Meridian 1

Call Processor PII
Description, Installation, and Administration Guide

Document Number: P0914249
Document Release: Standard 2.00
Date: June 2000

Printed in Canada

Revision history

June 2000

Standard 2.00. Up-issued to include changes to the dual ring fiber network graphic, Core/Net ID switch table, and references to the Clock Controllers.

April 2000

Standard 1.00. This is a global document and is issued for X11 Release 25.0x.

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About this document

This document is a global document. Contact your system supplier or your Nortel Networks representative to verify that the hardware and software described is supported in your area.

This manual contains complete instructions to install a new Meridian 1 Option 81C with Call Processor PII (CP PII). For information on upgrading to a Meridian 1 Option 81C CP PII, see *Call Processor PII/Fiber Network Guide System and Software Upgrade Guide* (P0914248).

Follow the instructions from beginning to end to successfully install your Meridian 1 system:

- Always double-check your work before proceeding to the next task. Loose connections, crossed cables or incorrect circuit card configuration will result in system failure.
- Incomplete planning or incorrect installation will result in system failure, unnecessary work and increased costs.

Introduction to Option 81C with Call Processor PII

Content list

The following are the topics in this section:

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- NT4N41 cPCI® Core/Network Module 15
- Intelligent Peripheral Equipment modules. 21
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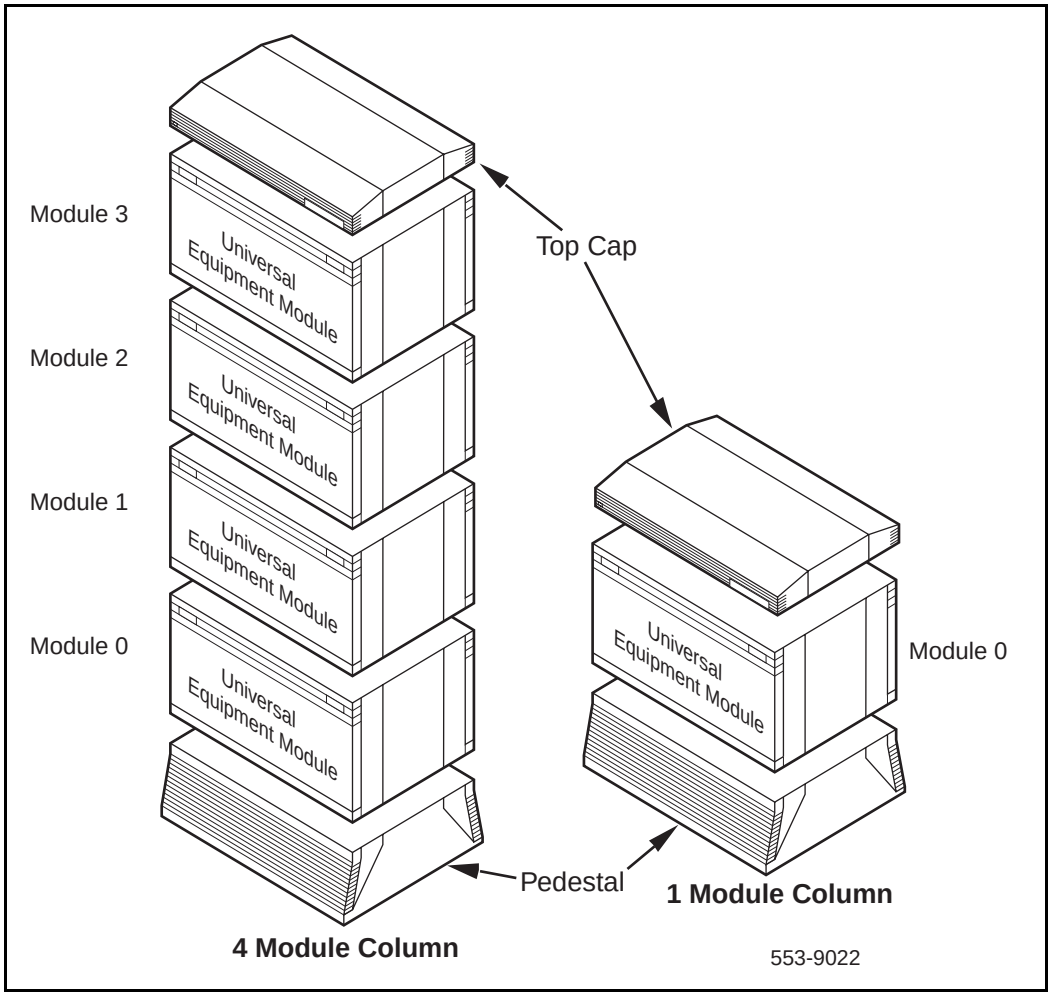
The Meridian 1 Option 81C with Call Processor PII (CP PII) provides the capacity and speed to meet the current and future communications demands of large and growing organizations. Based on Intel's Pentium II® processor, the CP PII offers a scalable, redundant architecture to ensure uninterrupted voice and messaging services. The CP PII open architecture provides seamless upgrades to increased capacity and to future generations of Intel Pentium processors.

Universal Equipment Modules

Universal Equipment Modules (UEMs) are the building blocks of the Meridian 1 communications system. Each UEM is a generic case containing sets of equipment used in Meridian 1 operations See Figure 1 on page 10.

Figure 1
Universal Equipment Modules



UEMs are stacked in columns

UEMs are stacked in columns, up to four modules high. These UEMs are numbered 0 to 3 from the bottom up See Figure 1 on page 10.

Pedestals

Each column sits on a pedestal that contains power, cooling and monitoring equipment, as follows:

- A Power Distribution Unit (PDU) in the back of the pedestal supplies either AC or DC power to the column.
- A System Monitor checks the column's cooling and power systems.
- A blower unit (accessible from the front of the pedestal) forces air up through the modules to cool the circuit cards.

Top Caps

A top cap is mounted on the top module of each column, and contains the following:

- Air exhaust grills in the cap that release air from the blowers in the pedestal.
- A heat sensor that monitors the temperature of the column.
- A red LED in the front of the cap's exhaust grill that lights if the system overheats or if a power outage occurs.
- Ladder racks for routing cables, can also be fitted to the top caps.

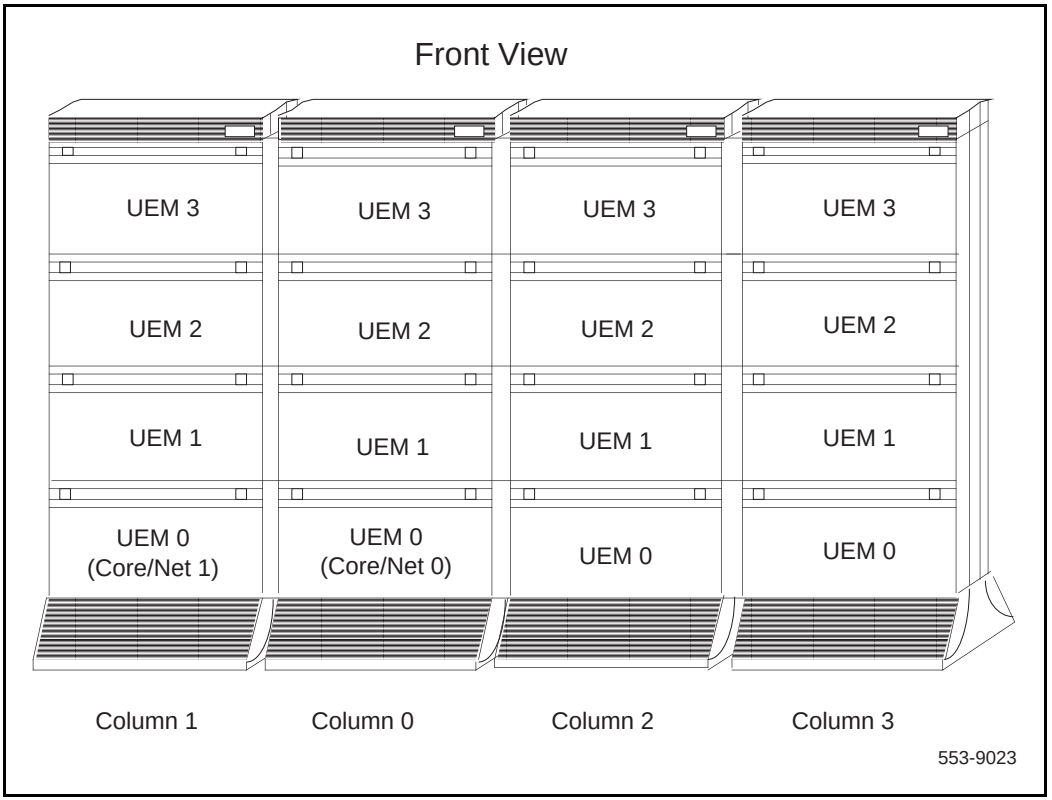
Columns are grouped together in rows

Columns are attached in rows. Column 0 is always the Column containing the "Core/Net 0" module. Column 1 is placed to the left of Column 0 and ALWAYS contains the "Core/Net 1" module.

Column 0 and Column 1 are placed at the far left of the row (front view). Column numbering continues to the right of Core 0. See Figure 2 on page 12.

Additional rows are configured with the lowest numbered column on the far left and the highest numbered column on the far right (front view).

Figure 2
Column row



UEMs are identified by function

Each UEM contains a specialized set of equipment to digitalize, process, and route phone calls and voice messages.

The card cage

Inside each UEM is a metal card cage, see Figure 4 on page 14. This card cage holds the circuit cards, power card and related equipment for that module. UEMs are named for the function of that card cage.

Card cages are bolted inside the UEM case and can be removed and replaced for repairs or upgrades.

Figure 3
UEMs identified by function

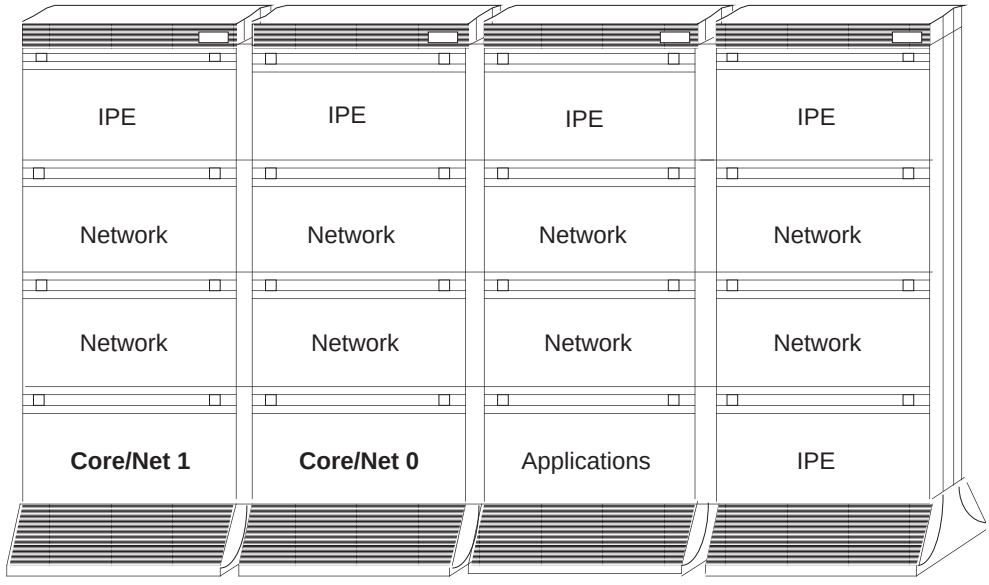
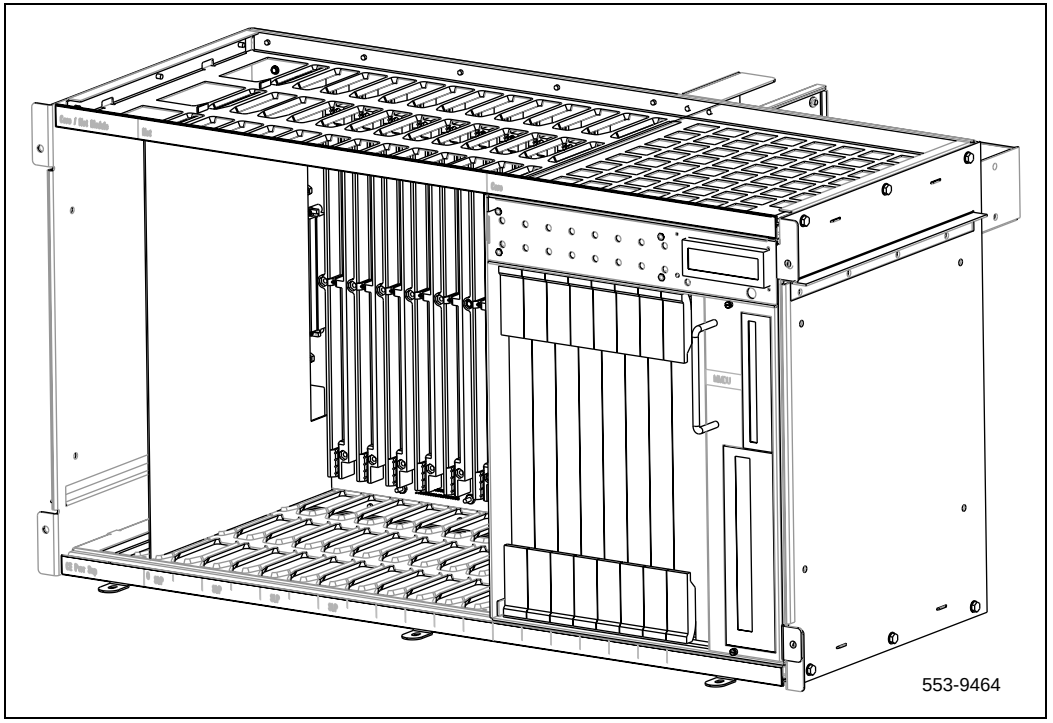


Figure 4 on page 14 shows a NT4N46AA Core/Net card cage with the Network cards removed and the Core cards installed. The NT4N46AA card cage replaces the existing Core/CPU card cages in the Option 51C, 61C, 81, and 81C modules when upgrading to CP PII.

Figure 4
NT4N46AA Core/Net card cage



Required modules

Each Meridian 1 Option 81C system with CP PII requires a basic set of modules to operate. The minimum equipment includes:

- **"NT4N41 cPCI® Core/Network Module" on page 15**: these modules contain the main processor cards and the first Network group. Each system includes two Core/Net modules.
- **"Intelligent Peripheral Equipment modules" on page 21**: these modules contain the equipment to digitize analog voice and data signals. Telephone terminal and trunk lines are physically connected to the IPE modules. The number of IPE modules depends on the requirements of the site.
- **"Network modules" on page 25**: these modules contain the Network equipment that provides the *timeslots*, or data paths, for the transmission of voice and data signals. Each system requires a minimum of two Network modules in addition to the Core/Net modules.

NT4N41 cPCI® Core/Network Module

The NT4N41 CP PII Core/Net module contains a NT4N46 AA card cage. The NT4N46 AA card cage contains both the main processor cards and the first Network group. Two Core/Net modules are installed side-by-side in each system, shown in Figure 3 on page 13.

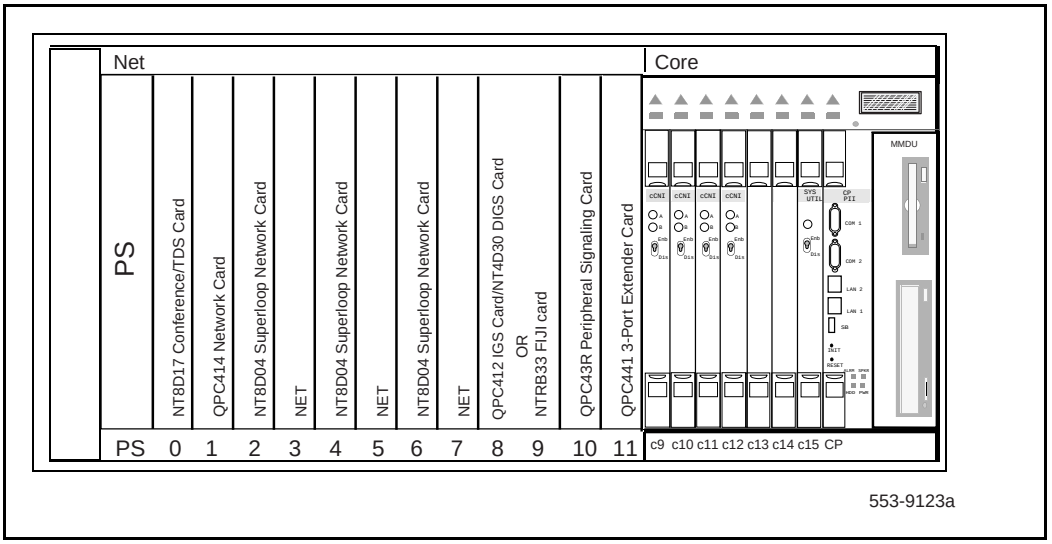
Core shelf

The Core side of the module contains the circuit cards that process calls, manage network resources, store system memory, maintain the user database, and monitor the health of the system. These circuit cards also provide administration interfaces through a terminal, modem, or local area network.

The Core shelves on the right side of the modules run in redundant mode: one Core operates the system while the other Core runs diagnostic checks and remains ready to take over if an error occurs in the active Core. Both Cores are connected to each Network group. If one Core fails, the second Core immediately takes over call processing.

The Core shelf backplane is a compact PCI data bus.

Figure 5
NT4N41 cPCI Core/Network Module



Network Shelf

The Network side of this module contains the cards for Network group 0.

As shown in Figure 5 on page 16, CP PII supports a Fiber Network Fabric network system with a FIJI card in slots 8 and 9 of Net side of the Core/Net Module.

Network module functions are described in “Network modules” on page 25.

Core circuit cards

The Core circuit cards are installed on the “Core” side of the Core/Net module. All Core circuit cards are installed in the factory prior to shipping.

cCNI: cPCI Core to Network Interface (NT4N65AB)

The cCNI cards connect the Core module cards to the 3PE cards in the Network modules.

Each Core module contains between one and four cCNI cards. Since each cCNI card can connect to two Network groups, each Core is connected to a minimum of two groups and a maximum of eight groups. The number of cCNI cards in a system depends on the number of Network groups in that system.

The first cCNI card that connects to Network group 0 and group 1 is installed in slot c9 of each Core/Net module. Each additional cCNI card is installed in ascending order from slots c10 to c12.

cCNI Transition card: cPCI Core to Network Interface Transition (NT4N66AB)

The cCNI Transition cards provide the cable connections to the 3PE Termination Panel in the rear of the module.

A cCNI Transition card is mounted directly behind each cCNI card (on the back side of the Core backplane). Four cCNI Transition cards for Core/Net Module are installed in the factory regardless of how many cCNI main cards are configured for the system.

Sys Util: System Utility (NT4N67AA)

The System Utility card supports Card ID. The card provides an interface between the security device and the computer, and an interface between the XSM and display panel for each cPCI core/net card cage. This card also includes a switch on the faceplate to enable or disable the Core cards.

One System Utility card is installed in slot c15 of each Core/Net module.

System Utility Transition card (NT4N68AA)

The System Utility Transition card provides connections for the security device, the system monitor, and the status panel. This Transition card is mounted on the rear of the backplane (back side) directly behind the System Utility card.

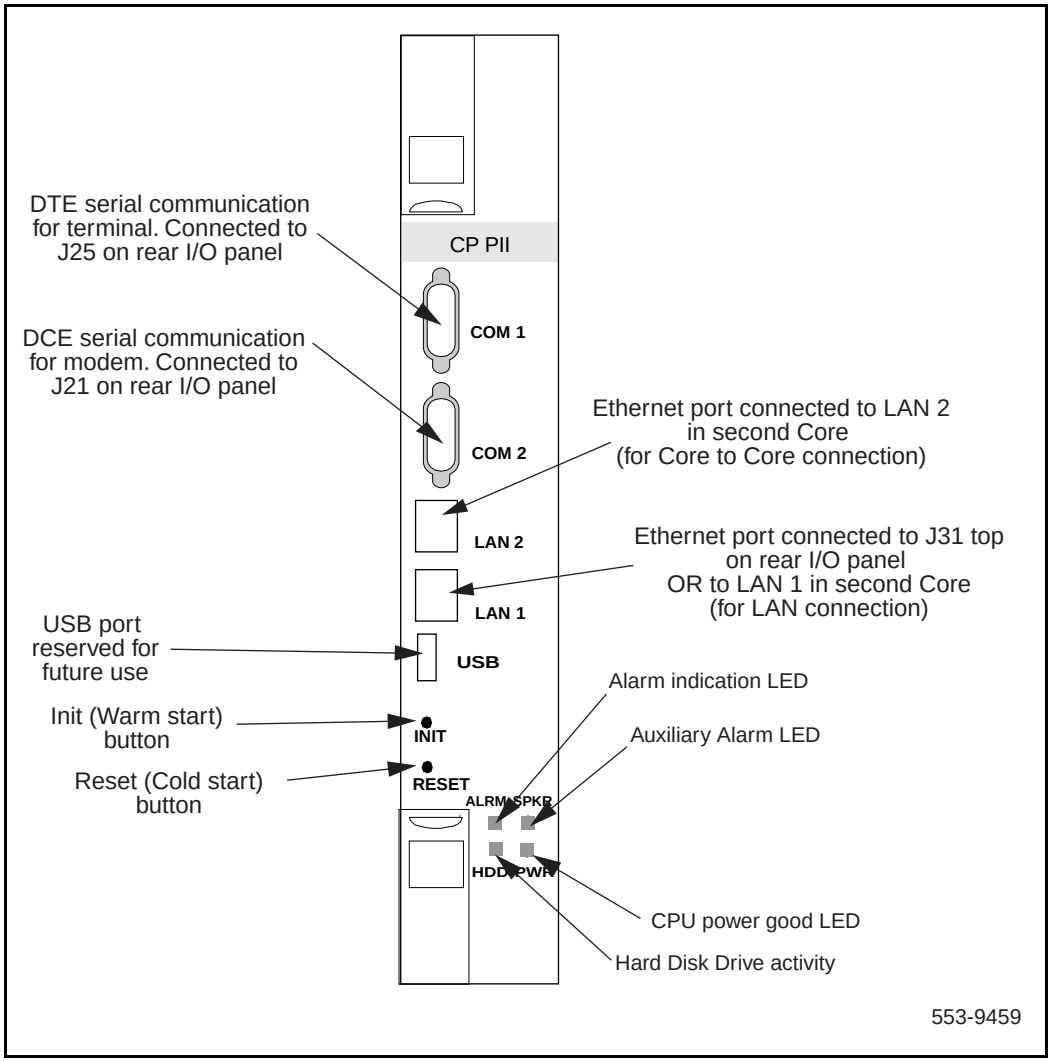
One System Utility Transition card is installed in each Core/Net module.

CP PII: Call Processor Pentium II (A0810496)

The CP PII card contains a Pentium II processor to process calls, manage memory and monitor the system. This card also provides serial and Ethernet interfaces used to manage the system. See Figure 6 on page 18.

One CP PII card is installed in the “CP” slot of each Core/Net module.

Figure 6
CP PII card



MMDU: Multi-Media Disk Unit (NT4N43AA)

This MMDU card contains the drives that store system software and databases. This card includes:

- a **hard disk** to store the system database and software.
- a **floppy disk** to install software or back up databases
- a **CD-ROM** to install system software

One MMDU card is installed in the far right of each Core/Net module.

Core redundancy

Dual Core architecture

Each CP PII includes two identical Core circuit card packs; while one Core processes calls, the other Core monitors the health of the system and waits to take control if the first Core fails. Two Core/Net modules must be installed to achieve this redundancy.

Uninterrupted call processing

Redundancy ensures that call processing will continue if a Core/Net module or circuit card fails. Each Core regularly checks the status of the other Core. Data and memory from the active Core is continually backed up onto the standby Core. If a failure occurs, the standby Core immediately takes over the system. Since the data and memory from the original Core is used to process calls, there is no noticeable difference to end users.

Redundant links

This redundant system is made possible through the Core to Core Ethernet connection (LAN 2 to LAN 2). See “Assemble the Core shelves” on page 133 for installation instructions.

Software Control

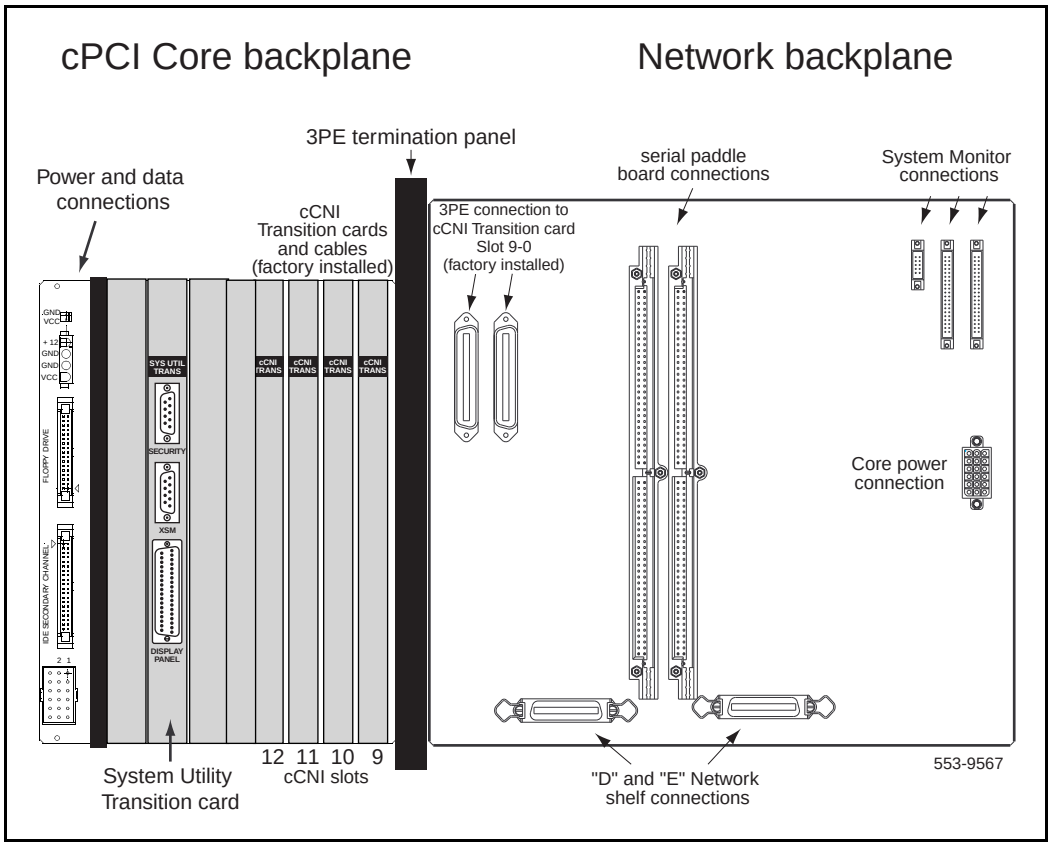
The active and standby Cores are managed and switched with the X11 system software. Cores are switched automatically in the event of system failure. Cores are also switched manually with X11 system software to perform maintenance and upgrades.

Backplane architecture

The CP PII Core/Net card cage contains two distinct backplanes:

- The **Core** side of the CP PII card cage uses a cPCI backplane. This backplane is a high speed industry standard that allows expansion and replacement with “off the shelf” components.
- The **Network** side of the CP PII Core/Net card cage is a standard Meridian 1 backplane.

Figure 7
CP PII Core/Net backplane (back view)



Core/Net ID switch (description)

Option switches on the side of the System Utility Transition card identify Core/Net modules as “Core 0” or “Core 1”. See Figure 8 on page 22. The Core ID switches are set in the factory.

The Core/Net ID settings are:

Table 1
Core module ID switch settings (System Utility Transition card)

Core 0	All switches are set to ON
Core 1	Switch 1 is set to OFF Switches 2 through 8 are set to ON

3PE Termination Panel

A Termination Panel on the back of each CP PII Core/Net card cage provides connections for the cCNI to 3PE cables.See Figure 9 on page 23. Installation of the 3PE cables is described in “Connect the Network modules to the Core/Net modules” on page 154. The two types of 3PE cables are:

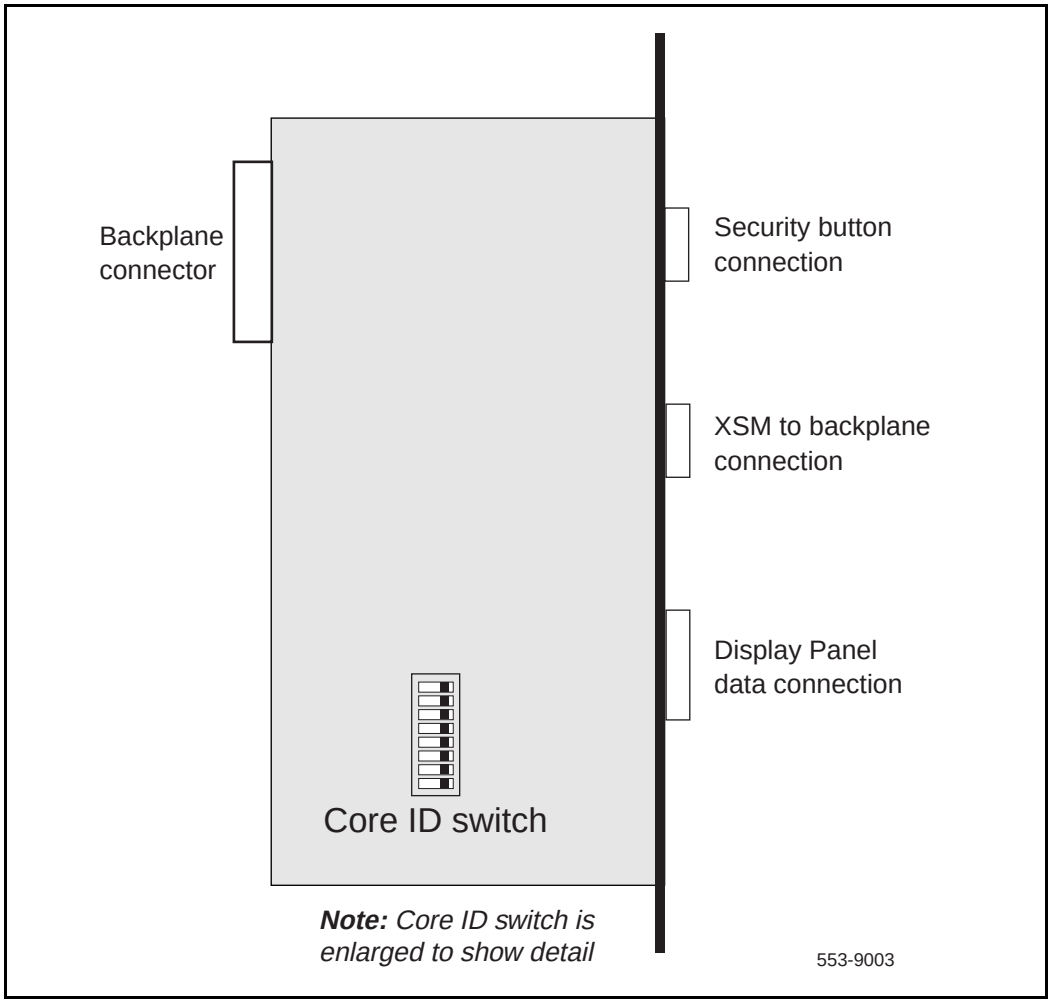
- **cCNI to Termination Panel**: each cCNI Transition card includes two cables that attach to the left side of the Termination Panel. These cables are factory installed.
- **Termination Panel to 3PE cards**: two cables attach from the right side of the Core/Net Termination Panel to each 3PE card.

Intelligent Peripheral Equipment modules

The Intelligent Peripheral Equipment (IPE) modules contain equipment for physically connecting phone lines and trunks to the Meridian 1 CP PII system. The equipment in these modules converts the analog voice signals from those telephone and trunk lines into digital data.

When the analog voice and data signal is converted into digital form by the Line or Trunk Cards in the IPE module, the signal is routed to a Network card (SNET and ENET) in a Network module.

Figure 8
System Utility Transition card (side view)



Superloop (SNET) and Network (ENET) cards provide *timeslot* paths for the electronic transmission of data. Each phone conversation utilizes two of these *timeslots*: one for each end of the conversation.

See “Network modules” on page 25 for more information on Superloops and timeslots.

Figure 9
3PE Termination Panel (rear module view)

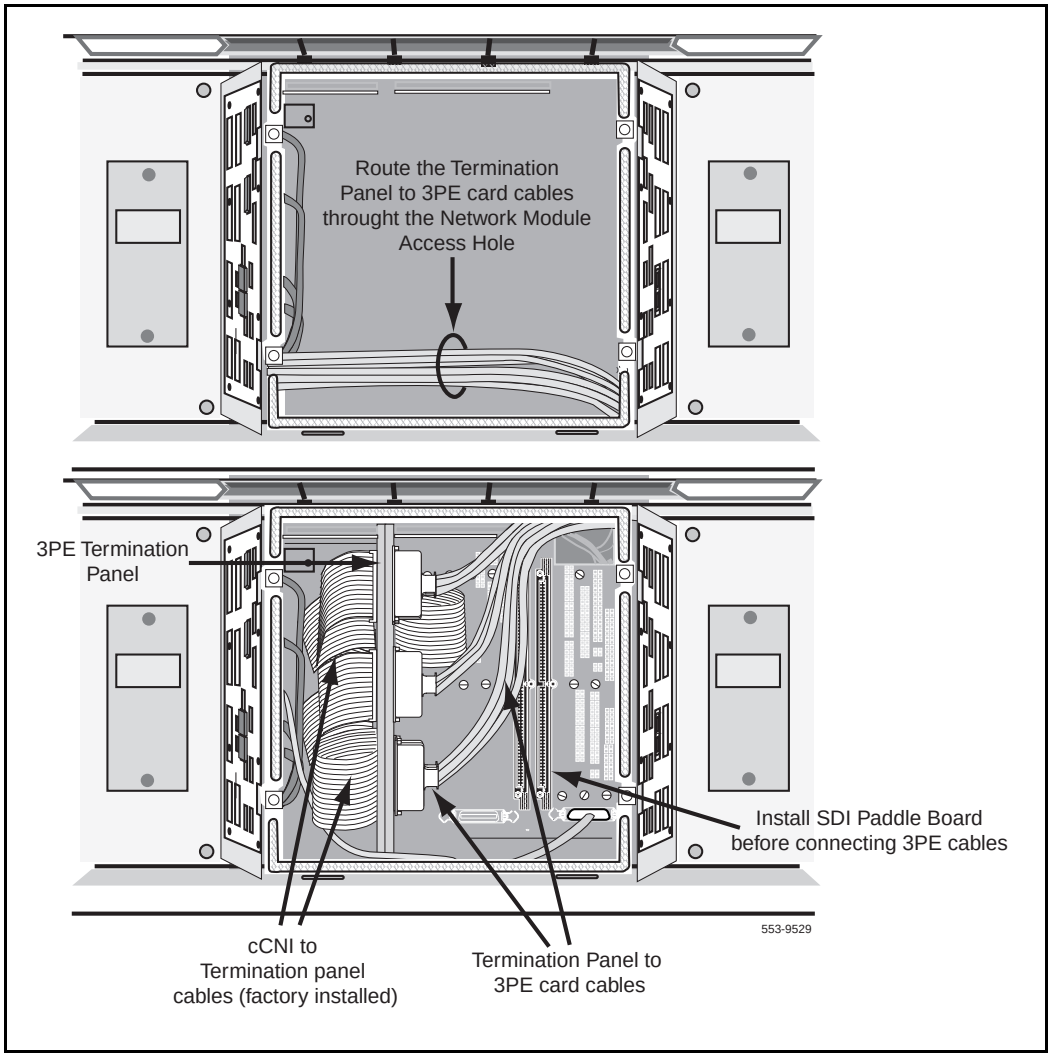
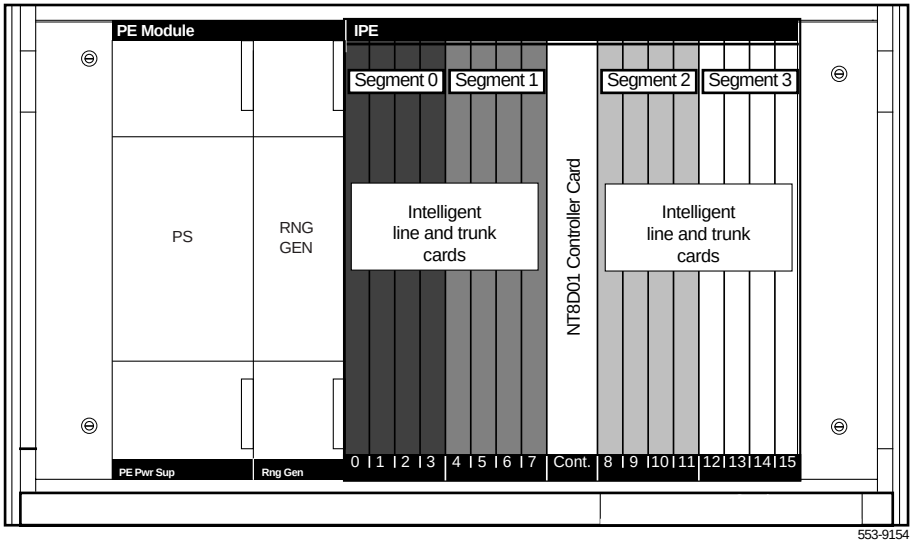


Figure 10
NT8D37 Intelligent Peripheral (IPE) module



IPE circuit cards

Line cards

The line cards convert analog voice signals into digital data. These cards connect to *internal* telephone lines through the I/O panel on the back of the module. The external lines are routed through the Modular Distribution Frame (MDF).

Line cards are installed in slots 0 through 15.

Trunk cards

The trunk cards convert analog voice signals into digital data. These cards connect to *external* telephone trunk lines through the I/O panel on the back of the module. The external lines are routed through the Modular Distribution Frame (MDF).

Trunk cards are installed in slots 0 through 15.

Controller card (NT8D01)

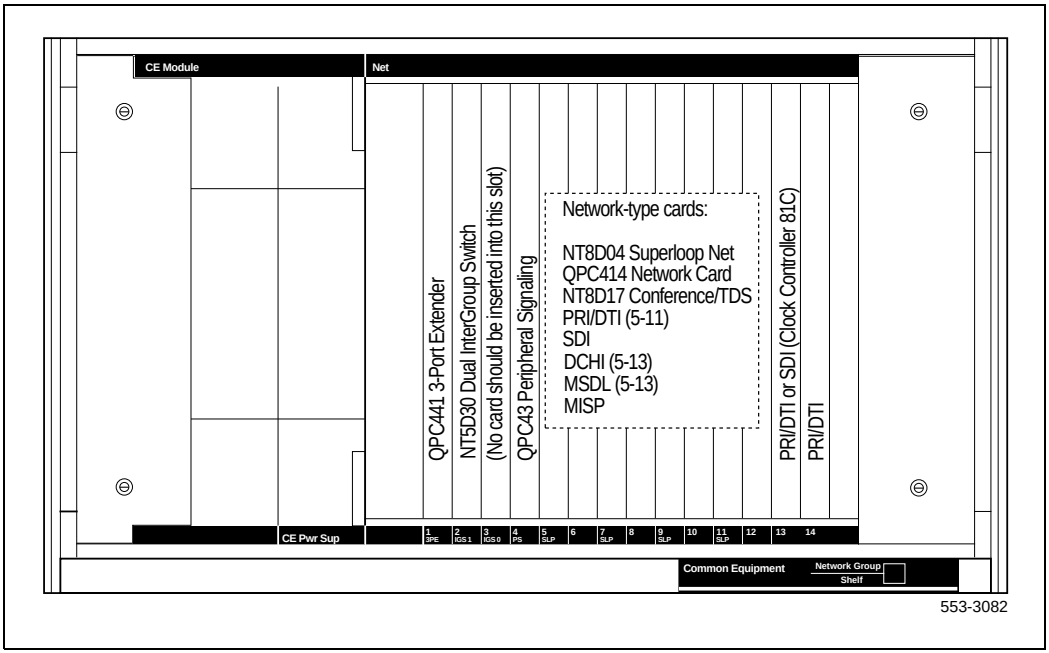
The Controller card provides the interface to the Superloop cards in the Network modules.

One Controller card is installed in the center slot of each IPE module.

Network modules

Network cards provide the *timeslots*, or data paths, needed for voice conversations.

Figure 11
Network shelf



Network circuit cards

OCMC: Optical Cable Management (NTRE39) - for CP PII with Fiber Network Fabric system only

Fiber optic cable used in Network group configuration is easily damaged if bent. The OCMC card is installed in Network modules to store and protect excess cable length. The OCMC card ensures that the fiber cable is not bent beyond a 30 mm bend radius.

The OCMC contains no electronic components and is not powered.

OCMC is a optional single width card installed between the Power supply and slot 1 in the Network modules. OCMC cards cannot be installed in Core/Net modules.

3PE: 3 Port Extender (QPC441)

The 3PE card extends CPU data, address, and control signals to network loops. The 3PE cards connect to the 3PE Termination Panel in the back of the Core/Net modules.

One 3PE card is installed in slot 1 of each Network module and slot 11 of each Core/Net module.

FIJI: Fiber Junctor Interface (NTRB33) - for CP PII with Fiber Network Fabric system only

FIJI cards are connected with fiber optic cable to form the Dual Ring Fiber Network. This Fiber Network provides uninterrupted voice and data communication between Network groups.

The FIJI Cards also connect to the Clock Controller cards for precise management of voice and signal data.

FIJI cards require two slots. In Network modules, one FIJI card is installed in slots 2 and 3. In Core/Net modules, one FIJI card is installed in slots 8 and 9.

Per Sig: Peripheral Signaling (QPC43)

Provides a signaling interface between the CPU and IPE through the network cards. Provides basic bit rate 2.048 MHz clock and timing signals for real-time functions.

One Per Sig card is installed in slot 4 of each Network module, and slot 10 of each Core/Net module.

XNET: Superloop (NT8D04)

Superloop cards provide the *timeslots*, or data paths for the transmission of voice signals. These cards connect to the IPE modules, which connect to the telephone lines and trunks.

Each Superloop card controls the capacity of two slots. When a Superloop card is installed, the adjacent slot is left empty. In Network modules, up to four Superloop cards are installed in slots 5 to 12. In Core/Net modules, three Superloop cards can be installed in slots 0 to 7.

ENET: Network (QPC414)

ENET cards provide the same function as Superloop cards. These cards require a single Network slot and offer half the capacity of the Superloop cards.

In Network modules, the Network cards are installed in slots 5 to 12. In Core/Net modules, the Network cards are installed in slots 0 to 7. A combination of Network and Superloop cards can be used.

Conference/TDS card (NT8D17)

The Conference/TDS card provides conference call capability, dial tones, and Multifrequency Sender (MFS) functionality.

One Conference/TDS card is located in slot 0 of each Core/Net module.

CC: Clock Controller (QPC471 or QPC775)

The Clock Controller cards synchronize the Meridian 1 system with an external source clock. This clock transmits timing signals to the CPU, Network groups and other equipment for the precise management of voice and signal data.

- Two Clock Controller cards are installed in each system. In Fiber Network Fabric network systems, the Clocks are connected to each other and to the FIJI cards in Network group 0.
- Clock Controllers must not be installed in Network shelf 0.
- Clock Controllers in a two group system are both installed in Network shelf 1.
- Clock Controllers, where possible, are installed in different Network groups. For example, one Clock Controller installed in a Network shelf 1. The other Clock Controller must be installed in a Network shelf 2.
- Clock Controllers are installed in separate columns for power and cooling redundancy.

Network modules organized into Network groups

Network modules are organized into Network Groups. See Figure 12 on page 29. Two modules are required to form a full Network group.

The first Network group (group 0) is contained in the Core/Net modules. Groups 1 through 7 are contained in separate Network modules.

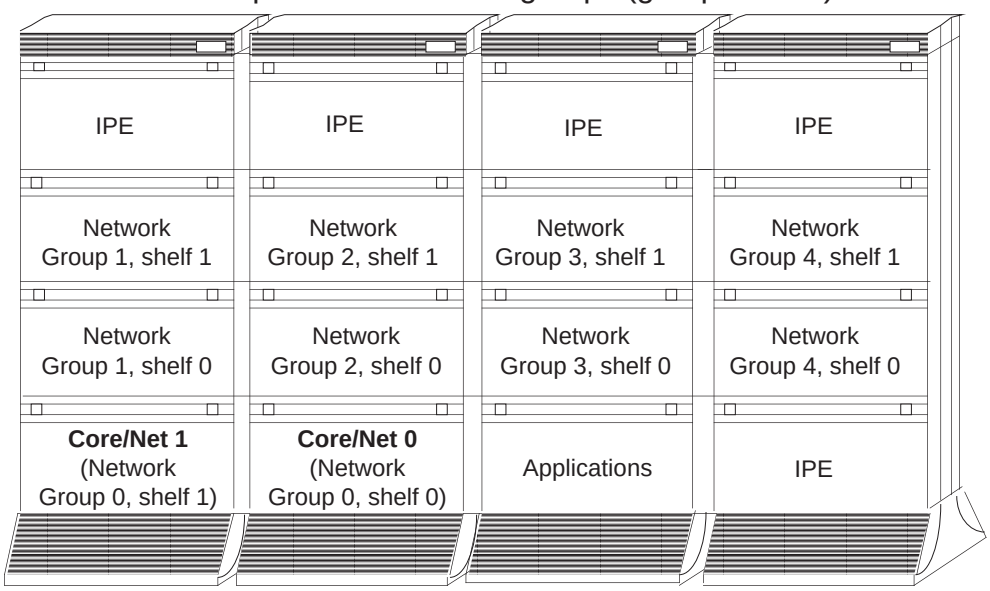
The number of Network groups determines system capacity. Each system supports a minimum of two groups (64 loops) and a maximum of eight groups (256 loops).

Timeslots

When analog signals are converted into digital form by the Line and Trunk cards in the IPE modules, the data is routed to a Network card in a Network or Core/Net module.

Network cards provide *timeslot* paths for the electronic transmission of voice and signal data. Each phone conversation utilizes two of these *timeslots*: one for each end of the conversation.

Figure 12
Example of a system with five Network groups - Fiber Network Fabric option



Note 1: Two Network modules form Network group.
Note 2: Application modules contain equipment for specialized features such as Meridian Mail.

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Timeslots are also used to provide conference call capability, tone signals and data transmission.

Loops

Timeslots are organized into *loops.* Each *loop* contains 32 *timeslots,* 30 of which are available for phone conversations (two *timeslots* are used for signaling).

Each network slot in a Network module supports 2 *loops* (64 total *timeslots,* 60 usable *timeslots*).

Network and Superloop cards

ENET Network cards (QPC414) provide the capacity for two loops of 60 usable timeslots. Network cards occupy one Network slot.

SNET Superloop cards (NT8D04) provide the capacity for four loops of 120 usable timeslots. Superloop cards occupy one slot but utilize the capacity from two adjacent Network slots. When a Superloop card is installed, the adjacent Network slot is left empty.

Loop assignments by Network group

Each Network module and group is assigned a group of loops.

Figure 13 on page 31 shows an example of Network shelf assignments for a five group system.

Dual Ring Fiber Network

The Network groups communicate through the Dual Ring Fiber Network. Calls and conversations are switched and routed across various Network groups as needed. This Network consists of two distinct rings of fiber optic cable: one ring connects all the FIJI cards in Network shelf 0's while the second ring connects all the FIJI cards in Network shelf 1's. This network communicates on a subset of the Sonet OC12c protocol (622 Mb bandwidth on each ring).

See "Configure the Network groups" on page 149 for instructions to install the Dual Ring cables for Fiber Network Fabric

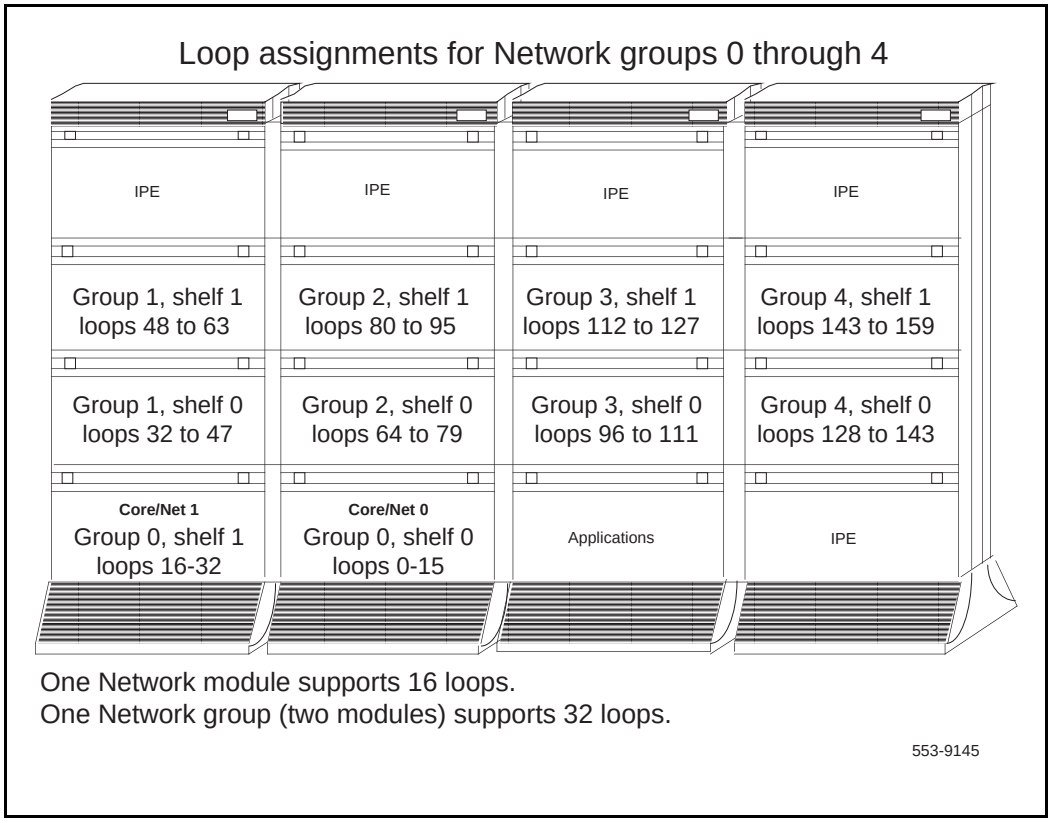
Intergroup switching

This Dual Ring fiber optic cable configuration provides complete non-blocking communication between the network groups; this eliminates the incidence of busy signals for calls switched between groups. Each FIJI card can handle 32 PCM links. A system of eight Network groups provides 7680 timeslots for 3840 simultaneous conversations.

Redundancy

This Dual Ring network is fully redundant: each of the fiber optic cable rings is capable of handling the traffic for an entire eight group network. If a fault in one ring is detected, the other ring automatically takes over call processing. No calls are lost during the switchover.

Figure 13
Loop assignments for five Network groups (Fiber Network Fabric)



Ring states

The Dual Ring Fiber Network operates under four states:

Drives Half (normal state)

- Both Rings share call processing functions.
- Traffic is shared between the two Rings.
- Each FIJI card drives 480 timeslots.

Drives Full

- All traffic is handled by a single Ring.
- Each FIJI card in the active Ring drives 960 timeslots.

Drives None

- The Ring is inactive and does not support call processing.

Survival

- The available FIJI cards in both Rings are used to maintain intergroup traffic.

Note: Only one Ring at a time can be under Drives Full or Drives None. These Ring states occur when a fault is found in one of the Rings.

The Rings can also be manually switched to "Full" or "None". If one Ring is put into "Full", the other automatically switches to "None".

System example

Figure 14 on page 33 shows a CP PII system with Fiber Network Fabric and three Network groups.

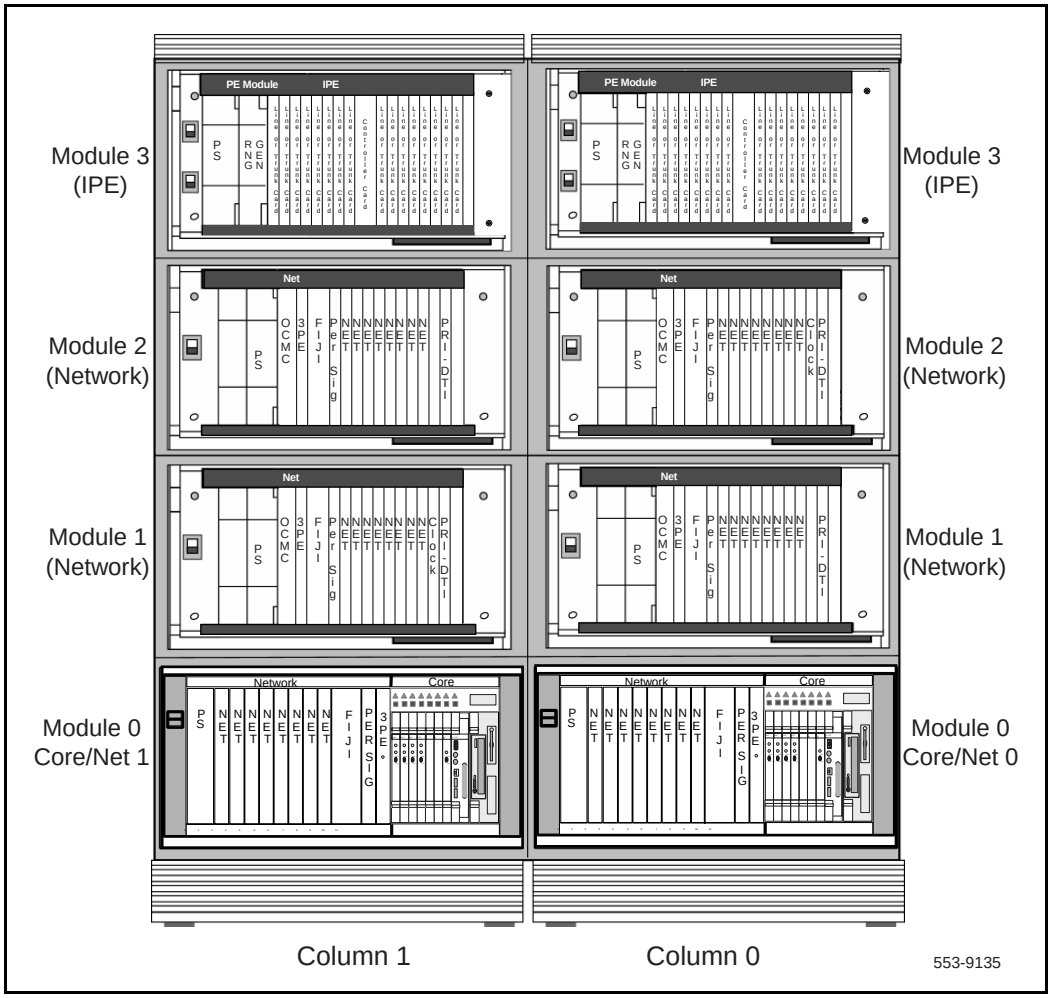
System Layout Plan

A *System Layout Plan* is shipped with each system. Use this plan for specific configuration information for each system, including column and module configuration and layout, cable connections and I/O panel connections per column.

Circuit card handling

Circuit cards contain numerous components that are easily damaged. Always handle cards carefully and protect them from static discharge, dust and moisture

Figure 14
Example of a two column CP PII system with Fiber Network Fabric (front view)



Card installation guidelines

CAUTION
To avoid card damage from static discharge, wear a properly connected antistatic wrist strap.

- To install a card, hold the card by the faceplate latches and gently push it into the slot until the connectors make contact with the backplane.
- Gently push the latches forward to seat the card and lock it in place.
- Never force the card into the slot. If the card gets stuck, remove it and try again.

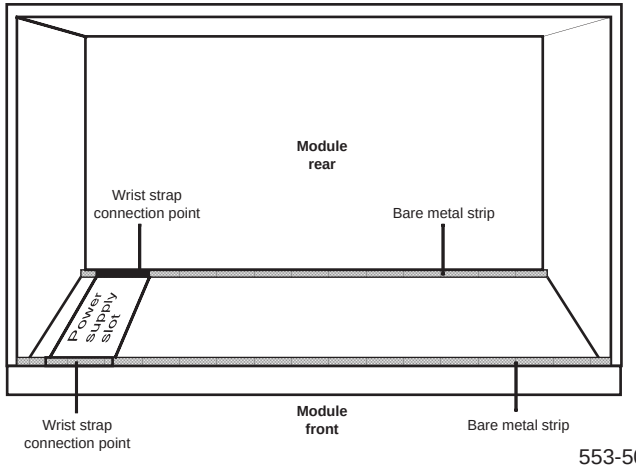
How to safely handle a circuit card

Failure to properly protect circuit cards from static discharge, dust and moisture can result in hardware failure. This will result in system failure and increased installation costs.

