI terminal power is installed in the satellite closet, whereas other power sources are installed in the workstation. The power supplies available for ISDN BRI terminals are:

- 353A — A 12W power supply with a single output of -40 VDC; a stand-alone supply that can be used **only** with ISDN BRI sets.
- 945-1 bulk power supply — Provides 13 ports with 18W at -40 VDC; a closet unit with an overall capacity of 144W available for terminal power. Terminal load should be distributed as evenly as possible across the 13 ports.

  When bridging (adding a second terminal to a port) or when moving terminals from port to port, ensure that you do not exceed the 18-watt power rating. No output should bridge more than two terminals. For specific information on bridging, refer to *ISDN Terminal Installation and Tests*, 555-021-101.

  This power supply can be used with ISDN BRI sets *only*.

  NOTE:
  If you are powering a large number of terminals with the 945-1, ensure that they are all close enough to the power supply to be accommodated by a single unit; that is, ensure that all terminals fall within the range limits of the power supply. (See Table 5-1, "Power Supply Distance Limits," for range and power data.)

- KS22911 — A 10W, -48 VDC workstation power supply; if the terminal

has a speakerphone or headset adapter, the power supply range is 150 ft.

- 346A bulk power supply — Four 10W outputs of -48 VDC each; located in the satellite closet and not limited to powering BRI terminals. The 346A is switch selectable and can also supply two outputs of 20W each.

Table 5-1, "Power Supply Distance Limits," shows power consumption and distance limits for the 7500 ISDN BRI and voice terminals with the heaviest adjunct load, the S201A. These distances are conservative and are valid for both 40V and 48V power supplies.

Table 5-1. Power Supply Distance Limits

Terminal	Power Consumption with S201A Speakerphone (Watts)	Distance (ft)*	
		24 AWG**	26 AWG
7505/06 VOM-T	4.3	730	450
7505/06 ADM-T	5.5	540	340
7507 VOM-T	6.8	420	260
7507 ADM-T	8.1	330	200
8503 VOM	2.8	1020	640

* Distances are calculated by using the maximum power consumption allowable and provide minimum distance allowable under all conditions for the set.

** 24 AWG should generally be used.

Adjunct Power Supplies

6

This chapter describes the power supplies for adjuncts such as speakerphones, display modules, or voice terminals. It further describes the adjuncts served by each supply and the AC power requirements of each power supply.

(Adjunct power is sometimes called "local power" or "auxiliary power".)

The customer designates a certain number of voice terminals to be fitted with one or more of the following adjuncts:

- Speakerphone
- Display module
- Call coverage module
- Headset
- Data stand
- Digital terminal display module

All these adjuncts require power either from an individual power supply located at the workstation, an individual power supply located in the satellite closet, or a bulk power supply located in the satellite closet. Diagrams showing how power supplies are connected at the workstation or satellite closet to a voice terminal appear in *DEFINITY Communications System Generic 1 and Generic 3 System Description and Specifications*, 555-230-200.

Individual Power Supplies

Only one power unit can be used individually to power adjuncts: the KS22911 power supply.

- KS22911 — A power supply that plugs into three-prong, 120 VAC outlets at the workstation. The KS22911 supplies -48 VDC up to 150 ft for any one adjunct and a speakerphone or headset. When the KS22911 is used at the workstation, it provides power through the connecting cord to a terminal.

  When small numbers of terminals require adjunct power, the KS22911 power supply can be installed in the satellite closet. From the satellite closet, it provides power over the fourth pair of the 4-pair installation cable to the information outlet (IO) at the workstation. If the distance from the satellite closet to the workstation exceeds 150 ft, you must install the power supply at the workstation.

Bulk Power Supply

The 346A modular bulk power unit is installed only in the satellite closet and accepts up to three 346A power supplies. Each 346A has four outputs. The power unit plugs into a 120 VAC outlet with 20A service. As many as four power units can be connected to the same 20A circuit, which must be dedicated and unswitched.

Each pair of outputs on the 346A has a slide switch between them. The switch allows the outputs to operate individually and supply 10W of power, or to operate in combination and put out 20W of power. The 346A transmits power over the fourth pair of the cable that connect the IDF to the IO at the workstation.

When the 10W outputs on the 346As are operating individually, they can power one speakerphone or headset and one other adjunct. When two outlets are operated in combination (20W power comes only from the upper output; the lower one is without power), they can power a data module, two other adjuncts, and a speakerphone or headset attached to one voice terminal. Table 6-1, "Maximum Loop Lengths for the 346A Power Unit," shows the loop distances for the 346A power unit.

Table 6-1. Maximum Loop Lengths for the 346A Power Unit

Adjunct Configuration	Cable Distances (ft)	
	24 AWG	26 AWG
Speakerphone S101A or headset 500A only	2750	1730
with 1 adjunct	531	334
with 2 adjuncts	350	238
with 3 adjuncts	250	167
Speakerphone S201A only	2060	1295
with 1 adjunct	493	309
with 2 adjuncts	331	208
with 3 adjuncts	243	152

G1/G3: Fiber Optics

7

Fiber optics in the G1/G3i/G3r systems provide intercabinet connectivity. Fiber in G3i and G3r is the same, however, G3r has DS1 remote capability.

Following is a list of useful information regarding G3r fiber optic cabling:

- The switch node carrier (SNC) contains elements of the CSS such as switch node interface (SNI) boards. These elements provide switching functions and fiber termination. Up to 16 SNI circuit packs can be equipped in a single SN carrier.
- The hardware connections for fiber optics are straightforward. The fiber module is the optical-to-electrical converter, either 9823A or 9823B, located on the rear connector panel that provides EI or SNI connectivity. The module provides conversion and connection between the EI or SNI and the fiber cable.

  In general, the backplane connections are only used for intracabinet connections and the rear connector panels are used for connections going outside the cabinet. Each SNI uses the 9823A or 9823B common fiber transceivers on the rear connector panel for fiber connectivity to a port network (PN) in another cabinet. The fiber cable from a 9823A has two multimode 62.5 micron fibers and uses the 3B ST®-type connectors.
- The lightguide cable interconnection terminal (LCIT) is used to connect individual fiber links to multifiber riser cables or outside plant cables. Each LCIT can house up to six fanouts and each fanout terminates one 12 fiber ribbon; each of the 12 fibers is connected to an individual connector.

Fiber-Optic Connectivity

Fiber-optic cabling can be use to connect a multicarrier cabinet to another multicarrier cabinet or a single-carrier cabinet (SCC).

Fiber-optic cabling connectivity uses several schemes to interconnect multicarrier cabinets:

- In a direct-connect, three-PN, simplex system, fiber-optic cabling is connected this way:
  - — The PPN cabinet to both EPN cabinets
  - — One EPN cabinet to the other EPN cabinet
- In a CSS-connect, simplex system, fiber-optic cabling is connected from each PN to the CSS.
- In CSS-connect, fully duplicated systems, fiber-optic cabling is connected from each EPN to the CSS and the duplicate CSS. There are two fibers from each PN, one to each CSS. Only one fiber-optic link is active at a time.

Transceiver Range Limitations

Table 7-1, "DEFINITY G1/G3i/G3r Fiber-Optic Transceiver Ranges," contains information on transceiver paddleboard ranges.

Table 7-1. DEFINITY G1/G3i/G3r Fiber-Optic Paddleboard Ranges

Application		Model	Distance Limits (62.5 Micron)
G1/G3i/G3r — as a central-location PN or a nearby remote PN	Transceiver	9823A	4900 ft (1.49 km)
G1/G3i/G3r — as a distant remote PN	Transceiver	9823B	25,000 ft (7.6 km)

Insert Labels

8

This chapter shows partial reproductions of the upper third of each insert label sheet. Table 8-1, "Numerical List of Insert Labels," lists the labels in numerical order. The representations are grouped by a color that indicates the source of the terminating leads, as follows:

- Green: network services central office (CO) trunks
- Purple: equipment ports
- Yellow: auxiliary cabinet and miscellaneous field
- Blue: information outlets (IOs)
- Gray: connections between IDFs
- White: connections between the MDF and the IDFs

Table 8-1. Numerical List of Insert Labels

Select Code	Label Title
801-100	1 Pair, Ports (Purple)
801-101	1 Pair, Ports (Purple)
801-102	1 or 3 Pair, Ports (Purple)
801-103	1 or 3 Pair, Ports Mix (Purple)
801-104	3 Pair, Ports (Purple)
801-105	3 Pair, Ports (Purple)
801-106	2 Pair, Ports (Purple)
801-107	2 Pair, Ports (Purple)
801-108	3 Pair, Misc (Purple)
801-109	4 Pair, Misc (Purple)
801-110	3 Pair, Misc (Yellow)
801-111	3 Pair, Misc (White)
801-112	3 Pair, Link (Gray)
801-113	2 Pair, Link (White)

Continued on next page

Numerical List of Insert Labels — Continued

Select Code	Label Title
801-114	2 Pair, Link (White)
801-115	3 Pair, Link (White): Obsolete
801-116	3 Pair, Link (White)
801-117	3 Pair, Link (White): Obsolete
801-118	3 Pair, Link (White)
801-119	3 Pair, Link (Blue)
801-120	4 Pair, Jack (Blue)
801-121	4 Pair, Jack 1-216 (Blue)
801-122	4 Pair, Jack 217-432 (Blue)
801-123	Pair Count, Generic (Green)
801-124	Pair Count, Generic (Yellow)
801-125	Pair Count, Generic (Purple)
801-126	Pair Count, Generic (Blue)
801-127	Pair Count, 1-900 (Green)

Continued on next page

Numerical List of Insert Labels — Continued

Select Code	Label Title
801-128	Pair Count, 1-900 (Yellow)
801-129	Pair Count, Generic (White)
801-130	Pair Count, 1-900 (White)
801-131	Pair Count, 901-1800 (White)
801-132	Pair Count, 1801-2700 (White)
801-133	1 Pair, Ports (Purple)
801-134	2 or 1 Pair, Ports (Purple)
801-135	1 or 2 Pair, Ports (Purple)
801-136	3 or 1 Pair, Ports (Purple)
801-137	1 or 3 Pair, Ports (Purple)
801-138	2 or 1 Pair, Ports (Purple)
801-139	1 or 2 Pair, Ports (Purple)
801-140	3 or 1 Pair, Ports (Purple)
801-141	1 or 3 Pair, Ports (Purple)

