Meridian 1
Succession 1000M
Succession 3.0 Software

Large System
Installation and Configuration

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Revision history

October 2003

Standard 1.00. This document is a new NTP for Succession 3.0. It was created to support a restructuring of the Documentation Library, which resulted in the merging of multiple legacy NTPs. This new document consolidates information previously contained in the following legacy documents, now retired:

- *Cabling Guide* (553-3001-109)

- *System Installation Procedures* (553-3001-210)

Contents

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.

Subject

This document provides installation and acceptance testing procedures for Meridian 1 Large Systems and Succession 1000M Large Systems.

Note on legacy products and releases

This NTP contains information about systems, components, and features that are compatible with Succession 3.0 Software. For more information on legacy products and releases, click the **Technical Documentation** link under **Support** on the Nortel Networks home page:

http://www.nortelnetworks.com/

Applicable systems

This document applies to the following systems:

- Meridian 1 Option 51C

- Meridian 1 Option 61

- Meridian 1 Option 61C

- Meridian 1 Option 61C CP PII

- Meridian 1 Option 81

- Meridian 1 Option 81C

- Meridian 1 Option 81C CP PII

- Succession 1000M Half Group

- Succession 1000M Single Group

- Succession 1000M Multi Group

Note that memory upgrades may be required to run Succession 3.0 Software on CP3 or CP4 systems (Options 51C, 61, 61C, 81, 81C).

System migration

When particular Meridian 1 systems are upgraded to run Succession 3.0 Software and configured to include a Succession Signaling Server, they become Succession 1000M systems. Table 1 lists each Meridian 1 Large System that supports an upgrade path to a Succession 1000M Large System.

Table 1
Meridian 1 systems to Succession 1000M systems

This Meridian 1 system...	Maps to this Succession 1000M system
Meridian 1 Option 51C	Succession 1000M Half Group
Meridian 1 Option 61	Succession 1000M Single Group
Meridian 1 Option 61C	Succession 1000M Single Group
Meridian 1 Option 61C CP PII	Succession 1000M Single Group
Meridian 1 Option 81	Succession 1000M Multi Group
Meridian 1 Option 81C	Succession 1000M Multi Group
Meridian 1 Option 81C CP PII	Succession 1000M Multi Group

For more information, see *Large System: Upgrade Procedures* (553-3021-258).

Intended audience

This document is intended for individuals responsible for installing and configuring Large Systems. To use this document, you should have a basic knowledge of Large System equipment and operation. Contact Nortel Networks for information on installation courses. You should also read and fully understand the *Large System: Overview* (553-3021-010) before you install a system.

Conventions

Terminology

In this document, the following systems are referred to generically as "system":

- Meridian 1

- Succession 1000M

The following systems are referred to generically as "Large System":

- Meridian 1 Option 51C

- Meridian 1 Option 61

- Meridian 1 Option 61C

- Meridian 1 Option 61C CP PII

- Meridian 1 Option 81

- Meridian 1 Option 81C

- Meridian 1 Option 81C CP PII

- Succession 1000M Half Group

- Succession 1000M Single Group

- Succession 1000M Multi Group

Related information

This section lists information sources that relate to this document.

NTPs

The following NTPs are referenced in this document:

*   *Circuit Card: Description and Installation (553-3001-211)*

*   *Signaling Server: Installation and Configuration* (553-3001-212)

*   *Software Input/Output: Administration* (553-3001-311)

*   *Software Input/Output: System Messages* (553-3001-411)

*   *Telephones and Consoles: Description* (553-3001-367)

*   *Large System: Overview* (553-3021-010)

*   *Large System: Planning and Engineering* (553-3021-120)

*   *Large System: Upgrade Procedures* (553-3021-258)

*   *Candeo Power System User Guide* (P0914425)

*   *Candeo Power System Installation Guide* (P0914426)

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Introduction

Contents

This section contains information on the following topics:

Overview

This document describes the procedures used to install and configure a Large System. For proper installation, perform the steps in the sequence stated in "Summary of procedures." The summary will refer you to other sections within this document. After completing the steps listed in those sections, return to the summary and continue on to the next step.

Whenever possible, install external power equipment before the system installation. If reserve power equipment is used, install it according to the manufacturer's instructions.

To install telephones and attendant consoles, see *Telephones and Consoles: Description* (553-3001-367).

System installation must be performed by qualified personnel only.

Summary of procedures

1. Prepare equipment for installation; go to "Preparing the equipment for installation" on page 38.

2. Place the fourth module on a column (if required); go to "Placing the fourth module on a column" on page 41.

3. Position and level equipment; go to "Positioning and leveling equipment" on page 47.

   Note: If earthquake bracing is required, go to "Installing earthquake bracing" on page 297. The section will provide procedures for installing column and floor bracing and positioning and levelling equipment. When those procedures are complete, return to Step 4 or Step 5 (as applicable) in this summary.

4. Install overhead cable tray kits (if required); go to "Installing overhead cable tray kits" on page 53.

5. Install power supplies in all modules:

   a. Make sure the system is disconnected from any power source.

   b. Set switches and breakers on all module power supplies or module power distribution units (MPDUs) to OFF.

   c. Insert each power supply into the appropriate card cage and hook the locking devices.

6. Install a NT4N43 cPCI Multi-Media Disk Unit in each cPCI Core/Net Module.

   Note: In each Large System, there are two MultiMedia Disk Units. Install a cPCI Multi-Media Disk Unit in each cPCI Core/Network.

7. Install power equipment and ground wiring:

   — For ac-powered systems, go to "Installing ac power" on page 57.

   — For dc-powered systems, go to "Installing dc power" on page 67.

8. Plan and designate the main distribution frame (MDF); go to "Planning and designating the Main Distribution Frame (MDF)" on page 99.

9 Install Power Failure Transfer Units (PFTUs) (if required); go to "Installing Power Failure Transfer Units (PFTUs)" on page 113.

10 Configure the system monitor; go to "Configuring the system monitor" on page 119.

11 Connect a system terminal (or modem); go to "Connecting a system terminal or modem" on page 135.

12 Install cabling:

— To cable common equipment, go to "Cabling common equipment in a single group system" on page 151.

— To cable network loops, go to "Cabling network modules and loops" on page 203.

— To cable IPE Modules to the MDF and to connect lines and trunks, go to "Cabling lines and trunks" on page 225.

13 Power up the system and load the system software; go to "Powering up the system and initial loading" on page 263.

14 If you are upgrading your system, do not install new software, but return to the upgrade procedures in *Large System: Upgrade Procedures* (553-3021-258).

15 Perform acceptance tests; go to "Performing acceptance tests" on page 287.

16 To test circuit cards, see "Acceptance tests" in *Circuit Card: Description and Installation* (553-3001-211). To test telephones and attendant consoles, see *Telephones and Consoles: Description* (553-3001-367).

17 Replace all covers and grills on the front and rear of the system.

Table 2
List of tasks in subsections

Preparing for installation

Contents

This section contains information on the following topics:

Requirements

Before system equipment is delivered to the installation site, you must consider these requirements:

- Fire protection and safety requirements

- Equipment room requirements

- Grounding and power requirements

- Cable requirements

Specifications for these requirements and for developing the equipment room floor plan are provided in *Large System: Planning and Engineering* (553-3021-120).

System equipment – UEMs

Universal Equipment Modules (UEMs) are the building blocks of the communications system. Each UEM is a self-contained unit with power, a card cage, I/O panels, and cable routing channels. It is a generic case containing sets of equipment used in system operations (see Figure 1 on page 21).

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 21). Cables connect cards in the same module, between two modules and between cards and the I/O panel in the same module.

Column components

Each column contains a pedestal base, a top cap, and up to four modules.

Pedestals

Each column sits on a pedestal. The pedestal contains power, cooling, and monitoring equipment.

- 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.

Figure 1
Universal Equipment Modules

Module 3

Module 2

Module 1

Module 0

Top Cap

Universal Equipment Module

Module 0

Pedestal

4 Module Column

1 Module Column

553-A0139
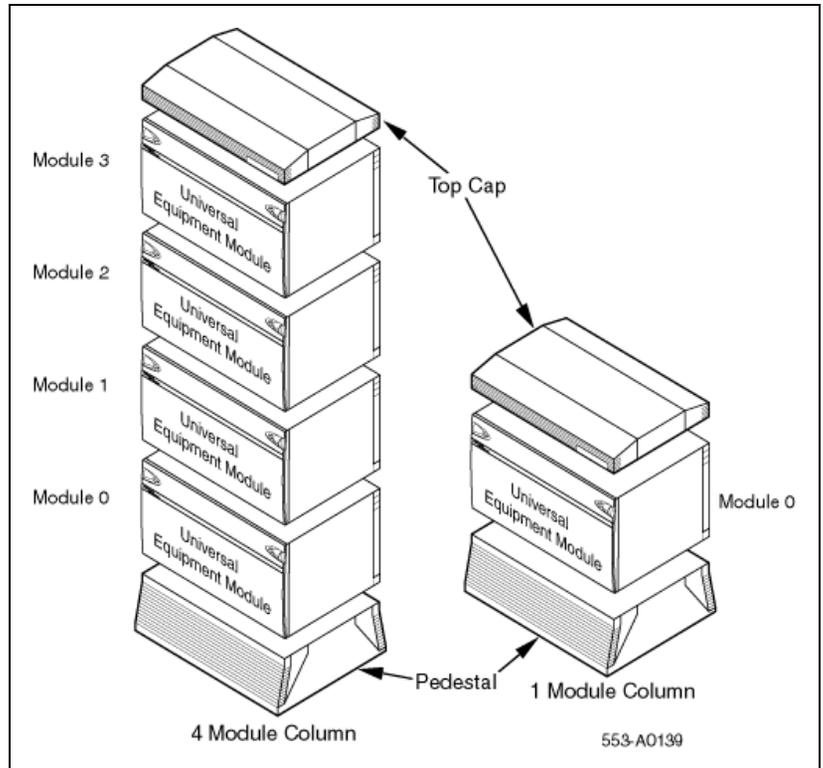
Top caps

A top cap is mounted on the top module of each column. It contains:

• 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.

Modules

Up to four modules can be included in a column. The modules can include:

- NT4N41 CompactPCI® (cCPI) Core/Network Module – required for all Large Systems

- NT8D35 Network Module – required for Meridian 1 Option 81C CP PII and Succession 1000M Multi Group

- NT8D37 Intelligent Peripheral Equipment (IPE) Module – required for all Large Systems

In addition, modules that house application-specific equipment, such as Meridian Mail and Meridian Link modules, can be included in a column.

Columns are grouped in rows

A system can have one column or multiple columns. 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).

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

For compliance with Electromagnetic interference/radio frequency interference (EMI/RFI) standards, spacer kits are provided to interconnect the columns in a multiple-column system.

Figure 2
Example of Large System column row

Front View

UEM 3	UEM 3	UEM 3	UEM 3
UEM 2	UEM 2	UEM 2	UEM 2
UEM 1	UEM 1	UEM 1	UEM 1
UEM 0 (Core/Net 1)	UEM 0 (Core/Net 0)	UEM 0	UEM 0
Column 1	Column 0	Column 2	Column 3

553-A0140
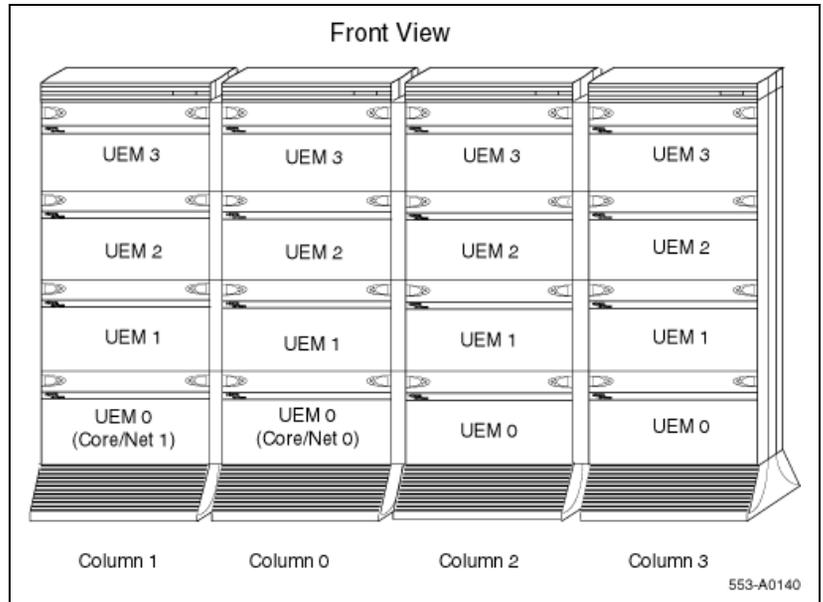
UEMs are identified by function

Each UEM contains a specialized set of equipment to digitalize, process, and route phone calls and voice messages (see Figure 3 on page 24).

Figure 3
UEMs identified by function
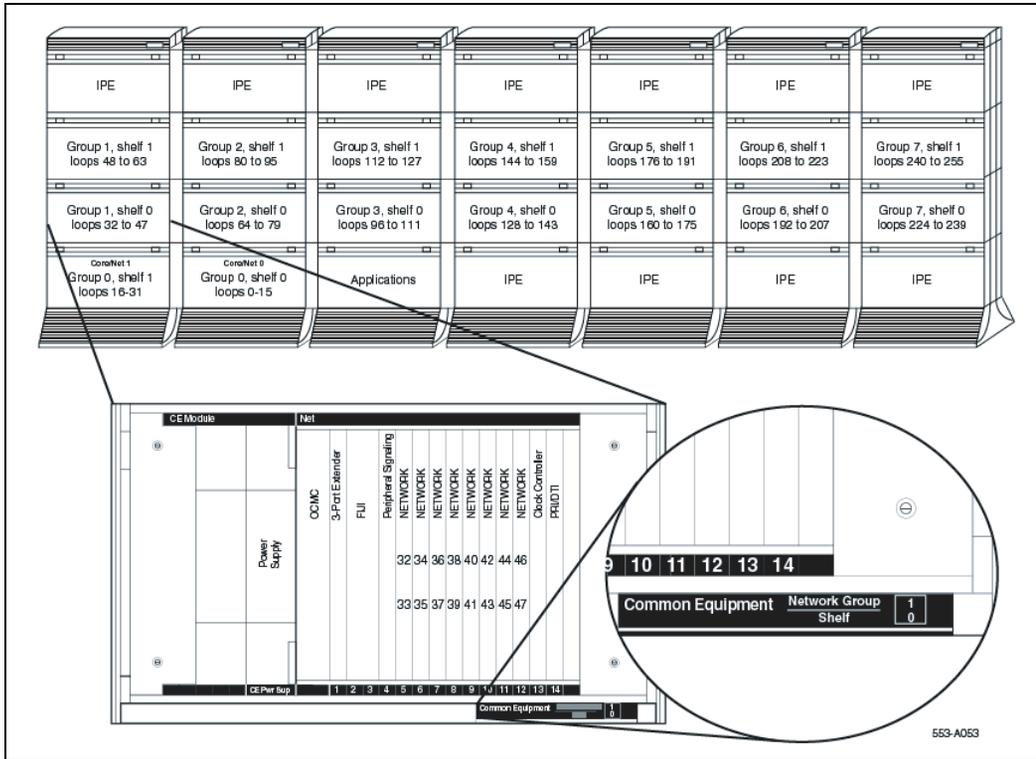
Card cage

Inside each UEM is a metal card cage. 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. Card cages can be removed and replaced for repairs or upgrades.

Core/Net module

Large Systems feature the NT4N41 Core/Net module. The Core/Net module provides a unified hardware platform for single group and multi-group configurations. The NT4N41 Core/Net module supports:

- Two CD-ROM for all systems.

- An integrated cPCI shelf.

- A NT4N48AA System Utility card that incorporates the functionality of the System Utility Transition card, LCD display, and the security device holder.

- An LCD display on the System Utility card (formerly located on the front chassis).

- A fanout panel (see Figure 4 on) to replace Transition cards (cCNI Transition card and System Utility Transition card) and provide connectivity to the network shelf.

- Upgrades from single group to multi-group configurations (requiring a new keycode file and any additional hardware necessary for a multi-group system).

Figure 4
NT4N41 Core/Net shelf fanout panel (backplane)
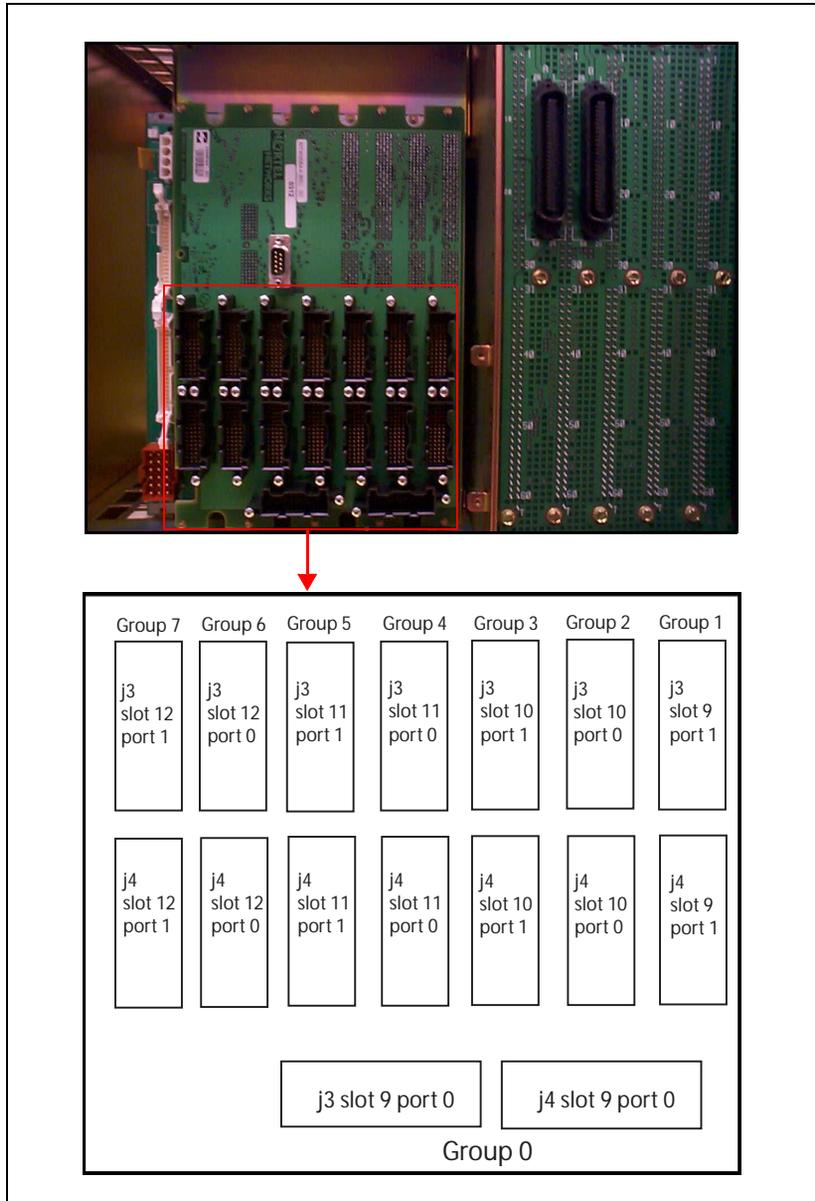
System options

The procedures in this document apply to the following system options:

- Meridian 1 Option 61C CP PII: enhanced common control complex with dual CPU, full network group

- Meridian 1 Option 81C CP PII: enhanced common control complex with dual CPU, multiple network groups

- Succession 1000M Single Group: a Meridian 1 Option 61C CP PII system upgraded to include a Signaling Server (see note below)

- Succession 1000M Multi Group: a Meridian 1 Option 81C CP PII system upgraded to include a Signaling Server (see note below)

    Note: For information about Succession Signaling Server installation and configuration, see *Signaling Server: Installation and Configuration* (553-3001-212).

All system options are available in both ac- and dc-powered versions.

System architecture and module types are described in *Large System: Overview* (553-3021-010). The components of ac-powered systems, dc-powered systems, and reserve power options for both are described in this document.

Meridian 1 Option 61C CP PII and Succession 1000M Single Group

These systems feature a dual Pentium II Processor with standby processing capability, fully redundant memory, and a full network group. Two Core/Net modules and one IPE module are the minimum installation requirements. Additional IPE modules and application modules can be used. The modules are stacked (see Figure 5 on page 28) or installed side-by-side (see Figure 6 on page 28).

Figure 5
Meridian 1 Option 61C CP PII stacked configuration
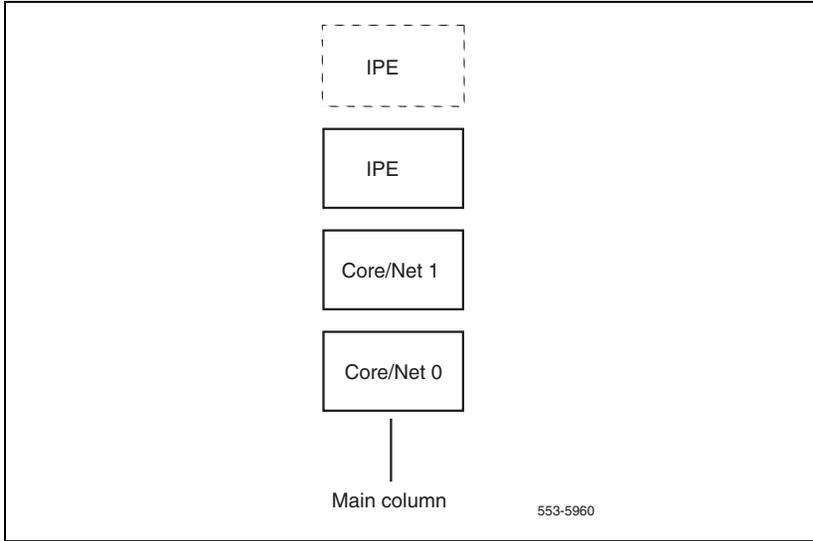
Figure 6
Meridian 1 Option 61C CP PII side-by-side configuration
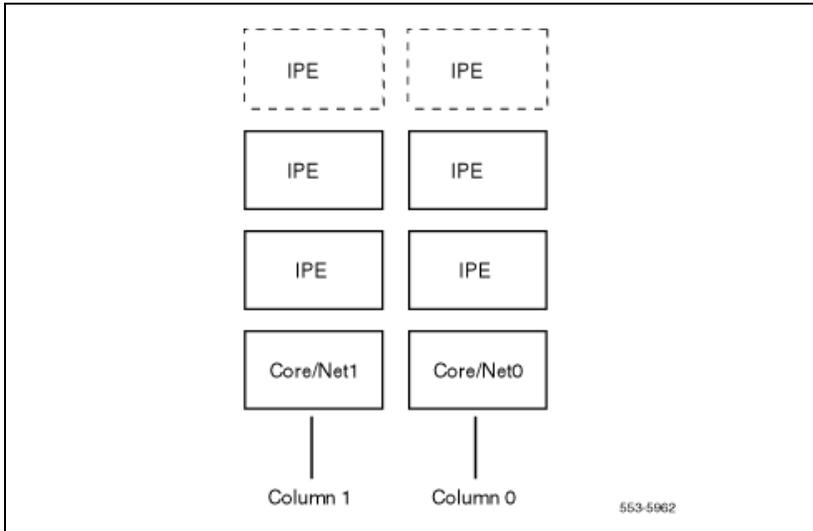
Meridian 1 Option 81C CP PII and Succession 1000M Multi Group

These systems feature a dual Pentium II Processor with standby processing capability, two Core/Net modules installed side-by-side, and two or more network groups. The Core/Net modules provide the first network group, and network module pairs provide additional network groups.

Without Fibre Network Fabric, these systems support up to five network groups. With Fiber Network, these systems support up to eight network groups, as shown in Figure 3 on .

Fibre Network Fabric provides complete non-blocking communications between the network groups, eliminating busy signals for network-blocked calls between groups. With Fibre Network Fabric, a Dual Ring fiber optic network replaces the Intergroup cards and module in the legacy system.

Figure 7 on shows an upgrade from a single-group system to a multi-group system. The upgrade consists of installing two network modules and one intergroup module or Fiber Network. If the ceiling height is too low for the four-tier column, a three-tier column can be used, as shown in Figure 8 on .

Figure 7
Migration from single-group system to multi-group system

NET	IGS	IPE
NET	NET	IPE
IPE	NET	IPE
Core/Net 1	Core/Net 0	IPE

Original Column   Upgrade Column   IPE expansion

553-7509
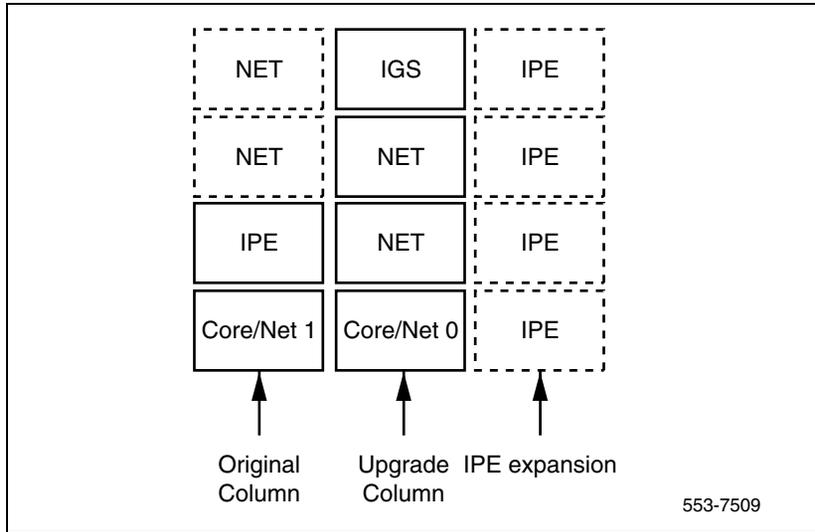
Figure 8
Migration from 3-tier single-group system to multi-group system

NET	IGS	IPE
NET	IPE	IPE
Core/Net 1	Core/Net 0	IPE

Upgrade Column   Original Column   IPE expansion

553-7510
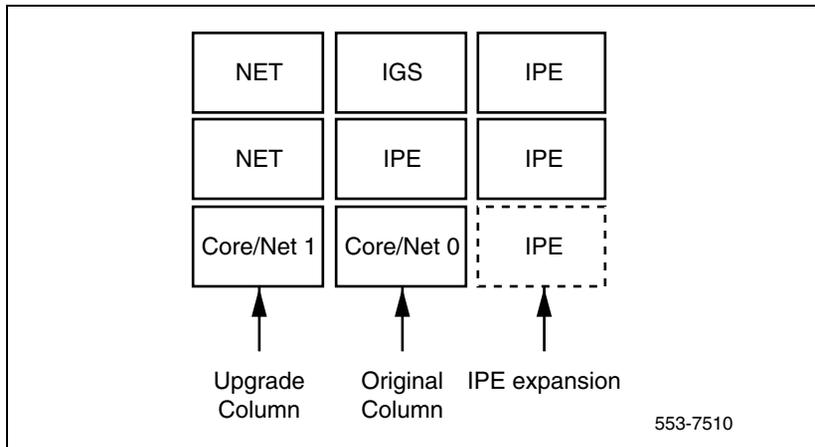
Succession Signaling Server

Succession 1000M systems use a Succession Signaling Server. The Succession Signaling Server provides a central processor to drive the signaling for Internet Telephones and IP Peer Networking. The Succession Signaling Server is an industry-standard PC-based server that provides signaling interfaces to the IP network, using software components that operate on the VxWorks™ real-time operating system.

The Succession Signaling Server can be installed in a load-sharing redundant configuration for higher scalability and reliability. The following software components can operate on the Succession Signaling Server.

- Terminal Proxy Server (TPS)

- H.323 Gateway Signaling software

- H.323 Gatekeeper software (optionally redundant)

- Succession 1000 Element Manager web server

Succession Signaling Server is an application server which houses any combination of Gatekeeper, H.323 Gateway, Line Terminal Proxy Server and Element Manager. The Succession Signaling Server is mounted on a 19" rack. (See Figure 9)

Figure 9
Succession 1000M Large System
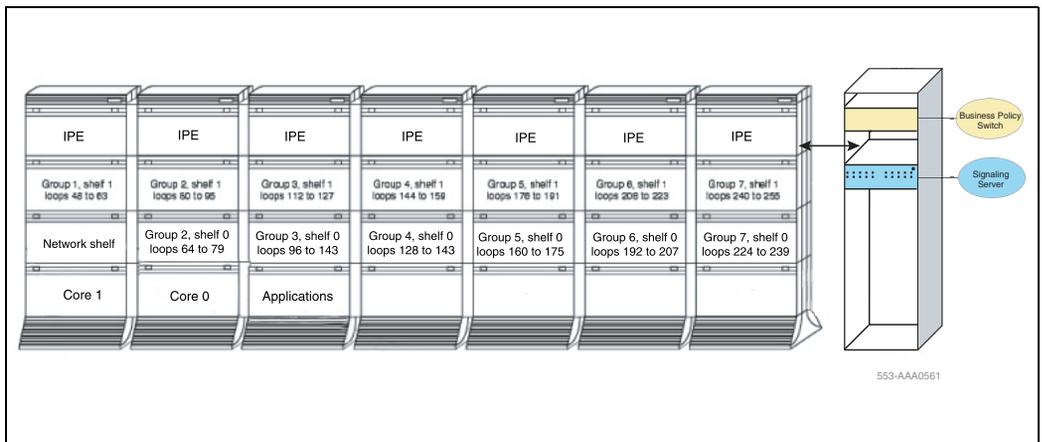
Engineering rules

Each system is defined using the following assumptions and general engineering rules.

1   A system may be upgraded to the next larger system type as defined in *Large System: Upgrade Procedures* (553-3021-258).

2   When expanding to the next system type, the changes to the physical configuration must be kept as simple as possible to reduce downtime and installation costs.

3   A module column should be built up to the maximum of four modules before moving to the next new column. In installations where the ceiling does not allow four-high columns, the alternate method of three-high tier configurations can be used.

4   Vertical routing of the internal signal cables be done only on the right side of a module.

5   The CPU modules must be on the bottom of a column or one level up for proper cooling and reliability.

6   The NTD35 network modules must be mounted in the same column one on top of the other. The modules must be stacked in one contiguous equipment bay.

7   The IPE modules can be located separately from the CPU and network bay, by up to the maximum network cable length of 45 feet.

8   Core/network modules can also be on top of each other in the first and second tier in multi-group systems.

Cable routing guidelines

A system layout, preconfigured at the factory, is included in the software box with each system shipment. Before you route cables, refer to the "to-from" cable connections in the system layout. Note that there are a variety of cable lengths. Make sure you install the designated cable for each connection.

Because the cable troughs (see Figure 10 on) and spaces on the sides of each module are within the EMI shielding of the system, unshielded cables can be routed in those areas. The corner vertical channels in the rear of the module are outside of the EMI shield. Cables routed in the vertical channels

must be shielded, and must enter and exit the EMI-shielded area through I/O panels and adapters.

Figure 10
Cable routing troughs – front view of module

Cabling troughs   553-3117
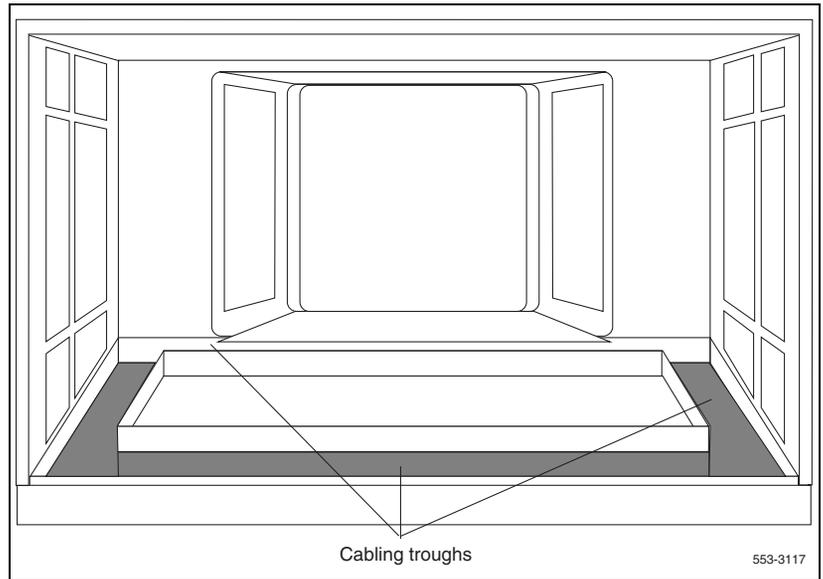
A typical routing scenario from the faceplate of a printed circuit pack (PCP) to one of the I/O panels is as follows:

- The cable comes off the faceplate of a PCP and drops down into the front horizontal cable trough.

- The cable is routed to the right side of the module in the horizontal cable trough to the vertical cable trough.

- The cable is routed to the back of the module and into the rear horizontal cable trough.

- The cable is routed to the left or right I/O panel at the rear of the module.

When connecting two half-group networks together, the cables are routed vertically through the square holes in the rear horizontal cable trough.

All other internal vertical cable routing from one module to another should be done only in the right vertical cable trough.

Since all faceplate to I/O panel cables are the same length and the card position in the card cage can vary, a cable may contain excess slack. It is therefore recommended that cables from cards in the left side of the card cage use the right I/O panel and cables from cards in the right side of the card cage use the left I/O panel whenever possible, as shown in Figure 11.

Figure 11
Top view of front to I/O connector panel routing
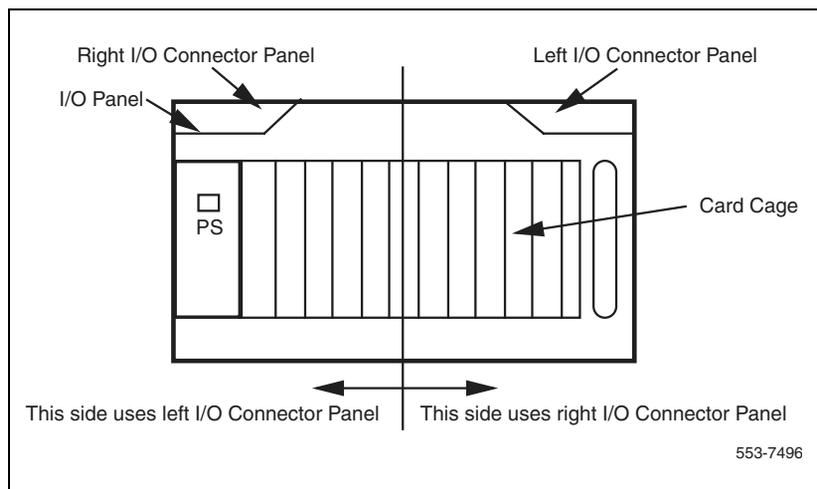
As space permits, cables can be routed:

1   Horizontally in the cable troughs at the front, rear, and sides of the module

Note: In a dc-powered module, because there is no MPDU, there is room to route cables horizontally from front to rear on the left side (front view) of the module.

2   Vertically on the sides of the module

3   Vertically in the corner channels in the rear of the module (shielded cables only)

CAUTION

Damage to Equipment

Cables must be routed as perpendicular as possible to any nearby power cables. Avoid routing cables near power cables if alternate routing is available. (At the rear of the module, cables routed between the I/O panel and the rear cover can be parallel to the power cables because the panel provides EMI shielding.)

Nortel Networks recommends that you use the 90° connector end of the cable to route the cable through a module or cabinet instead of the 180° end since some openings are small (see Figures 12 and 13). Furthermore, Nortel Networks recommends that you route cables top-to-bottom so gravity will ease installation.

Figure 12
90° cable connector

553-7497
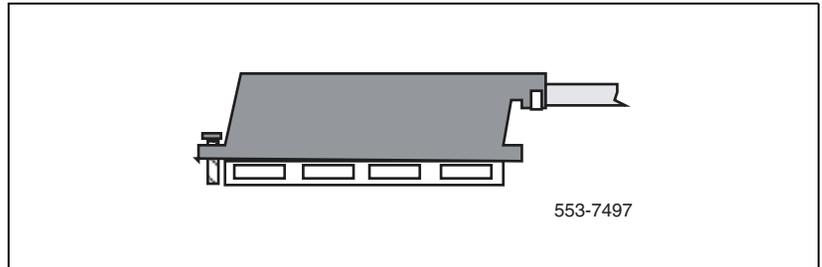
Figure 13
180° cable connector

553-7498
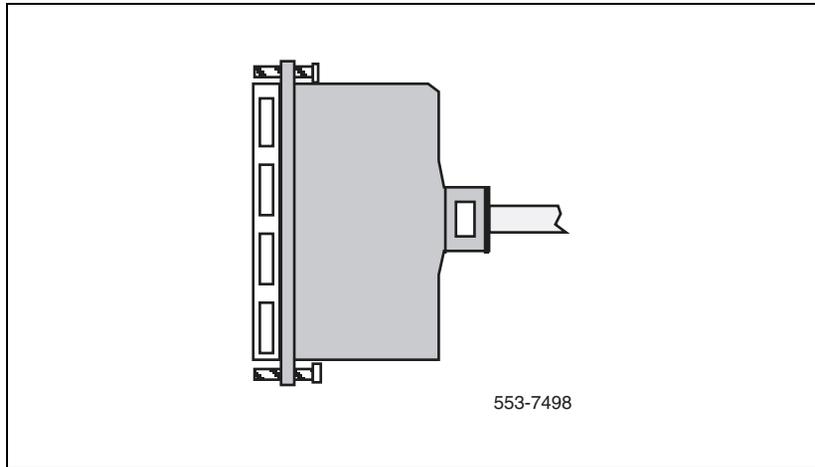
Equipment handling precautions

To avoid personal injury and equipment damage, review the following guidelines before handling the equipment.

Unloading equipment

Special ramps, packed inside the pallet holding Column 0, must be used to move the equipment off the pallet. Follow the instructions provided with the ramps.

> **CAUTION**
>
> **Damage to Equipment**
>
> Never pry up the pedestal to lift the column. This could cause major damage to the pedestal. Manually slide the column down the ramps provided.

Working with power supplies

There are no user-repairable components in the power supply. If a power supply fails, the complete unit must be replaced. Do *not* disassemble a power supply under any circumstances.