CAUTION
To avoid card damage from static discharge, wear a properly connected antistatic wrist strap.

- NTZC77AA contains an anti-static mat and ESD wrist-strap.
- If a wrist strap is not available, regularly touch one of the bare metal strips in the module to discharge static. See Figure 15 on page 35.
- Handle cards by the edges only. Do not touch the contacts or components.
- Unpack or handle cards away from electric motors, transformers or similar machinery.
- Always store cards in silver anti-static bags. Never stack cards on top of each other.

Figure 15
Static discharge points



Cable installation guidelines

Use the System Layout Plan as a guide

The System Layout shipped with each system includes a “Cable Connections” page for each column. Review the “to-from” information on these pages before you install the cables. Since cables come in a variety of lengths, be careful to install the correct cable for each connection.

Label the cables

Always attach labels to both ends of each cable. Include the purpose and connection information for the cable. Labels are critical for the proper connection and configuration of the system.

Properly labelled cables are also necessary to conduct upgrades, troubleshoot problems or perform repairs.

Route cables along module cable paths

Cables can be routed in the following ways, as space permits.

> **CAUTION**
> Do not route non-power cables near power cables if an alternate route is available. Cables must be routed as perpendicular as possible to any nearby power cables.

Cable troughs

Unshielded cables can be routed within the module cable troughs. See Figure 16 on page 37. These cables are EMI shielded by the module.

> ***Note:*** Because AC-powered modules require an MPDU, the left side of the trough is blocked. All cables must be routed though the right side of the trough (front view).

Module sides

Unshielded cables can be routed through the sides of the modules. These cables are EMI shielded by the module.

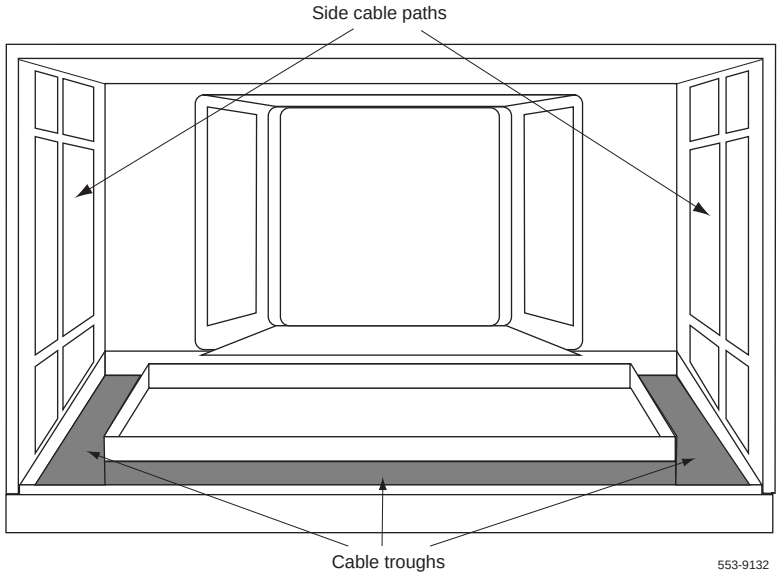
Rear vertical cable paths

Cables routed vertically through the rear corner channels are outside the module's EMI shielding and must be shielded with EMI insulation. These cables must be connected to the module components via the I/O panels.

Between rows and to external connections

All cables placed outside the modules or between rows must be insulated with EMI shielding.

Figure 16
Cable paths (front view of module)



Store excess cable length

Never store excess cable length in the Core/Net modules or near the Power Supply modules.

- For cCNI to 3PE cables, store any excess cables near the Network Module.
- Use the OCMC cards to store and manage fiber optic cable used for the Dual Ring Fiber Network (CP PII and Fiber Network Fabric).

EMI shielding

EMI shielding eliminates the electromagnetic field that causes equipment malfunction.

- Cables routed within the Network shelf or between the sides of the modules are EMI shielded by the module case insulation.
- Cables routed up and down the cable channels in the rear of the module, or outside the modules, must be insulated with shielded material.

System planning

Content list

The following are the topics in this section:

- Meridian Configurator 39
- Documentation 39

Each Meridian 1 system is individually configured to meet the needs of a customer's site. A properly configured and equipped system will provide uninterrupted call processing during an organization's busiest hours.

To design a system with the proper capacity, customers must first determine their organization's requirements. Using this information, a Nortel Networks representative or distributor can help the customer design a system.

Nortel Networks offers a variety of tools and assistance to determine the correct configuration for a site. Contact your Nortel Networks representative for more information on these tools.

Meridian Configurator

Meridian Configurator is the Nortel Networks tool to design a system that meets a customer's requirements. This DOS/Windows program analyzes the customer's specifications to create a detailed proposal for equipment. This proposal includes a complete equipment list, part numbers, software listing, engineering capacities, and pricing.

Documentation

Nortel Networks also provides written documentation and worksheets to determine system needs.

Capacity Engineering (553-3001-149)

The *Capacity Engineering* (553-3001-149) document provides guidelines to determine the capacity needs of a site. A Meridian 1 switch must be engineered upon initial installation, during upgrades, and when traffic loads change significantly.

Use this document with the Meridian 1 Configurator software.

System Engineering (553-3001-151)

System Engineering (553-3001-151) includes guidelines to determine the equipment needed for each system.

Use this document with the Meridian 1 Configurator software.

Site Planning

Content list

The following are the topics in this section:

- Equipment room requirements 42
- Design a fire protection system 52
- Design a floor plan 54

The site in which the Meridian 1 system will be installed must meet certain requirements for space, safety, cable routing and power. Follow the guidelines in this chapter to prepare a site to meet Meridian 1 installation requirements.

Equipment room requirements

Task summary list

The following is a summary of the tasks in this section:

- Space, page 42
- Location, page 43
- Power, page 43
- Floor and ceiling requirements, page 44
- Temperature and humidity control, page 44
- Air conditioning, page 46
- Static electricity, page 49
- Vibration, page 50
- EMI: Electromagnetic and radio frequency interference, page 51
- Dust, page 52
- Lights, page 52

Failure to meet the following environmental requirements can cause Meridian 1 equipment to malfunction or fail.

Space

The site must provide adequate space for the following:

Equipment space

See Design a floor plan, page 54 to determine the space required by your system. Space requirements are determined by the number of columns, the length-to-width ratio of the room, and the location of walls, partitions, windows, and doors.

Space must also be available to unpack, install, operate, service and store equipment. Additional space should be available for potential expansion.

The site must contain enough space to allow for sufficient cooling. See Temperature and humidity control, page 44 for more information.

Storage

Storage space is needed disks, printer paper, printouts, and daily reports. A secure storage room for spare parts is recommended.

Whenever possible, maintain the same environmental conditions in the storage areas as in the equipment room. If materials are stored in a room with different temperature and humidity, give them time to adjust to the equipment room conditions before use.

Maintenance and technician area

A work area is useful to store tools, equipment, documents, and spare parts. The area must have good lighting and convenient access to the Meridian 1. Typical items in a maintenance and technician area are:

- shelves for instruction books
- spare parts storage room
- paper storage area
- locking cabinet or storage area for backup disks
- table or desk
- terminal, printer, or equivalent device

Plan for surface space, power outlets, and the availability of the terminals/modems before installation.

Location

The location should be convenient for equipment delivery and close to related equipment such as the distribution frame and batteries. The site must also take cable limitations into account.

Power

Sufficient power and ground facilities must be available.

See Plan and install the power source, page 85 for more information.

Floor and ceiling requirements

- The floor must be strong enough to support anticipated loads. See Floor load estimates, page 56 to calculate the weight of your system.
- The ceiling must be able to support overhead cable racks.
- Floors must be made of sealed concrete or covered with vinyl or mastic tile.
- Avoid using sprayed ceilings or walls.

Temperature and humidity control

Frequent and extended system operation above recommended temperature limits degrades system reliability. Low humidity increases static electricity build-up. High humidity affects the performance of disks and printers.

Operate and store all Meridian 1 equipment within the guidelines detailed in Table 2 on page 45 and Table 3 on page 46.

Take temperature readings 76 cm (30 in.) from the front of the system. Table 2 on page 45 shows Meridian 1 operating requirements.

CAUTION

Do not expose equipment to absolute temperature limits for more than 72 hours. Do not place heat sources (such as floor heaters) near the equipment.

Table 2
Operating environment

Equipment	Temperature and humidity considerations
Meridian 1	Recommended: 15° to 30°C (59° to 86°F) RH 20% to 55%, non-condensing Absolute: 10° to 45°C (50° to 113°F) RH 20% to 80%, non-condensing temperature change less than 10°C (18°F) per hour
Telephones	Absolute: 0° to 50°C (32° to 122°F) RH 20% to 80%, non-condensing
Other terminal devices (such as personal computers, data sets, and printers)	Refer to the specific documentation or manufacturer's guidelines

If the system is operated above the recommended limits (it must remain within absolute limits), all disk drive units must be located in the lower two modules of a column.

Follow the specifications listed in Table 3 on page 46 to store or transport equipment.

Table 3
Storage environment

Equipment	Temperature/humidity considerations
Meridian 1 (without disk drive units)	Long and short term: –50° to 70°C (–58° to 158°F) RH 0% to 95%, non-condensing
Telephones	Long and short term: –50° to 70°C (–58° to 158°F) RH 5% to 95%, non-condensing
Disk drives	Long term: –20° to 60°C (–4° to 140°F) RH 10% to 90%, non-condensing Short term: –40° to 60°C (–40° to 140°F) RH 5% to 95%, non-condensing
Disks	Long term: 10° to 53°C (50° to 128°F) RH 20% to 80%, non-condensing Short term: –40° to 60°C (–40° to 140°F) RH 10% to 90%, non-condensing
Other terminal devices	Refer to the specific Nortel Networks documentation or the manufacturer's guidelines
Note: Temperature changes must be less than 30° C (54° F) per hour for long- and short-term storage and during transportation.	

Air conditioning

Use the following guidelines to estimate air conditioning requirements. Exact requirements must be determined by a qualified air conditioning engineer.

Air conditioning in equipment areas must handle the heat produced by the Meridian 1 equipment, personnel, and lighting. The air conditioning must also handle heat that comes through walls, windows, floors, and ceilings.

22 degrees C (72 degrees F) recommended temperature

A stable ambient operating temperature of approximately 22 degrees C (72 degrees F) is recommended. The temperature in the equipment room must not vary more than ±3.0 degrees C (±5 degrees F).

> ***Note:*** For systems with reserve power equipment, consult the manufacturer's specifications for recommended operating temperatures.

Estimate heat dissipation

Estimate the amount of air conditioning required at a rate of one ton of refrigeration for every 12,000 BTU/hr of heat generated in the equipment area, plus one ton for each 500 sq ft of floor space.

Heat dissipation from a system is estimated in BTUs per hour (BTU/hr).

> ***Note:*** Each person in the equipment room generates 600 BTU/hr.

CAUTION

Digital systems require constant power even when idle. Because these systems generate heat continuously, air conditioning requirements must be met at all times.

The following tables show the maximum power dissipation for Meridian 1 modules and DC rectifiers.

Table 4
Heat dissipation—modules

Module	Heat dissipation	
	Watts	**BTU/hr**
NT5D21 Core/Network	360	1230
NT4N41 Core/Net module	360	1230
NT8D35 Network	240	820
NT8D37 Intelligent Peripheral Equipment	340	1160
NT8D47 Remote Peripheral Equipment	240	820
Application Equipment Module		
— single	210	710
— dual	420	1420

Note: Thermal load (BTU/hr) = total power dissipation (watts) x 3.4

Note: The measurements are the same for AC- and DC-powered modules

Table 5
Heat dissipation—DC rectifiers

Equipment	Heat dissipation	
	Watts	BTU/hr
NT5C06 25-A rectifier	130	444
NT6D52 30-A rectifier	175	600
NT5C03 50-A rectifier	290	990
NT5C07 50-A rectifier	380	1,297
A0354954 100-A rectifier	580	1980

Note 1: Thermal load (BTU/hr) = total power dissipation (watts) x 3.4

Note 2: NT5C07 rectifier is a part of the MPP600 power plant. MPP600 may contain up to three such rectifiers in one power shelf. The maximum MPP600 plant capacity is 12 NT5C07 rectifiers or 600A at -48 VDC or four power shelves when using the main and the supplemental cabinets. Total MPP600 heat dissipation is 12x1,297=15,570 BTU/hr.

Static electricity

Electronic circuits are extremely sensitive to static discharge. Static discharge can damage circuitry, interrupt system operation, and cause lost data.

The human body

Because the human body is the most common collector of static electricity, use an anti-static wrist strap.

- To avoid card damage from static discharge, wear a properly connected antistatic wrist strap. See Figure 17 on page 51. NTZC77AA contains an anti-static mat and ESD wrist-strap.
- If a wrist strap is not available, regularly touch one of the bare metal strips in the module to discharge static. See Figure 17 on page 51.
- Handle cards by the edges only. Do not touch the contacts or components.
- Unpack or handle cards away from electric motors, transformers or similar machinery.
- Always store cards in silver anti-static bags. Never stack cards on top of each other.

CAUTION

A combination of plastic-soled shoes, certain flooring materials, and low humidity can cause body charges in excess of 15 kV.

Other causes of static electricity

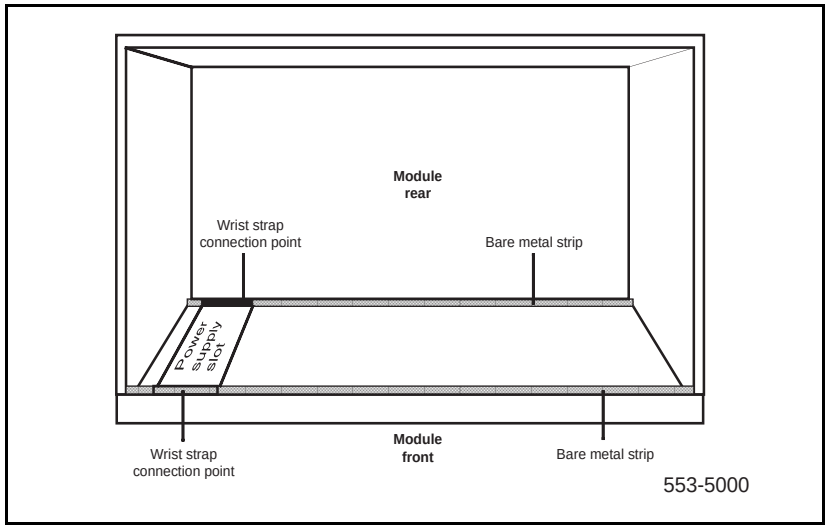
Static electricity is also caused by physical vibration, friction, the separation of materials, low humidity, certain types of carpeting, the wax on equipment room floors, and plastic-soled shoes.

Note: IEEE Standard 142-1982 recommends that flooring resistance be more than 25,000 ohms and less than 1 million megohms, measured by two electrodes 0.91 m (3 ft) apart on the floor. Each electrode must weigh 2.2 kg (5 lb) and have a dry flat contact area of 6.35 cm (2.5 in.) in diameter.

Vibration

Vibration deteriorates mechanical parts over time. Severe vibration causes serious disk errors. Avoid vibration in the site's structure. Raised floors must have extra support jacks at strategic places to prevent vibration.

Figure 17
Static discharge points



Limit vibration in an office environment to a frequency range of 0.5–200 Hz and a G-force magnitude of 0.1 G (in accordance with the Bellcore "Network Equipment Building Systems Generic Equipment Requirements" specification TR-EOP-000063).

EMI: Electromagnetic and radio frequency interference

Equipment that emits EMI/RFI interference must be located away from Meridian 1 equipment. The following are common EMI/RFI sources known to cause system malfunctions:

- thunderstorms, static electricity, and high-voltage power lines
- radar, broadcast stations, and mobile communications
- power tools, appliances (such as vacuum cleaners), and office business machines (such as copiers)
- industrial machines and ultrasonic cleaners
- vehicle ignition, arc welders, and dielectric heaters
- dimmer switches

Note: Meridian 1 equipment meets the United States FCC Rules, Part 15, and Canadian Standards Association (CSA) C108.8 for EMI/RFI radiation.

Dust

Accumulated dust and dirt degrades system reliability and performance. Dust and dirt cause:

- scratched circuit card contacts that cause intermittent failures.
- increased static electricity.
- increased operating temperatures of components.

Average dust density for an office environment must be 0.00014 g/m3 or better. False ceilings and tiled floors help maintain dust density requirements.

Lights

Illumination of 50 to 75 footcandles measured 76 cm (30 in.) above the equipment room floor is recommended. Avoid direct sunlight in the equipment room to prevent malfunctions by devices with light sensors (such as disk units).

Lighting cannot be powered from the equipment room service panel. For large system installations, consider provisions for emergency lighting in the equipment room.

Design a fire protection system

Task summary list

The following is a summary of the tasks in this section:

- Construction recommendations, page 53
- Fire extinguishing systems, page 53

Expertise is needed to properly locate and install sprinkler heads, fire and smoke detectors, and other fire prevention equipment. Consult fire prevention experts, insurance underwriters, local codes and local building authorities to plan and install an effective and comprehensive system.

Construction recommendations

Implement the following fire precautions during construction of a site:

- Extend walls from floor to ceiling.
- Construct walls, floor, and dropped ceilings of noncombustible material.
- If the structural floor is made from combustible materials, cover it with a noncombustible material.
- Clear the space between the raised and permanent floors of all debris before the system is installed.
- If there are power connections beneath a raised floor, use waterproof electrical receptacles and connectors.
- Install shatterproof windows and sprinklers to keep fire from spreading from an adjacent room or building.
- The roof or floor above the equipment area must be watertight.
- Design ducts and plumbing for air-conditioning systems to keep fire, heat, and smoke from spreading from one part of a building to another.
- Install smoke detectors in all appropriate places.
- Regularly check services such as steam, water, and power, and inspect pipes for excess condensation, leaks, or corrosion.

Fire extinguishing systems

Dry-pipe water sprinklers

Dry-pipe water sprinklers are strongly recommended. This type of system interrupts power to the room and opens a master valve that fills the overhead sprinklers.

Carbon dioxide systems

While carbon dioxide systems are also effective, they quickly exhaust the room's oxygen supply. If a carbon dioxide system is used, an alarm to warn site personnel when carbon dioxide is released must also be installed. For health and safety reasons, employees must be evacuated within 30 seconds of the release.

WARNING

Nortel Networks does not recommend Halon or any other fire extinguishing system not described above. Nortel Networks is supported by the Environmental Protection Agency to enforce any restrictions on the use of other fire extinguishing systems.

Design a floor plan

Task summary list

The following is a summary of the tasks in this section:

- Equipment to include, page 55
- Space requirements between equipment, page 55
- Space for possible expansion, page 55
- Equipment dimensions, page 56
- Sample floor plan, page 56
- Floor load estimates, page 56

Prepare a detailed layout that includes all Meridian 1 and auxiliary equipment. Use the Equipment dimensions, page 56 and Sample floor plan, page 56 in this section to design a plan for your site.

Equipment to include

- system columns and modules. Include space for possible expansion.
- the Main Distribution Frame (MDF)
- the AC power service panel
- the system terminal, printer, or other terminal devices (such as modems.
- external power equipment, such as DC power rectifiers
- cable racks
- PTFUs and auxiliary power supplies, if needed
- space for additional equipment, such as reserve power equipment or auxiliary processors.

Space requirements between equipment

- Equipment aisles must be separated by a minimum of 76 cm (30 in.)
- The minimum acceptable distance between the end of the column and walls, and between rows, is 92 cm (3 ft).
- The minimum acceptable ceiling height is 244 cm (8 ft).

Note: Equipment must be at least 30 cm (12 in.) from sprinkler heads. Do not place four-module columns with a cable rack directly under any sprinkler heads.

Space for possible expansion

Possible expansion must be accounted for in the floor plan since network group modules must be located together. Two possibilities are:

- Allow space for additional network groups to the right for Fiber Network Fabric.
- Allow for additional intelligent peripheral equipment to the right.
- Add peripheral equipment modules in a separate row of columns.

Equipment dimensions

Use the dimensions in Table 6 on page 56 to determine the space requirements and layout for the floor plan.

Table 6
Equipment dimensions

Equipment	Width		Depth		Height	
	cm	in.	cm	in.	cm	in.
Pedestal	81.3	32.0	66.0	26.0	25.4	10.0
Top cap	81.3	32.0	55.9	22.0	10.2	4.0
Module	81.3	32.0	55.9	22.0	43.2	17.0
One-module column	81.3	32.0	66.0	26.0	78.7	31.0
Two-module column	81.3	32.0	66.0	26.0	121.9	48.0
Three-module column	81.3	32.0	66.0	26.0	165.1	65.0
Four-module column	81.3	32.0	66.0	26.0	208.3	82.0

Note: Attached columns require a 7.6 cm (3 in.) spacer between each column for cable routing and EMI shielding.

Sample floor plan

Use the sample room plan in Figure 18 on page 57 to design a floor plan for your site. Each plan will differ due to system needs and the size and arrangement of the equipment room.

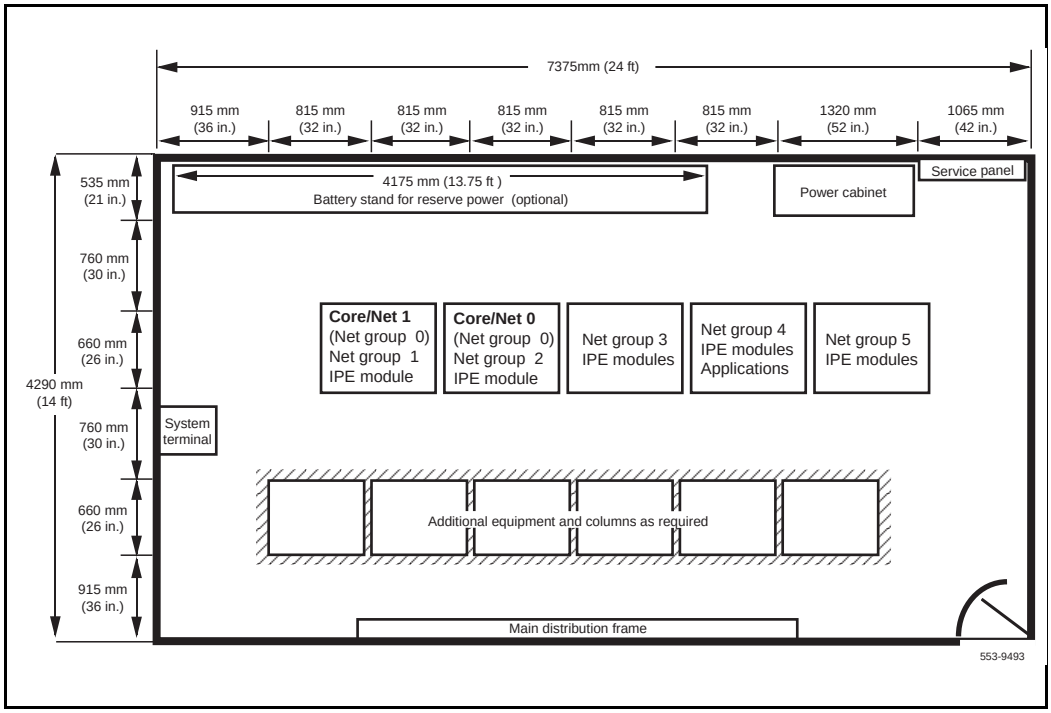
Floor load estimates

Use the estimated weights in Table 7 on page 58 and Table 8 on page 58 to:

- design a floor plan that evenly distributes the weight of the system on the floor
- verify that the equipment room floor is strong enough to support the total weight of the system

“Floor load” is the weight of the system divided by the occupied floor area

Figure 18
Sample equipment room floor plan



"Point load" is the local pressure exerted by the feet of the system on the floor.

These estimates represent fully loaded columns complete with pedestal, maximum circuit card configurations, power supplies, and cables.

Table 7
Equipment weight

Equipment	Weight empty		Weight full	
	kg	lbs	kg	lbs
Pedestal	18.1	40	31.7	70
Top cap	6.8	15	6.8	15
Module	22.7	50	58.9	130
One-module column	N/A	N/A	97.5	215
Two-module column	N/A	N/A	156.5	345
Three-module column	N/A	N/A	215.4	475
Four-module column	N/A	N/A	274.4	605

Table 8
Floor load estimates

Number of modules	Floor load (lbs/ft2)	(kPa)	Point load (lbs/in2)	(kPa)
One	38.1	(1.8 kPa)	11.0	75.8 (kPa)
Two	60.3	(2.8 kPa)	17.3	119.0 (kPa)
Three	82.4	(3.9 kPa)	23.7	163.4 (kPa)
Four	104.6	(5.0 kPa)	30.0	206.8 (kPa)

Note: The numbers under “Floor load (lbs/ft2) and kPa” are based on a floor area of 0.52 sq m (5.64 sq t) for the system. These numbers do not include the weight of the optional overhead cable rack. The numbers under “Point Load (lbs/in2) and (kPa)” are based on distributing the system weight among four feet, each with an area of 317 sq mm (4.91 sq in.); these numbers do not reflect the use of optional casters.

Install earthquake bracing if necessary

Content list

The following are the topics in this section:

- Install earthquake bracing 59
- Install non-seismic bracing only if necessary 74

Install earthquake bracing

Task summary list

The following is a summary of the tasks in this section:

- Review earthquake bracing standards, page 60
- Select the appropriate bracing kit for each column, page 61
- Select the appropriate anchor kit for each pedestal, page 61
- Prepare to drill the floor, page 62
- Drill holes in the concrete floor, page 64
- Attach the anchor plates to the floor (Kit A), page 65
- Attach the anchor plates to the floor (Kit B), page 65
- Install bracing rods in the column sides, page 66
- Position and level the columns, page 71

Earthquake bracing is required in earthquake prone regions.

To ensure equipment stability during an earthquake, two kits are required for each column:

- a *bracing kit* to provide vertical support to each column of modules.
- an *anchor kit* to secure each pedestal to the floor.

If the pedestal anchor kit described in this section is not available, a seismic engineering firm must be hired to install similar equipment. This equipment must meet the Bellcore or California OSHPD requirements.

Review earthquake bracing standards

Earthquake bracing must meet the Bellcore or the California OSHPD seismic specifications.

The Meridian 1 system has been certified to two of the most stringent seismic specifications for concrete floor mounting: BELLCORE and CALIFORNIA OSHPD:

- BELLCORE is intended for central-office equipment installations. The requirements are defined in the Network Equipment Building System (NEBS), General Equipment Requirements, TR-EOP-000063 issued by Bell Communications Research (BELLCORE). The Meridian 1 system has been certified to meet the maximum severity (Zone 4).
- CALIFORNIA OSHPD as part of the California building code, this specification requires the anchorage of all fixed hospital equipment to be approved by the California Office of Statewide Health Planning and Development (OSHPD), Division of Facilities Development and Financing. Meridian 1 has been certified for such installations under anchorage pre-approval number R-0233.

Select the appropriate bracing kit for each column

Choose the appropriate module bracing kit. See Table 9 on page 61. A separate kit is required for each column. When a module is added to a column, use the expansion bracing kit.

Table 9
Seismic Bracing Kits

Seismic Bracing Kit	System configuration
NT8D64CD[1]	1-module
NT8D64CA	2-modules
NT8D64CB	3-modules
NT8D64CC	4-modules
NT8D64BD[2]	expansion

Note 1: The NT8D64CD expansion kit does not include bracing rods or tie bars; these are not needed for single module installations.

Note 2: The NT8D64BD kit does not contain mounting plates; these are not needed for column expansion.

Select the appropriate anchor kit for each pedestal

See Table 10 on page 62:

- Both anchor kits meet the CALIFORNIA OSHPD specification.
- Only Kit B meets the BELLCORE specification.
- If neither specification is required, Kit A is recommended due to its shallower concrete requirement.

Floor requirements

- Both anchor kits can be used in hard-rock concrete as long as the compressive strength exceeds 20.7 megapascals (3000 psi).
- Only Kit A can be used in lightweight aggregate concrete with a compressive strength greater than 27.6 megapascals (4000 psi).

Floor parameters are usually found in the building's engineering drawings.

Table 10
Seismic Anchor Kits

Kit	Seismic Anchor Kit	BELLCORE	CAL OSHPD	Concrete thk (min)	Light-weight
A	NT8D64BE	No	Yes	90 mm (3.54")	Yes
B	NT8D64CE	Yes	Yes	180 mm (7.09 ")	No

Hardware description

These kits contain commercially available hardware that can be purchased separately from the manufacturer (using the listing below) or in packaged kits from Nortel Networks.

Nortel Networks Kit A (NT8D64BE)

Nortel Networks Kit A contains four of each of the following:

- Hilti® HDI 3/4" (box of 25, manufacturer part# 457564), Hilti Corporation (918) 252-6000 or, Multi-Set II (manufacturer part# RM-34), ITW Ramset/Redhead, Incorporated® (219) 874-4217
- hex head bolt, 0.3/4"-10 x 1.50" long, steel material, zinc plate finish
- flat washer, internal diameter = 0.812", outside diameter = 1.469", thickness = 0.120", steel material, zinc plate finish

Nortel Networks Kit B (NT8D64CE)

Nortel Networks Kit B contains four of the following:

- Hilti HSL M16/25 (box of 10, manufacturers part# 665934), Hilti Corporation (918) 252-6000

Prepare to drill the floor

One seismic anchor hole template kit (NT8D64BH) is required.

This kit is a Mylar template to mark floors for drilling. Only one of these reusable kits is needed per site

Required tools are:

- dark marking pencil
- center-punch
- rotary hammer drill
- carbide-tip drill bit
- 25.4 mm (1.00 inch) diameter (for Kit A, NT8D64BE)
- 24.0 mm (0.94 inch) diameter (for Kit B, NT8D64CE)
- blowout bulb or compressed air source
- hammer or mallet
- vacuum.

WARNING

Wear safety goggles to drill anchor holes. Obey all safety and warning precautions provided by the hammer drill and anchor bolt manufacturers.

Drill holes in the concrete floor

1 Mark the position of all of the columns using the equipment room floor plan.

2 Center-punch the center of each hole.

3 Use a carbide-tipped drill bit to drill the holes to the size and depth shown in Table 11 on page 64.

Table 11
Anchor hole sizes

Kit	Kit part number	Hole diameter	Hole depth
A	NT8D64BE	1.00 inch	3.18 inch
B	NT8D64CE	24 mm	125 mm

Note: The holes must be drilled straight and perpendicular to the floor surface for the anchors to be installed correctly. The drill fixture kit can aid this process.

4 If the drill hits reinforcing bar or the hole breaks through, abandon that hole and use the secondary hole location indicated in the anchor hole template.

5 Remove any debris from the holes with a blowout bulb or compressed air. Use a vacuum to dispose of the debris.

6 If the mounting plates are not installed immediately, cover the anchor holes to prevent debris from falling in.

Attach the anchor plates to the floor (Kit A)

Required tools (Kit A) are:

- setting tool (Hilti HST 3/4", manufacturer part#329821)
- 1 1/8 inch open-end wrench

1 Insert the anchors into the holes. Use the manufacturer's setting tool to install each anchor flush with the surface of the concrete. The setting tool is required for the Hilti anchor.

2 For each column, locate the two mounting plates over the anchors. Place an adapter bushing into each of the plate holes and insert a 3/4-inch diameter bolt and flat washer as shown in Figure 19 on page 66.

3 Level the plates with shims. Leave the stack of shims exposed until all leveling is complete (this allows the addition or removal of shims).

4 If the installation must meet CALIFORNIA OSHPD, tension proof load testing is required on 50 percent of the anchor bolts. These anchors must be tested to 24,020 newtons (5400 pounds) tension and 122 newton-meters (90 foot-pounds) torque. Any failure requires testing of all remaining anchors.

5 Proceed to Install bracing rods in the column sides, page 66.

Attach the anchor plates to the floor (Kit B)

Required tools for Kit B are:

- 24 mm open-end wrench

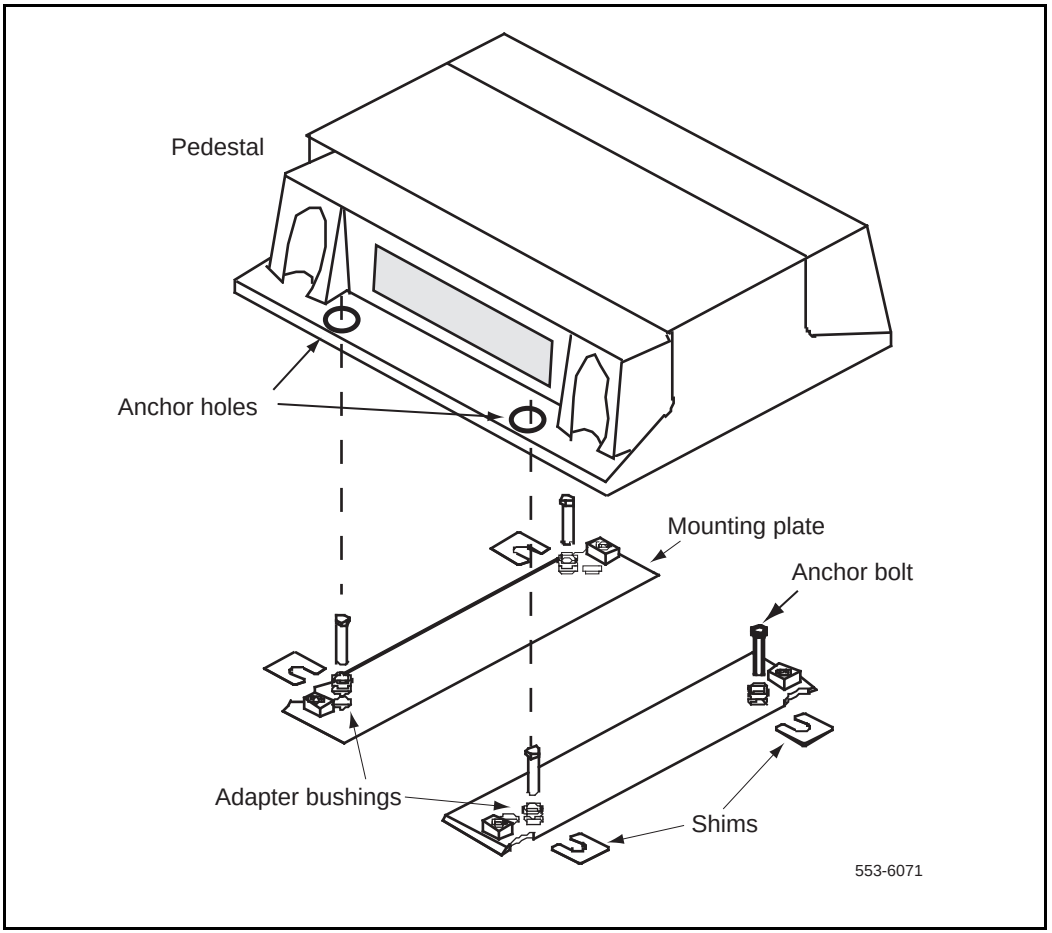
1 Locate the two mounting plates for each column over the anchor holes. Insert the anchors into the holes and tap the anchors into place with a mallet.

2 Level the plates with shims. Leave the stack of shims exposed until all leveling has been completed (this allows the addition or removal of shims if necessary).

3 If the installation must meet CALIFORNIA OSHPD, tension proof load testing is required on 50 percent of the anchor bolts. These anchors must be tested to 6230 newtons (1400 pounds) tension and 122 newton-meters (90 foot-pounds) torque. Any failure requires testing of all remaining anchors.

4 Proceed to "Install bracing rods in the column sides".

Figure 19
Pedestal mounting plate



Install bracing rods in the column sides

Required tools are:

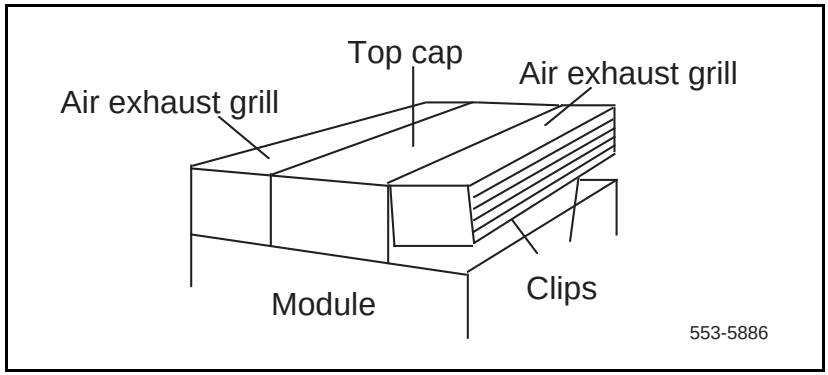
- 5/16 inch socket wrench
- 1/2 inch open-end wrench (for rods)
- 9/16 inch open-end wrench (for nuts)

Note: Install the rods before the columns are positioned.

1 Remove the top cap and grill

a Remove the air exhaust grills from the front and rear of the top cap: pull forward on the two clips underneath the front edge of each grill and lift the grill up. See Figure 20 on page 67.

Figure 20
Remove the top cap



b Remove the six screws that secure the top cap (Figure 20 on page 67) with a 5/16 in. socket wrench. Lift the top cap from the column.

c Remove the 4 bolts that secure the exterior module side panels Remove the side panels and set them out of the way.

2 Install the bracing rods

a Position each rod in the vertical slots behind the exterior side panels.

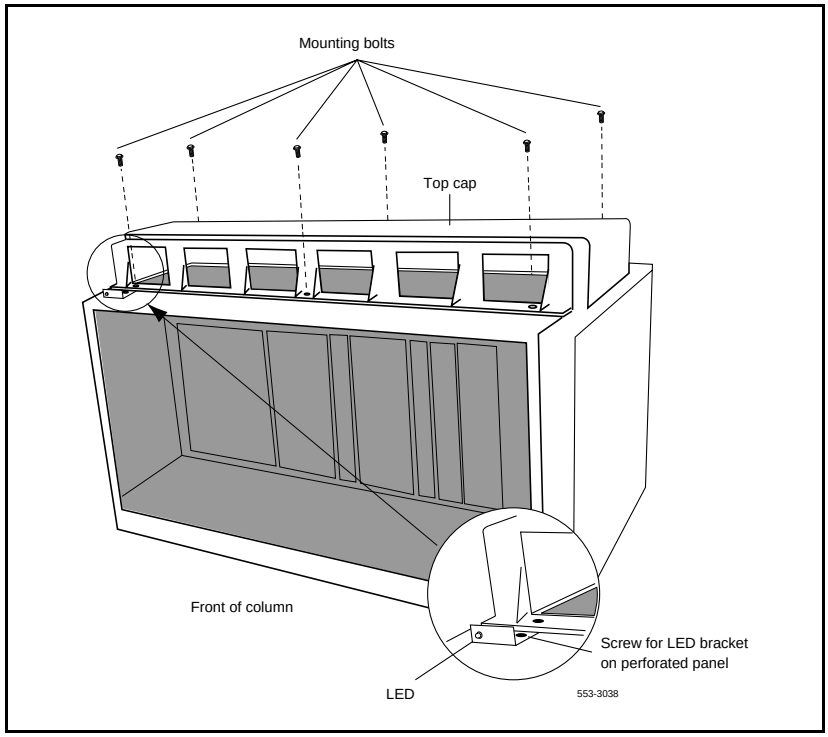
b Screw the rods into the pedestal slots (see Figure 22 on page 69). Tighten the rods in by hand or with a 1/2” open-end wrench.

c Place a tie bar over each pair of rods (Figure 22 on page 69).

3 Secure the tie bars with flat washers and hexagon nuts. Torque with 9/16” wrench to 17.6 joules (13.0 ft.-lbs).

Note: Expansion rods from the NT8D64BD bracing kit are screwed into the previously-installed rods with a coupling nut. Secure this two-piece rod in the same manner as the single rod described above.

Figure 21
Top cap mounting bolts



4 Reinstall the top cap and grills

a Position each top cap and install the bolts to secure it.

b Replace the air exhaust grills at the front and rear of each top cap.

5 Install NT8D49AA Spacer Kits between adjacent columns

a Attach EMI gaskets to both sides of the spacer (Figure 23 on page 70).

b Attach a spacer to the side of each module that will be connected to another module (Figure 24 on page 70).

c Attach the bolts from the inside of the module. Fit the round standoffs between the module frame (Figure 25 on page 71).

6 Proceed to Position and level the columns, page 71.

Figure 22
Install bracing rods for column support

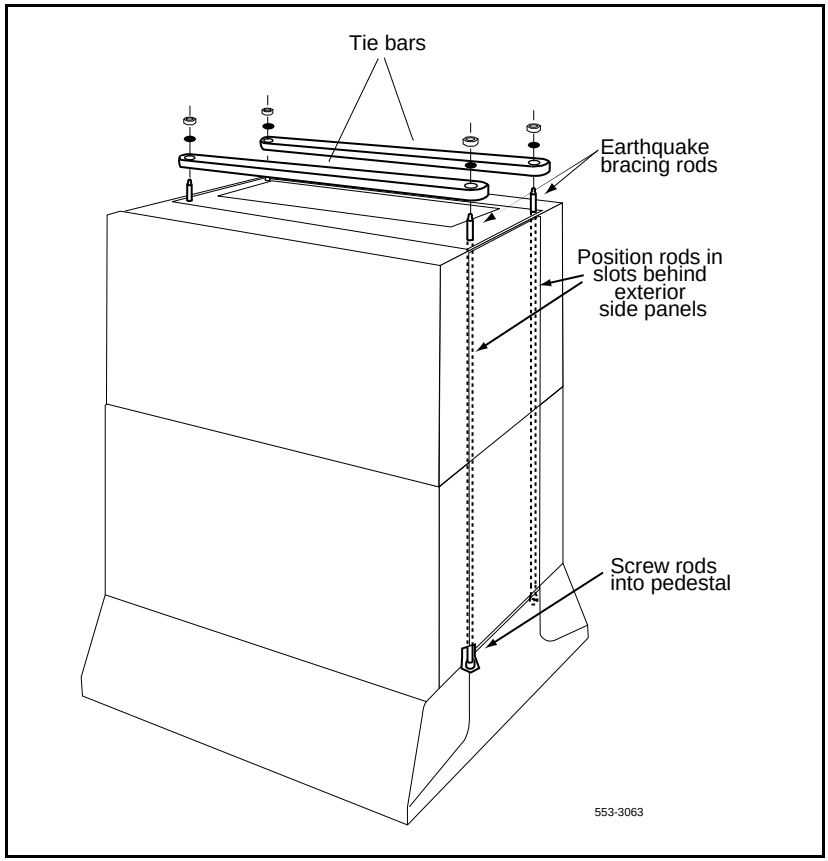


Figure 23
Column spacer

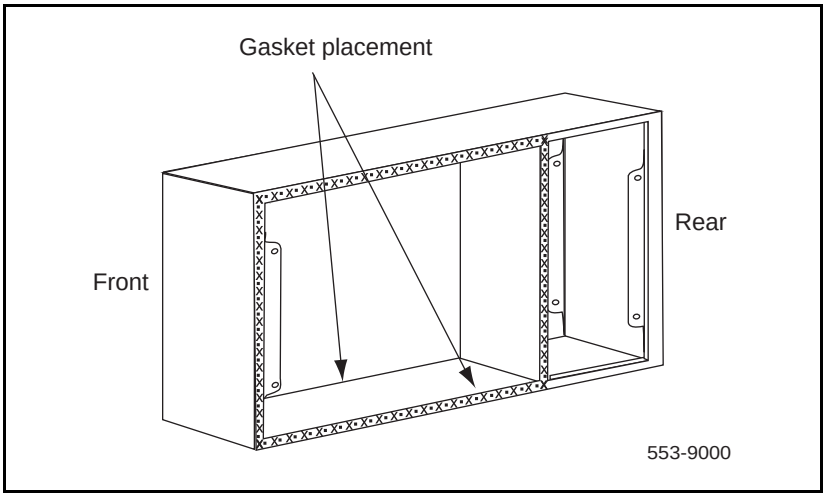


Figure 24
Add spacers to columns

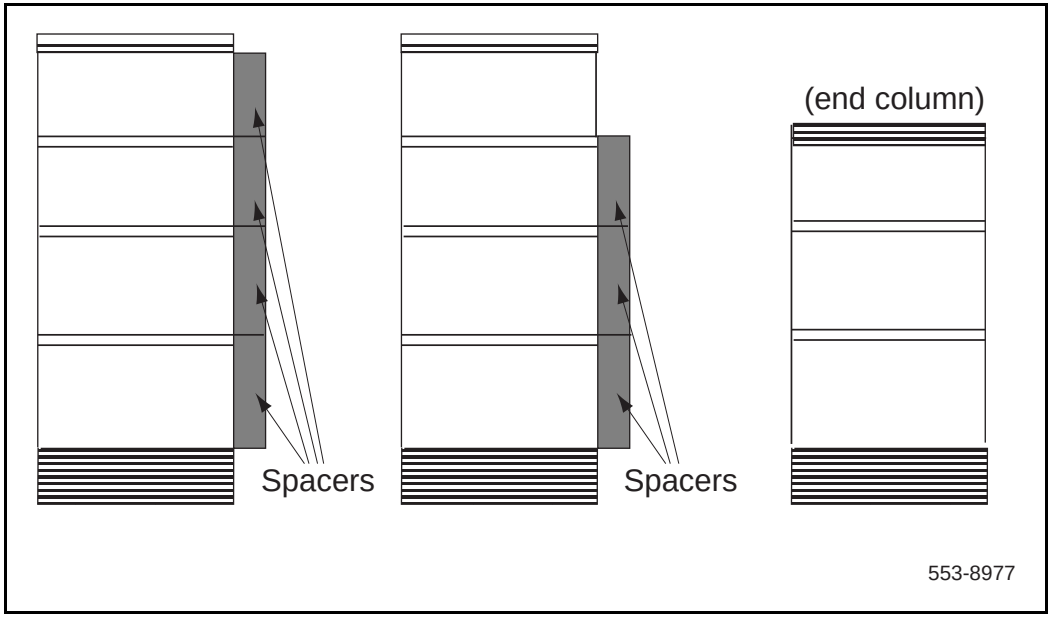
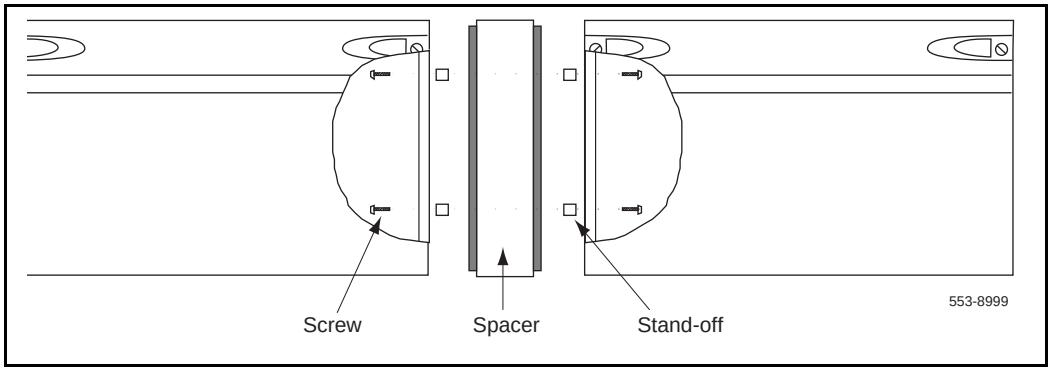


Figure 25
Column spacer assembly



Position and level the columns

Required tools are:

- 1 1/8 inch socket wrench (anchor bolts) for Kit A
- 24 mm socket wrench (anchor bolts) for Kit B
- 5/8” socket wrench (pedestal bolts)

1 Loosen the anchor bolts until the mounting plates are free to move.

2 Move the end column into position. Place the column on top of the anchor plates.

3 Loosely install the pedestal mounting hardware: 1/2” bolts, lockwasher, plain washer, and plastic insulating washer.

4 Level the column. Add or remove shims as needed.

5 Slide the shims completely under the seismic floor plates.

6 Tighten the pedestal mounting bolts: torque to 122 Newton-meters (90 ft.-lbs).

7 Tighten the concrete anchors: torque to 48 Newton-meters (35 ft.-lbs).

8 Repeat steps 1 through 7 for each column. Attach each column to the row. See Figure 26 on page 73.

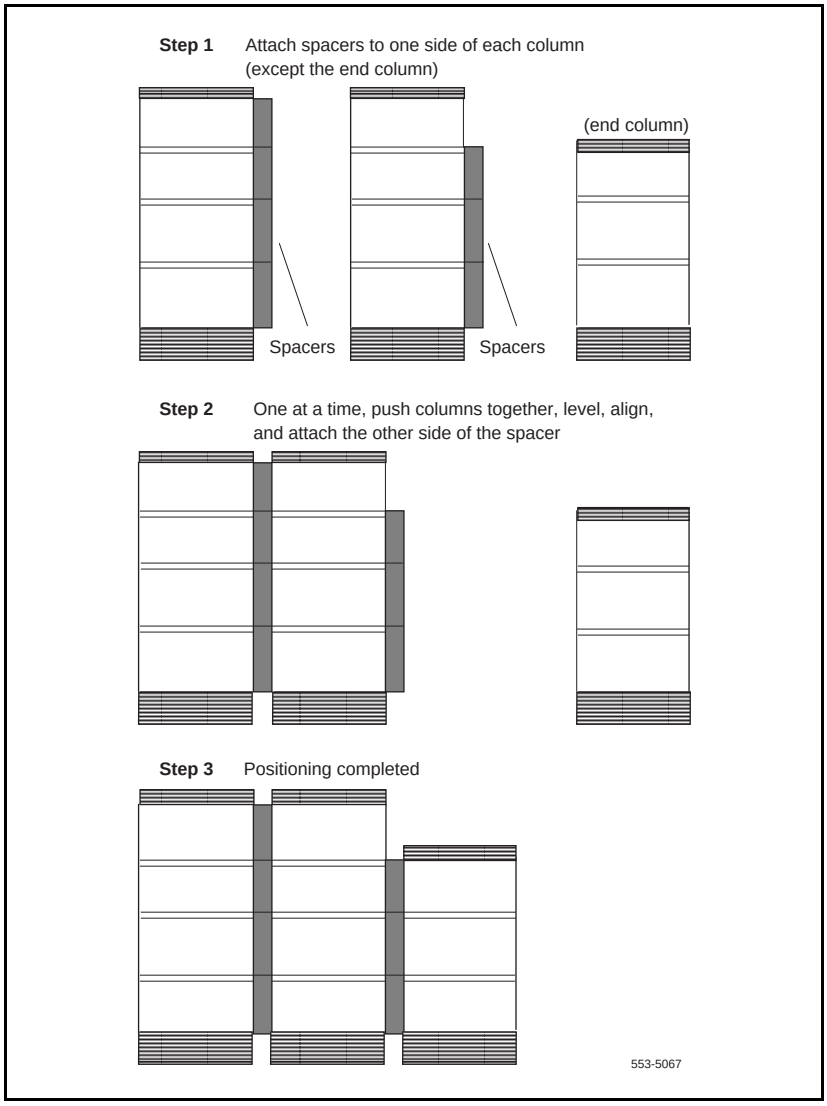
Attach the spacer bolts from the inside of the UEM. Fit the round standoffs between the module frame and the spacer. See Figure 25 on page 71.

WARNING

Do not pull the columns together by tightening the spacer screws or the spacers will be warped. Make sure the columns are securely in place and level before tightening the screws.

9 Repeat steps 1 through 8 until all the columns are in position.

Figure 26
Position and attach the columns



Install non-seismic bracing only if necessary

Task summary list

The following is a summary of the tasks in this section:

- Select the kit, page 74
- Install the NT8D64BF Floor Mounting Kit, page 74

In non-earthquake regions, the pedestal to floor attachment does not have to meets Bellcore or California OSHPD requirements.

Select the kit

NT8D64BF Floor Mounting Kit

This kit includes four anchor hardware sets, one to secure each corner of the column to the floor.

A minimum of two anchor sets can be used per column if they are placed in diagonally opposite corners.

This kit also includes four insulating washers to electrically insulate the bolts from the pedestal casting.

NT8D6401 Insulating Washer Kit

The NT8D6401 Insulating Washer Kit is used to electrically insulate the mounting bolts from the pedestal when a third party anchor kit is used.

Each NT8D6401 Insulating Washer Kit includes four insulating washers.

Install the NT8D64BF Floor Mounting Kit

1. Mark the position of each Meridian 1 column (use the equipment room floor plan as a guide).
2. Mark the location of the four anchor holes for each pedestal.
3. Center-punch the center of each hole in the floor.
4. Use a rotary hammer drill to make a hole in the following size and depth:
   - hole diameter 0.625”
   - hole depth 2.00”

5 Abandon the hole if you hit reinforcing bar or the hole breaks through. A minimum of two diagonally opposite anchors are required.

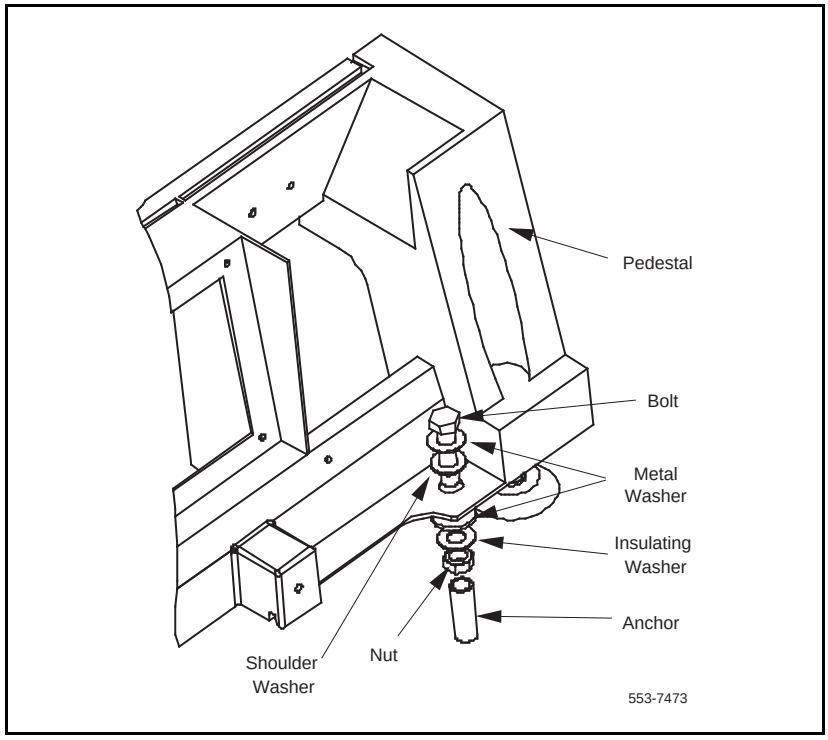
6 Remove debris from the hole with a blowout bulb or compressed air. Use a vacuum cleaner to dispose of the debris.

7 Insert the anchors into the holes. Use the manufacturer's setting tool to install each anchor flush with the surface of the concrete. Use the Hilti HST 1/2" setting tool, manufacturer part # 000329805 or equivalent.

8 Position each column over the anchors. Level the column.

9 Place a metal washer and shoulder washer onto the bolt. Insert the bolt into the pedestal hole. Thread a plastic washer, a metal washer, and the nut on the bottom side of the pedestal flange as shown in the Figure 27 on page 75.

Figure 27
Pedestal mounting flange (rear view)



10 Insert the bolt into the concrete anchor.

11 Tighten the nut to the pedestal flange and torque it to the 34 Newton-meters (25 ft.-lbs) with a 3/4” socket wrench. Do not overtighten.

12 Repeat steps 8 through 11 for each corner of the pedestal.

13 Attach each column to the row.

Attach the spacer bolts from the inside of the UEM. Fit the round standoffs between the module frame and the spacer. See Figure 25 on page 71.

Plan telephone lines and trunks

Content list

The following are the topics in this section:

- Introduction 77
- Design a cable plan for telephones and attendant consoles 78
- Plan and designate the Modular Distribution Frame (MDF) . . . 83

This chapter includes instructions to plan and install the telephone lines and trunks for a site. This chapter also includes instructions to connect those lines and trunks to a Modular Distribution Frame (MDF).

For instructions to connect lines and trunks from the MDF to the Meridian 1, see Connect lines and trunks to Meridian 1, page 185.

Introduction

The Meridian 1 provides switching capability for telephone communication. Telephone lines and trunks are not directly connected to the Meridian 1 switch. Instead, they are connected first to a Modular Distribution Frame (MDF). Additional lines are then connected between the MDF and the Meridian 1 equipment.