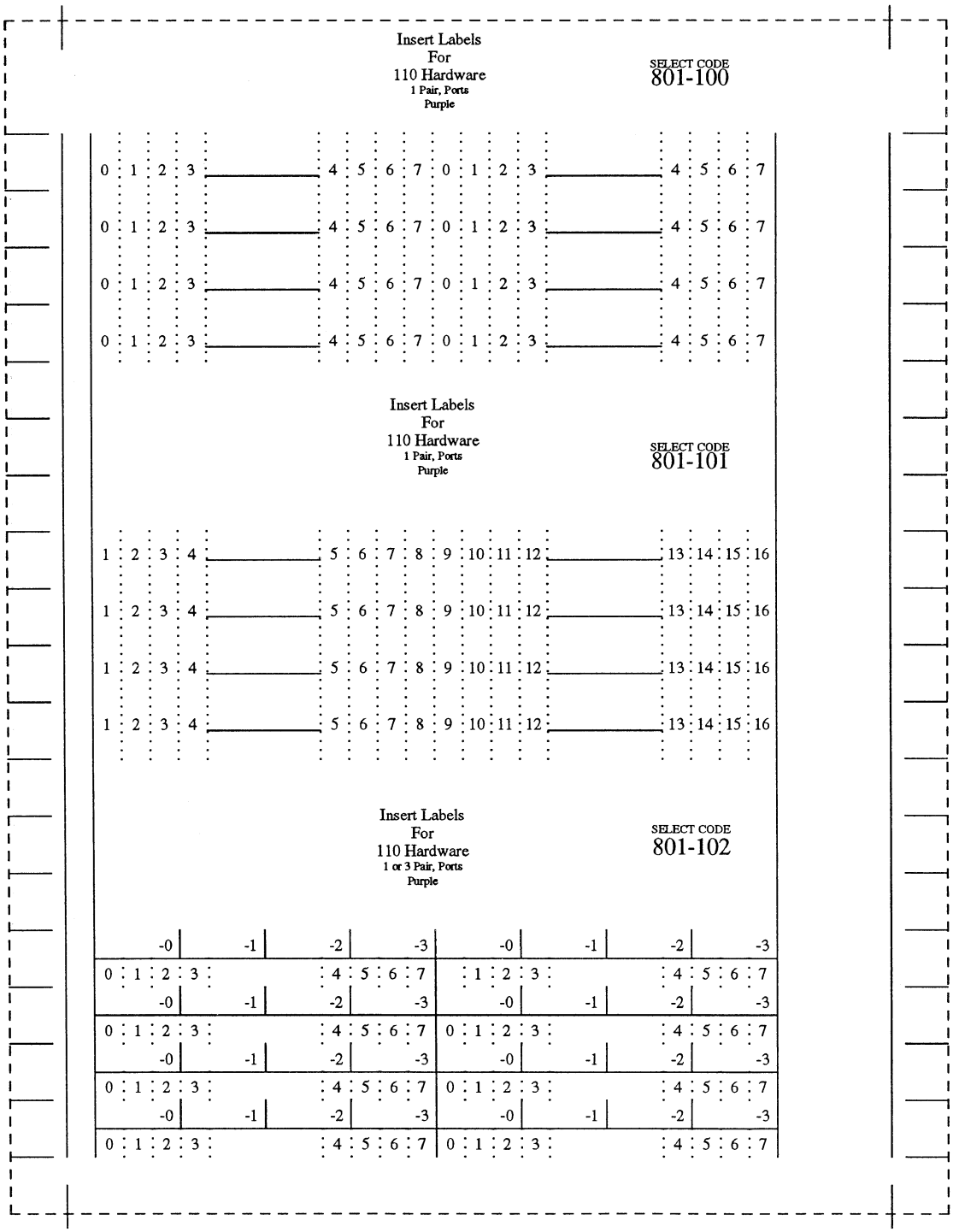


Figure 8-1. Insert Labels — Partial Reproductions

8

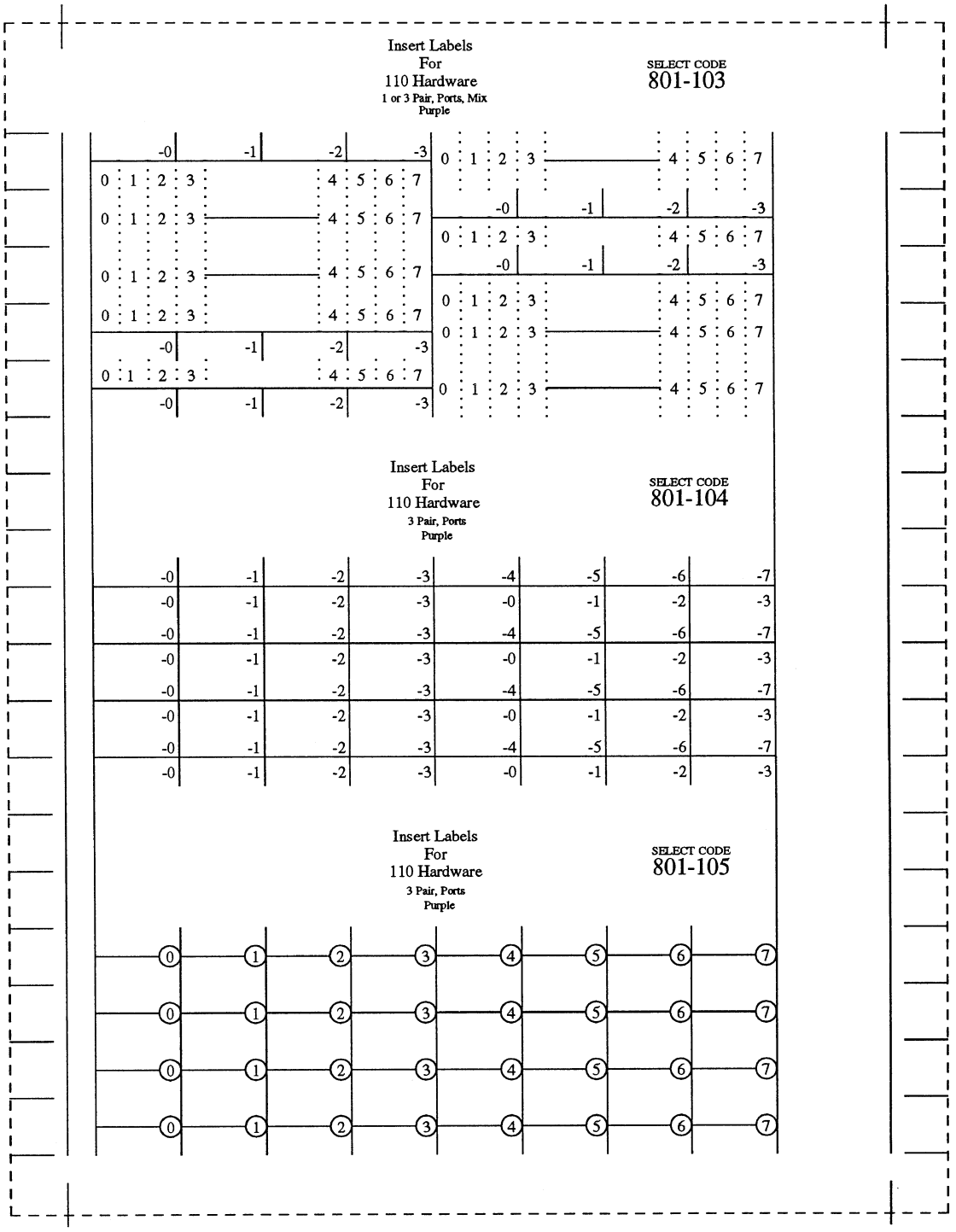


Figure 8-2. Insert Labels — Partial Reproductions

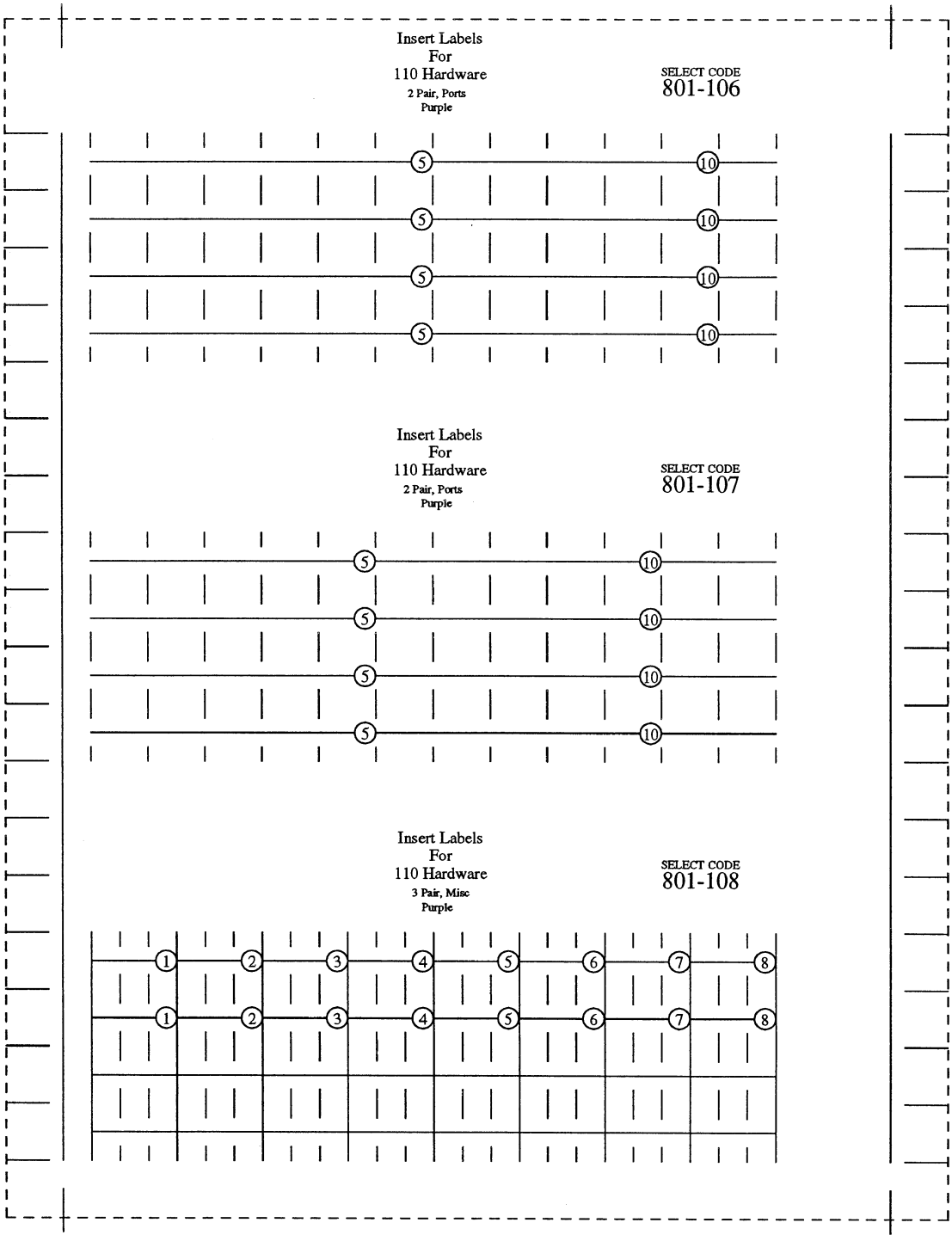


Figure 8-3. Insert Labels — Partial Reproductions

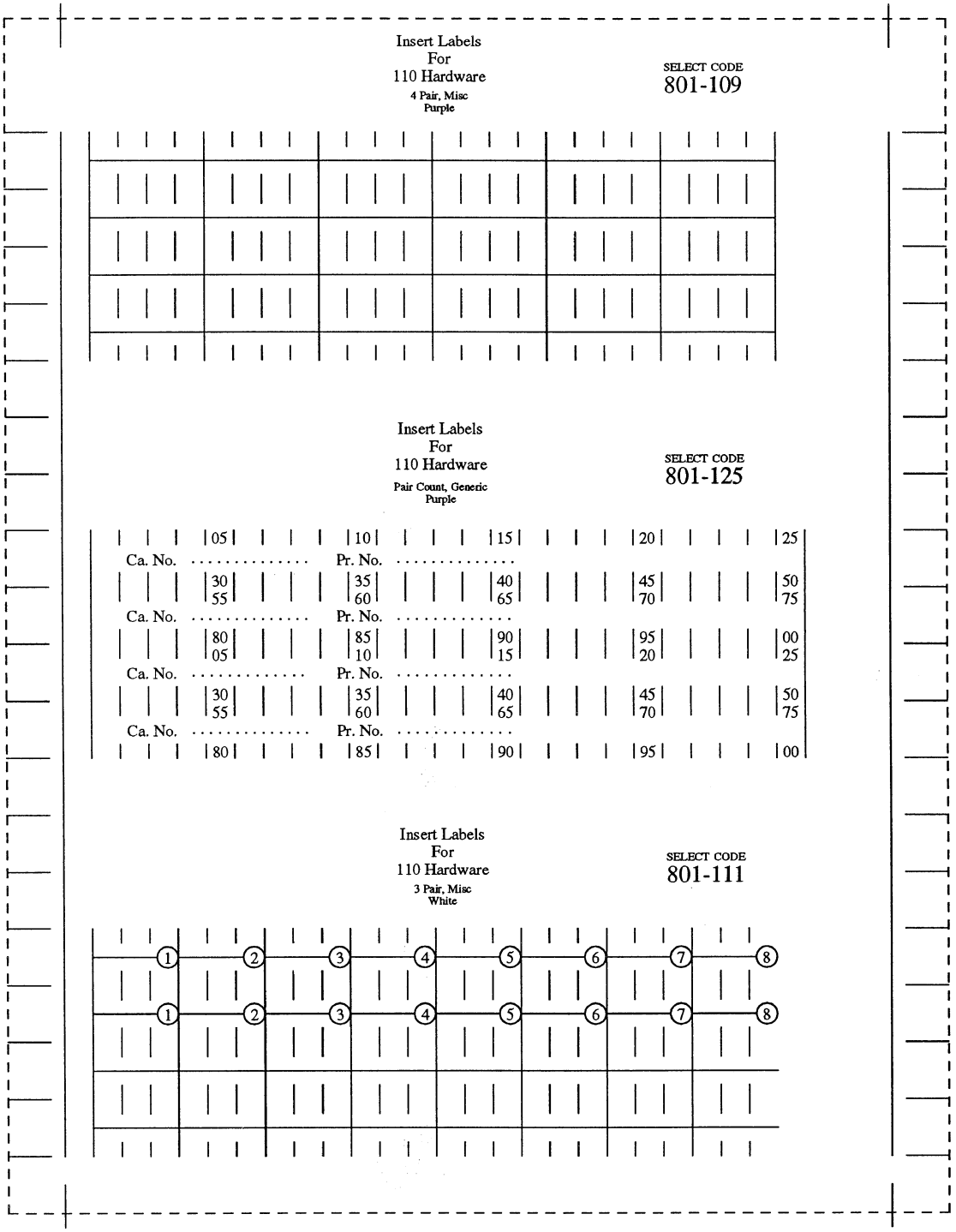


Figure 8-4. Insert Labels — Partial Reproductions

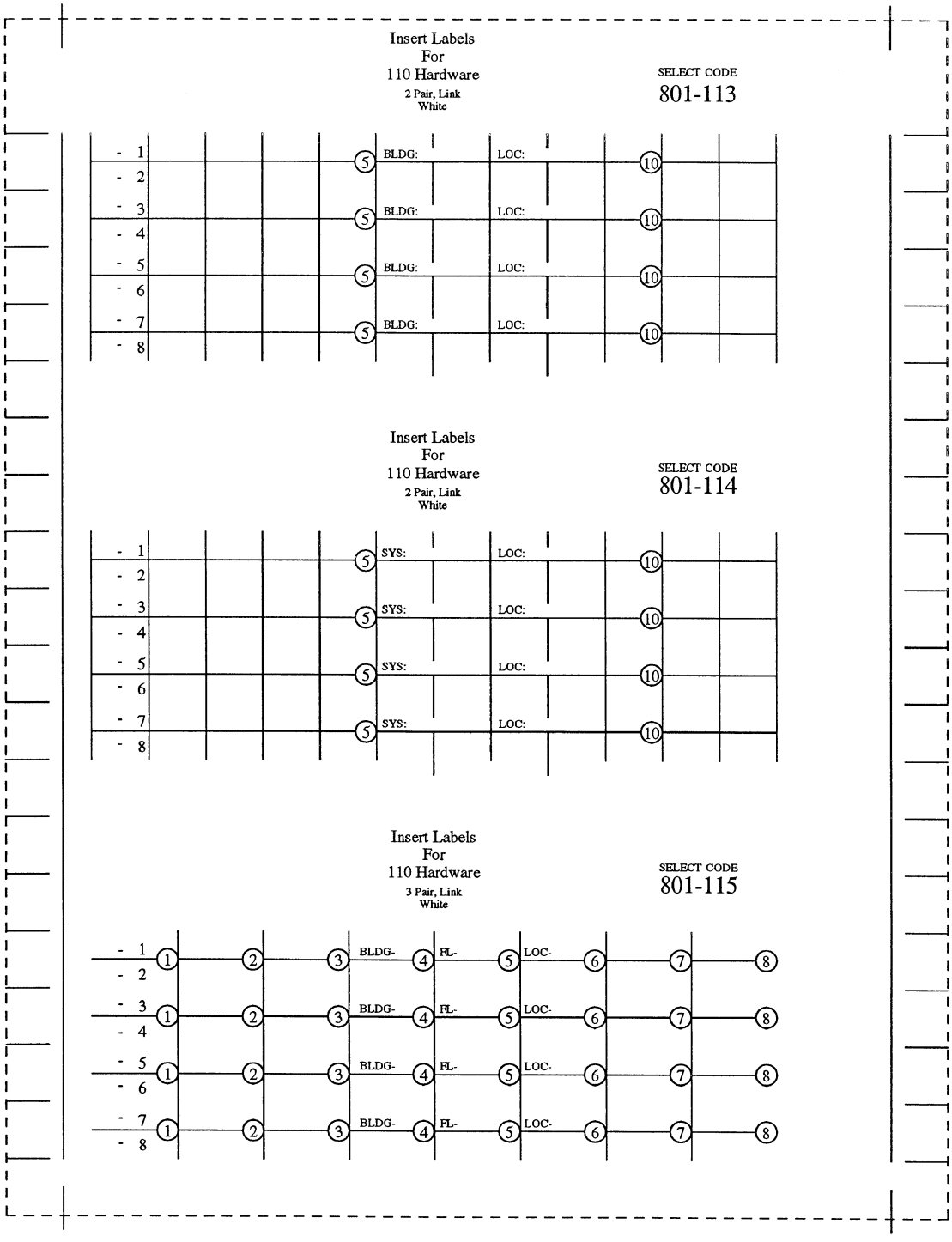


Figure 8-5. Insert Labels — Partial Reproductions

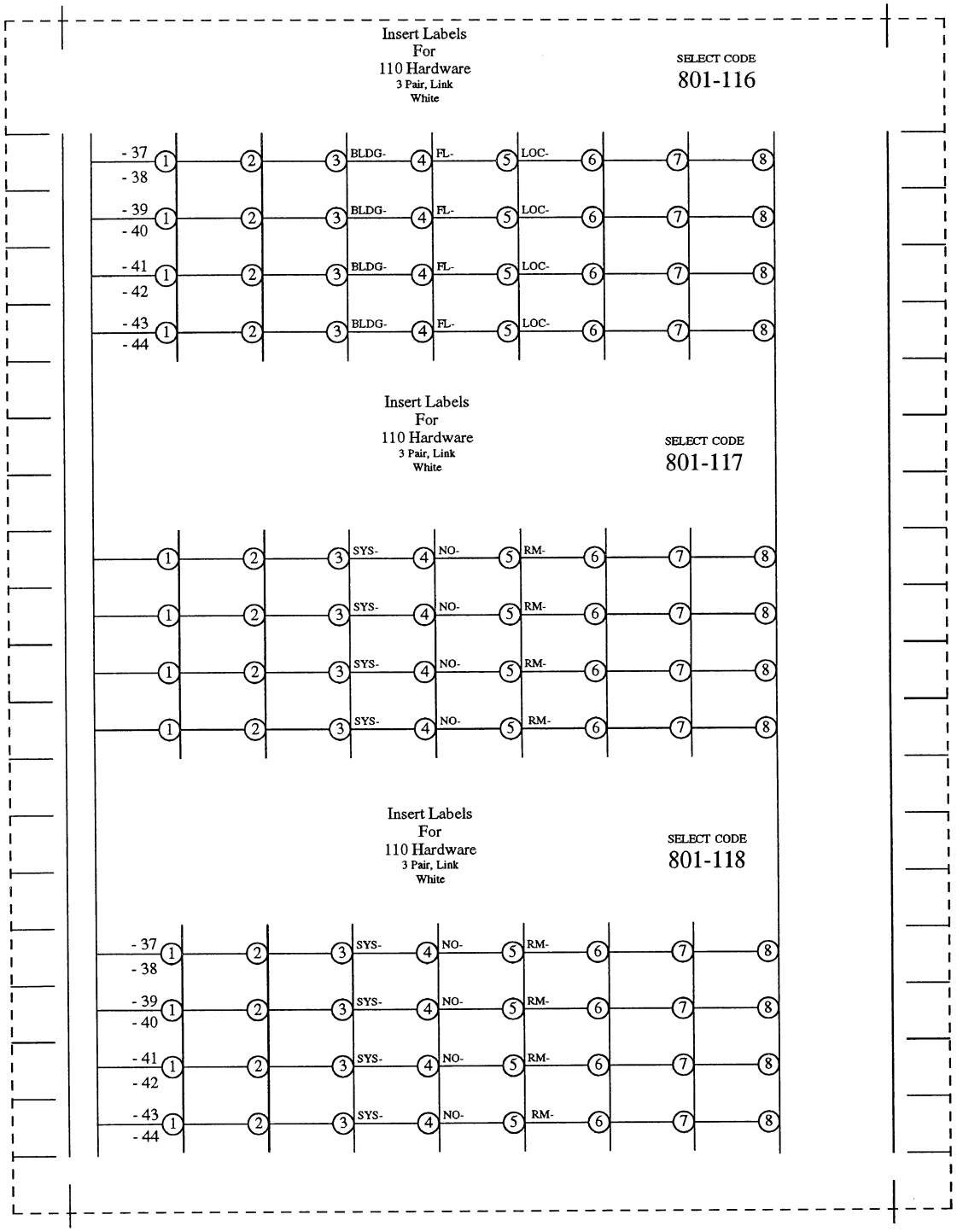


Figure 8-6. Insert Labels — Partial Reproductions

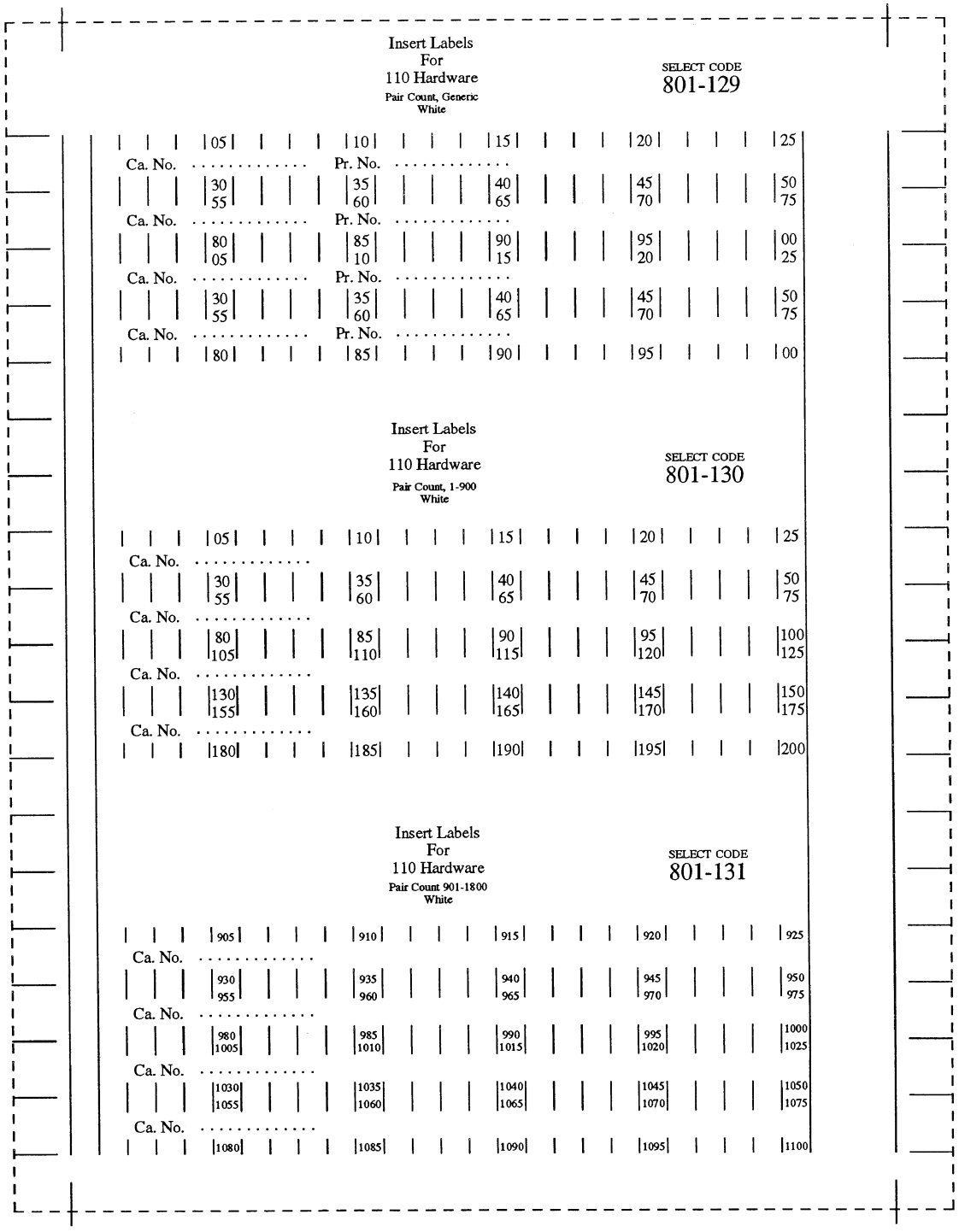


Figure 8-7. Insert Labels — Partial Reproductions

8

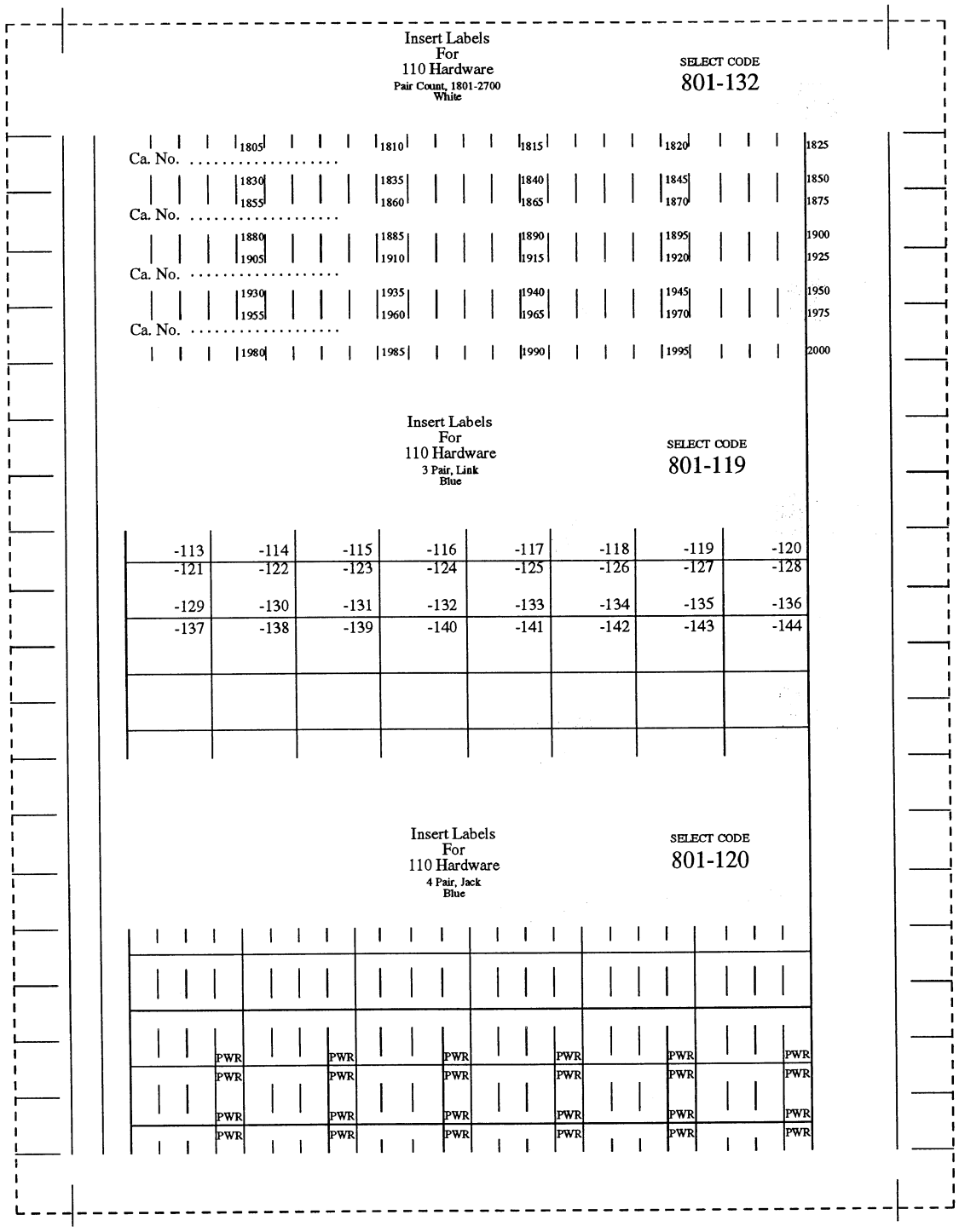


Figure 8-8. Insert Labels — Partial Reproductions

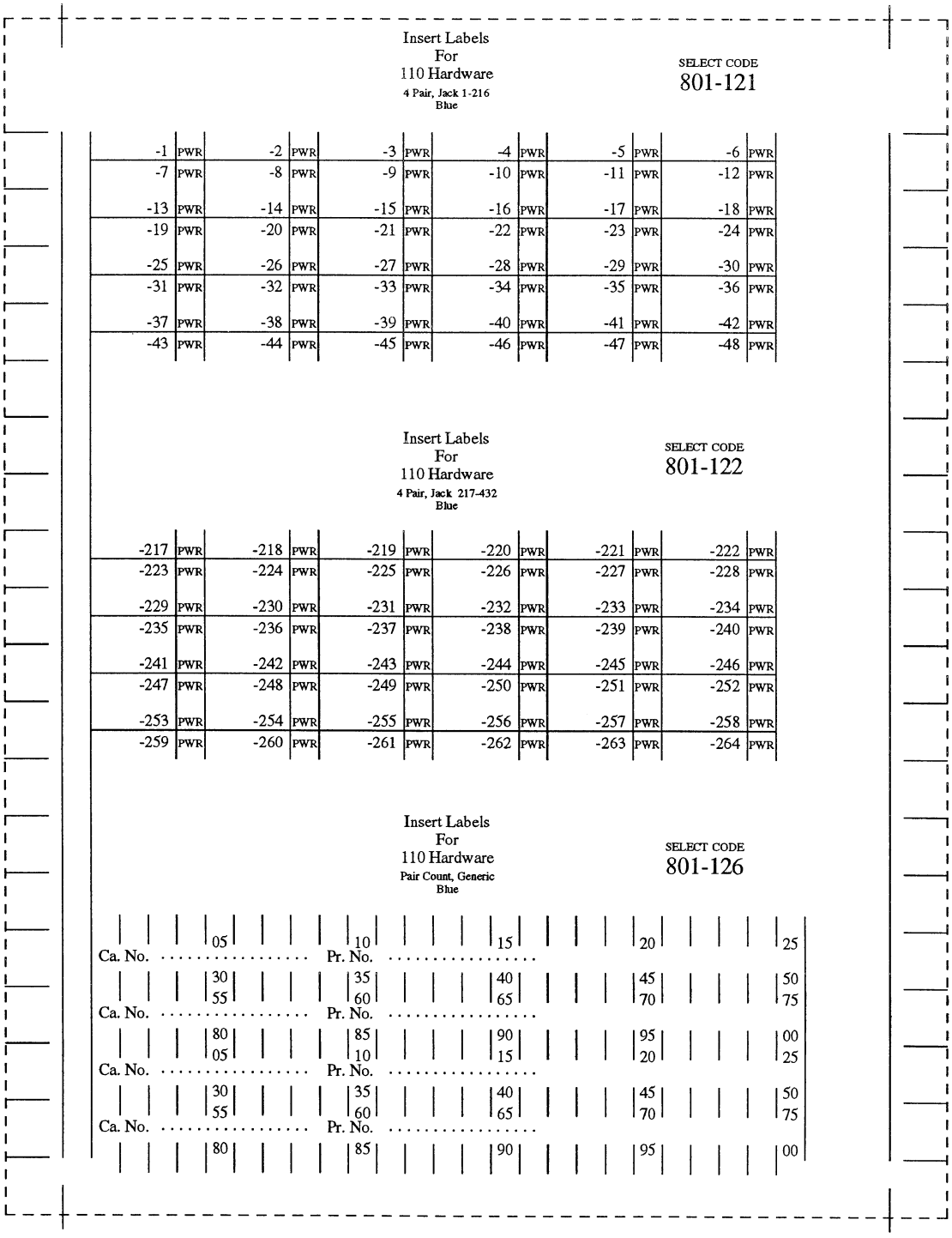


Figure 8-9. Insert Labels — Partial Reproductions

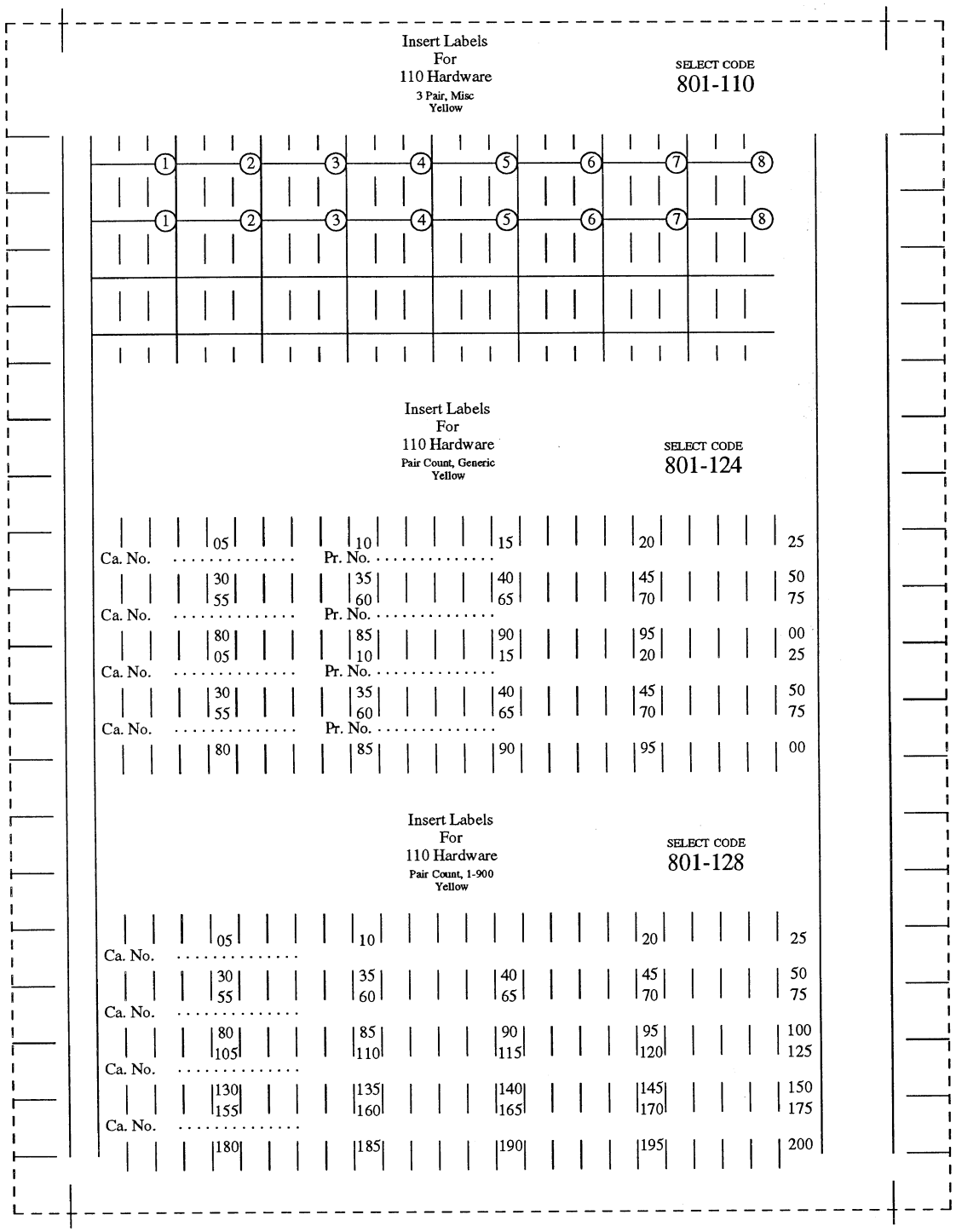


Figure 8-10. Insert Labels — Partial Reproductions

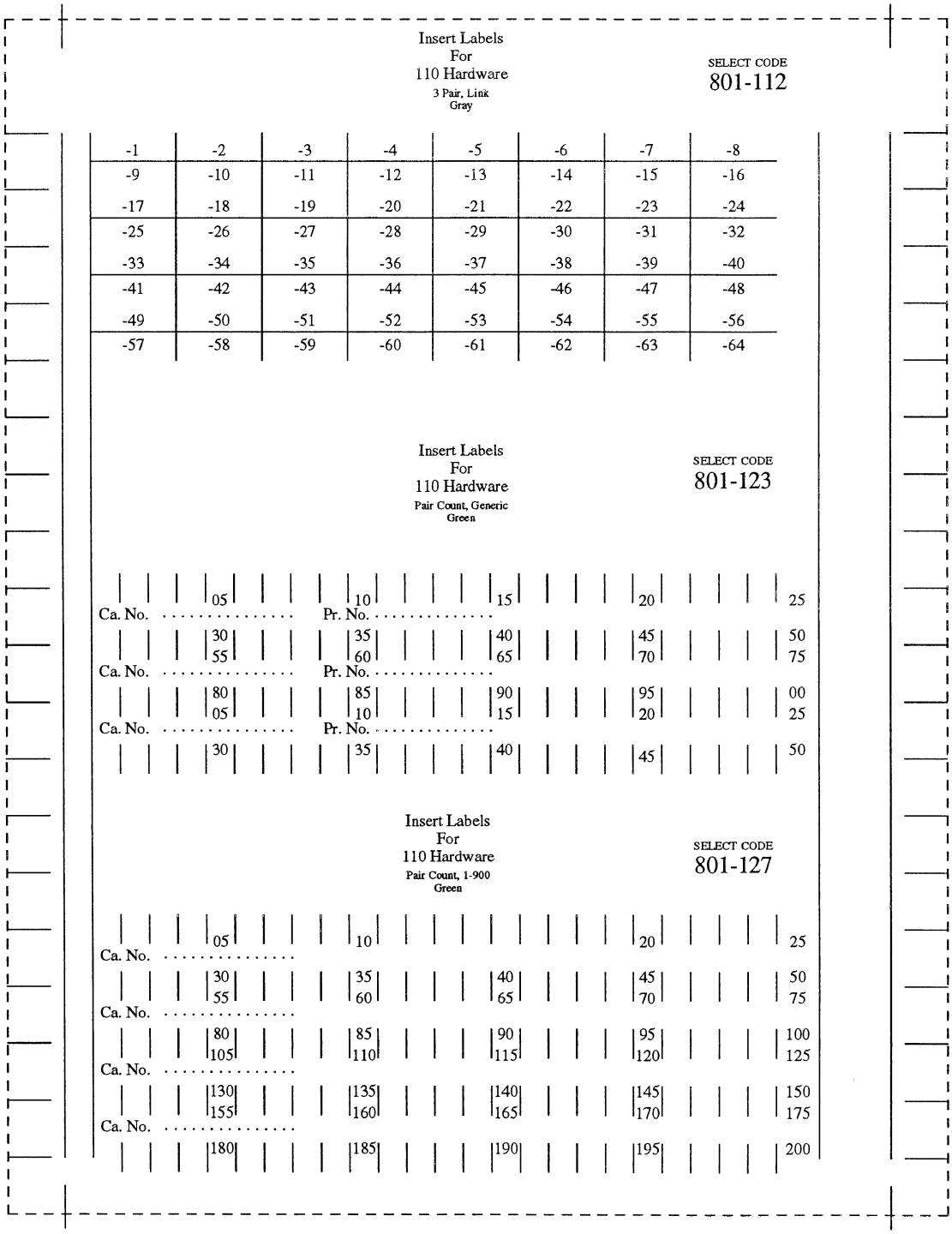


Figure 8-11. Insert Labels — Partial Reproductions

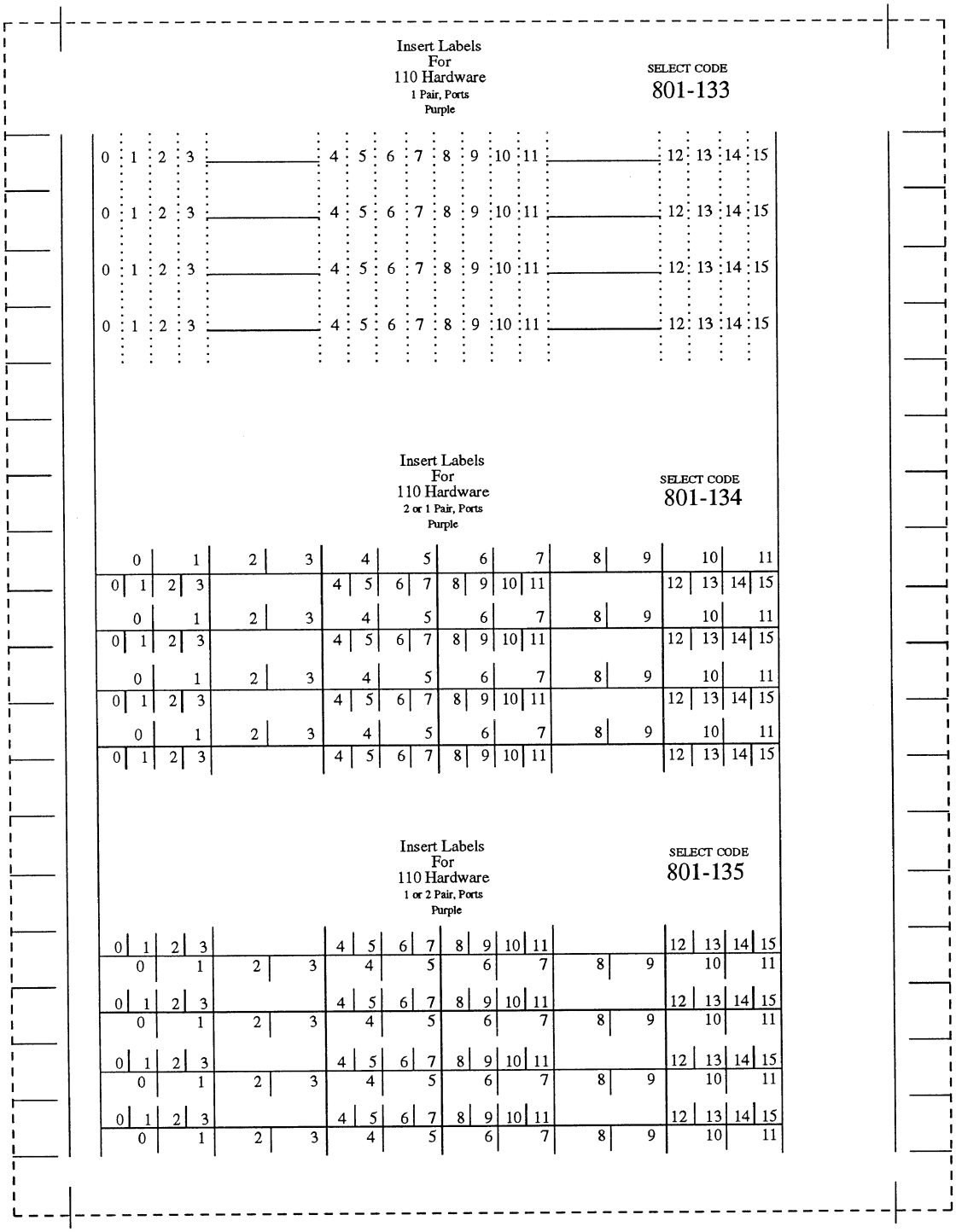


Figure 8-12. Insert Labels — Partial Reproductions

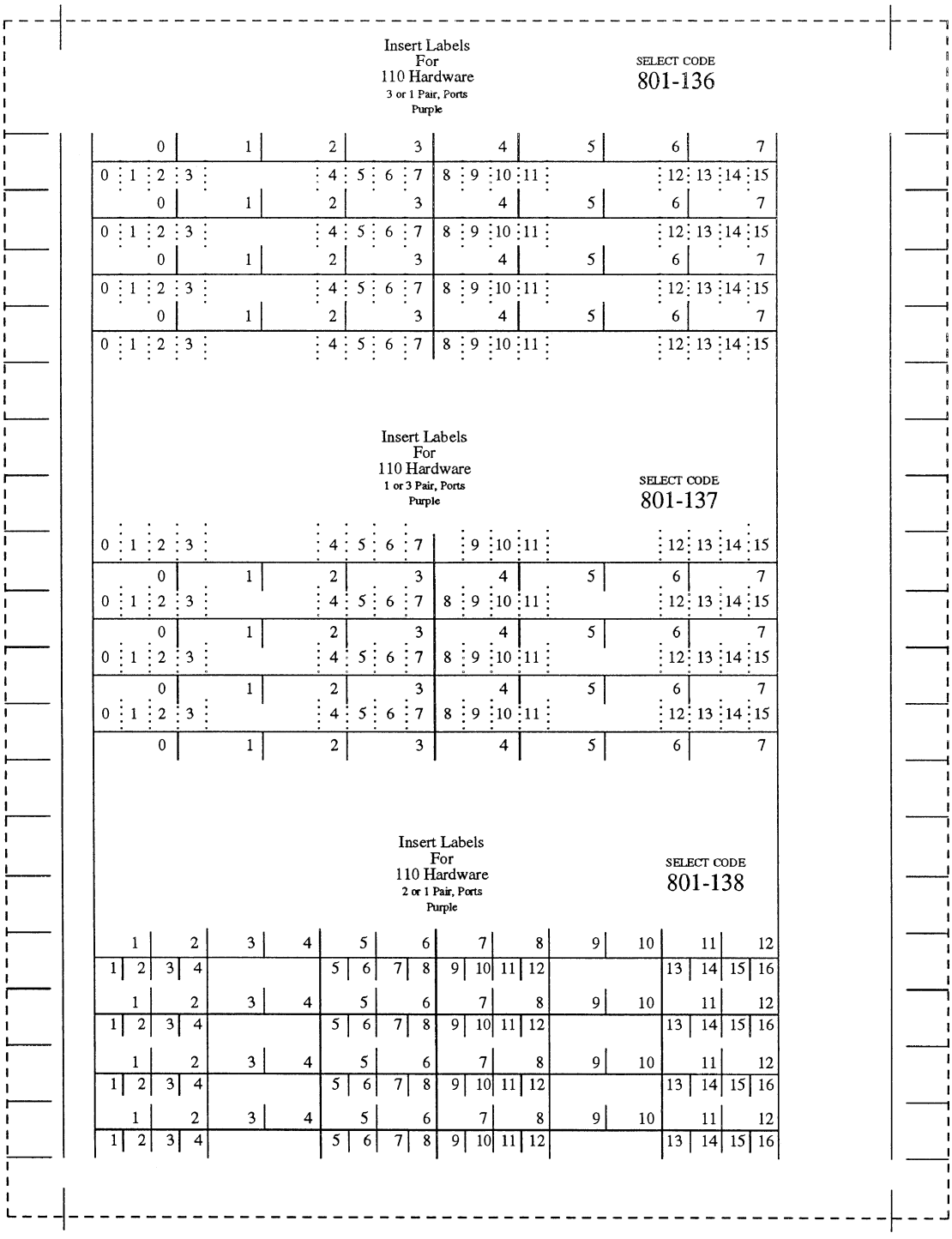


Figure 8-13. Insert Labels — Partial Reproductions

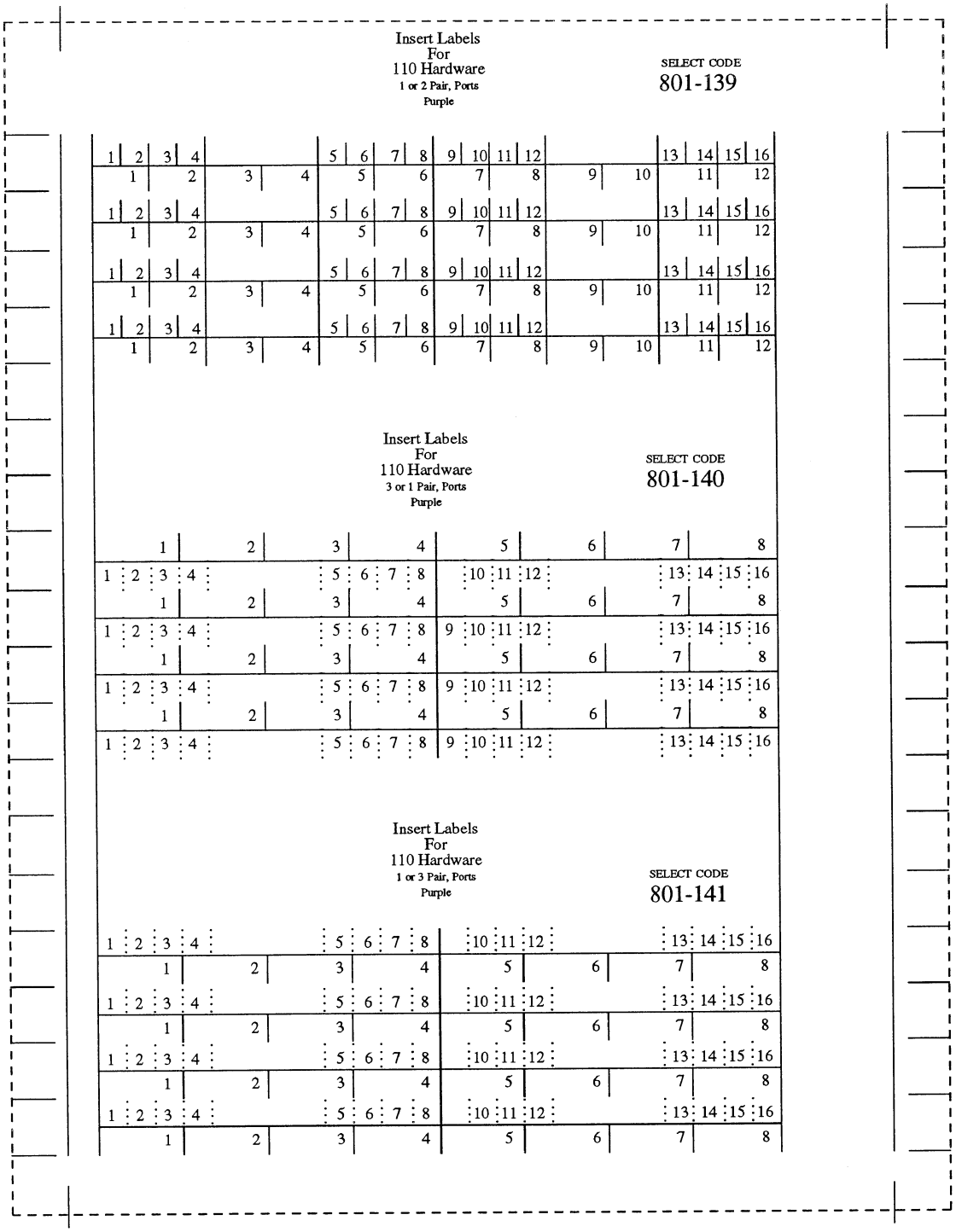


Figure 8-14. Insert Labels — Partial Reproductions

Abbreviations

ADFTC	analog/digital facility test circuit
ADM	asynchronous data module
ADU	asynchronous data unit
AIOD	automatic identifed outward dialing
AP	applications processor
ADU	asynchronous data unit
AUDIX	Audio Information Exchange