⚡	**DANGER OF ELECTRIC SHOCK** To avoid the danger of electric shock, be careful when working with power equipment and connections. **Comply with all Warnings.**

External power supplies such as a UPS, power plant, or batteries, may be heavy and require special handling procedures and additional personnel for unloading and installation. Also, be aware of weight distribution and keep the equipment room floor from being overly stressed.

Handling circuit cards

Follow these precautions when handling circuit cards.

1 Unpack or handle cards away from electric motors, transformers, or similar machinery.

2 Handle cards by the edges only. Do not touch the contacts or components.

3 Set cards on a protective antistatic bag. If an antistatic bag is not available, hand-hold the card, or set it in a card cage unseated from the connectors.

4 Store cards in protective packing.

5 Do not stack cards on top of each other unless they are packaged.

6 Wear a properly connected antistatic wrist strap when you work on the equipment. If a wrist strap is not available, regularly touch one of the bare metal strips in the module to discharge static. Figure 14 on shows the wrist strap connection points and the location of the bare metal strips you should touch.

Figure 14
Static discharge points
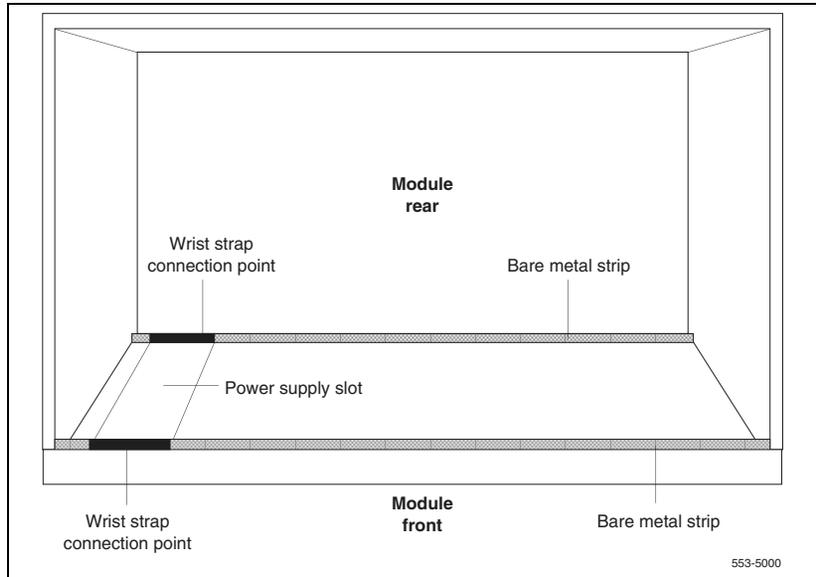
Preparing the equipment for installation

Use the equipment room floor plan to position equipment. See *Large System: Planning and Engineering* (553-3021-120) to prepare the equipment room and floor plan.

> **WARNING**
>
> A fully loaded column weighs 274.4 kg (605 lbs). More than one person is required to remove equipment from shipping pallets.

> **WARNING**
>
> Module covers are *not* hinged; do not let go of the cover. Lift the cover away from the module and set it out of the work area.

Procedure 1
Preparing the equipment for installation

1   Remove equipment from the shipping pallets; follow the unpacking
     instructions that come with the packaging material.

2   Remove the front and rear covers from each module:

     a.   With a flat blade screwdriver, turn the lock clockwise on the two
          locking latches (see Figure 15 on page 39).

Figure 15
Locking latches on the module cover

553-A0132
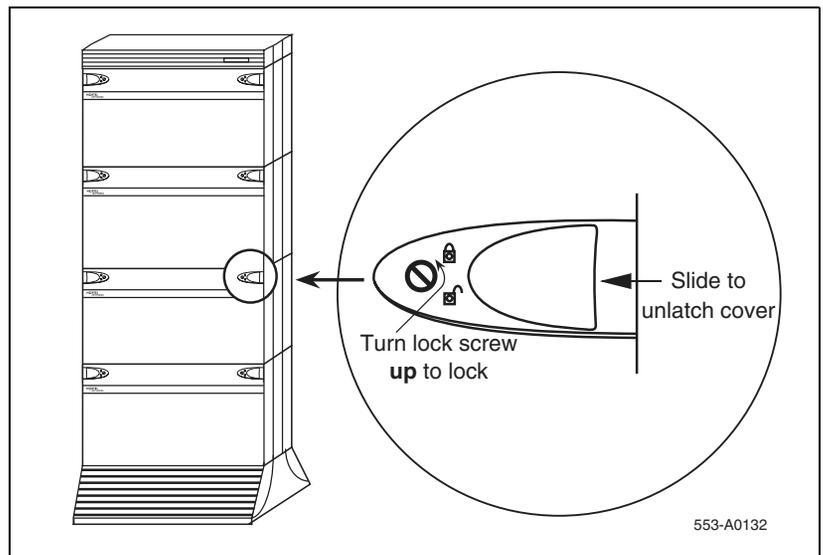
     b.   Simultaneously push the latches toward the center of the cover and
          pull the cover toward you while lifting it away from the module.

     c.   Set the covers aside until the installation is complete.

3   Remove the front and rear grills from each pedestal:

     a.   Loosen the two captive screws that secure the grill.

     b.   Pull the grill forward and lift it out of the base of the pedestal (see
          Figure 16 on page 40).

     c.   Set the grills aside until the installation is complete.

Figure 16
Removing the pedestal grill
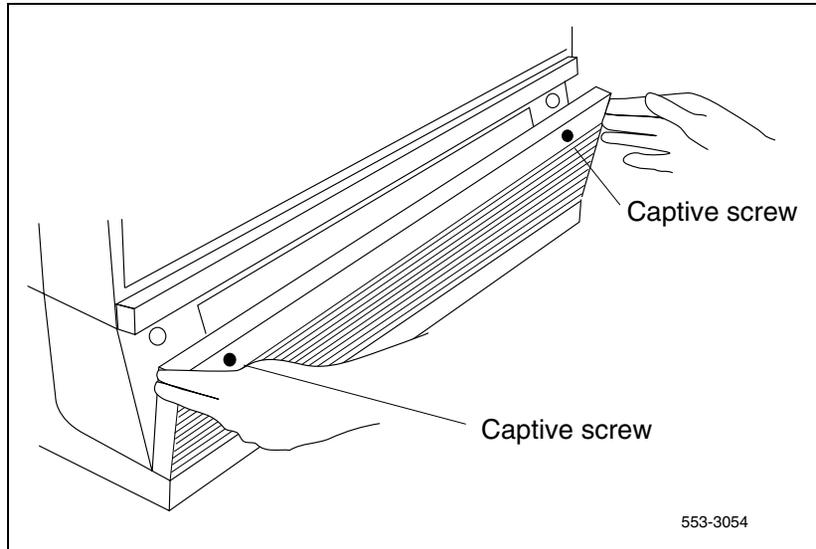
4   Make sure all of the items on the system order form are on the packing slip that comes with the equipment.

5   Inspect all equipment for physical damage. Report any damage to your supplier.

6   Check the option settings on all cards that have a switch symbol on the faceplate.

For a list of all option switch and jumper settings, refer to *Circuit Card: Description and Installation* (553-3001-211).

———————— **End of Procedure** ————————

Placing the fourth module on a column

Contents

This section contains information on the following topics:

Overview

A four-module column is shipped in two segments. One shipping pallet carries the pedestal and three modules. Another shipping pallet carries the fourth module and top cap.

Starting at the bottom of the column, modules are numbered from zero to three in each column.

Placing the fourth module on a column

Use Procedure 2 to place the fourth module and top cap on the column. To add a module to a column that is already powered, see the procedures in "Adding a module to a column" on .

	CAUTION
⚠	**System Failure**
	Never add a common equipment module in the third or the fourth tier of a column.

> **WARNING**
>
> A fully loaded module weighs approximately 58.9 kg (130 lbs). More than one person is required to place a module on a column.

Procedure 2
Placing the fourth module on a column

1 Position and secure the fourth module.

   a. Locate the positioning guides on the third module (see Figure 17).

   b. Position the fourth module so it faces the same direction as the column.

   c. Remove the front and rear module covers on the fourth module and rear module cover on the third module.

   d. Place the fourth module on top of the column and adjust it until it is seated securely on the positioning guides.

   e. Remove the I/O safety panel in the fourth module to gain access for installing the center mounting bolt.

   f. Use a 9/16-in. socket wrench to secure the fourth module with five mounting bolts (see Figure 18 on).

Figure 17
Module positioning guides

Positioning guides

Front

Rear

Opening for
cables

553-3056
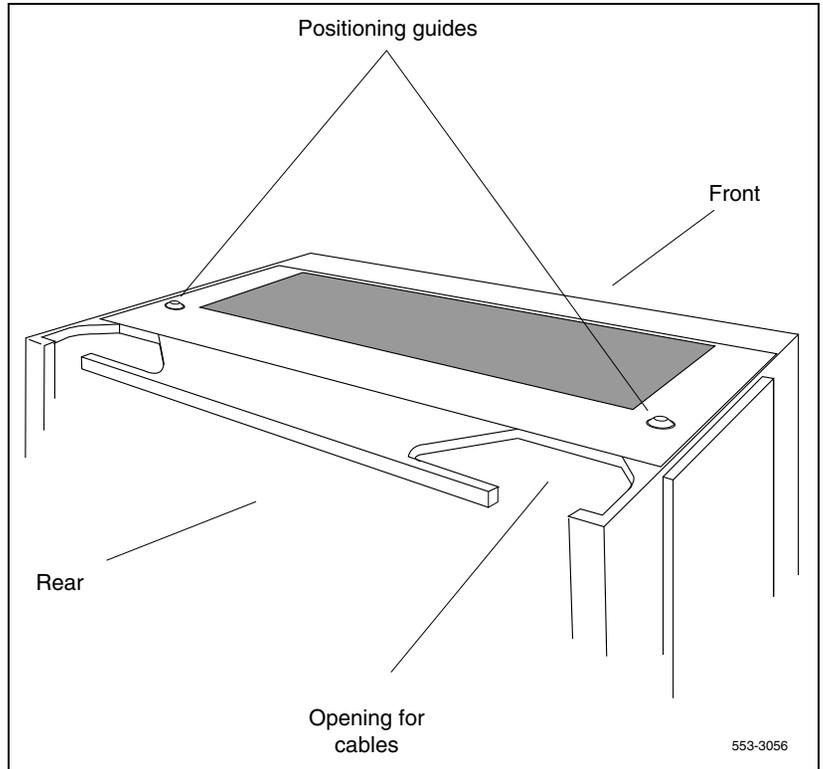
Figure 18
Module mounting bolts

553-3057
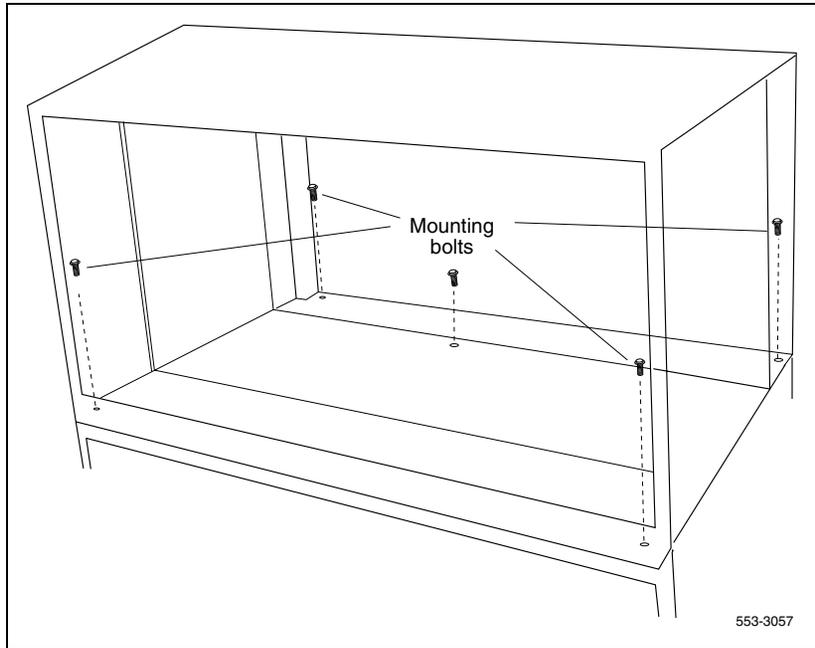
2   Connect the module-to-module power and system monitor cables.

a.   Connect the power connectors between the modules (see Figure 19 on).

b.   Connect the system monitor cable from connector J2 on the third module to J1 on the fourth module.

Figure 19
Power and system monitor connections

Top cap

I/O safety
panel

Module 3

Power connectors
between modules

System monitor
connector —
J2 in Module 2 to
J1 in Module 3

I/O safety
panel

Module 2

(Modules 0 and 1 below)

Rear of the column

553-5068
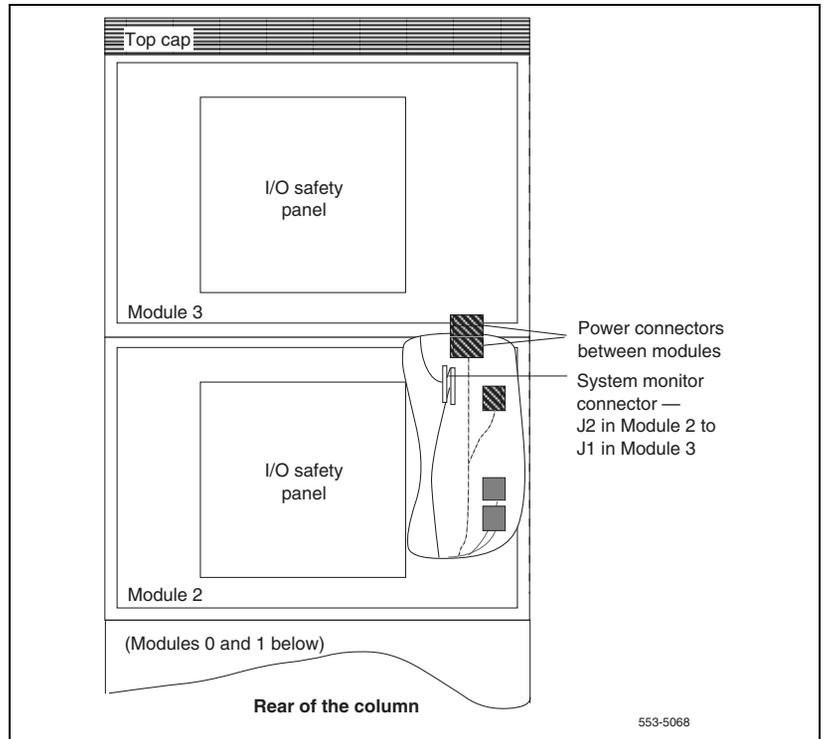
3   Reinstall the I/O safety panel in each module.

4   Replace the module covers.

────────   **End of Procedure**   ────────

Positioning and leveling equipment

Contents

This section contains information on the following topic:

Positioning and leveling the equipment

Columns normally stand on adjustable feet that provide leveling capability and ground isolation. However, casters are available and can be used for two-tier columns. If a third module is added to a column with casters, the casters must be replaced with leveling feet.

Note: If earthquake bracing is required, go to "Installing earthquake bracing" on page 297 to install column and floor bracing, and to position and level equipment. When those procedures are complete, return to Step 4 or Step 5 (as applicable) in the initial installation procedure.

Use Procedure 3 to position and level the equipment.

Procedure 3
Positioning and leveling the equipment

1   Check the equipment room floor plan to position columns.

2   Level the column.

    a.   Remove the front and rear exhaust grills.

    b.   Remove the front and rear air intake grills.

    c. Position a level across the top module cover on the front of the column.

    d. Loosen the locking nuts on the feet.

    e. Adjust the feet on each pedestal up or down to level the column.

    f. Perform step a to step e for leveling the rear of the system.

    g. Tighten the locking nuts.

    Note: Leave at least 1.27 cm (1/2 in.) between the floor and the bottom of the pedestal for air flow required by the blower unit.

3 **For a multiple-column system**, install NT8D49 Spacer Kits between columns.

    a. Remove the front and rear module covers.

    b. Remove the front and rear intake grills, if not already removed.

    c. Remove the trim plates from the module side where the spacer will be attached by removing the four screws securing the trim plates to the module.

    d. Remove the side panel from the module's side where the spacer is being attached by removing the four screws securing the side panel to the module.

    e. Attach gaskets to both sides in the front section of each spacer (see Figure 20).

Figure 20
Positioning spacer gaskets
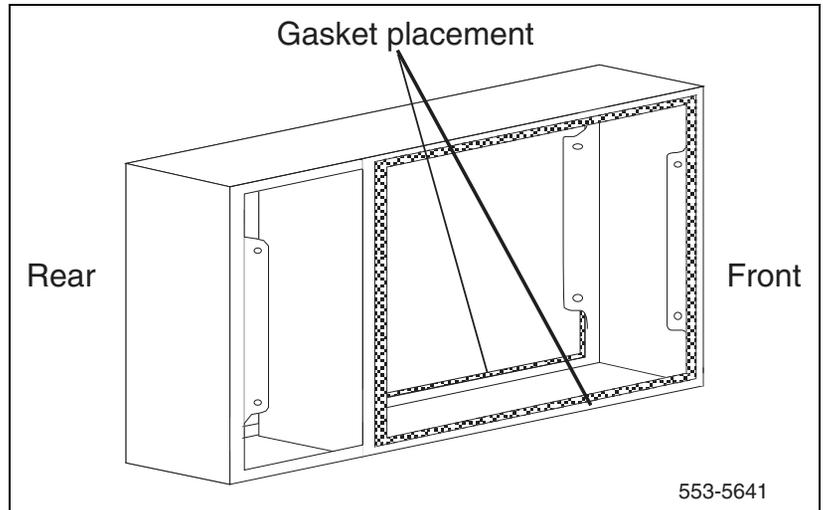
f. Attach a spacer to one side of each module, except the end column (see Figures 21 and 22).

— Position a spacer against the module.

— Insert one standoff between the spacer and module.

— Insert the one screw and tighten.

— Repeat the process for the remaining standoff and screws.

> **CAUTION**
>
> **Damage to Equipment**
>
> Do not try to adjust the horizontal position of a column by tightening the spacer screws. Tightening the screws with the columns too far apart will warp the spacer.

g. One at a time, push columns together, level, align, and attach the other side of the spacers.

Figure 21
Spacer positioning

553-A0130
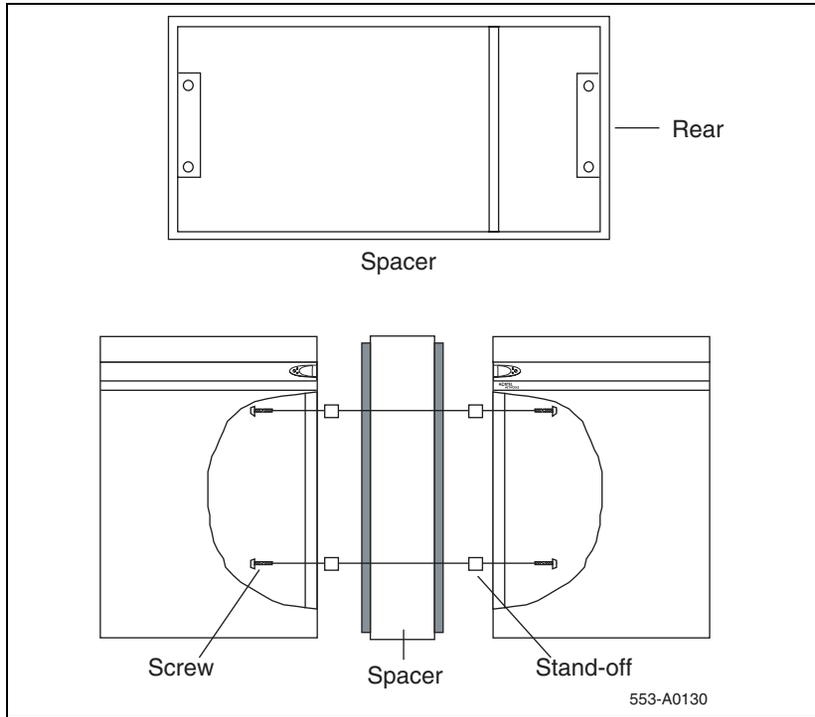
Figure 22
Column positioning with spacers

Step 1   Attach spacers to one side of each column
(except the end column)

(end column)

Spacers   Spacers

Step 2   One at a time, push columns together, level, align,
and attach the other side of the spacer

Step 3   Positioning completed

553-5067
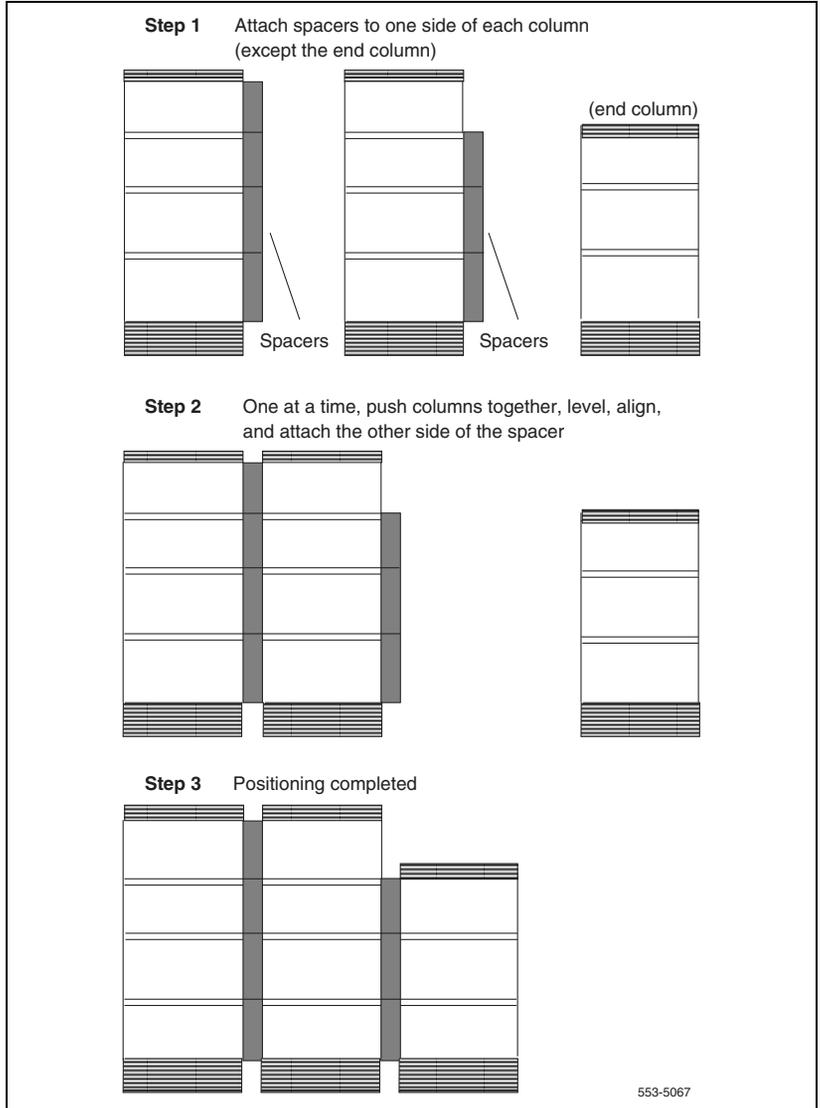
End of Procedure

Installing overhead cable tray kits

Contents

This section contains information on the following topic:

Installing overhead cable tray kits

Cable trays (also called ladder racks) can hang from a ceiling, or they can be mounted across the tops of the columns. If ceiling-hung racks are used, the rear top cap grill on each column must be replaced with a Top Cap Cable Egress Panel. The Cable Egress Panel has cutouts for cable routing. The cable trays and the equipment required to hang them must be provided by the customer and installed according to the manufacturer's instructions.

Nortel Networks offers an NT8D63 Overhead Cable Tray Kit that provides equipment for mounting cable trays on the Large System columns. The kit includes two support brackets, and front and rear exhaust grills with cutouts for cable routing. The cable tray itself must be provided by the customer; it is not included in the kit. Use this procedure to install the NT8D63 Kit.

> ⚠️ **CAUTION**
>
> **System Failure**
>
> Column frames must be insulated from contact with building structures such as concrete walls, floors, and ceilings. Whether the cable racks are column-mounted or ceiling-hung, the installation must maintain the integrity of the grounding architecture.

Procedure 4
Installing the overhead cable tray kits

1   Remove air exhaust grills at the front and rear of the top cap. Pull forward on the two clips underneath the front edge of each grill and lift up to remove the grill (see Figure 23).

Figure 23
Removing top cap grills
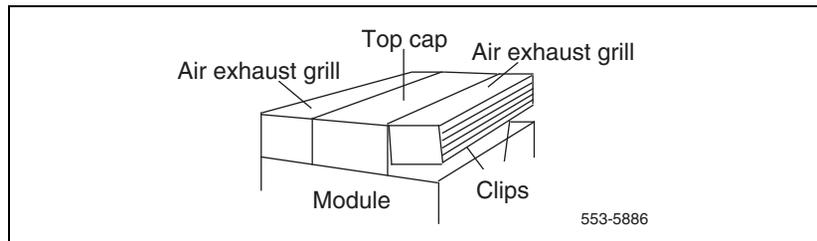
2   Mount a support bracket at the front and rear of the module (see Figure 24 on). Using two bolts, secure each support to the threaded holes in the top of the module.

Figure 24
Overhead cable tray kit
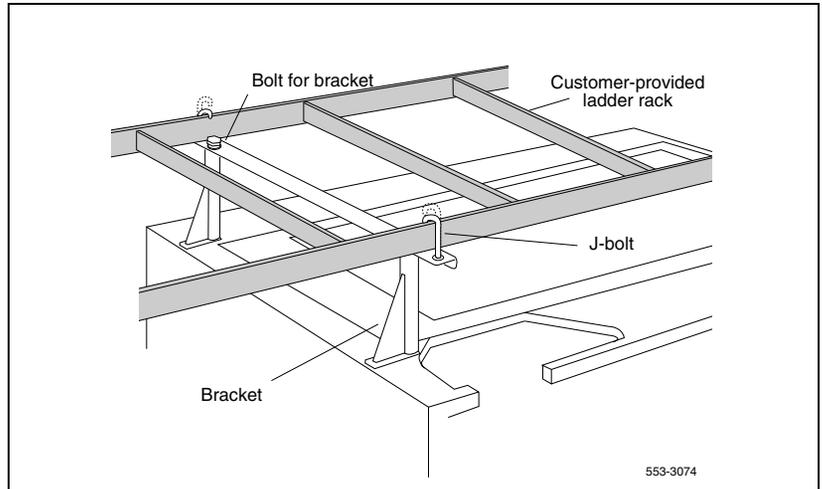
3   Install the front and rear air exhaust grills that come with the kit.

4   Place the cable rack on top of the support brackets and fasten it to the
    supports with the J-bolts as shown in Figure 24.

——————   **End of Procedure**   ——————

Installing ac power

Contents

This section contains information on the following topics:

Ac-powered systems

For ac-powered systems, use Procedure 5 on to install safety ground/protective earth and logic return wiring, and to install ground and alarm cabling for a UPS.

For ac-powered systems without reserve power, one input receptacle is required per column, within 2.4 m (8 ft) of each pedestal. One IG-L6-30 or L6-30 receptacle is required for each column. Instead of using the power plug provided, the Power Distribution Unit (PDU) can be hard-wired to the power source. In this case, #10 AWG conductors routed through 3/4-in. conduit are generally used. The leads connect to the L1, L2, and GND terminations on the field wiring terminal block on the PDU.

Note: Do not use ground fault circuit interrupt (GFCI) devices on Large System ac power feeds.

Systems that use reserve power plug into the UPS, which in turn plugs into the power source (associated batteries can be located within the UPS or installed externally). Consult the UPS documentation for receptacle requirements.

As a safety precaution, all ac service panels should be located in an area that is easily accessible at all times to allow for emergency shutdown. An optimal location would be near, or just outside the entry to the room containing the Large System (or the UPS, if equipped). Each circuit breaker in the panels should be clearly marked to identify the system component or components it services.

Safety ground/protective earth and logic return wiring

A separate safety ground/protective earth connection is required. The safety ground/protective earth wire must be #6 AWG or larger. It must connect the pedestal to the single-point ground (SPG). Using an isolated ground (IG) bus as the single-point ground is recommended. An ac equipment ground (ACEG) bus in the service panel or transformer is acceptable but not recommended. If used, the ACEG bus conductor must be a low impedance path to an approved source for ground. It must not contain induced electrical noise from sources such as building metallic structures (building steel, metallic conduit, metal pipes, etc.). Figures 25, 26, and 27 beginning on show an ACEG as the single-point ground.

Depending on the distances between columns, the location of the service panel, and the availability of panel SPG connection points, safety ground/ protective earth wiring can be daisy-chained or run independently from each column to the service panel. Figure 26 and Figure 27 show safety ground/ protective earth wiring in daisy-chain configurations.

> *Note:* Refer to *Large System: Planning and Engineering* (553-3021-120) for a complete description of approved ground sources and methods. Insulated ground wire must be used for system grounding.

Multiple-column systems use an insulated ground bus as the point where the logic return wires from different columns are consolidated before connecting to the single-point ground.

Figure 25
Single column – ground and logic return distribution

AC input

Large System

Service panel

120 V receptacle

IG or ACEG

Logic return (#6 AWG)

Safety ground (#6 AWG, min)

AC conduit

Cord or conduit

208/240 V receptacle (30 A L6 - 30 or IG - L6 - 30)

553-3154-1
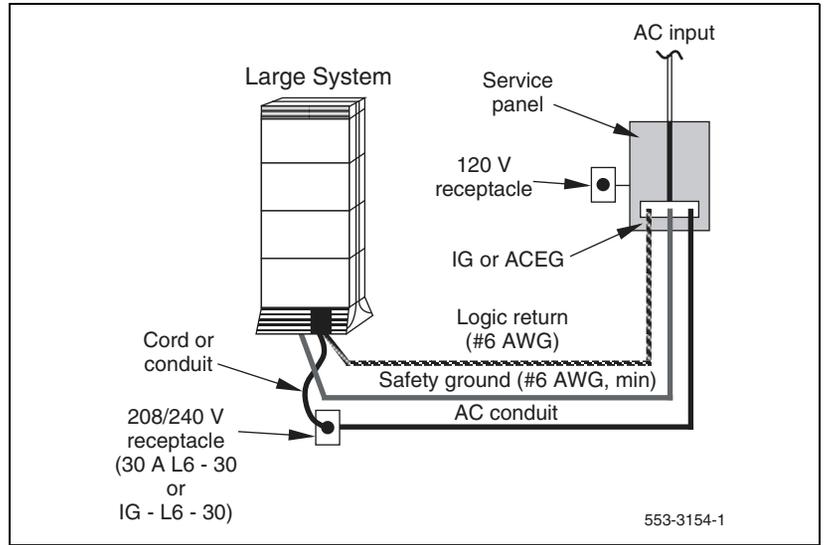
Figure 26
Multiple column – ground and logic return distribution

AC input

Large System

Service panel

120 V receptacle

IG or ACEG

Safety ground (#6 AWG, min)

Logic return reference (#6 AWG)

Cord or conduit

LRE

AC conduit

208/240 V receptacles (30 A L6 - 30 or IG - L6 - 30)

AC conduit

553-3155-1
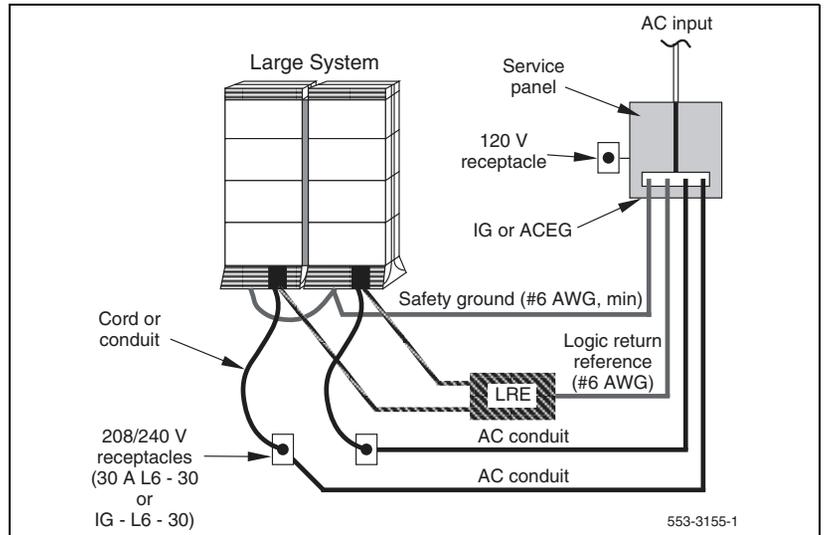
Figure 27
Multiple column, multiple row – ground and logic return distribution
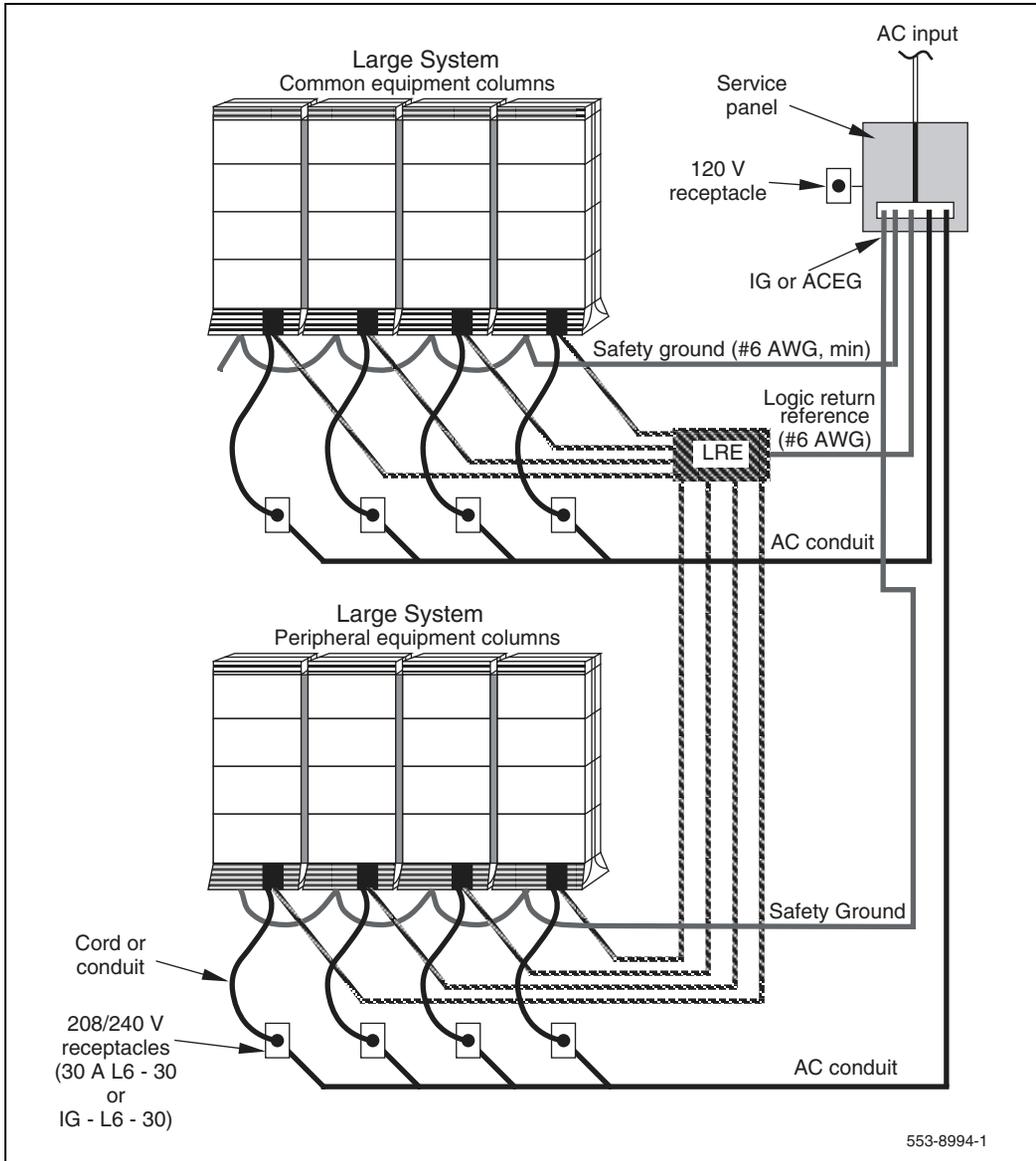
Installing ground cabling

Installing ground cabling involves:

1 "Installing safety ground/protective earth and logic return wiring" on page 61

2 "Installing UPS ground cabling" on page 64

Installing safety ground/protective earth and logic return wiring

Follow Procedure 5 to install safety ground/protective earth and logic return wiring.

Procedure 5
Installing safety ground/protective earth and logic return wiring

> **CAUTION**
>
> **System Failure**
>
> Failure to follow grounding procedures can result in unsafe or faulty equipment. See *Large System: Planning and Engineering* (553-3021-120) for a complete description of approved ground sources and methods.

1 Make sure the power cord is disconnected from the power source.

   Note: As a safety precaution, disable the circuit of each column at the service panel.

2 Remove the air intake grill.

3 Using a volt/ohm meter, measure the resistance between the ground pin on the power plug and a ground lug on the rear of the pedestal (see Figure 28).

   Note: The resistance should be 0 ohms; if it is greater than 0.5 ohms, check the power cord connections.

Figure 28
PDU ground lug locations

Ground lugs

553-8993
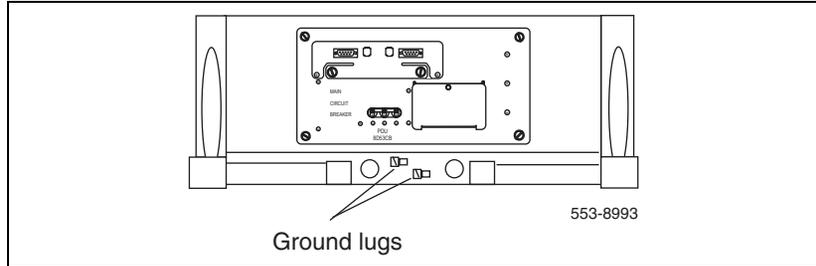
4   Connect the safety ground/protective earth wire (insulated ground wire
must be used for system grounding).

   a.   For a single-column system, connect a #6 AWG wire from the
   ground source in the service panel to a ground lug on the pedestal.

   b.   For a multiple-column system, connect a #6 AWG wire from the
   ground source in the service panel to a ground lug on the closest
   column. Daisy-chain #6 AWG ground wires from one pedestal to the
   next as illustrated in Figure 29, connecting all of the columns
   together. You can also run a #6 AWG wire from the ground source to
   each column individually. If the columns are not bolted together,
   physically separated groups of columns should be grounded
   individually as shown in Figure 27 on .