The telephone system of a site consists of the following components:

- Incoming lines and trunks that connect to the outside world.
- Interior telephone lines that connect a site's telephones and attendant consoles to the Meridian 1 switch.
- The MDF: a wiring block where both internal and external lines connect.
- The Meridian 1 system: all internal and external lines and trunks are indirectly connected to the Meridian 1 switch by way of the MDF.

Design a cable plan for telephones and attendant consoles

Task summary list

The following is a summary of the tasks in this section:

- Gather information, page 78
- Identify the zones, page 79
- Guidelines to determine wire routes, page 79
- Termination points, page 81
- Route the wires, page 81

Prepare a building cable plan to route the wires from each telephone and attendant console.

Include the location of distribution frames, conduits, access points, and power outlets.

Gather information

1 Identify the ownership of any currently installed building wire that will be used by the system.

2 Randomly test currently installed wires to ensure that they meet high-speed line specifications. All high-speed data wires must pass a verification test as part of the installation procedures.

3 Locate all conduits and floor ducts. Conduit used for telephone cable cannot be used for any other wiring.

4 Locate all main and intermediate distribution points.

Identify the zones

Divide the building cable plan into zones. Zones are typically the termination point of conduits throughout the office. Identify each zone on the building cable plan with a letter or number. Assign a block of numbers to each zone.

See Table 28 on page 80 for a sample zone illustration. Remember to leave room for expansion.

Guidelines to determine wire routes

To plan wire routes identify the start and end point of each wire; then determine the best routes based on the construction of the office. Use the guidelines below:

Floors

Route unconcealed wires along baseboard, ceiling moldings, or door and window casings. For the safety of employees, never run wire across open floor.

Route concealed wires inside floor conduits. Do not route wire under carpets.

Ceilings

National and local building codes specify the types of telephone wire that can run in each type of ceiling. Local building codes take precedence.

Walls

Vertical cables should run inside a wall, pole, or similar structure when possible.

Horizontal wires cannot be blind-fed through walls.

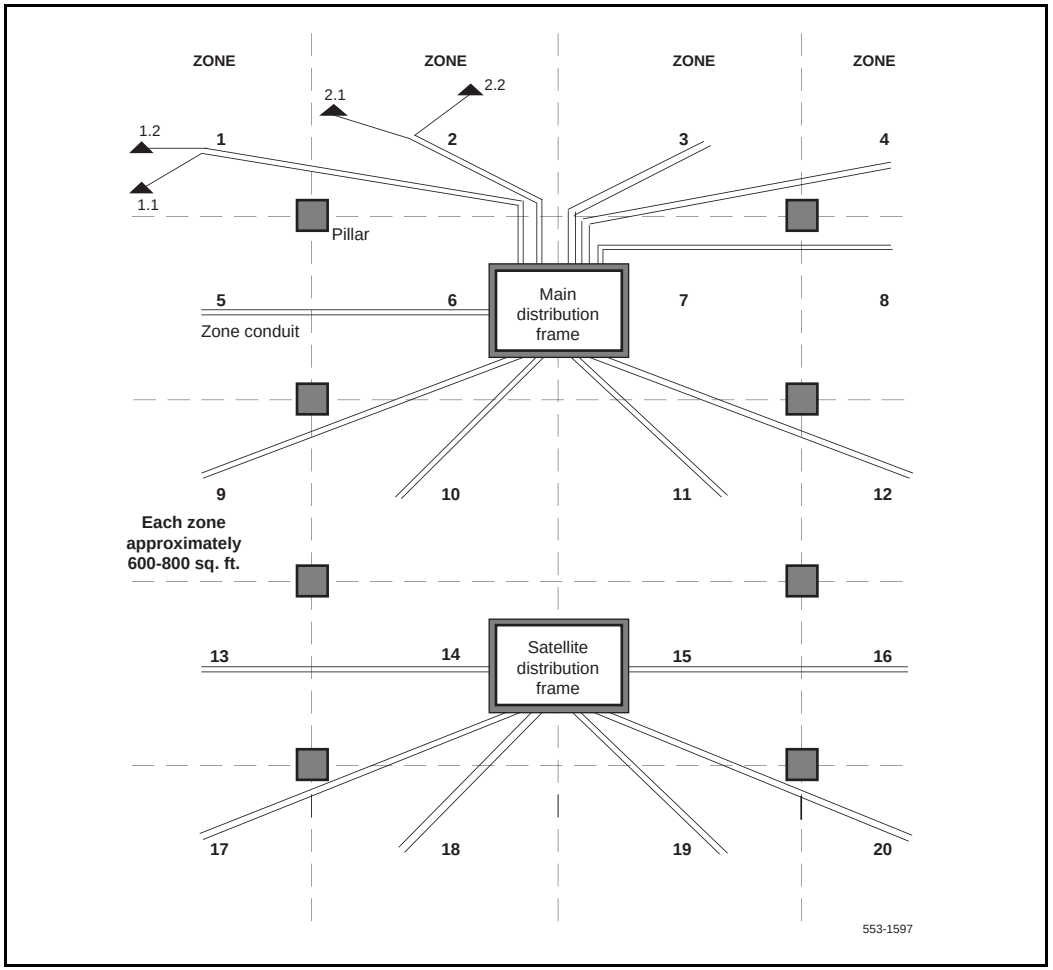
Between floors

Locate distribution frames as close to one another as possible. Local codes specify if a licensed contractor is required to install conduit.

EMI

Wires routed near strong EMI sources may experience data degradation. See EMI: Electromagnetic and radio frequency interference, page 51 for a description of common sources of interference

Figure 28
Building cable zones



Termination points

Once the wire routes are determined, identify the termination points. Cables can terminate at the following locations:

- the MDF, typically in the equipment room
- intermediate distribution frames, typically in the telephone utility closets on each floor
- wall jacks, typically located near the terminal device

At the distribution frame (also called the cross-connect terminal), house cables terminate on the vertical side of the two-sided frame and cross connect to equipment that is typically located on the horizontal. If you use a color field scheme, house cables typically terminate in the blue field and the equipment terminates on the purple (U.S.A.) or white (Canada) field.

In all cases, clearly mark the block where the cables terminate with:

- the cable location information
- the cable pair assignments

Keep a log book (cable record) of termination information. See Figure 29 on page 82.

Route the wires

1 Route three pairs of telephone wire from a distribution frame to a telephone jack near each terminal device. Modular jacks must be within 2. m (8 ft) of the device.

2 Route a 16-pair (or 25-pair) cable equipped with an Amphenol-type connector to each attendant console.

Figure 29
Sample cable record

CABLE RECORD

Customer _____
Location _____
Cable _____ Binder _____ Page ____ of ____

DN	TN				NAME	FEATURES / REMARKS	TERMINAL DEVICE	BLOCKS DF / HOUSE	COLOR
	L	S	C	U					W BL
									W OR
									W GR
									W BR
									W SL
									R BL
									R OR
									R GR
									R BR
									R SL
									BK BL
									BK OR
									BK GR
									BK BR
									BK SL
									Y BL
									Y OR
									Y GR
									Y BR
									Y SL
									V BL
									V OR
									V GR
									V BR
									V SL

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Plan and designate the Modular Distribution Frame (MDF)

Telephones and attendant consoles are not directly connected to the line cards in the Meridian 1. Instead, telephone lines are indirectly connected at the Modular Distribution Frame (MDF).

WARNING

Electrical shock hazard: Tip, ring, A, B, E, M, ESC, and ESCG connections are Telecommunications Network Voltages (TNV).

Contact your MDF vendor for cross-connect details.

Plan and install the power source

Content list

The following are the topics in this section:

- Introduction 85
- AC power system architecture 86
- DC power system architecture 89
- Power and ground requirements (North America) 92
- Install the ground source 96
- Reserve power 99

Follow the steps in this chapter to plan and install the power equipment for your site. This chapter describes the power equipment that is *external* to the Meridian 1 equipment.

For additional information to plan and install external AC or DC power, refer to *Power Engineering* (553-3001-152).

Introduction

The modular Meridian 1 power system

The internal Meridian 1 power system is modular. A power distribution unit (PDU) in each pedestal distributes AC or DC power to the power supply cards in each module. The power supply card converts the power to the required DC voltages and sends it to the Meridian 1 circuit cards.

The PDU in the pedestal also protects the modules from current or thermal overload.

Internal versus external power wiring

"**Internal**" power components are those contained within the Meridian 1. Meridian 1 components include the pedestal PDU, the module power supplies, and the wire harnesses.

- See Figure 31 "AC powered column" on page 88 and Figure 34 on page 91 for illustrations of internal power components.

"**External**" power components are those outside the Meridian 1 columns. AC systems without a UPS power backup system plug directly into the AC power source and have no external components. DC systems plug into external rectifiers (which then plug into the AC power source).

- See Figure 30 on page 87 and Figure 33 on page 90 for illustrations of external power components.
- Reserve power backup systems are also considered external components.

Differences between AC and DC systems

All functional elements within AC and DC Meridian 1 systems are identical: this includes equipment such as card cages, backplanes, circuit cards, and the system monitor.

Only the internal power equipment differs between AC and DC systems: the PDU in the pedestal, the power supplies in the modules, and the wiring harnesses are designed specifically for either AC or DC power.

AC power system architecture

AC-powered systems require no external power components and can plug directly into a commercial utility power source. AC voltage is converted into the required DC voltages by the power supplies in each module.

AC-powered systems are well-suited for small-to-medium-sized systems that require little or no reserve power.

Figure 30
AC powered system

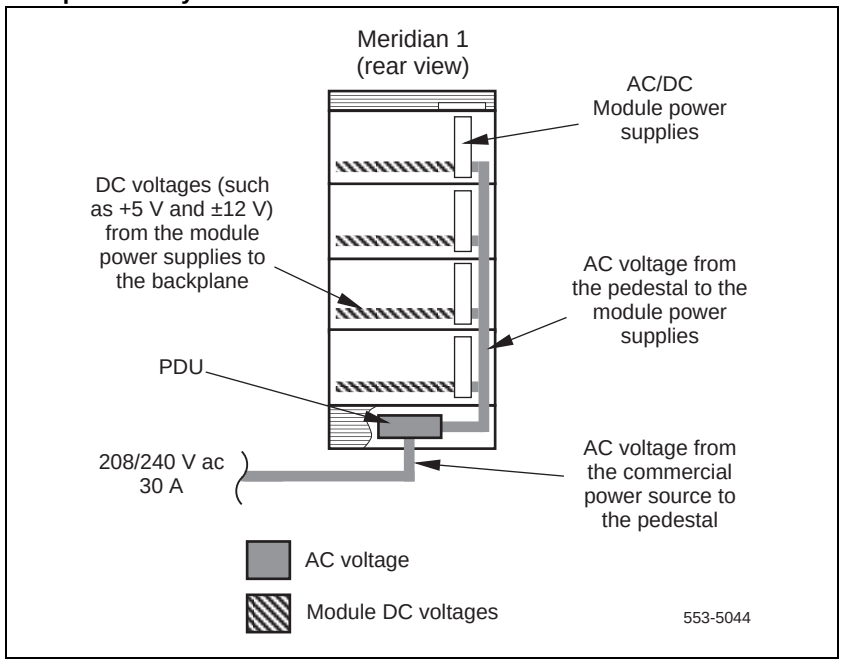
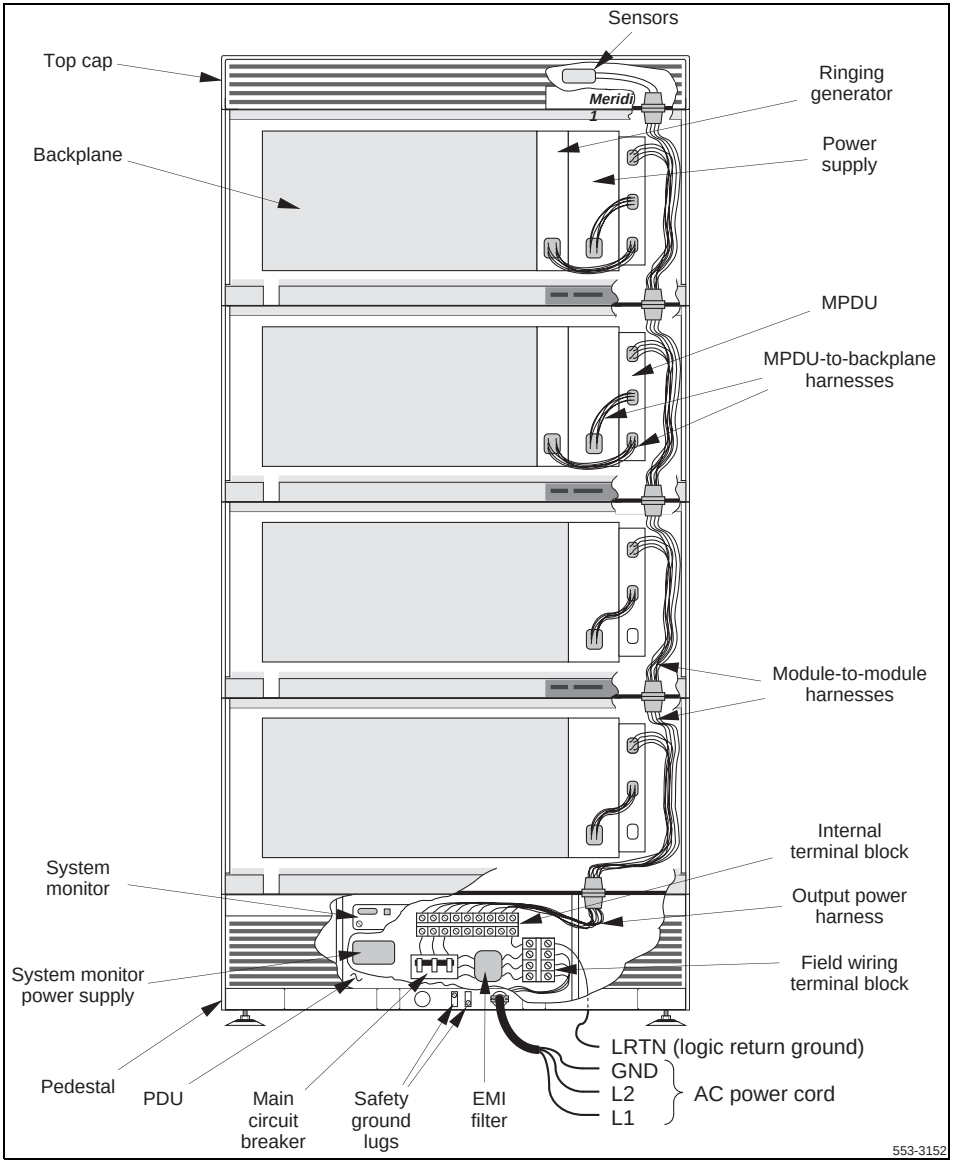


Figure 31
AC powered column

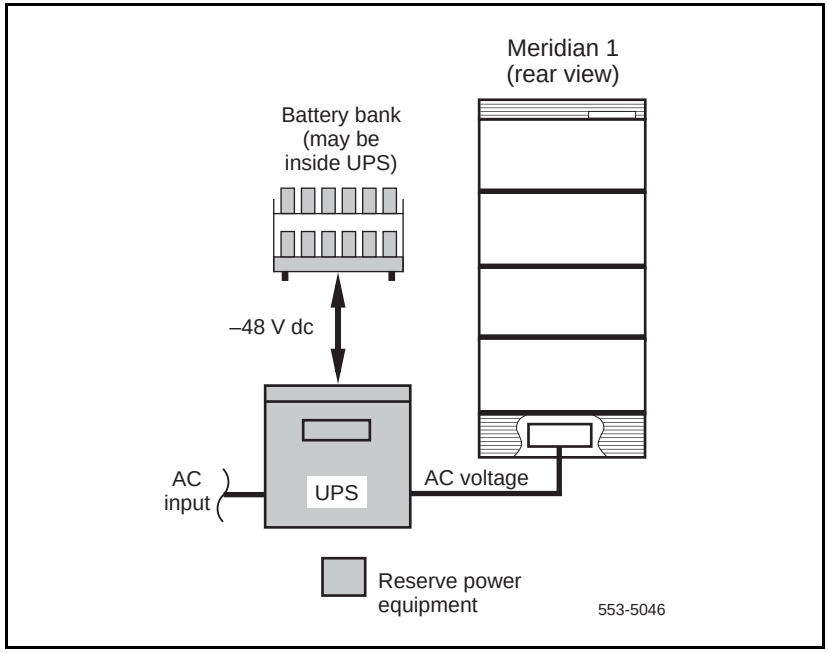


AC reserve power (UPS)

If AC reserve power is required, an uninterruptible power supply (UPS) is installed between the Meridian 1 system and the AC power source. A UPS system can provide between 15 minutes and 8 hours of reserve backup power.

UPS systems are also beneficial in systems that do not require power backup. A UPS provides power conditioning, including protection against sags, brownouts, and other low-voltage transient conditions that cause most power disturbances. See "Reserve power" on page 99 for instructions on installing a UPS.

Figure 32
AC powered system with UPS



DC power system architecture

All DC-powered Meridian 1 systems connect to external rectifiers which are then connected to a commercial AC power source. See Figure 33 on page 90.

DC-powered systems require a double conversion: the rectifiers first convert the AC voltage to DC voltage and send it to the Meridian 1 column. The power supplies in each module then convert the raw DC voltage to the DC voltages required by Meridian 1 components.

DC power is recommended for large systems that need eight or more hours of reserve power. DC power is also used in sites where DC power plants or batteries already exist.

Figure 33
DC powered system

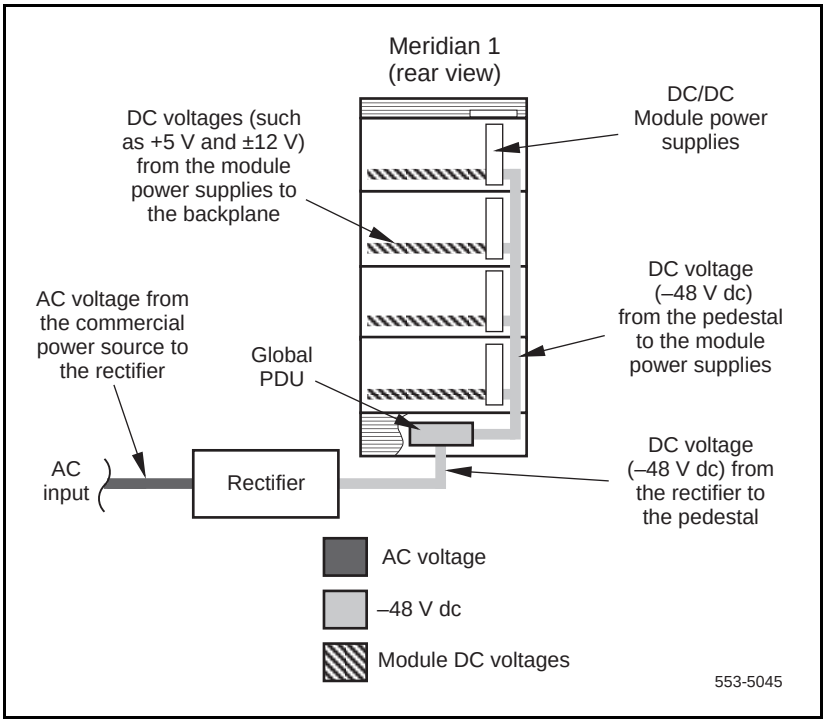
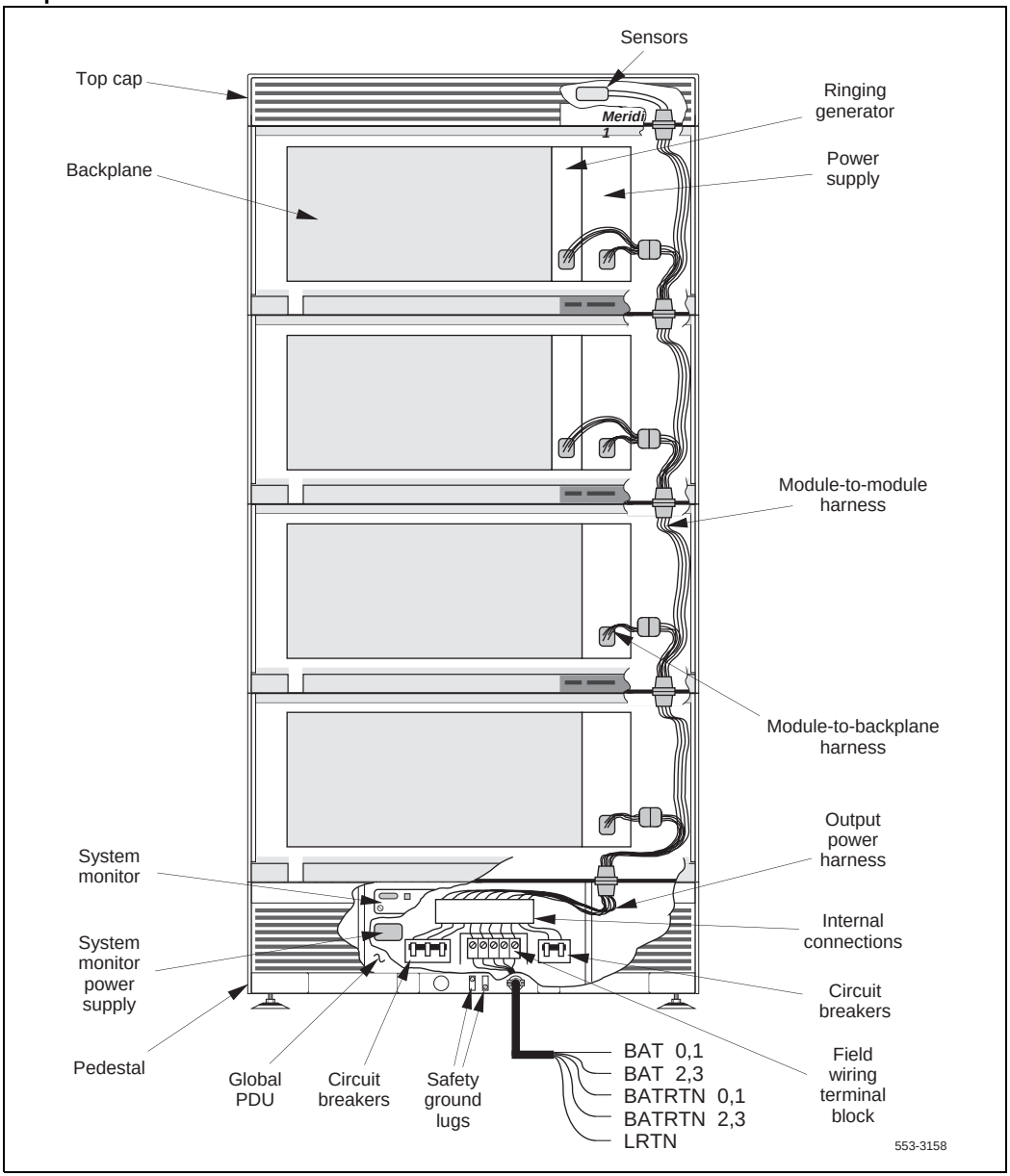


Figure 34
DC powered column



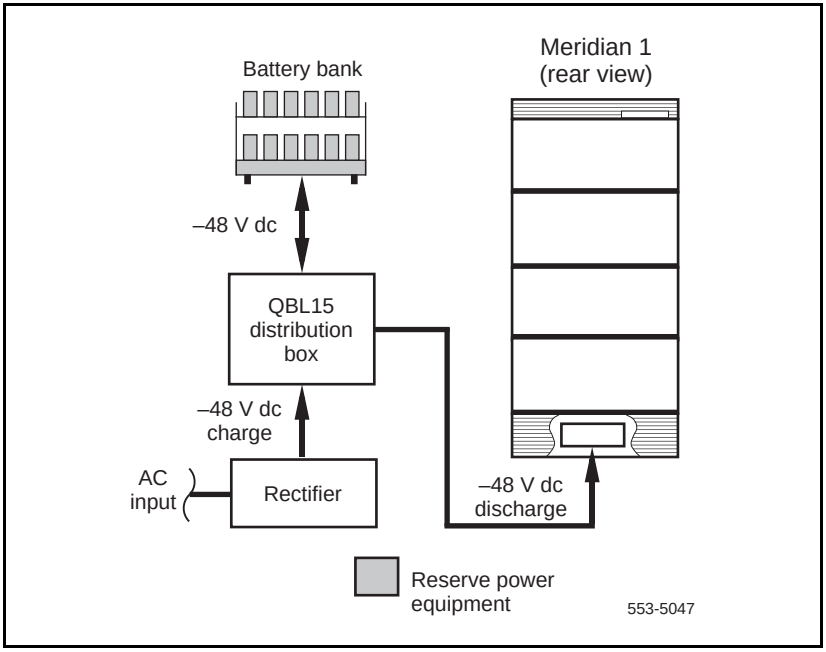
DC reserve power

An additional set of DC batteries are used for reserve power.

Nortel Networks offers complete DC power systems and power plants. Customer provided DC power systems can also be used.

See “Reserve power” on page 99 for instructions on installing DC batteries.

Figure 35
DC-powered system with battery bank



Power and ground requirements (North America)

AC power specifications

In an AC-powered system, no power components external to the Meridian 1 columns are required. AC systems perform a single conversion from the AC input voltage to the DC voltages required by circuit cards in each module. Optional reserve power is provided by an uninterruptible power supply (UPS) and batteries.

AC power supplies operate from a nominal input of 208 to 240 volts AC, single-phase. While the actual input range of the AC power supplies is 180–280 V, no restrapping the power supplies is required if the input line voltage is within 208–240 V.

AC-powered systems require one IG-L6-30 or L6-30 receptacle for each column within 2.4 m (8 ft) of the column's pedestal. Each column comes equipped with one 30 A cord and plug.

> ***Note:*** Do not use ground fault circuit interrupt (GFCI) devices on Meridian 1 AC power circuits.

As an alternative to using the power cord and plug, AC input to the PDU may be wired directly. Use #10 AWG conductors routed through 1.9-cm (3/4-in.) conduit. Connect the conductors to the input terminals on the field wiring terminal block in the PDU for a 240 V AC input, as indicated in Table 12 on page 93.

Table 12
AC input connections

AC input conductor	Meridian 1 PDU terminal
Hot—Phase I	L1
Hot—Phase II	L2
Safety Ground	GND

All AC input power wiring must contain a separate safety ground conductor (green wire). Nortel Networks strongly recommends a dedicated AC supply that runs uninterrupted from the building primary source to a dedicated equipment room service panel.

> ***Note:*** Follow all applicable electrical codes if the AC input is wired directly to the PDU.

If reserve power is used, install the UPS, along with its associated batteries (which may be internal or external to the unit), in series with the commercial power source. The Meridian 1 systems then plugs into the UPS. Consult the UPS manufacturer for requirements of the UPS power input receptacle.

DC power specifications

The DC power system must be able to provide the required current and operate within the specifications listed in Table 13 on page 94.

Table 13
Input specifications—DC power system

Input	Pedestal	Battery
Maximum range	–40 to –56.5 V	–42 to –56.5 V
Expected nominal (24 stationary cells)	—	–52.08 V
Expected nominal (23 sealed cells)	—	–51.75 V
Expected nominal (24 sealed cells)	—	–54.00 V
Noise (max C msg)	—	22 dBrnC (See Note)
Note: Without battery, C msg (max) is 32 dBrnC.		

Input power specifications

Meridian 1 DC-power plants require one separate AC input per rectifier, within 1.8 m (6 ft) of the rectifier. The total requirements for commercial AC power input is determined by the number and type of rectifiers used.

Note 1: Do not confuse the output rating of the rectifiers in DC amps with input requirements in AC amps.

Note 2: NT7D10AA and NT7D10DA PDUs with the NT6D53 junction box can be used to distribute the power to Meridian 1 when the power source is at a distance from Meridian 1. Refer to NT6D53 Junction Box and Table A-7 in *System Installation Procedures* (553-3001-210) for junction box implementation and power and ground wire gauges determination for various distances of power source to Meridian 1. Also, refer to *Wire size calculation* in this manual for determining the required wire size based on the current required and the distance between the power source and Meridian 1. A junction box may be used with the NT7D67CB PDU, but it is not required.

Circuit protection

RS-232 port protection

RS-232 type interfaces are susceptible to induced lightening damage when hardwired lines are run building to building. As little as 25 volts can cause damage. Typically only pins 2 (send), 3 (receive) and 7 (signal ground) are connected end to end via twisted shielded pairs.

Although the RS-232 specification supports only 50 feet of operation, many applications successfully pass data at much longer distances. However, problems arise when different grounds are used at the two ends of the cable. Grounding at both ends will cause a ground loop current to flow in the shield due to the fact that each ground point will most likely be at a different potential. This current flow will induce a voltage onto the signal or data lines resulting in erroneous data or fault conditions.

To prevent the creation of a current loop, the shield must only be grounded at one end and in general this takes place at the system end. SDI ports must be connected to the I/O panel at the rear of the M1 switch. RS-232 cables should then be connected to the I/O panel. RS-232 cables should never be connected directly to the connector on the SDI pack.

A modem or isolator must be installed for all RS - 232 devices not connected to the Meridian 1 AC equipment panel ground.

Off Premises Line Protection

All voice and data lines which run externally from the building that contains the Meridian 1 must have proper line protection. The cable sheath must be connected to the SPG.

AC Service panel requirements

AC power service panels must meet the requirements below:

- Panels must be located in the equipment room.
- No lights, air conditioners, heaters, generators, or motors may be connected to this service panel.

Install the ground source

Install the ground source before Meridian 1 installation. Adding a ground later is difficult and costly.

> **WARNING**
> Proper ground wiring is an essential step in Meridian 1 installation. Improper wiring can cause intermittent problems such as unplanned system initialization or system reloads. Improper wiring can also cause damage to circuit cards, and in some instances, personal injury or death to the technician.

Single Point Ground

A Single Point Ground (SPG) is a point at which multiple ground wires are consolidated at a single ground source.

Examples of SPGs are an isolated ground (IG) bus or AC Equipment Ground (ACEG) busbar in the service panel or transformer.

The SPG may also be a separate external bus that connects multiple ground wires to a single point in the service panel or transformer. A copper LRE is one example.

Examples of SPG busbars

The following busbars can be used as system Single Point Ground (SPG):

- Building principal ground (BPG), typically in single floor buildings.
- Floor ground bar (FGB), typically in multi-floor buildings.
- Dedicated SPG bar bonded to the building grounding systems.
- A section of the battery return (BR) bar of the power plant.

The various subsystems (such as groups of frames or equipment) of an IBN system can be configured as individual SPG entities, connected in a star configuration to the system SPG (star IBN).

Guidelines for implementing Single Point Ground

- All ground conductors must comply with local electrical codes and be terminated in a manner that is permanent, resulting in low impedance connections.
- All terminations should be readily accessible for inspection and maintenance.
- A grounding conductor must be continuous with no splices or junctions.
- The insulated grounding wire size must comply with the National Electric Code (NEC) Sections 250-94, 250-95, and 310-95.
- Conductors must be insulated against contact with foreign (non-AC) grounds.
- The use of building steel as an integral part of the ground system is not recommended.

Importance of a proper Single Point Ground

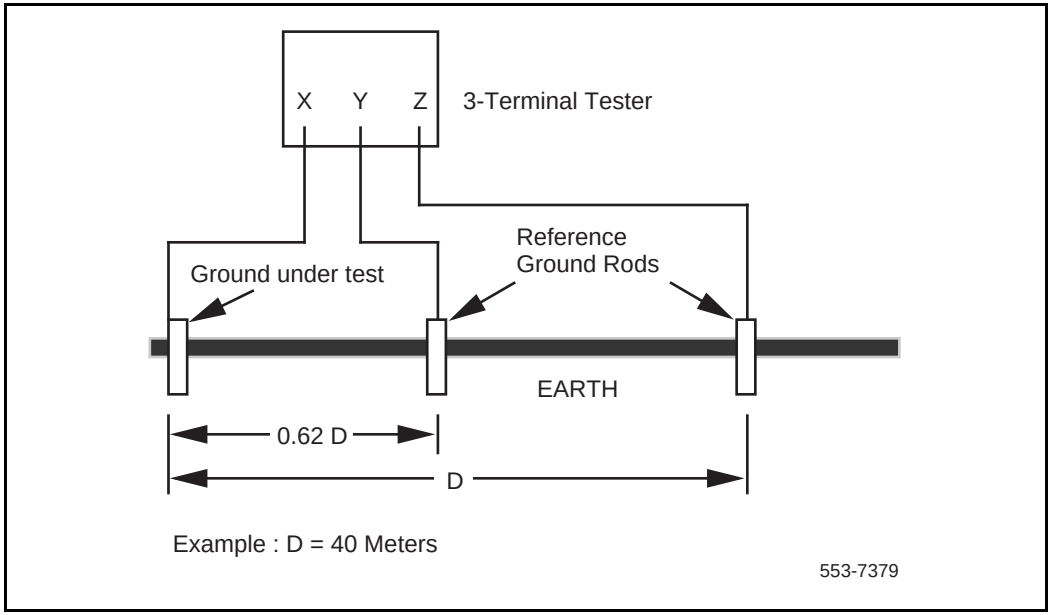
- **Safety**: For the safety of company personnel, the ground system must dissipate surge energy (such as lighting strikes on the outside plant). The ground system must also include fuses or breakers that switch OFF if a power fault causes excessive current flow.
- **Avoid equipment failure**: A proper ground helps prevent equipment failure. All indoor equipment, framework, batteries and logic equipment must be well grounded. Outside power plant cable shields and protectors must also be properly grounded.
- **EMI malfunctions**: Proper grounds prevent Electromagnetic Interference that causes equipment malfunction.
- **Sufficient power:** A good ground design supports all aspects of the power system, including DC batteries or an AC uninterruptible power supplies (UPS). All equipment associated with the telecommunication system should be considered as one large system.
- **Cost effectiveness:** A properly grounded system reduces system malfunction and downtime.

Identifying good grounds

A good ground is one where the resistance of the rods or plates to ground is as low as practical. A recognized industrial standard is 0.5 ohms.

Visually inspect that the connection of the ground conductor to the main ground is soundly made. A three terminal tester can also be used to verify the quality of the ground. See Figure 36 on page 98.

Figure 36
Three terminal testing



Refer to the three terminal tester manufacturers handbook for testing instructions.

RS-232 port protection

RS-232 type interfaces are susceptible to lightening damage when hardwired lines are run between buildings. As little as 25 volts can cause damage. Typically only pins 2 (send), 3 (receive) and 7 (signal ground) are connected end to end via twisted shielded pairs.

Although the RS-232 specification supports only 50 feet of operation, many applications successfully pass data at much longer distances. Problems occur when different grounds are used at the two ends of the cable. Because these grounds are often different, a ground loop current flows in the shield. This voltage in signal or data lines causes false data or fault warnings.

To prevent a current loop:

- Ground the shield only at the system end.
- Connect SDI ports to the rear I/O panel.
- Connect RS-232 cables to the I/O panel.
- Never connect RS-232 cables directly to the SDI pack connector.

A modem or isolator must be installed for all RS - 232 devices not connected to the Meridian 1 AC equipment panel ground.

Off Premises Line Protection

Voice and data lines routed outside the building that contains the Meridian 1 must have proper line protection. The cable sheaths must be connected to the SPG.

Reserve power

Reserve power is available for both AC and DC systems. When selecting reserve power equipment, consider:

- future system growth
- maximum time backup power is required
- existing power system capacity
- space and thermal environment (air conditioning)
- other equipment, such as lights and alarm systems

Reserve power for AC systems is provided by uninterruptible power supplies (UPS), installed in a series with the commercial power source. A UPS generally consists of a combination battery charger (AC/DC converter) and inverter (DC/AC converter), along with associated batteries. The batteries may be internal or external to the UPS. A UPS is not a standby power source, but an on-line unit with no output interruption when the AC power is interrupted.

DC systems use the traditional telecommunications powering method: external rectifiers (AC/DC converters) continuously charge a bank of batteries while the system power "floats" in parallel on the battery voltage.

AC reserve power

There are a number of UPS vendors and systems available. Factors to consider when choosing a UPS include:

- input voltage and frequency range
- output voltage and current capacity
- number and type of output receptacles
- regulatory and safety agency approvals
- efficiency and performance considerations
- alarm and status indications
- battery recharge time
- maximum time backup power is required
- existing batteries or other power equipment available at the site
- future system growth

UPS sizing

To determine UPS sizing, first calculate the total power requirements of the column (or columns) supported by the UPS. Convert the real power in watts (W) to complex or "apparent" power in volt-amperes (VA) by dividing the real power by the typical system power factor of 0.6. Then size the UPS in terms of its rating in VA (or kVA). For AC-powered Meridian 1 systems, Autoquote calculates the system power consumption in both watts and volt-amperes.

$$VA = \frac{W}{0.6}$$

To determine the sizing and provisioning of UPS batteries, follow the instructions provided by the UPS manufacturer. A general approach, however, is to take the total system power in watts, divide by the UPS inverter efficiency, and convert to battery current drain by dividing by the nominal discharge voltage of the battery string. Then multiply the battery current drain by the time needed for the reserve power to operate to determine the battery requirements in ampere-hours (A-hrs).

$$Ahr = \left(\frac{W_{total}}{V_{dischg}}\right) T_{reserve}$$

UPS interfacing

A UPS must meet the following requirements in order to be used with Meridian 1 systems:

- The UPS specifications must meet the commercial power specifications of the Meridian 1:
  - nominal output voltage range of 208–240 V AC, with a total input range of 180–250 V AC
  - nominal frequency of 50–60 Hz, with a total range of 47–63 Hz
  - total harmonic distortion (THD) of 5%, with 3% on any single harmonic, of the AC sine wave
- The UPS must be able to handle a non-linear loads (the AC module power supplies are a switched-mode design) and have a current crest ratio of 3.0 or greater.
- The UPS must be UL listed and certified under FCC Part 15, Subpart J as a Class A device.
- The UPS must have a 30 A, 250 V locking power receptacle (L6-30) for each Meridian 1 column to be powered.
- The UPS must meet ANSI standard C62.41 and IEEE standard 587-1980, class A and B, for transient surge suppression.

Note: It is convenient for the UPS to have one or more 120 V power outlets (5-15R) for auxiliary devices that must have backup power, such as the power fail transfer unit power supply.

UPS installation

When installing a UPS, follow the vendor's instructions carefully.

> ***Note:*** UPS installation can be complex. Nortel Networks recommends taking advantage of vendor training programs.

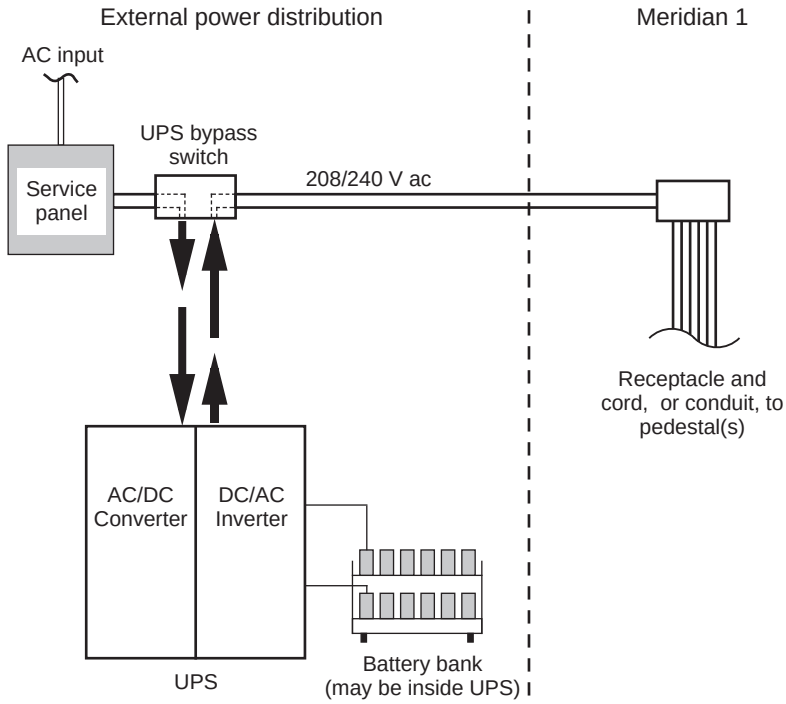
It is recommended that a bypass switch be installed during the initial UPS wiring (if the switch function is not inherently a part of the UPS itself). The UPS bypass switch allows the Meridian 1 to run directly from the commercial power source while the UPS is taken off-line during installation, service, or battery maintenance.

CAUTION

Take care when connecting battery cables to the UPS. Connecting battery cables backward can result in severe damage to the UPS.

Figure 37 on page 103 shows a general block diagram of a UPS installation and associated wiring.

Figure 37
AC reserve power configuration



Note: The AC safety ground (green wire) must route from the service panel, through the UPS, to the Meridian 1 panel or receptacles.

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Power conditioning

The term “power conditioner” refers to a wide variety of power protection or power quality improvement devices, such as low-pass filters, surge arrestors, line voltage regulators, and isolation transformers. Most of these devices can help prevent power line spikes and surges, and some isolation transformers can provide good noise rejection.

Although most power conditioning devices do not provide energy storage for undervoltage conditions, they can help prevent surges and other overvoltage conditions that can cause permanent damage to equipment.

When choosing UPS protection and power conditioning equipment, remember that over 90 percent of power disturbances in the U.S. are undervoltage conditions such as sags and outages. When there are U.S. power disturbances:

- 87% are power sags; 90% of these last 0.53 seconds or less
- 7.4% are impulses or spikes lasting less than 100 microseconds
- 4.7% are longer-term power failure; 90% of these last 4.2 hours or less, 75% last 40 minutes or less, and 50% last 38 seconds or less
- 0.7% are surges lasting more than 100 microseconds

Low voltage transients occur most frequently and may cause temporary loss of operation. High voltage transients occur much less often, but can cause damage to equipment as well as loss of operation.

Carefully consider the type of power line protection needed for the installation under consideration. A power conditioner can help provide overvoltage protection, but a UPS can (usually at a higher price) provide both overvoltage and undervoltage protection.

Alarm monitoring

Nortel Networks offers a system monitor to UPS interface cable for each of the product lines that have been tested for Meridian 1 compatibility. The system monitor interface is not supported for other vendors. Table 14 on page 104 lists the UPS-to-system monitor alarm cables that are available. UPS systems are not offered by, or available through Nortel Networks, but can be purchased directly from vendors or through authorized distributors.

Table 14
UPS-to-system monitor alarm cables

UPS vendor	Cable part number	Quantity
Alpha Technologies	NT8D46AU	one per UPS
Best Power Technology	NT8D46AJ	one per UPS
Exide Electronics	NT8D46AQ	one per UPS

The alarm interface consists of an “Inverter On” signal to indicate that the commercial power is interrupted and the UPS alone is supplying power to the system, and a “Summary Alarm” signal to indicate a fault or alarm condition at the UPS.

DC reserve power

Reserve power for DC systems is provided by adding batteries to the external power distribution system. Calculate reserve battery capacity as shown in “UPS sizing” on page 100. This determines the total ampere-hour requirements of the batteries.

To comply with safety requirements, read and fully understand the following documents before working with any battery systems:

- OSHA “Material Safety Data Sheet” that must be posted to meet OSHA requirements. This document outlines save reserve battery handling procedures.
- National Electric Code 645-10. This document outlines requirements that call for the installation of AC- and DC-power kill switches to battery systems in certain environments.

Current requirements

The DC current required for battery reserves is based on the total system power requirement. For new installations you can determine power and battery requirements from data provided by Nortel Networks.

Batteries

The reserve battery capacity required depends on the system line size (load), the time the reserve supply must last in the event of a power failure, and the battery end voltage. Table 15 on page 106 gives guidelines for reserve battery float and equalization voltages. These voltages must never be more negative than –56.5 V.

Table 15
Battery requirements

Battery configuration	Float voltage (V)		Equalize voltage (V)	
	Cell	Bank	Cell	Bank
24 stationary cells	–2.17	–52.08	–2.25	–54.00
23 sealed cells	–2.25	–51.75	–2.35	–54.05
24 sealed cells	–2.25	–54.00	–2.35	–56.40

Lead-calcium/absolyte batteries

Battery package provisioning is based on the number of Amp-hours required. Since battery package Amp-hour ratings are generally given at an eight hour discharge rate, adjustment factors are required to determine the required battery package. Table 16 on page 107 lists adjustment factors for lead-calcium and absolyte batteries. These factors are based on the discharge rates of the respective battery types from a specific supplier. Discharge characteristics may vary by manufacturer.

Table 16
Adjustment factors for lead-calcium and absolyte batteries

Reserve Hours	Lead Calcium Factor	(Sealed) Absolyte Factor
1	3.0	1.8
2	4.0	3.1
3	5.0	4.2
4	5.9	5.2
5	6.9	6.2
6	7.7	7.1
7	8.5	7.8
8	9.3	8.5
9	10.1	9.4
10	10.9	10.2

Note: If a system requires more than 10 hours of backup, the factor is linear. For example, if 15 hours are required, the factor is 15.

Calculate battery requirement using this formula:

$$Ahr = I_L \times F_{adj}$$

where

Ahr = battery requirement in amp-hours
I_L = system load, in amps
F_{adj} = appropriate adjustment factor from Table 16 on page 107

When using lead-calcium or sealed batteries, calculate battery recharge time using this formula:

$$T = \frac{Ahr \times 1.15}{I_{RO} - I_L}$$

where

T = battery recharge time
Ahr = battery capacity in amp-hours
I_L = total system load, in amps
I_{RO} = total rectifier output, in amps

Other battery considerations are:

- Not all sealed cells require equalization, but equalization voltage can be used for fast charging. Use a battery end voltage of 44 V when choosing battery banks.
- Use these electrical noise limitations for a battery bank:

— 20 mV rms maximum ripple

— 32 dBrnC maximum noise

- CEMF cells are not recommended because the noise they generate is unacceptable.

Prepare for Meridian 1 installation

Content list

The following are the topics in this section:

- Confirm that site and external equipment is installed correctly. 109
- Review inventory 110
- Review required equipment 111

Confirm that site and external equipment is installed correctly

Make sure that all the tasks listed below are completed before you begin Meridian 1 installation:

1 “Equipment room requirements” on page 42.

2 “Design a fire protection system” on page 52.

3 “Design a floor plan” on page 54.

4 “Install earthquake bracing if necessary” on page 59.

5 “Install non-seismic bracing only if necessary” on page 74.

6 “Plan telephone lines and trunks” on page 77.

7 “Plan and install the power source” on page 85

Failure to complete these tasks will result in increased installation time, possible system failure and an unsafe working environment.

All external systems must be installed before Meridian 1 installation is begun.

Review inventory

1. Confirm that all items on the packing slip have been received. These items should include all the required equipment listed in Table 17 on page 112 (AC systems) or Table 19 on page 115 (DC systems)
2. Inspect all equipment for physical damage. Report any damage to your supplier.

Review required equipment

Table 17 on page 112 lists the minimum equipment requirements for Option 81C systems with CP PII. Table 18 on page 115 lists the power-related equipment requirements for systems with DC power. Table 19 on page 115 lists the power-related equipment requirements for systems with AC power. Additional equipment may be required for increased capacity or features.

- The Option 81C system requires the following feature packages to be enabled: Call Processor PII (368) and Option 81C Software Package (299) . The Fiber Network Software Package (365) is required for the Fiber Network Fabric option.
- The maximum number of network groups supported on Option 81C with the Fiber Network Fabric is eight groups with X11 Release 25 or later software.
- This package is equipped with two (2) network groups. Additional groups can be ordered separately.
- This package contains two NT4N65 cards that provide CNI to 3PE connections for the first two network groups. Additional network groups require the purchase of two NT4N65 for Core 1 and Core 2 (each card supports two groups). Additional NT4N65AA cards must be ordered separately. Four NT8D76 cables must be ordered separately for each additional network group.
- Two (2) QPC471H (or QPC775) Clock Controller Cards must be ordered separately.
- Additional NT9D18AA Module Side Covers and NT8D49AA Column Spacer Kits to cover all exposed sides of modules, and to connect modules side-by-side, must be ordered separately.
- For DC systems, one NT6D42CD Ringing Generator DC must be added for each IPE Module in which analog type peripheral cards are to be used. Otherwise, one NT7D05AA Filler Panel-Ringing Generator must be equipped.
- For AC systems, one NT8D21AB Ringing Generator AC must be added for each IPE Module in which analog type peripheral cards are to be used. Otherwise, one NT7D05AA Filler Panel-Ringing Generator must be equipped.

- This package includes sixteen NT8D81AA Tip and Ring Cables within the IPE Module.

Table 17
Minimum requirements for new systems with AC or DC power (Part 1 of 3)

Part number	Description	Quantity (minimum per system)
A0810496	CP PII Call Processor Card (128MB Memory)	2
NT1R91AA	Modem Kit	1
NT4N43AA	cPCI Multi-Media Disk Unit	2
NT4N65AB	cPCI Core Network Interface Card (2 ports)	2
NT4N66AB	cPCI CNI Transition Card	8
NT4N67AA	cPCI System Utility Card	2
NT4N68AA	cPCI System Utility Transition Card	2
NT4N6809	Security Device Holder	2
NT4N88AA	CP PII to I/O DTE Cable (48 in.)	2
NT4N88BA	CP PII to I/O Panel DCE Cable (48 in.)	2
NT4N89AA	System Utility to XSM Cable	2
NT4N90AA	CP PII to I/O Panel Ethernet Cable (48 in.)	2
NT5D30AA	Dual InterGroup Switch [1]	4
NT5D84AA	Dual Security Device Kit	1
NT7D06AA	Filler Panel	2
NT8D01BC	Controller - Four Card	1
NT8D04BA	SuperLoop Network Card	1
NT8D17FA	Conference/TDS Card	4
NT8D22AC	System Monitor	2

Table 17
Minimum requirements for new systems with AC or DC power (Part 2 of 3)

Part number	Description	Quantity (minimum per system)
NT8D36AA	InterGroup Module [1]	1
NT8D41BA	Quad SDI Paddle Board	1
NT8D46AG	System Monitor to SDI Cable (34 In.)	1
NT8D46AL	System Monitor Serial Link Cable (7 Ft.)	1
NT8D46AS	System Monitor Inter-CPU Cable (30 In.)	1
NT8D49AA	Column Spacer Kit (2.75 In.)	2
NT8D74BD	Clock Controller to Junctor Cable (6 ft.) [1]	1
NT8D74BE	Clock Controller to Junctor Cable (8 ft.) [1]	1
NT8D76BD	cCNI to 3PE Cable (5 ft.) [1]	2
NT8D76BE	cCNI to 3PE Cable (6 ft.)	2
NT8D76BF	cCNI to 3PE Cable (8 ft.)	6 [1] 2 [2]
NT8D76BG	cCNI to 3PE Cable (10 ft.) [1]	2
NT8D80BZ	CPU Interface Cable (5 ft.)	2
NT8D84AA	SDI Paddleboard to I/O Cable (18 in.)	3
NT8D90AF	SDI Multi-Port Extension Cable (10 Ft.)	1
NT8D91AD	Network to Controller Cable (6 Ft.)	1
NT8D99AB	CPU to Network Cable (2 Ft.)	5
NT8D99AD	CPU to Network Cable (6 Ft.)	2
NT9D18AA	Module Side Cover	8 [1] 6 [2]

Table 17
Minimum requirements for new systems with AC or DC power (Part 3 of 3)

Part number	Description	Quantity (minimum per system)
NTRC17AA	CP PII Ethernet to Ethernet Cable (8.5 ft.)[2]	2
NTRB33AA	Fiber Junctor Interface Card (FIJI)[2]	4
NTRC46BA	Clock - FIJI Cable (5.5ft - 8ft/ 1.7m - 2.4m)[2]	2
NTRC47AA	FIJI - FIJI Synch Cable[2]	1
NTRC48AA	FIJI Fiber Ring Cable - 6ft/2m[2]	2
NTRC48BA	FIJI Fiber Ring Cable - 10ft/3m[2]	2
NTRC49AA	Clock - Clock Synch Cable[2]	1
NTRE39AA	Optical Cable Management Card (OCMC)[2]	2
NTRE40AA	Dual Ethernet Adapter (RJ45) for I/O Panel	2
NTZC91BA	Software Installation Kit (non-autovon)	1
P0712003	Instruction Package	1
P0738686	Meridian 1 Pallet Ramp Set	1
P0906308	cPCI Card Slot Filler Panel	16
QPC43R	Peripheral Signaling	4
QPC441F	Three-Port Extender	4

Note 1: Equipment required for InterGroup Switch network option only.

Note 2: Equipment required for Fiber Network Fabric network option only.

Required power related equipment

Table 18 on page 115 lists the power-related equipment requirements for systems with DC power. Table 19 on page 115 lists the power-related equipment requirements for systems with AC power.

Table 18
Minimum requirements for new systems with DC power

Part number	Description	Quantity (minimum per system)
NT4N41DA	cPCI Core/Network Module DC	2
NT6D40BA	Peripheral Equipment Power Supply DC	1
NT6D41AD	Common Equipment Power Supply DC	2
NT6D41CA	Core/Network Power Supply DC	2
NT7D00BA	Top Cap DC	2
NT8D35EA	Network Module DC	2
NT8D37EC	Intelligent Peripheral Equipment Module DC	1
NTRD25BA	DC Pedestal Assembly	2

Table 19
Minimum requirements for new systems with AC power

Part number	Description	Quantity (minimum per system)
NT4N41AA	cPCI Core/Network Module AC	2
NT7D00AA	Top Cap AC	2

Table 19
Minimum requirements for new systems with AC power

Part number	Description	Quantity (minimum per system)
NT8D06AB	Peripheral Equipment Power Supply AC	1
NT8D29AB	Common Equipment Power Supply AC	2
NT8D29BA	Core/Network Power Supply AC	2
NT8D35BA	Network Module AC	2
NT8D37BA	Intelligent Peripheral Equipment Module AC	1
NTRD25AA	AC Pedestal Assembly	2

Assemble the columns and rows

Content list

The following are the topics in this section:

- Prepare to unload equipment 117
- Remove the module and pedestal covers 118
- Assemble the columns 120
- Connect the columns in rows 124

Universal Equipment Modules (UEMs) must be assembled into columns and rows according to the System Layout Plan included with the shipment. Follow the instructions in this chapter in sequence:

Prepare to unload equipment

Before the equipment is removed from the pallets, review the placement of the modules and columns. Review the System Layout Plan to determine the placement of columns and rows. See “Introduction to Option 81C with Call Processor PII” on page 9 for an overview of module and column identification.

System layout overview shipments

Depending on where the system is manufactured, the nimber of modules can vary. Due to shipping restrictions, three and four Module columns are shipped in two sections: the pedestal and two lower modules are shipped on one pallet. The third and fourth modules and top cap are shipped on a separate pallet.

Remove the module and pedestal covers

1 Use the special ramps provided to slide the equipment off the pallets.

> **WARNING**
> Fully loaded columns weigh 275 kg (600 lbs.). More than one person is required to move or lift equipment. Do NOT pry up the pedestal to lift the column: this will cause major damage to the column. Manually slide the column down the ramps provided.

2 Remove the front and rear covers from each module. See Figure 38 on page 118:

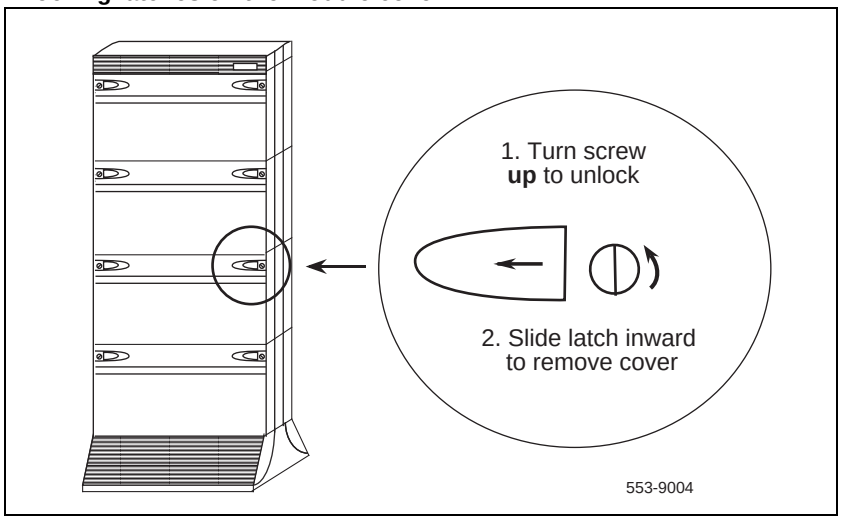
a Turn the plastic screws up to unlock the cover.

b Push the two locking latches inward.

c Pull the cover toward you and lift it away from the module.

Note: Module covers are not hinged. Do not let go of the cover or it will fall. Set the cover aside until the installation is complete.