BEF	building entrance facility
BRI	basic rate interface
CBC	coupled bonding conductor
CO	central office
CSS	stage switch
DCP	digital communcations protocol
DCS	distributed communications system
DID	direct inward dialing
DS1	digital service level-1
DSX	digital signals cross-connect
DTDM	digital terminal data module

EI	expansion interface
EPN	expansion port network
FX	foreign exchange
IDF	intermediate distribution field
IO	information outlet
IROB	in-range, out-of-building
ISDN	integrated services digital network
LAN	local area network
MCC	multicarrier cabinet
MDF	main distribution field
MET	multibutton electronic telephone
MPDM	modular processor data module
MTDM	modular trunk data module
NEC	National Electrical Code
ONS	on site
OFS	off site
PDS	premises distribution system
PEC	price element code
PN	port network
PPN	processor port network
RISC	Reduced Instruction Set Computer
SCC	single-carrier cabinet
SNI	switch node interface
SSI	standard serial interface
TDM	time-division multiplexing
VOM	voice-only module
XLBET	extra-large building entrance terminal

Glossary

A

analog/digital-facility test circuit (ADFTC)
A maintenance circuit resident in communications-system processor port carriers for use in testing the hardware associated with modem pooling.

applications processor (AP)
A computer designed for running applications that both manage and enhance the capabilities of a communications system.

asynchronous data unit (ADU)
A limited-distance modem that allows direct connection between RS-232C equipment and the communications system.