Figure 29
Ac column ground lug daisy chain connection
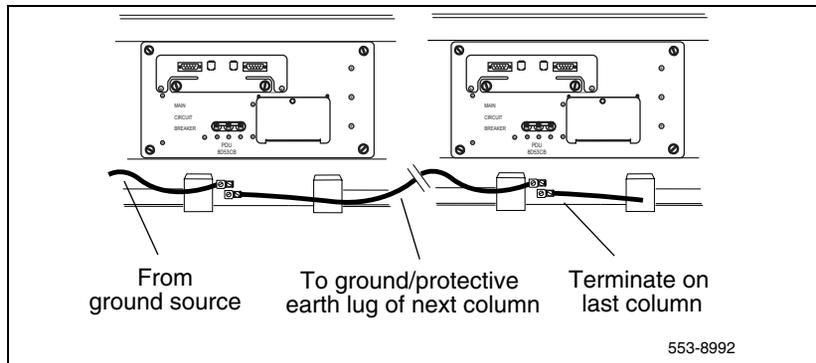
From
ground source

To ground/protective
earth lug of next column

Terminate on
last column

553-8992

5   Place a warning tag on the connection at the ground source. The warning tag should read WARNING—TELEPHONE SYSTEM GROUND CONNECTION—DO NOT DISCONNECT.

6   Using a volt/ohm meter, measure the resistance between the ground pin on the power plug and the ground terminal on the power outlet.

7   The resistance should be 0 ohms. If the resistance is greater than 0.5 ohms, check the power outlet ground and safety ground/protective earth connections.

8   Remove the PDU field wiring access plate.

9   Connect the logic return wire.

Starting at the LRE, connect a #8 AWG wire and route it to the column and up or down the I/O channel area, as appropriate. Then route the wire through the conduit hole in the pedestal to LRTN on the field wiring block (see Figure 30).

Figure 30
Logic return connection for each column

553-8996
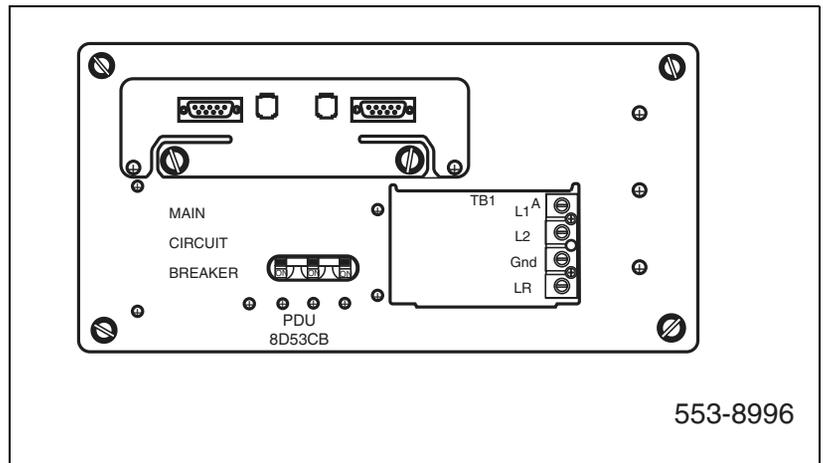
10   Replace the PDU field wiring access plate.

—————— **End of Procedure** ——————

Installing UPS ground cabling

Use the manufacturer's documents to install and cable a UPS. If the UPS does not contain an integral bypass switch, add one externally during initial UPS wiring. Figure 31 is a block diagram of a UPS installation and associated wiring.

Follow Procedure 6 to install UPS ground cabling.

Note: Because UPS installation can be complex, Nortel Networks recommends that installers attend vendor training programs.

Figure 31
Ac reserve power configuration

553-3163

Note: The ac safety ground (green wire) must route from the service panel, through the UPS, to the Large System panel or receptacles.
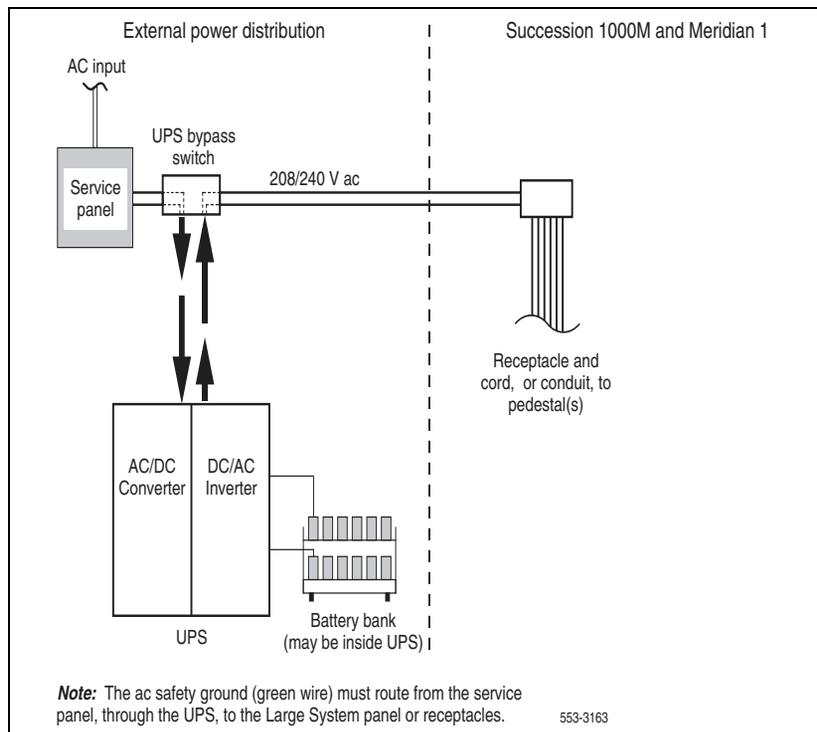
Procedure 6
Installing the UPS ground cabling

> **CAUTION**
>
> **Damage to Equipment**
>
> Take care when connecting battery leads to the UPS. A battery reversal can result in severe damage to the UPS.

1   Make sure the safety ground/protective earth wire is connected on all Large System columns.

2   Daisy-chain ground cables to each UPS (see Figure 32) using #6 AWG wire.

3   Daisy-chain ground cables to each bypass switch (if equipped) using #6 AWG wire.

4   Run a #6 AWG wire between the ground lug on the rear of the pedestal, the bypass switch, and the UPS to a common frame ground point.

5   Run a #6 AWG wire between the common ground point and the ground bus in the service panel.

———————————————— **End of Procedure** ————————————————

Figure 32
UPS grounding diagram

553-3089
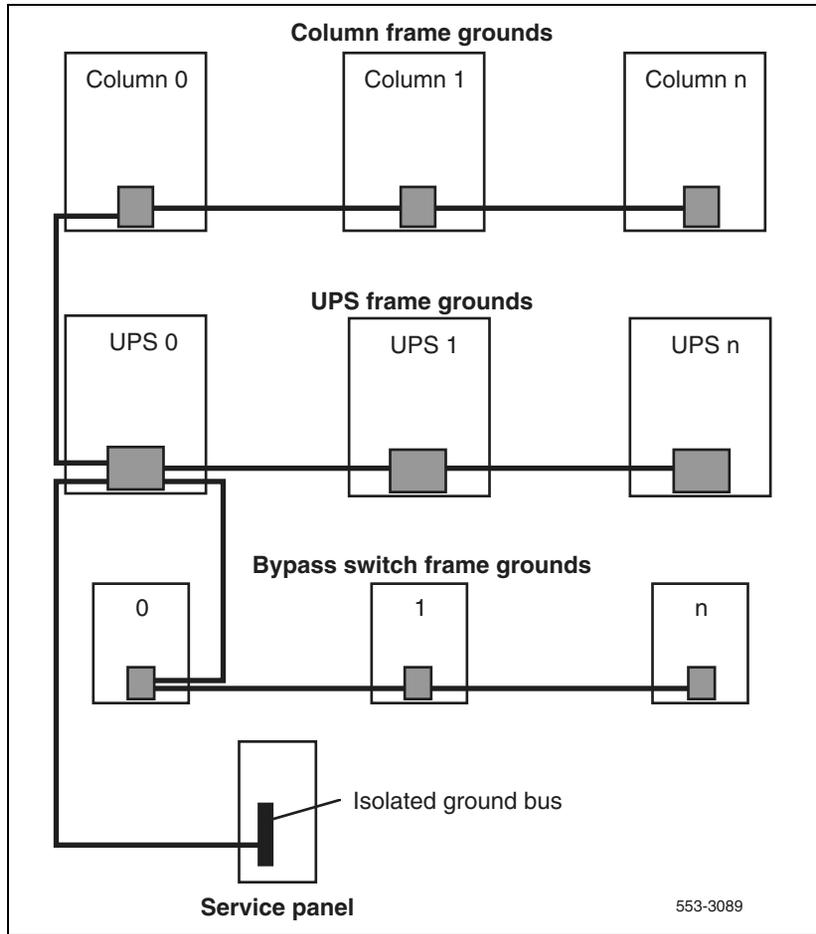
Installing dc power

Contents

This section contains information on the following topics:

Dc-powered systems

This chapter provides procedures to install safety ground/protective earth and logic return wiring, configure system monitors, and connect PFTUs for dc-powered systems using a Candeo dc Power Plant power system.

Note: The procedures in this chapter apply to the global power distribution unit (PDU). Throughout this document, the global PDU is referred to as the "NT4N49AA PDU."

To install reserve power equipment (batteries), follow the instructions provided with the equipment. To comply with safety requirements, consult the following articles before working with any battery systems.

- Read the "Material Safety Data Sheet" that must be posted to meet OSHA requirements. This article outlines appropriate reserve battery handling procedures.

- Refer to National Electric Code 645-10. This article outlines requirements that call for the installation of ac- and dc-power kill switches to battery systems in certain environments.

As a safety precaution, all dc service panels should be located in an area that is easily accessible at all times to allow for emergency shutdown. An optimal location would be near, or just outside, the entry to the room containing the dc power system for the Large System. Each circuit breaker within a panel should be clearly marked to identify the system component or components it services.

Candeo dc power system

The Candeo platform provides a simple, quick to deploy, and easy to operate power solution. Based upon modular building blocks (rectifiers, System Manager, dc distribution and battery connection modules), the system is designed to power -48 Vdc applications. The Candeo platform can be expanded by adding rectifiers, battery connection modules, frames, and distribution modules.

The Candeo provides "plug and walk-away" installation and set-up. The platform can be reconfigured or expanded while it remains online. Installation and maintenance benefits include:

- Shelfless 50 A rectifiers

- Fully front accessible

- Automatic alarms and rectifier configuration settings

- No inter-module wiring

- All modules are hot insertable

- All internal bussing

- Fully insulated environment

- High efficiency

- IP ready for simplified internet connectivity

- HTML-based graphical user interface

- Automated web-based maintenance and comprehensive on-screen troubleshooting

- Remote access via modem or Ethernet permits remote operation of the power system

- Intelligent backbone simultaneously carry dc power, alarm information and data signals

- Built-in temperature compensation

- Built-in charge current limiting

- EMI FCC class B or CISPR class B for systems up to 1000 A (50 kW)

  Note 1: The Candeo dc power plant is considered "external" power equipment because it is not housed in Large System columns.

  Note 2: Dc-powered systems generally require one input receptacle for each rectifier, within 1.8 m (6 ft) of each rectifier. The commercial power receptacles required are determined by the number and type of rectifiers used.

In a single frame configuration, a Candeo system can power a complete range of medium-sized applications. Built around the shelf less Candeo Rectifier 50/48, this system operates from any voltage between 80 vac to 300 vac (single phase). When configured with 50 A Candeo rectifiers, the system delivers up to 500 A from a single 42" (1050mm) frame and up to 1000 A from a single, 84" (2100 mm) frame.

More detailed information is supplied in the following Candeo power system manuals that are included with the system. Candeo Power System User guide (P0914425) and Candeo Power System Installation Guide (P0914426).

Candeo modules

The Candeo platform uses a combination of modules or building blocks to deliver custom configurations. The modules include:

1 Rectifier 50/48 Module

2 System Manager Module

3 Distribution 500 Module

Rectifier 50/48 Module

The shelfless Rectifier 50/48 provides up to 50 Amps (2 750 W) of -48 Vdc power. Designed to operate at a nominal input voltage of 208/240 Vac, the rectifier will also operate over an input range of 80 Vac to 300 Vac (45 to 65 Hz) at reduced output power. The rectifier delivers full output power when operating in environments ranging between 0 and 50 degrees Celsius.

Rectifier features include:

- High power density – 4.3 W /in3

- High efficiency (> 92%)

- Shelfless design

- Hot insertable

- Tool-less rectifier installation

- 100% tool-less maintenance strategy

- Ultra-low THD of less than 5 percent

- Temperature-controlled cooling fans

- MTBF > 250 000

- Zone 4 seismic

- Compliant with global standards (FCC part 15 class B, UL 1950, CSA 22.2#950, CE, VDE, IEC 950 and CISPR22 class B)

System Manager Module

The System Manager is the main control element of the Candeo system. The System Manager's local and remote system management capabilities provide total control over the power system.

System Manager Module features include:

- Automatic set-up

- Single point of adjustment

- User-friendly interface

- Rapid troubleshooting

- Real-time updates

- Extensive data reporting

- Inventory mapping

- Battery management functions: temperature compensation, discharge tests, charge control, equalize, load shedding and rectifier sequential start

- Alarm and statistical history

- Built in remote access using any web browser

- System cloning

- Integrated system management facilities through several interfaces, including RS-232 and RS-485 serial data ports and programmable dry-C contacts

- Optional MODEM

Distribution 500 Module

The Distribution 500 provides the dc distribution connectivity for a capacity of 500 A. The module plugs in the system anywhere when greater distribution capacity is required. The module can accommodate a wide variety of distribution elements, including single and double pole circuit breakers as well as GMTX type fuses.

Distribution Module features include:

- Wide selection of distribution elements:
    - up to twenty, 1 to 100 A single pole circuit breakers
    - or up to ten, 100 to 150 A double pole circuit breakers
    - or up to six, 50 A capacity blocks, each providing 10 positions for (0-10 A) GMTX fuses
    - up to 20 fuse holders
    - or any mix of the above elements
- Completely modular
- No pre-set limits to the number of distribution modules
- Tool-less additions or upgrades
- Hot-insertable
- Front access
- Fully insulated environment
- No configuration required
- Troubleshooter alarm indicators
- System capacity monitoring

Additional information is available in the following Candeo Power System manuals:

- Candeo Power System User guide (P0914425)
- Candeo Power System Installation Guide (P0914426)

Sample configurations

Example configuration #1

- 42" Frame with battery kit, LVD and distribution 500 (with 20 breaker positions).

- 17 mid trip breakers (30 amp), one GMTX fuse block (takes up 3 breaker positions).

- System monitor.

- Up to 10 rectifiers (500 amp capacity).

Example configuration #2

- 42" Frame with battery kit, LVD and distribution 500 (with 20 breaker positions). 17 mid trip breakers (30 amp), one GMTX fuse block (takes up 3 breaker positions).

- Additional distribution 500 (with 20 breaker positions). 11 mid trip breakers (30 amp), three GMTX fuse blocks (takes up 3 breaker positions per block).

- System monitor.

- Up to 6 rectifiers (300 amp capacity).

Example configuration #3

- 84" Frame with battery kit, LVD and distribution 500 (with 20 breaker positions). 20 mid trip breakers (30 amp).

- 2nd 84" Frame with battery kit, LVD and distribution 500 (with 20 breaker positions). 11 mid trip breakers (30 amp), three GMTX fuse blocks (takes up 3 breaker positions per block).

- Additional distribution 500 (with 20 breaker positions), 10 mid trip breakers (30 amp).

- System monitor.

- Up to 10 rectifiers (500 amp capacity) in frame one, up to 10 rectifiers (500 amp capacity) in frame two.

- One interframe dc link bar kit.

Installation reference guide

The Candeo system can be easily installed using the Candeo Power Systems Installation Manual AP6C75 (P0914426). A basic synopsis of the installation manual is as follows.

- Site Preparation – Overview, tools and test equipment, precautions and receiving materials.

- Locating and Erecting Frames – Locating and installing the frame on various floor types and consideration for earthquake anchoring. Included also are procedures for isolating the frame for ISG (isolated system ground).

- Cabling and Connecting – Basic rules, connecting ac to rectifiers, connecting dc cables from batteries, connecting dc loads and miscellaneous cabling. This section details all grounding for frame as well as battery return connections. Under connecting the dc load cables details on wiring and installing the load clips, fuse blocks and breakers are detailed. Miscellaneous cables details remote sensing to batteries, input ports and alarm connections, communication port connections to connect to RS-232, Ethernet or external modem.

- Startup and Adjustment Procedures – The Candeo system comes pre configured with the Distribution 500 and Battery Connection Kit installed. In this section the rectifiers are added and the system is powered up and will go through a self test. At this point, see Chapter 5 "Configuring and Operating the Candeo Power System" in the user manual (UM6C75).

- End of Job Routines and Turnover – This section covers end of job routines such as designating circuits, numbering frames, installing the top cover, optional doors and turn over to the customer.

Configuration reference guide

The Candeo system can be easily configured using the Candeo Power System User manual UC6C75 (P0914425). The manual contents include:

1   Overview of the Candeo Power System

2   System Description and Specifications

3   System Engineering

NT6D53 Junction Box

If a rectifier is positioned at a distance from the Large System, the NT6D53 Junction Box can provide an interim connection between the rectifier and the field wiring terminal block in the pedestal. One junction box supports one column. The junction box can be used with the NT4N49AA PDU, but it is not required.

The junction box is equipped with a 3-m (10-ft) flexible conduit that contains all the wiring needed to connect the rectifier to the pedestal. (Make sure the junction box is installed close enough to the pedestal for the conduit to reach the terminal block in the pedestal.)

On the input side, the junction box has allowance for up to four #4 AWG pairs and one logic return, and up to two 1-1/4 in. conduit fittings (one fitting is supplied). On the output side, the junction box is pre-wired with four #10 AWG pairs (one pair per module) and a logic return. This wiring is routed in a 3-m (10-ft) length of 3/4-in. conduit that connects to the pedestal.

The junction box connects to the pedestal in one of two ways.

1 For distances of up to 30 m (100 ft), there are:

    a four split feeds per column with nine #10 AWG conductors in a single 3/4-in. conduit, and

    b two 30-amp feeds from the distribution point to the junction box with five #4 AWG conductors in a single 1-1/4 in. conduit.

2   For distances of up to 60 m (200 ft), there are:

   a   four split feeds per column with nine #10 AWG conductors in a
        single 3/4-in. conduit, and

   b   two 30-amp feeds from the distribution point to the junction box,
        with nine #4 AWG conductors in two 1-1/4 in. conduits.

Safety ground/protective earth and logic return wiring

The single-point ground (SPG) required by the system can be an isolated
ground (IG) bus or ac equipment ground (ACEG) bus in the service panel or
transformer. The system must be connected to safety ground/protective earth
in accordance with NEC requirements. For international use, the system must
be connected to safety ground/protective earth in accordance with
Paragraph 2.5 of EN60950/IEC950.

Note: Refer to *Large System: Planning and Engineering*
(553-3021-120) for a complete description of approved ground sources
and methods. Insulated ground wire must be used for system grounding.

Cabling and connecting the grounding leads

This section covers cabling and connecting the grounding leads for the
Candeo power system. The Candeo's two grounding leads are:

1   the frame or safety ground lead(s) for the frame(s), and

2   the battery return reference (BRR) ground lead for the system.

<table>
<tr><td>⚠</td><td>

CAUTION

Follow local requirements and electrical code

The grounding methods described in this section are
generic. Specific local, provincial, state or federal
electrical codes and grounding requirements, as well as
specific Customer or communication equipment
requirements shall prevail.
</td></tr>
</table>

> **CAUTION**
>
> **Maintain the integrity of the frame or safety ground**
>
> The frame or safety ground shall not be confused with the reference ground lead, nor with the battery return leads. The frame or safety ground shall be wired in such a way as not to be carrying any ac or dc current at any time.

Note 1: In some equipment sites, depending on the grounding topology and the size of the building, the floor ground bar (FGB) and the building principal ground (BPG) may be the same busbar.

Note 2: In some equipment sites, depending on the grounding topology, the power plant battery return reference ground bar (BRR) may be determined as being the single point ground (SPG). Then, the battery return reference (BRR) lead is usually run to the floor ground bar (FGB).

Cabling and connecting the ground leads involves:

1   "Connecting the power plant frame ground (or safety ground) lead(s)" on page 77

2   "Installing safety ground/protective earth wiring" on page 90

Connecting the power plant frame ground (or safety ground) lead(s)

Unless specifically instructed otherwise in the specifications or by the Customer, the frame ground leads, also referred to as the safety ground leads, are usually connected using the approach described in Procedure 7 and as shown in Figure 33 on page 80 and Figure 34 on page 81.

Note 1: The frame ground collector cable is normally sized according to its length (distance between the main dc distribution cabinet and the FGB or BPG) as well as the maximum fuse or circuit breaker size that can be provided in the power plant. Refer to Table 3 for the recommended cable size for the Candeo power system.

Note 2: The frame ground drop into the Candeo frame must be the same size as the frame ground collector. The frame ground drop into battery stands, racks or stacks is usually No. 6 AWG.

Table 3
Recommended cable size for the frame ground collector

Cable length	Recommended size (see notes 1 and 2 above)
0 to 20'	No. 2 AWG
20 to 40'	No. 0 AWG
40 to 80'	No. 0000 AWG
80 to 160'	No. 500 kcmil

Table 4
Torque values for bolted connections (Part 1 of 2)

Bolt size	Threads/inch	Torque (in-lb)	Tension (lb)
#8	32 36	18 20	625 685
#10	24 32	23 32	705 940
1/4"	20 28	80 100	1840 2200
5/16"	18 20	140 150	2540 2620
3/8"	16 24	250 275	3740 3950

Table 4
Torque values for bolted connections (Part 2 of 2)

Bolt size	Threads/inch	Torque (in-lb)	Tension (lb)
7/16"	14 20	400 425	5110 5120
1/2"	13 20	550 575	6110 6140
5/8"	11	920	7350
3/4"	10	1400	9300
7/8"	9	1950	11100
1"	8	2580	12900

Procedure 7
Installing and connecting the power plant frame ground leads

1   If the power system is sharing a frame ground (FG) collector cable with other equipment, go to step 2. If the power system is not sharing a frame ground collector cable with other equipment, go to step 3.

2   Use the appropriate two-hole lug to connect one end of a cable to the frame ground plate at the top of the frame for a top-fed system or at the bottom for a bottom-fed system, as shown in Figure 34 on page 81. Apply the appropriate torque per Table 4 depending on the size of the bolting material used. Connect the other end of this cable to the frame ground collector with a parallel tap connector as shown in the left side illustration of Figure 33 on page 80.

   Note: Refer to Note 2 and Table 3 on page 78 for the recommended cable size.

3   Use the appropriate two-hole lug to connect one end of a cable to the frame ground plate at the top of the frame for a top-fed system or at the bottom for a bottom-fed system, as shown in Figure 34 on page 81. Apply the appropriate torque (refer to Table 4 for torque values). Connect the other end of this cable to the nearest Floor Ground Bar (FGB), which in some sites may be the Building Principal Ground (BPG) as shown in the right side illustration of Figure 33 on page 80.

4   Repeat step 2 or 3 for any other frame(s) as applicable.

5   Secure the cables as required and use an identification tag bearing the mention "PWR PLT FG" to identify the cable(s) at the BPG or FGB ground bar connection.

———————— **End of Procedure** ————————

Figure 33
Typical installation of the power system frame ground lead

553-AAA0758
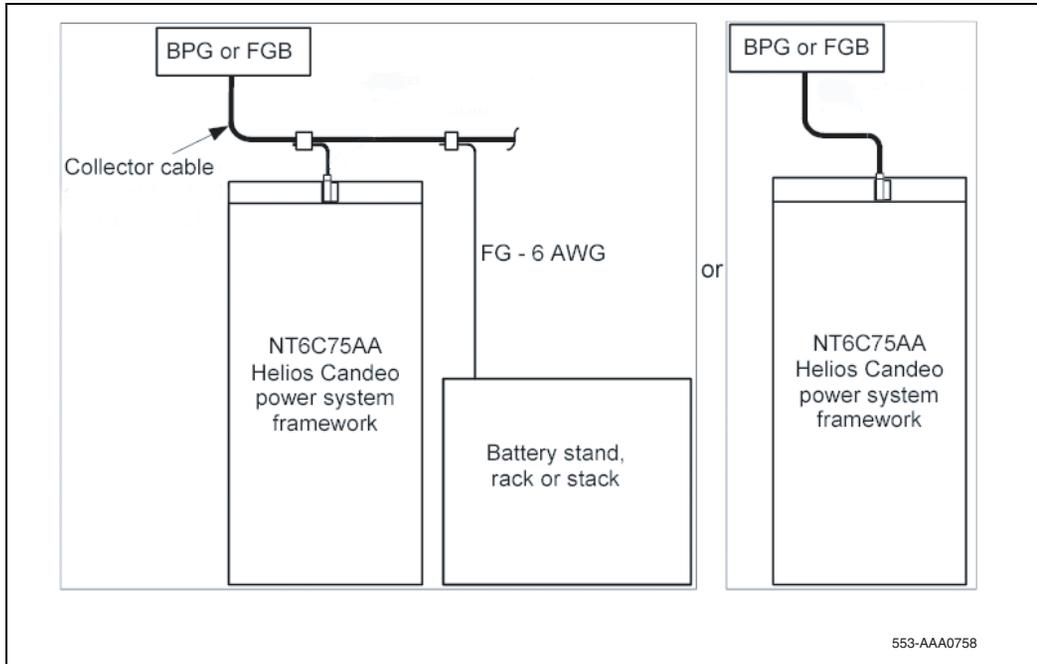
Figure 34
Connection of the frame ground lead inside the frame

Holes for
1/2" bolts at
1-3/4" c-c

Holes for
3/8" bolts
at 1" c-c

Holes for
1/4" bolts
at 5/8" c-c

553-AAA0759
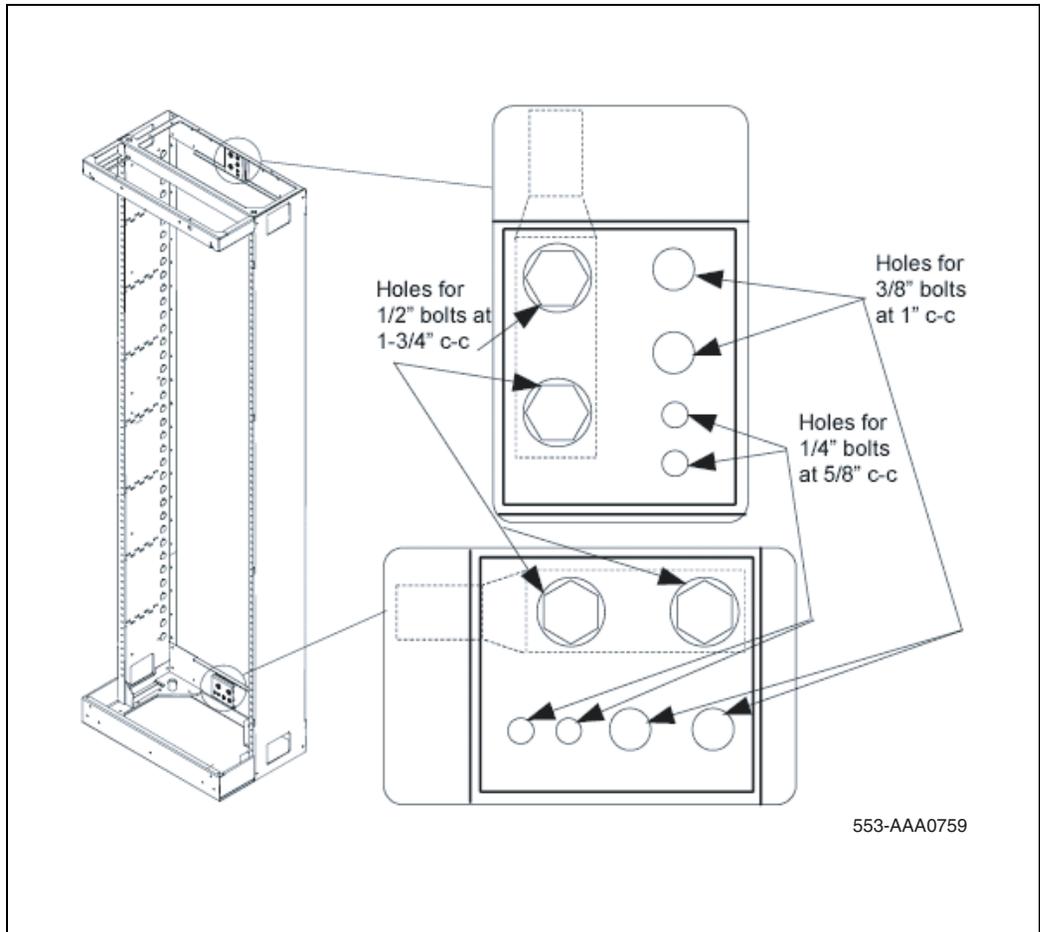
Figure 35
Ground and logic return distribution – Candeo Power System

AC input

Large System

Service panel

120 V receptacle

IG or ACEG

Safety ground (#6 AWG, min)

See Note 1

BRE/LRE

Battery / logic return reference

Optional Batteries

+

−

Battery Connection Module (1000 A) (No BLVD Contactor)

Distribution Module (500 A)

System Manager

Distribution Module (500 A)

Space

AC conduit

Rack

Rectifier Modules

Note 1: DC power feeds to Large System pedestals. Each feed consists of two BAT(−), two BATRTN(+), and one LRTN(+) conductors.
Note 2: The Candeo power system delivers up to 500 A from a single 42" (1050 mm) frame and up to 1000 A from a single 84" (2100 mm) frame.
Note 3: Batteries may be installed in two optional battery trays located under the rectifier shelves.

553-AAA0520

Figure 36
Ground and logic return distribution – Candeo Power System

Note 1: DC power feeds to pedestals. Each feed consists of two BAT (–), two BATRTN (+), and one LRTN (+) conductors. All (5) conductors terminate **inside** the distribution panel.
Note 2: The system delivers up to 500 A from a single 42" frame and up to 1000 A from a single 84" frame.
Note 3: The cabinet safety ground is furnished through the green wire ground in the AC input wiring.

553-AAA0534
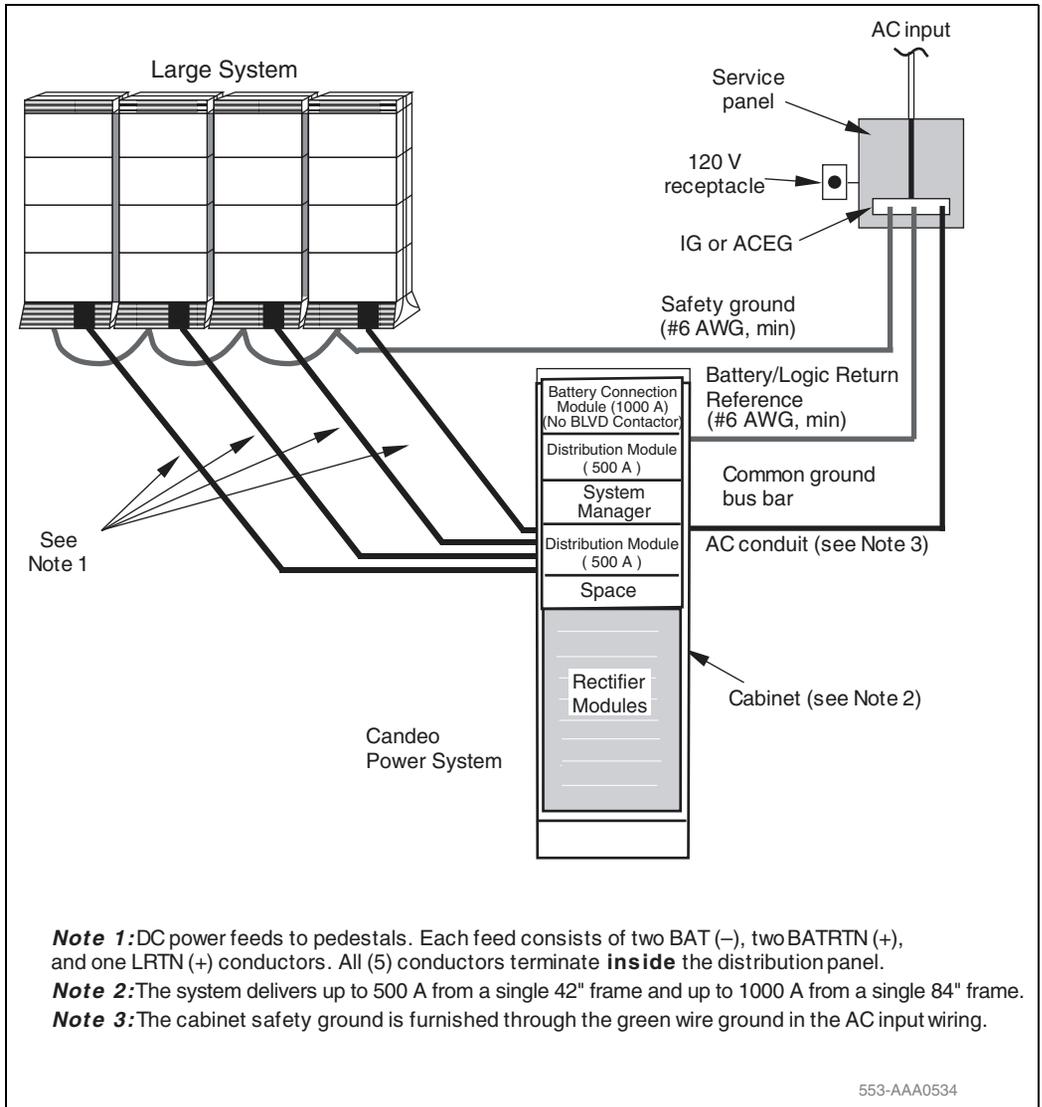
NT4N49AA Four Feed PDU

The NT4N49AA 4-wire PDU supports independent power feeds to each of 4 modules in a stack if required. However, in a typical installation where independent power feeds are not required, two jumper wires are provided to jumper adjacent battery leads. When the jumper wires are used, the 4-wire PDU effectively provides the same "shared" power configuration provided by the existing dc PDU. Therefore, the new PDU is backward-compatible and can replace an existing PDU unit in a stack, if required.

Figure 37
Standard 2-feed wiring

Cable-tie saddle   Cable restraint bar   Cable-tie saddle

553-AAA0467
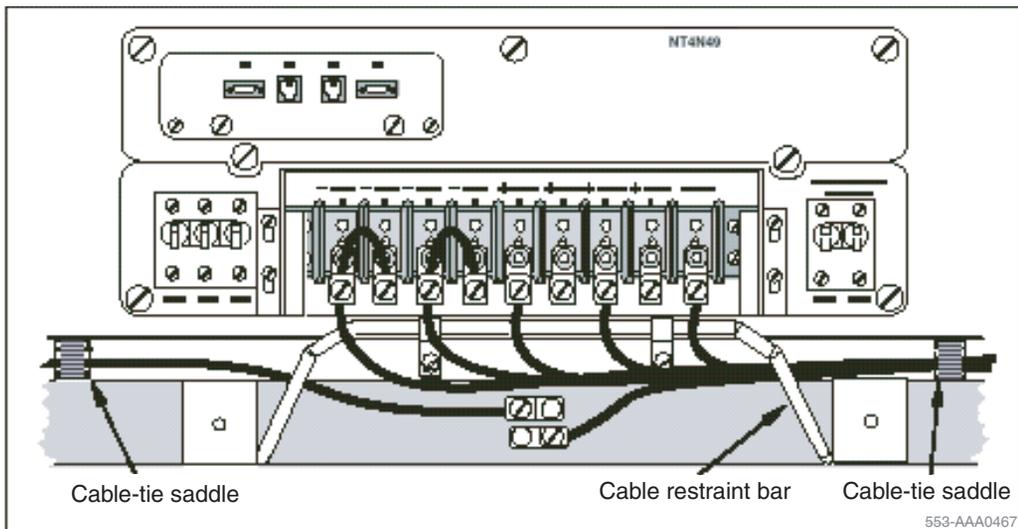
The NT4N49AA dc PDU:

1   supports 4 input circuits, implemented through the following terminal configuration: 4 (negative) battery leads, 4 return leads and logic return lead

2   is fully backward compatible with the existing PDU it is replacing

3   supports independent power feeds to each of 4 modules

Where independent power feeds are not required, 2 jumper wires are provided to jumper adjacent battery leads. When the jumper wires are used, the 4-wire PDU effectively provides the same "shared" power configuration provided by the existing dc PDU.

The 4 breakers (one for each module) in the existing dc PDU (NT4N50AA) are rated at 18 amps each. The same breakers in the 4-feed PDU are rated at 28 amps.