Figure 38
Locking latches on the module cover



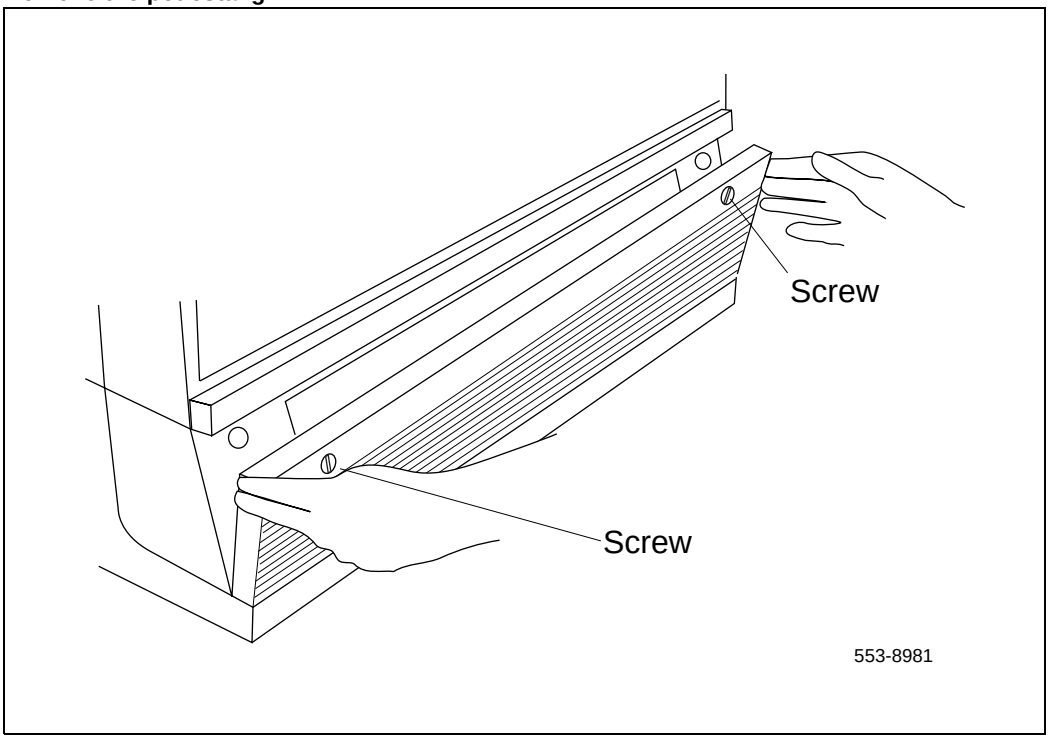
3 Remove the front and rear grills from each pedestal. See Figure 39 on page 119.

a Loosen the two captive screws that secure the grill

b Pull the grill forward and lift it out of the pedestal base.

c Set the grill aside until the installation is complete.

Figure 39
Remove the pedestal grill

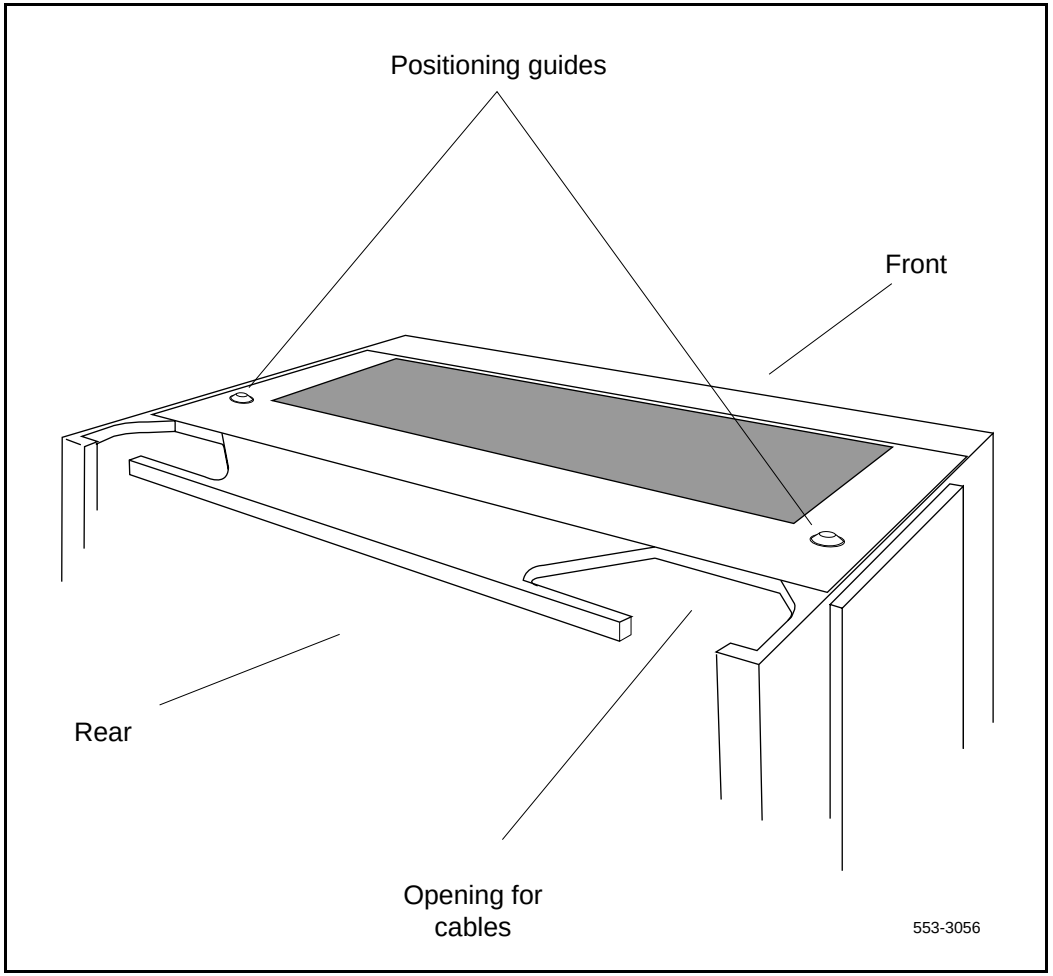


Assemble the columns

Review the System Layout plan to determine the placement of UEMs with each column.

1 Locate the positioning guides on the top of the column. See Figure 40 on page 120.

Figure 40
Module positioning guides



2 Position the third or fourth module on the floor facing in the same direction as the column.

3 With the front and rear covers removed, lift the module onto the top of the column and seat it securely on the positioning guides.

> **WARNING**
> A fully loaded module weighs approximately 60 kg (130 lbs.). At least two people are required to place a module on a column.

4 Install the five mounting bolts with a 9/16-in. socket wrench (Figure 41 on page 122). To gain access to the center mounting bolt in the rear, remove the I/O safety panel from the rear of the newly added module.

5 Connect the power and System Monitor cables between the modules (Figure 42 on page 123):

a Connect the power connectors between the modules.

b Connect the System Monitor cable from connector J2 on the lower module to J1 on the higher module.

Figure 41
Module mounting bolts

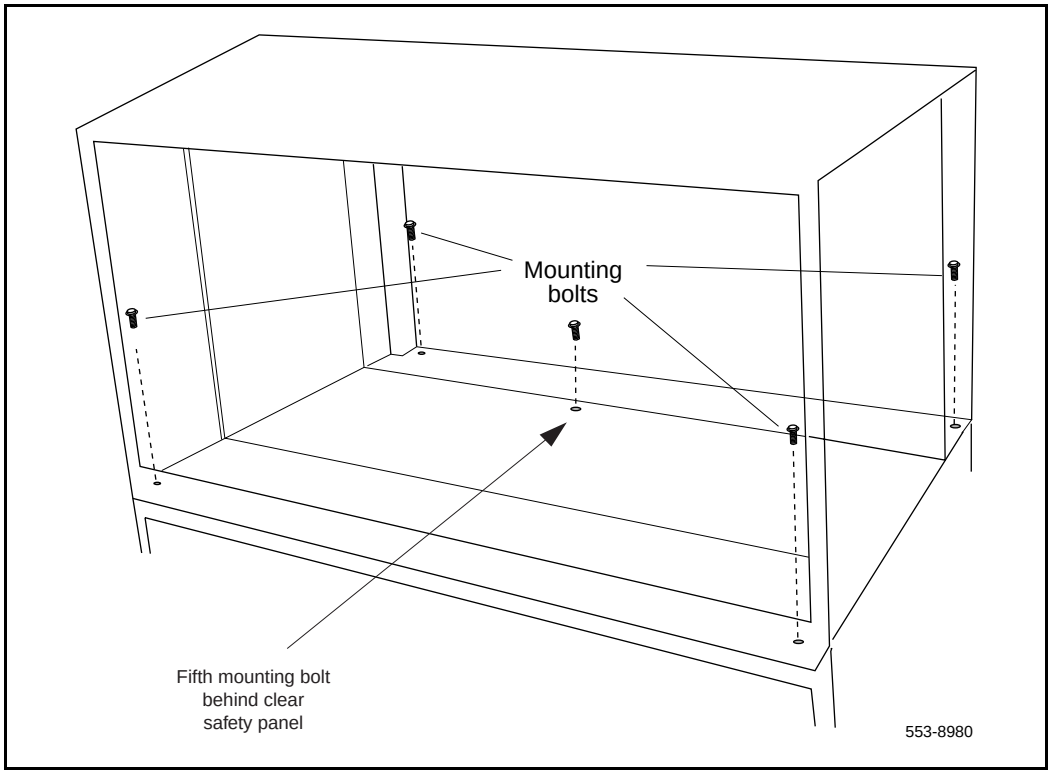
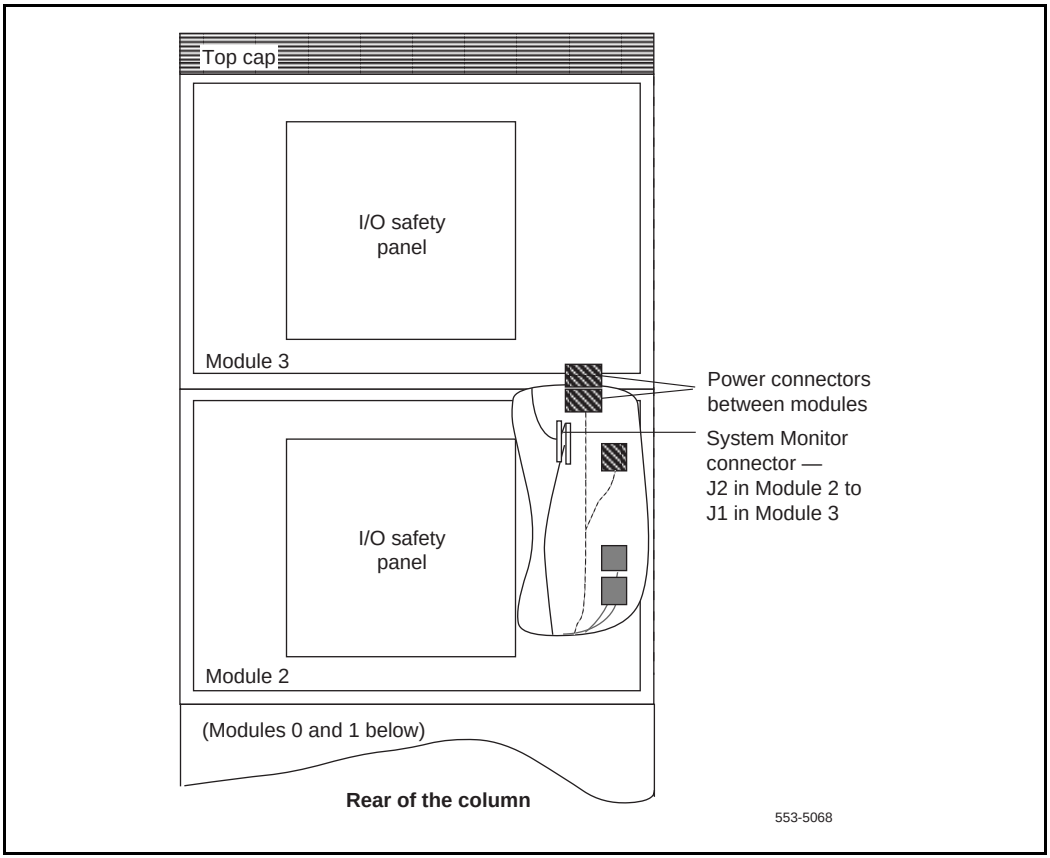


Figure 42
Power and system monitor connections



Connect the columns in rows

Review the System Layout Plan to determine the placement of each column in the row.

> **WARNING**
> If earthquake bracing is required, refer to “Install earthquake bracing if necessary” on page 59 before the columns are installed. To secure columns for earthquakes, holes must first be drilled into the floor. The pedestals are then secured to anchor plates.

Repeat the steps in this section for each column in the row:

1 "Install column spacers" on page 124.

2 "Push the columns together one at a time" on page 127.

3 "Level the column" on page 127.

4 "Attach the column to the row" on page 129.

5 "Install overhead cable tray kits (optional)" on page 130.

Table 20 on page 124 shows the equipment needed for each row assembly.

Table 20
Equipment for row assembly

Part Number	Description
NT8D49AA	Column Spacer Kit (2.75 in.)
NT8D63	Overhead Cable Tray Kit (optional)
P0699851	Top Cap Egress Panel (optional)

1 Install column spacers

a Remove the outer trim plates and inner side panels from the module sides to be fitted with spacers.

b Attach EMI gaskets to both sides of the spacer. See Figure 43 on page 125.

c Attach a spacer to one side of each module, except the modules in the end column (Figure 44 on page 126).

Note: Attach the bolts from the inside of the module. Fit the round stand-offs between the module and the spacer (Figure 45 on page 126).

Figure 43
Module spacer with EMI gaskets

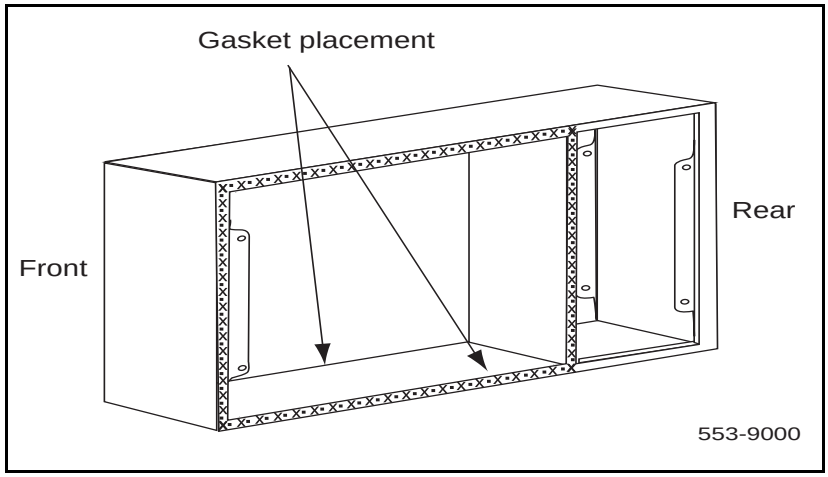


Figure 44
Attach spacers to one side of each column (except end column)

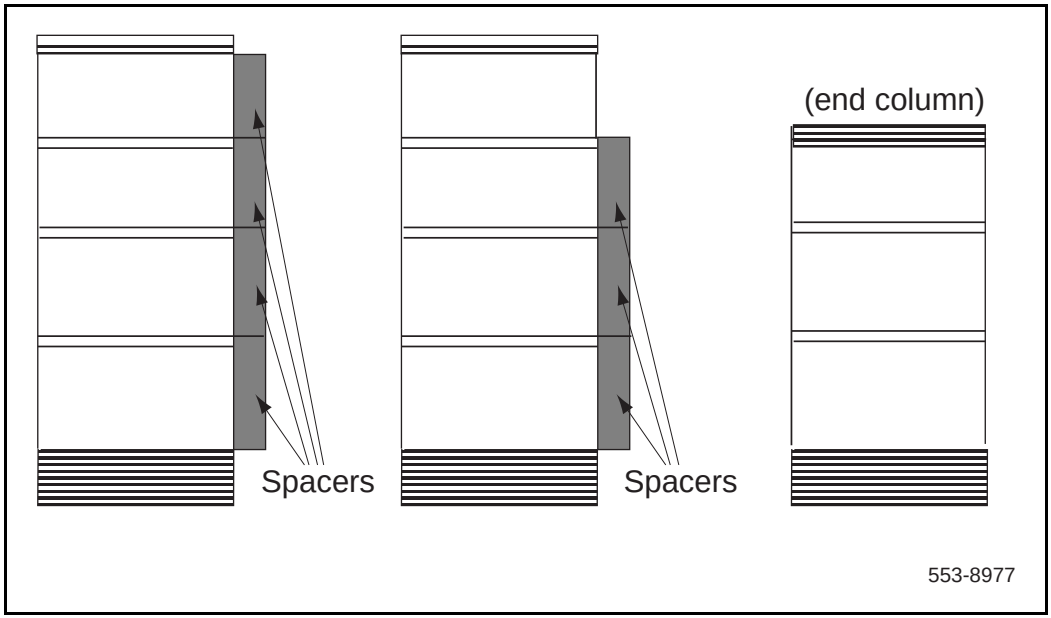
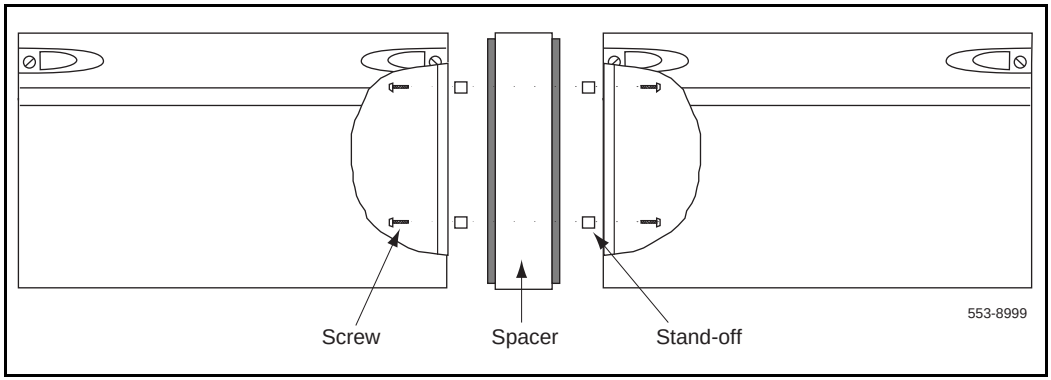


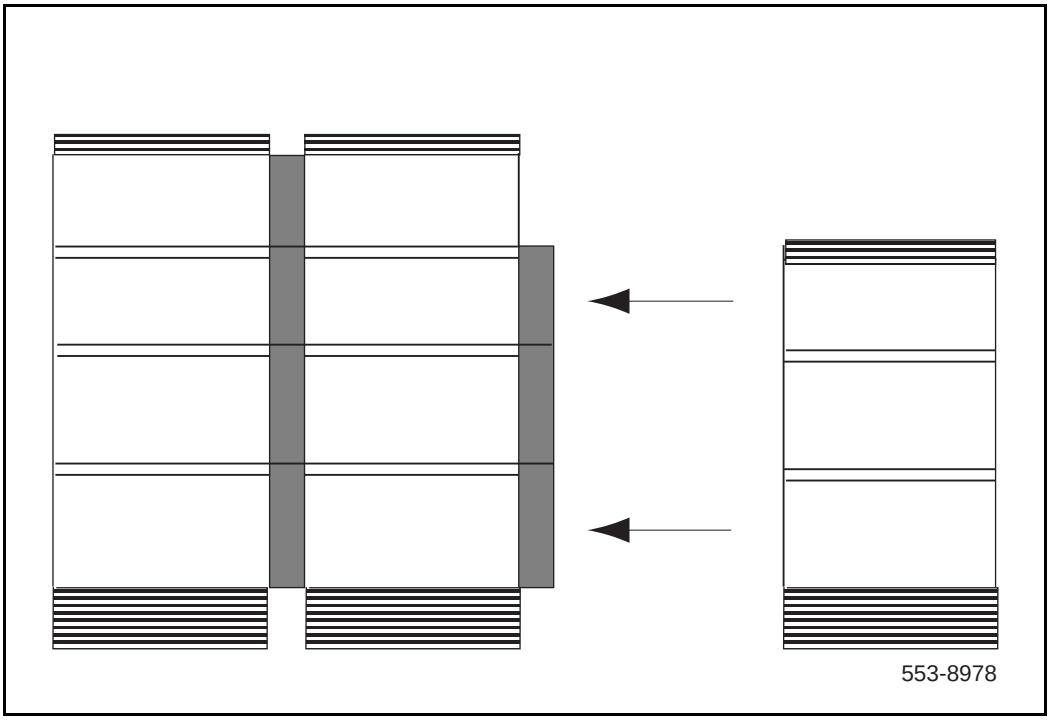
Figure 45
Spacer bolts and stand-offs



2 Push the columns together one at a time

> **CAUTION**
> **Do NOT attach the columns.** Follow the steps below to level and align the column before it is attached to the row.

Figure 46
Push the columns together



3 Level the column

Note: always level the column before it is attached to an adjoining column or spacer.

a Remove the front and rear air intake grills to gain access to the four leveling feet located on each corner of the pedestal.

b Position a level across the front of the top module.

c Loosen the locking nuts on the feet (Figure 47 on page 128).

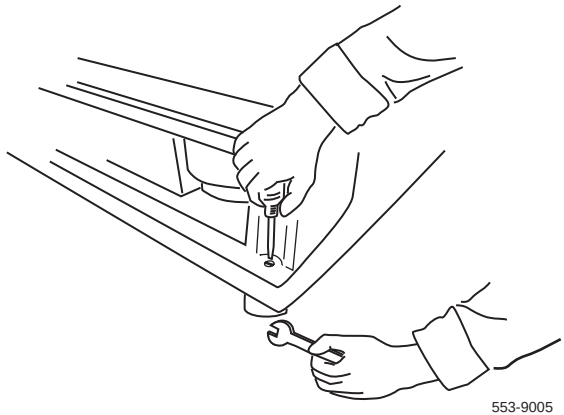
d Adjust the feet on each corner of each pedestal with a screwdriver. Raise or lower the adjustable feet until the module is level (Figure 47 on page 128).

e Tighten the locking nuts.

WARNING

For proper air flow to the blower cooling unit, leave at least 1.25 cm (1/2 in.) between the floor and the bottom of the pedestal. Restricted air flow will cause the system to overheat.

Figure 47
Adjust the levelling feet



Note: Non-adjustable casters are available for use with columns of one or two modules.

4 Attach the column to the row

Note: Do NOT attach the column to the row until the column has been leveled and aligned.

a Attach the spacer bolts from the inside of the module.

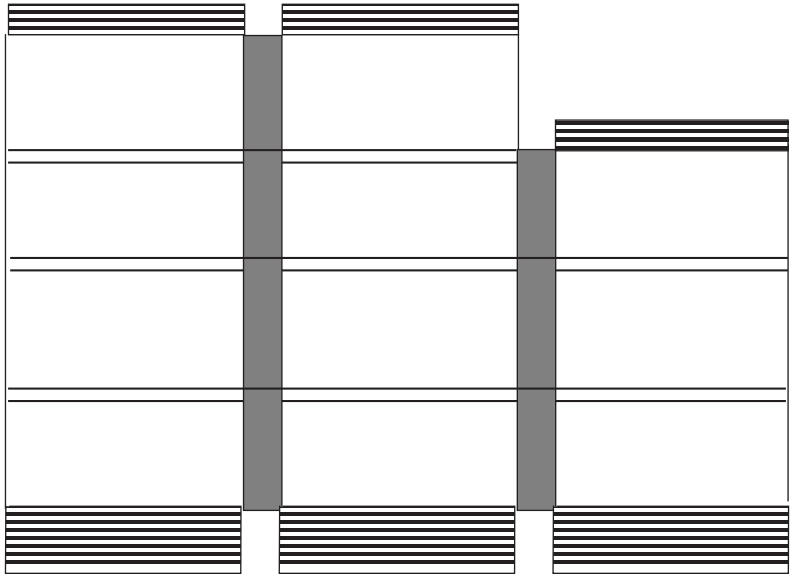
b Fit the round stand-offs between the module and the spacer (Figure 45 on page 126).

c Tighten the spacer bolts.

WARNING

Do not pull the columns together by tightening the spacer screws or the spacers will be warped. Make sure the columns are securely in place and level before tightening the screws.

Figure 48
Columns attached with spacers



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5 Install overhead cable tray kits (optional)

If cables are to be routed along the top of the Meridian 1 System, Nortel Networks offers an NT8D63 Overhead Cable Tray Kit. This kit includes two support brackets, plus front and rear exhaust grills with cutouts for cable routing.

The ladder-rack cable tray itself is not included with the kit and must be provided by the customer.

Customer-supplied ladder-rack cable trays can also be hung from the ceiling. If such ceiling-hung racks are used, the rear top cap grill on each column must be replaced with a P0699851 Top Cap Egress Panel that contains cutouts for cable routing.

WARNING

To maintain the integrity of Meridian 1 grounding architecture, both column-mounted and ceiling-mounted cable trays must be insulated from contact with building structures such as concrete walls, floors, and ceilings.

a Remove the air exhaust grills from the front and rear of the top cap (pull forward on the two clips underneath the front edge of each grill and lift the grill up (Figure 49 on page 131).

b Mount the support brackets at the front and rear of the module. Two bolts secure each bracket the top of the module (Figure 50).

c Install the new front and rear air exhaust grills containing cutouts for cable routing (included with the NT8D63 kit)

d Place the customer-supplied ladder rack on top of the support brackets. Fasten the rack to the supports with J-bolts (Figure 50 on page 131).

.

Figure 49
Remove the top cap grills

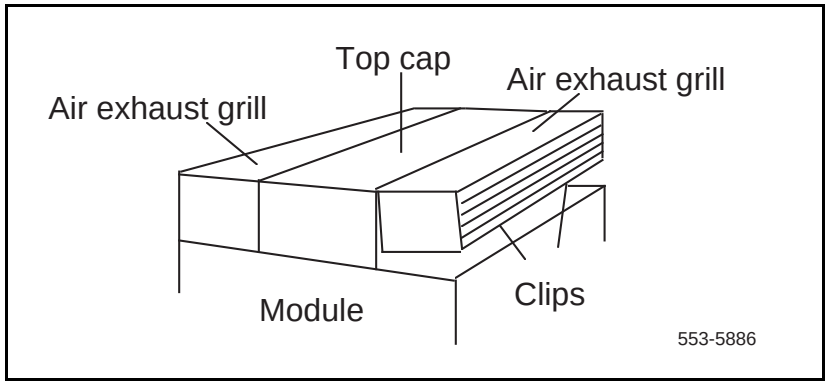
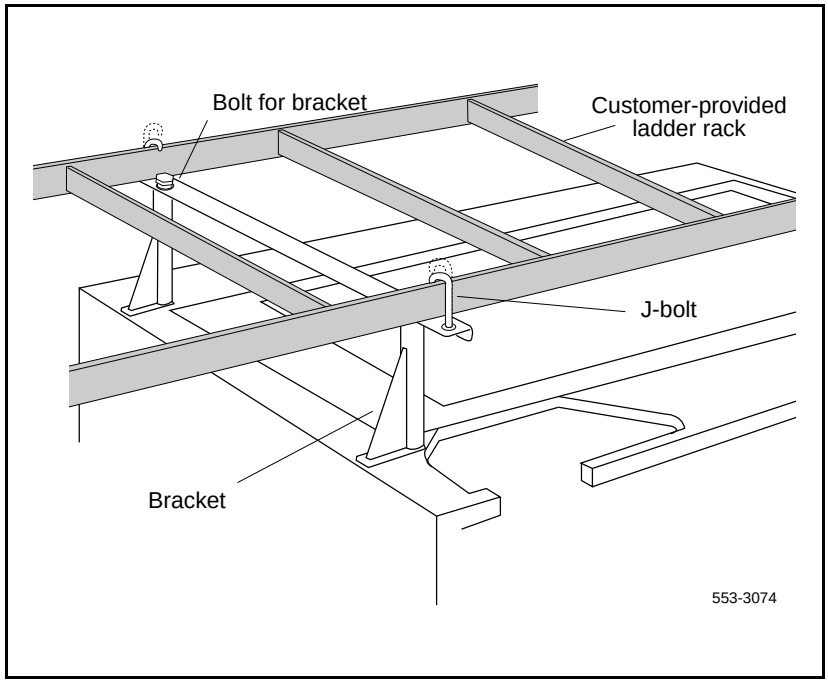


Figure 50
Overhead cable tray kit



Assemble the Core shelves

Content list

The following are the topics in this section:

- Review Core/Net module placement 133
- Review required Core cards 135
- Check that the Core cards (front side) are installed 136
- Check that the Core Transition cards are installed 136
- Cable the Core shelves 141

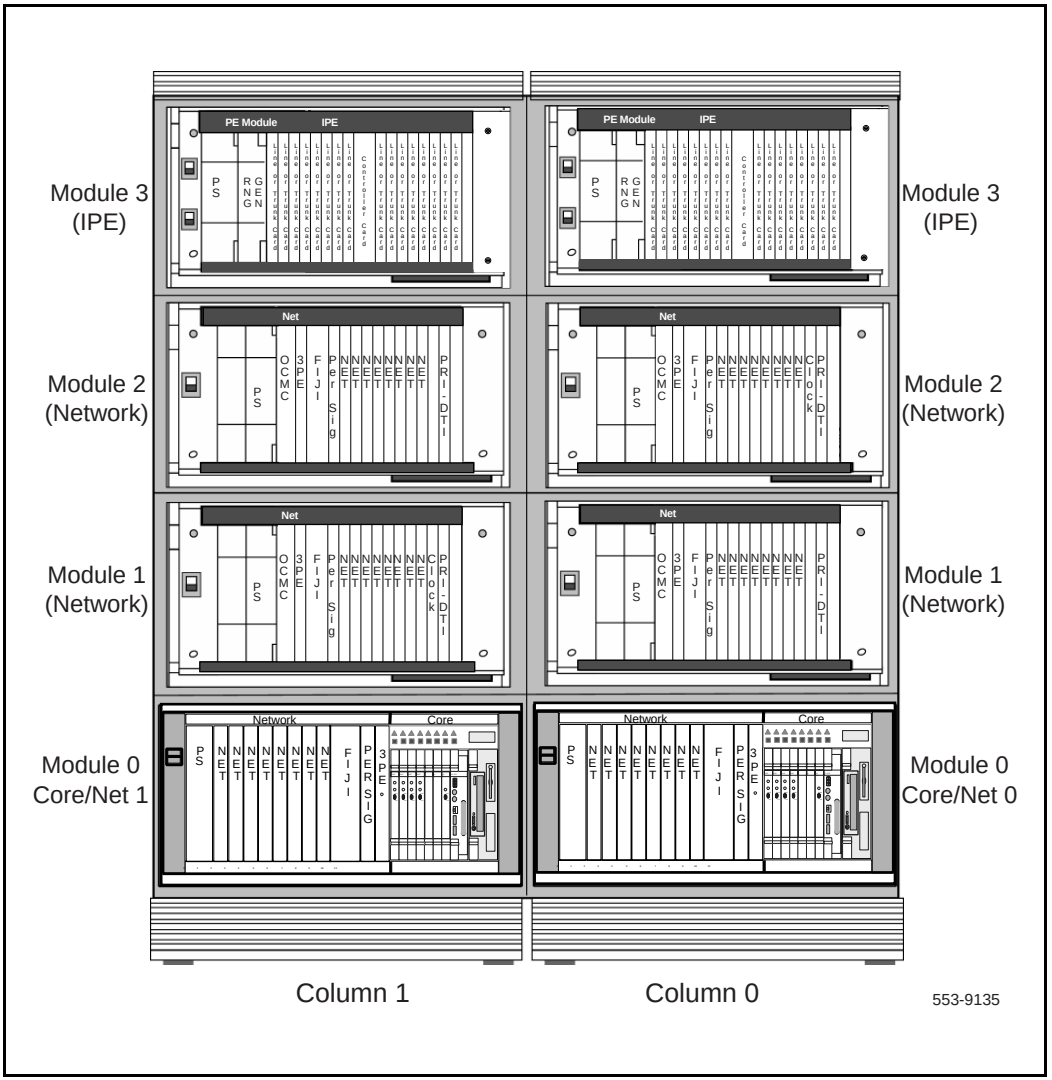
The Core/Net modules contain two distinct sets of circuit cards: Core cards and Network cards. See Figure 51 on page 134. This chapter contains instructions on how to configure the Core side of the CP PII Core/Net modules. To configure the Network side of the Core/Net modules, follow the instructions in Configure the Network groups, page 149.

Review Core/Net module placement

Core/Net modules are installed side by side on top of separate pedestals, for power and cooling redundancy. Core/Net 1 is always on the left. Core/Net 0 is always on the right. See Figure 51 on page 134.

Switches on the side of the System Utility Transition card identify the Core/Net modules as Core 0 or Core 1.

Figure 51
Side by side placement of CP PII Core/Net modules



Review required Core cards

All Core cards are installed in the factory. See Table 21 on page 135 for the Core card requirements for each Core/Net module.

Refer to Universal Equipment Modules, page 10 for module and card descriptions.

Table 21
Required Core cards (minimum per Core/Net module)

Card part number	Description	Number required per Core/Net module	Backplane side
NT4N65AB	cCNI: cPCI Core Network Interface Card	1 to 4[1]	front
NT4N66AB	cCNI Transition card[2:] cPCI Core Network Interface Transition Card	4	back
NT4N67AA	System Utility Card	1	front
NT4N68AA	System Utility Transition Card[2]	1	back
A0810496	CP PII Call Processor Card (128MB memory)	1	front
NT4N43AA	cPCI Multimedia Disk Unit (MMDU)	1	front

Note 1: Each cCNI card supports two Network groups. The number of cCNI cards in each system depends on the number of Network groups installed in the system. See the System Layout plan to determine the number and placement of cCNI cards.

Note 2: Transition cards are factory installed on the back of the he data bus backplane. These cards add functionality and cable connections to the front side cards.

Check that the Core cards (front side) are installed

All Core cards are factory installed. The Core cards (front side) are:

- **NT4N65AB cPCI Core Network Interface (cCNI) cards**: Each system contains between one and four NT4N65 cCNI cards per Core/Net Module. The cCNI cards are located in slots c9-c12. If not already installed, install a P0906308 cPCI Card Slot Filler Panel to cover any of slots, c10 - c 12, which do not contain cCNIs.
- Slots c13 and c14 are left empty. If not already installed, install a P0906308 cPCI Card Slot Filler Panel in each slot.
- **NT4N67AA System Utility (Sys Util) card** is located in slot c15.
- **A0810496 Call Processor PII (CP PII)** is located in the slot marked CP.
- **NT4N43AA cPCI Multi-Media Disk Unit (MMDU)** is located in the extreme right hand slot next to the CP PII card. The MMDU contains the Hard drive, floppy drive and CD-ROM drive.

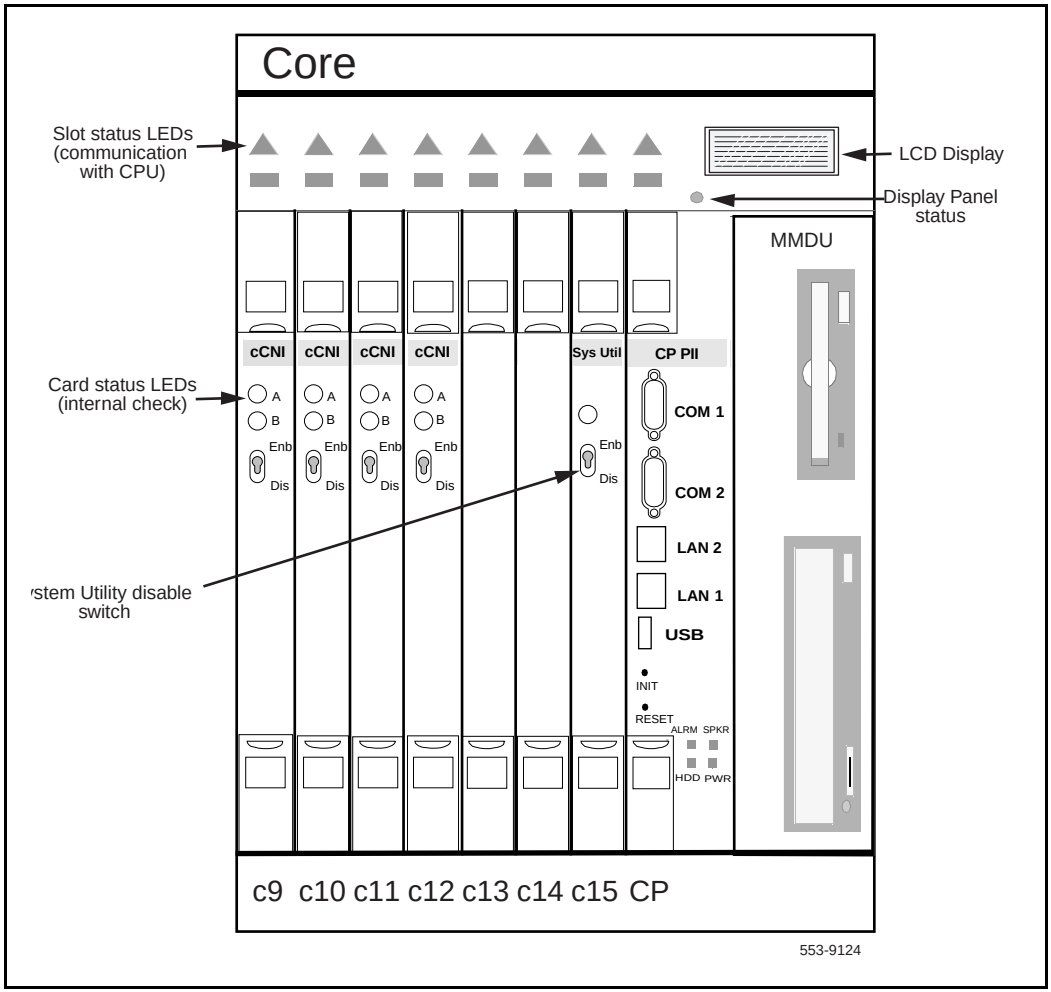
Figure 52 on page 137 shows Core card (front side) placement.

If the Core cards are not installed, see Core card replacement, page 276 to add or replace cards.

Check that the Core Transition cards are installed

Transition cards are factory installed on the back side of the Core backplane. See Figure 53 on page 139. These cards add functionality and cable connections to the front side cards. See Backplane architecture, page 20 for a description of the Core and Network backplanes in the Core/Net modules.

Figure 52
Core card placement in the NT4N41 Core/Net Module (front)



There are two types of Transition cards:

- **cCNI Transition cards**: these cards provide the cCNI to 3PE cable connections. Four cCNI Transition cards are installed directly behind the cCNI card slots on the back side of each Core backplane, regardless of the number of cCNI main cards.
- **Sys Util Transition cards**: this card provides data, security and system monitoring connections for the Core shelf. One card is installed directly behind the System Utility card in each Core/Net module.

See Replace the cPCI Core Network Interface Cards, page 267 for information on replacing cards.

Figure 53
Transition card layout (back side of the Core backplane)

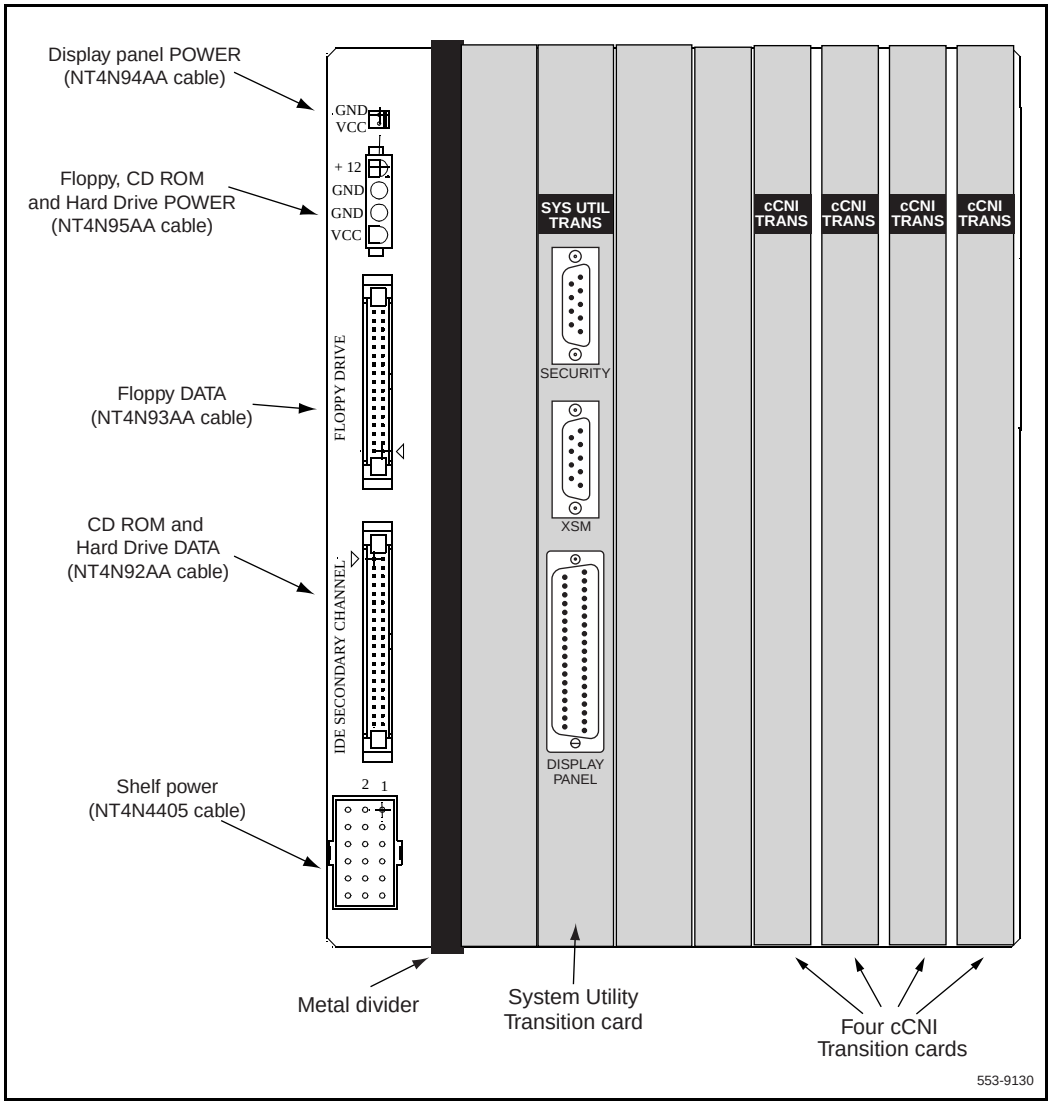
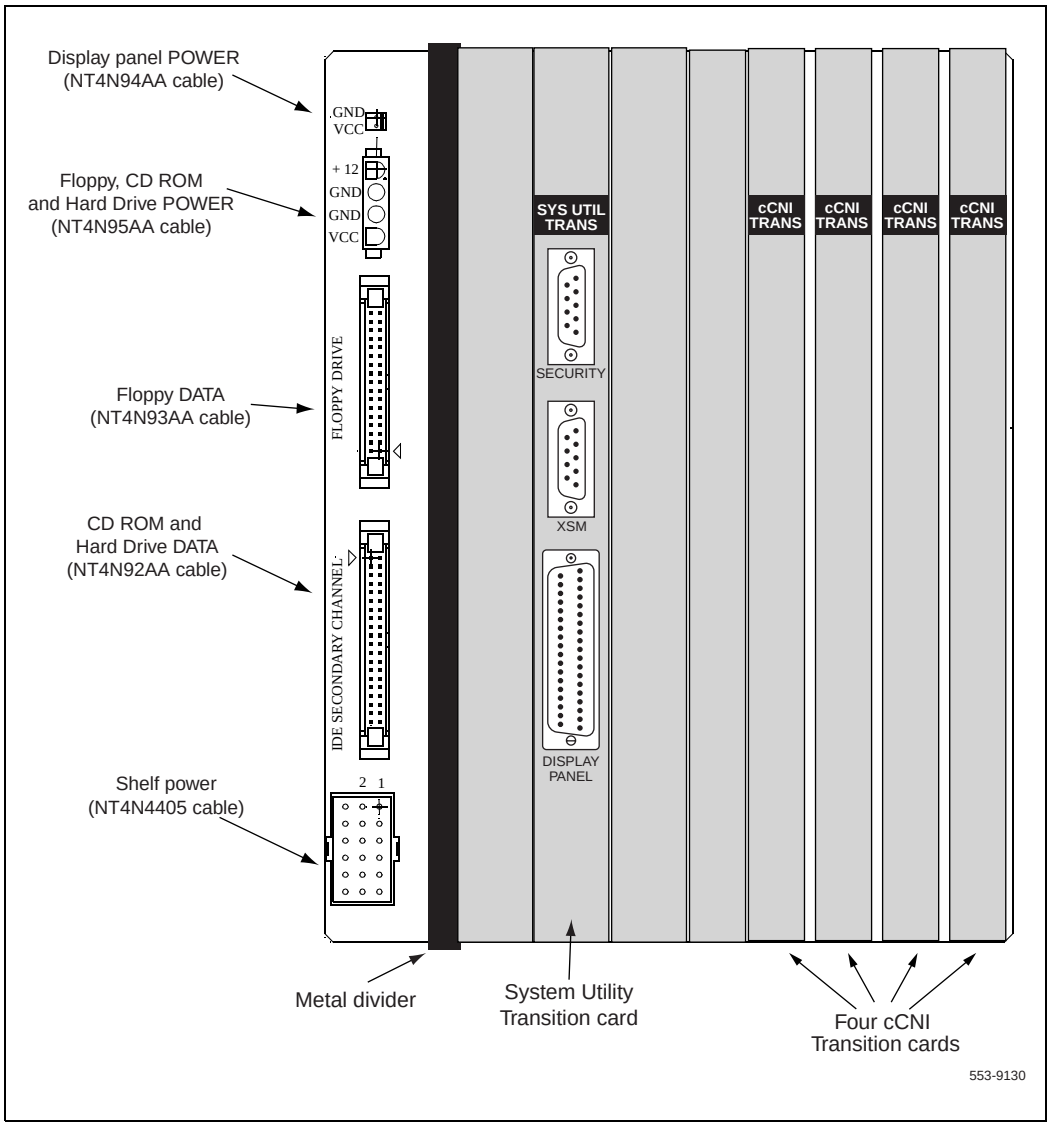


Figure 54


Display panel POWER
(NT4N94AA cable)
Floppy, CD ROM
and Hard Drive POWER
(NT4N95AA cable)
Floppy DATA
(NT4N93AA cable)
CD ROM and
Hard Drive DATA
(NT4N92AA cable)
Shelf power
(NT4N4405 cable)
GND
VCC
+ 12
GND
GND
VCC
FLOPPY DRIVE
IDE SECONDARY CHANNEL
2 1
SYS UTIL TRANS
SECURITY
XSM
DISPLAY PANEL
cCNI TRANS
cCNI TRANS
cCNI TRANS
cCNI TRANS
Metal divider
System Utility
Transition card
Four cCNI
Transition cards
553-9130

Cable the Core shelves

Task summary list

The following is a summary of the tasks in this section:

- Required Core cables, page 141
- Install the CP PII to I/O panel cables, page 144
- Install the CP PII to I/O panel cables, page 144
- Connect the Core modules to a local area network, page 146

This section describes installation of the *internal* Core cables. Cables for Core to non-Core modules are described in subsequent sections.

Required Core cables

Table 22 on page 141 lists field installed cables. Cables in Table 23 on page 142 are factory installed.

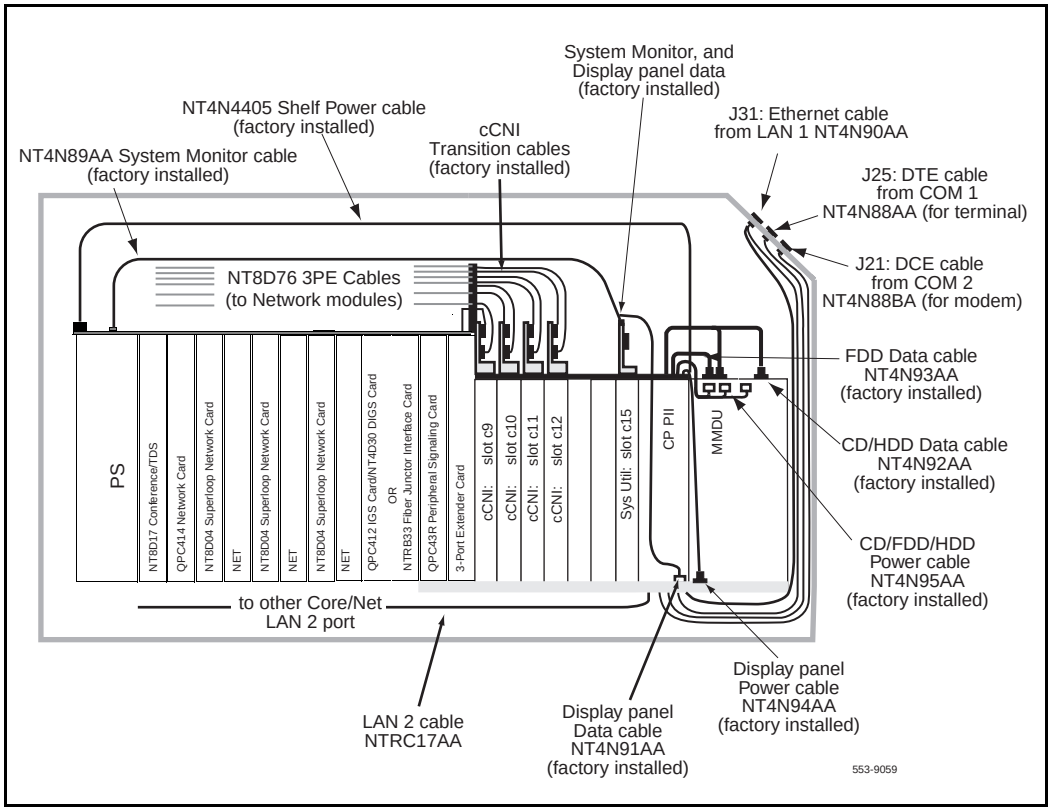
Table 22
Field installed Core cables (internal)

Cable part number	Description	Number required per system
NT4N88AA	COM 1 (DTE/terminal)	2
NT4N88BA	COM 2 (DCE/modem)	2
NT4N90AA	Ethernet (CP PII card to I/O panel)	2
NTRC17AA	Crossover Ethernet cable (Core to Core)	2
customer supplied	Standard Ethernet cable (Core to LAN hub)	2

Table 23
Factory installed Core cables (internal)

Cable part number	Description	Number required per system
NT4N4405	Shelf Power: Net backplane to Core backplane	2
NT4N89AA	System Utility card to XSM	2
NT4N91AA	LED/LCD Data	2
NT4N92AA	CD-ROM/HDD Data	2
NT4N93AA	FDD Data	2
NT4N94AA	LED/LCD Power	2
NT4N95AA	Core/Net FDD/HDD/CD ROM Power	2

Figure 55
Core/Net cable connections (top view)



Install the CP PII to I/O panel cables

Connect the cables from the CP PII card faceplate to the I/O panel on the back of the Core/Net modules:

- COM 1 is used to connect a terminal.
- COM 2 is used to connect a modem.
- LAN 1 is used to connect the system to a LAN hub.
- LAN 2 is used to connect Core 0 to Core 1 for system redundancy.

Figure 55 on page 143 displays the COM and LAN cable connections.

IMPORTANT

Label all cables on both ends before installation. Labels help ensure that the cables are properly routed and connected. Cable labels also help installers to troubleshoot problems and replace equipment.

1 Connect **COM1** on the CP PII faceplate to **J25** on the I/O panel with cable **NT4N88AA**.

2 Connect **COM2** on the CP PII faceplate to **J21** on the back of the I/O panel with cable **NT4N88BA**.

3 Connect the **Dual Ethernet Adapter** (RJ45) for I/O Panel (NTRE40AA) to **J31**. Secure the adapter to J31 with the two screws included in the shipment.

4 Connect **LAN 1** (Ethernet) on the CP PII faceplate to **J31 (top)** of the I/O panel with cable **NT4N90AA**.
This connection can only be made *after* the Dual Ethernet Adapter is installed (see step 3 above).

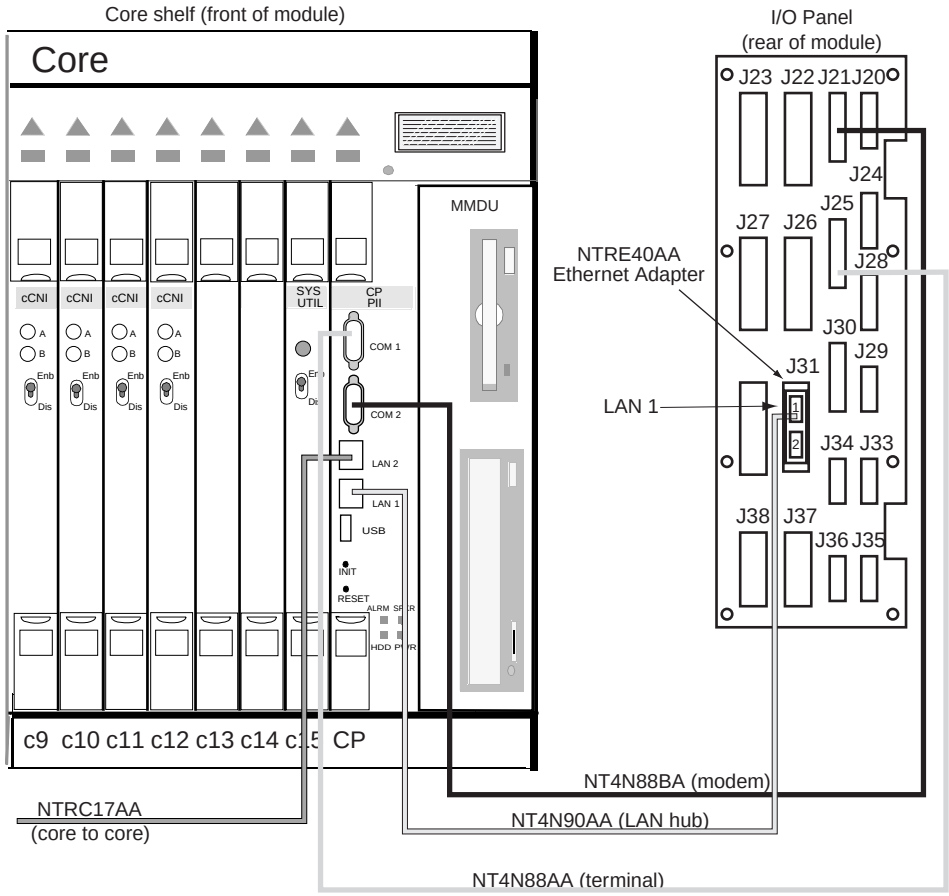
Note: If a LAN hub is not used, connect LAN 1 in Core 0 to LAN 1 in Core 1. See Figure 57 on page 147.

5 Connect a **crossover Ethernet cable (NTRC17AA)** from the **LAN 2** port in Core 0 to the **LAN 2** port Core 1. This connection is for Core redundancy. See Core redundancy, page 19 for more information.

Note: To ensure EMI shielding, route the cable along the front of the card cage and through the sides of the Core/Net modules.

6 Repeat steps 1 through 4 in the second Core/Net module.

Figure 56
CP PII to I/O panel connections



Connect COM 1 to J25 with a NT4N88AA DTE cable (terminal).
Connect COM 2 to J21 with a NT4N88BA DCE cable (modem).
If a LAN hub is available: connect LAN 1 to J31 top (LAN hub) with NT4N90AA Ethernet cable (as shown in figure).
If a LAN hub is not available: connect LAN 1 in Core 0 to LAN 1 in Core 1 with a NTRC17AA cable (not shown in figure).
Connect LAN 2 in Core 0 to LAN 2 in Core 1 with a NTRC17AA crossover Ethernet cable.