Audio Information Exchange (AUDIX) system
An AT&T voice-mail system that allows users to leave, receive, replay, transfer, and broadcast recorded messages.

automatic identified outward dialing (AIOD)
An arrangement whereby a communications system can provide automatic number-identification (ANI) data to a class-5 serving office to allow billing of central-office (CO) trunk calls to individual system extensions. An AIOD data link connects the class-5 serving office and the communications system that is used by the CO to query the system for billing data.

avalanche diode
A solid-state device used as a primary electrical protector against surges caused by lightning, power crosses, and ground-potential rise.

B

backbone cable
See *distribution cable.*

backplane
The rear surface of a circuit-pack carrier that is equipped with clusters of pins for the connection of equipment cables.

basic rate interface (BRI)
A standard ISDN format that supports two B-channels and one D-channel.

black cable
See *distribution cable.*

building entrance facility
The cross-connect field (which may or may not be enclosed) where cables from the central office (CO) terminate for cross-connection to the network interface (NI).

bulk power supply
A power supply capable of providing power to multiple voice terminal adjuncts.

bulk power unit
The combination of a panel that plugs into 120 VAC and up to three power supplies that are mounted on the panel to supply power to voice terminal adjuncts.

C

call coverage module
A voice terminal adjunct with 20 appearance lights. The module is typically used by an attendant covering calls for a group. The group's phones are bridged to the attendants, and an appearance light lights on the module when a member of the group receives a call.

campus cable
See *distribution cable.*

carbon block
A surge-limiting device that is placed in series with distribution cabling or cabling from the central office (CO). The block arcs to ground across an air gap when voltage surges through it in excess of a predetermined level. Carbon blocks are used as primary electrical protection.

center stage switch (CSS)
The central interface of a G3r system between processor port networks (PPNs) and expansion port networks (EPN) that permits the increase of port networks in size and complexity.

central office (CO)
A location housing telephone switching equipment that provides local telephone service and access to toll facilities for long-distance service.

circuit pack
A circuit board of one or more layers that is inserted into the carriers of a switch cabinet and that controls a particular operation of the switch.

combination protection
The use of primary and secondary electrical protectors, usually in a single device, to protect against two or more types of electrical surges.

comcode
The nine-digit identification number for AT&T's equipment and parts.

coupled bonding conductor (CBC)
A conductor that is connected between a PBX single-point ground and the protector ground terminal. It is run adjacent to protected pairs in an associated cable. The mutual coupling between the bonding conductor and the pairs reduces electrical potential differences in terminating equipment.