Figure 38
Optional 4 feed wiring

Cable-tie saddle   Cable restraint bar   Cable-tie saddle

553-AAA0468
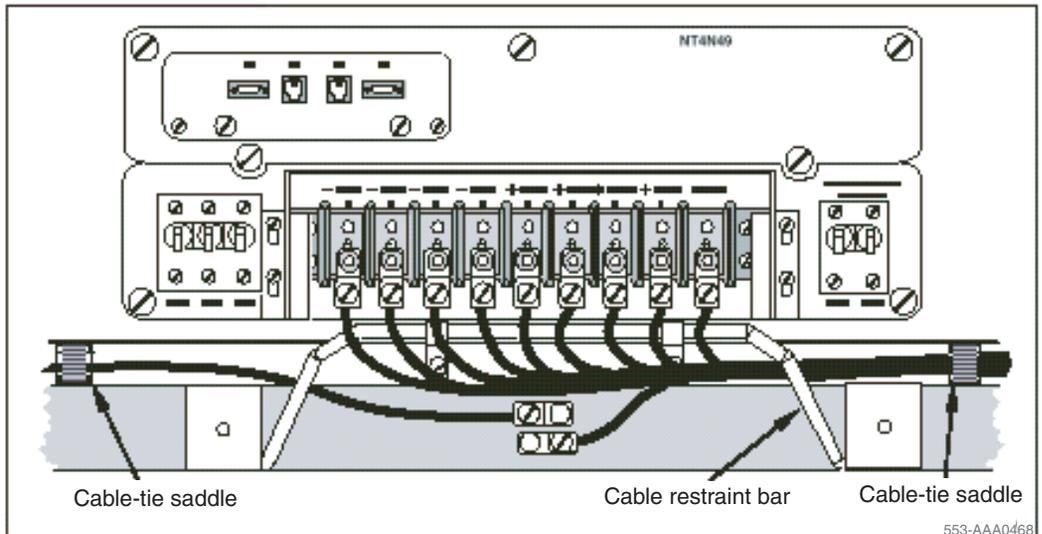
A readily accessible disconnect device for input power is required.

> **CAUTION**
>
> **Damage to Equipment**
>
> Dc power for the NT7D09 pedestal must be provided with circuit protection of 30 amps for the -BAT 0/1 and -BAT 2/3 feeds (see Figure 39 on page 86).

Circuit breakers must be located next to each other and labeled to show that both must be shut off to remove all power to the system.

Figure 39
PDU circuit protection
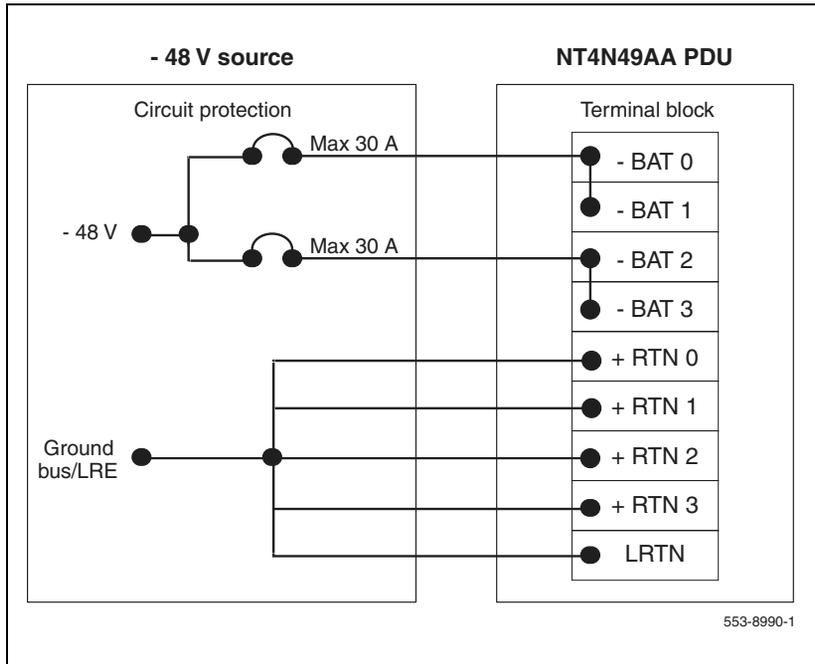
A maximum loop drop of two volts is allowed between the pedestal, or junction box, and the external power equipment. See Table 5 for allowable wire sizes. See *Large System: Planning and Engineering* (553-3021-120) for detailed information on calculating wire size.

Table 5
Wire gauge requirements with two 30-amp feeds (five wires)

Length	#8 AWG	#6 AWG	Single #4 AWG	Double #4 AWG
0–3 m (10 ft)	Yes	Yes	Yes	Yes
3–6 m (20 ft)	Yes	Yes	Yes	Yes
6–9 m (30 ft)	Yes	Yes	Yes	Yes
9–12 m (40 ft)	Yes	Yes	Yes	Yes
12–15 m (50 ft)	Yes	Yes	Yes	Yes
15–18 m (60 ft)	No	Yes	Yes	Yes
18–21 m (70 ft)	No	Yes	Yes	Yes
21–24 m (80 ft)	No	Yes	Yes	Yes
24–27 m (90 ft)	No	No	Yes	Yes
27–30 m (100 ft)	No	No	Yes	Yes
30–60 m (200 ft)	No	No	No	Yes
over 60 m (200 ft)	No	No	No	No

Note 1: Two 30-amp feeds are typically adequate for a column with four modules (five wires total—two 30-amp feed pairs plus logic return).

Note 2: If dual conduit is used, the wires must be run in battery/battery return pairs, with one pair in one conduit and the other pair, plus logic return, in the other conduit.

Legend:
Yes = Wire size is adequate for the distance.
No = Wire size has too high a voltage drop and is inadequate for the distance.

The following equipment is located in the rear of each pedestal (see Figure 40) in Large System columns.

1   The PDU distributes power to the entire column.

2   The field wiring terminal provides the connection point for wiring brought into the pedestal.

3   A circuit breaker is provided for each module in the column and for the blower unit.

Note: All column circuit breakers will trip if a column thermal overload is detected or a dc-power low-voltage condition is sensed.

4   The system monitor checks the column temperature, cooling system status, system voltage status, and controls alarms and line transfer states accordingly.

Figure 40
Dc-power equipment in the rear of the pedestal – NT4N49AA PDU
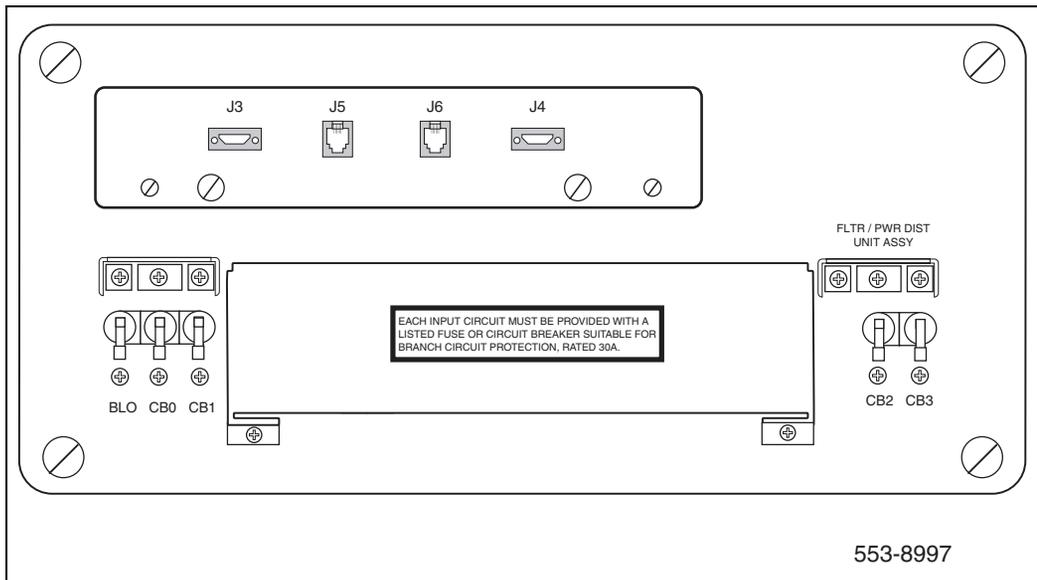
With the NT4N49AA PDU, the safety ground/protective earth wires and all wiring to the terminal block in the PDU must be neatly routed within the cable-tie saddles and under the cable restraint bar at the base of the pedestal (see Figure 41 on). This ensures that there is room to install the PDU cover, safety cover, and rear grill.

Conduit is not required with the NT4N49AA PDU. However, 1-1/4 or 3/4 in. conduit can be used if local codes or individual installations require it. Conduit can be routed down through the column from overhead racks or up through the floor. Conduit clamps and the hardware to fasten the conduit are provided in the pedestal. If the NT7D0902 Rear Mount Conduit Kit is used, conduit can enter from the rear of the column (above the floor).

Figure 41
Cable routing in the rear of the pedestal – NT4N49AA PDU

Cable-tie saddle   Cable restraint bar   Cable-tie saddle

553-8989
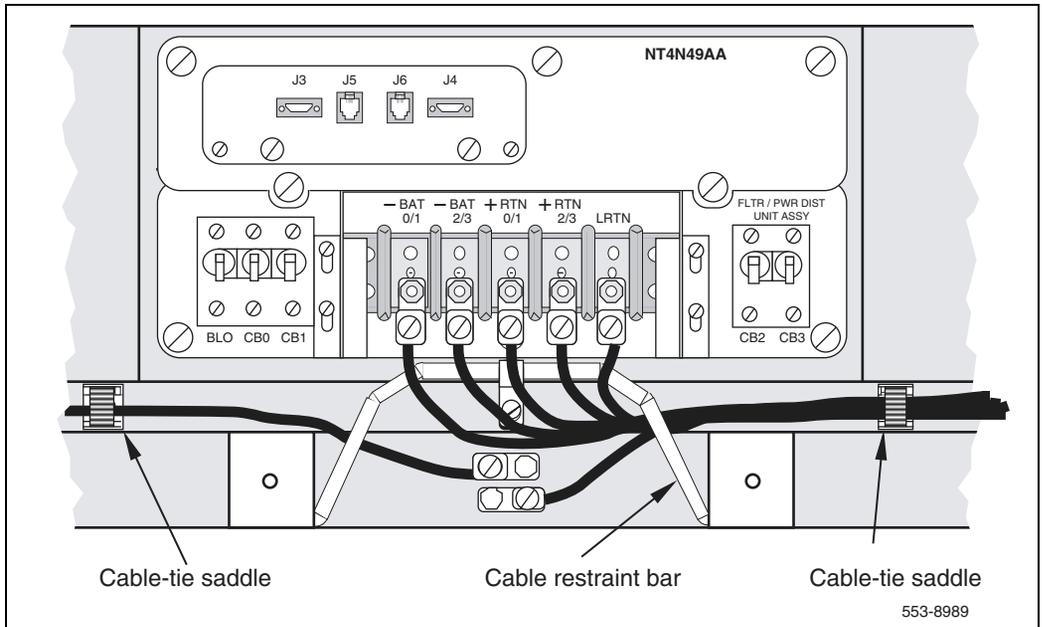
Installing the NT4N49AA Four Feed PDU

Installing the NT4N49AA PDU is a two-step process. It involves:

1   Installing safety ground/protective earth wiring on page 90

2   Connecting power from the power plant to the NT4N49AA PDU on page 92

Note: For installation in the UK, refer to the procedure Connecting UK power to the NT4N49AA PDU on page 95.

Installing safety ground/protective earth wiring

CAUTION

System Failure

Failure to follow grounding procedures can result in unsafe or faulty equipment. See *Large System: Planning and Engineering* (553-3021-120) for a complete description of approved ground sources and methods.

Procedure 8
Installing safety ground/protective earth wiring

1   Remove the associated 30-amp fuse or set circuit breakers to the OFF position in the power plant to disconnect each pedestal from the power source.

2   Remove the air intake grill from the rear of the pedestal.

3   At the rear of the pedestal, use a Phillips screwdriver to remove the metal cover over the terminal block to access the safety ground/protective earth lugs. Leave the cover off until all pedestal connections are made.

4   Connect the safety ground/protective earth wire.

Note: Use only insulated ground wire for system grounding.

    a.   **For a single-column system**, connect a #6 AWG wire from the ground source in the service panel to a ground lug on the pedestal.

    b.   **For a multiple-column system**, connect a #6 AWG wire from the ground source in the service panel to a ground lug on the closest column. Daisy-chain #6 AWG ground wires from one pedestal to the next as illustrated in Figure 42, connecting all of the columns together (or run a #6 AWG wire from the ground source to each column individually).

    Note: The safety ground/protective earth wire must be routed within the cable-tie saddles and under the cable restraint bar at the base of the pedestal.

5   Place a warning tag on the connection at the ground source. The warning tag should read WARNING—TELEPHONE SYSTEM GROUND CONNECTION—DO NOT DISCONNECT.

———— **End of Procedure** ————

Figure 42
Dc column ground lug daisy-chain connection.

From ground source   To ground/protective earth lug (or service panel)   Terminate on last column

553-8995
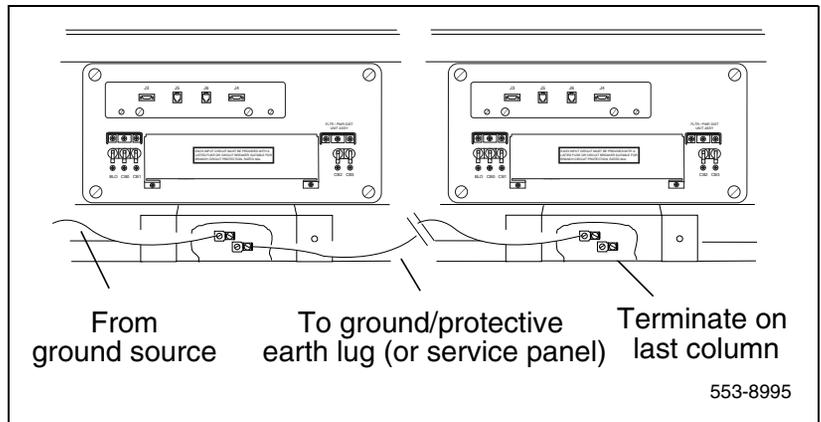
Connecting power from the power plant to the NT4N49AA PDU

>*Note 1:* On columns which have only two modules, run five wires to facilitate future expansion to a four module column.

>*Note 2:* If only two modules are used in the column, set the CB2 and CB3 circuit breakers to off.

Procedure 9
Connecting power from the power plant to the NT4N49AA PDU

1 Ensure that power to the power plant is removed from the service panel.

2 Remove the air intake grill from the rear of the column pedestal being wired by removing the two screws securing the air intake grill to the pedestal.

3 Use a Phillips screwdriver to remove the PDU safety cover.

4 Remove the top cover from the power plant.

a. Remove the six screws from the top of the power plant.

b. Release the captive screw on the front control panel.

c. Lay the control panel down and remove the top cover.

5 Route the wires between the power plant and the pedestal of the column being wired.

6 For installations that use a junction box:

a. Insert the conduit from the junction box into one of the conduit access holes in the pedestal.

b. Route the wires within the cable-tie saddles and under the cable restraint bar at the base of the pedestal.

c. Connect the wires to the matching connections on the terminal block on the junction box.

— Connect the red wires to – BAT 0, – BAT 1, – BAT 2, and – BAT 3.

— Connect the black wires to + BATRTN 0, + BATRTN 1, + BATRTN 2, and + BATRTN 3.

— Connect the orange or white wire to LRTN.

7 For installations that do not use a junction box:

   a. Route two red wires between the power plant and the pedestal of the column being wired.

   b. Route two black wires between the power plant and the pedestal of the column being wired.

   c. Route one (orange or white) wire for the logic return ground (LRTN) between the power plant and the pedestal of the column being wired.

   d. Route the wires within the cable-tie saddles and under the cable restraint bar at the base of the pedestal.

8 Connect wires to the PDU.

   a. Connect a red wire for each module to – BAT 0, – BAT 1, – BAT 2, and – BAT 3 on the connection block.

   b. Connect a black wire for each module to + BATRTN 0, + BATRTN 1, + BATRTN 2, and + BATRTN 3 on the connection block.

   c. Connect the (orange or white) wire to the LRTN terminal on the connection block.

9 Connect wires to the power plant.

   a. Connect the red wires to the first two circuit breakers in the main control/distribution panel. See Figure 43 for PDU to Candeo dc Power Plant connections. Each new column connects the next two available circuit breakers.

   Note: If only two modules are used in the column, make sure the CB2 and CB3 circuit breakers are set to off.

   b. Connect the black wires to the ground bus/LRE.

   c. Connect the orange or white wire to ground bus/LRE.

10 Replace the metal safety cover over the terminal block on the PDU.

   a. Lower the front panel over the mounting screws on the PDU.

   b. Tighten the screws holding the cover.

11 Replace the power plant cover.

12 Replace the junction box cover.

———————— **End of Procedure** ————————

Figure 43
PDU to Candeo connections
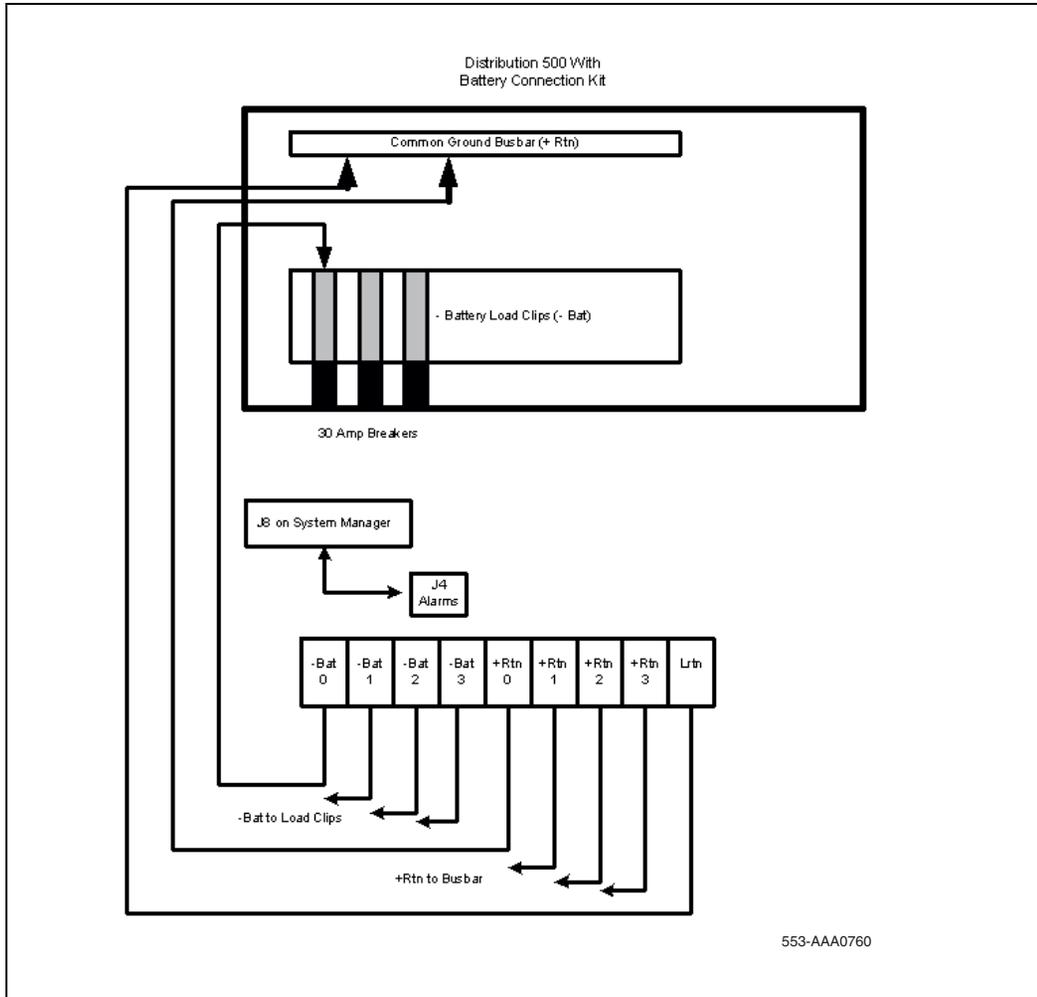
Connecting UK power to the NT4N49AA PDU

To connect the external power system to the pedestal, use the following procedure for each column (this procedure gives the connections for a four-module column).

Note: All wiring to the PDU must be routed within the cable-tie saddles and under the cable restraint bar at the base of the pedestal.

Procedure 10
Connecting UK power to the NT4N49AA PDU

1 Open the front door of the 8B/2R or 8B/4R master power cabinet.

2 If a junction box is used, insert the conduit from the junction box into one of the conduit access holes in the pedestal.

Connect the wires from the junction box to the matching connections on the terminal block on the PDU.

   a. Connect the red wires – BAT 0, – BAT 1, – BAT 2, and – BAT 3.

   b. Connect the black wires + BATRTN 0, + BATRTN 1, + BATRTN 2, and + BATRTN 3.

   c. Connect the remaining LRTN wire (orange or white wire).

Note: If a junction box is used, the connections described in Steps 2 through 4 apply to the junction box rather than the pedestal.

3 Connect the red BAT (–48V) wires.

   a. At the 8B/2R or 8B/4R master power cabinet, connect wires to the terminals on the –ve distribution rail (see Figure 43 on).

   b. At the PDU, connect the wires to the terminal block.

   — connect module 0 to – BAT 0

   — connect module 1 to – BAT 1

   — connect module 2 to – BAT 2

   — connect module 3 to – BAT 3

4   Connect the black BATRTN (+48V) wires.

   a.   At the 8B/2R or 8B/4R master power cabinet, connect wires to the
        +ve bus.

   b.   At the PDU, connect the wires to the terminal block:

        —   connect modules 0 to + BATRTN 0

        —   connect modules 1 to + BATRTN 1

        —   connect modules 2 to + BATRTN 2

        —   connect modules 3 to + BATRTN 3

5   Connect an orange #8 AWG (10 sq mm) LRTN wire from the logic return
     equalizer (LRE) in the rear of the master power cabinet to LRTN on
     terminal block TB1 in the pedestal. (See Figure 43 on .)

6   Reinstall the metal safety cover over the terminal block.

   a.   Lower the front panel over the mounting screws on the PDU.

   b.   Tighten the screws holding the cover.

7   Close the covers on the 8B/2R or 8B/4R master power cabinet.

────── **End of Procedure** ──────

System monitor connections

When connecting to an 8B/2R or 8B/4R master power cabinet, one
NT8D46AT cable is required to extend the alarm terminal to the master
system monitor in the pedestal. See Figure 43 on .

The orange colored wire on NT8D46AT marked "ALARM" extends from
any of three alarm terminals on the top of the power cabinet to connector
marked J4 in the system monitor. The remaining "Trip" and "DC ON" wires
on the NT8D46AT cable are not used and should be snipped before installing
the cable.

Figure 44
UEM to 8B/2R or 8B/4R master power cabinet 2R or
8B/4R master power cabinet connections

To Test Jack Frame (TJF)
16 sq mm green/yellow

Master Power Cabinet(s)

Positive Bus

Black wires

Factory installed
(16 sq mm
green/yellow)

Orange wire
(10 sq mm)

Logic Return Equalizer,
LRE (functional earth)

Alarm terminal
(3 off)

J4 in
system
monitor
(XSM)

-VE Distribution Rail

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |

Each output is rated at 30 A
maximum. Maximum total
output is 150 A.

Power alarm cable
(NT8D46AT)

Red wires

TB1 in Power distribution unit

To CB4 (blower)
CB0 (module 0),
& CB1 (module 1)

To CB2 (module 2)
& CB3 (module 3)

To connections
in pedestal

| - BAT 0 | - BAT 1 | - BAT 2 | - BAT 3 | + RTN 0 | + RTN 1 | + RTN 2 | + RTN 3 | LRTN |

Note: Optional 4 feed wiring shown   553-6458

Planning and designating the Main Distribution Frame (MDF)

Contents

This section contains information on the following topics:

About terminations

All Large System terminations are cross-connected on frame-mounted or wall-mounted modules and connecting blocks. The layout of the blocks can vary to meet the requirements of the site.

> **DANGER OF ELECTRIC SHOCK**
>
> Tip, ring, A, B, E, M, ESC, and ESCG connections can be considered to be Telecommunications Network Voltages (TNV).

Installation and designation

Refer to the manufacturer's documentation for recommendations and detailed procedures on installing and labelling the cross-connect blocks.

This chapter describes how to install and connect a Succession 1000 system using the BIX or Krone Test Jack Frame (UK) cross-connect terminals.

This chapter contains the following procedures:

- Procedure 11: "Installing the BIX cross-connect terminal" on .

- Procedure 12: "Installing the Krone Test Jack Frame (UK)" on .

Terminal block requirements

The cross-connect terminal requires enough connecting blocks to terminate up to four 25-pair cables for each Media Gateway and Media Gateway Expansion. When Ethernet connections are used instead of traditional cabling, the Succession Media Card Input/Output Adapter is used:

- For the 1.5 Mbit DTI/PRI circuit card NTAK09, use the NTBK04 cable.

- For the 2.0 Mbit DTI circuit card NTAK10, 2.0 Mbit PRI circuit card NTAK79, and 2.0 Mbit PRI circuit card NTBK50, use the NTBK05 cable.

- For up to four 25-pair cables from each Media Gateway and Media Gateway Expansion.

  — Each slot that is equipped with a trunk or line circuit card requires a cable.

  — If the NTAK19EC 2-port SDI cable or the NTAK19FB 4-port SDI cable are not used with the NTAK03 or NTAK02 cards, then you require a 25-pair cable for each of these cards.

- Four conductors for the AUX cable from the Media Gateway.

- One 25-pair cable from each QUA6 PFTU.

- Wiring from telephones and trunks.

> **DANGER**
> Always use caution when installing or modifying telephone lines. Do not install telephone wiring during a lightning storm. Never touch uninsulated telephone wiring, unless the line is disconnected at the network interface.

Installing the BIX cross-connect terminal

Procedure 11 describes how to install the BIX cross-connect terminal.

Procedure 11
Installing the BIX cross-connect terminal

1   Refer to the equipment layout plan to determine where to place the cross-connect terminal.

2   Layout the terminal blocks as shown in Figure 47 on .

3   Attach labels on the cross-connect terminal to indicate the terminal blocks assigned to the following:

- 25-pair cables from the system

- AUX wiring

- Power Failure Transfer Units (PFTUs)

- Telephones and consoles

- Trunks

- Miscellaneous equipment

——————— **End of Procedure** ———————

Figure 45
Typical BIX cross-connect terminal layout

Figure 46
BIX module

Figure 47
Recommended layout for NT8D37 IPE Modules

Cable terminations for one NT8D37 IPE Module

From I/O panel	
	Cable A
	Cable B
	Cable C
	Cable D (Note)
	Cable E
	Cable F
	Cable G
	Cable H (Note)
	Cable K
	Cable L
	Cable M
	Cable N (Note)
	Cable R
	Cable S
	Cable T
	Cable U (Note)
	Spare
	Spare
	Spare
	Spare

Note: In NT8D37DC IPE Modules, these slots are not used. They *are* used in NT8D37EC IPE Modules.

553-3099

Installing the Krone cross-connect system (UK)

In the Krone cross-connect system, one terminating strip holds 10 pairs of cable. When cross-connecting a 25-pair cable on this system, 8 of the 10 terminating points are used on each strip. One 25-pair cable, therefore, occupies three terminating strips:

8 pairs per strip X 3 strips = 24 pairs

Card allocations

Figures 48 and 49 provide module card allocations for the Krone cross-connect system.

Procedure 12 describes how to install the Krone Test Jack Frame for the UK.

Procedure 12
Installing the Krone Test Jack Frame (UK)

1   Refer to the equipment layout plan to determine where to place the cross-connect terminal.

2   Lay out the terminal blocks.

3   Attach labels on the cross-connect terminal to indicate the terminal blocks assigned to the following:

- Analog line cards
- DC15/AC15/RAN/PAG cards
- Data Access cards
- AUX wiring
- Power Failure Transfer Units
- Digital line cards
- Telephones
- Exchange line trunk cards
- Direct Dialing Inward trunk cards
- Miscellaneous equipment

———————— **End of Procedure** ————————

Figure 48
IPE module card allocation – Krone cross-connect system
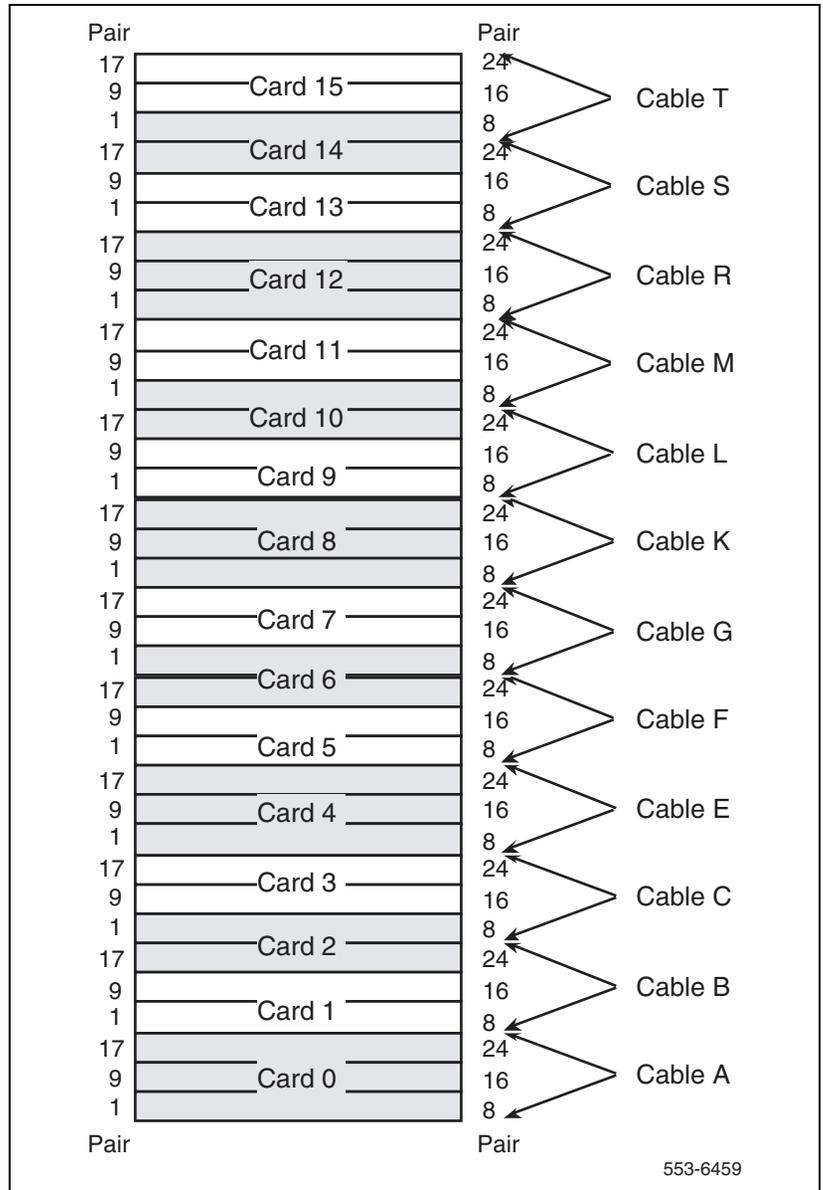
Figure 49
CE/PE module card allocation – Krone cross-connect system
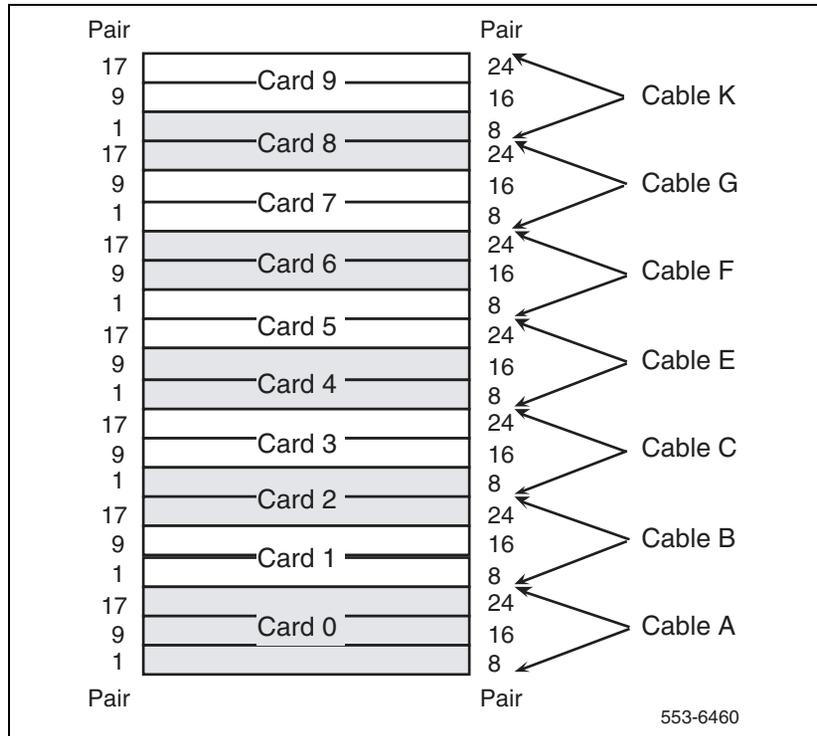
Labels

Terminating strips on the Krone cross-connect must be labeled if they contain wiring. The labels that attach to the terminating strips have two sides: the front side shows the card name and card number, and the reverse side (flip-up side) shows pair designations for that card.

There are two types of mandatory labels: those with safety warnings and those without. Mandatory labels with safety warnings are required for the following cards:

• NT5K02 analog line card

• NT5K19 analog tie trunk card

• QUA6 Power Failure Transfer Unit (PFTU)

Labels are mandatory for the following cards but they do not need safety warnings:

• NT5K18 Exchange line card

• NT5K17 Direct Dial Inwards (DDI) card

Table 6 through to Table 12 show labels for the Krone cross-connect system.

Table 6
Label for Analog Line Card

Table 7
Label for Analog Tie Trunk Card

SAFETY WARNING TIE TRUNKS	2W E+M :........		LOOP..........
SEE INSTRUCTIONS FOR USE :	4W E+M :......... RAN :......... SHELF.........		
	AC15 :......... PAG :.......... CARD..........		

								TRK. I.D. NO.'S
T0 T0	T0 R0 / R0 R0	E M	SB SA T1 T1	T1 R1 / R1 R1	E M	SB SA	2W E+M	

SAFETY WARNING TIE TRUNKS	2W E+M :........		LOOP..........
SEE INSTRUCTIONS FOR USE :	4W E+M :......... RAN :.......... SHELF.........		
	AC15 :......... PAG :.......... CARD..........		

								TRK. I.D. NO.'S
T2 T2	T2 R2 / R2 R2	E M	SB SA T3 T3	T3 R3 / R3 R3	E M	SB SA	2W E+M	

SAFETY WARNING TIE TRUNKS	2W E+M :.........		LOOP..........
SEE INSTRUCTIONS FOR USE :	4W E+M :......... RAN :......... SHELF.........		
	AC15 :......... PAG :.......... CARD..........		

								TRK. I.D. NO.'S
T0 T0	T0 R0 / R0 R0	E M	SB SA T1 T1	T1 R1 / R1 R1	E M	SB SA	2W E+M	

553-6462

Table 8
Label for Data Access Line Card (NT7D16)

SAFETY WARNING

SEE INSTRUCTIONS FOR USE :   DATA EQUIPMENT

LOOP..........
SHELF.........
CARD..........

Unit: Dir. Number: Unit: Dir. Number:

T D   R D   C D S   D T S   G N C   D D D   D T R   R I   T D   R D   C D S   D T S   G N C   D D D   D T R   R I

SAFETY WARNING

SEE INSTRUCTIONS FOR USE :   DATA EQUIPMENT

LOOP..........
SHELF.........
CARD..........

Unit: Dir. Number: Unit: Dir. Number:

T D   R D   C D S   D T S   G N C   D D D   D T R   R I   T D   R D   C D S   D T S   G N C   D D D   D T R   R I

SAFETY WARNING

SEE INSTRUCTIONS FOR USE :   DATA EQUIPMENT

LOOP..........
SHELF.........
CARD..........

Unit: Dir. Number: Unit: Dir. Number:

T D   R D   C D S   D T S   G N C   D D D   D T R   R I   T D   R D   C D S   D T S   G N C   D D D   D T R   R I

553-6463

Table 9
Label for Power Failure Transfer Unit

SAFETY WARNING								
SEE INSTRUCTIONS FOR USE				POWER FAIL TRANSFER UNIT CABLE J1.				

A L M	G N D	P F T S	G N D	T C		PFT 1						
						EXT	LINE CARD	CO TRK.	COT CARD			
T R	T R	T R	T R	T R	T R	T R	T R	T R

SAFETY WARNING								
SEE INSTRUCTIONS FOR USE				POWER FAIL TRANSFER UNIT CABLE J1.				

PFT 2				PFT 3					
EXT	LINE CARD	CO TRK.	COT CARD	EXT	LINE CARD	CO TRK.	COT CARD		
T R	T R	T R	T R	T R	T R	T R	T R	T R	T R

SAFETY WARNING								
SEE INSTRUCTIONS FOR USE				POWER FAIL TRANSFER UNIT CABLE J1.				

PFT 4				PFT 5				- 52 V	- 52 V	
EXT	LINE CARD	CO TRK.	COT CARD	EXT	LINE CARD	CO TRK.	COT CARD			
T R	T R	T R	T R	T R	T R	T R	T R	T R	T R

553-6464

Table 10
Label for Digital Line Card (NT8D02)

SAFETY WARNING									LOOP.......... SHELF......... CARD.........

SEE INSTRUCTIONS FOR USE : DIGITAL TELEPHONES

									DIR. NO.'S
0	1	2	3	4	5	6	7		
T R	T R	T R	T R	T R	T R	T R	T R	T R	

SAFETY WARNING									LOOP.......... SHELF......... CARD.........

SEE INSTRUCTIONS FOR USE : DIGITAL TELEPHONES

									DIR. NO.'S
8	9	10	11	12	13	14	15		
T R	T R	T R	T R	T R	T R	T R	T R	T R	

553-6465

Table 11
Label for Exchange Line Trunk Card (NT5K18)

EXCHANGE LINES				LOOP.......... SHELF......... CARD..........

				EXCHANGE NO.'S
0	1	2	3	
T R	T R	T R	T R	

EXCHANGE LINES				LOOP.......... SHELF......... CARD..........

				EXCHANGE NO.'S
4	5	6	7	
T R	T R	T R	T R	

EXCHANGE LINES				LOOP.......... SHELF......... CARD..........

				EXCHANGE NO.'S
0	1	2	3	
T R	T R	T R	T R	

553-6466

Table 12
Label for Direct Dial Inward Trunk Card (NT5K17)

DIRECT DIAL INWARDS

LOOP..........
SHELF.........
CARD..........

				EXCHANGE LINES
0	1	2	3	
T R	T R	T R	T R	

DIRECT DIAL INWARDS

LOOP..........
SHELF.........
CARD..........