553-9466

Connect the Core modules to a local area network

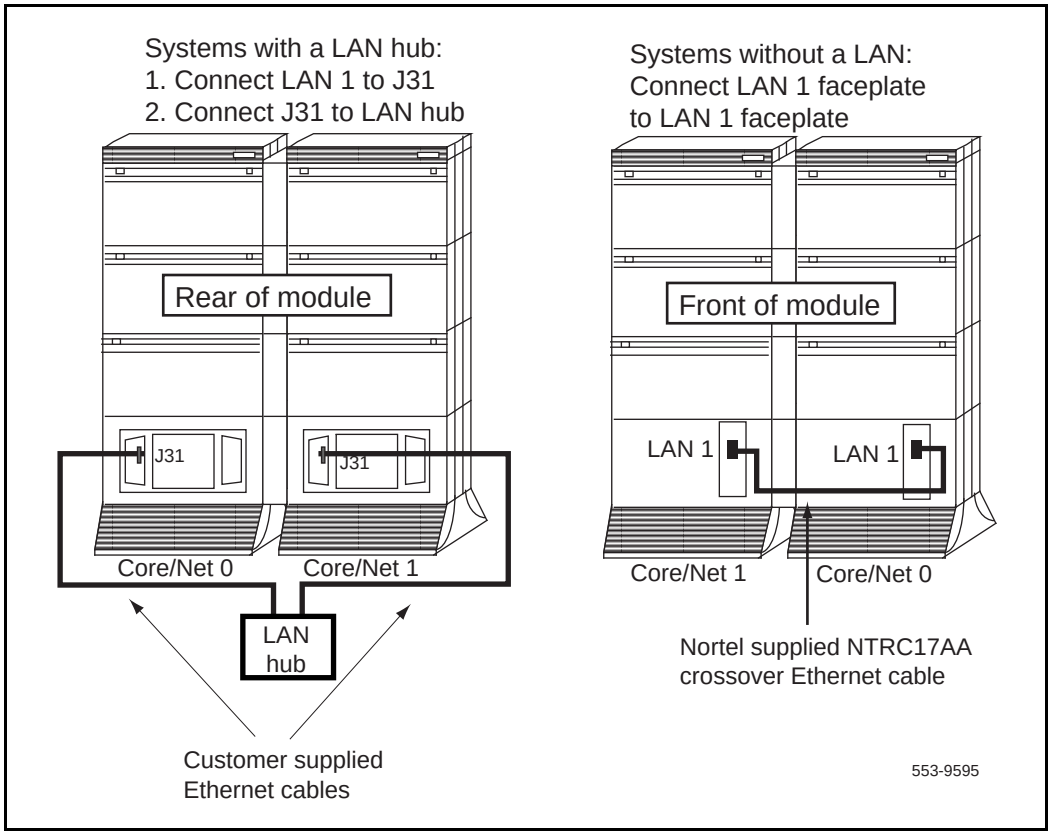
Connect each Core/Net module to a local area network (LAN). This connection provides a communication channel for LAN based administration tools such as MAT. This connection also supplies additional redundancy capabilities. See Figure 57 on page 147.

Note 1: If a LAN is not available, connect the second NTRC17AA crossover Ethernet cable (included in the basic package) between the J31 ports in Core/Net 0 and Core/Net 1.

Note 2: The Core/Net I/O panel cables must be installed as described on Install the CP PII to I/O panel cables, page 144 before the Ethernet connections can be completed.

1. Label both sides of two *customer supplied* Ethernet cables.
2. Connect an Ethernet cable from J31 (top) on the Core/Net 0 I/O panel to the LAN hub.
3. Connect a second Ethernet cable from J31 (top) on the Core/Net 1 I/O panel to the LAN hub.

Figure 57
Options for LAN 1 connections



Configure the Network groups

Content list

The following are the topics in this section:

- Connect Network group 0: shelf 0 to shelf 1 149
- Connect groups 1 through 7: shelf 0 to shelf 1 152
- Connect the Network modules to the Core/Net modules. 154
- Connect the Network cards to the IPE backplane 162
- Configure the Clock Controllers - Fiber Network Fabric 179

This chapter contains information on important concepts in addition to instructions to correctly configure your system. Read and review each section in order and complete the installation steps to properly configure the Network groups.

Each system contains between two and eight Network groups. Group 0 is contained in the Core/Net modules. Groups 1 through 7 are contained in the Network modules. Each Network group is comprised of two Network shelves: shelf 0 and shelf 1.

Connect Network group 0: shelf 0 to shelf 1

Task summary list

The following is a summary of the tasks in this section:

- Connect the 3PE faceplates in the Core/Net modules, page 150
- Connect the Core/Net backplanes, page 151

The Core/Net modules contain Network group 0: shelf 0 is in Core/Net 0, shelf 1 is in Core/Net 1.

Shelf 0 must be connected to shelf 1 for Network group 0 to operate correctly. Complete the two steps below:

1 Connect the 3PE faceplates in the Core/Net modules, page 150.

2 Connect the Core/Net backplanes, page 151.

Connect the 3PE faceplates in the Core/Net modules

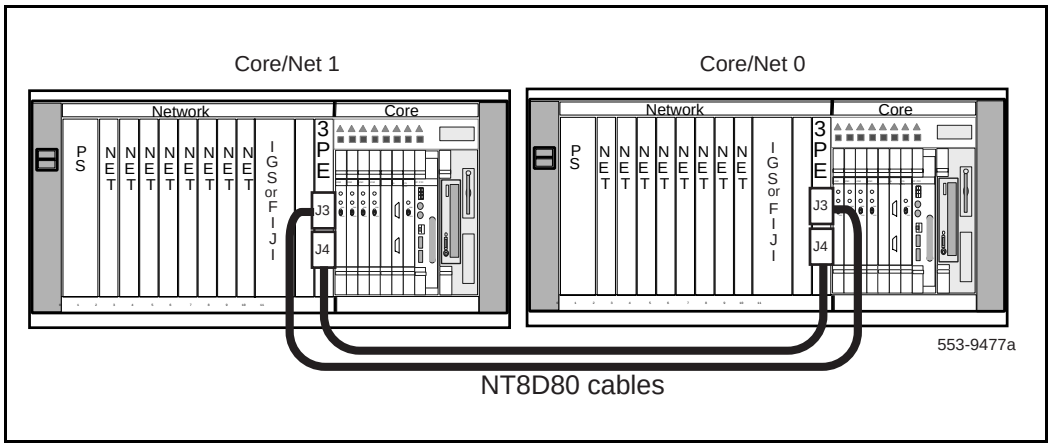
The 3PE cards in the Core/Net modules must be directly connected with an NT8D80 cable. See Figure 58 on page 150. This connection is only made between the group 0 shelves (in the Core/Net modules).

1 Connect a NT8D80 cable from the J4 port in the Core/Net 0 3PE card to J4 port in the Core/Net 1 3PE card.

2 Connect a second NT8D80 cable from the J3 port in Core/Net 0 to the J3 port in Core/Net 1.

Note: The 3PE cards are located in Core/Net slot 11.

Figure 58
3PE faceplate connection between the Core/Net modules



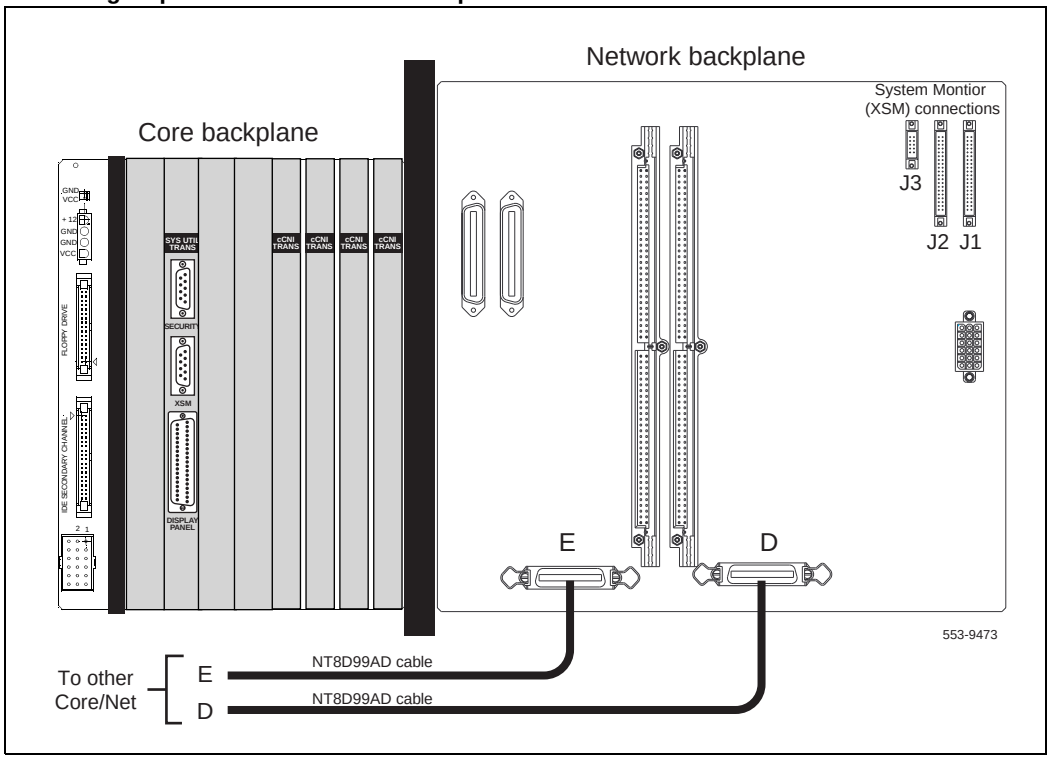
Connect the Core/Net backplanes

In group 0 only, the shelf 0 and shelf 1 backplanes must be connected with two NT8D99AD cables (Core/Net modules only).

1 Connect one NT8D99AD cable from the “E” port in Core/Net 0 to the “E” port in Core/Net 1.

2 Connect a second NT8D99AD cable from the “D” port in Core/Net 0 to the “D” port in Core/Net 1. See Figure 59 on page 151.

Figure 59
Network group 0: shelf 0 to shelf 1 backplane connections



Connect groups 1 through 7: shelf 0 to shelf 1

On the back of each Network module backplane are five connectors: A, B, C, D and E. See Figure 60 on page 153. The connectors from shelf 0 of each Network group 1 through 7 must be connected to the connectors in shelf 1 of the same Network group.

> ***Note:*** In North American systems, these connections are made in the factory. In shipments outside North America, the Network shelves are shipped separately. These connections must be made in the field

This connection is NOT made for Network group 0 in the Core/Net modules.

1 Connect an NT8D99AB cable from the **A** connector in shelf 0 of Network group 1 to the **A** connector in shelf 1 Network group 1.

2 Connect the **B** connector in shelf 0 to the **B** connector in shelf 1.

3 Connect the **C** connector in shelf 0 to the **C** connector in shelf 1.

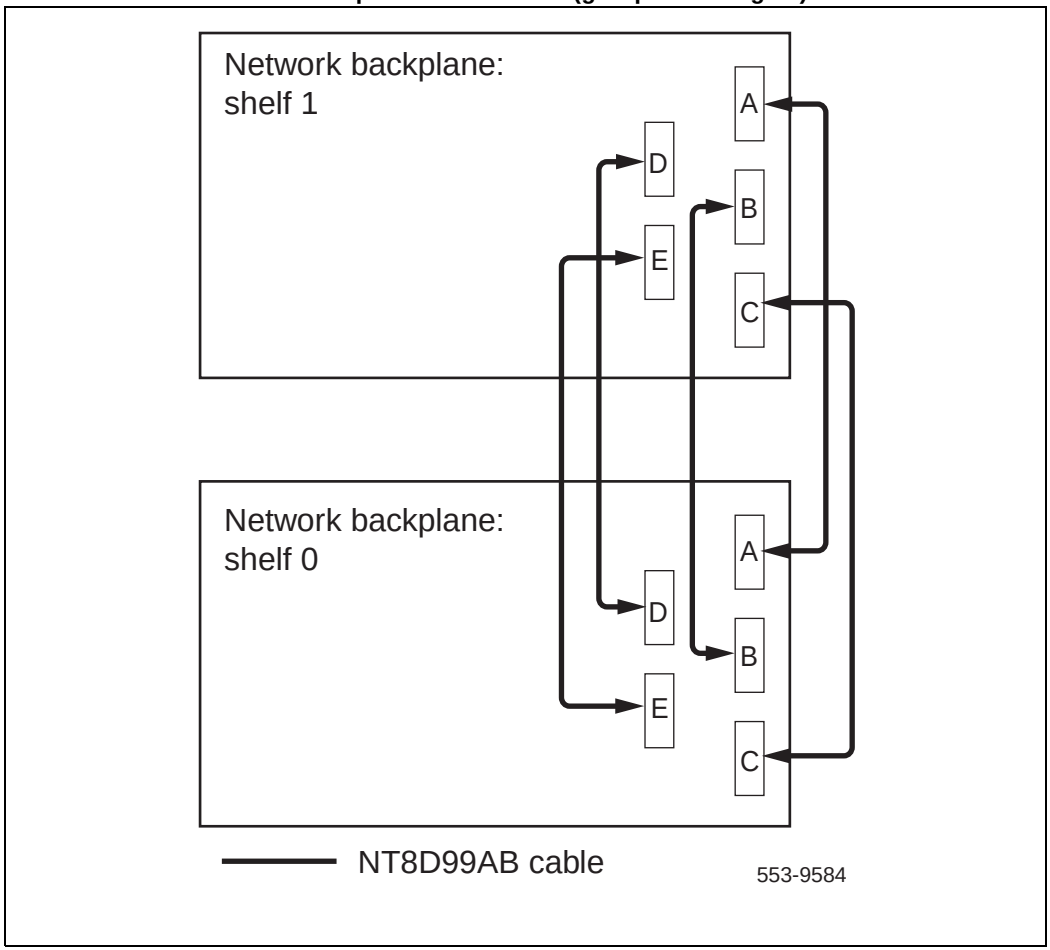
4 Connect the **D** connector in shelf 0 to the **D** connector in shelf 1.

5 Connect the **E** connector in shelf 0 to the **E** connector in shelf 1.

6 Connect the A, B, C, D, and E connectors between shelf 0 and shelf 1 for all other Network groups in the system (except group 0)

Note: All connections are made with an NT8D99AB cable.

Figure 60
Network shelf 0 to shelf 1 backplane connections (groups 1 through 7)



Connect the Network modules to the Core/Net modules

Task summary list

The following is a summary of the tasks in this section:

- cCNI slot and port assignments, page 154
- cCNI to 3PE Termination Panel cable connections, page 158
- Connect the 3PE cables to the 3PE Termination Panels, page 158

Each Network shelf contains one 3PE card. These 3PE cards are connected to the Termination Panel in the back of the Core/Net shelves.

Figure 61 on page 155, Figure 62 on page 156 and Figure 62 on page 156 show the location of the Termination Panel and 3PE cables on the Core/Net backplane.

.

cCNI slot and port assignments

Each system contains a minimum of one and a maximum of four CNI cards. Each cCNI card contains two ports to support up to two Network groups.

cCNI cards are identified by slot and port. Each port is assigned in software to a specific Network group. Use the System Layout Plan to determine the connections for your system.

- Each 3PE card has two faceplate connections: J3 and J4. Two cables are used for each card.
- 3PE cards in Network shelves “0” are connected to the 3PE Termination Panel in Core/Net 0.
- 3PE cards in Network shelves “1” are connected to the 3PE Termination Panel in Core/Net 1.

Figure 61
3PE Termination Panel in the Core/Net module (top view)

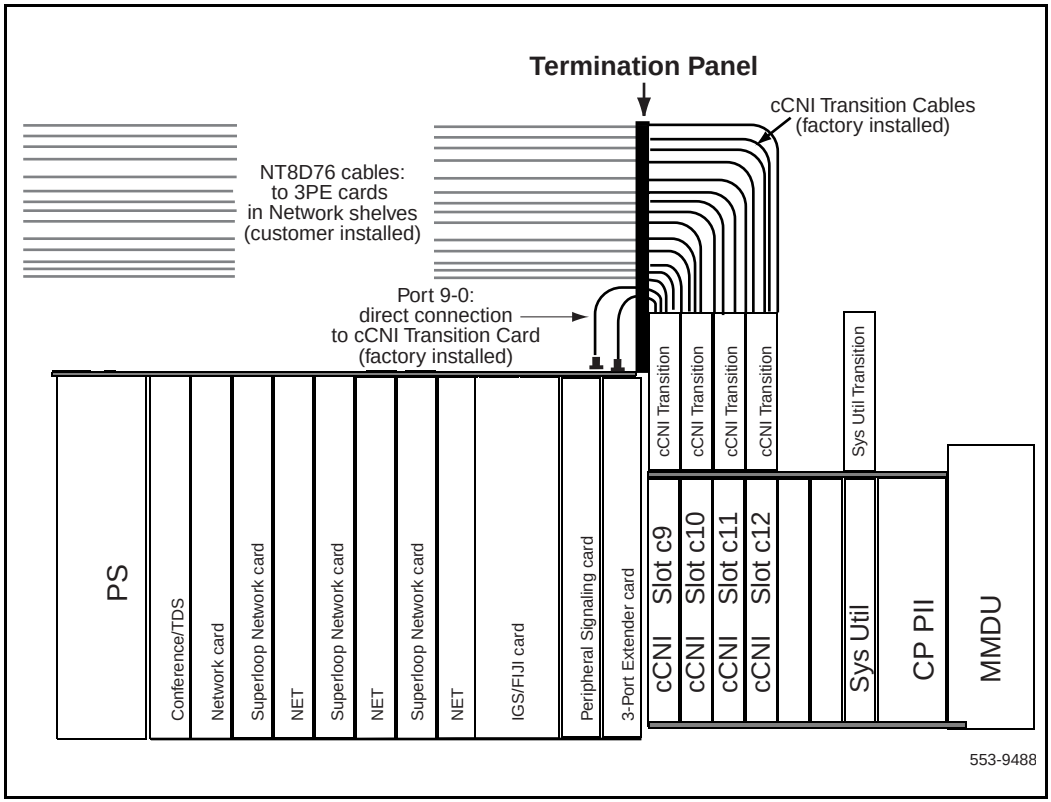


Figure 62
Core/Net backplane (rear view)

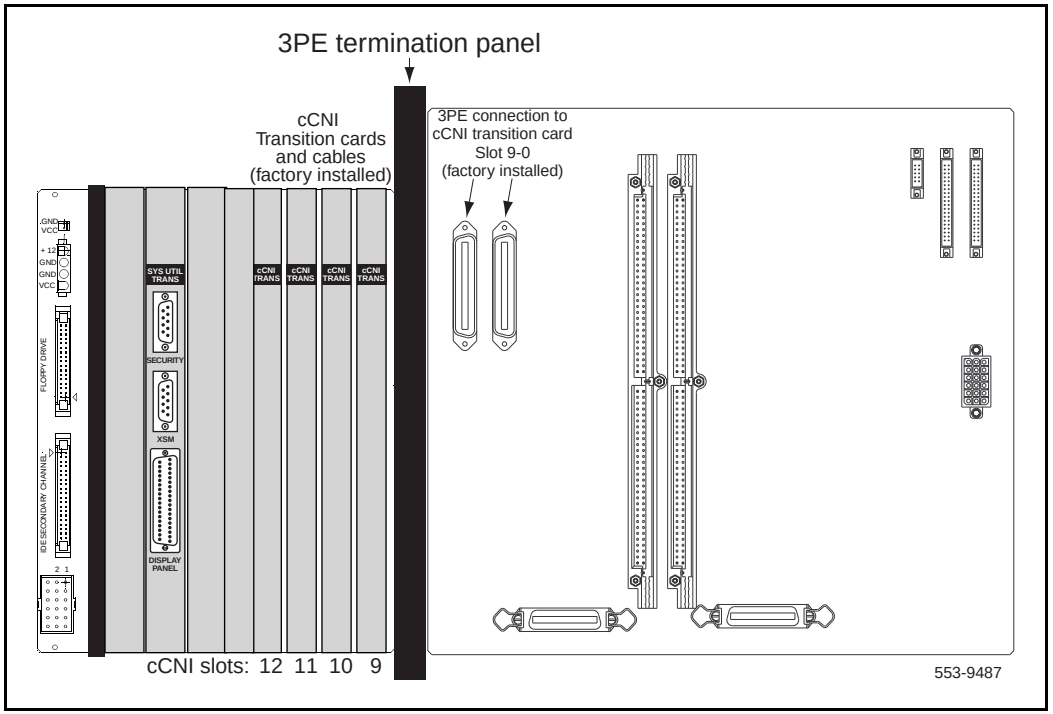


Figure 63
3PE Termination Panel (rear module view)

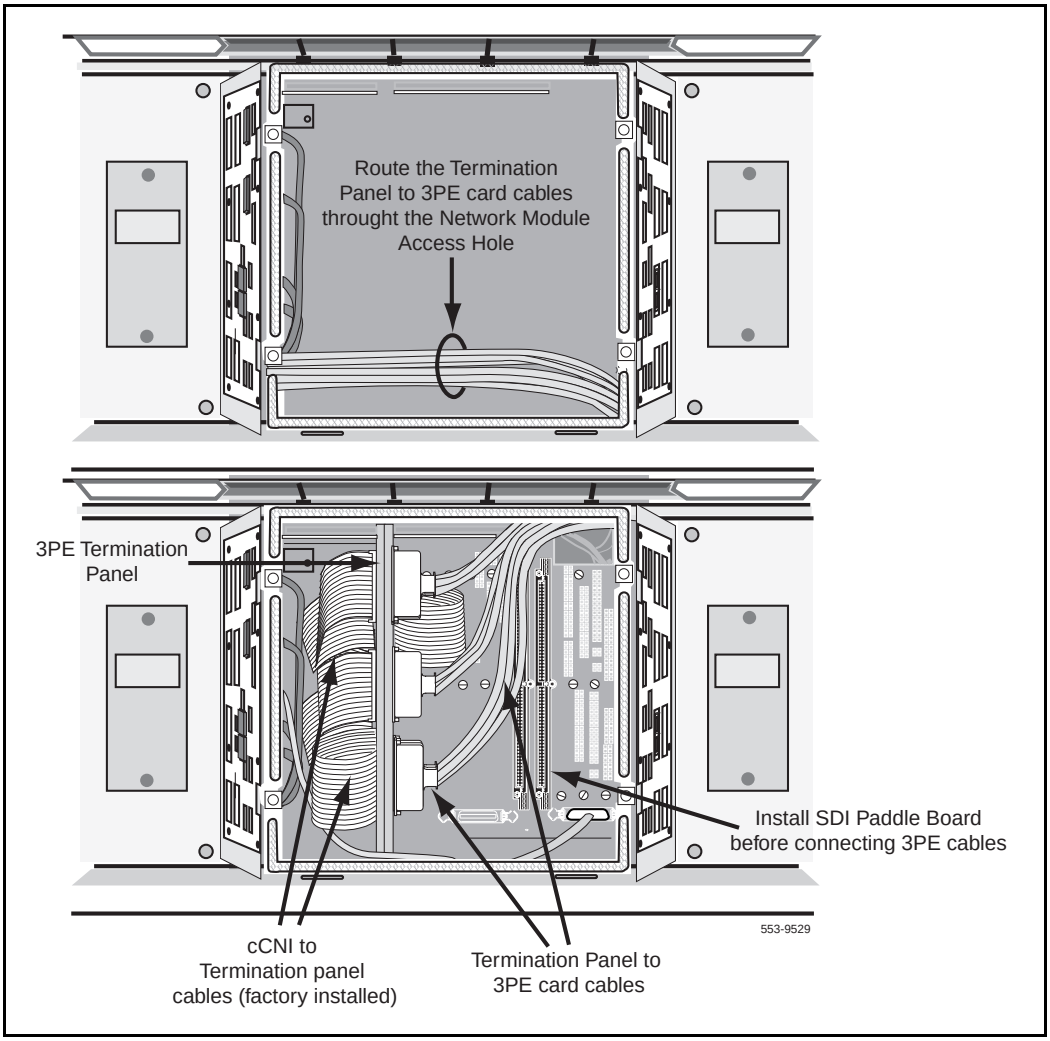


Table 24 on page 158 specifies the default Network group assignments for each cCNI slot and port. These designations can be changed in software if necessary.

Table 24
cCNI Network group designations

cCNI card slot	cCNI card port	3PE Termination Panel label	Connected to Network group
c9	0	N/A (factory installed directly to the Core/Net backplane)	0
c9	1	Port 9-1	1
c10	0	Port 10-0	2
c10	1	Port 10-1	3
c11	0	Port 11-0	4
c11	1	Port 11-1	5
c12	0	Port 12-0	6
c12	1	Port 12-1	7

cCNI to 3PE Termination Panel cable connections

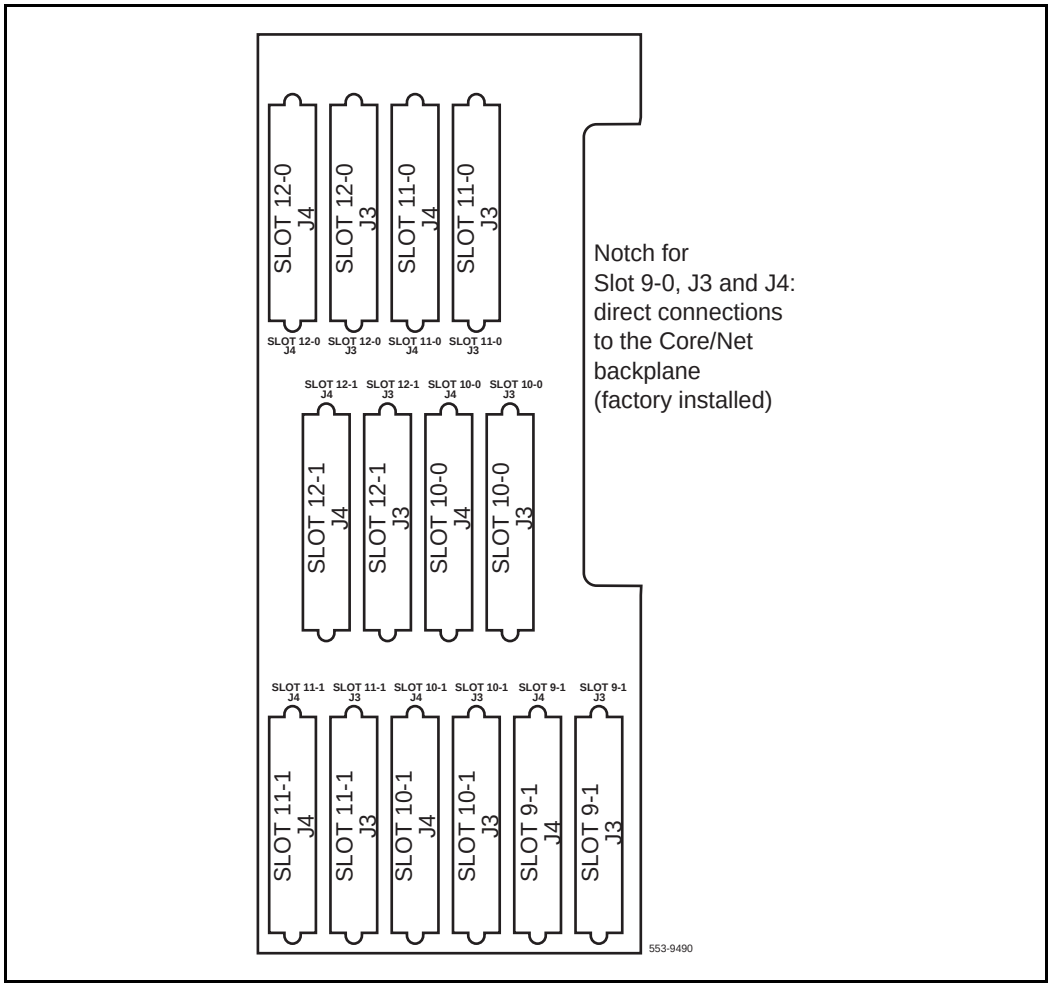
The cCNI slot and port connections are labeled on the 3PE Termination Panel. See Figure 64 on page 159. Each 3PE card is connected with two cables: one to J3 and one to J4. Table 24 on page 158 specifies the Network group that connects to each slot.

Connect the 3PE cables to the 3PE Termination Panels

Two NT8D76 cables connect from J3 and J4 of each 3PE faceplate to the 3PE Termination Panel. See Figure 65 on page 161.

Refer to Table 24 on page 158 for cCNI port and slot assignments. Connect shelf 0 3PE cards to the Core/Net 0 panel; connect shelf 1 3PE cards to the Core/Net 1 panel. The 3PE cables for Network group 0 are factory installed.

Figure 64
3PE Termination Panel (Core/Net module)



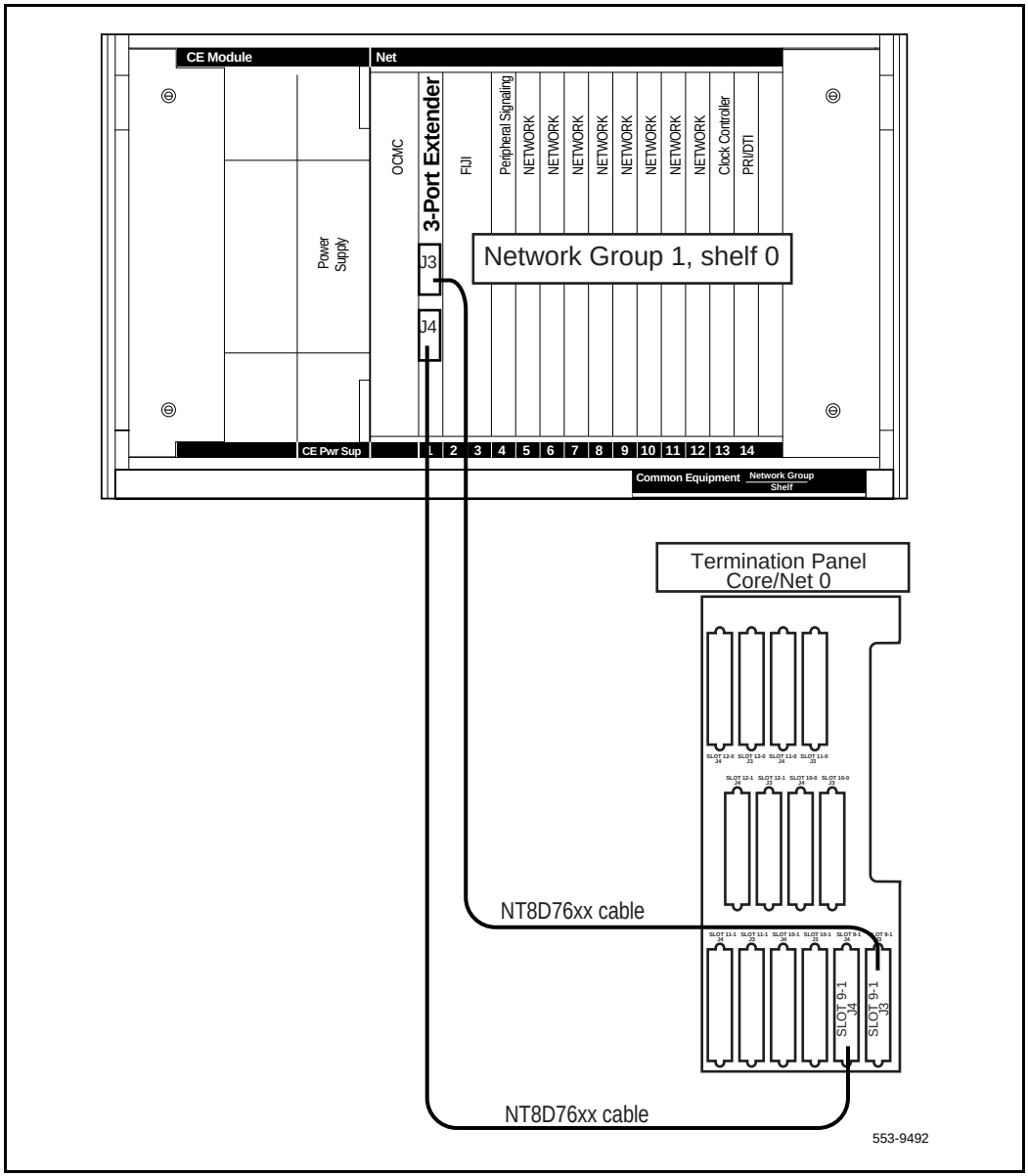
Connect the Network shelf 0 3PE cards to Core/Net 0

1. Connect a NT8D76 cable of the appropriate length from J3 on the 3PE card faceplate in **Network group 1, shelf 0** to the **Port 9-1, J3** connection on the 3PE Termination Panel in **Core/Net 0**.
2. Connect a NT8D76 cable of the appropriate length from J4 on the 3PE card faceplate in **Network group 1, shelf 0** to the **Port 9-1, J4** connection on the 3PE Termination Panel in **Core/Net 0**.
3. Connect a NT8D76 cable of the appropriate length from J3 on the 3PE card faceplate in **Network group 2, shelf 0** to the **Port 10-0, J3** connection on the 3PE Termination Panel in **Core/Net 0**.
4. Connect a NT8D76 cable of the appropriate length from J4 on the 3PE card faceplate in **Network group 2, shelf 0** to the **Port 10-0, J4** connection on the 3PE Termination Panel in **Core/Net 0**.
5. Install the remaining cables according to the assignments in Table 24 on page 158.

Connect the Network shelf 1 3PE cards to Core/Net 1

1. Connect a NT8D76 cable of the appropriate length from J3 on the 3PE card faceplate in **Network group 1, shelf 1** to the **Port 9-1, J3** connection on the 3PE Termination Panel in **Core/Net 1**.
2. Connect a NT8D76 cable of the appropriate length from J4 on the 3PE card faceplate in **Network group 1, shelf 1** to the **Port 9-1, J4** connection on the 3PE Termination Panel in **Core/Net 1**.
3. Connect a NT8D76 cable of the appropriate length from J3 on the 3PE card faceplate in **Network group 2, shelf 1** to the **Port 10-0, J3** connection on the 3PE Termination Panel in **Core/Net 1**.
4. Connect a NT8D76 cable of the appropriate length from J4 on the 3PE card faceplate in **Network group 2, shelf 1** to the **Port 10-0, J4** connection on the 3PE Termination Panel in **Core/Net 1**.
5. Install the remaining cables according to the assignments in Table 24 on page 158.

Figure 65
Example of 3PE faceplate to 3PE Termination Panel connection



Connect the Network cards to the IPE backplane

Task summary list

The following is a summary of the tasks in this section:

- IPE shelf 1 and shelf 2 designations, page 164
- IPE segments, page 165
- Superloop connections to the IPE segments, page 165
- Superloop to IPE segment assignments, page 166
- Connect the XNET (Superloop) cards to the IPE modules, page 168
- Required cards for Fiber Network Fabric, page 171
- Required cables for Fiber Network Fabric, page 172
- FIJI card description - Fiber Network Fabric, page 172
- Optical Cable Management Card (OCMC), page 173
- Cable the fiber optic rings, page 175
- Cable the fiber optic rings, page 175
- Connect the FIJI to FIJI cables (shelf 0 to shelf 1), page 177

The IPE modules contain equipment to physically connect trunk and terminal telephone lines to the Meridian 1 system. The line and trunk cards in the IPE modules convert analog voice signals into digital data. That digital data is sent to the Superloop cards where calls are assigned timeslots, or speech paths, for the duration of the conversation.

Superloop cards in the Network shelves are cabled to these IPE backplane connectors.

This section describes the concepts and procedures needed to connect the superloop cards in the Network shelves to the IPE module backplanes. Review each section in order and complete the procedures as described:

1 IPE shelf 1 and shelf 2 designations, page 164.

2 IPE segments, page 165.

3 Superloop connections to the IPE segments, page 165.

4 Superloop to IPE segment assignments, page 166.

5 Connect the XNET (Superloop) cards to the IPE modules, page 168.

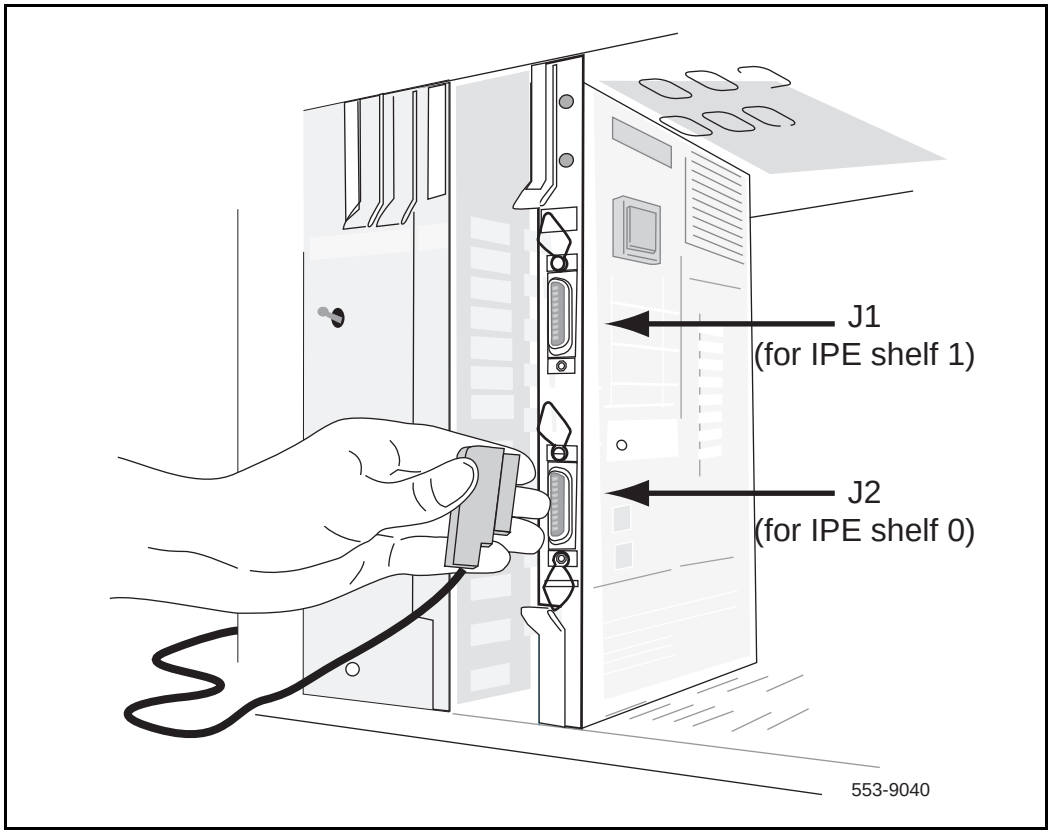
IPE shelf 1 and shelf 2 designations

Each superloop card can be connected to two different IPE shelves.

- IPE shelves connected to J2 of a superloop card is considered “shelf 0” for that superloop card.
- IPE shelves connected to J1 of a superloop card is considered “shelf 1” for that superloop card.

These designations are used to assign the superloop cards to different IPE segments. These designations are also used in software configuration.

Figure 66
Superloop faceplate cable connections

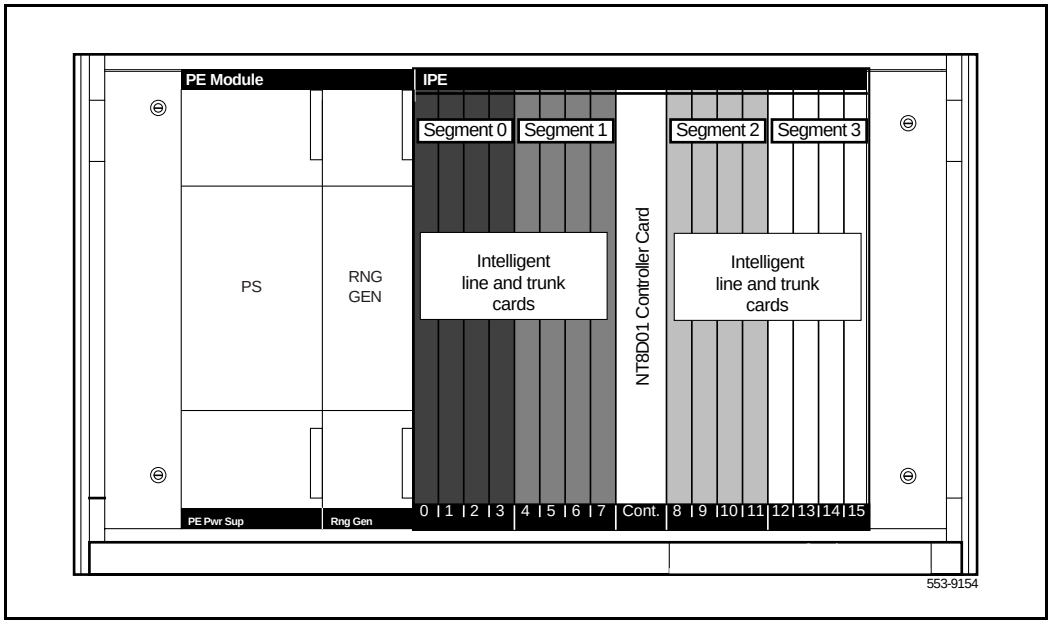


IPE segments

Each 16 slot IPE module is divided into four segments of intelligent line or trunk cards. See Figure 67 on page 165. Superloop cards are connected to between one and eight IPE segments (in either one or two IPE modules).

The number of segments supported by a Superloop card depends on a site's traffic and non-blocking requirements. Higher blocking ratios result in a greater chance of busy signals. Lower Superloop to IPE segment ratios results in a non-blocking system that eliminates the chance of busy signals.

Figure 67
IPE module segments: front side of an IPE module

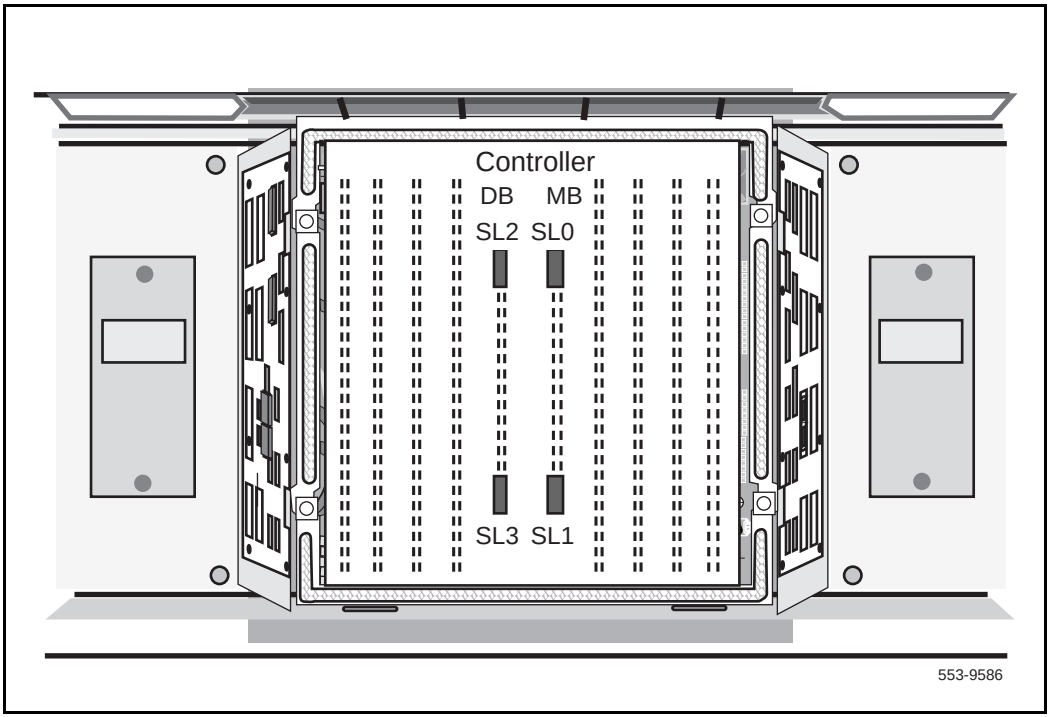


Superloop connections to the IPE segments

A Controller card (NT8D01) in each IPE module manages the communication between the IPE cards and the superloop cards. On the IPE backplane, behind this Controller card, there are four connections labelled SL0, SL1, SL2, SL3. See Figure 68 on page 166. The superloop cards are cabled to these connections with NT8D85 cables.

The way in which a superloop card is connected to the IPE backplane determines the IPE segments controlled by that superloop card. Table 25 on page 167 contains the connection information to assign IPE segments to a superloop card.

Figure 68
IPE segment connections on an IPE module backplane



Superloop to IPE segment assignments

Table 25 on page 167 contains the connections to assign superloop cards to between one and eight IPE segments. For new systems, these configurations are made in the factory and shown in detail on the column layouts in the System Layout plan.

Table 25
Superloop to IPE segment configurations

	FROM		TO	
	Superloop network card	**Faceplate connector**	**IPE shelf**	**Backplane connector**
One segment per superloop	NT8D04 #1	J2	shelf 0	SL0
	NT8D04 #2	J2	shelf 0	SL1
	NT8D04 #3	J2	shelf 0	SL2
	NT8D04 #4	J2	shelf 0	SL3
Two segments per superloop	NT8D04 #1	J2	shelf 0	SL0
	NT8D04 #2	J2	shelf 0	SL1
Four segments per superloop	NT8D04 #1	J2	shelf 0	SL0
Eight segments per superloop	NT8D04 #1	J2	shelf 0	SL0
	NT8D04 #1	J1	shelf 1	SL0
One segment per superloop/three segments per another superloop	NT8D04 #1	J2	shelf 0	SL0
	NT8D04 #2	J2	shelf 0	SL1
Two segments per superloop/six segments per another superloop	NT8D04 #1	J2	shelf 0	SL0
	NT8D04 #2	J2	shelf 1	SL0
	NT8D04 #2	J1	shelf 1	SL1

Connect the XNET (Superloop) cards to the IPE modules

Review the sections above to understand how the superloop cards are connected to the IPE backplanes. Follow the instructions below to connect the IPE to superloop cables:

1 Review the System Layout Plan to determine the IPE segments assigned to each Superloop. See Figure 68 on page 166. Note the following:

- the loop number assigned to the IPE segments.
- the module and slot assignments for the NT8D04 Superloop Network Card associated with each loop.
- the location of IPE Modules associated with each loop.

2 Verify that the Enb/Dis switch on each superloop network card is set to Dis.

3 Connect the superloop network card faceplate to the associated IPE backplane:

a Label both ends of an NT8D91 cable with the loop number

b Connect one end of the cable to the superloop network card faceplate connector. See Figure 66 on page 164:

- J1 for IPE shelf 1
- J2 for IPE shelf 0

c Connect the other end of the cable to the SL0, SL1, SL2, or SL3 IPE backplane connector assigned to the loop (see the assignments in Table 25 on page 167).

Note: The key (polarizing tab) on the side of the cable connector must be inserted into the keyway on the left side, facing the backplane, of the backplane connector. Blue and white wires should show through the top of the cable connector and, if there is a directional label, the arrow on the cable connector should be located at the top right.

4 Seat and secure all connectors.

CAUTION

Due to the possibility of EMI/RFI noise, do not route cables from front to rear next to the power supply unit.

Cable the Dual Ring Fiber Network - FNF only

The information contained in this section through Connect the FIJI to FIJI cables (shelf 0 to shelf 1), page 177 applies to CP PII with Fiber Network Fabric only.

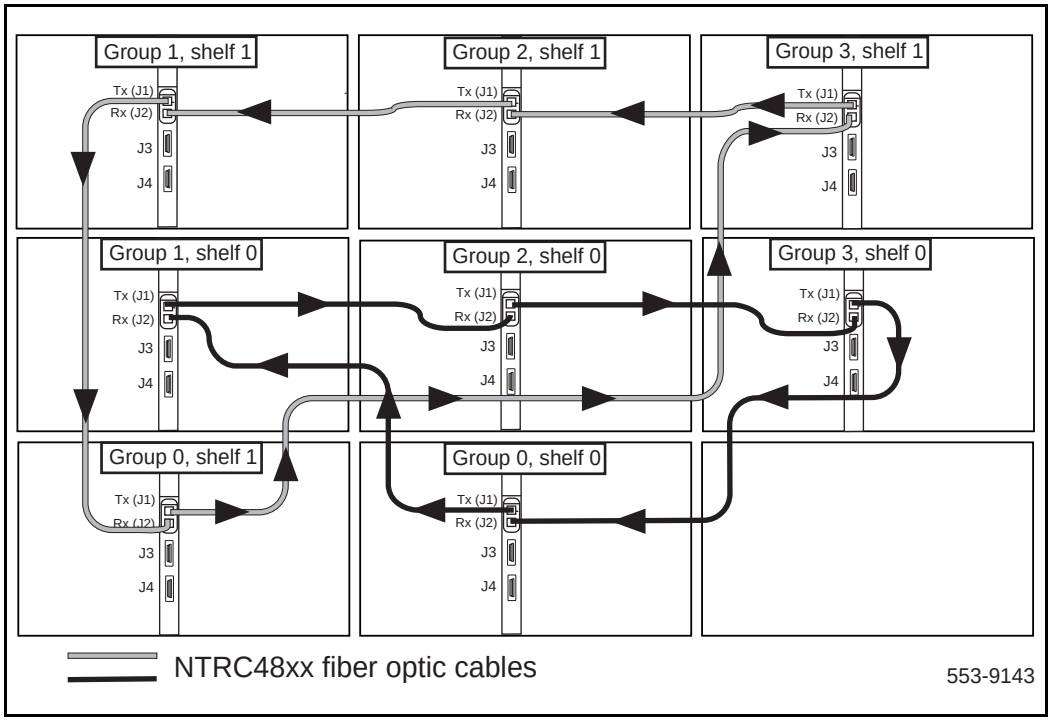
The FIJI cards in the Network modules are connected with fiber optic cables to form a Dual Ring Fiber Network. This Fiber Network allows calls to be routed between Network groups.

The Fiber Network consists of two separate rings: one ring connects all the Network shelf 0's while the second ring connects all the Network shelf 1's. See Figure 69 on page 170. Two steps are required to configure the Fiber Network:

1 Cable the fiber optic rings, page 175

2 Connect the FIJI to FIJI cables (shelf 0 to shelf 1), page 177.

Figure 69
Dual Ring Fiber Network



Required cards for Fiber Network Fabric

The number of cards required by each system depends on system configuration.

Table 26
Fiber Network required cards

Quantity	Part number	Description
1 per Network module	NTRB33	Fiber Junctor Interface (FIJI) card
1 per Network module, as needed	NTRE39	Optical Cable Management Card (OCMC)
8 per system (4 per Core), as needed	NT4N65AA	compact Core Network Interface (cCNI-3) cards
2 per system	QPC471*	Clock Controller cards
2 per system	QPC775**	Clock Controller cards

* Systems installed in the United States.

**Systems installed outside the United States.

Note: Either Clock Controller can be installed, but QPC471 and QPC775 Clock cards cannot be combined in one system.

Required cables for Fiber Network Fabric

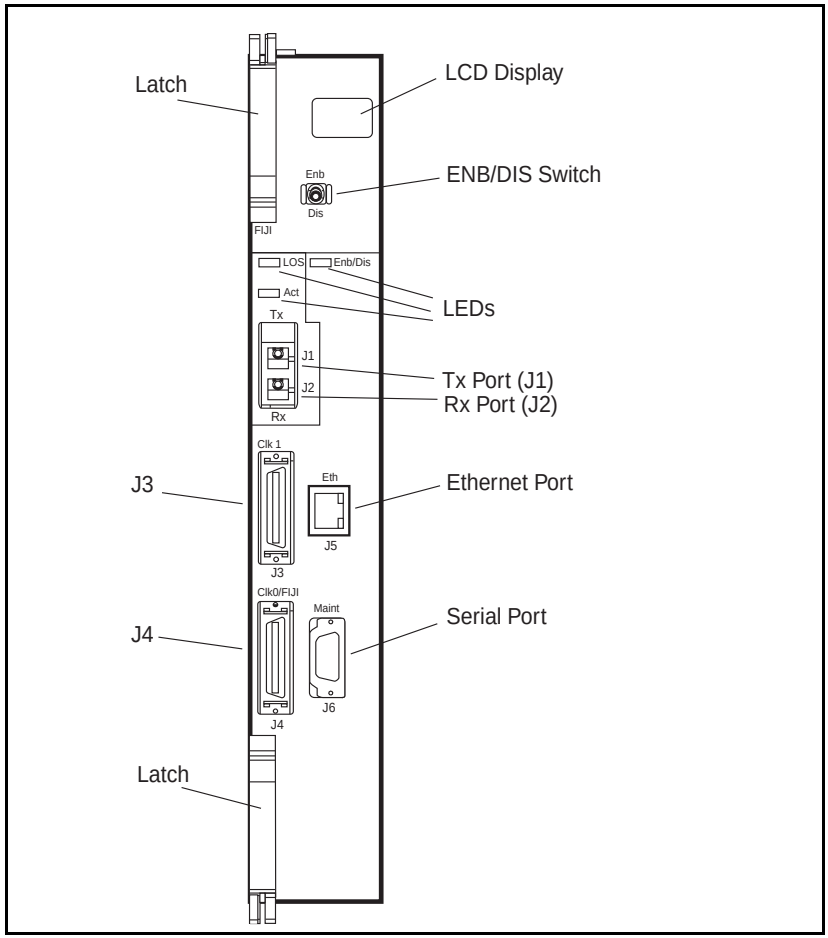
Table 27
Required cables

Cable type	Quantity	Part number	Description
Fiber Ring cable	1 per FIJI card	NTRC48AA	6 ft. fiber optic cable
		NTRC48BA	10 ft. fiber optic cable
		NTRC48CA	12 ft. fiber optic cable
		NTRC48DA	14 ft. fiber optic cable
		NTRC48EA	19 ft. fiber optic cable
		NTRC48FA	26 ft. fiber optic cable
		NTRC48GA	32 ft. fiber optic cable
		NTRC48HA	50 ft. fiber optic cable
Clock to FIJI	2 per system	NTRC46AA	4 ft.-13.5 ft.*
		NTRC46BA	5.5 ft. - 8 ft.*
		NTRC46CA	22 ft.-22 ft.*
Clock to Clock	1 per system	NTRC49AA	6 ft.
		NTRC49BA	20 ft.
FIJI to FIJI Sync	1 per network group	NTRC47AA	5 ft.
* indicates the lengths of the two “Y” terminations.			

FIJI card description - Fiber Network Fabric

Fiber Network Fabric is enabled by the installation of one NTRB33 Fiber Junctor Interface (FIJI) card in each Core/Net or Network module. FIJI cards require two slots; they are installed in slots 2 and 3 of each Network module, or in slots 8 and 9 of each Core/Net module. The LCD display shows the Network group and shelf. If an error occurs, this window displays an Alarm code.

Figure 70
FIJI card faceplate



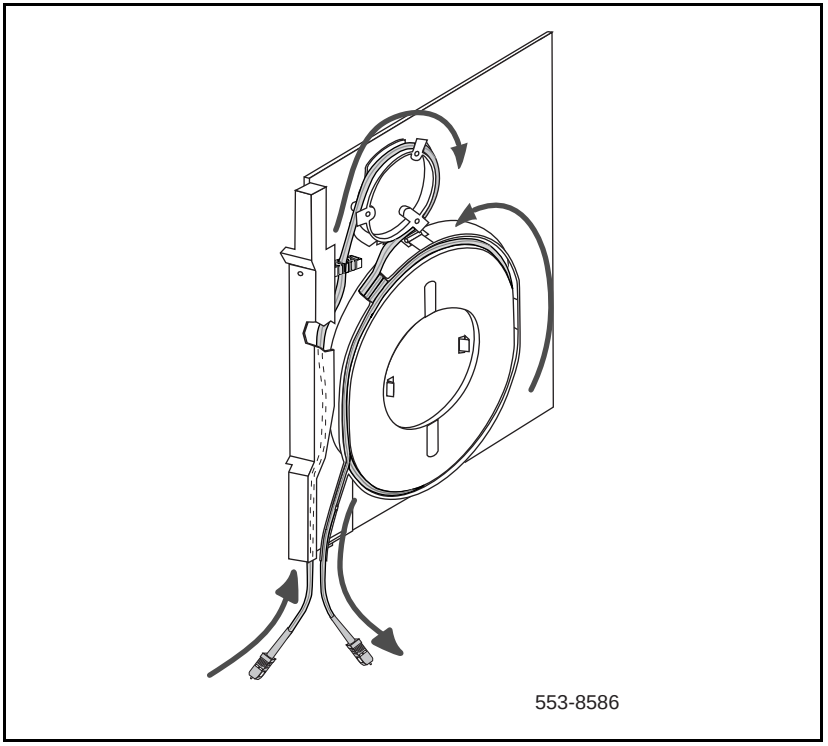
Optical Cable Management Card (OCMC)

Because fiber optic cables are easily damaged if bent, the NTRE39 Optical Cable Management Card (OCMC) is installed in Network modules to store and protect excess cable length. The OCMC card ensures that the fiber cable is not bent beyond a a 30 mm bend radius. See Figure 71 on page 174.

The OCMC contains no electronic components and is not powered by the backplane. This card is used primarily in upgrades where the intergroup cable distances vary greatly.

OCMC is a single width card installed between the Power supply and slot 1 of a Network module. Two OCMC cards can be installed in these slots if necessary.

Figure 71
OCMC: the Optical Cable Management Card



Cable the fiber optic rings

The Dual Ring Fiber Network is comprised of two separate rings of NTRC48 fiber optic cable: one ring between the FIJI cards in all Network shelf 0's and a second ring between the FIJI cards in all Network shelf 1's.