cross-connect block
A flame-retardant plastic block containing metal wiring terminals (quick clips) used to establish cross-connections between cables.

cross-connect field
An arrangement of cross-connect blocks used for the termination and cross-connection of groups of cables.

customer participation
The set up and removal of cross-connections at the main and intermediated distribution fields (MDFs and IDFs) by the customer.

D

data-link transformer
An isolation transformer, used for secondary electrical protection, that protects against residual voltages and sneak currents.

designation strip
A clear plastic strip installed between the terminal strips of the 110A-type cross-connect blocks to hold and protect insert labels.

digital circuit packs
The circuit packs installed in port carriers to serve digital terminals.

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 64Kbps information (I-) channels and one 8Kbps signaling (S-) channel.

digital service level-1 (DS1)
The multiplexing of 24 voice and/or data communication onto a single channel for transmission.

digital signals cross-connect (DSX)
A special cross-connect assembly used to terminate and cross- connect cables carrying DS1 signals.

digital terminal
A terminal that uses the Digital Communications Protocol (DCP) to transmit voice, data, and station control information to and from the switch simultaneously through a two-wire-pair connection.

digital terminal data module (DTDM)
An add-on data module for the model 7403D and 7405D voice terminals. The DTDM converts RS232C signals to digital communication protocol (DCP) to permit an RS232C data terminal to share the voice terminal's wiring connection to the switch.

direct inward dialing (DID)
A feature of the communications system that allows an incoming call from the public network, not FX (foreign exchange) or WATS (Wide Area Telecommunications Service) to reach a specific voice terminal of the private network without attendant assistance.

direct-connect switch
A switch that connects the processor port network (PPN) directly to one or two expansion port networks (EPNs) without the presence of a center stage switch (CSS).

display module
A 40-character screen that attaches to the 7405D voice terminal to display messages and calling information.

distributed communications system (DCS)
A private network of multiple switches with transparent operation of certain attendant and terminal features between the switches. To users, the DCS appears to be one switch.

distribution cable
The cable that connects the main distribution frame (MDF) to an intermediate distribution frame (IDF). When the cable is run between floors in the same building, it is called "riser," "house," or "backbone cable." When the cable runs from the MDF in one building to an IDF in another building, it is called campus "cable." Distribution cable is also called "black cable" because of its heavy polyvinyl chloride (PVC) protective covering.