				EXCHANGE LINES
4	5	6	7	
T R	T R	T R	T R	

DIRECT DIAL INWARDS

LOOP..........
SHELF.........
CARD..........

				EXCHANGE LINES
0	1	2	3	
T R	T R	T R	T R	

553-6467

Installing Power Failure Transfer Units (PFTUs)

Contents

This section contains information on the following topics:

PFTU configurations

In ac-powered systems, PFTUs are powered by the A0367916 Auxiliary – 48V Power Supply (up to six PFTUs can be supported by one power supply). In dc-powered systems, PFTUs are powered from an auxiliary –48 V dc fused output from the external power equipment.

Figure 50 shows a high-level view of PFTU alarm connections. For PFTU operation, the wiring from the following equipment cross-connects through termination areas at the MDF:

1   PFTU

2   Auxiliary power supply

3   System monitor

4   Attendant console (optional)

5   Designated telephones (DTMF or rotary dial types)

6   Central office trunks

Figure 50
MDF terminations for typical PFTU operation
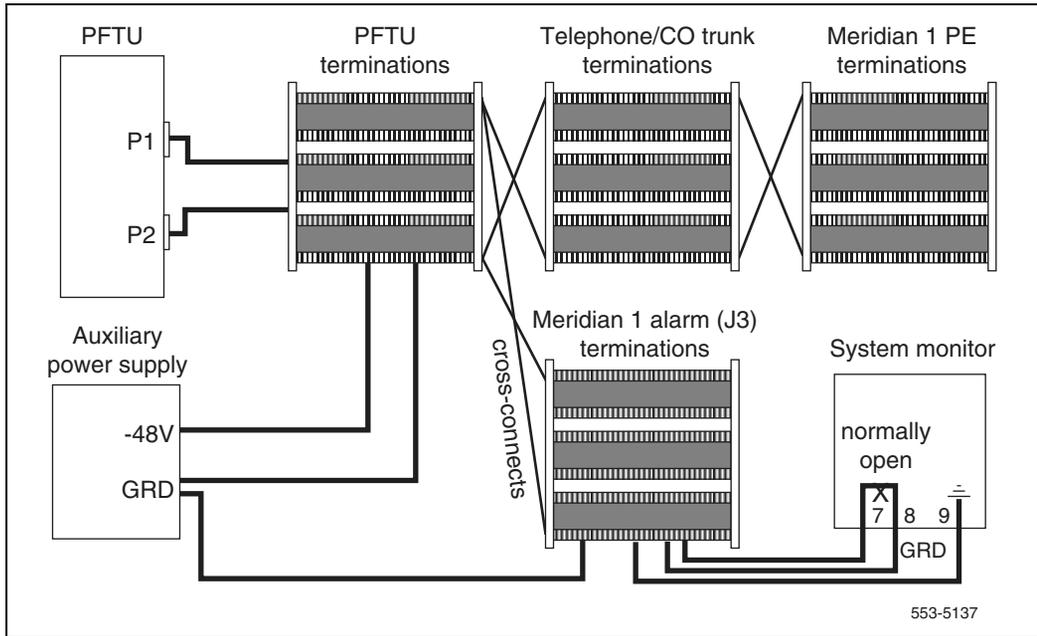
Figure 51 shows detail view of the PFTU alarm connections. The PFTU can be activated by system power failure and using the Attendant console TC switch. If more than one Attendant console is connected to the system, it must be connected in parallel with the main Attendant console as shown in the figure.

Figure 51
Typical PFTU connection to the MDF and the Master System Monitor
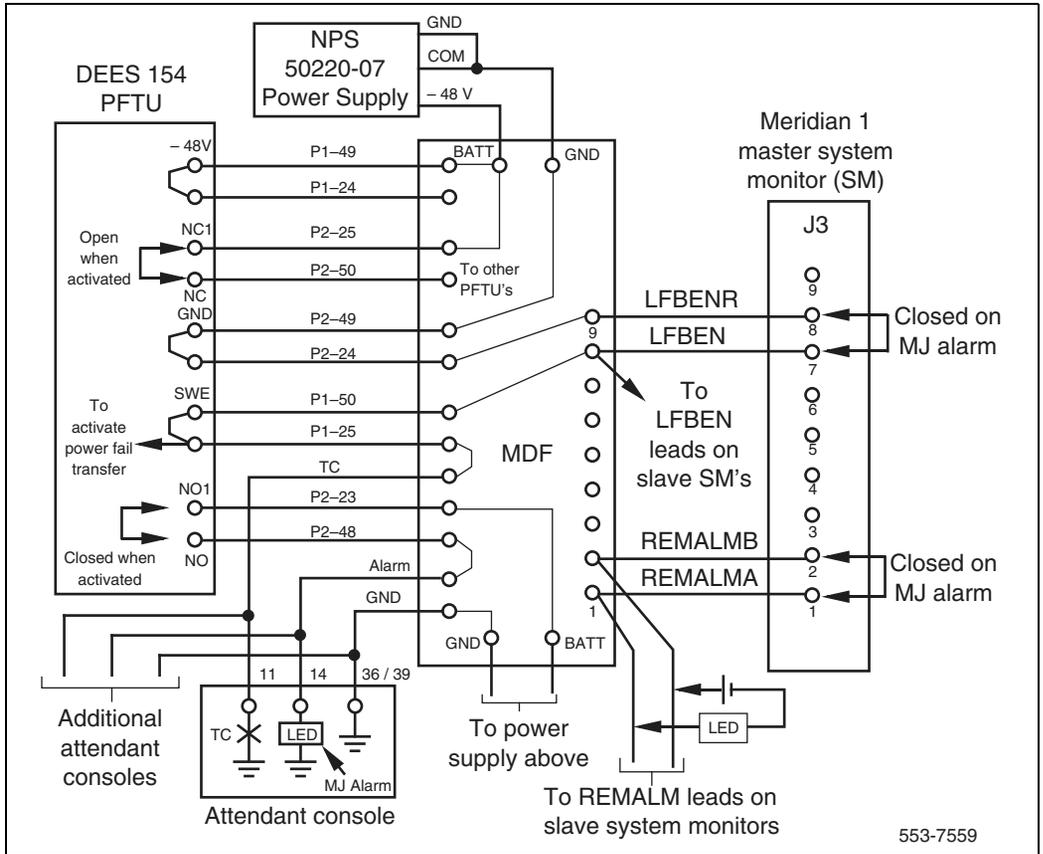
Installing PFTUs

Use the following procedure and any instructions provided with the Power Failure Transfer Unit (PFTU) to install and connect PFTUs.

Procedure 13
Installing the PFTUs

1   Install PFTUs according to the manufacturer's instructions.

2   Attach the yellow PFTU label to the designation strip, indicating the top connector as P1 and the bottom connector as P2.

3   Install two NE-A25B type 25-pair cables from connectors P1 and P2 on the front of the PFTU to the PFTU termination area at the MDF.

4   Cross-connect wiring for PFTU operation as shown in Table 13.

Table 13
MDF cross-connections for PFTU operations

Description	Connection
–48 V dc + return (GND)	PFTU connector P1, pin 49 PFTU connector P2, pin 49 and MDF GND
All grounds on system monitor cable	MDF GND
Console cable pin 11 Console cable pin 36	PFTU connector P1, pin 25 MDF GND
LFBEN (line forced bypass enable) LFBENR (line forced bypass enable return)	PFTU connector P1, pin 50 MDF GND
MDF GND	PFTU connector P2, pin 24

Note: At connector P1 on the PFTU, pins 25 and 50 are labeled SWE for "switch enable." When pin 25 is grounded by the attendant console or pin 50 is grounded by the system monitor, line transfer is activated.

5   For ac-powered systems, install the A0367916 auxiliary power supply.

　a.   Attach the unit to the wall using screws in the four mounting holes.

　b.   Connect a #24 (or larger) AWG wire from the –48 V connection on the auxiliary power supply to the PFTU termination area on the MDF.

    c. Connect a #24 (or larger) AWG wire from the ground (GND) connection on the auxiliary power supply to the PFTU termination area on the MDF.

    d. Connect a second #24 (or larger) AWG wire from the GND connection on the auxiliary power supply to the Large System alarm termination area on the MDF.

    e. Plug in the A0367916 auxiliary power supply.

       — If a UPS is used, you must plug the power supply into an auxiliary output on the UPS.

       — Without a UPS, plug the power supply into an outlet in the equipment room.

6 For dc-powered systems, power the PFTU from the fused low-current auxiliary power outputs on the dc power system. One 1.33-amp fuse supports up to six PFTUs.

—————————— **End of Procedure** ——————————

Connecting trunks and telephones

The "ground start" feature on 500/2500-type telephones connected to CO trunks requiring a ground start condition is not required. Automatic ground start is performed by the PFTU. However, rotary dials (dial pulse) are required on telephones assigned to trunks that are not equipped to recognize tone pulses (touch tone).

See the PFTU documentation for MDF cable terminations for telephones and trunks associated with the PFTU. If the connections are not designated on the connecting blocks, mark the blocks as shown in the documentation or install the appropriate designation strips.

Procedure 14
Connecting trunks and telephones

1 For each telephone assigned to the PFTU.

    • Connect the tip and ring of the line card to the first pair of the assigned PFTU.

    • Connect the tip and ring of the telephone to the second pair of the assigned PFTU.

2   For each trunk assigned to the PFTU.

- Connect the tip and ring of the CO card to the third pair of the assigned PFTU.

- Connect the tip and ring of the trunk to the fourth pair of the assigned PFTU.

———————————— **End of Procedure** ————————————

Installing QUA6 PFTUs (UK installations)

QUA6 PFTUs are used for Large System installations in the United Kingdom. The QUA6 PFTU is powered from an auxiliary –48V dc fused output from the external power equipment.

Figure 50 on page 114 shows a high-level view of QUA6 PFTU alarm connections. For PFTU operation, the wiring from the following equipment cross-connects through termination areas at the MDF:

1   PFTU

2   Auxiliary –48 V dc

3   System monitor

4   Attendant console (optional)

5   Designated telephones

6   Central Office trunks

Configuring the system monitor

Contents

This section contains information on the following topics:

System monitor cabling

Multi-column systems

Cabling between system monitors in a multi-column system requires the use of a single cable. The cabling is done in a daisy-chain fashion with the master system monitor at the beginning of the chain. The order in which each system monitor is cabled is not important. However, the address of each slave system monitor must be unique and there cannot be any gaps in the slave numbering. Figure 52 shows a typical cabling scheme between columns.

Figure 52
System monitor to system monitor serial link cabling
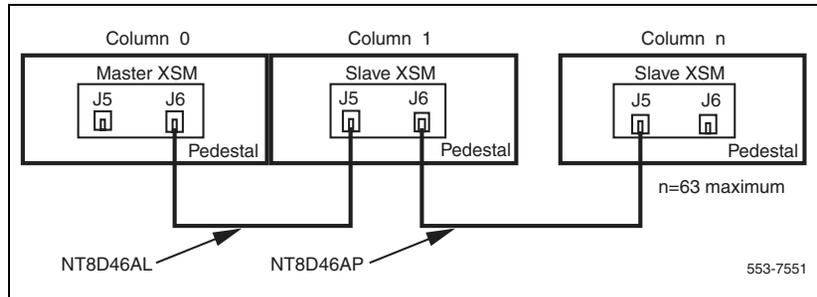
Power failure transfer control

The system monitor can be cabled to the MDF to provide power failure transfer control or additional alarms. The cable used is the NT8D46BH, EH, or DH and it is plugged into J3 on the system monitor. With the same J3 connector, the system monitor can be used with a variety of cables to upgrade systems.

Ac power control

The system monitor can also monitor and control an ac-powered UPS. Connector J4 is used for this interface. Three cables are available for connecting to a UPS: NT8D46AQ, NT8D46AJ, and NT8D46AU.

Dc power observation

The system monitor can also work with dc power supplies. A J4 connector monitors the rectifiers. Cable requirements depend on the battery distribution box in use. With the Candeo power system, a NT8D46xx cable interfaces from the connector **J4** of the Large System's system monitor to the Candeo's system manager alarm output ports. Refer to "Alarm interfacing to Candeo" on for additional information.

Configuring the NT8D22 System Monitor

The master NT8D22 System Monitor interfaces with a Serial Data Interface (SDI) port in the column with CPU 0.

Procedure 15
Configuring the NT8D22 System Monitor

1   Set the baud rate for the SDI port associated with the system monitor to 1200 baud in DTE mode.

2   In the rear of the pedestal, loosen the two retaining screws on the system monitor and remove it from the PDU.

3   Set the option switches for each system monitor. (See *Circuit Card: Description and Installation* (553-3001-211) for a detailed description of switch setting options.)

   a.   **For a single-column system**, set the switches as shown in Table 14.

   Note: Connect and cable the system monitor in a single-column system like a master system monitor for the rest of this procedure.

Table 14
NT8D22 switch settings for a single-column system

Switch	1	2	3	4	5	6	7	8
SW1	off	off	*	on**	off	off	off	off
SW2	on	off	on	on	on	on	on	on
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.

   b.   **For a multiple-column system**, set the system monitor in the column with CPU 0 as the master, using the settings shown in Table 15 and Table 17 on page 123.

   c.   Set option switches on slave system monitors as shown in Table 16 and Table 18 on page 128. If CPU 0 and CPU 1 are in different

columns, set the system monitor in the column with CPU 1 as slave unit 1. Number the slaves sequentially wherever possible.

———————————— **End of Procedure** ————————————

Table 15
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 17 on page 123					
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.							

Table 16
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 18 on page 128					
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.							

Table 17
SW2 on *master*—total number of slaves in the system

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
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

Cabling the NT8D22 System Monitor

The NT8D22 System Monitor is used to monitor the temperature, power supplies, and blower unit in a column. A series of daisy-chained flat-ribbon cables between each module is used to connect the power supplies and the top cap thermal sensors to the system monitor located in the pedestal. The flat cable routes through the square holes in the rear horizontal cable trough. Figure 53 shows the cabling of the system monitor in a column.

Figure 53
System monitor module to module cabling
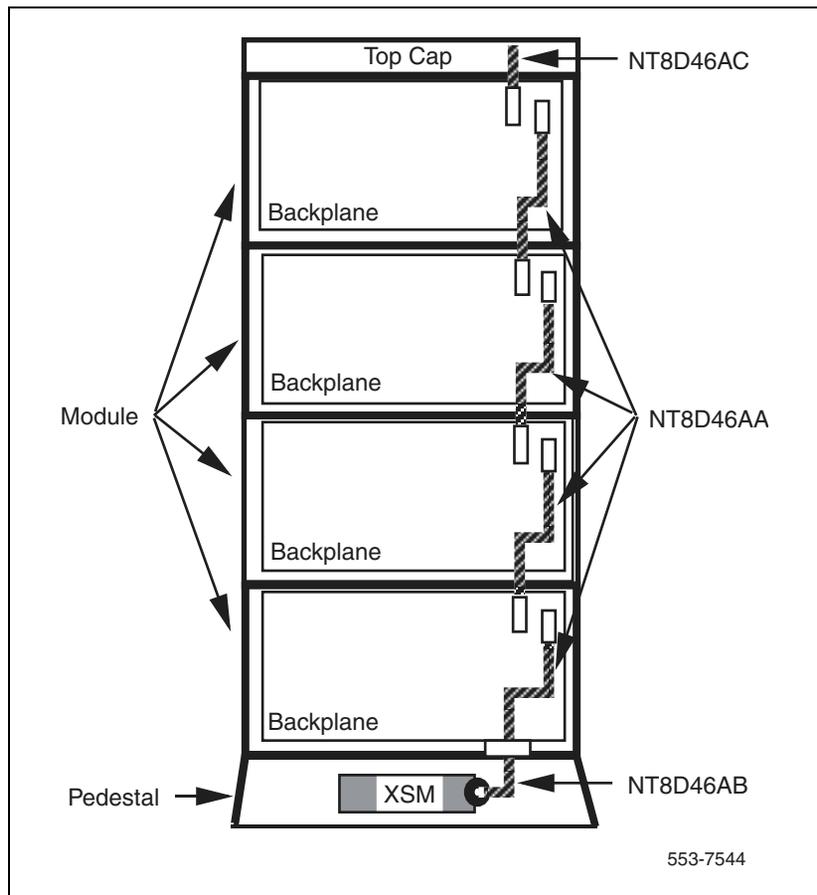
Follow the steps in Procedure 16 to cable the NT8D22 System Monitor.

Procedure 16
Cabling the NT8D22 System Monitor

1   Remove the I/O safety panel in the rear of the module with CPU 0.

2   Connect the master system monitor to the SDI port.

3   Connect the master system monitor to slave unit 1 with an NT8D46AS cable.

4   Connect the narrow ribbon on an NT8D46AG cable from connector J2 in the module with CPU 0 to the assigned port on the SDI card (see Figure 54).

Figure 54
Cabling two side-by-side NTD40 shelves – system monitor to slave unit 1 and SDI port
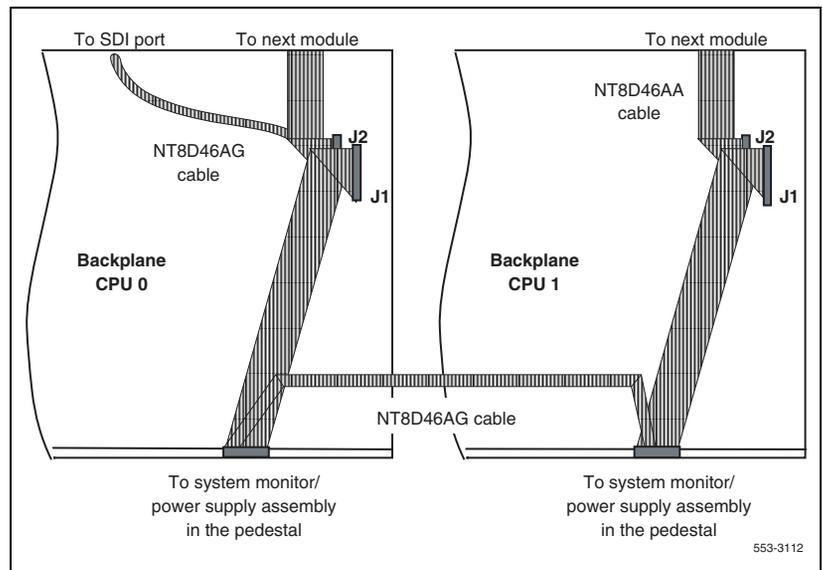
Figure 55
Cabling Succession 1000M Single Group or Meridian 1 Option 61C
CP PII, single column with stacked Core/Net modules – cable master
system monitor to SDI port
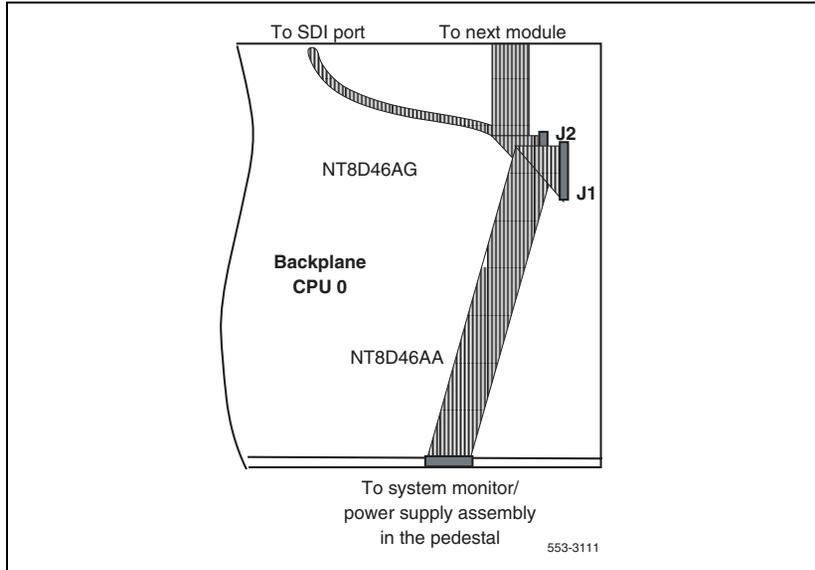
5   Daisy-chain slave system monitors to the master.

    a.   **For a single-column system**, skip this step.

    b.   **For a multiple-column system**, beginning with the master system
monitor, cable in series (slave 1 to slave 2, slave 2 to slave 3, and so
on) from connector J6 to connector J5 on each system monitor (see
Figure 56 on). Terminate at connector J5 on the last
column.

    —   If columns are adjacent, use an NT8D46AL cable.

    —   If columns are not adjacent, use an NT8D46AP cable.

Figure 56
Multiple-column system monitor connections

553-3114
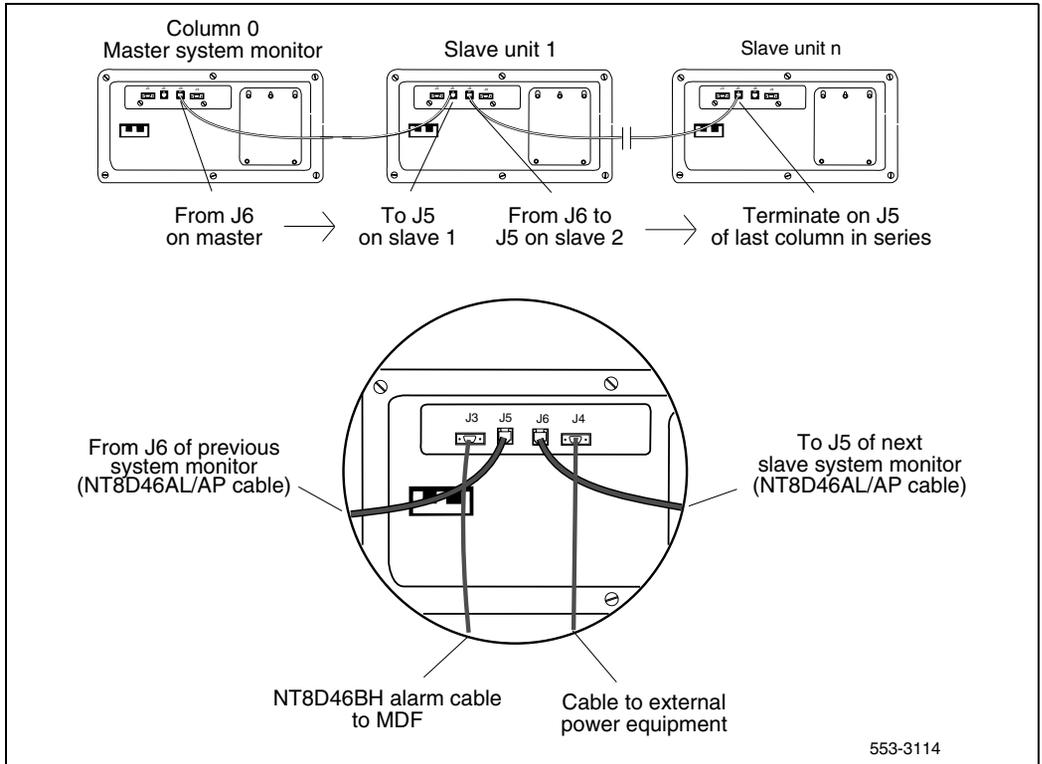
6 For PFTU or external alarm cabling, connect a system monitor to MDF cable.

- Connect a system monitor to MDF cable to connector J3 on the master system monitor.

- Connect the cable at the alarm termination area at the MDF. See Table 18 for the terminating sequence.

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

Note 2:   If additional contact closures are required through the J3 REMALMA or REMALMB leads (for a hard alarm in case a column loses power, for example), additional system monitor to MDF cables can be ordered.

Table 18
NT8D22 System Monitor – pin assignments at J3

Pin	Direction	Color	Signal name	Description
1	out	BL/W	REMALMA	Remote major alarm (connect for external alarm)
2	out	OR/W	REMALMB	Remote major alarm return (connect for external alarm)
3	out	GR/W	CE-SYSLT	CE system line transfer (upgraded systems only)
4	—	BR/W	MDF0/GND	MDF return (ground)
5	in	SL/W	CEALMIN	CE alarm (upgraded systems only)
6	—	BL/R	SYSLTIN	System line transfer in (upgraded systems only)
7	out	W/BL	LFBEN	Line forced bypass enable (connect for PFTU operation)
8	out	W/OR	LFBENR	Line forced bypass enable return (connect for PFTU operation)
9	—	W/GR	GND	Ground

Note: Pins 6, 8, and 9 should be connected and grounded at the MDF.

7   For ac-powered systems with a UPS:

a.   Connect the appropriate cable (see the following list) from connector J4 on the system monitor in the column with CPU 0 (the master system monitor) to the associated UPS. Table 19 gives the pin assignments and signal descriptions for the alarm cables.

— 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.

b.   Connect the cable to the UPS as specified by the manufacturer.

c.   Repeat this step for each system monitor with an associated UPS (see Figure 57 on).

Table 19
NT8D22 System Monitor – pin assignments at J4

Pin	Signal description
1	Not used
2	Not used
3	Not used
4	Not used
5	Alarm 1 (ac fail; to UPS)
6	Alarm 1 return
7	Alarm 2 (Power sense; from UPS)
8	Alarm 2 return
9	Not used

Figure 57
UPS alarm cabling
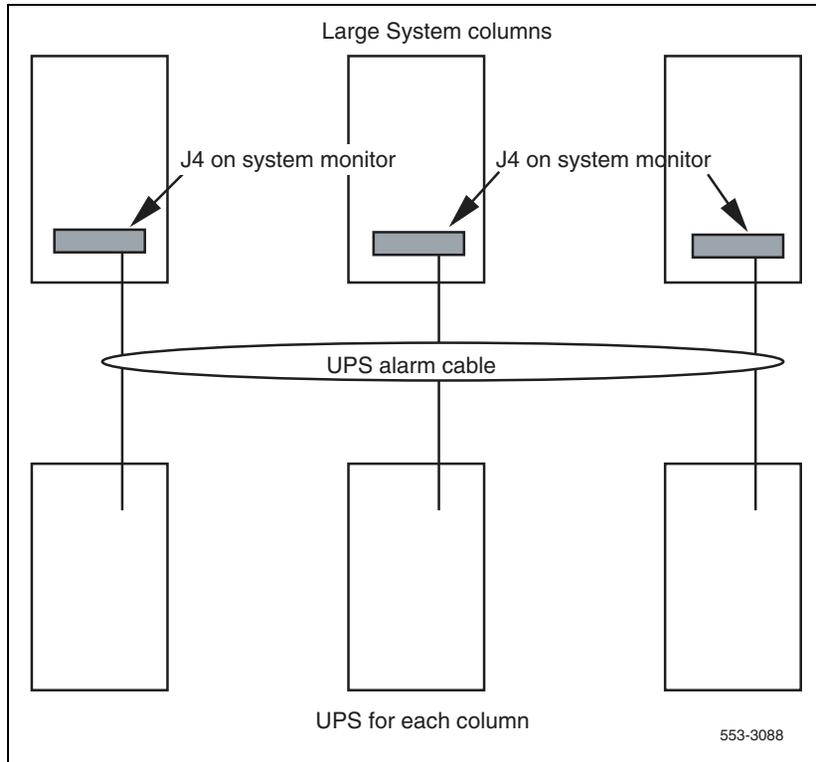
8   For dc-powered systems, extend the alarm and trip leads from connector
J4 on the system monitor in the column with CPU 0 (the master system
monitor) to the external power equipment using an NT8D46AV cable (see
Table 20 on page 131).

Note 1: Conduit is not required.

Note 2: 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.

Table 20
Alarm and trip lead connections—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.			

Alarm interfacing to Candeo

The Candeo interfaces with the system through the Candeo's system manager alarm output ports.

A Nortel Networks cable (NT8D46xx) interfaces from the connector **J4** of the System Monitor (NT8D22xx) located in the Large System pedestal to the Candeo's system manager alarm output ports. The intent of monitoring these alarms is to allow the Large System to report conditions such as low float voltage, major alarms and ac fail alarms. The customer has the option of customizing these alarms through the Candeo system manager and can define what major or minor alarms they wish to monitor.

The System Candeo DC Power Plant produces a Major Alarm for the following faults:

1   High voltage shut down (HVSD)

2   High voltage (HV)

3   Battery on discharge (BOD)

4   Low voltage (LV)

    5   Low voltage disconnect (LVD)

    6   Alarm busy supply (ABSF)

    7   Internal fuse alarm (INT FA)

    8   Fuse alarm (FA)

    9   Rectifier fail alarm (RFA)

Table 21
System Monitor connections – NT8D46xx

Wire	Connector pins	Colour	Label	Suggested alarm
1	P1-1	Black	DCON0	Rectifier Fail
2	P1-2	Red	DCON1	Major
3	P1-3	White	DCON2	Major
4	P1-4	Green	DCON3	Major
5	P1-5	Orange	ALARM	Low Float Voltage
6-9	Not used	Not used	Not used	Not used

Table 22
Cable lengths

Cable	Length
NT8D46AV	32'
NT8D46BV	64'
NT8D46CV	100'

Cabling the Candeo

There are eight configurable Candeo output ports for output alarms. Each output port can use one of the following three contact types: normally open, normally closed, and common. Large Systems use normally closed contacts. Common contacts connect to the Candeo battery return bus. The connector strip J8 is used for all output connections and is removable from system

manager for ease of wiring. Ensure that pin 1 is in the correct orientation for wiring when strip has been removed.

Table 23
Alarm configuration – NT8D46xx

Label	Colour	Candeo alarm port	Candeo J8 connector	Candeo configuration
DCON0	Black	Port 1	J8-1 Normally Closed	Loss of ac power
DCON1*	Red	Port 2	J8-1 Normally closed	Major alarms
DCON2*	White	Port 2	J8-4 Normally closed	Major alarms
DDON3*	Green	Port 2	J8-4 Normally closed	Major alarms
ALARM	Orange	Port 3	J8-7 Normally Closed	Low float
* Twist red, white and green together and connect to port 2 as Major				
Jumper together and connect to battery return bus. J8-2,5,8				

Configuring the alarm ports

Follow the steps in Procedure 17 to configure the alarm ports.

Procedure 17
Configuring the alarm ports

1   Select "Alarm Severity and Output" from the system manager display screen.

2   Under "Alarm Name", select the line with "Ac Fail", and change "Output Port" to 1.

3   Under "Alarm Name", select the line with "Major", and change "Output Port" to 2 (by default it should already be 2).

4   Under "Alarm Name", select the line with "Low Float", and change "Output Port" to Port 3.

5   All other "Output Ports" should be set to "None".

Note: For more detailed information refer to the Alarms section in the *Candeo Power System User Guide (P0914425*).

———————————— **End of Procedure** ————————————

Customizing alarms

Under "Alarm Severity and Outputs", the ports and severity can be configured per customers requirements. If the customer wishes they can utilize signals DCON1, DCON2 and DCON3 by connecting them to other available "No Connect" ports (connect commons on J8 to the battery return bus) and customize as desired.

Under the alarm output screen the relay state is defaulted to "not energized" when alarm is on. To change the relay state an engineering password is required. Contact Astec support for a temporary password to change this field. After the setting has been changed use the normally open contacts when wiring J8.

Note: For further information on all alarms that can be configured for the Candeo see the Alarms section in the *Candeo Power Systems User Guide (P0914425).*

Connecting a system terminal or modem

Contents

This section contains information on the following topics:

About the system terminal

At this point in the installation, a terminal must be connected to a serial data interface (SDI) port to provide an I/O interface to the system. When the installation is complete, a terminal (for local access) or a modem (for remote access) must remain permanently connected to an SDI port to provide a constant I/O interface to the system (see Figure 58 on).

Figure 58
Terminal connection diagram
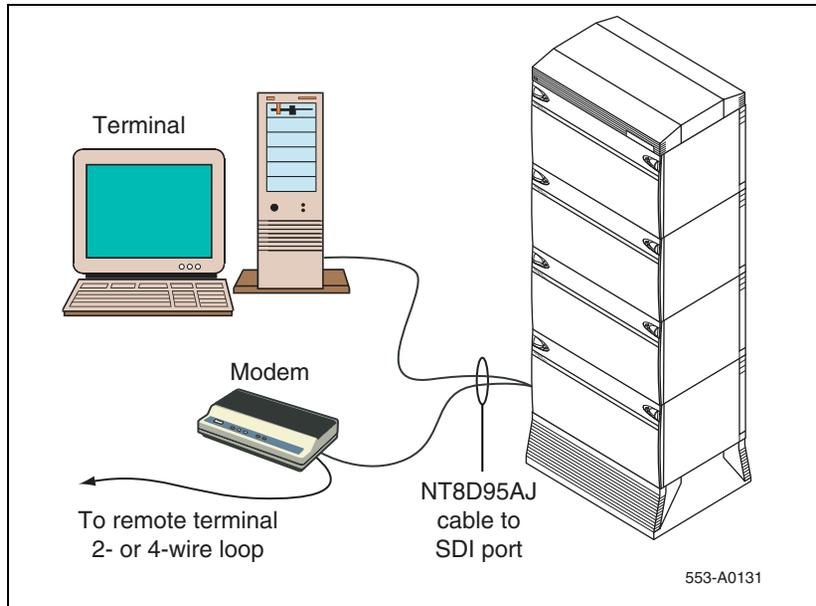
During the initial installation of a dual CPU system, you may want to
temporarily install additional terminals for split mode monitoring, or
programming, or both.

Note: In a Large System, I/O ports on the Call Processing (CP) cards
can be used to monitor CPU operations. These configurations should not
be used as the permanent I/O connection for the system because the port
is only active when the associated CPU, or CPU, is active.

Connecting a terminal

During the system installation and for continuing system operation, a terminal must be connected to an SDI port in a network slot to provide an I/O interface to the active CPU in the system (for local access). In addition, a data terminal equipment (DTE) port (COM 1) and a data communication equipment (DCE) port (COM 2) on the Call Processor Pentium II (CP PII) card can be used for direct access of the cPCI Core/Network Module. Typically, the CP card ports (CPSI ports) or COM1 and COM2 are preconfigured on I/O addresses four and five.

The CPSI/COM1 and COM2 ports are active only when the CPU associated with the CP card is active. Therefore, the CPSI/COM1 and COM2 ports should not be used as the only I/O connection for the system.

When the initial installation is complete, you must leave a terminal or a modem connected to the system. One SDI port in a network slot must be permanently connected to a terminal or modem. On the CPSI/COM1 and COM2 ports you can:

1   disconnect the ports;

2   leave terminals connected for local monitoring; and,

3   connect modems for remote monitoring.

The ABCDE-Switch, which provides up to four-to-one switching, is available from Nortel Networks as part number A0377992. The switch box can be used to connect the SDI and CPSI/COM1 and COM2 ports to a terminal or a modem. If used, one switch box must be used for terminals and one for modems.

Terminal guidelines

During an installation, you can connect terminals to the CPSI/COM1 ports for split mode monitoring, or programming, or both. (Due to the speed of the system messages displayed, personal computers are useful for file capture and review.)

Terminals connected to the CPSI/COM1 ports can be installed as follows.

1   One terminal connects to a CPSI/COM1 port in one CPU (the cable is switched from module to module as needed); one terminal is required in addition to the terminal for the SDI port connection (see Figure 59 on page 139).

2   One terminal connects to a switch box that connects to a CPSI/COM1 port in each CPU; one terminal and a switch box are required in addition to the terminal for the SDI port connection (see Figure 60 on page 140).

3   One terminal connects to a switch box that connects to an SDI port and to a CPSI/COM1 port in each CPU; one terminal and a switch box are required (see Figure 61 on page 142).

Connecting a terminal to a CPSI port

Use Procedure 18 to connect a CPSI/COM1 port directly (no switch box) to a terminal (see Figure 59 on page 139).

Procedure 18
Connecting a terminal to a CPSI port

1   Set the terminal to 9600 baud, 7 data, space parity, one stop bit, full duplex, XON.

2   Connect an NT8D95 cable to a matching connector on the terminal.

3   Connect the NT8D95 cable to J25 on the I/O panel in the rear of the cPCI Core/Network Module.

4   If you are using only one terminal for both CPSI/COM1 ports, switch the cable as needed. The terminal connected to the SDI port always communicates with the active CPU.

———————————— **End of Procedure** ————————————

Figure 59
One terminal for the CPSI/COM1 ports
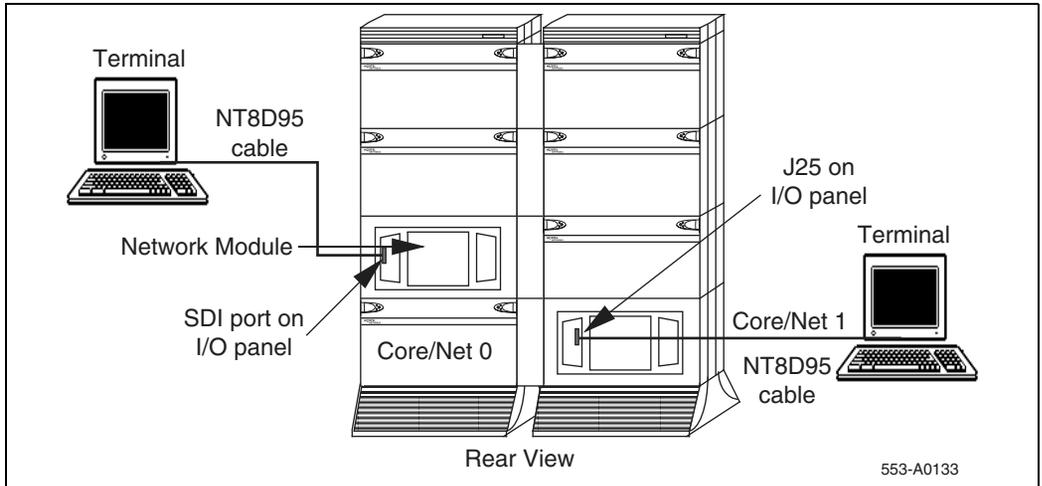
Connecting a switch box and terminal to CPSI/COM1 and COM2 ports

Use Procedure 19 to connect CPSI/COM1 ports to a switch box and a terminal (see Figure 60 on).

Procedure 19
Connecting a switch box and terminal to CPSi/COM1 and COM2 ports

1   Set the terminal to 9600 baud, 7 data, space parity, one stop bit, full duplex, XON.

2   Connect an NT8D95 cable to the terminal and to the switch box.

3   Connect NT8D95 cables to a matching connector on the switch box. When using an A0377992 ABCDE box, connect:

   — CPU 0 to connector A.