Install the shelf 0 fiber optic ring (ascending)

To create the shelf 0 fiber optic loop, connect the FIJI cards in each Network shelf 0 in *ascending* order. See Figure 72 on page 176:

Note: Each end of the NTRC48xx cable is labeled "Tx" or Rx" in the factory. Remove the black cap from the end of each cable before it is connected.

1. Start with group 0, shelf 0.
2. Connect a NTRC48xx FIJI Fiber Ring cable of the appropriate length from the Tx (J1) port of the FIJI card in **Group 0, shelf 0** to the Rx (J2) port of the FIJI card in **Group 1, shelf 0**.
3. Connect a NTRC48xx FIJI Fiber Ring cable of the appropriate length from the Tx (J1) port of the FIJI card in **Group 1, shelf 0** to the Rx (J2) port of the FIJI card in **Group 2, shelf 0**.
4. Continue to connect NTRC48xx FIJI Fiber Ring cables of the appropriate length from the Tx (J1) port to the Rx (J2) port in shelf 0 of each Network group. Connect these cables in **ascending** order of Network groups.
5. To complete the Ring, connect a final cable from the Tx (J1) port in the **highest number group** back to the Rx (J2) port in **Group 0, shelf 0.**

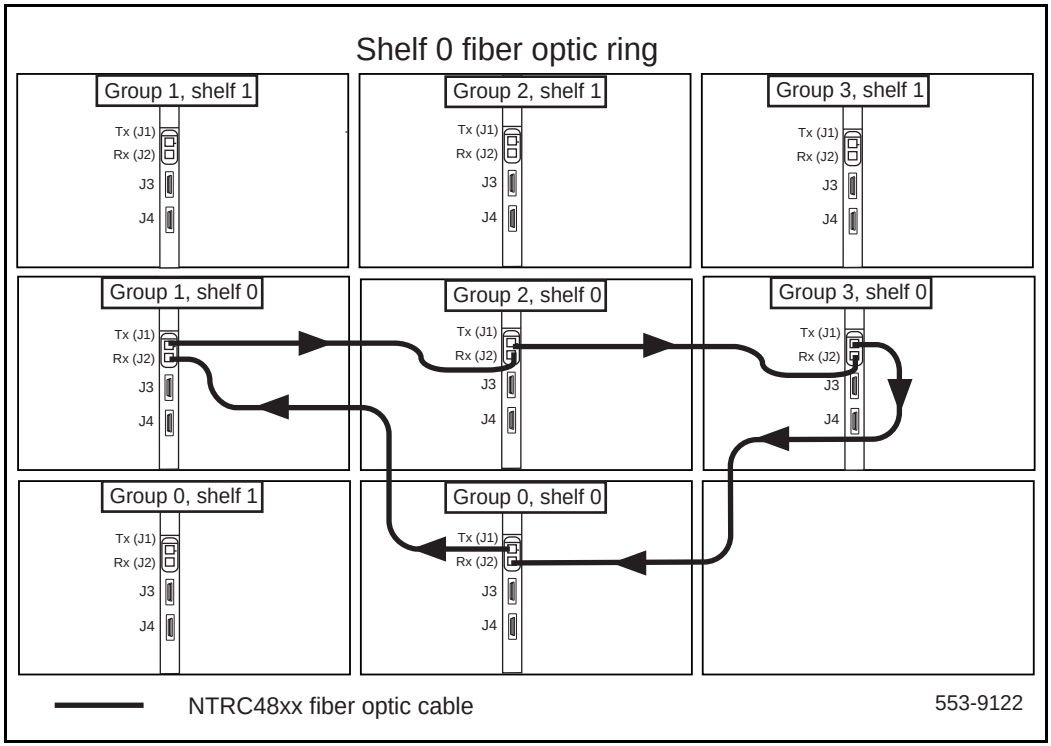
Install the shelf 1 fiber optic ring (descending)

To create the shelf 1 fiber optic loop, connect the FIJI cards in each Network shelf 1 in *descending* order. See Figure 74 on page 178.

Note: Each end of the NTRC48xx cable is labeled "Tx" or Rx" in the factory. Remove the black cap from the end of each cable before it is connected.

1. Start with Network group 0, shelf 1.
2. Connect a NTRC48xx FIJI Fiber Ring cable of the appropriate length from the Tx (J1) port of the FIJI card in **Group 0, shelf 1** to the Rx (J2) port of the FIJI card in the **highest Network group, shelf 1**.

Figure 72
Shelf 0 fiber optic ring example (ascending)

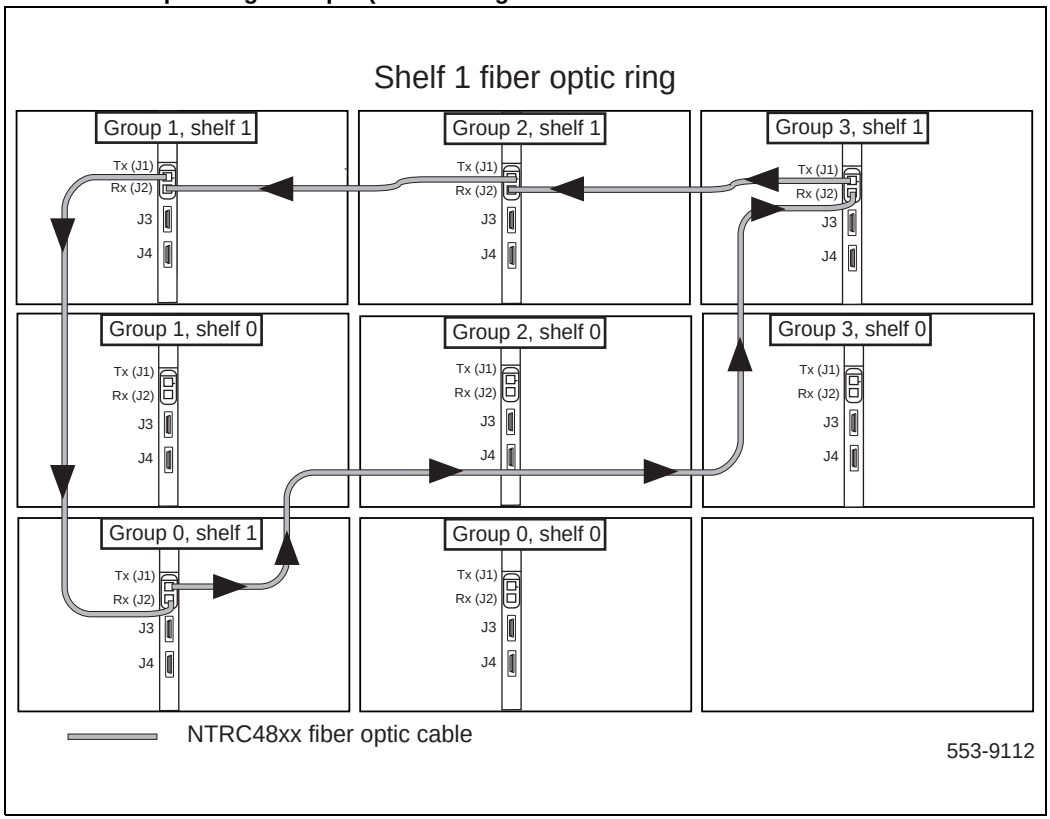


3 Connect a NTRC48xx cable from the Tx (J1) port of the FIJI card from the Tx (J1) port in the **highest Network group, shelf 1** to the Rx (J2) port in the **second highest Network group, shelf 1**.

4 Continue to connect NTRC48xx FIJI Fiber Ring cables of the appropriate length from the Tx (J1) port to the Rx (J2) port in shelf 1 of each Network group. Connect these cables in **descending** order of Network groups.

5 To complete the Ring, connect a final cable from Tx in **Group 1, shelf 1** to Rx in Group 0, shelf 1.

Figure 73
Shelf 1 fiber optic ring example (descending



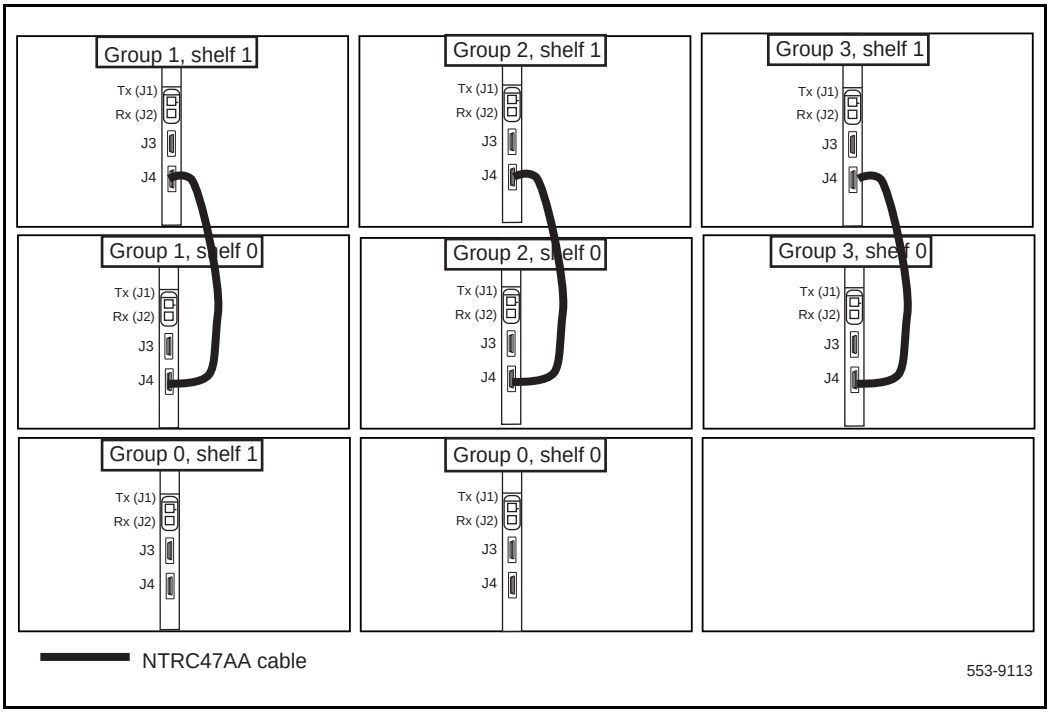
Connect the FIJI to FIJI cables (shelf 0 to shelf 1)

The FIJI cards in shelf 0 and shelf 1 of each Network group (except group 0) must be directly connected with a NTRC47AA FIJI to FIJI Synch Cable cable.

1 Connect a NTRC47AA cable from J4 to J4 of the FIJI cards in each Network group, except group 0. See Figure 74 on page 178.

2 **Do NOT connect a cable in group 0.** The FIJI to FIJI connection in group 0 is made as part of the Clock Controller connections described on Configure the Clock Controllers - Fiber Network Fabric, page 179.

Figure 74
FIJI shelf 0 to FIJI shelf 1 connections



Configure the Clock Controllers - Fiber Network Fabric

Task summary list

The following is a summary of the tasks in this section:

- Card placement, page 179
- Connect the Clock Controller cables - Fiber Network Fabric only, page 181

Two Clock Controller cards are required in each system. These cards synchronize Meridian 1 functions.

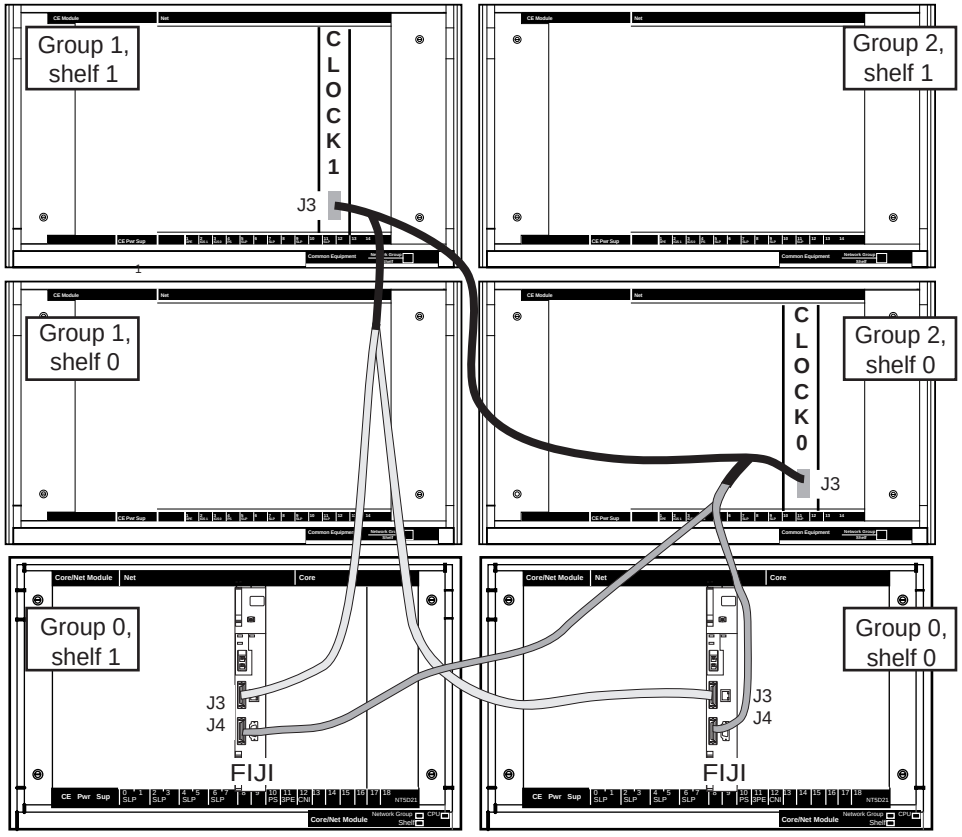
The Clock Controllers are installed based on the rules listed below.

Card placement

Figure 75 on page 180 shows an example of two Clock Controllers installed in a two-column system. Cards must be installed based on the rules below:

- Two Clock Controller cards are installed in each system. The Clocks are connected to each other and to the FIJI cards in Network group 0.
- The two Clock Controllers must be installed in Slot 13 of any Network module.
- Clock Controllers must not be installed in Network shelf 0.
- Clock Controllers are both installed in Network shelf 1 in a two group system.
- Clock Controllers are installed in different Network groups. For example, Clock 0 can be installed in a Network shelf 1. Clock 1 can be installed in a Network shelf 2.
- Clock Controllers are installed in separate columns for power and cooling redundancy.

Figure 75
Clock Controller placement - Fiber Network Fabric option



Connect the Clock Controller cables - Fiber Network Fabric only

Connect the cables to the Clock Controllers as shown in Figure 76 on page 183:

1 Connect the Clock to Clock cable:

- **a** Connect P1 of the NTRC49 cable to port J3 of Clock Controller 0.
- **b** Connect P2 of the NTRC49 cable to port J3 of Clock Controller 1.

2 Connect the Clock to Clock and Clock to FIJI cables:

- **a** At Clock 0: Connect the "**J1 Clock** " end of a Clock to FIJI cable (NTRC46Ax) to the **J1** end of the Clock to Clock cable.
- **b** At Clock 1: Connect the "**J1 Clock** " end of a second Clock to FIJI cable (NTRC46Ax) to the **J2** end of the Clock to Clock cable.

3 Connect the Clock 0 to FIJI cable:

- **a** Connect P1 of the NTRC46 cable from Clock 0 to **J4** of the FIJI card in group 0, **shelf 0**.
- **b** Connect P2 of the NTRC46 cable from Clock 0 to **J4** of the FIJI card in group 0, **shelf 1**.

4 Connect a Clock 1 to the FIJI cable:

- **a** Connect P1 of the NTRC46 cable from Clock 1 to **J3** of the FIJI card in group 0, **shelf 0.**
- **b** Connect P2 of the NTRC46 cable from Clock 1 to **J3** of the FIJI card in group 0, **shelf 1**.

5 Set the Clock controller switch settings. See Table 28 on page 182

Table 28
Clock Controller switch settings

Option 81 systems equipped with Fiber Network must use the Option 81C switch settings to enable Clock Hunt software. DO NOT use the Option 81 switch settings.

SW1				SW2				SW4			
1	**2**	**3**	**4**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**
on	off	off	off	off	off	off	off	**	on	*	*

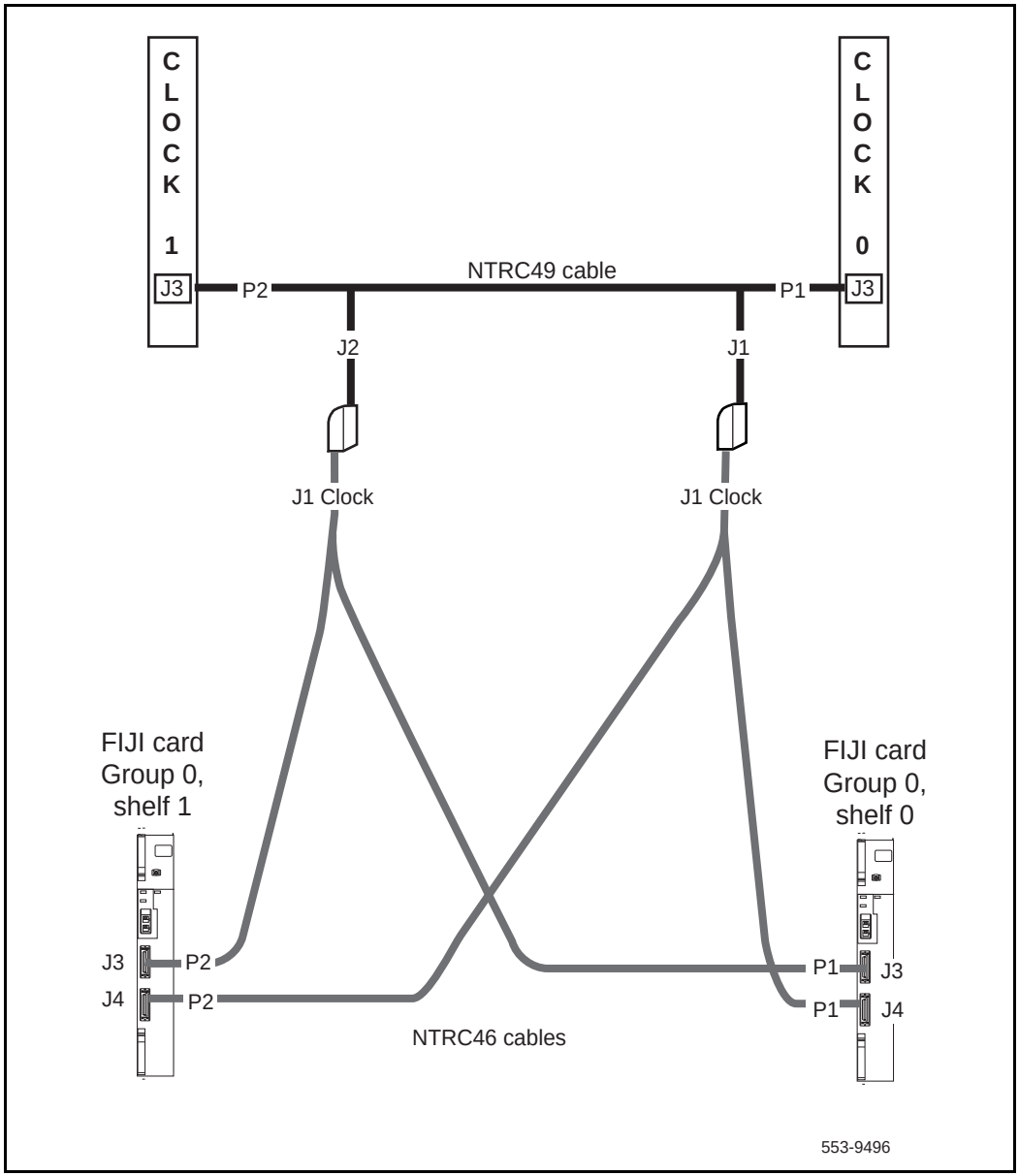
*Cable length between the J3 faceplate connectors:		
0–4.3 m (0–14 ft.)	off	off
4.6–6.1 m (15–20 ft.)	off	on
6.4–10.1 m (21–33 ft.)	on	off
10.4–15.2 m (34–50 ft.)	on	on

***** If there is only one Clock Controller card in the system, set to OFF. If there are two Clock Controller cards, determine the total cable length between the J3 connectors (no single cable can exceed 25 ft.) and set these two switch positions for this cable length, as shown above. The maximum total (combined) length is 50 ft. Set the switches on both cards to the same settings.

** Set to ON for Clock Controller 0. Set to OFF for Clock Controller 1.

Note: For FNF based-systems, the total clock path length is equal to the length of the NTRC49 cable used to connect between the two clock controller cards.

Figure 76
Clock Controller cable configuration - Fiber Network Fabric option



Connect lines and trunks to Meridian 1

Content list

The following are the topics in this section:

- I/O panel connections 188
- Connecting lines and trunks 190

Cables are designated by the letter of the I/O panel cutout (A, B, C, and so on) where the 50-pin cable connector is attached. Each cable has three 20-pin connectors (16 positions are used), designated 1, 2, and 3, that attach to the backplane. Using the designations described, the backplane ends of the first cable are referred to as A-1, A-2, and A-3.

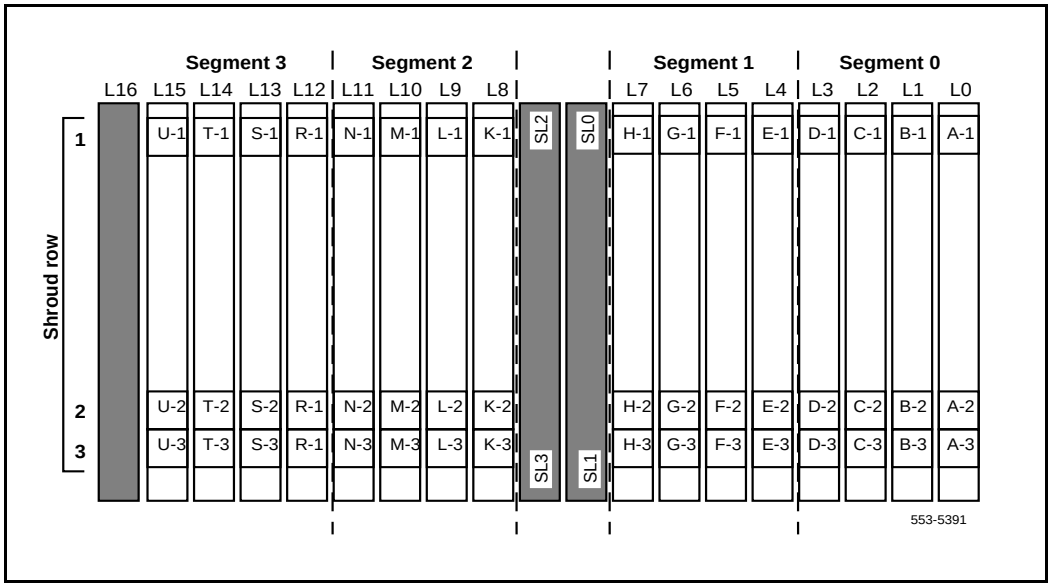
The locations of the cable connectors on the backplane are designated by the slot number (L0 through L15 for NT8D37) and the shroud row (1, 2, and 3). Using these designations, the slot positions in the first slot are referred to as L0-1, L0-2, and L0-3.

In NT8D37BA and NT8D37EC, and later vintage, IPE Modules, all 16 IPE card slots support 24-pair cable connections. Table 29 on page 186 shows the cable connections from the backplane to the inside of the I/O panel. Figure 78 on page 189 shows the designations for the backplane end of the cables, the backplane slot designations for the cable connections, and the associated network segments for the backplane slots.

Table 29
NT8D37 cable connections

Backplane slots – shroud rows	I/O panel/ cable designation
L0–1, 2, 3	A
L1–1, 2, 3	B
L2–1, 2, 3	C
L3–1, 2, 3	D
L4–1, 2, 3	E
L5–1, 2, 3	F
L6–1, 2, 3	G
L7–1, 2, 3	H
L8–1, 2, 3	K
L9–1, 2, 3	L
L10–1, 2, 3	M
L11–1, 2, 3	N
L12–1, 2, 3	R
L13–1, 2, 3	S
L14–1, 2, 3	T
L15–1, 2, 3	U

Figure 77
NT8D37 backplane cable designations



I/O panel connections

Use this procedure to cable NT8D37 IPE Modules.

Note: The corner vertical channels in the rear of the module are outside of the EMI shield. Cables in those vertical channels must be shielded, and must enter and exit the EMI-shielded area through I/O panels and adapters.

CAUTION
Electrical shock hazard
Tip, ring, A, B, E, M, ESC, and ESCG connections may be considered to be Telecommunications Network Voltages (TNV).

1. Select an appropriate number of NE-A25B (or equivalent) cables, long enough to run from the I/O panels on the rear of the module to the MDF.

   Figure 78 on page 189 shows the I/O panels on the NT8D37 IPE Module.

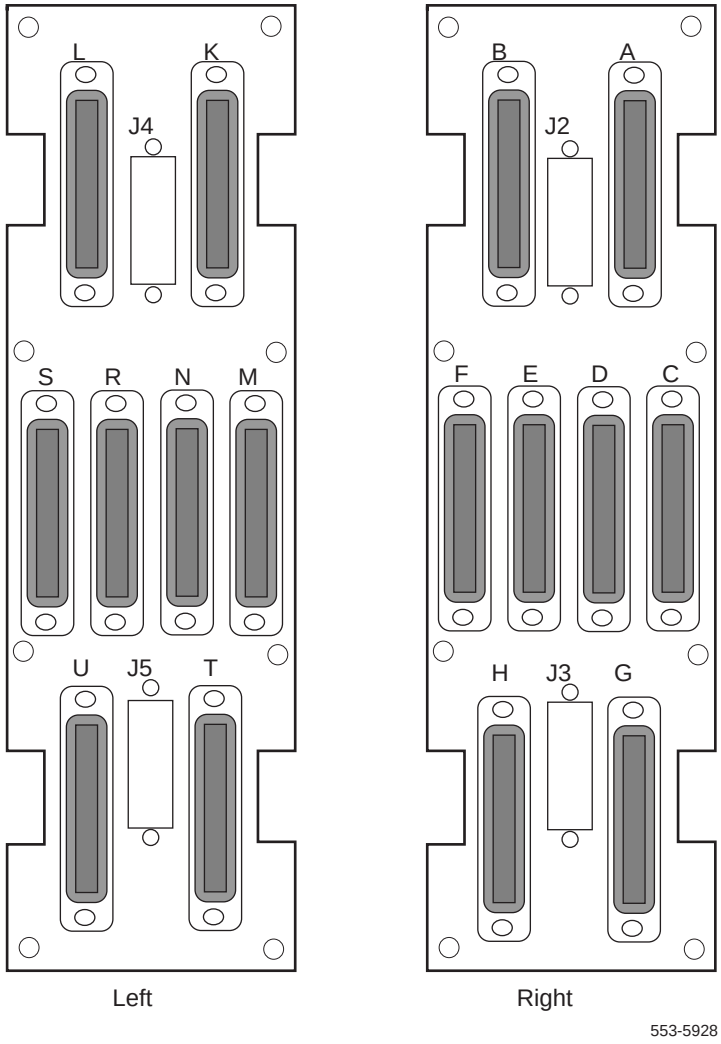
2. Attach a tag that shows the module number and the I/O connector designation to both ends of each cable.

3. Connect each cable to the appropriate connector on the I/O panel and run the cables to the MDF.

4. Terminate each cable on the cross-connect block designated with the appropriate module number.

5. Make sure all cables are neatly run, properly seated, and secured with cable ties.

Figure 78
NT8D37 IPE Module I/O panels



Connecting lines and trunks

Throughout this procedure, make sure wiring is not reversed and is on the proper terminals. Allow enough slack in the wiring to allow tracing and to reconnect wires if they break at the terminal.

1 Extend incoming wiring (such as cables from the central office or wiring from a recorded announcement machine) to the MDF and terminate them on separate connecting blocks.

2 Assign and record terminal numbers (TNs) for each line or trunk. Determine the location of the line or trunk connection and its assigned TN from the work order or assignment records.

3 Connect each line and trunk to the TN using cross-connecting wire (typically 24 AWG type-Z wire). Table 24 on page 158 lists pair-termination tables for line and trunk cards in NT8D11 CE/PE, NT8D13 PE, and NT8D37 IPE Modules.

Cross-connect incoming wiring and lines and trunks at the MDF.

Pair-termination for line and trunk cards in NT8D37 IPE Modules are provided in:

- Table 30, “NT8D37 IPE Module: line card pair-terminations,” on page 191.
- Table 31, “NT8D37 IPE Module: NT8D14 Universal Trunk Card pair-terminations,” on page 193Table 32, “NT8D37 IPE Module: NT8D15 E&M Trunk Card 2-wire paging mode pair-terminations,” on page 194.
- Table 33, “NT8D37 IPE Module: NT8D15 E&M Trunk Card 2-wire type 1 mode pair-terminations,” on page 194.

Table 30
NT8D37 IPE Module: line card pair-terminations

Pair	Pin numbers	Pair color	Unit 24/card
1T/1R	26/1	W-BL/BL-W	0
2T/2R	27/2	W-O/O-W	1
3T/3R	28/3	W-G/G-W	2
4T/4R	29/4	W-BR/BR-W	3
5T/5R	30/5	W-S/S-W	4
6T/6R	31/6	R-BL/BL-R	5
7T/7R	32/7	R-O/O-R	6
8T/8R	33/8	R-G/G-R	7
9T/9R	34/9	R-BR/BR-R	8
10T/10R	35/10	R-S/S-R	9
11T/11R	36/11	BK-BL/BL-BK	10
12T/12R	37/12	BK-O/O-BK	11
13T/13R	38/13	BK-G/G-BK	12
14T/14R	39/14	BK-BR/BK-BR	13
15T/15R	40/15	BK-S/S-BK	14

Table 30
NT8D37 IPE Module: line card pair-terminations

Pair	Pin numbers	Pair color	Unit 24/card
16T/16R	41/16	Y-BL/BL-Y	15
17T/17R	42/17	Y-O/O-Y	16
18T/18R	43/18	Y-G/G-Y	17
19T/19R	44/19	Y-BR/BR-Y	18
20T/20R	45/20	Y-S/S-Y	19
21T/21R	46/21	V-BL/BL-V	20
22T/22R	47/22	V-O/V-O	21
23T/23R	48/23	V-G/G-V	22
24T/24R	49/24	V-BR/BR-V	23
25T/25R	50/25	V-S/S-V	Spare

Table 31
NT8D37 IPE Module: NT8D14 Universal Trunk Card pair-terminations

Lead designations			Pin numbers	Pair color	Unit
RAN mode	**Paging mode**	**Other modes**			
0T/0R CP/MB	0T/0R A/PG	0T/0R	26/1 27/2	W-BL/BL-W W-O/O-W	0
1T/1R CP/MB	1T/1R A/PG	1T/1R	28/3 29/4	W-G/G-W W-BR/BR-W	1
2T/2R CP/MB	2T/2R A/PG	2T/2R	30/5 31/6	W-S/S-W R-BL/BL-R	2
3T/3R CP/MB	3T/3R A/PG	3T/3R	32/7 33/8	R-O/O-R R-G/G-R	3
4T/4R CP/MB	4T/4R A/PG	4T/4R	34/9 35/10	R-BR/BR-R R-S/S-R	4
5T/5R CP/MB	5T/5R A/PG	5T/5R	36/11 37/12	BK-BL/BL-BK BK-O/O-BK	5
6T/6R CP/MB	6T/6R A/PG	6T/6R	38/13 39/14	BK-G/G-BK BK-BR/BK-BR	6
7T/7R CP/MB	7T/7R A/PG	7T/7R	40/15 41/16	BK-S/S-BK Y-BL/BL-Y	7

Each of the following I/O panel connectors is cabled as shown above: connectors A, B, C, D, E, F, G, H, K, L, M, N, R, S, T, and U. These connectors are associated with backplane slots 0 through 15, sequentially.

Use LD 14 to select trunk termination impedance (600 ohm or 900 ohm). See the *X11 Administration* (553-3001-311) for information on LD 14.

Table 32
NT8D37 IPE Module: NT8D15 E&M Trunk Card 2-wire paging mode pair-terminations

Pair	Pin numbers	Pair color	Unit
0T/0R A/PG	26/1 29/4	W-BL/BL-W W-BR/BR-W	0
1T/1R A/PG	30/5 33/8	W-S/S-W R-G/G-R	1
2T/2R A/PG	34/9 37/12	R-BR/BR-R BK-O/O-BK	2
3T/3R A/PG	38/13 41/16	BK-G/G-BK Y-BL/BL-Y	3
Note: Each of the following I/O panel connectors is cabled as shown above: connectors A, B, C, D, E, F, G, H, K, L, M, N, R, S, T, and U. These connectors are associated with backplane slots 0 through 15, sequentially.			

Table 33
NT8D37 IPE Module: NT8D15 E&M Trunk Card 2-wire type 1 mode pair-terminations

Pair	Pin numbers	Pair color	Unit
0T/0R E/M	26/1 28/3	W-BL/BL-W W-G/G-W	0
1T/1R E/M	30/5 32/7	W-S/S-W R-O/O-R	1
2T/2R E/M	34/9 36/11	R-BR/BR-R BK-BL/BL-BK	2
3T/3R E/M	38/13 40/15	BK-G/G-BK BK-S/S-BK	3
Note: Each of the following I/O panel connectors is cabled as shown above: connectors A, B, C, D, E, F, G, H, K, L, M, N, R, S, T, and U. These connectors are associated with backplane slots 0 through 15, sequentially.			

Table 34
NT8D37 IPE Module: NT8D15 E&M Trunk Card 4-wire type 1 and type 2 mode pair-terminations

Lead designations		Pin numbers	Pair color	Unit
Type 1	**Type 2**			
TA/TB	TA/TB	26/1	W-BL/BL-W	0
RA/RB	RA/RB	27/2	W-O/O-W	
E/M	EA/EB	28/3	W-G/G-W	
ESC/ESCG	MA/MB	29/4	W-BR/BR-W	
TA/TB	TA/TB	30/5	W-S/S-W	1
RA/RB	RA/RB	31/6	R-BL/BL-R	
E/M	EA/EB	32/7	R-O/O-R	
ESC/ESCG	MA/MB	33/8	R-G/G-R	
TA/TB	TA/TB	34/9	R-BR/BR-R	2
RA/RB	RA/RB	35/10	R-S/S-R	
E/M	EA/EB	36/11	BK-BL/BL-BK	
ESC/ESCG	MA/MB	37/12	BK-O/O-BK	
TA/TB	TA/TB	38/13	BK-G/G-BK	3
RA/RB	RA/RB	39/14	BK-BR/BR-BK	
E/M	EA/EB	40/15	BK-S/S-BK	
ESC/ESCG	MA/MB	41/16	Y-BL/BL-Y	

Note: TA/TB is the transmit pair; RA/RB is the receive pair.

Configure the System Monitor

Content list

The following are the topics in this section:

- System monitor description 197
- Install the System Monitor cables 198
- Configure the System Monitor cards 206

System monitor description

The System Monitor (XSM) tracks the status Meridian 1 power and cooling systems. If an internal power or temperature problem occurs, the CPU sends a warning message to a system terminal or to a remote location via a modem. The system can also speed up the pedestal fans to assist cooling.

The System Monitor can also be attached to the external AC or DC power source. If a power problem occurs, the system sends a warning message to the terminal. In extreme cases where there is a loss of power or abnormal current, the System Monitor also shuts the system down.

Master and slave System Monitors

A System Monitor circuit card is located in the pedestal of each column. The card in the pedestal of Column 0 is the "*master*". The cards in each of the remaining columns are "*slaves*". The Meridian 1 system supports up to 63 *slave* columns.

The *master* System Monitor collects information from each *slave* and sends the information to the CP PII cards in the Core/Net modules. This information is stored in a log for review by the technician. If a serious problem occurs, the CPU can send a message (by a terminal or modem) or shut down all or part of the system.

Note: The System Monitors are identified by switch settings. The System Monitors for new systems are configured in the factory. See Configure the System Monitor cards, page 206 to configure a new Monitor when a column is added to a system.

Column and top cap connections

The System Monitor in each pedestal is connected to the modules in that column and to the temperature sensor in the top cap. If a power card fails or the column becomes too hot, a warning message is sent to the terminal. If the temperature gets too high, the cooling fans in the pedestal will speed up to assist with cooling.

Connections to external power sources

The *master* System Monitor card in column 0 can also be attached to the external AC or DC power source. If the power fails or falls to unacceptable levels, the System Monitor system sends a warning message to a terminal, modem or MDF and the system monitor shuts the system down.

Connection to the MDF

The *master* System Monitor card in column 0 can also be connected to the MDF. When a major alarm occurs, a message can be directly sent to a remote location.

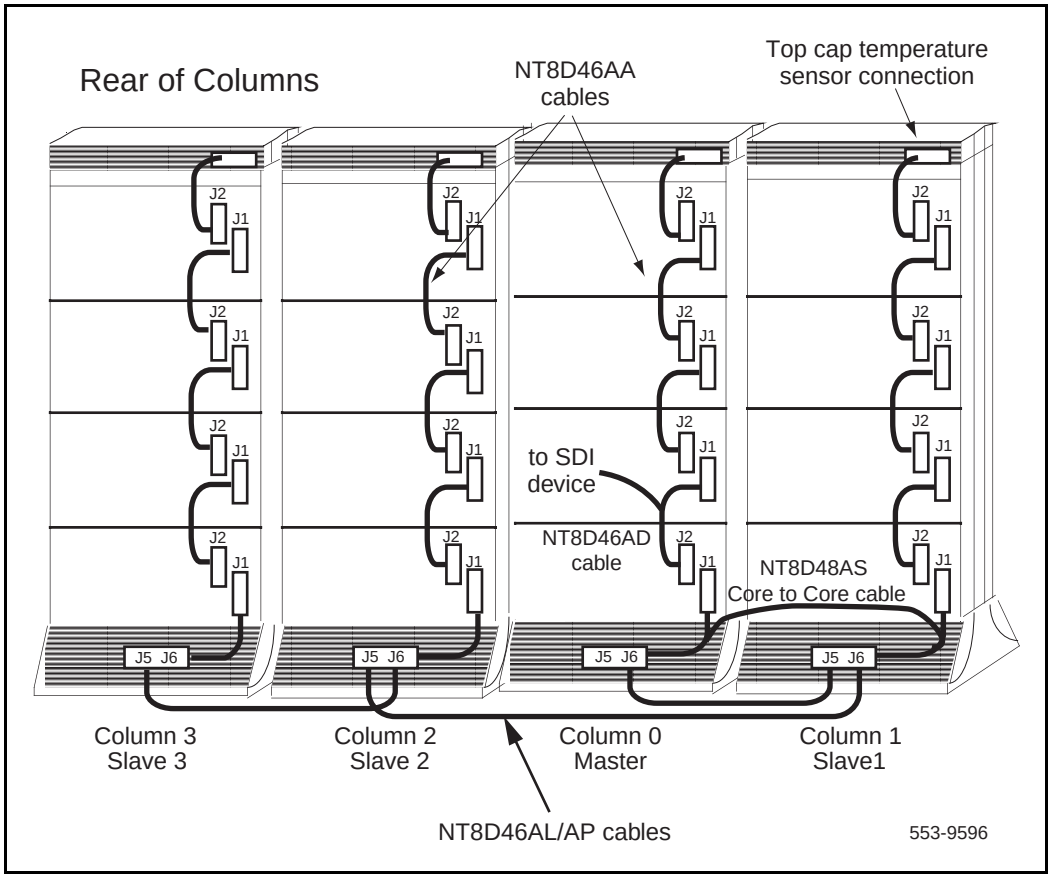
Install the System Monitor cables

Task summary list

The following is a summary of the tasks in this section:

- Daisy-chain the pedestal connections, page 200
- Connect the modules, top cap, and SDI port, page 202
- Connect the master System Monitor to the MDF, page 204
- Connect the master System Monitor to a UPS (optional for AC Systems), page 204
- Connect the master System Monitor to DC power, page 205

Figure 79
System Monitor cable configuration



Daisy-chain the pedestal connections

1 Connect a NT8D46AL/AP cable to the J6 System Monitor port in the rear of the Column 0 pedestal. This is the *master* System Monitor.

- If columns are adjacent, use a NT8D46AL cable.
- If columns are not adjacent, use a NT8D46AP cable.

2 Route the cable to the Column 1 pedestal and connect it to the J5 port. This is the first *slave* Monitor.

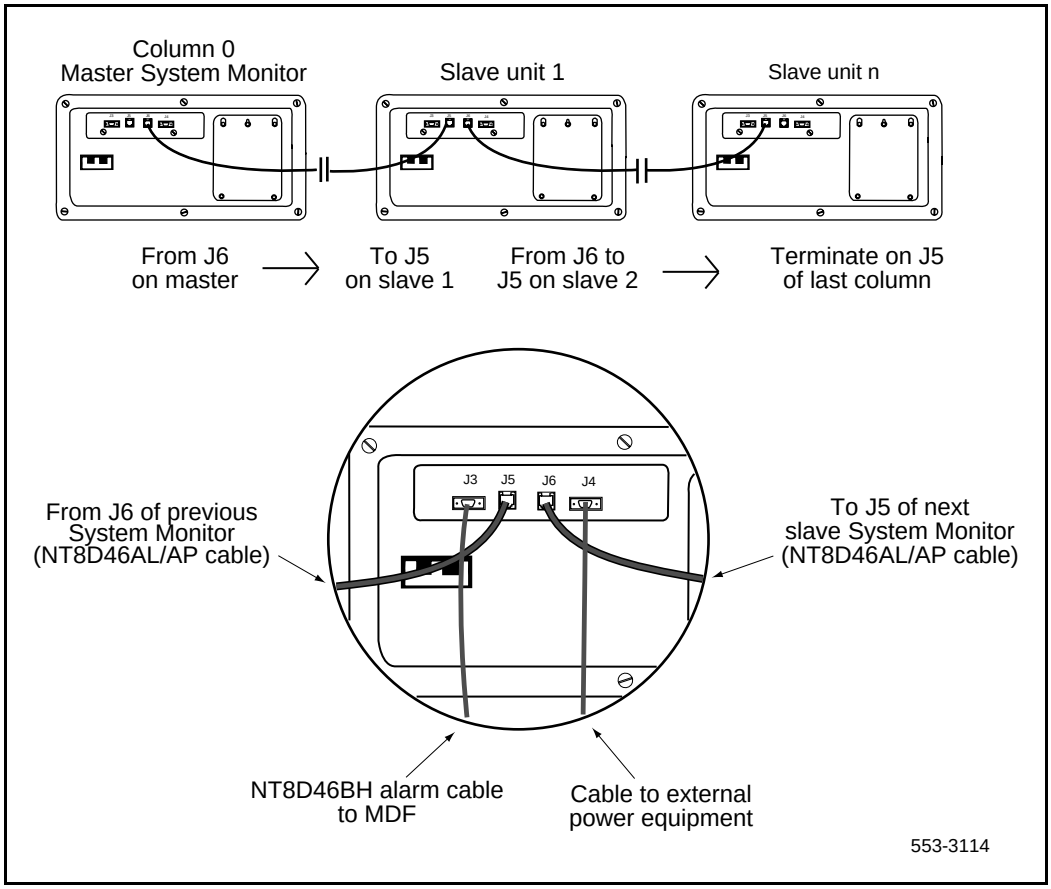
3 Route another cable from J6 in Column 1 to the J5 port in Column 2. This is the second *slave* Monitor.

4 Daisy-chain the cables between columns (from J6 to J5) in succession until all the columns are connected, as shown in Figure 80 on page 201.

5 Daisy-chain the System Monitor cables to the end of the row in one direction until all the columns are attached.

6 Terminate on J5 of the last column in the row.

Figure 80
System Monitor pedestal connections



Connect the modules, top cap, and SDI port

The System Monitor circuit card in the pedestal of each column is connected to that column's modules and top cap with NTD846AA cables.

In new systems, these cables are factory installed for the lower modules and pedestal. Attach the System Monitor cables to the modules added during installation. See Assemble the columns, page 120 for more information.

> ***Note 1:*** For **shipments to North America**, four column modules are shipped in two sections: the pedestal and bottom three modules are shipped on one pallet, and the fourth module and top cap are shipped on another. The System Monitor connections to the fourth module and top cap must be made after the module is assembled. See Assemble the columns and rows, page 117.

> ***Note 2:*** For **shipments outside North America**, the third and fourth modules are shipped separately from the pedestal and bottom two modules. The System Monitor connections to the third and fourth modules and top cap must be made after the module is assembled. See Assemble the columns and rows, page 117.

Follow the instructions below to connect the upper modules and top cap. Refer to Figure 79 on page 199 for an overview of System Monitor cables.

1 Connect the **NTD46AA** cables in a daisy chain from J1 to J2 of the backplanes to the top cap.

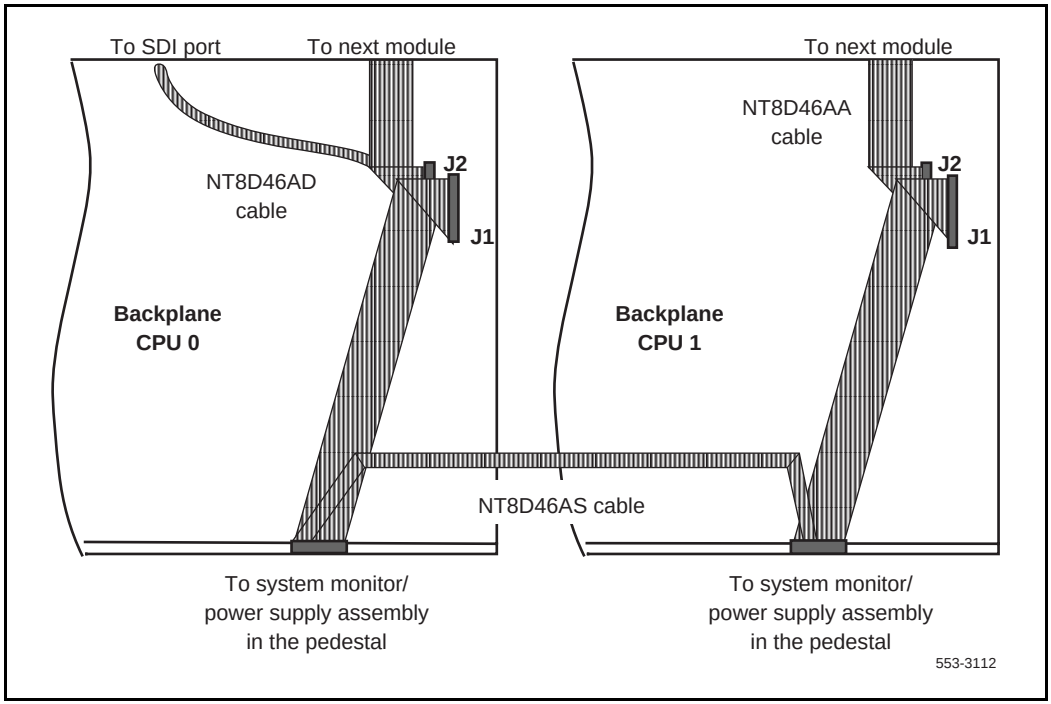
2 Connect an **NT8D46AD** cable in Core/Net 0 J2. This cable is also used to connect the System Monitor to the assigned port on an SDI card.

3 Connect the System Monitor in Column 0 to the System Monitor in Column 1 with a NT8D46AS cable. See Figure 81 on page 203.

> ***Note:*** This cable is used by the system to transfer information between the CPUs for redundancy.

Refer to Figure 81 on page 203 for a detail of the backplane connections

Figure 81
Column 0 and Column 1 System Monitor cables



Connect the master System Monitor to the MDF

For PFTU or external alarm, connect the *master* System Monitor to the MDF.

1 At the pedestal of the *master* System Monitor, connect a System Monitor to MDF cable to the J3 connector Figure 80 on page 201.

Note 1: The System Monitor to MDF cable is available in three lengths NT8D46BH (32 ft.), NT8D46EH (100 ft.), and NT8D46DH (150 ft.).

2 Connect the cable at the Meridian 1 alarm termination area at the MDF.

Connect the master System Monitor to a UPS (optional for AC Systems)

1 Connect the appropriate cable (see below) from J4 on the *master* System Monitor to the UPS.

- For a Best Inc. UPS, use an NT8D46AJ alarm cable.
- For an Exide UPS, use an NT8D46AQ alarm cable.
- For an Alpha UPS, use an NT8D46AU alarm cable.

2 Connect a cable from each slave System Monitor to the columns' associated UPS.

Connect the *master* System Monitor to DC power

1 Connect a cable from J4 on the *master* System Monitor to the DC power plant.

Table 35
Alarm and trip lead connections for System Monitor to DC power — NT8D46AV cable

Color	Description	Connection at control and distribution panel	
		Terminal block No	Pwr Sys Alarm Name
OR	Alarm	TB2 Position 6	Low Float
BL	DCON 0	TB4 Position 8	Rectifier Fail Alarm
R	DCON 1*	TB5 Position 2	Major Alarm
W	DCON 2*	TB5 Position 2	Major Alarm
GR	DCON 3*	TB5 Position 2	Major Alarm

* Connect the red, white, and green wires together at MJA.

Note 1: An NT8D46BV cable, 20 m (64 ft.), or NT8D46CV cable, 33 m (100 ft.), can be used instead of the NT8D46AV cable. Connections are the same as the NT8D46AV cable.

Note 2: The System 600/48 Power Plant produces a Major Alarm for the following faults:

- High voltage shut down (HVSD)
- High voltage (HV)
- Battery on discharge (BOD)
- Low voltage (LV)
- Low voltage disconnect (LVD)
- Alarm busy supply (ABSF)
- Internal fuse alarm (INT FA)
- Fuse alarm (FA)
- Rectifier fail alarm (RFA)

Configure the System Monitor cards

Task summary list

The following is a summary of the task in this section:

- Set the option switches, page 207

The System Monitor circuit cards are pre-configured in new systems.

Use the instructions in this section to reconfigure the System Monitor cards when a column is added to the system.

Description

In order to work properly, each System Monitor circuit card must be assigned as "*master*" or "*slave*".

The card in Column 0 must be set to *master*. The cards in each remaining column are set to *slave*.

The *master* card in Column 0 must also be configured with the total number of *slave* cards in the system.

Each *slave* card is also assigned a unique unit address, which is used by the CPU to identify the column if a problem occurs.

The *slave* card unit address must be the same as the column number. The *slave* System Monitor in Column 4, for example, must be set to unit address 4.

Set the option switches

Follow the instructions below for each column in the system:

1 In the rear of the pedestal, loosen the two retaining screws on the System Monitor and remove it from the PDU.

2 Set the System Monitor switches in Column 0 as the *master* using the settings shown in Table 36 on page 207.

Table 36
Switch settings for *master* in multiple-column system

Switch	1	2	3	4	5	6	7	8
SW1	off	off	*	on**	off	off	off	off
SW2	on	off	To set positions 3–8, see Table 37					
SW3	on	on	on	on				
* Set to on for a DC-powered system; set to off for an AC-powered system. ** Set to off if the system is not equipped with a PFTU.								

3 Set the *master* System Monitor switches in Column 0 to reflect the total number of *slave* columns in the system (use the settings in Table 37).

Table 37
SW2 on *master*—total number of *slaves* in the system (Part 1 of 2)

How many *slave* units	Switch position						How many *slave* units	Switch position					
	3	4	5	6	7	8		3	4	5	6	7	8
0	on	on	on	on	on	on	32	off	on	on	on	on	on
1	on	on	on	on	on	off	33	off	on	on	on	on	off
2	on	on	on	on	off	on	34	off	on	on	on	off	on
3	on	on	on	on	off	off	35	off	on	on	on	off	off
4	on	on	on	off	on	on	36	off	on	on	off	on	on
5	on	on	on	off	on	off	37	off	on	on	off	on	off
6	on	on	on	off	off	on	38	off	on	on	off	off	on
7	on	on	on	off	off	off	39	off	on	on	off	off	off
8	on	on	off	on	on	on	40	off	on	off	on	on	on
9	on	on	off	on	on	off	41	off	on	off	on	on	off

Table 37
SW2 on *master*—total number of *slaves* in the system (Part 2 of 2)

How many *slave* units	Switch position						How many *slave* units	Switch position					
	3	4	5	6	7	8		3	4	5	6	7	8
10	on	on	off	on	off	on	42	off	on	off	on	off	on
11	on	on	off	on	off	off	43	off	on	off	on	off	off
12	on	on	off	off	on	on	44	off	on	off	off	on	on
13	on	on	off	off	on	off	45	off	on	off	off	on	off
14	on	on	off	off	off	on	46	off	on	off	off	off	on
15	on	on	off	off	off	off	47	off	on	off	off	off	off
16	on	off	on	on	on	on	48	off	off	on	on	on	on
17	on	off	on	on	on	off	49	off	off	on	on	on	off
18	on	off	on	on	off	on	50	off	off	on	on	off	on
19	on	off	on	on	off	off	51	off	off	on	on	off	off
20	on	off	on	off	on	on	52	off	off	on	off	on	on
21	on	off	on	off	on	off	53	off	off	on	off	on	off
22	on	off	on	off	off	on	54	off	off	on	off	off	on
23	on	off	on	off	off	off	55	off	off	on	off	off	off
24	on	off	off	on	on	on	56	off	off	off	on	on	on
25	on	off	off	on	on	off	57	off	off	off	on	on	off
26	on	off	off	on	off	on	58	off	off	off	on	off	on
27	on	off	off	on	off	off	59	off	off	off	on	off	off
28	on	off	off	off	on	on	60	off	off	off	off	on	on
29	on	off	off	off	on	off	61	off	off	off	off	on	off
30	on	off	off	off	off	on	62	off	off	off	off	off	on
31	on	off	off	off	off	off	63	off	off	off	off	off	off

4 Set the System Monitor switches in each remaining column as *slave* using the settings shown in Table 38.

Table 38
Switch settings for *slaves* in multiple-column system

Switch	1	2	3	4	5	6	7	8
SW1	off	off	*	**	off	off	off	off
SW2	off	off	To set positions 3–8, see Table 39					
SW3	off	off	off	off				

***** Set to on for a DC-powered system; set to off for an AC-powered system.

****** Set to on to enable PFTU (if equipped) during over-temperature condition.
Set to off to disable PFTU during over-temperature condition.

5 Set the unit address for each *slave* column using the settings in Table 39. Column 1 (containing Core module 1) must always be "*slave* unit address" 1. Number the remaining *slaves* sequentially whenever possible.