E

enhanced primary protector
A protector that operates at a lower voltage or current threshold than a primary protector.

expansion interface (EI)
A port circuit card in a port network (PN) that provides the interface between a PN's TDM bus and LAN bus, and a fiber-optic link. The EI carries five types of information: circuit-switched data, packet-switched data, network control, timing control, and DS1 control.

expansion port network (EPN)
A port network (PN) that is connected to the TDM bus and LAN bus of a processor port network (PPN). The EPN is the network used in G1 and G3 systems for growth.

extra-large building entrance terminal (XLBET)
A frame manufactured by the AT&T Service Center to hold terminal blocks for main distribution frames (MDFs) and intermediate distribution frames (IDFs). The Service Center manufactures the XLBET in several models.

F

foreign exchange (FX)
A central office (CO) other than the one located in the calling customer area.

frame
A metal structure used to hold arrangements of cross-connect blocks.

fusible link
A short length of fine wire that melts when subjected to an electrical current exceeding 5A. It is used as a primary protector against ground-potential rise and power crosses.

G

gas tube
A device containing a sealed special gas used to protect against high-voltage surges. Gas tubes are used as primary electrical protectors against lightning, ground potential rise, and power crosses. They reset themselves for a limited number of times depending upon the duration of surges.

ground-potential rise
A voltage, conducted through the earth to the grounding point for a switch and its cabling, that exceeds the voltage being discharged into the earth by the switch and cable grounds. Ground-potential rise is usually caused by a lightning strike or a severe power fault nearby.

H

hardwired
Wired directly from the main distribution frame (MDF) to an information outlet (IO) that bypasses an intermediate distribution frame (IDF).

headset
A device, substituting for a handset, that combines an earphone and mouthpiece in an arrangement to be worn on the user's head. A headset is used mostly by employees who must have their hands free for duties other than answering calls.

heat coil
A device that overheats from low currents (0.3A to 5.0A) and grounds a conductor. Heat coils are supplementary electrical protectors used to protect against sneak current caused by power crosses, power inductions, and ground potential rise.

homerun
Installation cable that runs from the main distribution frame (MDF) in the equipment room to the information outlet (IO) at the workstation without a cross-connection in a satellite closet.

horizontal subsystem
See *installation cable.*

hybrid circuit packs
Circuit packs installed in the port carriers to serve hybrid terminals.

hybrid terminal
A telephone with multiple features that requires one wire pair for analog voice transmissions and two wire pairs for digital-control transmissions.

I

information outlet (IO)
The wall jack at an employee's desk that his or her terminal plugs into. The IO is connected to the intermediate distribution field (IDF) by installation cabling.

insert labels
Labels inserted into the designations strips of the 110A terminal blocks to identify a cable and its leads when the cable is terminated on a main distribution frame (MDF) or an intermediate distribution frame (IDF).

installation cable
Usually a 4-pair cable that connects an information outlet (IO) to an intermediate distribution frame (IDF). Installation cable is also known as "gray cable" or "horizontal wiring."

integrated services digital network (ISDN)
An end-to-end digital network that supports a wide array of voice and data services.

intermediate distribution field (IDF)
A cross-connect field where the distribution cables from the main distribution field (MDF) are cross-connected to the installation cables from the information outlets (IOs). The IDF is usually located in a satellite closet. It can be wall mounted or frame mounted depending on the size and special needs of the installation. Also a generic term for other than MDF cross-connect fields.

in-range, out-of-building (IROB)
Within the maximum loop range of the port circuit pack and outside the building containing the switch, with consideration for circuit pack version and protection requirements.

ISDN
integrated services digital network

J

jumper wire
A twisted-pair wire in 24 or 26 AWG used with a special tool to cross-connect cables terminated on main distribution frames (MDFs) and intermediate distribution frames (IDFs).

M

main distribution frame (MDF)
The cross-connect field where cables from the central office (CO) are cross-connected to the switch and where port cables from the switch are cross-connected to the distribution cables. The MDF is the largest cross-connect field of the installation and is located in the equipment room.

modular processor data module (MPDM)
A multipurpose data module that can be set up to convert any one of several protocols to Digital Communications Protocol (DCP) for automatic or off-premises data calls.

modular trunk data module (MTDM)
A multipurpose data module used to convert RS232C protocol to digital communications protocol (DCP). It is used for modem pooling, private line trunks, switched networks, and off-premises data-only extensions.

multibutton electronic telephone (MET)
A telephone made for the AT&T DIMENSION® PBX. Some of the MET's features work with the G3r.

multicarrier cabinet (MCC)
A G1/G3 cabinet that contains more than one carrier.

N

network
A group of G1/G3 switch ports in a processor port network (PPN) or expansion port network (EPN) cabinet.

P

patchcords
Wires in 2-, 3-, or 4-pair groupings with connectors on either end. Patchcords are used with 110P-type cross-connect hardware for cross-connections that do not require a special tool.

port
A circuit on a port circuit pack that provides connection to a G3r. voice or data terminal.

power cross
The actual contact or possibility for contact of high-voltage power lines with the distribution cables of a switch.

power induction
The creation of electrical currents in distribution cables by power lines running parallel and very close to the cables.

premises distribution system (PDS)
The transmission network inside a building or group of buildings that connects various types of voice and data communication devices, switching equipment, and information management systems.

price element code (PEC)
The number used to give the cost of and to order AT&T equipment and parts.

primary protector
The protector installed on one or both ends of exposed cabling to protect against high-voltage surges caused by lightning, power crosses, and ground-potential rise. Also called a "standard protector."

purple field
The section of the main distribution frame (MDF) where the cables from line or trunk ports from the communications system terminate.

R

Reduced Instruction Set Computer (RISC)
A high-speed (33MHz) call processor for the G3r system.

remote network
A module that is located outside the equipment room that the central switch is located in and is connected to the central switch by an fiber-optic link.

residual voltages
Low voltages that remain in distribution cables after higher voltages have triggered primary protectors.

riser
See *distribution cable.*

riser subsystem
See *distribution cable.*

S

satellite closet
A small walk-n room used to house an intermediate distribution frame (DF) and any adjunct power supplies that are needed.

self-supporting frame
A frame that is bolted to the floor.

single-carrier cabinet (SCC)
A G1/G3 cabinet that holds only one carrier.

sneak current
Current caused by power induction.

sneak-current fuse
A fuse that operates when a sneak current reaches a level that may be harmful to the system.

speakerphone
A combination speaker and microphone that plugs into a telephone. A speakerphone enables the user to talk and listen without using the handset.

standard serial interface (SSI)
A protocol used to link application processors (APs) to 400-series printers and to the 500 Business Communications Terminal (BCT).

star configuration
A configuration of telecommunications and/or computer hardware in which a central node connects to each terminal by a single, point-to-point link. Communications between terminals must pass through the central node.

stringer system
The lattice of metal grids under a raised floor. The stringer system holds the floor tiles and supports the equipment loads.

supplementary protection
Protection against residual voltages and sneak currents.

surge
A sudden, abnormal, and potentially harmful flow of voltage and/or current in installation cabling.

switch-node interface (SNI)
In G3, the basic building block of a switch node. An SNI circuit card controls the routing of circuit, packet, and control messages.

system adjuncts
Processor-controlled machines that are linked to the communications system and perform special functions to augment the capabilities of the system. Audio Information Exchange (AUDIX) systems and application processors (AP) are examples of system adjuncts.

T

terminating leads
The individual wires in a cable.

trunk/aux field
The section of the main distribution frame (MDF) where cables from the central office (CO) and from auxiliary equipment terminate for cross-connection to the switch.

W

white field
The area of the main distribution frame (MDF) where distribution cables from the intermediate distribution frame (IDF) terminate; the area of the IDF where distribution cables from the MDF terminate.

wiring block
The portion of the terminal block on which distribution and central office (CO) cables terminate.

workstation
The location of an employee's desk and the information outlet (IO) for the terminals used at that desk.

Z

zone concept
The approach to designing and constructing large main distribution frames (MDFs) so that distribution cables and equipment cables, which must be cross-connected, fall within the same section of the MDF.

Index

0

A

B

C

IN

D

E

F

G

H

I

J

K

L

M

N

O

P

R

S

T

W

X

Z

We'd like your opinion.

AT&T welcomes your feedback on this document. Your comments can be of great value in helping us improve our documentation.

DEFINITY® Communications System Generic 1 and Generic 3 Main Distribution Field Design
555-230-630, Issue 1, April 1992

1. Please rate the effectiveness of this document in the following areas:

	Excellent	Good	Fair	Poor
Ease of Finding Information				
Clarity				
Completeness				
Accuracy				
Organization				
Appearance				
Examples				
Illustrations				
Overall Satisfaction				

2. Please check the ways you feel we could improve this document:

- ☐ Improve the overview/introduction
- ☐ Improve the table of contents
- ☐ Improve the organization
- ☐ Add more figures
- ☐ Add more examples
- ☐ Add more detail
- ☐ Make it more concise
- ☐ Add more step-by-step procedures/tutorials
- ☐ Add more troubleshooting information
- ☐ Make it less technical
- ☐ Add more/better quick reference aids
- ☐ Improve the index

Please add details about your major concern. _____

_____

_____

3. What did you like most about this document? _____

_____

_____

4. Feel free to write any comments below or on an attached sheet. _____

_____

_____

_____

_____

If we may contact you concerning your comments, please complete the following:

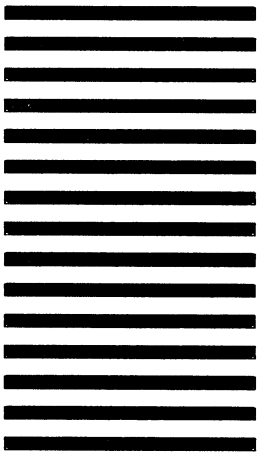
Name: _____ Telephone Number: (___)_____

Company/Organization: _____ Date: _____

Address: _____

When you have completed this form, please fold, tape, and return to address on back. Thank you.

NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES



BUSINESS REPLY MAIL

FIRST CLASS PERMIT NO. 522 DENVER, CO

POSTAGE WILL BE PAID BY ADDRESSEE

AT&T
Technical Publications Department
Room 22-2C11
11900 North Pecos Street
Denver, Colorado 80234