   — CPU 1 to connector B.

4   Connect the NT8D95 cables from the switch box to J25 on the I/O panel in the rear of the cPCI Core/Network Modules.

5 To communicate directly with a CPSI/COM1 port, switch the cable as needed. The terminal connected to the SDI port will always communicate with whichever CPU is active.

——————— **End of Procedure** ———————

Figure 60
One terminal and a switch box to two CPSI/COM1 ports

Note: The A0377992 switch box can be used in this configuration.

553-A0134
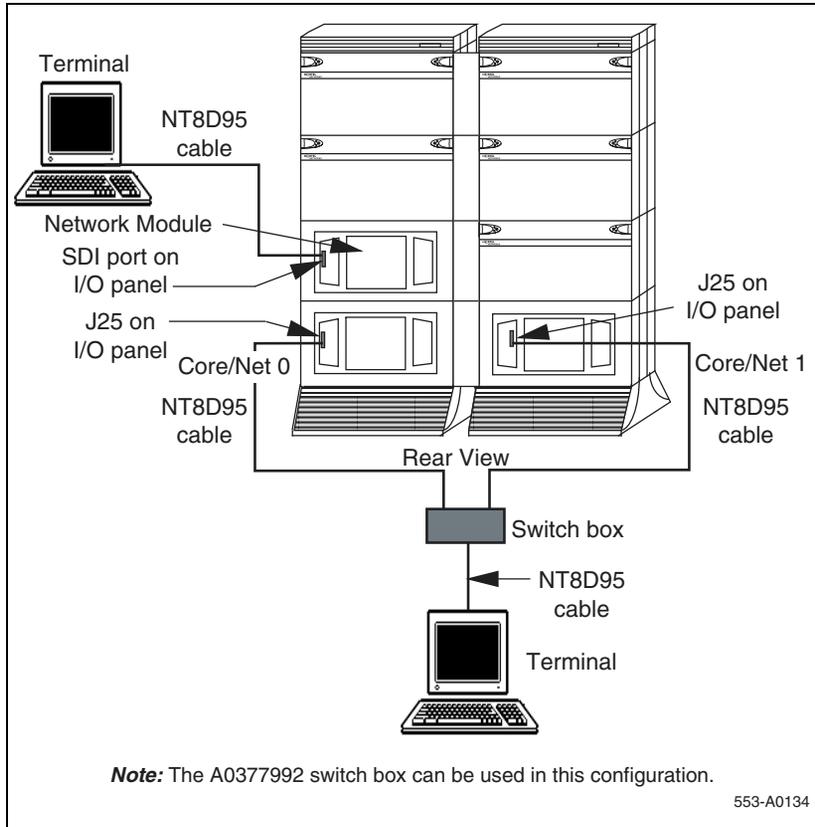
Connecting a switch box and terminal to the SDI and CPSI/COM1 ports

Use Procedure 20 to connect CPSI/COM1 ports to a switch box and a terminal (see Figure 60 on and Figure 61 on).

Procedure 20
Connecting a switch box and terminal to the SDI and CPSI/COM1 ports

1   Set the terminal to 9600 baud, 7 data, space parity, one stop bit, full duplex, XON.

2   Connect an NT8D95 cable to the terminal and to the switch box.

3   Connect NT8D95 cables to a matching connector on the switch box. When using an A0377992 ABCDE box, connect:

— CPU 0 to connector A.

— CPU 1 to connector B.

— The SDI port to connector D (connector C is common).

4   Connect NT8D95 cables from the switch box to J25 on the I/O panel in the rear of each cPCI Core/Network Module.

5   Connect an NT8D95 cable from the switch box to the I/O panel slot for the SDI card.

6   To communicate with the system in general, set the switch box to the SDI port. To communicate directly with a CPSI COM1 port, switch the cable as needed.

──────────   **End of Procedure**   ──────────

Figure 61
One terminal and a switch box to the SDI and CPSI/COM 1 ports

Note: The A0377992 switch box can be used in this configuration.

553-A0135
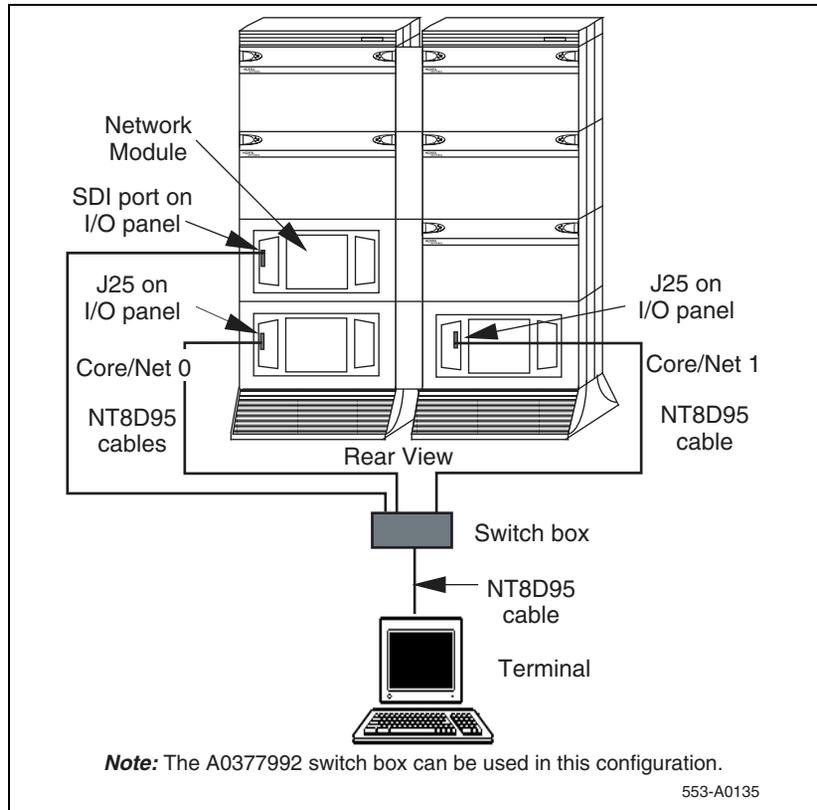
Connecting a modem

A modem must be connected to an SDI port in a network slot. The modem provides an I/O interface to the active CPU in the system for remote access.

You can connect a modem to one of the following:

1   An SDI port to remotely monitor general system operation

2   The CPSI ports for debugging and patch downloading (through your Nortel Networks representative)

3   A remote connection to both the SDI and CPSI/COM 2 ports

Modem guidelines

At the Large System end (the local end), modems must be set to dumb mode (command recognition OFF, command echo OFF). The local end modems can be configured with:

1   one modem connected to the SDI port and the cable switched to each CPSI/COM 2 port as needed (see Figure 62 on), or

2   one modem connected to a switch box that is connected to the SDI and CPSI/COM 2 ports (see Figure 63 on).

Note: The second method listed here is preferred. Other configurations, such as a separate modem for each port, are possible.

At the remote end, at least one modem (which can be set to smart mode), one terminal, and one RS-232 cable are required in all modem configurations.

Required and recommended specifications for local end modems are:

1   *Required:* true, not buffered, 9600 baud support (required for remote Nortel Networks technical support)

2   *Required:* CCITT V.32 or V.32bis compliance

3   *Recommended*: the ability to adjust to lower and higher speeds, depending on line quality, while maintaining 9600 baud at local DTE

4   *Recommended*: V.42 error correction

5   *Recommended*: V.42bis data compression

A dispatch or call back modem, normally connected to the SDI port, can be used if it meets the requirements. To use a dispatch or call back modem that does not meet the requirements, the modem must be used with a modem that meets specifications.

Configuring the modem

Use Procedure 21 to configure the modem. You must configure the modem before you connect it to the Large System. A terminal, such as a PC computer, is required to configure the modem.

Procedure 21
Configuring the modem

1 Turn the modem off.

2 Set the modem DIP switches as follows.

- DIP switches 1, 3, 7, and 8 to ON (down)

- DIP switches 2, 4, 5, and 6 to OFF (up)

3 Connect an RS-232 cable to the modem and to a terminal.

4 Set the terminal with the following values.

- 9600 baud

- 8 bits

- 1 stop bit

- no parity

5 Turn the modem on and enter each command listed below with a carriage return (press Enter or Return key).

- AT&F Load active profile

- AT&H0 Flow control disabled

- AT&D3 Resets on receipt of DTR

- AT&S1 Modem controls DSR

- ATS0 =1 Answer after 1 ring

- ATS2 =128 Escape character = ASCII 128

- ATS7 =60 Pause 1s for carrier detection

- ATQ1 Quiet mode

- AT&W Store active profile

The modem responds **OK** to every command (except for the last two commands ATQ1 and AT&W).

6   Disconnect the power cord and serial from the modem.

7   Set DIP switches 1 and 4 to ON (down) and the remaining switches OFF (up).

End of Procedure

Connecting a modem to an SDI port

Use Procedure 22 to connect an SDI port directly (no switch box) to a modem (see Figure 62 on).

Procedure 22
Connecting a modem to an SDI port

1   At the remote end, connect an RS-232 cable to the terminal and to the modem.

2   At the remote end, connect the cable from the modem to an RJ11 telephone jack. If a cable is required, connect an NT8D46 cable to the modem and to the RJ11 jack.

3   At the local end, configure the modem.

Follow the manufacturer's instructions to set the modem for 9600 baud, auto answer, dumb mode, command recognition OFF, command echo OFF.

4   At the local end, connect an NT8D95 cable to the SDI port on the I/O panel in the rear of the module and to the modem.

5   At the local end, connect the cable from the modem to an RJ11 telephone jack. If a cable is required, connect an NT8D46 cable to the modem and to the RJ11 jack.

6   To communicate with a CPSI/COM 2 port, switch the cable from the modem to the port as needed.

   • For debugging or monitoring, connect the cable to the *active* CPU at J21 on the I/O panel in the rear of the cPCI Core/Network Module.

   • For patch downloading, connect the cable to the *inactive* CPU at J21 on the I/O panel in the rear of the cPCI Core/Network Module.

End of Procedure

Figure 62
Modem to SDI port

RJ11 jack

Smart mode modem

Terminal

Modem cable (or NT8D46)

RS-232 cable

Remote end

Public phone network

RJ11 jack

Dumb mode modem

SDI port on I/O panel

Network module

Modem cable (or NT8D46)

NT8D95 cable

Rear View

Note: The A0381391 modem can be used in this configuration.

553-A0136
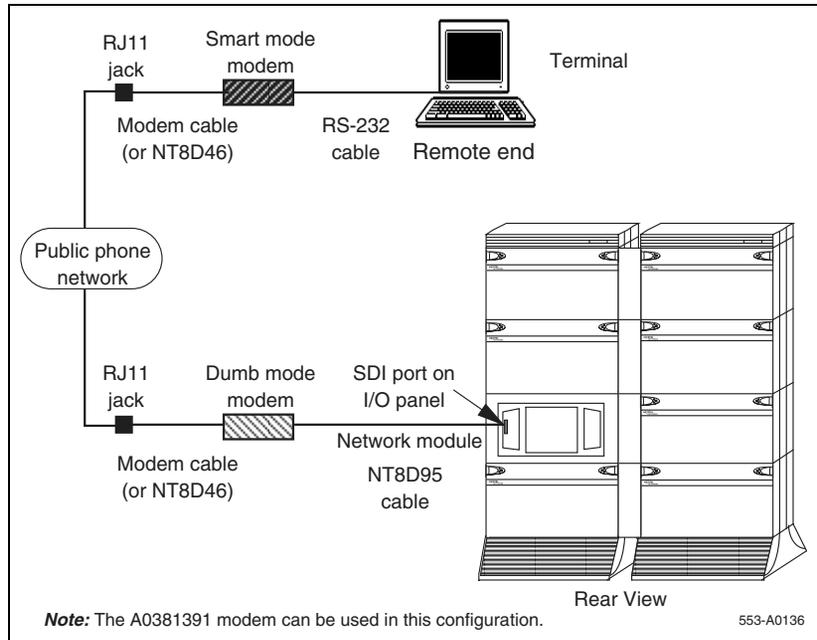
Connecting modem to switch box, CPSI/COM 2 ports, SDI ports

Use Procedure 23 to connect SDI and CPSI/COM 2 ports to a switch box and a modem (see Figure 63 on page 148 and Figure 64 on page 149).

Procedure 23
Connecting a modem to a switch box, CPSI/COM 2 and SDi ports

1   At the remote end, connect an RS-232 cable to the terminal and to the modem.

2   At the remote end, connect the cable from the modem to an RJ11 telephone jack. If a cable is required, connect an NT8D46 cable to the modem and to the RJ11 jack.

3   At the local end, configure the modem.

Follow the manufacturer's instructions to set the modem for 9600 baud, autoanswer, dumb mode, command recognition OFF, and command echo OFF.

4   At the local end, connect NT8D95 cables to:

- J21 on the I/O panel in the rear of the Core or Core/Network Modules
- the SDI port on the I/O panel in the rear of the Network module

5   At the local end, connect NT8D84 cables to the SDI Paddle Board at the Core/Network backplane to the I/O panel in the rear of the cPCI Core/Network Module.

6   At the local end, connect NT8D95 cables from the I/O panels to a matching connector on the switch box.

   a.   If you are using an A0377992 ABCDE box, connect cables as follows.

     — Connect CPU 0 to connector A.

     — Connect CPU 1 to connector B.

     — Connect the SDI port to connector D (connector C is common).

7   At the local end, connect an NT8D95 cable from the switch box to the modem.

8   At the local end, connect the cable from the modem to an RJ11 telephone jack. If a cable is required, connect an NT8D46 cable to the modem and to the RJ11 jack.

9   At the local end, set the switch box as needed to communicate with the CPSI/COM 2 ports.

- During normal operation, set the switch to the SDI port.
- For debugging, set the switch to the *active* CPU.
- For patch downloading, set the switch to the *inactive* CPU.

———————————— **End of Procedure** ————————————

Figure 63
Modem to a switch box and SDI and CPSI/COM 2 ports (dual-column systems)

RJ11 jack

Smart mode modem

Terminal

Modem cable (or NT8D46)

RS-232 cable

Remote end

SDI port on I/O panel

Network module J21 on I/O panel

J21 on I/O panel

Core/Net 0

Core/Net 1

NT8D95 cables

Rear View

NT8D95 cable

Public phone network

Switch box

RJ11 jack

Modem cable (or NT8D46)

NT8D95 cable

Dumb mode modem

Note: The A0377992 switch box and A0381391 modem can be used in this configuration.

553-A0137

Figure 64
Modem to a switch box and SDI and CPSI/COM 2 ports (single-column systems)

553-A0138

Cabling common equipment in a single group system

Contents

This section contains information on the following topics:

Cabling guidelines

The NT4N41 Core/Net module backplane (see Figure 65 on page 153), like all circuit boards, has a primary side and a secondary side. The primary side, which faces the front of the module, contains the primary shrouds, which provide mechanical guidance for the pins of the card edge connectors. The secondary side of the backplane, which faces the rear of the module, contains the secondary shrouds, which provide mechanical guidance for cable connectors.

Because the cable troughs and spaces on the sides of a module are within the EMI shielding of the system, unshielded cables can be routed in those areas.

As space permits, common equipment cables can be routed horizontally in the cable troughs at the front, rear, and sides of the module or vertically on the sides of the module.

Note: In a dc-powered module, because there is no MPDU, there is room to route cables horizontally from front to rear on the left side (front view) of the module.

> **CAUTION**
>
> **System Failure**
>
> Cables must be routed as perpendicular as possible to any nearby power cables. Avoid routing cables near power cables if alternate routing is available.
>
> At the rear of the module, cables routed between the I/O panel and the rear cover can be parallel to the power cables because the panel provides EMI shielding.

A label kit is included in system package. Use of these labels is optional.

Note: To replace cables from the Core/Net module backplane, you must use the P0741489 Extraction Tool provided, located in the rear of the module (behind the I/O safety panel).

Figure 65
NT4N41 Core/Net shelf fanout panel (backplane)
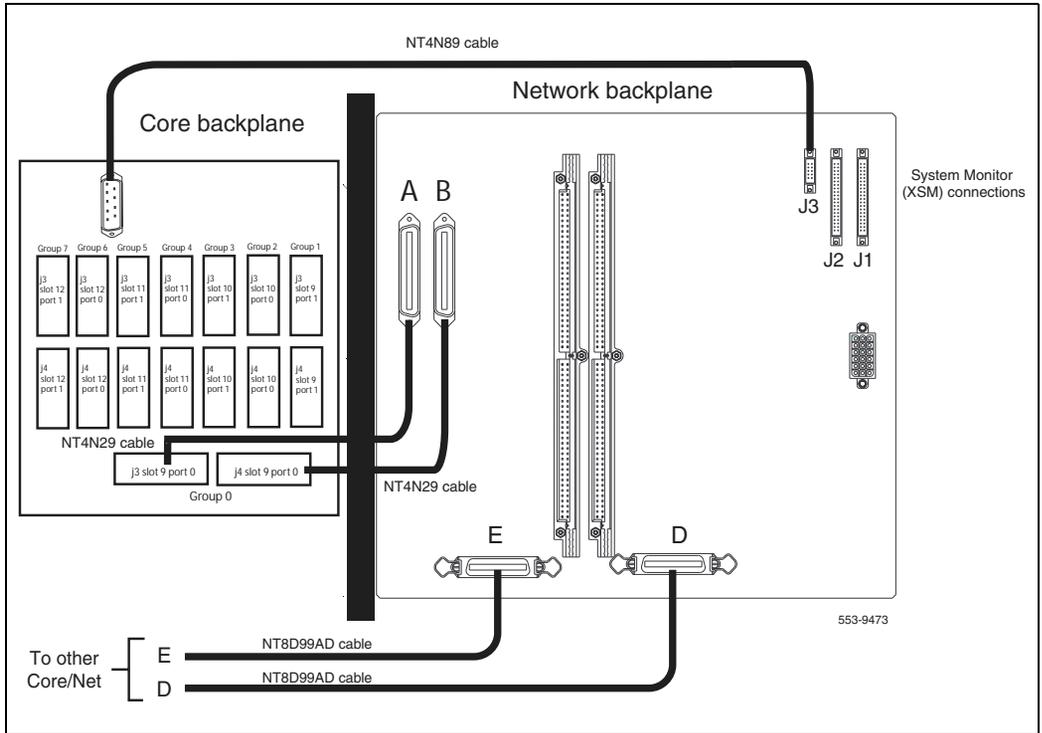
Core/Net module

The Core/Net modules contain two distinct sets of circuit cards: Core cards and Network cards. This section contains instructions on:

1 "Reviewing Core/Net module placement" on

2 "Reviewing required Core cards" on

3 "Checking that the Core cards (front side) are installed" on

Reviewing Core/Net module placement

Core/Net modules can be installed side-by-side on top of separate pedestals (see Figure 66) for power and cooling redundancy or in a stacked configuration (see Figure 67) in a single column.

Core/Net 1 is always on the left. Core/Net 0 is always on the right.

Figure 66
Stacked configuration of Core/Net modules

553-AAA0757
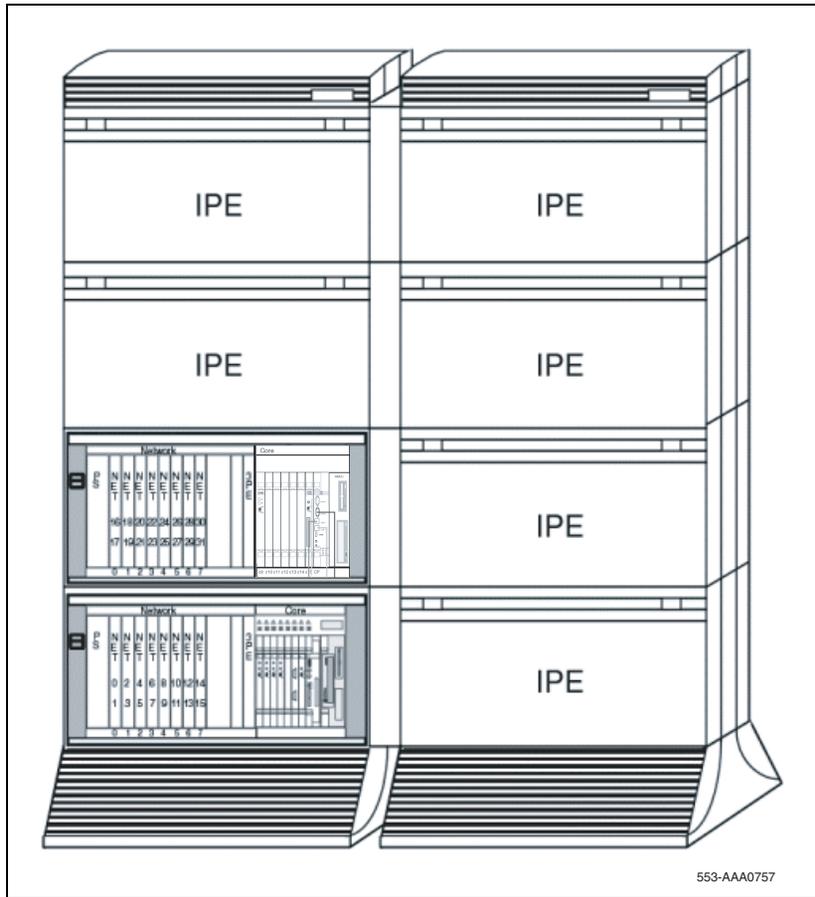
Figure 67
Side-by-side configuration of Core/Net modules

553-AAA0756
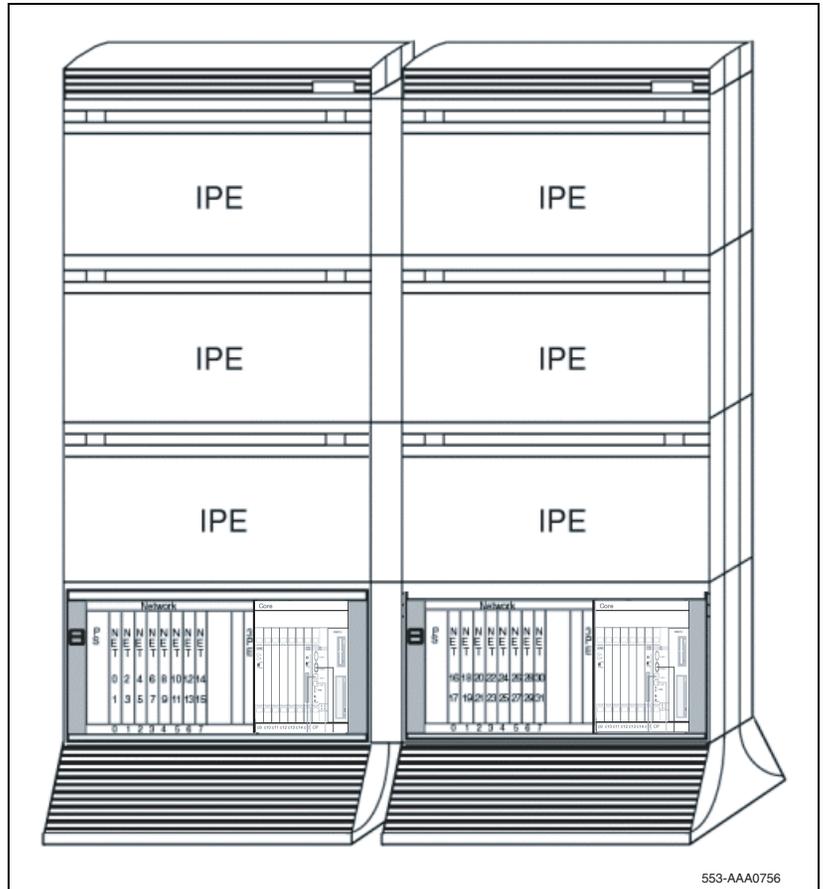
Reviewing required Core cards

All Core cards are installed in the factory. See Table 24 for the Core card requirements for each Core/Net module. Refer to "System equipment – UEMs" on page 20 for module and card descriptions.

Table 24
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	front
NT4N48AA	System Utility Card	1	front
NT4N64AA	CP PII Call Processor Card (256MB memory)	1	front
NT4N43CA	Multimedia Disk Unit (MMDU)	1	front

Checking that the Core cards (front side) are installed

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

1   **NT4N65AB cPCI Core Network Interface (cCNI) card**. Each system contains one NT4N65 cCNI card per Core/Net module. The cCNI cards are located in slot c9. If not already installed, install a P605337 cPCI Card Slot Filler Panel to cover slots c10 - c12, which do not contain cCNIs.

Note: In the NT4N41 Core/Net module, port 0 on the NT4N65 Core to Network Interface (cCNI) Card in slot c9 must be configured as "Group 0." Communication between the bv cCNI and 3PE cards for Group 0 is accomplished through the NT4N29 cable. Only one cCNI card is required for Group 0.

Note: Slots c13 and c14 are left empty. If not already installed, install a P0605337 cPCI Card Slot Filler Panel in each slot.

2 **NT4N48AA System Utility card**. The System Utility card is located in slot c15.

3 **NT4N64AA Call Processor PII** (**CP PII**). This card is located in the slot marked CP.

4 **NT4N43CA Multi-Media Disk Unit** (**MMDU**). The 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.

Cabling the Core side

This section describes installation of the Core cables. Table 25 lists field-installed cables. Table 26 lists factory-installed cables.

Table 25
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
NT4N90BA	Ethernet (CP PII card to I/O panel)	2
NTRC17BA	Crossover Ethernet cable (Core to Core)	1
customer supplied	Standard Ethernet cable (I/O Panel to LAN switch)	2
Note: If there is no connection to a LAN, connect the 2 LAN 1 connectors using the NTRC17BA crossover cable.		

Table 26
Factory installed Core cables (internal) (Part 1 of 2)

Cable part number	Description	Number required per system
NT4N4405	Shelf Power: Net backplane to Core backplane	2
NT4N29AA	cCNI to 3PE Core/Net shelf cable	4

Table 26
Factory installed Core cables (internal) (Part 2 of 2)

Cable part number	Description	Number required per system
NT4N92AA	CD-ROM/HDD Data	2
NT4N93AA	FDD Data	2
NT4N95AA	Core/Net FDD/HDD/CD ROM Power	2
NT4N89AA	System Utility Card to XSM (see Figure 69)	2

Figure 68
Core/Net cable connections (top view)
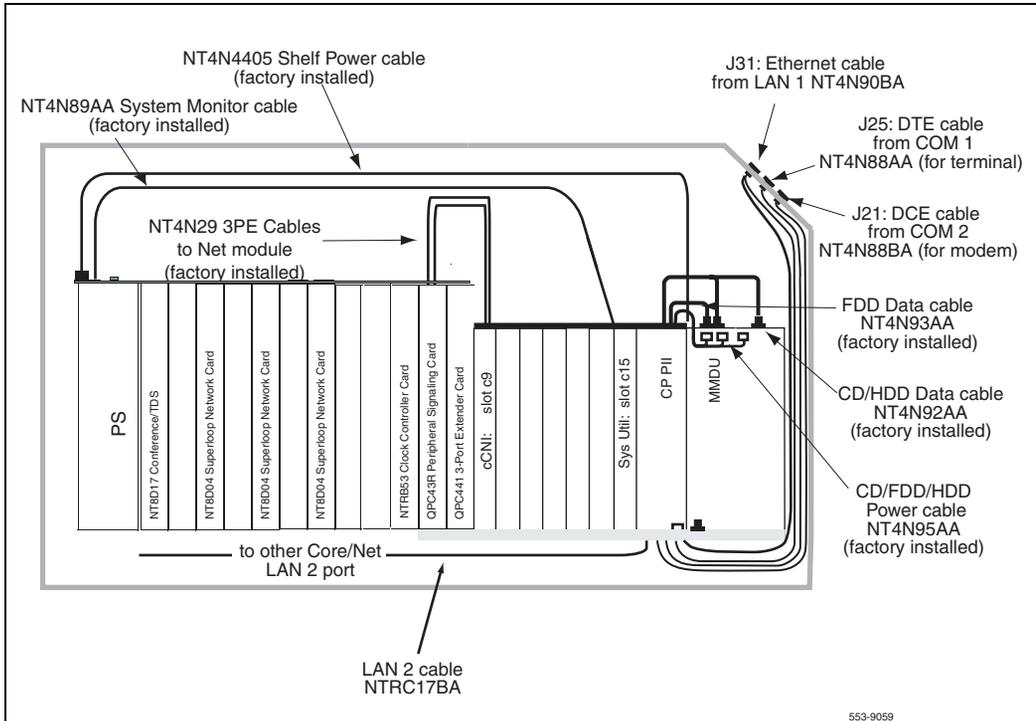
Figure 69
CP PII Core and Network backplanes
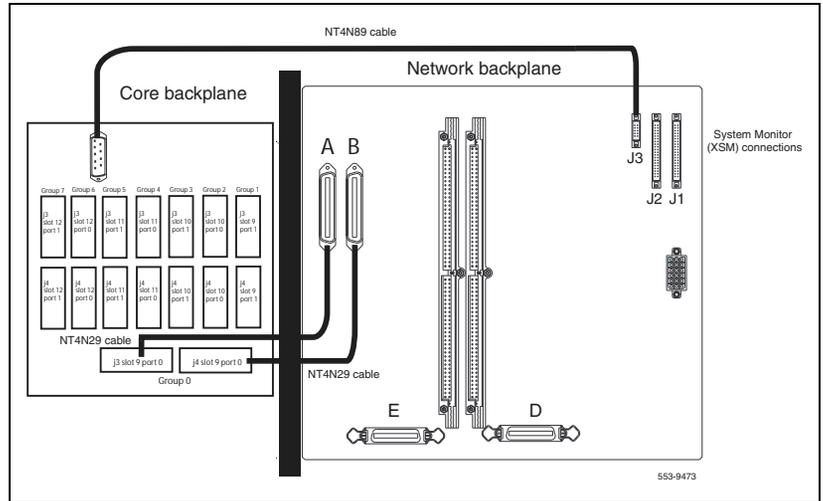
Cabling the I/O panel

Connect the cables from the CP PII card faceplate to the I/O panel on the back of the Core/Net modules. Figure 68 on page 158 displays the COM and LAN cable connections.

- 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 switch.

- LAN 2 is used to connect Core 0 to Core 1 for system redundancy.

    Note: If there is no LAN, LAN 1 and LAN 2 are connected from Core 0 to Core 1.

> **CAUTION**
>
> **Loss of Data**
>
> 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.

Procedure 24
Installing the CP PII to I/O panel cables

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 NT4N90BA.
    This connection can only be made *after* the Dual Ethernet Adapter is installed (see step 3 above).

    Note: If a LAN switch is not used, connect LAN 1 in Core 0 to LAN 1 in Core 1.

5   Connect a crossover Ethernet cable (NTRC17BA) from the LAN 2 port in Core 0 to the LAN 2 port Core 1. This connection is for Core redundancy.

    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.

──────────────── **End of Procedure** ────────────────

Cabling the Network side

Table 27 lists the number of circuit cards required by each system. Table 28 lists the number of net cables required by each system.

Table 27
Required Net side cards

Quantity	Part number	Description
2 per system	NTRB53	Clock Controller card
2 per system	3PE QPC441 vintage F or later	3 Port Extender
2 per system	PS QPC43 vintage R or later	Peripheral Signaling Card

Table 28
Required Net side cables

Quantity	Part number	Description
1 per system	NT8D75	Clock Controller cable
2 per system	NT8D80 3PE to 3PE	3 Port Extender cable

Figure 70
CP PII Core/Net Module slot
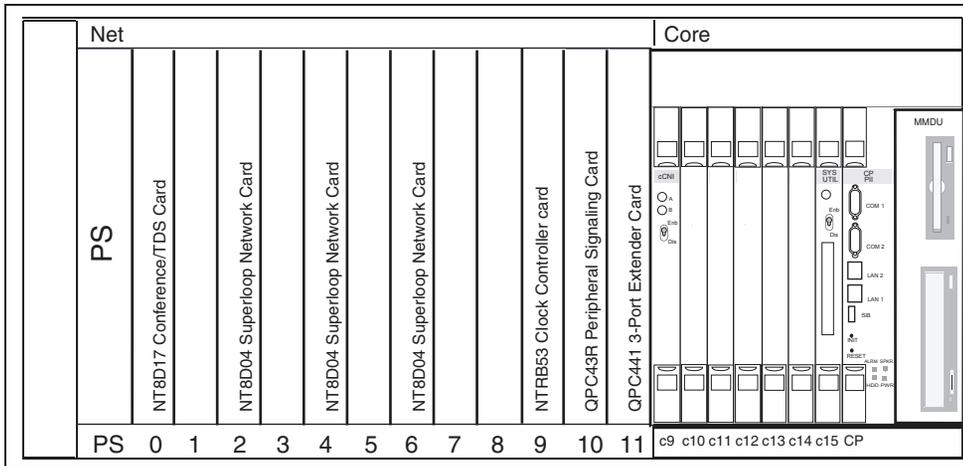
553-9123r26revised

Configuring and cabling the Clock Controllers (NTRB53)

Two Clock Controller cards are required in each system to synchronize functions.

The Clock Controllers cards must be installed as directed in the following two rules.

1 Two Clock Controller cards must be installed in each system. The Clocks must be connected to each other in Network Group 0.

2 The two Clock Controllers must be installed in Slot 9 of each Core/Net module.

For Clock controller DIP-switch settings refer to *Circuit Card: Description and Installation* (553-3001-211).

Connecting Clock Controller cables

Procedure 25
Connecting the Clock Controller cables

See Figure 74 on page 168.

1   Connect P1 of the NT8D75 cable to port J3 of Clock Controller 0.

2   Connect P2 of the NT8D75 cable to port J3 of Clock Controller 1.

—————————— **End of Procedure** ——————————

Connecting network Group 0: Shelf 0 to Shelf 1

Each Single Group System contains one Network group, Group 0. Each Network group is comprised of two Network shelves: Shelf 0 and Shelf 1.

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.

This section contains instructions on:

1   "Connecting the 3PE faceplates in the Core/Net modules" on page 163

2   "Inspecting CNI to 3PE (NT4N29AA) factory installed cables" on page 164

3   "Connecting the Core/Net backplanes" on page 166

Connecting 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 71 on page 165. This connection is only made between the Group 0 shelves in the Core/Net modules.

Procedure 26
Connecting the 3PE faceplates 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.

———————————— **End of Procedure** ————————————

Inspecting CNI to 3PE (NT4N29AA) factory installed cables

New NT4N29 cables must be installed for existing Network Group 0. If the system has XSDI cards, reinstall the cards and attach the cables.

Procedure 27
Inspecting NT4N29AA factory installed cables

1   If Network Group 0 will be in the Core/Net, the factory configuration of the new Core/Net modules is correct. Continue on to "Connecting the Core/Net backplanes" on .

2   If Network Group 0 will not be in the Core/Net module, re-configuration of the processor module is required.

Note: Re-configuration of the processor module is required to allow for concurrent or future use of the Network portion of the Core/Net for a higher Network group. The NT4N40 shelf is factory installed with NT4N29 cables and is configured as Group 0.

a. Use the extraction tool to disconnect the NT4N29 cables from the Core backplane.

b. Connect the cables to the appropriate group (see Table 29).

Table 29
Fanout panel to 3PE card connectors

Group Number		Fanout Panel connector		3PE card connector
0	connects from	9-0, J3	to	A
0	connects from	9-0, J4	to	B
Note: Group 0 cables (NT4N29) connect the fanout panel directly to the network backplane of Core/Net 1.				

———— **End of Procedure** ————

Figure 71
3PE faceplate connections
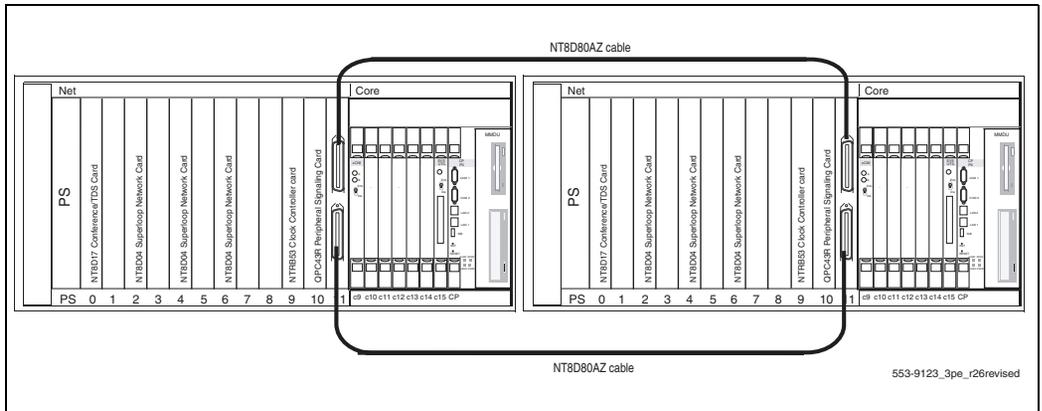
Connecting the Core/Net backplanes

The Shelf 0 and Shelf 1 backplanes must be connected with two NT8D99AD cables (Core/Net modules only).

Procedure 28
Connecting the Core/Net backplanes

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 72.

──────── **End of Procedure** ────────

Figure 72
Connecting the Core/Net backplanes
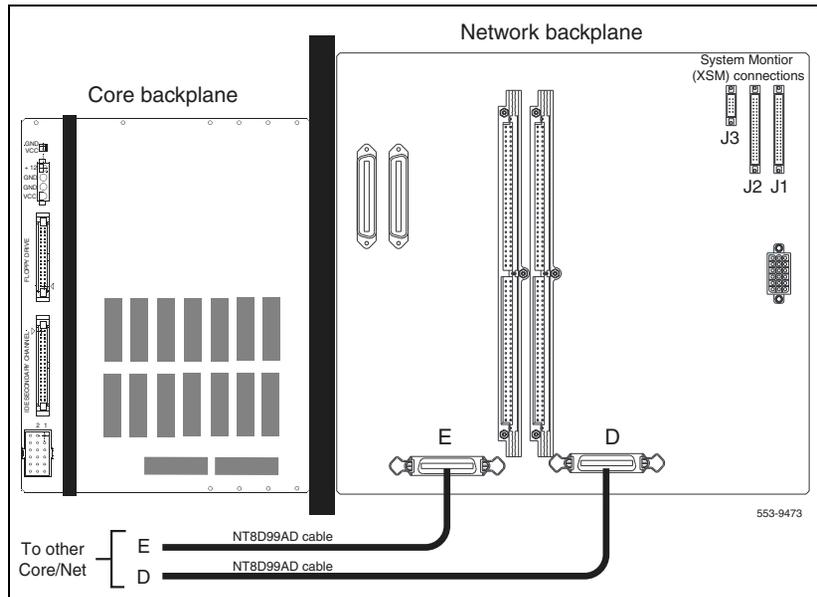
Optioning the System Utility Card

To install the system utility card, first identify Core/Net 0 and Core/Net 1 shelves. Then adjust the DIP switches according to Table 30.