Table 39
SW2 on each *slave*—unit number for the slave (Part 1 of 2)

Slave unit address	Switch position						*Slave* unit address	Switch position					
	3	4	5	6	7	8		3	4	5	6	7	8
1	on	on	on	on	on	off	33	off	on	on	on	on	off
2	on	on	on	on	off	on	34	off	on	on	on	off	on
3	on	on	on	on	off	off	35	off	on	on	on	off	off
4	on	on	on	off	on	on	36	off	on	on	off	on	on
5	on	on	on	off	on	off	37	off	on	on	off	on	off
6	on	on	on	off	off	on	38	off	on	on	off	off	on
7	on	on	on	off	off	off	39	off	on	on	off	off	off
8	on	on	off	on	on	on	40	off	on	off	on	on	on
9	on	on	off	on	on	off	41	off	on	off	on	on	off
10	on	on	off	on	off	on	42	off	on	off	on	off	on
11	on	on	off	on	off	off	43	off	on	off	on	off	off
12	on	on	off	off	on	on	44	off	on	off	off	on	on

Table 39
SW2 on each *slave*—unit number for the slave (Part 2 of 2)

***Slave* unit address**	**Switch position**						***Slave* unit address**	**Switch position**					
	3	**4**	**5**	**6**	**7**	**8**		**3**	**4**	**5**	**6**	**7**	**8**
13	on	on	off	off	on	off	45	off	on	off	off	on	off
14	on	on	off	off	off	on	46	off	on	off	off	off	on
15	on	on	off	off	off	off	47	off	on	off	off	off	off
16	on	off	on	on	on	on	48	off	off	on	on	on	on
17	on	off	on	on	on	off	49	off	off	on	on	on	off
18	on	off	on	on	off	on	50	off	off	on	on	off	on
19	on	off	on	on	off	off	51	off	off	on	on	off	off
20	on	off	on	off	on	on	52	off	off	on	off	on	on
21	on	off	on	off	on	off	53	off	off	on	off	on	off
22	on	off	on	off	off	on	54	off	off	on	off	off	on
23	on	off	on	off	off	off	55	off	off	on	off	off	off
24	on	off	off	on	on	on	56	off	off	off	on	on	on
25	on	off	off	on	on	off	57	off	off	off	on	on	off
26	on	off	off	on	off	on	58	off	off	off	on	off	on
27	on	off	off	on	off	off	59	off	off	off	on	off	off
28	on	off	off	off	on	on	60	off	off	off	off	on	on
29	on	off	off	off	on	off	61	off	off	off	off	on	off
30	on	off	off	off	off	on	62	off	off	off	off	off	on
31	on	off	off	off	off	off	63	off	off	off	off	off	off
32	off	on	on	on	on	on							

Install a terminal and modem

A maintenance terminal is required to communicate with the system

Connect and configure a terminal

1 Connect a NT8D95 cable to the J25 port of the Core/Net I/O panels. See Figure 82 on page 212.

2 If only one terminal is used for both Cores, install an “A/B” box (A0377992) to switch the terminal from side to side.

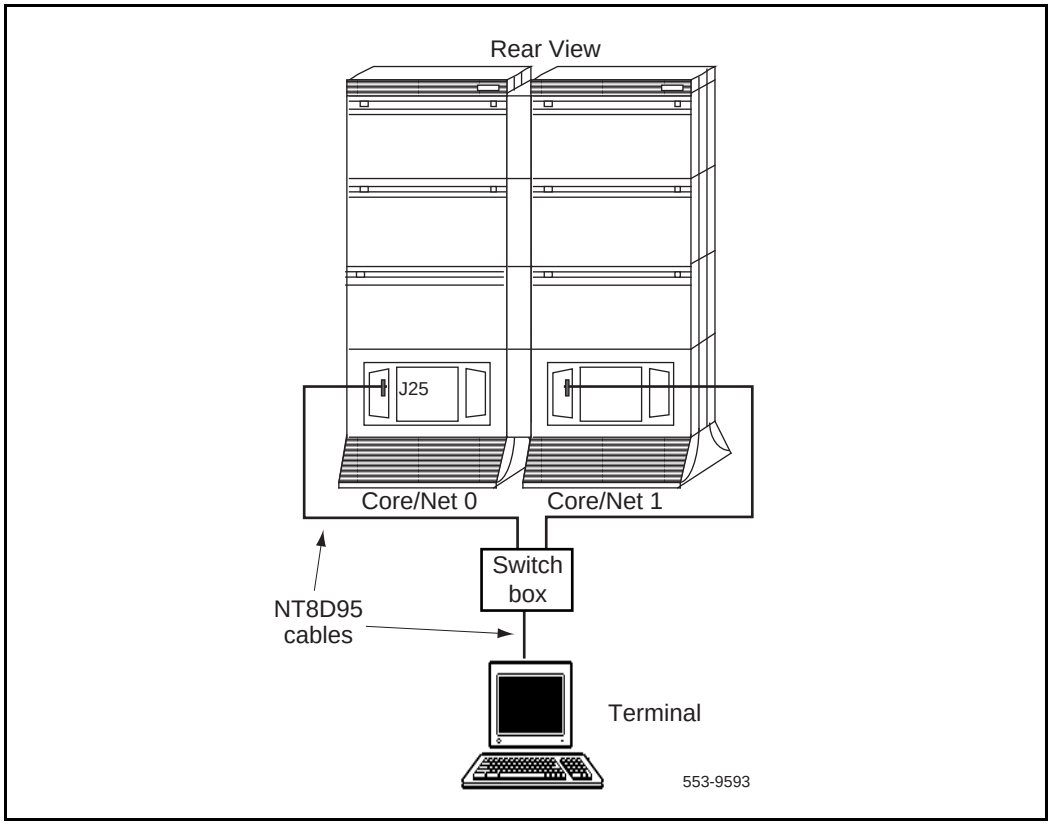
Note: The terminal will communicate with whatever side is active

3 Connect the NT8D95 cable to the terminal.

4 Configure the terminal:

- 9600 Baud
- 7 data
- space parity
- 1 stop bit
- full duplex
- XOFF

Figure 82
Terminal connected to both Core/Net modules



Connect power and ground wires

Content list

The following are the topics in this section:

- Install AC power and ground wires 213
- Install DC power and ground wires 222

Install AC power and ground wires

Task summary list

The following is a summary of the tasks in this section:

- Prepare for installation (AC power), page 214
- Install the safety ground (AC power), page 215
- Install the logic return ground (AC power), page 219

This section contains instructions for connecting the Meridian 1 AC power and ground wiring to the external power source.

For instructions on planning and installing the external AC power source and UPS power reserve system, see Plan and install the power source, page 85.

WARNING

Correctly installed power and ground wiring is an essential step in Meridian 1 installation. Improper wiring can cause intermittent problems such as unplanned system initialization or system reloads. Improper wiring can also cause damage to circuit cards, and in some instances, personal injury or death to the technician.

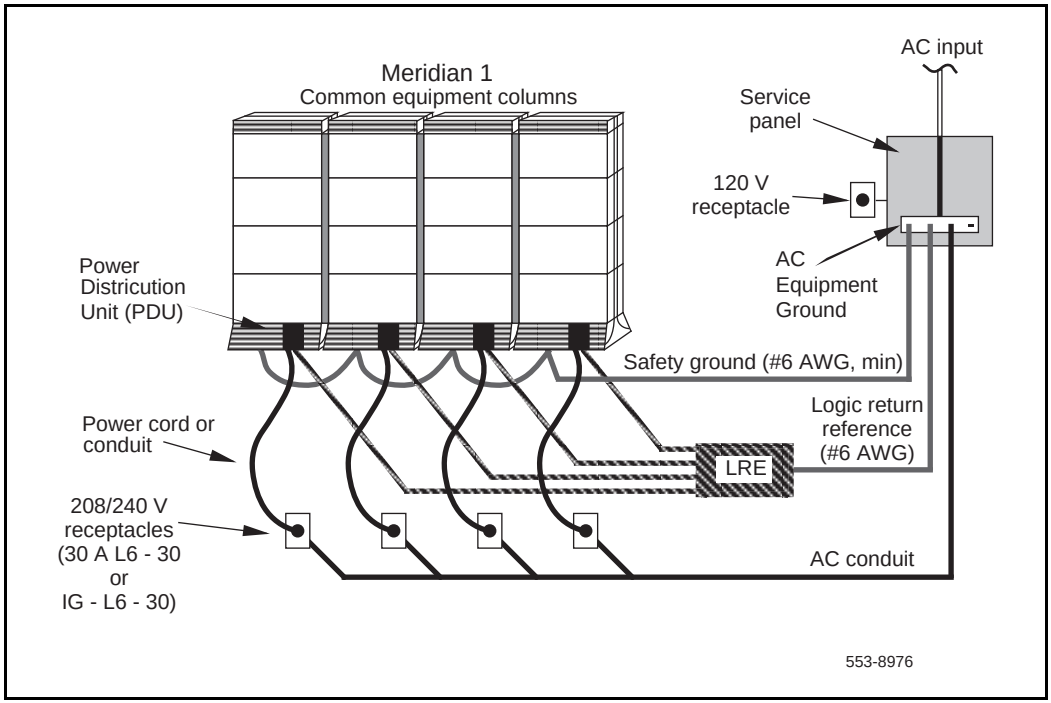
Prepare for installation (AC power)

All external power and ground sources must be installed prior to Meridian 1 installation. See Plan and install the power source, page 85.

Turn off all internal and external power switches and breakers:

- Verify that all circuit breakers in the AC main power panel are set to OFF.
- Verify that the main circuit breakers in the back of each pedestal are set to OFF.
- Verify that the blowers in each pedestal are switched OFF.
- Verify that the module power supplies are switched OFF.

Figure 83
External AC power and ground wiring



Grounds used in AC powered systems

- **Safety ground** (page 215): the safety ground reduces the risk of personal injury and system malfunctions. This ground is also referred to as the protective earth ground or personal hazard ground.
- **Logic return ground** (page 219): the logic return grounds prevent damage to the circuit cards from transient voltage and static electricity.
- **Chassis ground** (frame ground): the chassis ground uses the internal frame of the Meridian 1 to complete the safety ground. This ground is pre-installed.

Install the safety ground (AC power)

The safety ground reduces the risk of electrical shocks that cause personal injury and system malfunctions. Meridian 1 columns are daisy-chained together and connected to a single ground source (see Figure 83 on page 214).

1 As a safety precaution, verify that the power cords are disconnected and that the circuit breakers for each column are turned OFF.

2 Remove the air intake grill.

3 Use a volt/ohm meter to measure the resistance between the ground pin on the power plug and a ground lug on the rear of the pedestal. If the resistance is greater than 0 ohms, check the power cord connections.

4 Connect an insulated #6 AWG wire from the AC equipment ground source in the service panel (Figure 83) to the ground lug in the pedestal of the closest column (Figure 85).

5 Daisy-chain an insulated #6 AWG wire from one pedestal to the next, connecting all the columns together (Figure 85).

6 Place a warning tag on the connection at the ground source: “WARNING—TELEPHONE SYSTEM GROUND CONNECTION—DO NOT DISCONNECT”.

7 Use a volt/ohm meter to measure the resistance between the ground pin on the power plug and the ground terminal on the power outlet. If the resistance is greater than 0.5 ohms, check the power outlet ground and safety ground/protective earth connections. Ideally, the resistance will be 0 ohms (Figure 86).

Figure 84
Test resistance between the ground pin and ground lug

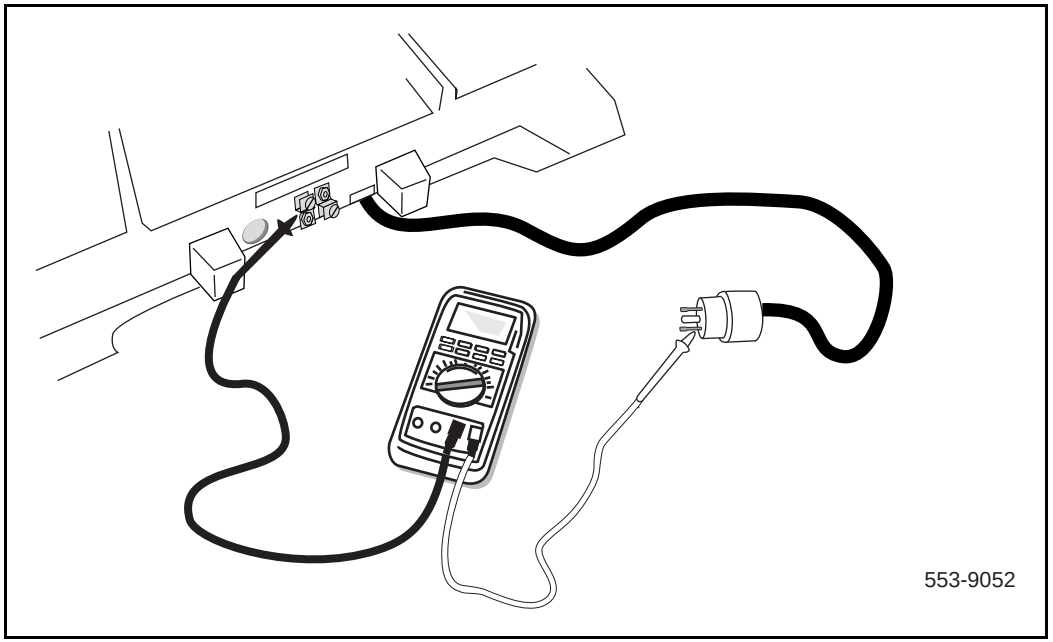


Figure 85
AC pedestal wiring

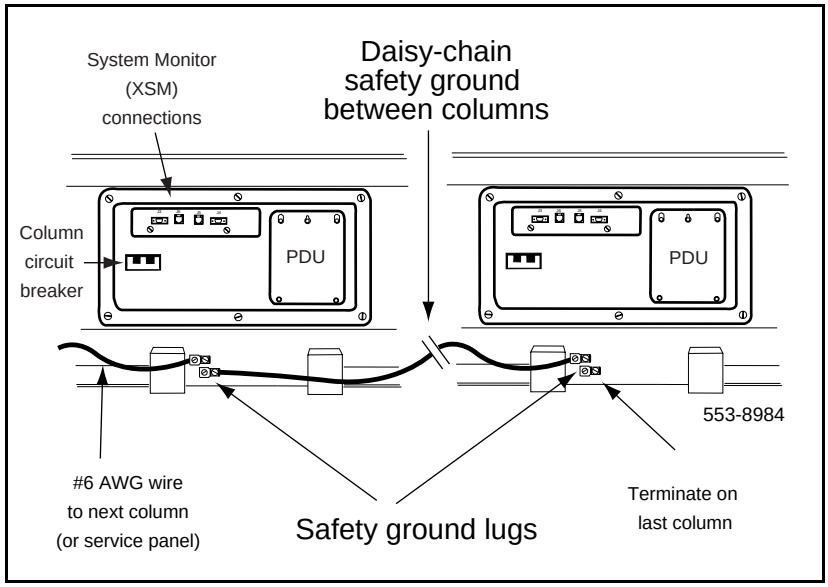
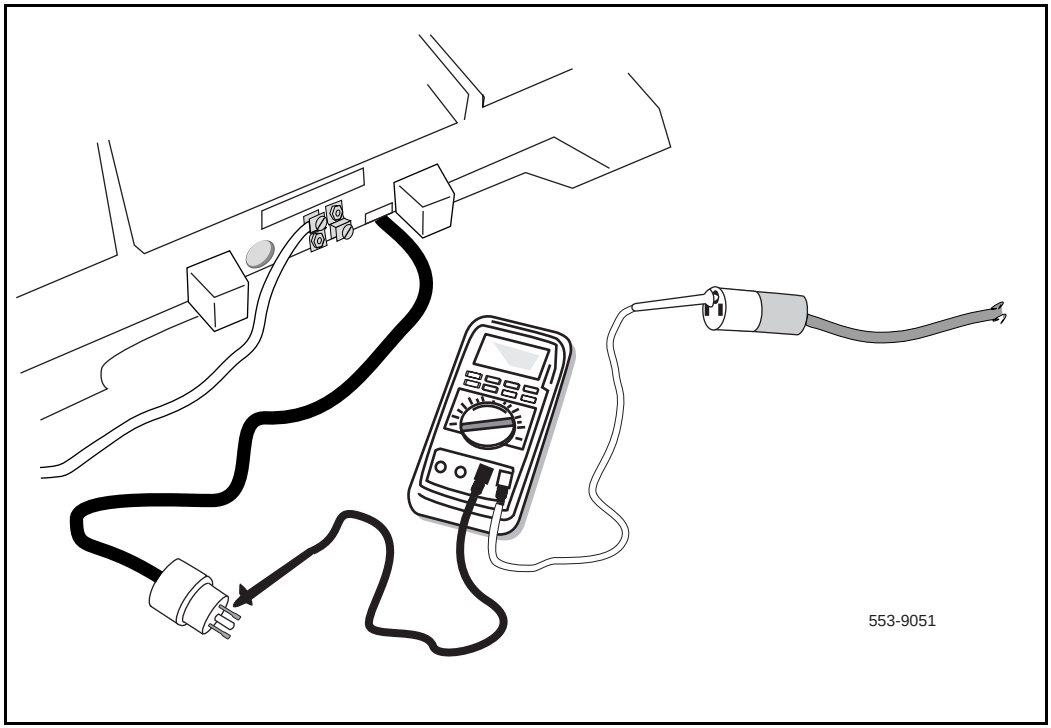


Figure 86
Test the ground resistance between the power plug and power terminal



Install the logic return ground (AC power)

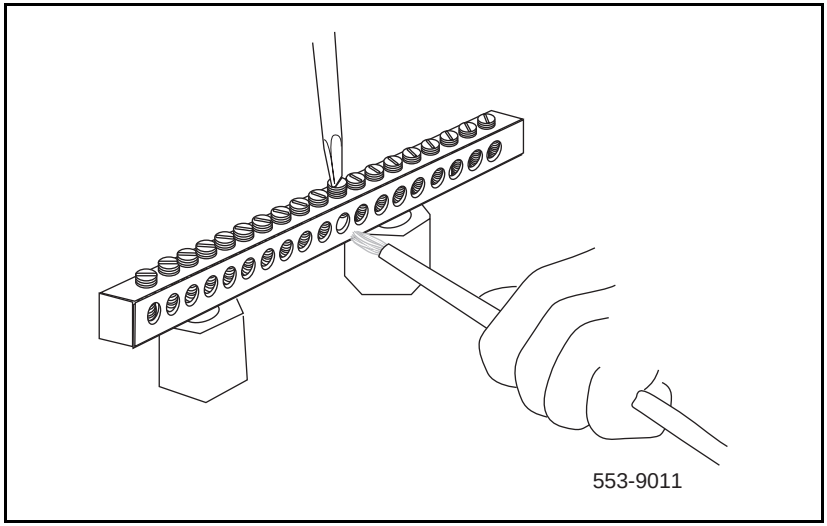
The logic return grounds prevent damage to the circuit cards from transient voltage and static electricity.

To create the ground, a wire is connected from the LRTN terminal on each column to a Logic Return Equalizer (LRE). The LRE is connected to a single ground source, usually in the AC service panel.

The LRE (NT6D5303 or NT6D5304) is a metal block that consolidates the ground wires so they can be connected to a single ground source (Figure 87).

1 Connect the Logic Return Equalizer (LRE) to the AC service panel ground source with an insulated #6 AWG wire. .

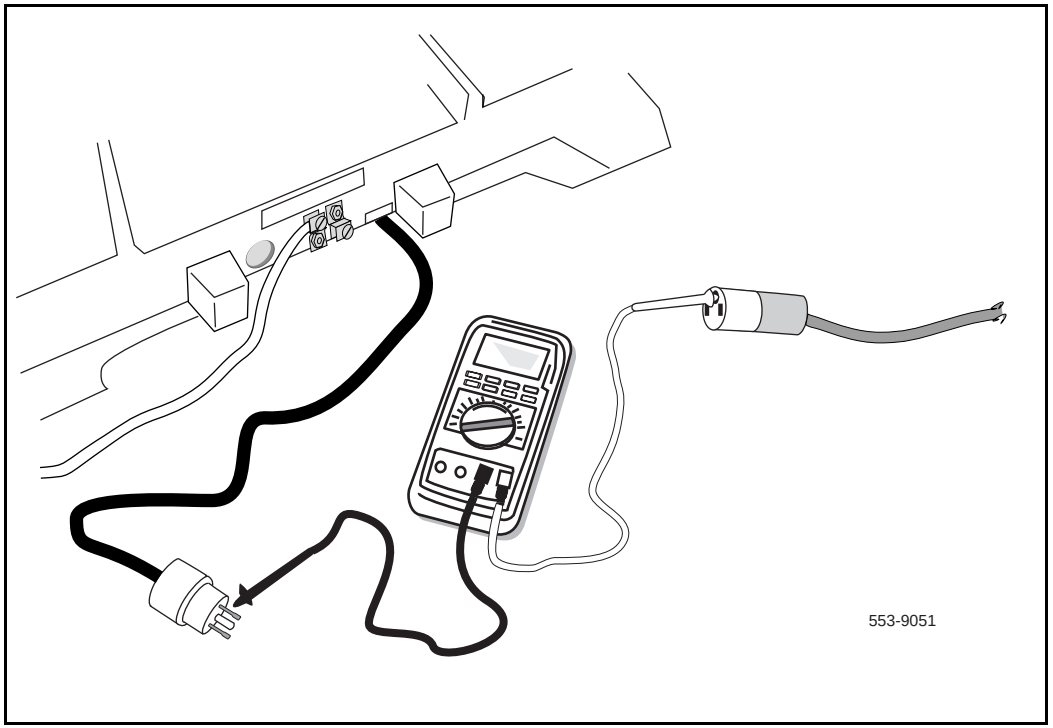
Figure 87
Logic Return Equalizer (LRE)



Note: Complete the steps below for each column in the system.

2 Use a volt/ohm meter to measure the resistance between the ground pin on the power plug and the ground terminal on the power outlet. See Figure 88 on page 220. If the resistance is greater than 0.5 ohms, check the power outlet ground and safety ground/protective earth connections. Ideally, the resistance will be 0 ohms.

Figure 88
Test the ground resistance between the power plug and power terminal



3 Remove the field wiring access plate on the Power Distribution Unit (PDU).

4 Connect an insulated #8 AWG wire to “LRTN” on the field wiring block in the pedestal of each column (Figure 89).

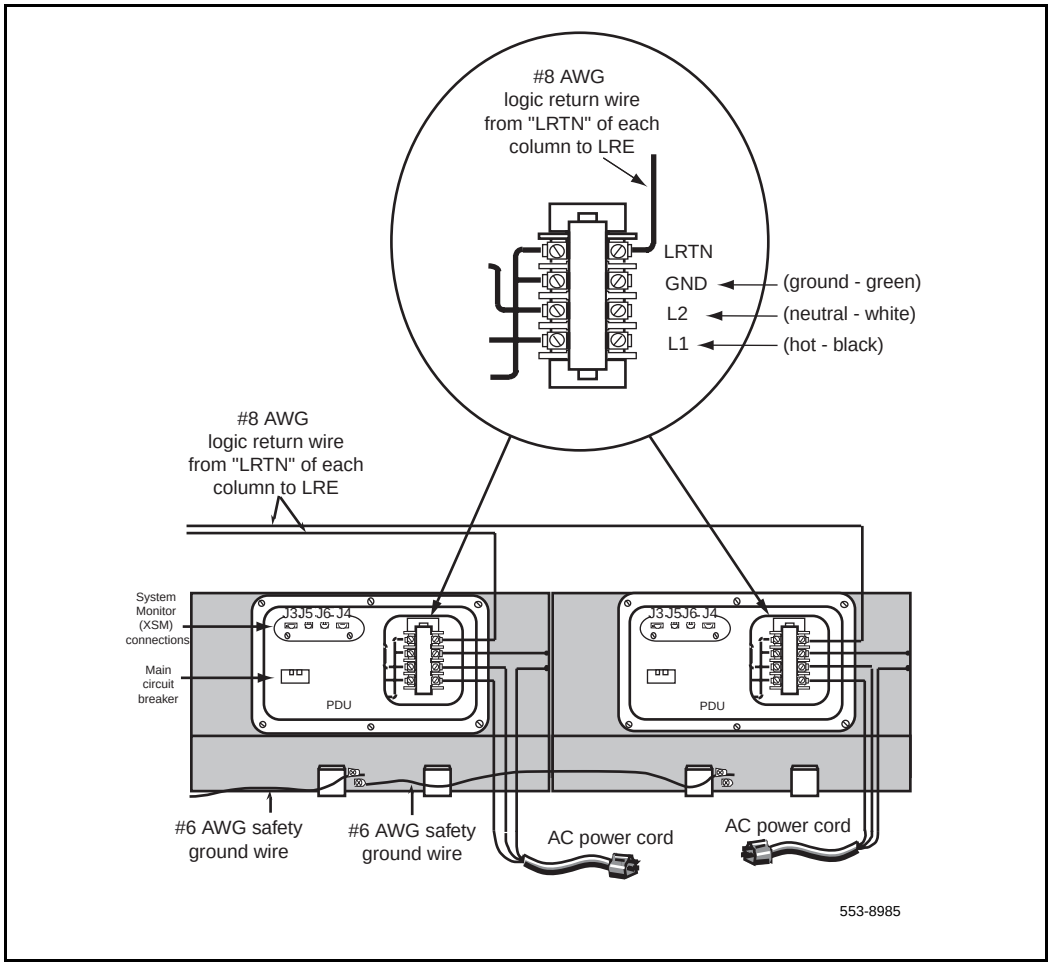
5 Route the wire through the conduit hole in the pedestal and either up or down the column I/O channel area.

6 Attach the other end of the wire to the LRE.

7 Replace the field wiring access plate on the PDU.

8 Proceed to Power up AC systems, page 231.

Figure 89
Field wiring access block in AC systems



Install DC power and ground wires

Task summary list

The following is a summary of the tasks in this section:

- Prepare for installation (DC power), page 223
- Install the safety ground (DC systems), page 223
- Connect columns to the DC power plant, page 227

DC powered systems require an external rectifier, or power plant, to be installed between the Meridian 1 system and the AC power source (see Figure 90).

This section contains instructions for installing the ground and power wiring from the Meridian 1 system to the DC rectifier or power plant.

For instructions on planning and installing the DC power source, including reserve battery power, see Plan and install the power source, page 85.

WARNING

Proper power and ground wiring is an essential step in Meridian 1 installation. Improper wiring can cause intermittent problems such as unplanned system initialization or system reloads. Improper wiring can also cause damage to circuit cards, and in some instances, personal injury or death to the technician.

Prepare for installation (DC power)

All external power and ground sources must be installed on the site prior to Meridian 1 installation. See Plan and install the power source, page 85.

Turn off all internal and external power switches and breakers:

- Verify that all circuit breakers in the AC main power panel are set to OFF.
- Remove the 30-amp fuse or set the circuit breakers to OFF in the DC power plant.
- Verify that the main circuit breakers in the back of each pedestal are set to OFF.
- Verify that the blowers in each pedestal are switched OFF.
- Verify that the module power supplies are switched OFF.

Install the safety ground (DC systems)

The safety ground reduces the risk of personal injury and system malfunctions. This ground is also referred to as protective earth ground or personal hazard ground.

1 As a safety precaution, verify that the power cords are disconnected and that the circuit breakers for each column are turned OFF.

2 Remove the air intake grill.

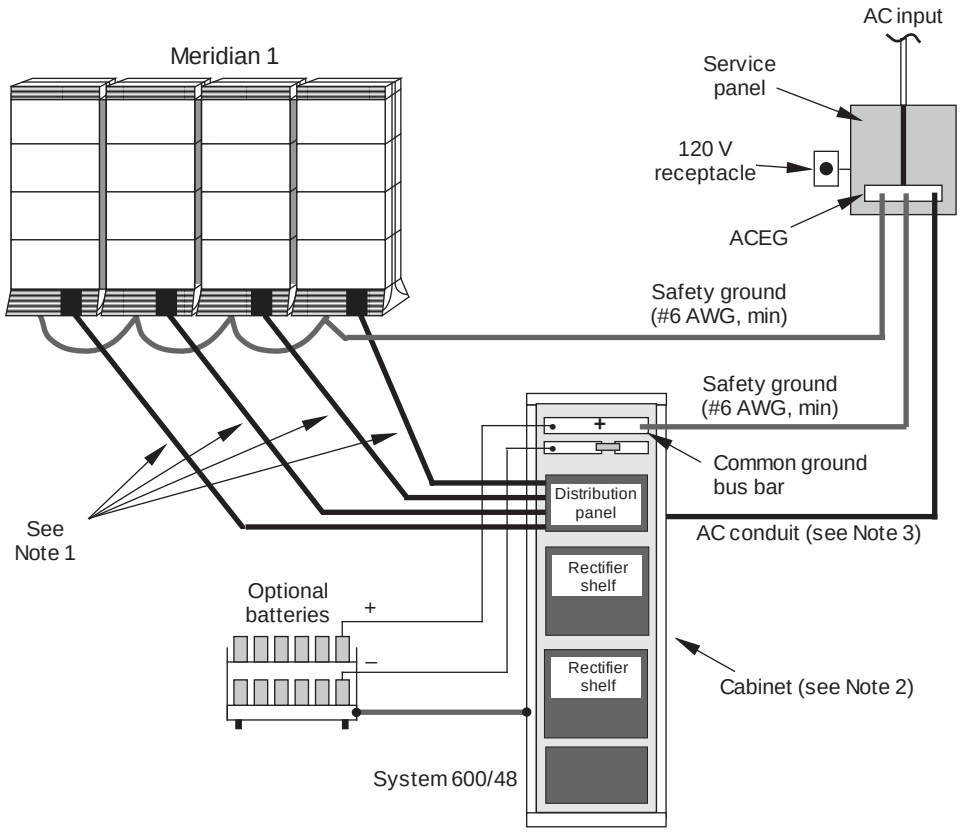
3 At the rear of the pedestal, remove the plastic safety cover over the terminal block to access the safety ground lugs (Figure 91 on page 225). Leave the cover off until all pedestal connections are made.

4 Connect an insulated #6 AWG wire from the AC equipment ground (ACEG) source in the service panel (Figure 90 on page 224) to the ground lug in the pedestal of the closest column (Figure 92 on page 226)

5 Daisy-chain an insulated #6 AWG wire from one pedestal to the next, connecting all the columns together (Figure 92).

6 Place a warning tag on the connection at the ground source in the service panel: “WARNING—TELEPHONE SYSTEM GROUND CONNECTION—DO NOT DISCONNECT”.

Figure 90
External DC power and ground wiring



Note 1: DC power feeds to Meridian 1 pedestals. Each feed consists of two BAT (–), two BATRTN (+), and one LRTN (+) conductors. All (5) conductors terminate **inside** the distribution panel.

Note 2: Up to six NT5C07 rectifiers can be equipped in a cabinet for a total of 300 amps.

Note 3: The cabinet safety ground is furnished through the green wire ground in the AC input wiring.

553-5811

Figure 91
DC power rear pedestal equipment

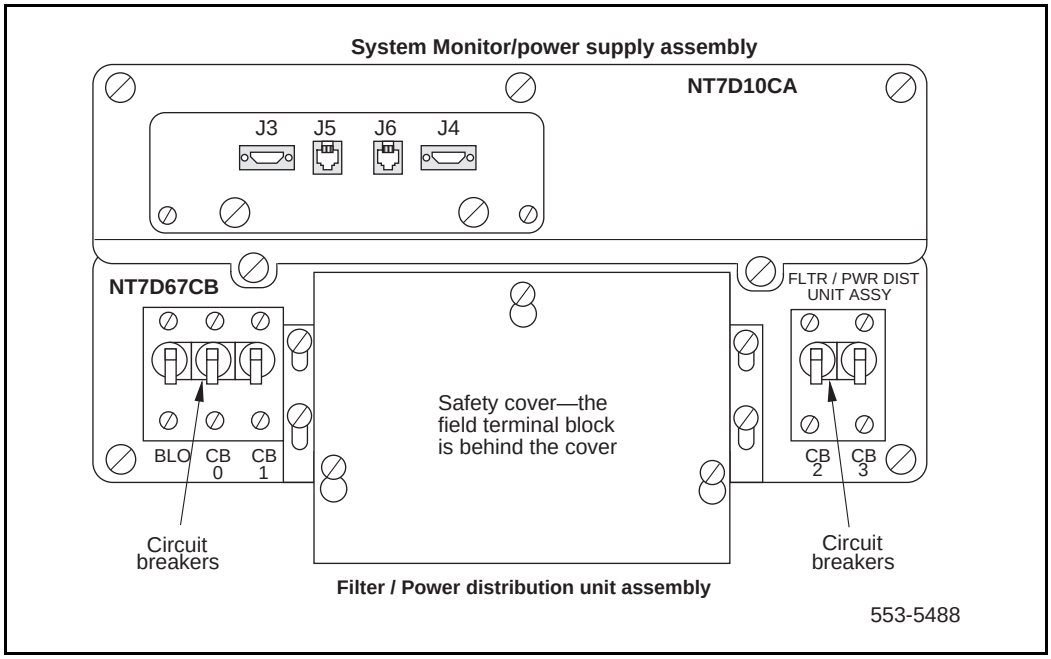
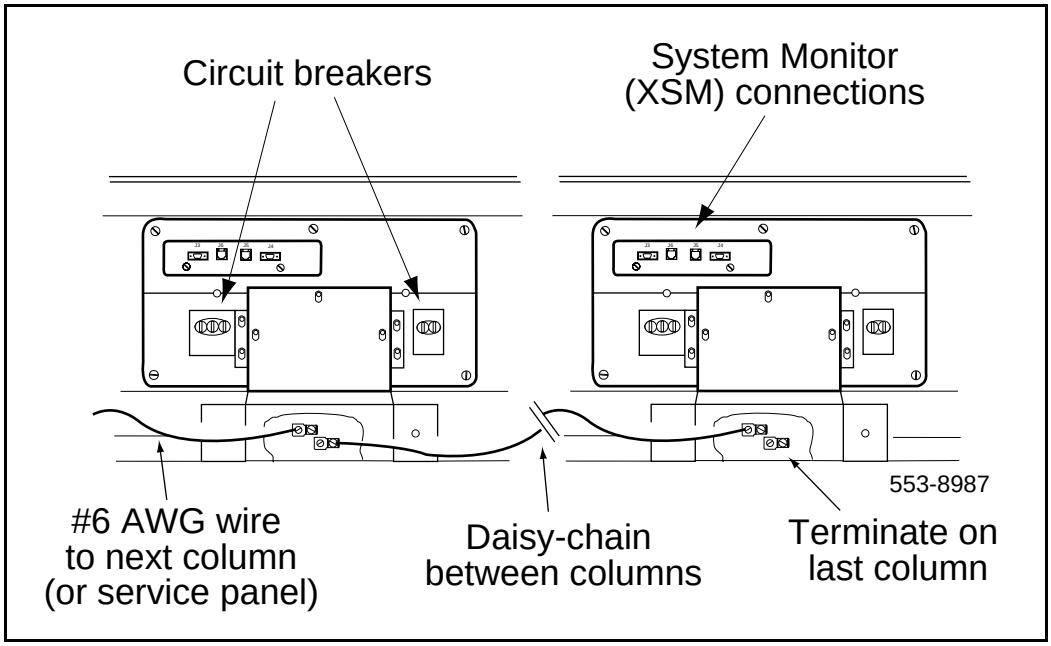


Figure 92
Daisy-chain safety ground wiring



Connect columns to the DC power plant

The ground and power wires described below are connected from each column to the DC power plant.

Refer to Figure 90: "External DC power and ground wiring" on page 224 for DC power configuration.

1 Verify that the circuit breakers in the AC service panel are switched OFF.

2 In the DC power plant, remove the associated 30 amp fuses or set the circuit breakers to OFF.

3 Remove the cover from the DC power plant.

4 Route the following 5 wires from each column to the DC power plant. At the pedestal, route the wires through one of the conduit access holes and under both the cable tie-ins and cable restraint bar (see Figure 93 on page 228). This ensures that there is enough room to install the PDU cover, safety cover and rear grill.

Wires connected from each column to the DC power plant

Quantity per column	Connection	Color	Type
1	logic return (LRTN)	orange or white	ground
2	battery return (BATRTN)	black	ground
2	battery wires: (BAT)	red	power

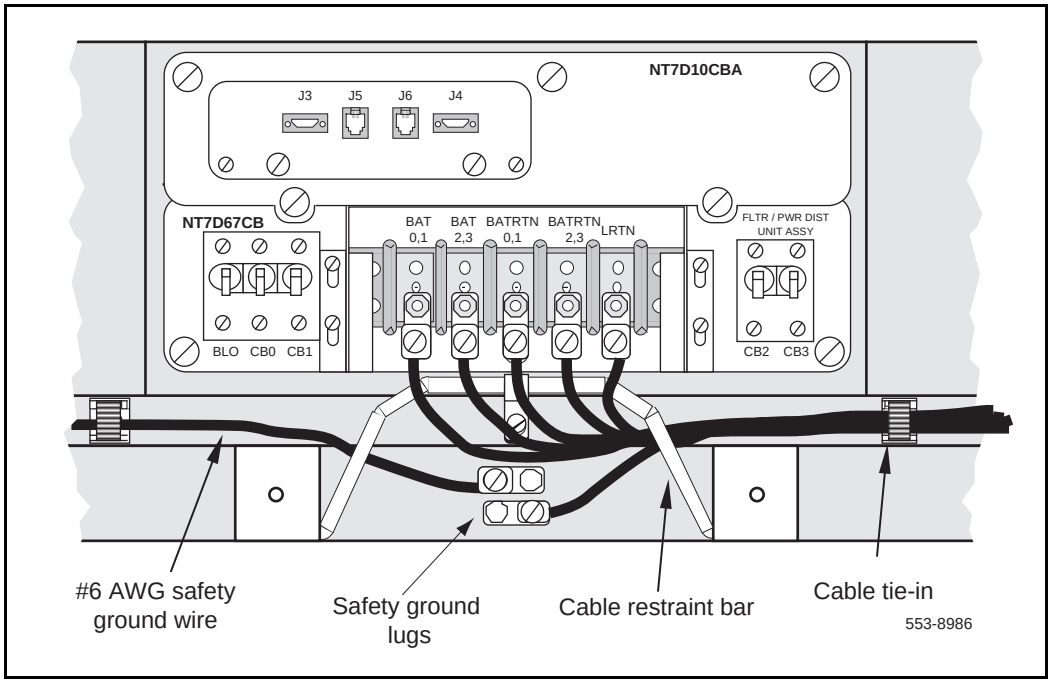
Note 1: The logic return grounds (LRTN) prevent damage to circuit cards from transient voltage and static electricity.

Note 2: The logic return ground (LRTN) and battery return grounds (BATRTN) connect to a ground bus/LRE in the DC power plant. This ground bus/ LRE consolidates the wires and connects them to a single ground source in the AC service panel.

5 Connect the wires to the PDU at the base of the pedestal (Figure 93):

- Connect the 2 red wires to BAT 0,1 and to BAT 2,3.
- Connect the 2 black wires to BATRTN 0,1 and BATRTN 2,3.
- Connect the orange or white wire to LRTN.

Figure 93
DC power PDU rear pedestal wiring



6 Connect the wires to the DC power plant:

- Connect the red wires from BAT 0,1 and BAT 2,3 to the first two available circuit breakers in the main control/distribution panel. These wires supply power to columns 0, 1 and columns 2, 3.
- Connect the two black wires from BATRTN 0,1 and BATRTN 2, 3 to the ground bus/LRE.
- Connect the orange or white wire from LRTN to the ground bus/LRE.

Note: If a junction box is used, connect the wires from the column pedestal to the corresponding connections in the junction box. A junction box provides an interim connection between the power plant and the column in cases where the DC power plant is located at a distance from the Meridian 1 system. One junction box is required per column. See Plan and install the power source, page 85 for additional information on DC power plants and junction boxes.

7 Replace the cover on the DC power plant or junction box.

8 Replace the safety cover on the PDU in the column pedestal.

9 Proceed to Power up DC systems, page 236.

Power up the system

Content list

The following are the topics in this section:

- Power up AC systems 231
- Power up DC systems 236

Power up AC systems

Task summary list

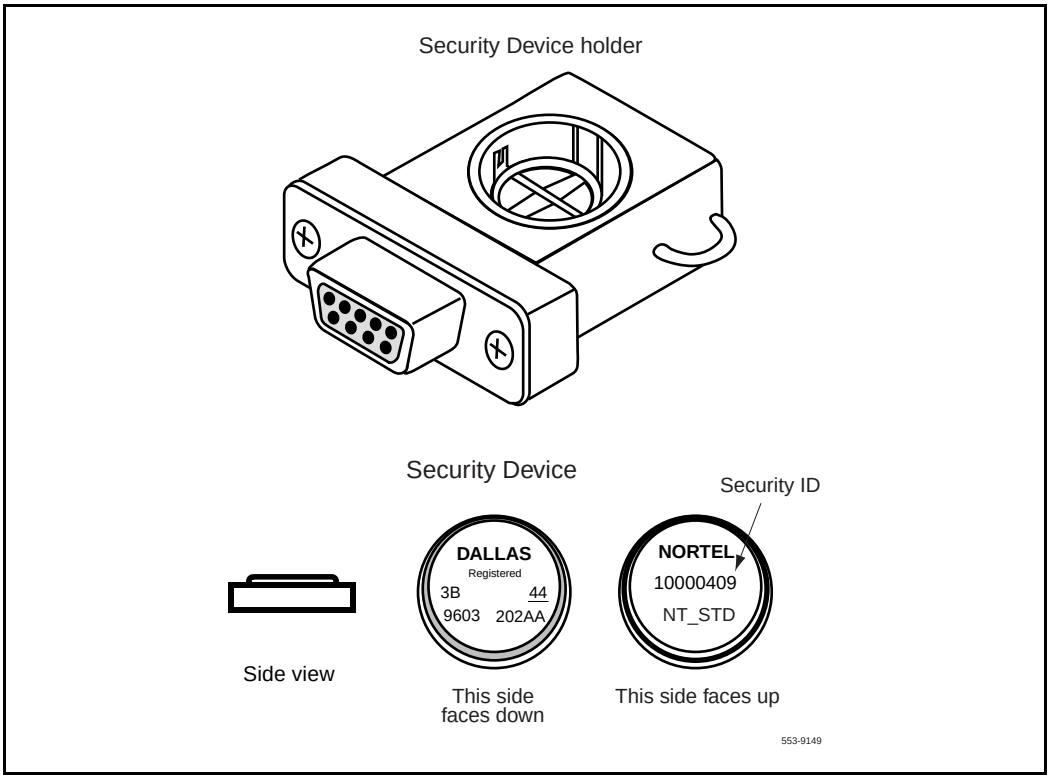
The following is a summary of the tasks in this section:

- Install the Security Device, page 231
- Prepare for power up, page 233
- Connect the AC power source, page 234
- Turn AC power ON, page 235
- Reset the main circuit breakers (AC power), page 235

Install the Security Device

The Security Device (Figure 94) resembles a large watch battery and is shipped with the software package. This device, along with the Keycode Installation diskette, enables the features for each individual system.

Figure 94
Security Device and holder



The Security Device is inserted into the Security Device holder. This assembly is attached to the back of the System Utility Transition card (Figure 95 on page 233).

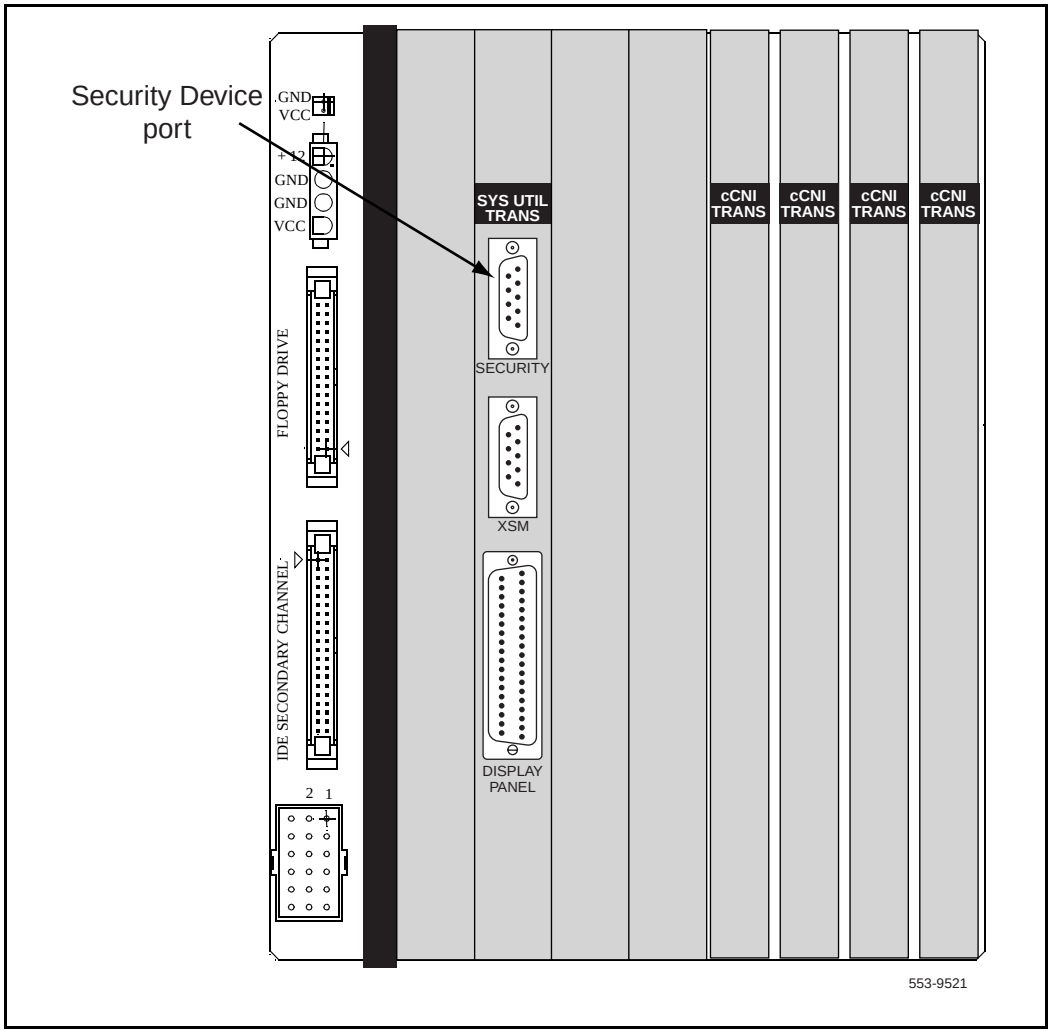
1 Verify that the 8-digit code on the Keycode Installation diskette matches the 8-digit code on the Device.

2 Insert the Security Device into the holder with the “Nortel” side facing up. Do not bend the clip more than necessary.

3 Insert the assembly (Device and holder) into the back of the System Utility Transition card in both Core/Net modules (Figure 95).

4 Verify that the Security Device is securely in place.

Figure 95
Security Device installation (System Utility Transition card)



Prepare for power up

1 Verify that all power breakers and switches are turned OFF:

a Set the AC service panel circuit breakers OFF.

b Set the main circuit breakers in the rear of each pedestal OFF.

c Set the power supply or MPDU switches in each module OFF.

d Set the ringing generators in each IPE or PE module OFF.

e Set the blower unit switch in the front of each pedestal OFF.

2 Set all faceplate switches to ENB.

Connect the AC power source

The Meridian 1 system can be connected to the AC power source with one of the two options below:

Option 1: Use the installed power plug (recommended)

Each column can be directly connected to the AC power source.

1 Connect the power plug from each column to the AC power respectable.

2 Proceed to Turn AC power ON, page 235.

Option 2: Hard-wire the power connections (optional)

Instead of using the power-plug, each column can be hard-wired to the service panel.

1 Route three #10 AWG wires (green, white and black) through 3/4 in. conduit from the service panel to each Meridian 1 column.

2 At the column, connect the wires to the field wiring access block of the PDU according to the following (see Figure 89 on page 221):

- GND (ground) to the green wire
- L2 (neutral) to the white wire
- L1(hot) to the black wire

3 Connect the wires to the hot, neutral and ground connections at the service panel.

4 Proceed to Turn AC power ON, page 235.

Turn AC power ON

CAUTION

If a problem occurs when a step is performed, resolve that problem before continuing.

1. In the AC power panel, set the circuit breaker for Column 0 to ON.
2. Set the main circuit breaker for Column 0 to ON (rear of the pedestal).
3. Set the blower unit switch for Column 0 to ON. On initial power-up, the blower will rotate slowly. As the system heats up, the cooling fans will turn faster.
4. Set the main circuit breaker for Column 0 to ON. The main circuit breaker is located in the rear of the pedestal (see Figure 85 on page 217).
5. Set the power supply switch (or MPDU circuit breaker) in each module to ON. The green light will turn on after a few seconds.

   Note: If the module is equipped with a ringing generator, set the breakers or switches for both the power supply and the ringing generator to ON. The green LED on a ringing generator normally takes up to 90 seconds to light.

6. Repeat steps 1 through 5 for each column in the system. Start with Column 1 and continue until power is turned on in all the columns. Make sure the green lights in all the module power supplies are lit before proceeding to the next column.
7. When the green LED lights in all module power supplies and ringing generators are lit, proceed to “Reset the main circuit breakers (AC power)”.

Reset the main circuit breakers (AC power)

1. Turn the main circuit breakers in the pedestal of each column OFF again.
2. Wait 30 seconds.
3. Set the main circuit breakers for NON-CORE columns ON. Leave the Core columns OFF.

4 For each non-Core column, verify that:

- the main circuit breaker in the pedestal did not trip OFF
- the main blower unit in each column is running
- the ringing generators are lit
- the red column LEDs in the top cap are lit. These LEDs will remain red until the system reloads.

5 Simultaneously turn the main circuit breakers for the two Core columns ON.

6 For each Core column, verify the following:

- the main circuit breaker in the pedestal did not trip OFF
- the main blower unit in each column is running
- the ringing generators are lit
- the red column LEDs in the top cap are lit. These LEDs will remain red until the system reloads.

7 When the system is running, reattach all covers and panels to the modules and columns. Module covers must be kept on so the air from the pedestal fans will be directed up through all the modules and out the exhaust vents in the top cap. When the module covers are removed, the upper modules are not cooled properly because the air escapes from the open module door.

If the module covers are left off and the system overheats, circuit cards will malfunction and, in extreme cases, melt.

Power up DC systems

Task summary list

The following is a summary of the tasks in this section:

- Install the Security Device, page 236
- Prepare for power up, page 239
- Turn DC power ON, page 239

Install the Security Device

The Security Device (Figure 96) resembles a large watch battery and is shipped with the software package. This device, along with the Keycode Installation diskette, enables the features for each individual system.

The Security Device is inserted into the Security Device holder. This assembly is attached to the back of the System Utility Transition card (Figure 97 on page 238).

1. Verify that the 8-digit code on the Keycode Installation diskette matches the 8-digit code on the Device.
2. Insert the Security Device into the holder with the “Nortel” side facing up. Do not bend the clip more than necessary.
3. Insert the assembly (Device and holder) into the back of the System Utility Transition card in both Core/Net modules (Figure 97).
4. Verify that the Security Device is securely in place.

Figure 96
Security Device and holder

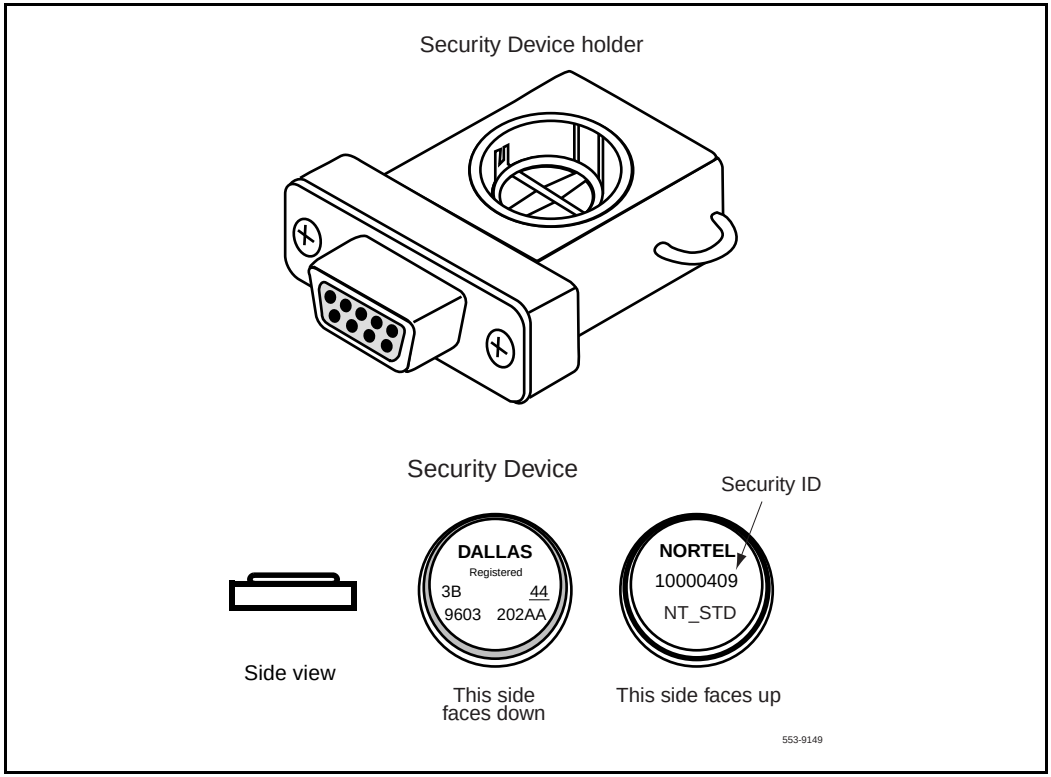
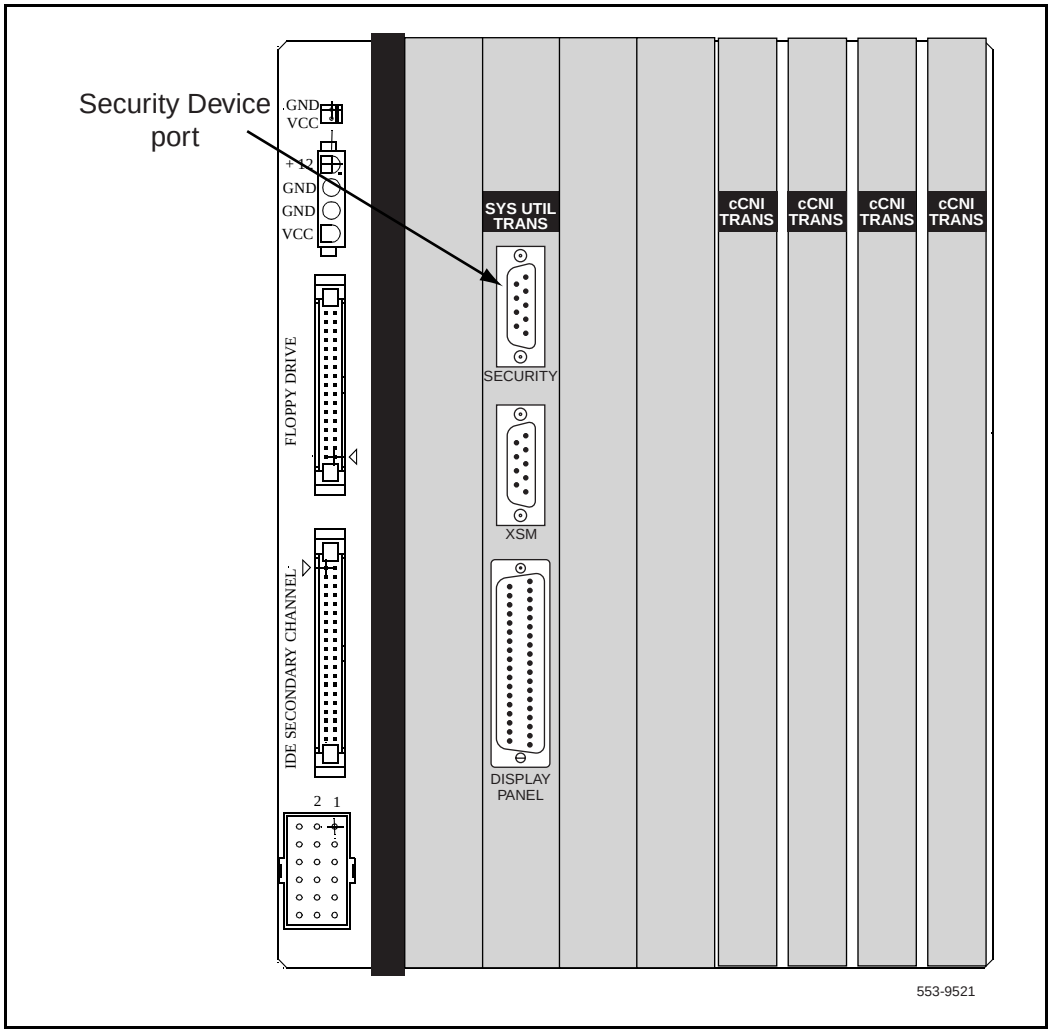


Figure 97
Security Device installation (System Utility Transition card)



Prepare for power up

1 Verify that all power breakers and switches are turned OFF:

- Set the AC service panel circuit breakers to each recitfier OFF.
- Remove the DC power distribution fuses or set the distribution circuit breakers OFF.
- Set all circuit breakers in the rear of each pedestal OFF.
- Set the power supply switches in each module OFF.
- Set the ringing generators in each IPE or PE module OFF.
- Set the blower unit in each pedestal OFF.

2 Set all faceplate switches to ENB.

3 Proceed to “Turn DC power ON”.

Turn DC power ON

1 Connect each DC rectifier to its associated AC outlet and set the breakers in the AC power panel to ON.

2 Turn the rectifiers ON one at a time. Wait 10 seconds between each rectifier.

CAUTION

If a problem occurs in any of the following steps, resolve that problem before continuing.

Perform the following tasks for each column.

Note: Power up the Core columns last.

3 On the DC power source for each column, replace the distribution fuses or set the distribution breakers to ON. Do the Core columns last.

4 Set the blower unit breaker switch ON (the far left breaker in the rear of the pedestal).

5 Set the blower unit switch in the front of the pedestal to ON. Verify that the fan is running. On initial power-up, the blower will rotate slowly. As the system heats up, the cooling fans will turn faster.

6 Set the power supply switch in each module to ON. The green light will turn on after a few seconds.

Note: If the module is equipped with a ringing generator, set the breakers or switches for both the power supply and the ringing generator to ON. The green LED on a ringing generator normally takes up to 90 seconds to light.

7 Repeat steps 1 through 5 for each column in the system. Start with Column 2 and continue until power is turned on in all the columns. Do the Core columns last.

8 Make sure the green lights in all the module power supplies are lit before proceeding to the next column. The red LED for each column remains lit until the system reloads.

9 Once the system is running, reattach all covers and panels to the modules and columns. Module covers must be kept on so the air from the pedestal fans will be directed up through all the modules and out the exhaust vents in the top cap. When the module covers are removed, the upper modules are not cooled properly because the air escapes from the open module door.