Table 30
System Utility Card DIP switch settings

	Core/Net 0	Core/Net 1
DIP switch 1	on	off
DIP switch 2	on	on

Figure 73 on shows Core card (front side) placement. If the Core cards are not installed, refer to Figure 73 to add or replace cards.

Figure 73
Core side of Core/Net module
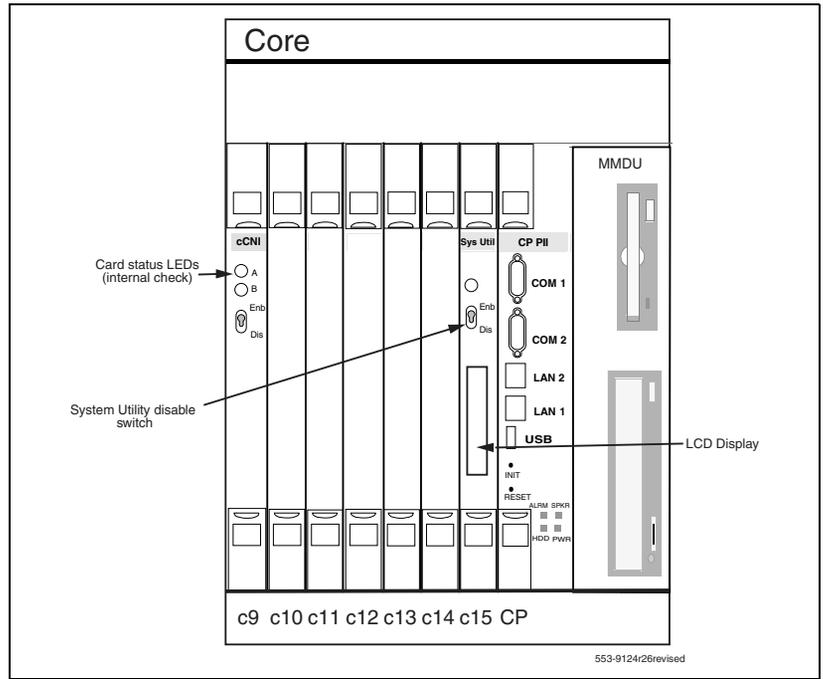
Connecting Core modules to a LAN

Connect each Core/Net module to a local area network (LAN). This connection provides a communication channel for LAN based systems management tools such as OTM, Symposium, Call Pilot and Element Manager. This connection also supplies additional redundancy capabilities. See Figure 75 on page 169.

Note 1: If a LAN is not available, connect the second NTRC17BA 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 "Cabling the I/O panel" on page 159 before the Ethernet connections can be completed.

Figure 74
CP PII to I/O panel connections)
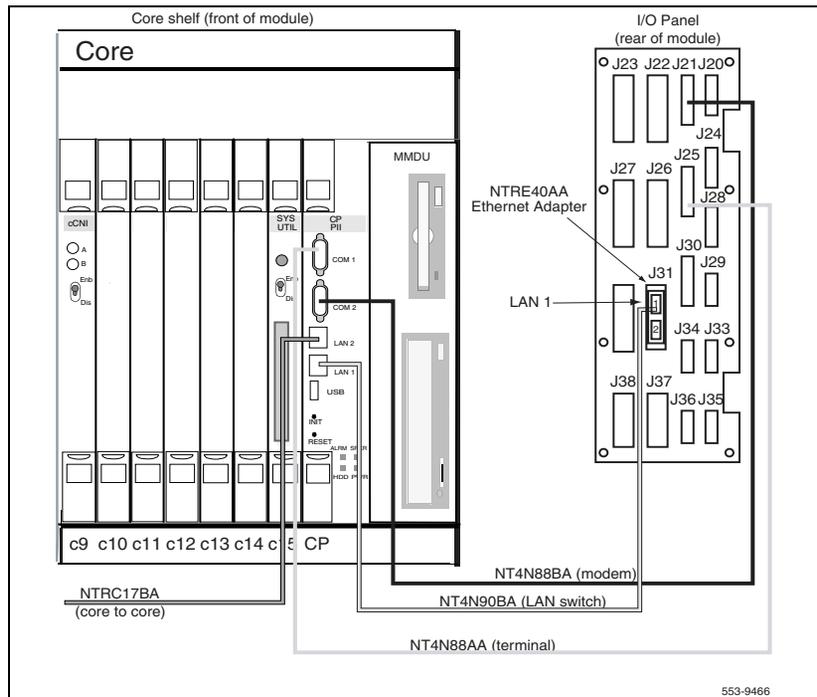
Procedure 29
Connecting the Core module to a LAN

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 switch.

3   Connect a second Ethernet cable from J31 (top) on the Core/Net 1 I/O
panel to the LAN switch.

—————————   **End of Procedure**   —————————

Figure 75
Options for LAN 1 connections

553-A0145
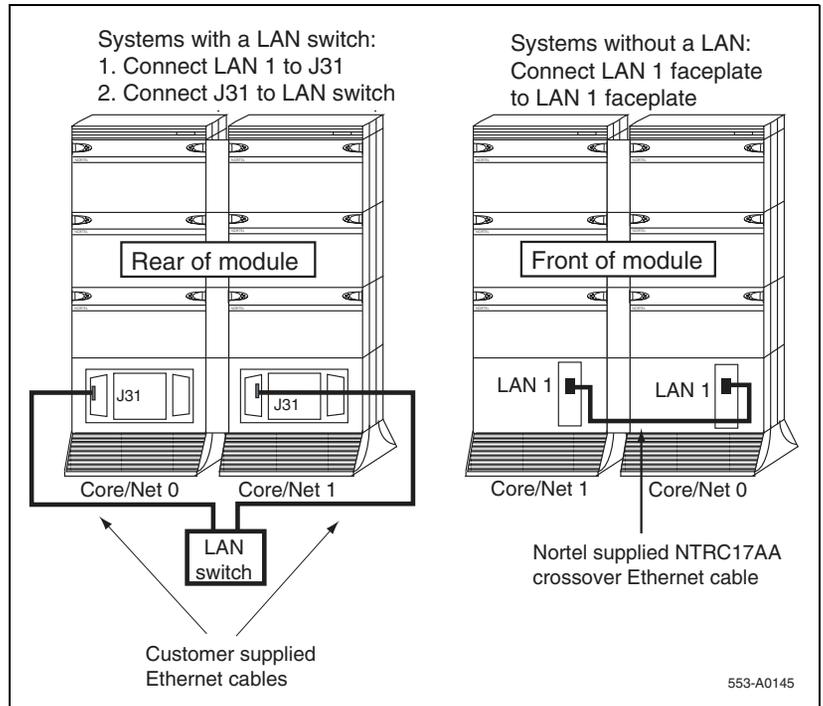
Cabling common equipment in a multi group system

Contents

This section contains information on the following topics:

Cabling guidelines

The NT4N41 Core/Net module backplane (see Figure 76 on page 173), like all circuit boards, has a primary side and a secondary side. The primary side, which faces the front of the module, contains the primary shrouds, which provide mechanical guidance for the pins of the card edge connectors. The secondary side of the backplane, which faces the rear of the module, contains the secondary shrouds, which provide mechanical guidance for cable connectors.

When routing cCNI to 3PE cables, store any excess cable length near the associated Network module. Do not store excess cable in the Core/Net module.

Because the cable troughs and spaces on the sides of a module are within the EMI shielding of the system, unshielded cables can be routed in those areas. As space permits, common equipment cables can be routed horizontally in the cable troughs at the front, rear, and sides of the module or vertically on the sides of the module.

Note: In a dc-powered module, because there is no MPDU, there is room to route cables horizontally from front to rear on the left side (front view) of the module.

> **CAUTION**
>
> **System Failure**
>
> Cables must be routed as perpendicular as possible to any nearby power cables. Avoid routing cables near power cables if alternate routing is available.
>
> At the rear of the module, cables routed between the I/O panel and the rear cover can be parallel to the power cables because the panel provides EMI shielding.

Figure 76
NT4N41 Core/Net shelf fanout panel (backplane)
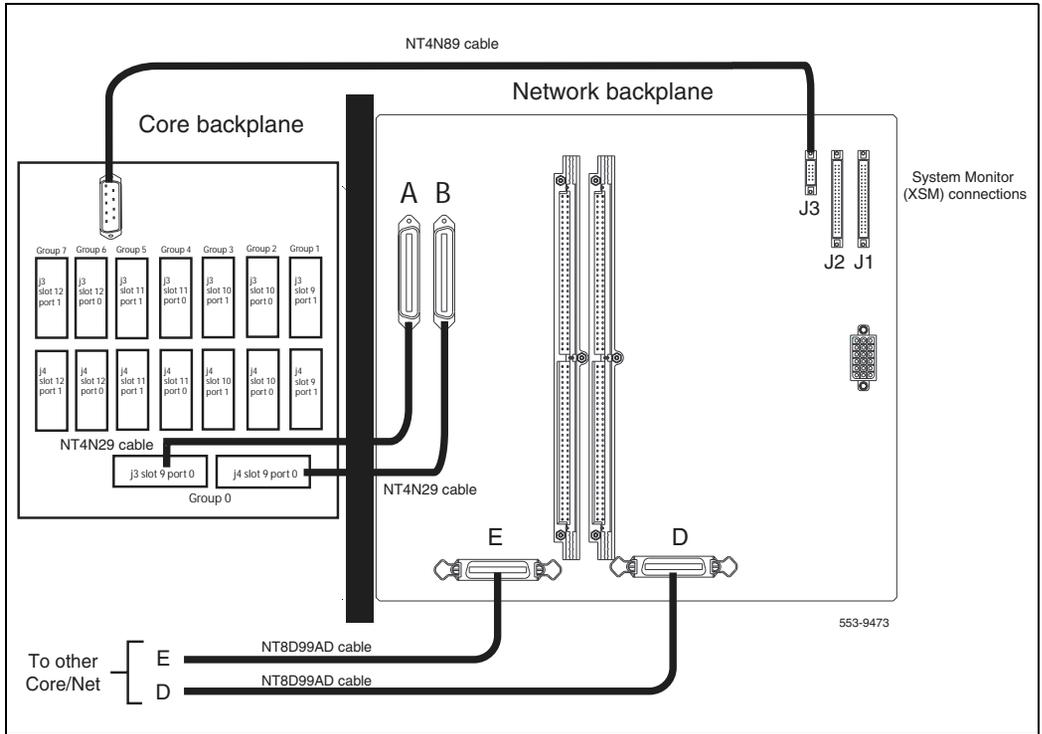
A label kit is included in the system package. Use of these labels is optional.

Core/Net module

The Core/Net modules contain two distinct sets of circuit cards: Core cards
and Network cards (see Figure 77 on page 175). 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 "Cabling network modules and loops" on page 203.

Reviewing 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 77 on page 175).

Reviewing required Core cards

All Core cards are installed in the factory. See Table 31 on page 174 for the Core card requirements for each Core/Net module. Refer to "System equipment – UEMs" on page 20 for module and card descriptions.

Table 31
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
NT4N48AA	System Utility Card	1	front
NT4N64AA	CP PII Call Processor Card (256MB memory)	1	front
NT4N43CA	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.			

Figure 77
Side-by-side placement of CP PII Core/Net modules

Module 3 (IPE)

Module 2 (Network)

Module 1 (Network)

Module 0 Core/Net 1

Module 3 (IPE)

Module 2 (Network)

Module 1 (Network)

Module 0 Core/Net 0

Column 1

Column 0

553-9135
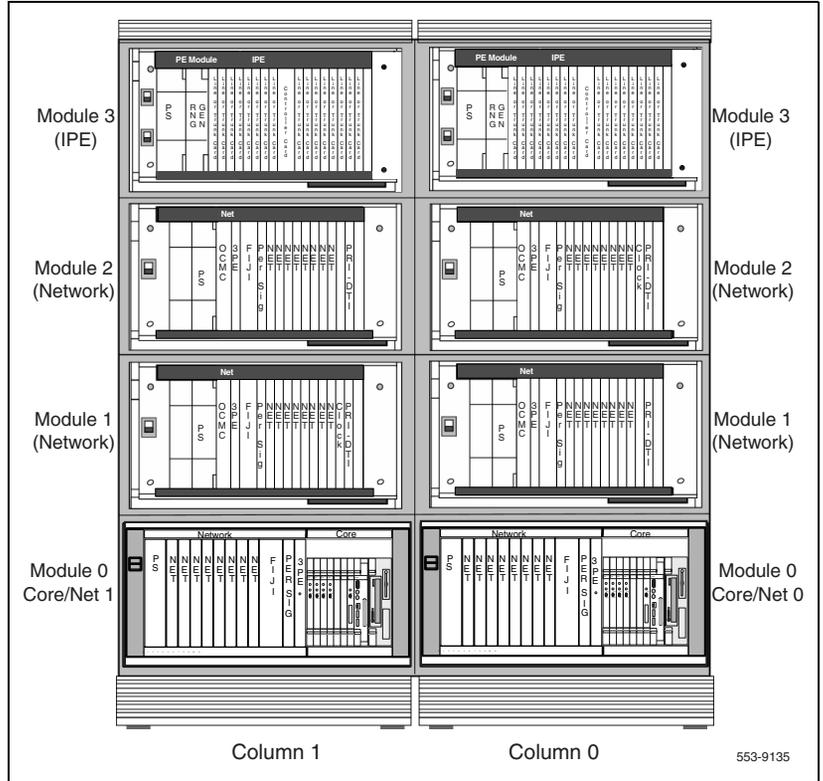
Checking Core card (front side) installation

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

1   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 P0605337 cPCI Card Slot Filler Panel to cover any of slots, c10 - c12, which do not contain cCNIs.

Note: In the NT4N41 Core/Net module, port 0 on the NT4N65 Core to Network Interface (cCNI) Card in slot c9 must be configured as "Group 0." Communication between the bv cCNI and 3PE cards for Group 0 is accomplished through the NT4N29 cable.

Note: Slots c13 and c14 are left empty. If not already installed, install a P0605337 cPCI Card Slot Filler Panel in each slot.

2   NT4N48AA System Utility (Sys Util) card. The System Utility card is located in slot c15.

3   NT4N64AA Call Processor PII (CP PII). This card is located in the slot marked CP.

4   NT4N43CA Multi-Media Disk Unit (MMDU). The 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.

Cabling the Core/Net module backplane

Before you connect cables to the backplane, visually inspect the backplane shroud connectors to make sure there are no bent pins.

CAUTION

Damage to Equipment

Pins may be bent or broken if you try to insert the cable connector at an angle. Do not push the connector in any further after you hear the click.

Procedure 30
Cabling the Core/Net module backplane

1 Orient the cable connector so the strain relief paddle is to the right.

2 Partially insert the cable connector so its guides mate to the corresponding backplane connector.

3 Apply a small amount of pressure to push the cable connector straight into the backplane connector. You will feel a click when the connector seats.

———————— **End of Procedure** ————————

Disconnecting cables from the Core/Net module backplane

To disconnect cables from the Core/Net module backplane, you must use the P0741489 Extraction Tool provided, located in the rear of the module (behind the I/O safety panel).

<table>
<tr>
<td>⚠️</td>
<td>

CAUTION

Damage to Equipment

Use the P0741489 Extraction Tool to disconnect cables from the backplane shrouds in NT4N41 Core/Network modules.

Follow the procedure below to avoid bending or breaking pins when removing cable connectors from the backplane shrouds.

Do not insert the extraction tool unless the cable connector is locked into the shroud.

Do not force the extraction tool deeper than the detent on the cable connector.

Do not improvise with common hand tools.

</td>
</tr>
</table>

Procedure 31
Removing cable connectors from the backplane

Use extreme caution to avoid bending or breaking backplane pins. Do not insert the extraction tool unless the cable connector is locked into the securing clip. A gentle tug on the cable will allow you to determine whether or not the connector is secured. Do not force the extraction tool deeper than the tab on side of the cable connector hood.

1 Grasp the cable connector by the strain relief tab.

2 Center the long flat edge at the straight end of the tool between the cable connector hood and the securing clip.

   Note: If the straight end of the tool is notched, use that end if the connector can be accessed straight-on. If you must approach the connector from any angle at all, use the angled end.

3 Gently insert the extraction tool and gradually apply pressure in the direction directly toward the backplane while gently pulling the cable away from the backplane. A gentle side-to-side rocking motion may be used on the cable if needed.

⚠️ **CAUTION**

Damage to Equipment

Do not pry the against the connector with the extraction tool. Simply inserting the tool between the connector and the securing clip is sufficient to unlock the connector. Prying may cause damage to the connector or the backplane pins.

---

4 Stop applying pressure as soon as the cable connector comes loose from the backplane.

5 Slowly remove the extraction tool and the cable connector.

———————————— **End of Procedure** ————————————

Optioning the System Utility Card

To install the system utility card, first identify Core/Net 0 and Core/Net 1 shelves. Then adjust the DIP switches according to Table 32 below.

Table 32
System Utility Card DIP switch settings

	Core/Net 0	Core/Net 1
DIP switch 1	on	off
DIP switch 2	on	on

Figure 78 on page 180 shows Core card (front side) placement. If the Core cards are not installed, refer to this figure to add or replace cards.

Figure 78
Core card placement in the NT4N41 Core/Net Module (front)
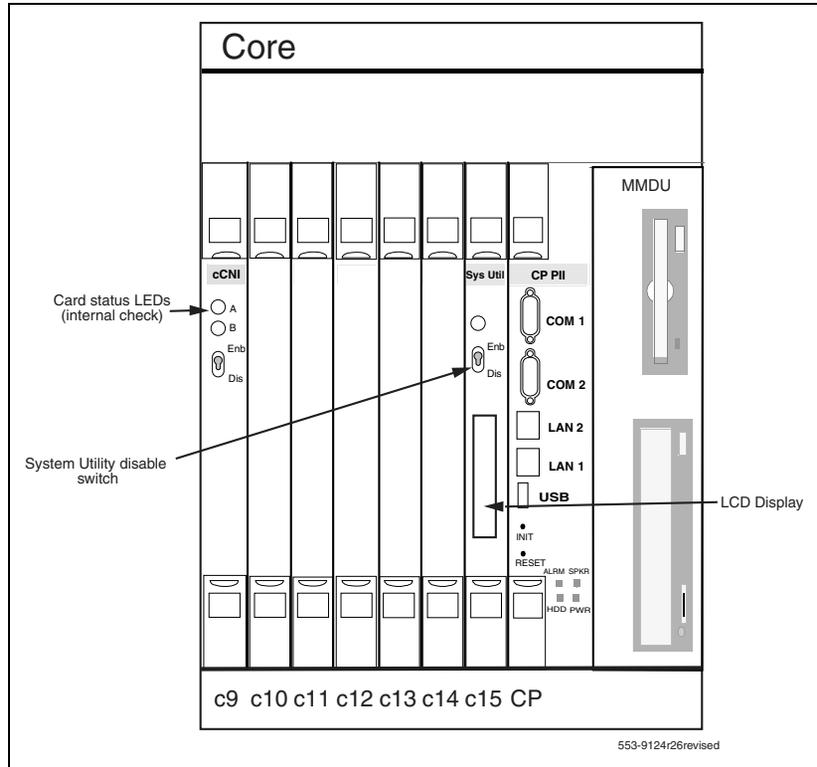
Core shelf cabling

This section describes installation of the *internal* Core cables (see Figure 80
on page 183). Cables for Core to non-Core modules are described in
subsequent sections.

Figure 79
Card placement in the NT4N41Core/Net Module

553-9123r26revised
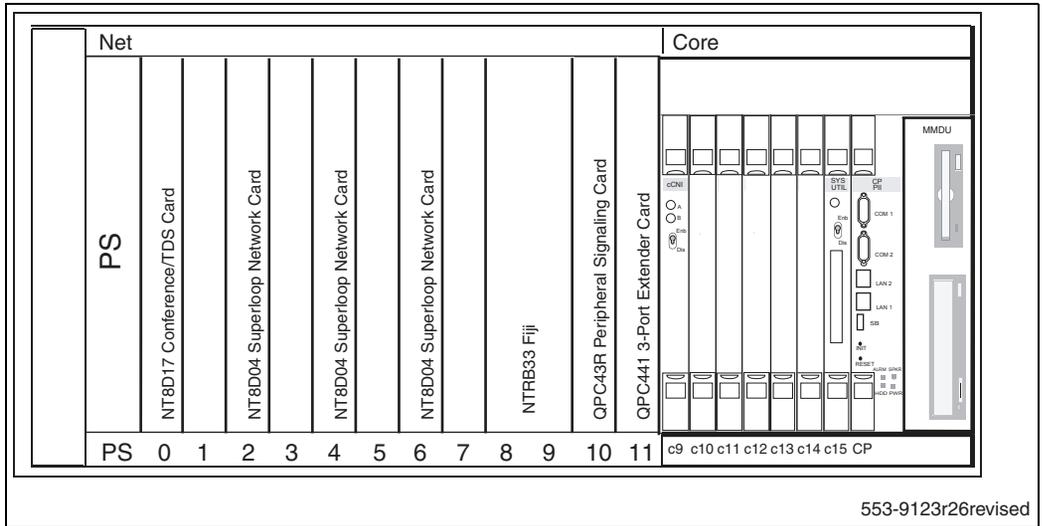
Required Core cables

Table 33 on lists field installed cables. Cables in Table 34 on are factory installed.

Table 33
Field installed Core cables (internal) (Part 1 of 2)

Cable part number	Description	Number required per system
NT4N88AA	COM 1 (DTE/terminal)	1
NT4N88BA	COM 2 (DCE/modem)	2
NT4N90BA	Ethernet (CP PII card to I/O panel)	2
NTRC17BA	Crossover Ethernet cable (Core to Core)	2

Table 33
Field installed Core cables (internal) (Part 2 of 2)

Cable part number	Description	Number required per system
Customer supplied	Standard Ethernet cable (I/O Panel to LAN switch)	2
Note: If there is no connection to a LAN, connect the 2 LAN 1 connectors using the NTRC17BA crossover cable.		

Table 34
Factory installed Core cables (internal)

Cable part number	Description	Number required per system
NT4N4405	Shelf Power: Net backplane to Core backplane	2
NT4N29AA	cCNI to 3PE Core/Net shelf cable	4
NT4N89AA	System Utility card to XSM (see Figure 81)	2
NT4N92AA	CD-ROM/HDD Data	2
NT4N93AA	FDD Data	2
NT4N95AA	Core/Net FDD/HDD/CD ROM Power	2

Figure 80
Core/Net cable connections (top view)

NTND14 cables:cCNI to 3PE cables in Network Shelves (Customer install Group 1 cable)

NT4N4405 Shelf Power cable
(factory installed)

NT4N89AA System Monitor cable
(factory installed)

J31: Ethernet cable
from LAN 1 NT4N90BA

J25: DTE cable
from COM 1
NT4N88AA (for terminal)

J21: DCE cable
from COM 2
NT4N88BA (for modem)

NT4N29 3PE Cables
to Net module
(factory installed)

FDD Data cable
NT4N93AA
(factory installed)

CD/HDD Data cable
NT4N92AA
(factory installed)

CD/FDD/HDD
Power cable
NT4N95AA
(factory installed)

PS

NT8D17 Conference/TDS
NT8D04 Superloop Network Card
NT8D04 Superloop Network Card
NT8D04 Superloop Network Card
NTRB53 Clock Controller Card
QPC43R Peripheral Signaling Card
QPC441 3-Port Extender Card
cCNI: slot c9
Sys Util: slot c15
CP PII
MMDU

to other Core/Net
LAN 2 port

LAN 2 cable
NTRC17BA

553-9059

Figure 81
CP PII Core and Network backplanes
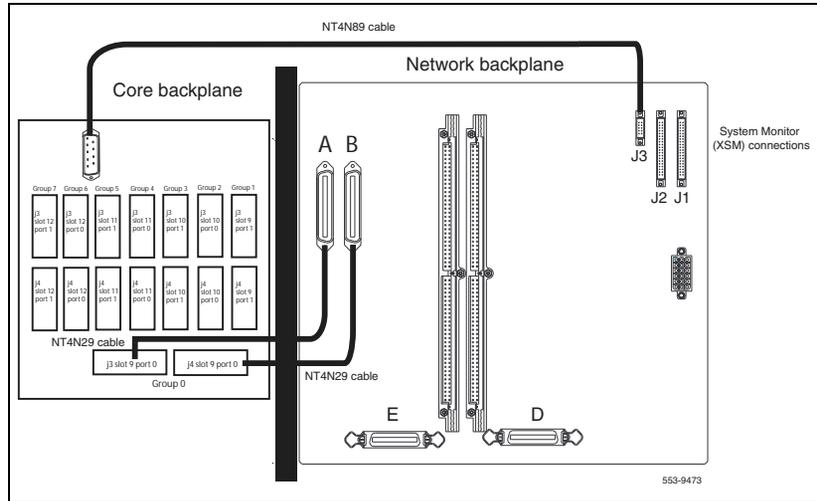
Cabling the I/O panel

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 switch.

- LAN 2 is used to connect Core 0 to Core 1 for system redundancy.

  Note: If there is no LAN, LAN 1 and LAN 2 are connected from Core 0 to Core 1.This connection is made on the backplane.

Figure 82 on displays the COM and LAN cable connections.

> **CAUTION**
>
> **Damage to Equipment**
>
> 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.

Procedure 32
Installing the CP PII to I/O panel cables

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 NT4N90BA.
     This connection can only be made *after* the Dual Ethernet Adapter is installed (see step 3 above).

     Note: If a LAN switch is not used, connect LAN 1 in Core 0 to LAN 1 in Core 1.

5   Connect a crossover Ethernet cable (NTRC17BA) from the LAN 2 port in Core 0 to the LAN 2 port Core 1. This connection is for Core redundancy.

     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.

———————————— **End of Procedure** ————————————

Figure 82
I/O panel connections
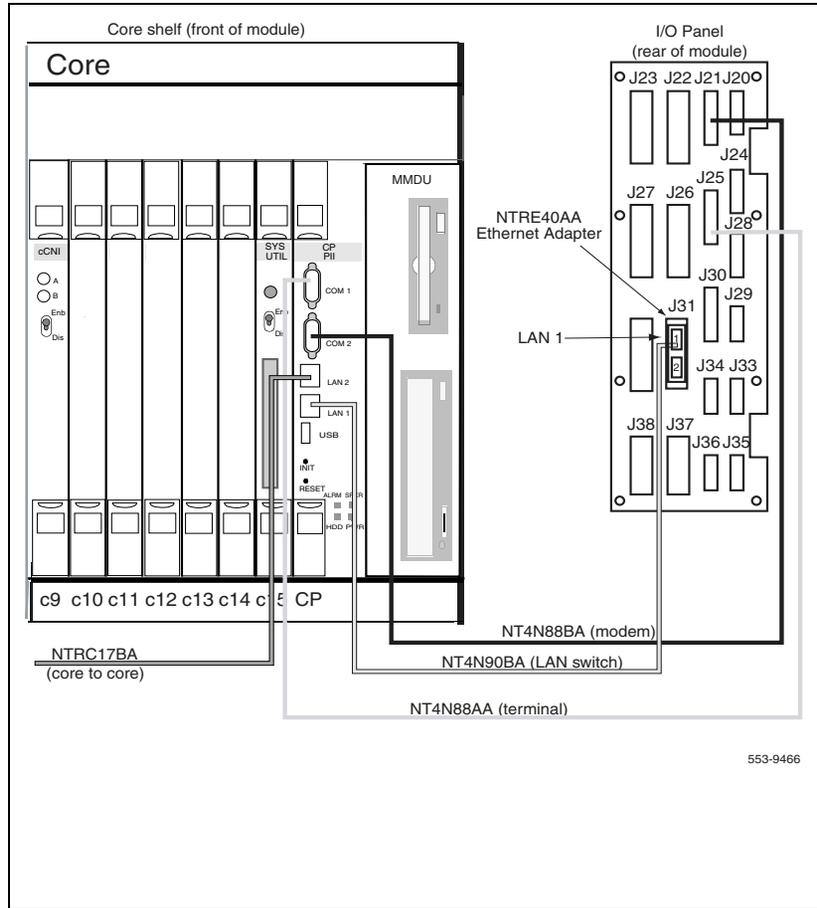
Cabling the Core module to the LAN

Connect each Core/Net module to a local area network (LAN). This
connection provides a communication channel for LAN based systems
management tools such as OTM, Symposium, Call Pilot, and Element
Manager. This connection also supplies additional redundancy capabilities.
See Figure 83 on .

Note 1: If a LAN is not available, connect the second NTRC17BA 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 "Cabling the I/O panel" on before the Ethernet connections can be completed.

Procedure 33
Connecting the Core module to a LAN

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 switch.

3 Connect a second Ethernet cable from J31 (top) on the Core/Net 1 I/O panel to the LAN switch.

———————————————— **End of Procedure** ————————————————

Figure 83
Options for LAN 1 connections
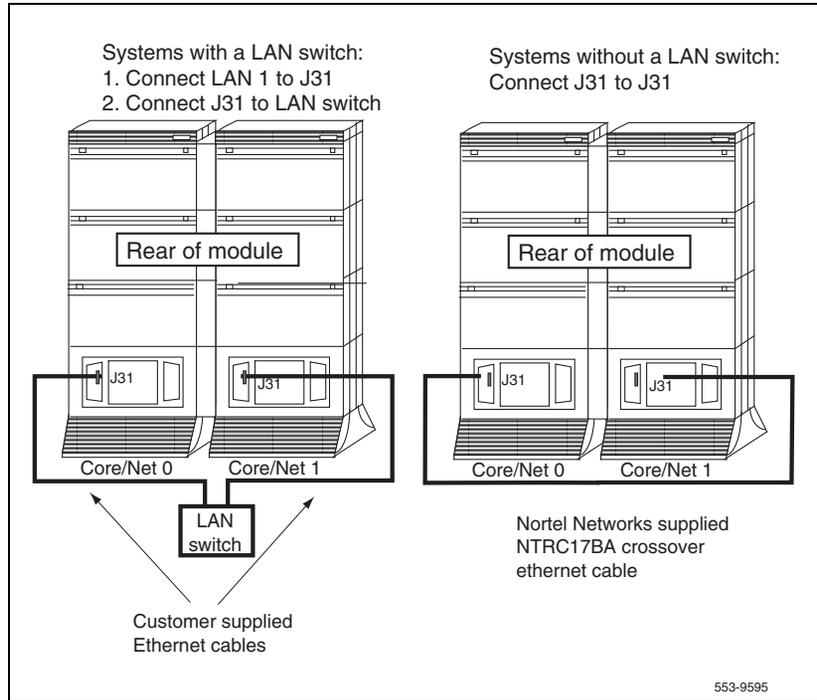
Cabling a Dual Ring Fiber Network

The FIJI cards in the Network modules are connected to form a Dual Ring Fiber Network. This 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 (Figure 84 on page 189). Four steps are required to configure the Fiber Network:

- "Installing the Shelf 0 fiber optic ring (ascending)" on page 194.

- "Installing the Shelf 1 fiber optic ring (descending)" on page 195.

- "FIJI to FIJI cabling" on page 197.

• "Cabling and configuring the Clock Controller" on .

Figure 84
Dual Ring Fiber Network

NTRC48xx fiber optic cables

553-9143
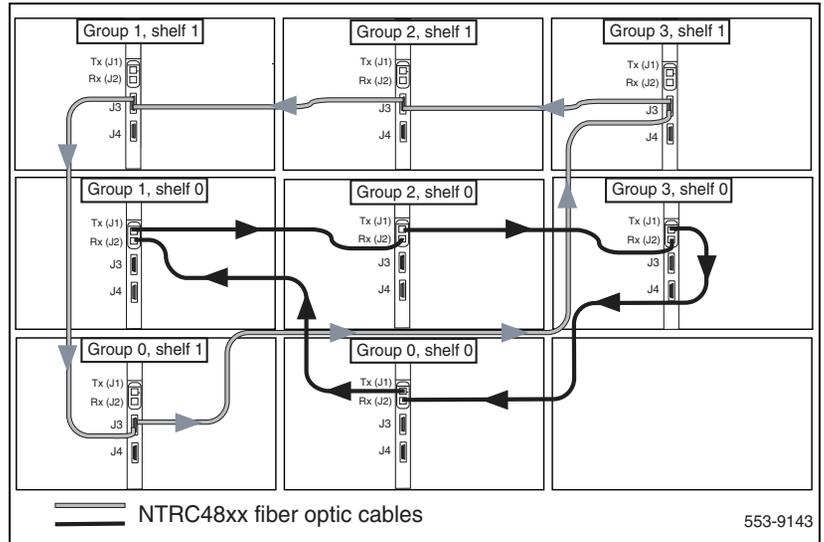
Required cards

Table 35 on outlines the number of circuit cards required by each system depends on system configuration.

Table 35
Fiber Network required cards (Part 1 of 2)

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)

Table 35
Fiber Network required cards (Part 2 of 2)

Quantity	Part number	Description
8 per system (4 per Core), as needed	NT4N65AA	Compact Core Network Interface (cCNI-2) cards
2 per system	NTRB53	Global Clock Controller cards

Required cables

Table 36 on outlines the required cables. Cable lengths will vary depending on system configuration.

Table 36
Required cables

Cable type	Quantity	Part number	Description
Fiber Ring cable	1 per FIJI card	NTRC48AB	6 ft. fiber optic cable
		NTRC48BB	10 ft. fiber optic cable
		NTRC48CB	12 ft. fiber optic cable
		NTRC48DA	14 ft. fiber optic cable
		NTRC48EA	19 ft. fiber optic cable
		NTRC48FA	26 ft. fiber optic cable
Clock to FIJI	2 per system	NTRC46AB	4 ft. - 13.5 ft.*
		NTRC46BB	5.5 ft. - 8 ft.*
		NTRC46CB	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.			

> **WARNING**
>
> The shortest Fiber Cable must always be used.
>
> The cables from Group 0 to Group 1 must always be the same length as the cables from the last group back to Group 0
>
> The delta between the lengths of each fiber ring from Group 0 to any other group must not exceed 50'. Rings are directional. Ring 0 is ascending and ring 1 is descending.

FIJI card cabling

Fiber Network is enabled by the installation of one NTRB33 Fiber Junctor Interface (FIJI) card in each Core/Net or Network module (see Figure 85 on). 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 85
FIJI card faceplate
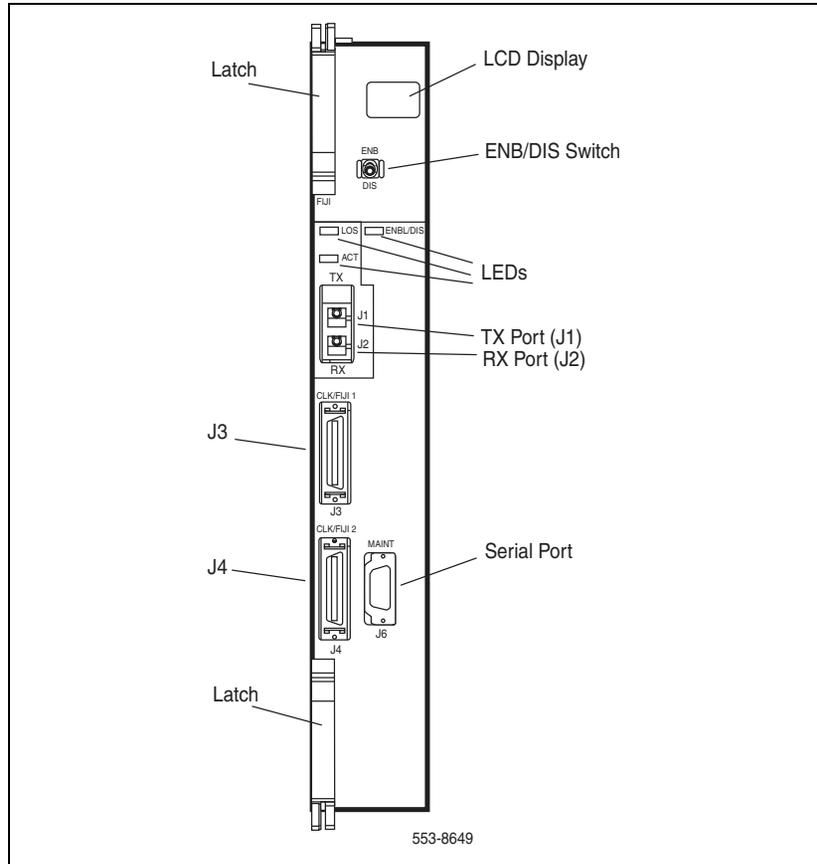
Optical Cable Management Card (OCMC)

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 (Figure 86 on).

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.

Figure 86
OCMC: the Optical Cable Management Card

553-858E
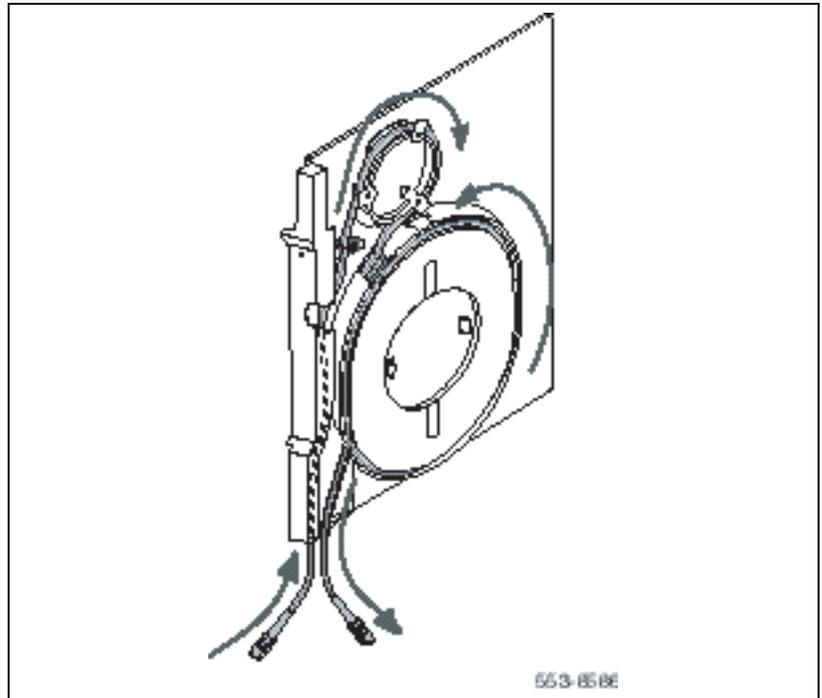
Installing the Shelf 0 fiber optic ring (ascending)

To create the Shelf 0 fiber optic loop, connect the FIJI cards in each Network Shelf 0 in *ascending* order (Figure 87 on).