If the module covers are left off and the system overheats, circuit cards will malfunction and, in extreme cases, melt.

Software loading

Content list

The following are the topics in this section:

- Load the software 241
- Install the customer database 250

New Meridian 1 systems ship with the latest release of the X11 system software.

To understand the process, read through the instructions before you begin. To complete these procedures, the system must be working and connected to a terminal.

Load the software

Task summary list

The following is a summary of the tasks in this section:

- Install the software on Core/Net 1, page 241
- Install software on Core/Net 0, page 245
- Test Core/Net 1 and Core/Net 0, page 249

Install X11 software on both Core hard drives. Follow the tasks below in order to complete the installation.

Install the software on Core/Net 1

1 Install the CD-ROM into the CD-ROM drive in the MMDU:

a Press the button on the CD-ROM drive to open the CD-ROM disk holder.

b Place the CD-ROM disk into the holder with the disk label showing.Use the four tabs to secure the CD-ROM drive.

c Press the button again to close the CD-ROM disk holder. **Do not** push the holder in by hand.

Note: If the CD-ROM is not in the CD-ROM drive, the installation will not continue. Insert the CD-ROM to continue.

2 Place the CP PII Install floppy disk into the MMDU floppy drive.

Note: If a problem is detected during the system verification, Install stops, prints an error message, and aborts the installation.
If the verification is not successful, do not continue; contact your technical support organization.

3 Press the RESET button on CP PII. Before the Install menu runs, the system validates hard disk partitioning which takes about five minutes.

The screen displays:

Testing partition 0

0 percent done...1 percent done.....99 percent done....100 percent done

Testing partition 1

0 percent done...1 percent done.....99 percent done....100 percent done

Testing partition 2

0 percent done...1 percent done.....99 percent done....100 percent completed!

Disk physical checking is completed!

There are 3 partitions in disk 0:
The size of partition 0 of disk 0 is XX MB
The size of partition 0 of disk 0 is XX MB
The size of partition 0 of disk 0 is XX MB

Disk partitions and sectors checking is competed!

4 Press <cr> to start the software installation.

5 When prompted, remove the CP PII Install Program diskette and insert the Keycode diskette.

<**a**> Continue with keycode validation.

<**y**> Confirm that the keycode matches the CD-ROM release.

6 When the screen displays the Install Menu, select the following options in sequence when you are prompted to do so:

<a> Install software.

<a> Verify that the CD-ROM is now in drive.

The Installation Status Summary screen appears that lists the options to be installed.

<y> Start Installation.

<a> Continue with Upgrade.

7 Select a PSDL file to install. The PSDL file contains the loadware for all downloadable cards in the system and loadware for M3900 series sets.

Select one of the six psdl files

<1> Global 10 Languages <default>

<2> Western Europe 10 Languages

<3> Eastern Europe 10 Languages

<4> North America 6 Languages

<5> Rls xx up-issue where xx = current version

<6> North America 6 Languages:

The languages contained in each selection are outlined as follows:

1 English, French, German, Spanish, Swedish, Italian, Norwegian, Brazilian, Portuguese, Finnish, Japanese Katakana.

2 English, French, German, Spanish, Swedish, Norwegian, Danish, Finnish, Italian, Brazilian Portuguese.

3 English, French, German, Dutch, Polish, Czech, Hungarian, Russian, Latvian, Turkish.

4 English, Spanish, French, Brazilian Portuguese, Japanese Katakana, German.

5 English, French, German, Spanish, Swedish, Italian, Norwegian, Portuguese, Finnish, Japanese Katakana.

6 English, French, German, Spanish, Brazilian Portuguese, Japanese Katakana.

8 Continue with ROM upgrade when prompted.
Select a database to install.

<**cr**> Enter carriage return to continue.

<**a**> Continue with CP BOOTROM installation.

<**a**> Install the CP BOOTROM from hard disk.

<**a**> Start installation.

<**a**> Continue with ROM upgrade.

The Installation Status Summary screen appears. Verify that CD to disk, disk to ROM, and CP-BOOTROM were installed.

<**cr**> Continue.

<**q**> Quit.
Remove any diskettes and the CD-ROM from the MMDU drives.

<**y**> Confirm quit.

<**a**> Reboot the system.

9 The system automatically performs a sysload: several message appear on the system terminal. Wait for “DONE” and then “INI” message to display before you continue.

10 Confirm that X11 Release 25 software is installed and working on Core/Net 1:

LD 135 Load the program.

STAT CPU Display the CPU status.

STAT CNI Display the cCNI status.

Check for peripheral software download

Load LD 22 and print the software version.

LD 22

REQ Print.

TYPE PSWV.

ISSP Print issue and release.

TID Print Tape ID.

SLLP Print System and patch information.

Print auxiliary ID.

******** Exit program.

Install software on Core/Net 0

1 Install the CD-ROM into the CD-ROM drive in the MMDU:

a Press the button on the CD-ROM drive to open the CD-ROM disk holder.

b Place the CD-ROM disk into the holder with the disk label showing.

c Press the button again to close the CD-ROM disk holder. **Do not** push the holder in by hand.

Note: If the CD-ROM is not in the CD-ROM drive, the installation will not continue. Insert the CD-ROM to continue.

2 Place the CP PII Install floppy disk into the MMDU floppy drive.

Note: If a problem is detected during the system verification, Install stops, prints an error message, and aborts the installation. If the verification is not successful, do not continue; contact your technical support organization.

3 Press the manual RESET button on the CP PII card faceplate. Before the Install menu runs, the system validates hard disk partitioning which takes about five minutes. The screen displays:

Testing partition 0

0 percent done 0 percent done...1 percent done 1 percent done...99 percent done...99 percent done....100 percent done....100 percent done

Testing partition 1

0 percent done 0 percent done...1 percent done 1 percent done...99 percent done...99 percent done....100 percent done....100 percent done

Testing partition 2

0 percent done 0 percent done...1 percent done 1 percent done...99 percent done...99 percent done....100 percent done....100 percent completed!

Disk physical checking is completed!

There are 3 partitions in disk 0:
The size of partition 0 of disk 0 is XX MB
The size of partition 0 of disk 0 is XX MB
The size of partition 0 of disk 0 is XX MB

Disk partitions and sectors checking is competed!

4 At the terminal, press <cr> to start the software installation.

5 When prompted, remove the CP PII Install Program diskette and insert the Keycode diskette.

<**a**> Continue with keycode validation

<**y**> Confirm that the keycode matches the CD-ROM release

6 When the screen displays the Install Menu, select the following options in sequence when you are prompted to do so:

<**a**> Install software.

<**a**> Verify that the CD-ROM is now in drive.

The Installation Status Summary screen appears that lists the options to be installed.

<**y**> Start Installation.

<**a**> Continue with Upgrade.

7 Select a PSDL file to install. The PSDL file contains the loadware for all downloadable cards in the system and loadware for M3900 series sets.

Select one of the six psdl files

<1> Global 10 Languages <default>

<2> Western Europe 10 Languages

<3> Eastern Europe 10 Languages

<4> North America 6 Languages

<5> Rls xx up-issue where xx = current version

<6> North America 6 Languages:

The languages contained in each selection are outlined as follows:

1 English, French, German, Spanish, Swedish, Italian, Norwegian, Brazilian, Portuguese, Finnish, Japanese Katakana.

2 English, French, German, Spanish, Swedish, Norwegian, Danish, Finnish, Italian, Brazilian Portuguese.

3 English, French, German, Dutch, Polish, Czech, Hungarian, Russian, Latvian, Turkish.

4 English, Spanish, French, Brazilian Portuguese, Japanese Katakana, German.

5 English, French, German, Spanish, Swedish, Italian, Norwegian, Portuguese, Finnish, Japanese Katakana.

6 English, French, German, Spanish, Brazilian Portuguese, Japanese Katakana.

8 Continue with ROM upgrade when prompted.
Select a database to install.

<**cr**> Enter carriage return to continue.

<**a**> Continue with CP BOOTROM installation.

<**a**> Install the CP BOOTROM from hard disk.

<**a**> Start installation.

<**a**> Continue with ROM upgrade.

The Installation Status Summary screen appears. Verify that CD to disk, disk to ROM, and CP-BOOTROM were installed.

<**cr**> Continue.

<**q**> Quit (remove any diskettes and the CD-ROM from the MMDU drives).

<**y**> Confirm quit.

<**a**> Reboot the system.

9 The system automatically performs a sysload: several message appear on the system terminal. Wait for “DONE” and then “INI” message to display before you continue.

10 Confirm that X11 Release 25 software is installed and working on Core/Net 0:

LD 135 Load the program.

STAT CPU Display the CPU status.

STAT CNI Display the cCNI status.

11 Press the INIT button on the CP PII card of Core/Net 0 to place the system into the full redundant mode.

Check for peripheral software download

Load LD 22 and print the software version..

LD 22

REQ PRT

TYPE PSWV

ISSP Print issue and release.

TID Print Tape ID.

SLLP Print System and patch information.

	Print auxiliary ID.
********	Exit program.

Test Core/Net 1 and Core/Net 0

From the active CPU, Core/Net 1, perform these tests:

1 Perform a redundancy sanity test using the following sequence:

LD 135	
STAT CNI c s	Get status of cCNI cards.
STAT CPU	Get status of CPU and memory.
TEST CPU	Test the CP PII card in both Core/Nets.
TEST CNI c s	Test each cCNI card (core, slot).
STAT SUTL	Get status of System Utility (main and Transition) cards.
TEST SUTL	Test the System Utility (main and Transition) cards.
TEST IPB	Test the Inter Processor Bus
TEST LCD	Test the LCDs.
TEST LED	Test the LEDs.

2 Test system redundancy:

LD 137	
TEST RDUN	Test redundancy.
DATA RDUN	
TEST CMDU	Test the MMDU card.

3 Switch Cores and test the other side (Core/Net 0)

LD 135	
SCPU	Switch cores.
TEST CPU	Test the inactive Core/Net.
STAT CNI c s	Get status of cCNI (both main and Transition) cards.
TEST CNI c s	Test cCNI (both main and Transition) cards.
STAT SUTL	Get status of System Utility card.
TEST SUTL	Test System Util card.

TEST IPB	Test Inter Processor Bus.
TEST LCD	Test LCDs.
TEST LED	Test LEDs

4 Clear the display and minor alarms on both Cores.

CDSP	Clear the displays on the Cores.
CMAJ	Clear major alarms.
CMIN ALL	Clear minor alarms.

5 Get the status of the Cores, CNIs, and memory.

STAT CPU	Get the status of both Cores and redundancy
STAT CNI c s	Get the status of all configured cCNIs (both main and Transition) cards.
********	Exit program.

Install the customer database

Use the administration overlays in the *X11 Administration* (553-3001-311), and the procedures outlined in the following:

- *System Programming Guide*
- *Telephone and Attendant Console: Installation* (553-3001-215)
- *M3900 Series Meridian Digital Telephones: Description, Installation, and Administration* (553-3001-216)
- appropriate NTPs for other features

Acceptance test

Content list

The following are the topics in this section:

- Perform acceptance tests 251
- The LCD/LED display panel on the Core/Net modules 261
- Core card faceplate LEDs 264

Perform acceptance tests

Task summary list

The following is a summary of the tasks in this section:

- Module power supply test, page 252
- Blower Unit and Thermal Sensor Test, page 253
- Sysload test, page 256
- System terminal and system monitor test, page 257
- PFTU test (if PFTUs are required), page 258
- Multi-Media Disk Drive Unit Test, page 259

Acceptance tests verify that the system recognizes and reports faults when they occur.

See the *X11 Administration* (553-3001-311) *Guide* for detailed explanations of software prompts. See the *X11 System Messages Guide* (553-3001-411) for the meaning of system messages and display codes generated during acceptance tests.

Note: If the expected messages or codes do not display during the following tests, contact your Nortel Networks support representative for assistance.

Module power supply test

This procedure checks that module power supplies and ringing generators are working and in communication with the System Monitor.

Perform this procedure for each power supply when you install a module.

These tests can cause an initialization; ignore INI messages during the tests.

Turn the power supply OFF and back ON

1 Check that the green LED on the power supply is lit and that the column red LED in the top cap is OFF**.**

2 Set the power supply to OFF. If there is an MPDU in the module, use the associated circuit breaker on the MPDU. If there is a switch on the power supply, use the switch.

3 The green LED on the power supply goes out. The column red LED lights.

4 The following codes displays at the system terminal:

- PWR0002: power supply failure for the system monitor
- BSD090: power supply failure for peripheral equipment
- BSD000: background signaling and diagnostics is loaded.

Note: If the power supply is in an IPE Module, XMI messages may be generated.

5 Set the power supply to ON.

6 The green LED on the power supply lights. The column red LED goes out.

7 The system terminal displays PWR0000 (power supply OK).

Unseat the power supply

8 Set the power supply to OFF.

9 Wait until the column red LED lights, then unseat the power supply. The column red LED remains lit.

10 The following codes display at the system terminal:

- PWR0002: power supply failure for the system monitor
- BSD090: power supply failure for peripheral equipment
- BSD000: background signaling and diagnostics is loaded.
- PWR0003: the power supply on the system monitor is not installed or has been removed.

11 Make sure the power supply switch is OFF and then push it back into the slot.

12 Set the power supply to ON.

13 The green LED on the power supply lights. The column red LED goes out.

14 The system terminal displays PWR0000 (power supply OK).

Blower Unit and Thermal Sensor Test

This procedure checks that the blower unit works and is in communication with the System Monitor. Perform this test when you initially install a column.

Turn the blower unit OFF and back ON

1 In the front of the pedestal, set the blower unit circuit breaker or power switch to OFF.

2 The red LED at the top front of the column lights.

3 The following codes displays at the system terminal:

- PWR0006: the blower temperature sensor is at 55 degrees Celsius (151 degrees Fahrenheit). The blower has lost power or is damaged.
- BSD090: power supply failure for peripheral equipment.

Note: Some DC powered blower units such as the NT8D52DD may also display PWR0005 and PWR0045.

4 Set the blower unit circuit breaker or power switch to ON. The column LED goes out.

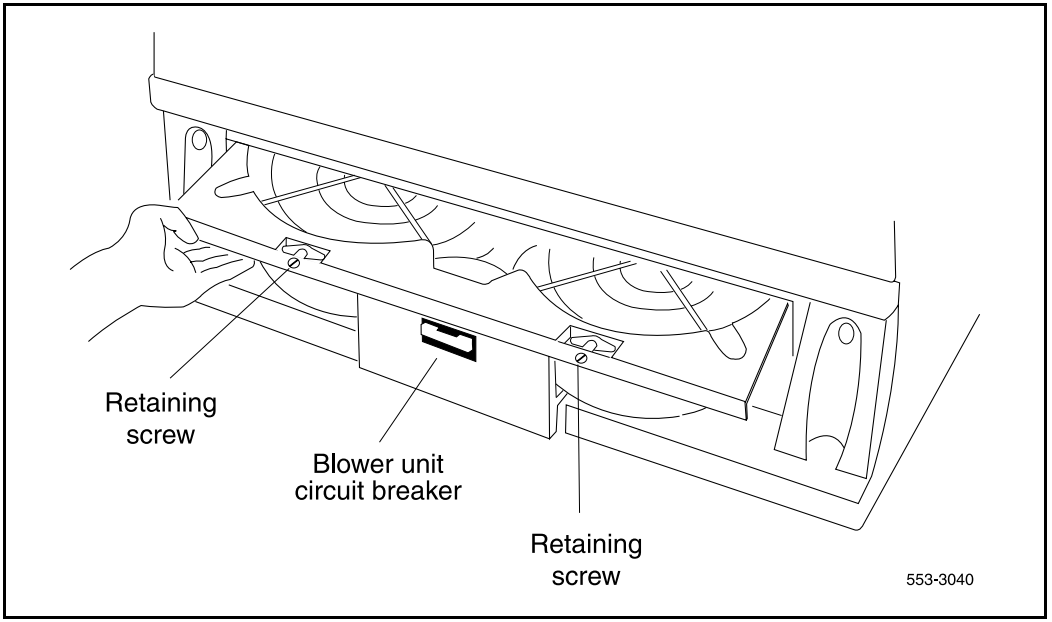
5 The system terminal displays PWR0046 (the blower temperature sensor is less than 55 degrees Celsius).

Remove and replace the blower unit

6 Use a screwdriver to loosen the retaining screws at the front of the blower unit and pull the unit out until it disconnects from the pedestal (Figure 98).

Note: Pull the unit out until it disconnects from the pedestal. Do *not* pull the unit all the way out of the pedestal.

Figure 98
Blower unit removal



7 The column red LED lights. The following codes display at the system terminal:

- PWR0006: the blower temperature sensor is at 55 degrees Celsius (151 degrees Fahrenheit). The blower has lost power or is damaged.
- BSD090: power supply failure for peripheral equipment.

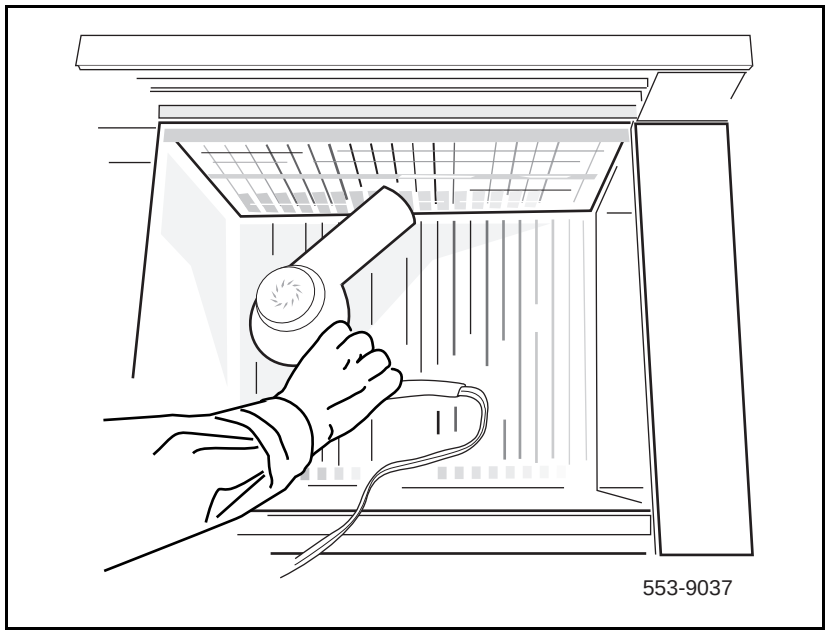
8 Reinstall the blower unit and tighten the retaining screws.

9 The column LED goes out. The system terminal display PWR0046 (the blower temperature sensor is less than 55 degrees Celsius).

Manually heat the top cap temperature sensors

10 Heat each of the two thermal sensors under the top cap of the column with a hand-held hair dryer or similar heat source (Figure 99). Follow steps 10 through 14 for one sensor, then repeat the steps for the other sensor.

Figure 99
Heat the top cap temperature sensors



11 Thirty seconds after the thermal sensor detects 70 degrees Celsius (158 degrees Fahrenheit), the main circuit breaker or the blower unit circuit breaker at the rear of the pedestal trips. The column red LED lights.

12 The following codes display at the system terminal:

- PWR0004: the circuit breaker tripped.
- PWR0006: the blower temperature sensor is at 55 degrees Celsius (151 degrees Fahrenheit). The blower has lost power or is damaged.
- PWR0007: the blower temperature sensor is at 70 degrees C (158 degrees Fahrenheit).

13 Allow the sensor to cool, then reset the circuit breaker in the pedestal. If a sysload occurs, allow it to complete.

14 The column LED goes out. The following codes display at the system terminal

- PWR0044: the circuit breaker is reset.
- PWR0047: the blower temperature sensor is less than 70 degrees C (158 degrees Fahrenheit)
- PWR0046: the blower temperature sensor is at 55 degrees Celsius (151 degrees Fahrenheit).

15 Repeat steps 10 through 14 for the other thermal sensor.

Sysload test

The Reload buttons on the CP PII circuit cards manually activate the System Loader program. The System Loader program initiates call processing and starts memory checking diagnostics. This process is called a sysload (or system reload).

CAUTION

Call processing is interrupted during a Sysload. Active calls can be lost.

After all you load all required programs and data and complete all checks:

- the system erases the System Loader from system memory
- the Initialize Program runs
- normal call processing begins

The System Loader automatically runs on system power up or if a common equipment or power fault destroys information in the system memory. For maintenance purposes, activate sysload only if call processing has stopped.

1 To start the sysload, simultaneously press the RESET buttons on the CP PII cards.

2 The red LED at the top of the CPU column lights.

3 All attendant consoles display the major alarm indication.

4 The LED on the front of the disk drive lights (only the LED on the active Core lights).

5 <Sysload messages on the LCD screen, other>

6 When the sysload is complete, the system terminal displays DONE and the system automatically invokes the initialization program.

7 The column red LED goes out.

8 The major alarm indication disappears from all attendant consoles.

9 The system automatically runs the programs in the daily/midnight routine diagnostics.

10 Monitor the progress of the midnight routines: press the RETURN key on the system terminal.

System terminal and system monitor test

Use Overlay Programs to perform tasks at the system terminal. LD ## identifies the Overlay Programs. See the *X11 Input/Output Guide* for information on Overlay Programs and System Messages.

Press the Enter key after typing each command. <cr> identifies the enter key in these instructions.

Log into the system

1 At the prompt, type: **LOGI <cr>**

2 The system responds with **PASS**

3 Type in the password and press **<cr>**

Note: Passwords are initially set as *0000*. Change passwords with the Configuration Record (LD 17).

Test the system monitor status

1 Type **LD 37 <cr>** to load program 37 (Input/Output Diagnostic)

2 Enter **STAT XSM** <cr>

3 The system responds with PWR000 (System Monitor OK)

Test the terminal status

1 **TTY x** "x" is the device number assigned to the system terminal. If this is terminal 2, type **TTY 2 <cr>**.

2 The system responds with:

ABCDEFGHIJKLM
NOPQRSTUVWXYZ
%*!&()<>=:,.?
READY FOR INPUT

3 Step through the keys on the keyboard one at a time. The system echoes all keyboard input.

4 Type **END <cr>** after you check all the keys.

5 To exit **LD 37**, type **** <cr>** and press the enter key.

6 The system responds with **OVL000**.

7 Type **LOGO <cr>** to log out of the system.

PFTU test (if PFTUs are required)

This procedure tests the PFTU and its interface with the system monitor.

1 Set the line transfer switch on the PFTU to BYPASS. Associated attendant consoles should display a major alarm.

2 Set the line transfer switch on the PFTU to NORMAL.

3 Set the line transfer switch on the attendant console associated with the PFTU to ON. Associated attendant consoles should display a major alarm.

4 Set the line transfer switch on the attendant console associated with the PFTU to OFF. The "major" alarm condition displayed on attendant consoles associated with the PFTU should disappear.

5 Repeat Steps 2 and 3 for each attendant console associated with the PFTU.

6 Set the line transfer switch on the PFTU to BYPASS and test the telephones and trunks connected to the PFTU.

- Place an outgoing call from each telephone associated with the PFTU. Each telephone should be connected directly to a trunk.
- Place an incoming call on each trunk associated with the PFTU. Each trunk should be connected directly to a telephone.

7 Set the line transfer switch on the PFTU to NORMAL and test the telephones and trunks connected to the PFTU. The telephones and trunks associated with the PFTU should return to normal operation.

Multi-Media Disk Drive Unit Test

Use this procedure to test the cPCI Multi-Media Disk Drive Unit (MMDU). This unit contains the CD-ROM, hard disk and floppy disk drives.

Use Overlay Programs to perform tasks at the system terminal. LD ## identifies the Overlay Programs.

See *X11 Input/Output Guide* for more information on Overlay Programs and system messages.

Press the Enter key after typing each command. <cr> identifies the enter key in these instructions.

Log into the system

1 At the prompt, type: **LOGI <cr>**

2 The system responds with **PASS**

3 Type in the password and press **<cr>**

Note: Passwords are initially set as *0000*. Use the Configuration Record (LD 17) to change passwords.

Check the status of the MMDUs

1 Type **LD 137 <cr>** to load program 137 (Core Input/Output Diagnostic)

2 Type IDC CMDU side slot drive# to print the identification for the MMDU.

3 Type **STAT CMDU** <cr> to check that the MMDUs are active.

Test MMDU 0

1 Type **TEST CMDU <cr>**.

This test includes a self test, a read-write capability test, and a disk access test on both the hard disk and floppy disk drives.

2 The correct system response is **OK.** If it is not, see the *X11 Input/Output Guide* for the meaning of the message received.

3 Type **** <cr>** to exit LD 137.

4 The system responds with **OVL000**.

Test MMDU 1

1 Type **LD 135 <cr>** to load program 135.

2 The system responds with **Switch Cores**.

3 Type **SCPU <cr>** to make the inactive Core active. If the switch-over is successful, the system responds with **OK**. If it is not successful, an error message appears.

4 Type **** <cr>** to exit LD 135.

5 The system responds with **OVL000**.

6 Type **LD 137 <cr>** to load program 137 (Core Input/Output Diagnostic)

7 Type **TEST CMDU 1 slot drive <cr>**.

This test includes a self test, a read-write capability test, and a disk access test on both the hard disk and floppy disk drives.

8 The correct system response is **OK.** If it is not, see the *X11 Input/Output Guide* for the meaning of the message received.

9 Type **** <cr>** to exit LD 137.

10 The system responds with **OVL000**.

11 Type **LOGO <cr>** to log out of the system.

The LCD/LED display panel on the Core/Net modules

The LCD/LED display panel across the top of the Core/Net module core cards has two rows of LEDs (see Figure 100):

- The LED lights across the top of the shelf show redundancy status. They also check the cards' communication with the CP II processor. These LED panel lights indicate if the chain of communication is broken anywhere between the CP PII and the individual circuit cards
- The bottom LEDs indicate which side is active.

Table 40 shows the states of the LCD/LED display panel.

Table 40
LCD/LED display panel

OFF OFF	RED OFF	OFF GREEN	ON ON
Shelf not configured.	Card disabled.	Card configured and enabled.	Test state (idle side)

Table 41 shows the LCD/LED display panel states for the CP PII card only.

Table 41
LCD/LED display panel states for the CP PII card

OFF OFF	OFF OFF	OFF GREEN	GREEN GREEN	GREEN OFF
Initial state (power up)	Redundancy disabled. Ethernet connection down.	Redundancy disabled. Ethernet connection up.	Redundancy enabled. Ethernet connection up.	Redundancy enabled and Ethernet connection down.

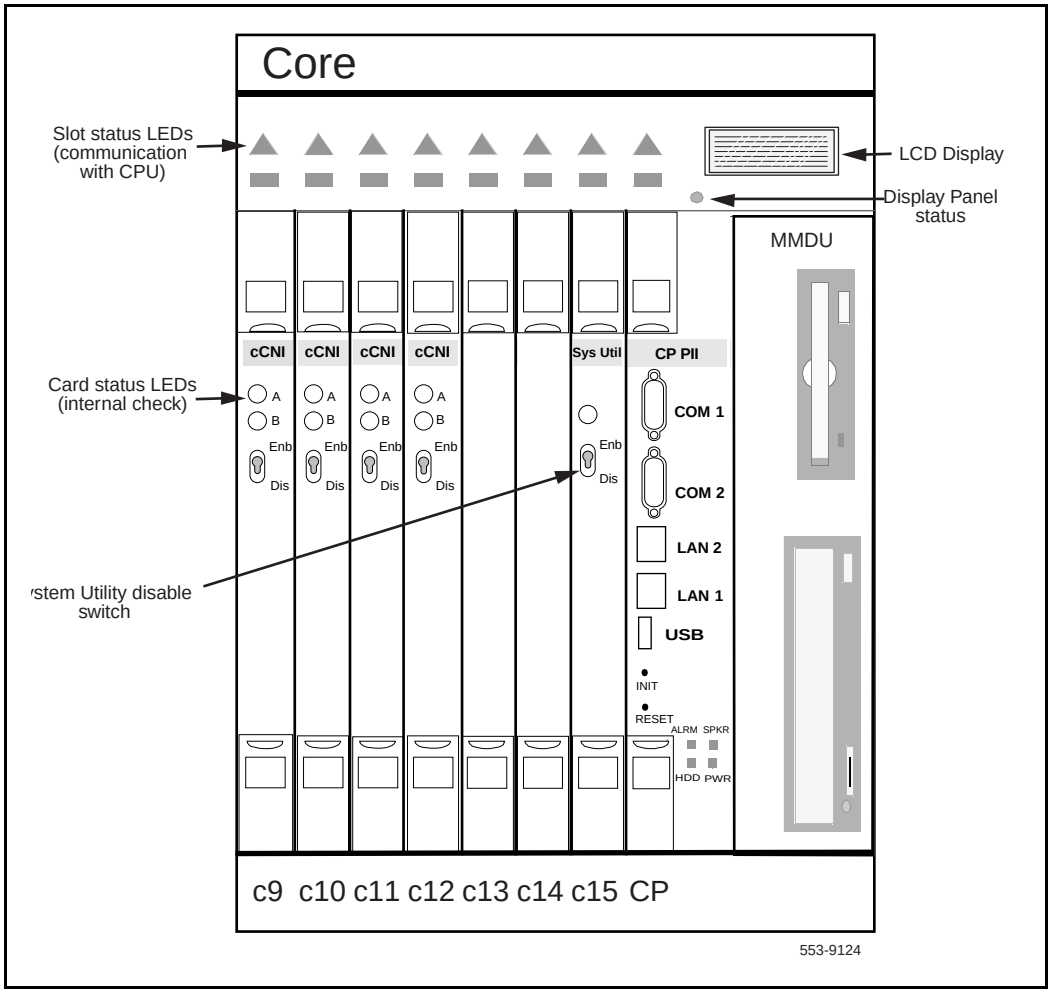
Table 42 shows the LCD/LED display panel states for all core cards *except* the CP PII card.

Table 42
LCD/LED display panel states all Core cards except the CP PII card

RED GREEN	RED GREEN	OFF OFF	OFF GREEN	RED OFF
Initial state (power up)	Self test or lamp testing progress	Card not configured	Card enabled and on active side.	Card is user or system disabled

.

Figure 100
Core/Net module front view - LCD/LED display panel



Core card faceplate LEDs

Task summary list

The following is a summary of the tasks in this section:

- LED/LCD display panel status, page 264
- System Utility LED, page 264
- Remaining core card LEDs, page 265

LED/LCD display panel status

The LCD on the display panel provides information about the display panel itself (Table 43).

Table 43
LCD on display panel

OFF	RED	GREEN
No power cable or no system power	No data cable or LCD bad	Display panel is working

System Utility LED

The System Utility main Core card has one LED. It provides the information shown in Table 44.

Table 44
LED on display panel

OFF	RED	GREEN
No power	Faceplate switch down = ON Main card hardware enabled.	Main card hardware inaccessible and disabled.

Remaining core card LEDs

The LED on the remaining core cards provides the information shown in Table 45.

Table 45
Core card LED status

OFF	RED	GREEN
No power or not configured.	Configured but not in service.	Configured and in service; fully functional.

Replace the cPCI Core Network Interface Cards

Content list

The following are the topics in this section:

- Circuit card handling precautions 267
- Core card replacement 268
- cPCI Core Network Interface Card replacement 268

Circuit card handling precautions

WARNING

To avoid card damage from static discharge, wear a properly connected antistatic wrist strap.

- If a wrist strap is not available, regularly touch one of the bare metal strips in the module to discharge static.
- Handle cards by the edges only. Do not touch the contacts or components.
- Unpack or handle cards away from electric motors, transformers or similar machinery.
- Always store cards in silver anti-static bags. Never stack cards on top of each other.
- NTZC77AA contains an anti-static mat and ESD wrist-strap.

Core card replacement

All card are factory installed. If you need to replace a card, follow the guidelines below.

> **CAUTION**
> To avoid card damage from static discharge, wear a properly connected antistatic wrist strap.

Review "Circuit card handling" on page 32.

- To remove a card, hold the card by the faceplate latches and gently pull it out of the slot.
- To install a card, hold the card by the faceplate latches and gently push it into the slot until the connectors make contact with the backplane.
- Gently push the latches forward to seat the card and lock it in place.
- Never force the card into the slot. If the card gets stuck, remove it and try again.

See Figure 52 on page 137 and Figure 53 on page 139 for the correct card placement in the Core/Net module.

cPCI Core Network Interface Card replacement

This section describes how to replace:

- NT4N65 cPCI Core Network Interface Cards.
  See "Procedure 1: Replace the NT4N65 cPCI Core Network Interface (cCNI) card" on page 269.
- NT4N66 cPCI Core Network Interface Transition Cards.
  See "Procedure 2: Replace the NT4N66 cPCI Core Network Interface (cCNI) Transition Card" on page 270.

Procedure 1:
Replace the NT4N65 cPCI Core Network Interface (cCNI) card

1 Check that the Core containing the cCNI card to be replaced is inactive:

a The LCD/LED display panel across the top of the Core/Net module core cards has two rows of LEDs.
If either of the LEDs (top = red or bottom = green) is on for any of the cards, that side is in a test or idle state.

b If the Core containing the cCNI is active, switch cores in LD 135:

LD 135	To load the program.
SCPU	Switch.Core (if necessary).

2 Still in LD 135, software disable the cCNI card:

DIS CNI c s p Disable the cCNI card, where:

c = Core number (0 or 1)
s = Slot number (9 - 12)
p = Port number (0, 1)

This software disables both the cCNI card and its associated cCNI Transition card.

3 Hardware disable the cCNI card: set the faceplate switch to DIS.

4 Use a small-bladed screwdriver to remove the screws from the cCNI card.

5 To remove the card, hold the card by the faceplate latches and gently pull it out of the slot.

6 To install the replacement card, hold the card by the faceplate latches and gently push it into the slot until the connectors make contact with the backplane.

7 Gently push the latches forward to set the card and lock it in place.

CAUTION

Never force the card into the slot. It the card gets stuck, remove it and try again.

8 Use a small-bladed screwdriver to replace the screws on the card.

9 Hardware enable the cCNI card: set the faceplate switch to ENB.

10 Software enable the cCNI card:

LD 135	To load the program.
ENL CNI c s p	Enable the cCNI card, where: c = Core number (0 or 1) s = Slot number (9 - 12) p = Port number (0, 1) This software enables both the cCNI card and its associated cCNI Transition card.

Procedure 2: Replace the NT4N66 cPCI Core Network Interface (cCNI) Transition Card

To replace a cCNI Transition Card, you must software and hardware disable the NT4N65 cCNI card associated with the NT4N66 cCNI Transition Card. You must disable the cCNI from the **inactive** core.

1 Check that the Core containing the cCNI card to be replaced is inactive:

a The LCD/LED display panel across the top of the Core/Net module core cards has two rows of LEDs.
If either of the LEDs (top = red or bottom = green) is on for any of the cards, that side is in a test or idle state.

b If the Core containing the cCNI Transition card is active, make the other Core active:

SCPU	Switch.Core (if necessary).

2 Still in LD 135, software disable the cCNI card:

DIS CNI c s p	Disable the cCNI card, where: c = Core number (0 or 1) s = Slot number (9 - 12) p = Port number (0, 1) This software disables both the cCNI card and its associated cCNI Transition card.

3 At the front of the module, hardware disable the NT4N65 cCNI card: set the faceplate switch to DIS.

4 At the back of the module, use a small-bladed screwdriver to remove the screws, located on the top and bottom of the cCNI Transition cards. Be careful not to drop the screws into the Pedestal. Refer to Figure 101.

Note: cCNI Transition card replacement is more effective when all the cards are removed as a group, the card changed, and the card group replaced.

5 Remove the four screws that fasten the 3PE Termination Panel to its mounting bracket. Refer to Figure 102.

6 Move the 3PE Termination Panel carefully to the left and out of its mounting bracket.

7 Press the card faceplate latches and unseat each card. (The cables are part of the NT4N66 cCNI Transition card assembly.)

8 Remove the NT4N66 cCNI Transition cards, cables, and 3PE Termination panel as an assembly.

9 Disconnect the cCNI Transition Card cable(s) to be replaced from the 3PE Termination panel.

Note: If you remove more than one cable, label the cables to correctly reconnect them later.

10 Install the NT4N66 cCNI Transition cards, cables, and 3PE Termination panel as an assembly.

11 Gently push the latches forward to set the card and lock it in place.

CAUTION

Never force the card into the slot. It the card gets stuck, remove it and try again.

12 Place the 3PE Termination Panel into its mounting bracket.

13 Install the four screws that fasten the 3PE Termination Panel to its mounting bracket.

14 Use a small-bladed screwdriver to replace the screws on the cCNI Transition cards.

15 At the front of the module, hardware enable the NT4N65 cCNI card: set the faceplate switch to ENB.

16 Software enable the NT4N65 cCNI card:

LD 135 To load the program.

ENL CNI c s p Enable the cCNI card, where:

c = Core number (0 or 1)
s = Slot number (9 - 12)
p = Port number (0, 1)

This software enables both the cCNI card and its associated cCNI Transition card.

Figure 101
Core/Net backplane

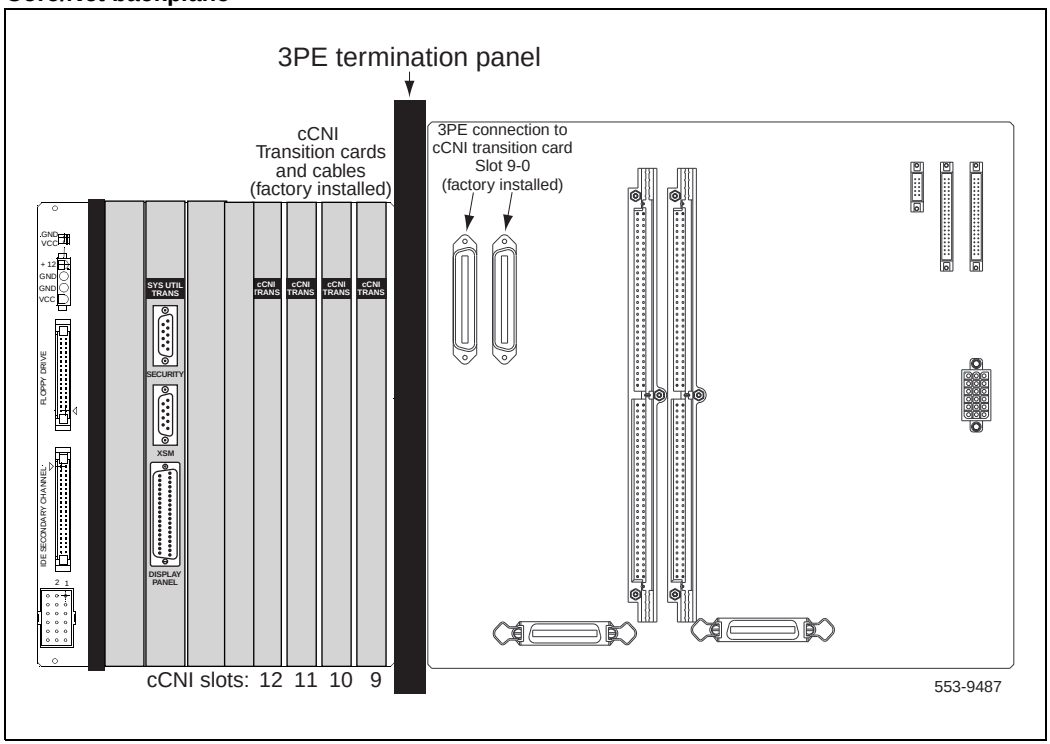
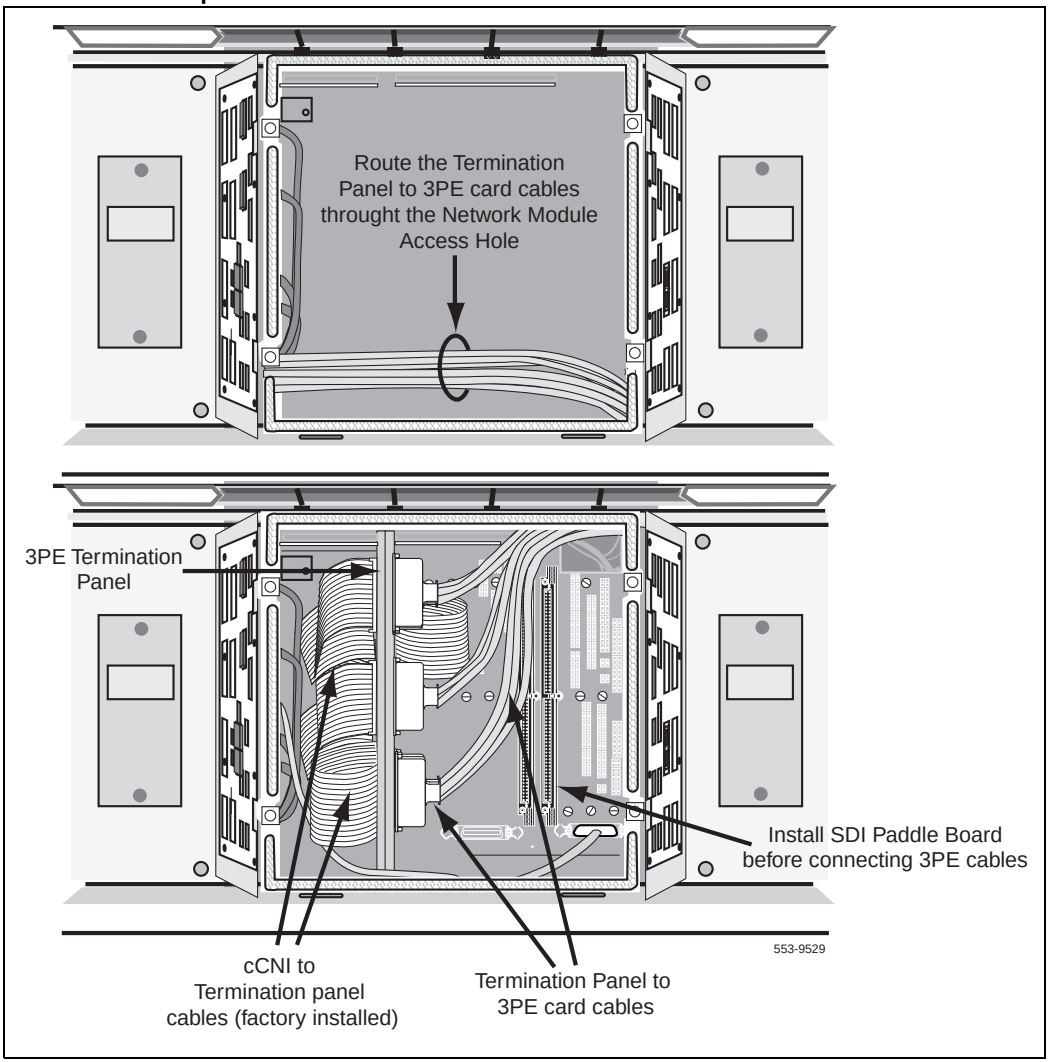


Figure 102
3PE Termination panel



Replace the NT4N43 cPCI Multi-Media Disk Unit

Content list

The following are the topics in this section:

- Circuit card handling precautions 275
- Core card replacement 276
- Replace the NT4N43 cPCI Multi-Media Disk Unit. 276

Circuit card handling precautions

WARNING

To avoid card damage from static discharge, wear a properly connected antistatic wrist strap.

- If a wrist strap is not available, regularly touch one of the bare metal strips in the module to discharge static.
- Handle cards by the edges only. Do not touch the contacts or components.
- Unpack or handle cards away from electric motors, transformers or similar machinery.
- Always store cards in silver anti-static bags. Never stack cards on top of each other.
- NTZC77AA contains an anti-static mat and ESD wrist-strap.

Core card replacement

All card are factory installed. If you need to replace a card, follow the guidelines below.

> **CAUTION**
> To avoid card damage from static discharge, wear a properly connected antistatic wrist strap.

Review "Circuit card handling" on page 32.

- To remove a card, hold the card by the faceplate latches and gently pull it out of the slot.
- To install a card, hold the card by the faceplate latches and gently push it into the slot until the connectors make contact with the backplane.
- Gently push the latches forward to seat the card and lock it in place.
- Never force the card into the slot. If the card gets stuck, remove it and try again.

See Figure 52 on page 137 and Figure 53 on page 139 for the correct card placement in the Core/Net module.

Replace the NT4N43 cPCI Multi-Media Disk Unit

If you have an I/O panel with an access panel and an interior cutout, to replace the Multi-Media Disk Unit (MMDU):

- Use "Procedure 1: Replace the NT4N43 cPCI Multi-Media Disk Unit leaving the card cage in place" on page 277.

OR

If you have an I/O panel with an access panel without an interior cutout or an I/O panel with solid metal on the left side, to replace the Multi-Media Disk Unit (MMDU):

- Use "Procedure 2: Replace the MMDU by removing the card cage" on page 278.

Procedure 1:
Replace the NT4N43 cPCI Multi-Media Disk Unit leaving the card cage in place

1 At the rear of the Call Processor PII (CP PII) module, remove the three cables connected to the back of the MMDU (see Figure on last page):

- **a** On the bottom cable, the CD-ROM and Hard Drive Data Cable (NT4N92AA), push up the tabs and disconnect the cable.
- **b** On the middle cable, the Floppy Data Cable (NT4N93AA), push up tabs and disconnect the cable.
- **c** On the top cable, the Floppy, CD-ROM and Hard Drive Power Cable (NT4N95AA), squeeze the tabs, top and bottom, and release the cable.

2 At the front of the module, use a slotted or Phillips screwdriver to unscrew the screws on the top and bottom center of the MMDU.

Note: Some systems have MMDU screws which are captive; some systems have MMDU screws which may be removed.

3 Use the MMDU handle to slowly pull the MMDU forward, bringing the attached cables with it.

4 Remove the MMDU unit (with the cables attached) from the card cage.

5 Remove the cables and reattach them to the new MMDU.

6 From the front of the module, bundle and feed the cables attached to the MMDU into the MMDU slot.

CAUTION

When you feed the cables into the MMDU slot, be very careful that the cables do not pinch or snag on either side.

7 Slowly slide the MMDU three-quarters of the way into the shelf until it is supported in the shelf.

8 At the rear of the module, gently pull the attached cables through to clear the backplane edge.

> **CAUTION**
> Be careful not to pull any cables too hard or you may dislodge them from the unit. If any cables become dislodged, remove the MMDU from the front of the module and reattach the cables.

9 Connect the three MMDU cables:

- **a** Connect the longer of the two ribbon cables to the connector labeled Floppy Drive.
- **b** Connect the shorter of the two ribbon cables to the slot (below the Floppy Drive) labeled IDE Secondary Channel.
- **c** Open the tabs and push the connector to attach the third cable to the top cable connection labeled +12, GND,GND,VCC.

10 From the front of the module, carefully slide the MMDU the remainder of the way into its slot.

11 Use a slotted or Phillips screwdriver to secure the screws on the top and bottom center of the MMDU.

Procedure 2:
Replace the MMDU by removing the card cage

1 Power down the shelf containing the card cage.

2 Disconnect the card cage cables:

- **a** Label and disconnect all cables to the front of the module. Tape over the contacts to avoid grounding. Tape or tie all cables to the sides so the working area in front of the card cage is totally clear.
- **b** If there is an I/O safety panel, remove it by turning the screws on each side. Set the cover aside.
- **c** Tag and disconnect all cables from the backplane to the interior of the I/O assembly.
- **d** Tag and disconnect all plugs, wires, and cables to the backplane.

3 Remove the card cage:

Note 1: Leave all cards in the card cage. You will relocate them to the CP PII card cage later in the upgrade procedure.

Note 2: Use two people to remove the Core 1 card cage because of the weight.

a Remove the two mounting screws at the bottom rear of the card cage that secure the card cage to the module casting.
You need a 1/4" nut driver to remove the screws.
It is recommended that you use a magnetized screwdriver to avoid dropping the screws into the base of the UEM module.

b Remove the front trim panels on both sides of the card cage.

c Remove the three mounting screws that secure the front of the card cage to the bottom of the module.
Save the screws for use with the CP PII card cage.

d Pull the card cage forward until it is halfway out of the module.

e Disconnect cables, plugs, and wires from the rear of the module to the backplane:

f Remove the logic return (LTRN) (orange) wire from the backplane bolt.
Be careful; do not drop the nut or lock washer into the pedestal.

g Remove the wire from the frame ground bolt on the module.

h Label and disconnect the module power connectors. These are small orange connectors plugged into the module power distribution unit (MPDU) in an AC-powered system, or connected to each other in a DC-powered system.

i Label and disconnect the system monitor ribbon cables from J1 and J2.

j Remove the card cage from the module. Set it on a table to allow front and back access to the MMDU.

CAUTION

Be sure to perform the following step. If you do not tape the EMI shield in position, you will not be able to install the card cage in the module correctly.

k Reposition the EMI shield (it looks like a brass grill) in the base of the module. Tape over the front mounting tabs to hold the shield in position. You will remove the tape later.

CAUTION

Check for and remove any debris (such as screws) that may have fallen into the base of the UEM module.

4 Remove cables attached to the MMDU:

a At the rear of the card cage, remove the three cables connected to the back of the MMDU (see Figure on last page):(NT4N92AA), push up the tabs and disconnect the cable.

b On the middle cable, the Floppy Data Cable (NT4N93AA), push up tabs and disconnect the cable.

c On the top cable, the Floppy, CD-ROM and Hard Drive Power Cable (NT4N95AA), squeeze the tabs, top and bottom, and release the cable.

5 At the front of the module, use a slotted or Phillips screwdriver to unscrew the screws on the top and bottom center of the MMDU.

Note: Some systems have MMDU screws which are captive; some systems have MMDU screws which may be removed.

6 Use the MMDU handle to slowly pull the MMDU forward, bringing the attached cables with it.

7 Remove the MMDU unit (with the cables attached) from the card cage.

8 Remove the cables and reattach them to the new MMDU.

9 From the front of the module, bundle and feed the cables attached to the MMDU into the MMDU slot.

CAUTION

When you feed the cables into the MMDU slot, be very careful that the cables do not pinch or snag on either side.

10 Slowly slide the MMDU three-quarters of the way into the shelf until it is supported in the shelf.

11 At the rear of the module, gently pull the attached cables through to clear the backplane edge.

CAUTION

Be careful not to pull any cables too hard or you may dislodge them from the unit. If any cables become dislodged, remove the MMDU from the front of the module and reattach the cables.

12 Connect the three MMDU cables:

- **a** Connect the longer of the two ribbon cables to the connector labeled Floppy Drive.
- **b** Connect the shorter of the two ribbon cables to the slot (below the Floppy Drive) labeled IDE Secondary Channel.
- **c** Open the tabs and push the connector to attach the third cable to the top cable connection labeled +12, GND,GND,VCC.

13 From the front of the module, carefully slide the MMDU the remainder of the way into its slot.

14 Use a slotted or Phillips screwdriver to secure the screws on the top and bottom center of the MMDU.

15 Replace the card cage:

- **a** Check that the power harness at the right rear corner of the card cage is attached card cage
- **b** Slide the CP PII card cage halfway into the module.

16 Reconnect the card cage cables.
Hold the card cage firmly and make the following connections at the rear of the module.

- **a** In **AC** powered systems, connect the remaining module power connectors to J2 on the MPDU.

  In **DC** powered systems, connect the module power connectors to each other.

b Attach the **system monitor** ribbon cables:

- Connect the ribbon cable that goes down to the pedestal to connector **J1** on the backplane.
- Connect the ribbon cable that goes up the column to **J2** on the backplane.

c Attach the green ground wire to the frame ground bolt on the module. Use a 11/32" socket wrench to attach the wire. Remove the nut and the lock washer at the top of the bolt. Put the frame ground wire terminal over the bolt. Reinstall the top lock washer and the nut, then tighten down the nut.

Note: For all of the wire terminals to fit on the bolt, remove one of the lock washers. Leave a lock washer at the bottom of the bolt and at the top of the bolt. Leave a third lock washer between the second and third, or the third and fourth, wire terminals.

d Attach the orange logic return wire. Remove one nut and the lock washer from the LRTN blot at the rear of the card cage. Put the wire terminal over the bolt, reinstall the lock washer and nut, then tighten down the nut. Use a 1/4" or 2/8" socket wrench.

17 Slide the card cage all the way into the module.

18 Check the position of the EMI shield. If the EMI shield has shifted, reposition it. Remove the tape holding the EMI shield.

19 Pre-route cables NT4N88AA, NT4N88BA and NT4N90AA before you secure the card cage.

a Route cable **NT4N88AA** from **COM1** on the CP PII faceplate to **J25** on the I/O panel. (NT4N88AA is used to connect a terminal.)

b Route cable **NT4N88BA** from **COM2** on the CP PII faceplate to **J21** on the I/O panel. (NT4N88BA is used to connect a modem.

c Route cable **NT4N90AA** from **LAN 1** on the CP PII faceplate to **J31 (top)** of the I/O panel

d Secure the card cage to the module with the three short screws in the front and the two long screws in the rear.

Note: You need a minimum 12" long, 3/8" hex head nut driver for the two screws in the rear of the card cage.

20 Replace the trim panels on both sides of the card cage.

21 Install the screws at the back of the card cage.

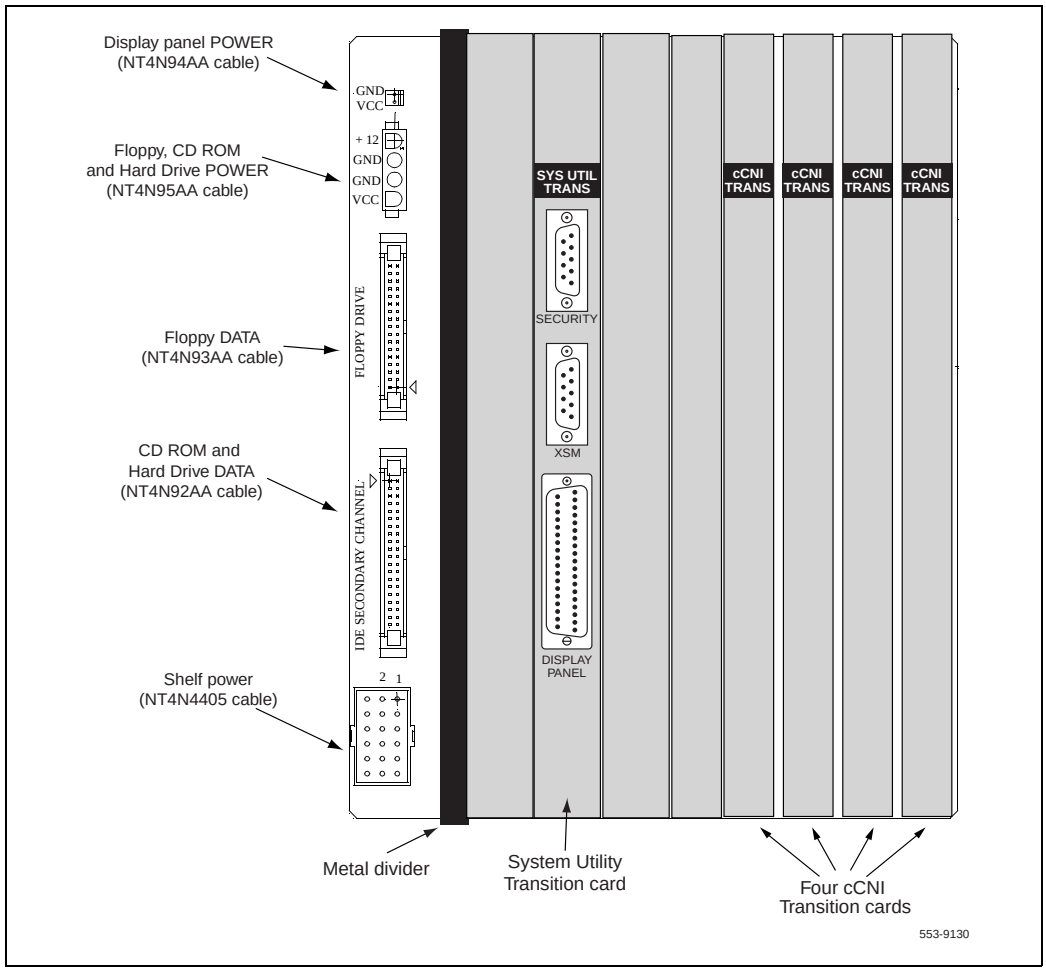
22 Reconnect the LAN 1, COM1 and COM2 cables.

23 Reconnect cables, plugs, and wires to the backplane:

a Reconnect all plugs, wires, and cables to the backplane. Cables include 3PE to cCNI Transition cables; D and E intermodule cable; and the intermodule power harness.

b Position the I/O safety panel. Tighten the screws.

Figure 103
Location of cable connections on MMDU



Meridian 1

Call Processor PII

Description, Installation, and Administration Guide

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Publication number: P0914249
Document release: Standard 2.00
Date: June 2000
Printed in Canada

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