Procedure 34
Installing the Shelf 0 fiber optic ring (ascending)

1   Start with the Tx (J1) port in 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.

──────────────── **End of Procedure** ────────────────

Figure 87
Shelf 0 fiber optic ring on a 4 group machine

NTRC48xx fiber optic cable

553-9122
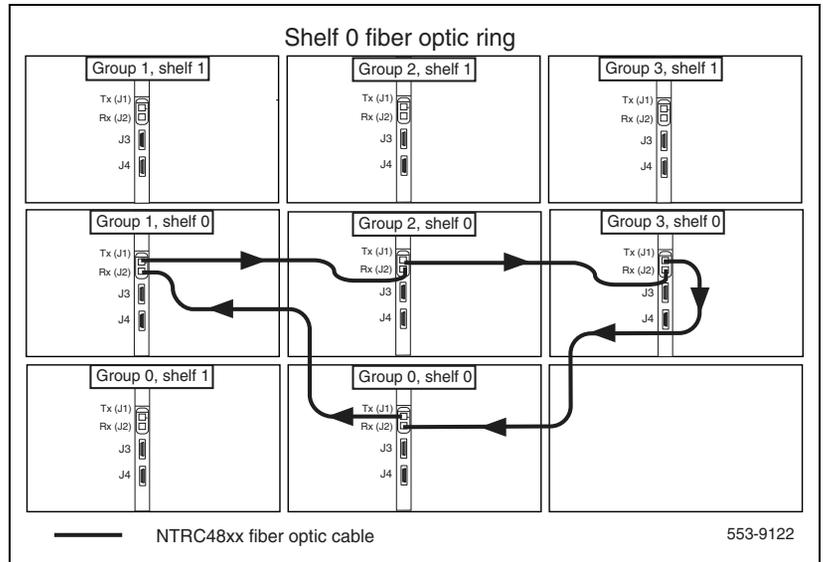
Installing the Shelf 1 fiber optic ring (descending)

To create the Shelf 1 fiber optic loop, connect the FIJI cards in each Network Shelf 1 in *descending* order (Figure 88 on).

Procedure 35
Installing the Shelf 1 fiber optic ring

1   Start with the Tx (J1) port in 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. This is the longest NTRC48xx cable that came with the shipment.

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.

——— **End of Procedure** ———

Figure 88
Shelf 1 fiber optic ring on a 4 group machine
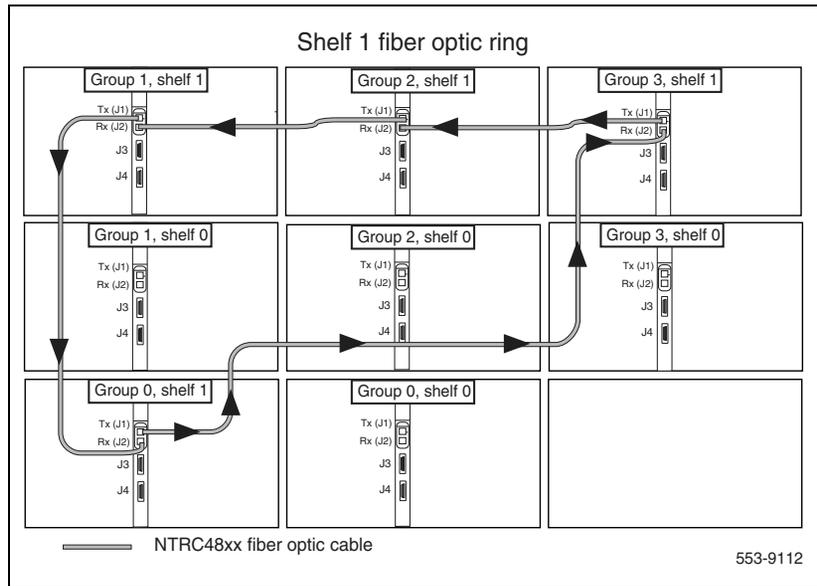
FIJI to FIJI cabling

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.

Procedure 36
Connecting the FIJI to FIJI cables

1   Connect a NTRC47AA cable from J4 to J4 of the FIJI cards in each Network group, except Group 0 (Figure 89 on page 197).

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 page 198.

—————— **End of Procedure** ——————

Figure 89
FIJI Shelf 0 to FIJI Shelf 1 connections
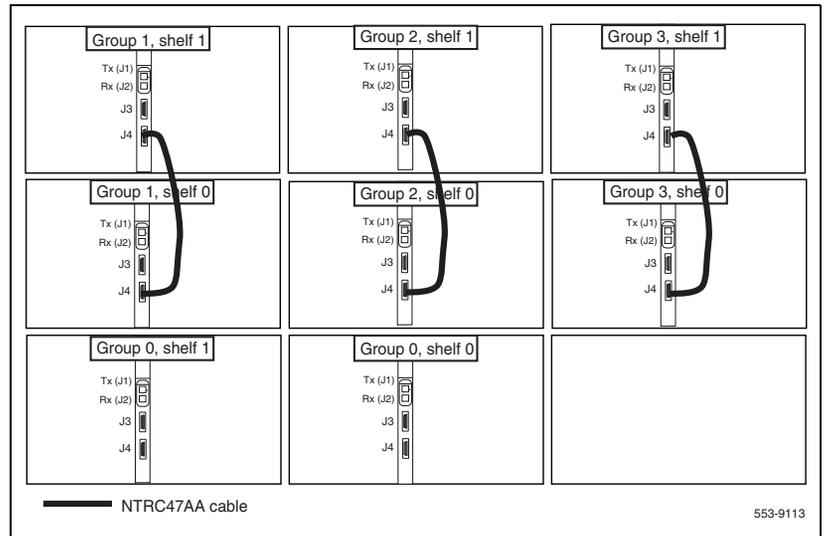
Cabling and configuring the Clock Controller

Two Clock Controller cards are required in each system. These cards synchronize Large System functions.

Figure 90 on shows the two Clock Controllers installed in a two-column system.

The Clock Controllers Cards must be installed as directed in the following three rules.

1 Two Clock Controller cards must be installed in each system. The Clocks must be connected to each other and to the FIJI cards in Network Group 0.

2 One Clock Controller must be installed in Network Shelf 0, slot 13. A second Clock Controller must be installed in Network Shelf 1, slot 13.

3 Clock Controllers should be installed in different Network groups if possible.

> **IMPORTANT!**
>
> The Clock Controller cannot be installed in the Core/Net shelf.

Figure 90
Clock Controller placement

Figure showing Clock Controller placement with labels:
- Group 1, shelf 1 — CLOCK 1 — J3
- Group 2, shelf 1
- Group 1, shelf 0
- Group 2, shelf 0 — CLOCK 0 — J3
- Group 0, shelf 1 — FIJI — J3, J4
- Group 0, shelf 0 — FIJI — J3, J4

Legend:
NTRC46 cable: Clock 0 to J4 FIJI, Group 0   NTRC49 Clock to Clock cable
NTRC46 cable: Clock 1 to J3 FIJI , Group 0

553-9121
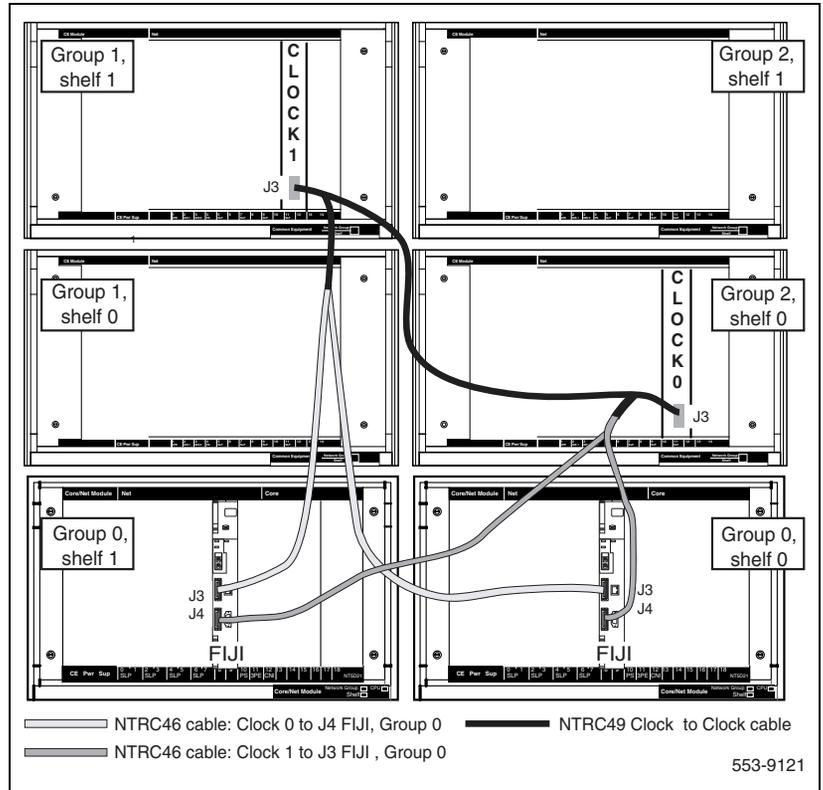
Cabling the Clock Controller

Connect the cables to the Clock Controllers as shown in Figure 91 on

Procedure 37
Connecting the Clock Controller cables

1 Connect the Clock to Clock cable:

   a. Connect P1 of the NTND49 cable to port J3 of Clock Controller 0.

   b. Connect P2 of the NTND49 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 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.

———————————— **End of Procedure** ————————————

Figure 91
Clock Controller cable configuration

553-9496
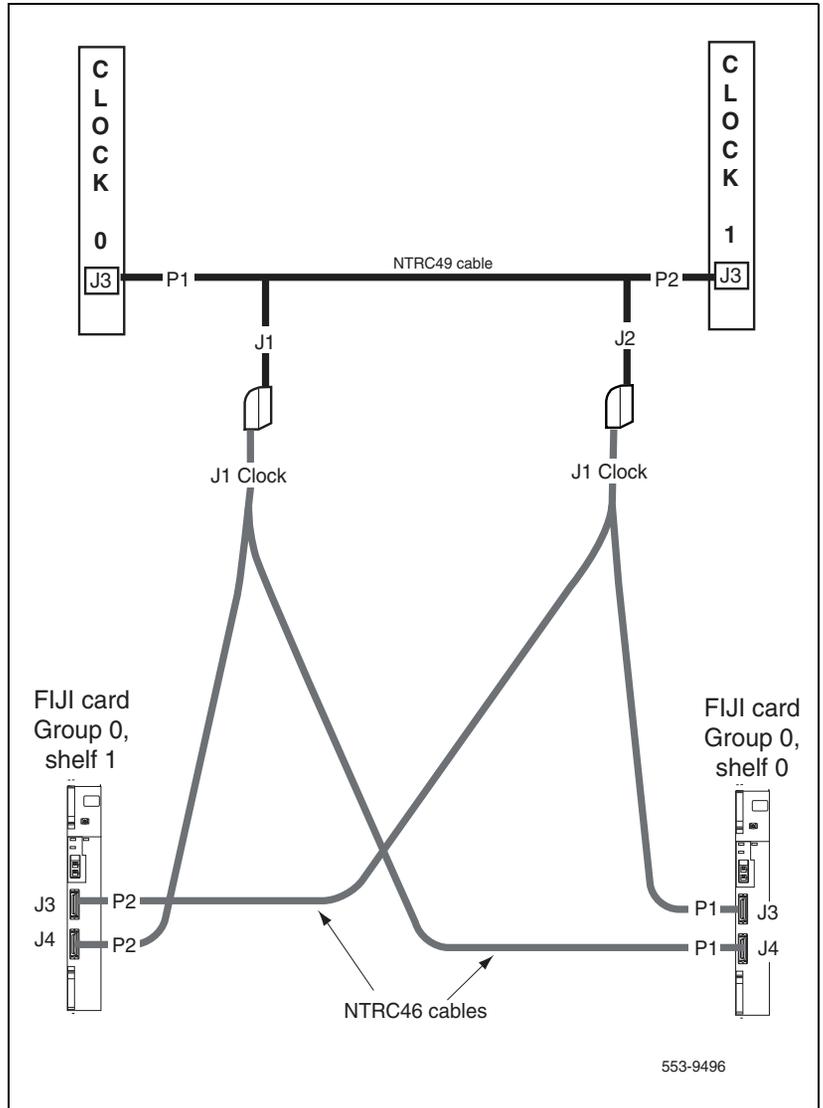
Cabling network modules and loops

Contents

This section contains information on the following topics:

Network-to-network cabling

Cabling between NT8D35 Network Modules interconnects the two half-groups to build a full-network group. The first full-group is located in the core/network module together with the CPU. The maximum length of the interconnecting cables between the two modules is 2 feet. The two half-group network modules must therefore be stacked on top of one another. The cables are then routed from the backplane of one module to the backplane of the other through the vertical holes in the rear horizontal cable trough of the modules.

> **WARNING**
>
> The shortest Fiber Cable must always be used.
>
> The cables from Group 0 to Group 1 must always be the same length as the cables from the last group back to Group 0
>
> The delta between the lengths of each fiber ring from Group 0 to any other group must not exceed 50'. Rings are directional. Ring 0 is ascending and ring 1 is descending.

Network module connections

Each multi-group system contains between 2 and 8 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.

Connecting network Group 0: Shelf 0 to Shelf 1

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.

Connecting network Group 0: Shelf 0 to Shelf 1 involves:

1   "Connecting the 3PE faceplates in the Core/Net modules" on

2   "Connecting the Core/Net backplanes" on

Connecting 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 92 on . This connection is only made between the Group 0 shelves (in the Core/Net modules).

Procedure 38
Connecting the 3PE faceplates 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.

———— **End of Procedure** ————

Figure 92
3PE faceplate connection between the Core/Net modules
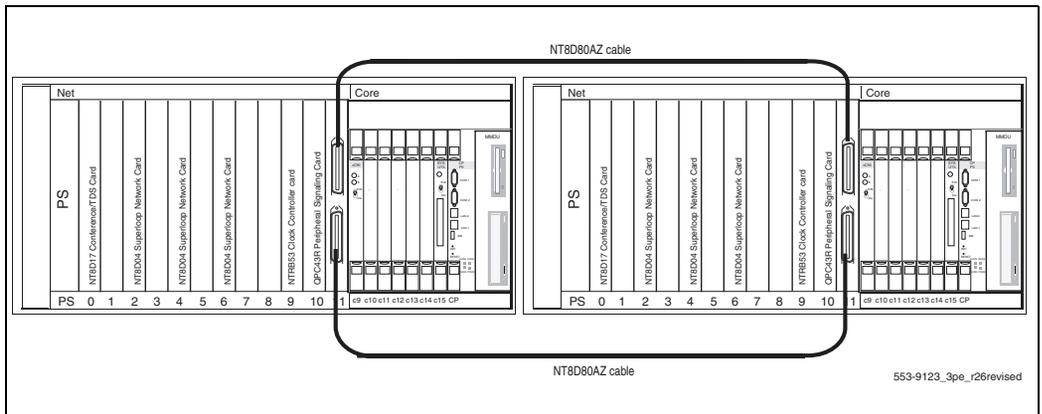
Connecting the Core/Net backplanes

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

Procedure 39
Connecting the Core/Net backplanes

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 93 on .

——————————————— **End of Procedure** ———————————————

Figure 93
Network Group 0: Shelf 0 to Shelf 1 backplane connections
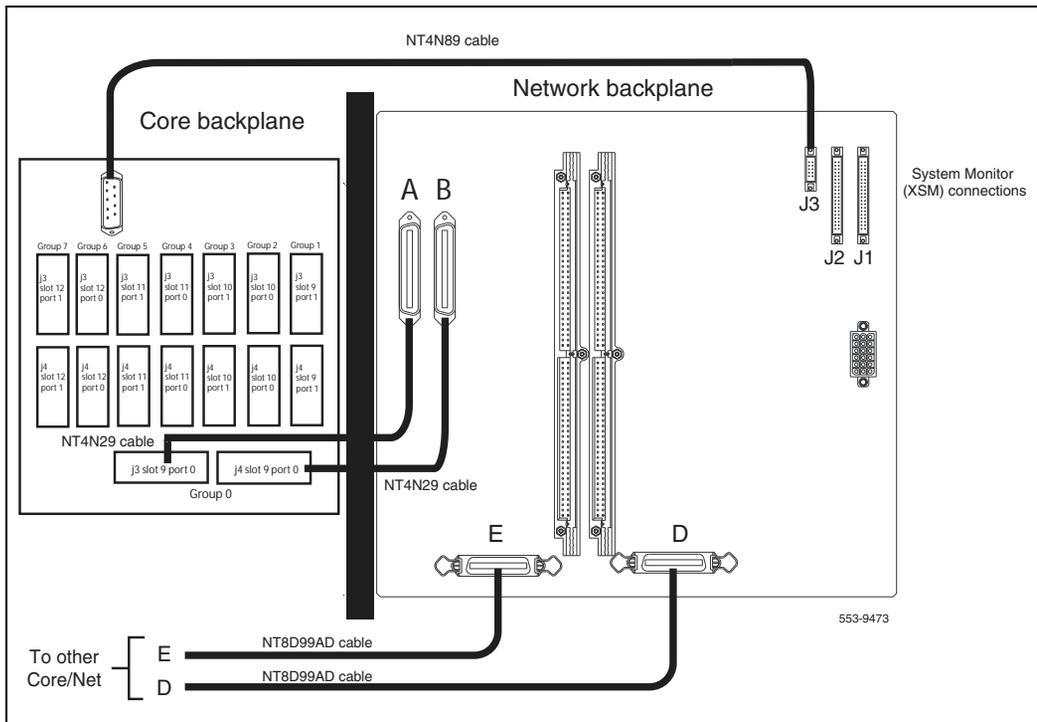
Connecting Groups 1 through 7: Shelf 0 to Shelf 1

On the back of each Network module backplane are five connectors: A, B, C, D and E. See Figure 94 on . 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.

Procedure 40
Connecting Groups 1 through 7: Shelf 0 to Shelf 1

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.

─────── **End of Procedure** ───────

Figure 94
Network Shelf 0 to Shelf 1 backplane connections (Groups 1 through 7)

Network backplane:
shelf 1

A
D
B
E
C

Network backplane:
shelf 0

A
D
B
E
C

NT8D99AB cable

553-9584
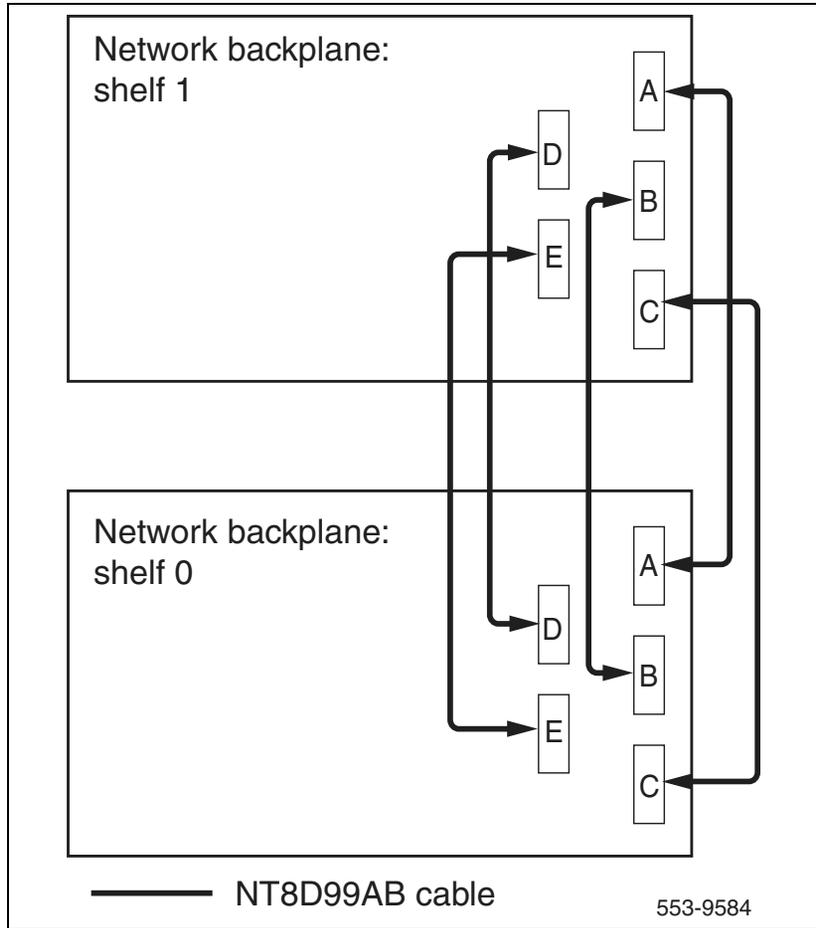
Connecting the Network modules to the Core/Net modules

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

Figure 95 on , Figure 96 on , and Figure 97 on show the location of the Fanout panel and 3PE cables on the Core/Net backplane.

Figure 95
3PE Fanout panel in the Core/Net module (top view)

Figure 96
Core/Net backplane (rear view)

553-9487
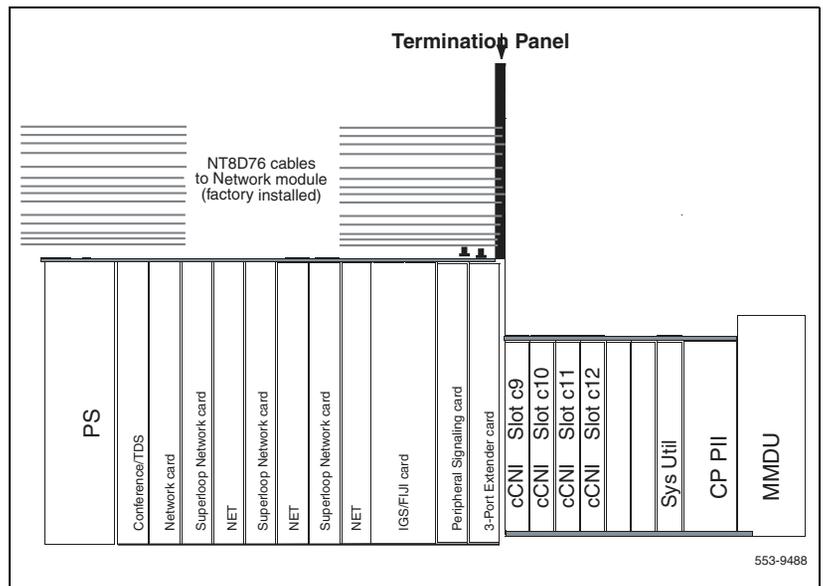
Figure 97
3PE Fanout panel (rear module view)

NTND14 to 3PE cables

Install SDI Paddle Board
before connecting 3PE cables

NTND14 cables to Core Backplane Fanout panel

553-9529
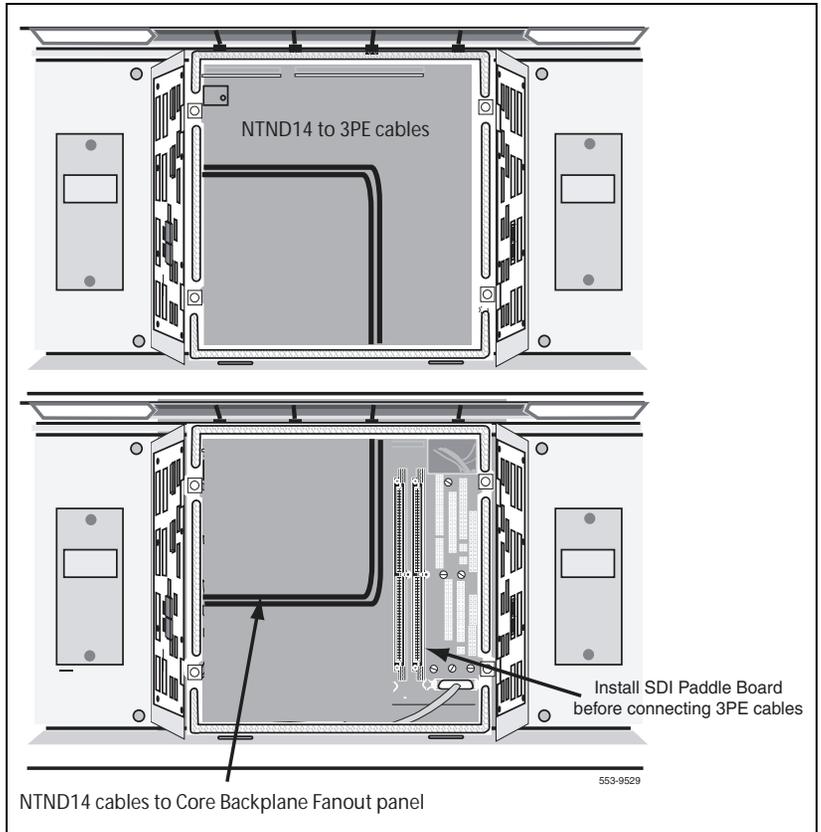
cCNI slot and port assignments

Each system contains a minimum of one and a maximum of four cCNI 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 Fanout panel in Core/Net 0.

- 3PE cards in Network shelves "1" are connected to the 3PE Fanout panel in Core/Net 1.

Table 37 on page 212 specifies the Network group assignments for each cCNI slot and port. These designations cannot be changed in software.

Table 37
cCNI Network group designations

cCNI card slot	cCNI card port	3PE Fanout 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 Fanout panel cable connections

The cCNI slot and port connections are labeled on the Fanout panel (see Figure 98). Each 3PE card is connected with two cables: one to J3 and one to J4. Table 37 on specifies the Network group that connects to each slot.

Figure 98
Fanout panel (Core/Net module)
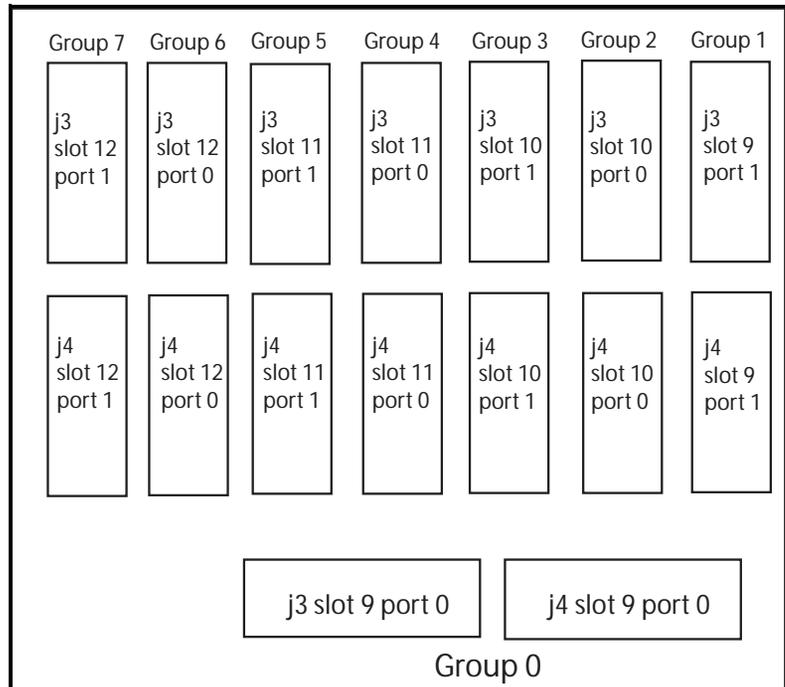
Connecting the 3PE cables to the 3PE fanout panels

Two NTND14 cables connect from J3 and J4 of each 3PE faceplate to the 3PE Fanout panel. See Figure 99 on .

Figure 99
3PE faceplate to Fanout panel connections – Network Group 1, Shelf 0 example
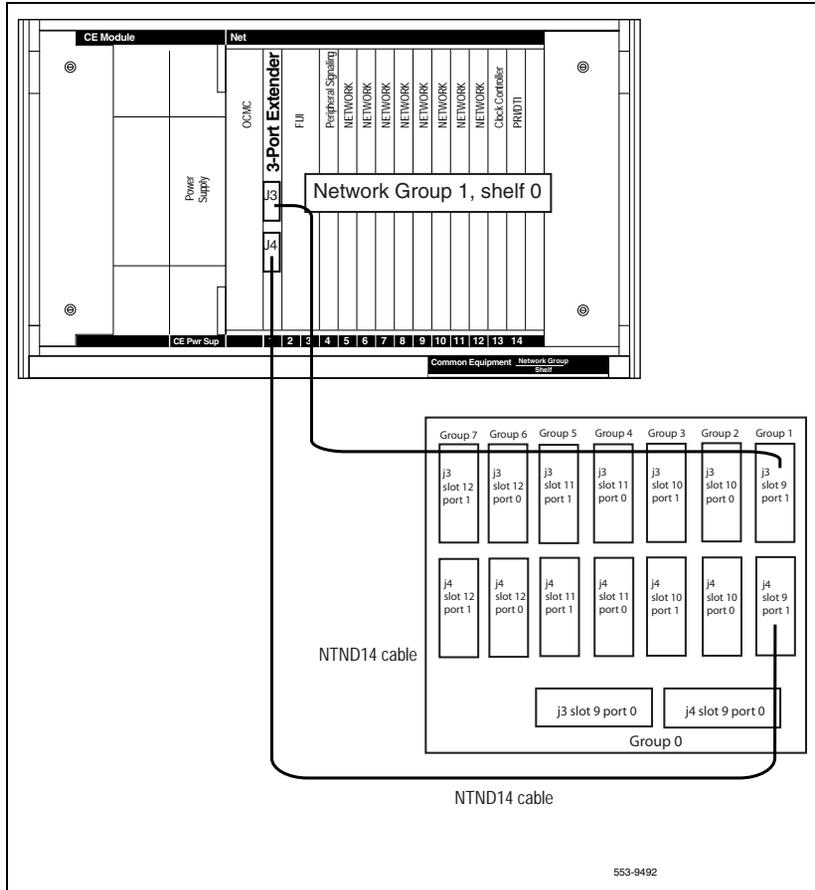
Refer to Table 37 on page 212 for cCNI port and slot assignments. Connect Shelf 0 3PE cards to the Core/Net 0 panel; connect Shelf 1 3PE cards to the Core/Net 1 panel. The 3PE cables for Network Group 0 are factory installed.

> **WARNING**
>
> The shortest Fiber Cable must always be used.
>
> The cables from Group 0 to Group 1 must always be the same length as the cables from the last group back to Group 0
>
> The delta between the lengths of each fiber ring from Group 0 to any other group must not exceed 50'. Rings are directional. Ring 0 is ascending and ring 1 is descending.

Procedure 41
Connecting the Network Shelf 0 3PE cards to Core/Net 0

1   Connect a NTND14 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 Fanout panel in Core/Net 0.

2   Connect a NTND14 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 Fanout panel in Core/Net 0.

3   Connect a NTND14 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 Fanout panel in Core/Net 0.

4   Connect a NTND14 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 Fanout panel in Core/Net 0.

5   Install the remaining cables according to the assignments in Table 37 on page 212.

———————— **End of Procedure** ————————

Procedure 42
Connecting the Network Shelf 1 3PE cards to Core/Net 1

1   Connect a NTND14 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 Fanout panel in Core/Net 1.

2   Connect a NTND14 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 Fanout panel in Core/Net 1.

3   Connect a NTND14 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 Fanout panel in Core/Net 1.

4   Connect a NTND14 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 Fanout panel in Core/Net 1.

5   Install the remaining cables according to the assignments in Table 37 on
page 212.

———————————   **End of Procedure**   ———————————

Cabling the NT8D04 Superloop Network Card

Depending on whether your system is configured as a single row of columns
or double row of columns, proceed with "Basic cabling for single-row
network connections" on page 217 or "Basic cabling for multiple-row
network connections" on page 220.

> ⚠ **CAUTION**
>
> **System Failure**
>
> Due to the possibility of EMI/RFI noise, do not route
> cables from front to rear next to the power supply
> unit.

Procedure 43
Basic cabling for single-row network connections

1 Refer to the work order and the cabling layout shipped with the system to determine:

- Each loop number assigned

- The module and slot assignments for the NT8D04 Superloop Network Card associated with each loop

- The location of NT8D37 IPE Modules that contain NT8D01 Controller Cards associated with each loop

2 Set the Enb/Dis switch on each superloop network card to Dis.

3 Cable network loops from the faceplate connector on the superloop network card to the backplane for associated controller cards (see Table 38 on).

- Label both ends of an NT8D91 cable with the loop number, then connect one end of the cable to the superloop network card faceplate connector:

    — J1 for Shelf 1

    — J2 for Shelf 0

- On the backplane for the controller card, connect the cable to the SL0, SL1, SL2, or SL3 connector assigned to the loop.

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.

Figure 100 on shows the superloop network card faceplate connectors, the backplane connectors for the controller card, and the cables required.

4 Seat and secure all connectors.

5 Set the Enb/Dis switch on each network card to Enb.

6 During system software configuration, use the *Software Input/Output: Administration* (553-3001-311) to enter loop assignments.

———————— **End of Procedure** ————————

Table 38
NT8D04 network loop configurations

	FROM		TO	
	Superloop network card	**Faceplate connector**	**Controller card**	**Backplane connector**
One segment per superloop	NT8D04 #1	J2	NT8D01AC #1	SL0
	NT8D04 #2	J2	NT8D01AC #1	SL1
	NT8D04 #3	J2	NT8D01AC #1	SL2
	NT8D04 #4	J2	NT8D01AC #1	SL3
Two segments per superloop	NT8D04 #1	J2	NT8D01AD #1	SL0
	NT8D04 #2	J2	NT8D01AD #1	SL1
Four segments per superloop	NT8D04 #1	J2	NT8D01AD #1	SL0
Eight segments per superloop	NT8D04 #1	J2	NT8D01AD #1	SL0
	NT8D04 #1	J1	NT8D01AD #2	SL0
One segment per superloop/ three segments per another superloop	NT8D04 #1	J2	NT8D01AD #1	SL0
	NT8D04 #2	J2	NT8D01AD #1	SL1
Two segments per superloop/ six segments per another superloop	NT8D04 #1	J2	NT8D01AC #1	SL0
	NT8D04 #2	J2	NT8D01AC #2	SL0
	NT8D04 #2	J1	NT8D01AC #2	SL1
Note: NT8D01AC is a controller-4 NT8D01AD is a controller-2				

Figure 100
NT8D04 Superloop Network Card network loops – connectors for single-row connections

Note 1: The NT8D04 Superloop Network Card may be located in any acceptable slot in an NT4N41 Core/Network Module or NT8D35 Network Module.

Note 2: On superloop network cards, connector J1 is used for odd numbered shelves, connector J2 is used for even numbered shelves.

553-5237
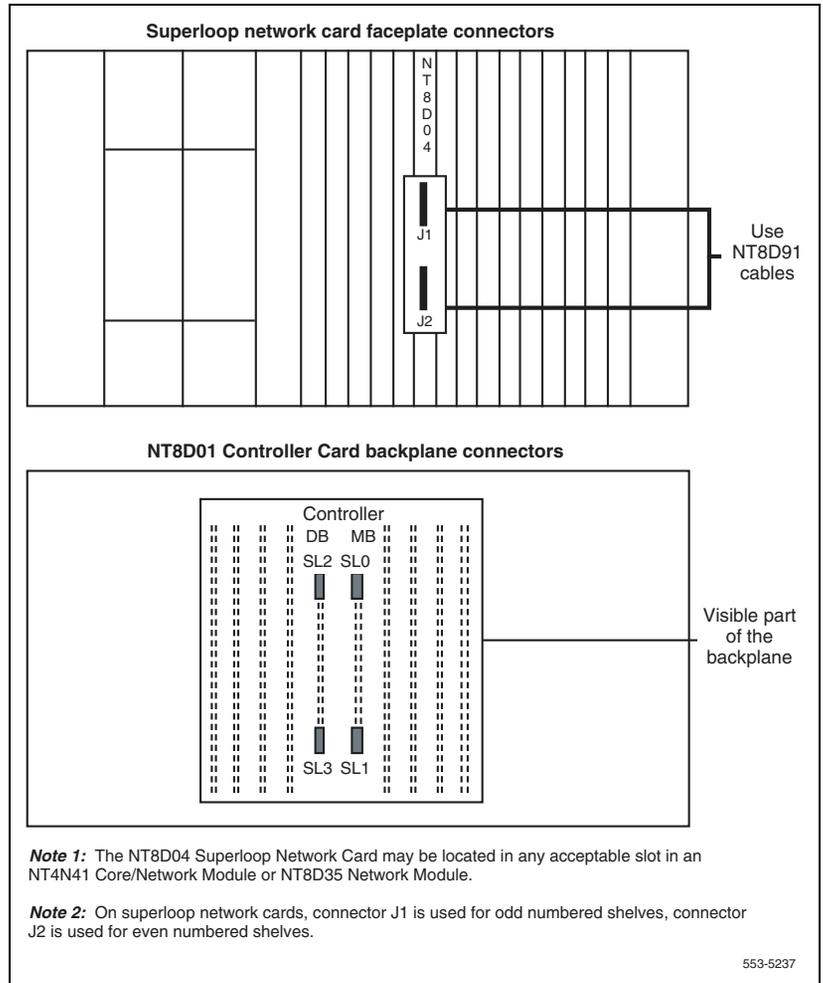
Procedure 44
Basic cabling for multiple-row network connections

1   Refer to the work order and the cabling layout shipped with the system to determine:

   - Each loop number assigned

   - The module and slot assignments of the NT8D04 Superloop Network Card associated with each loop

   - The location of NT8D37 IPE Modules that contain NT8D01 Controller Cards associated with each loop

2   Set the Enb/Dis switch on the faceplate of each network card to Dis.

3   Install NT8D1107 Superloop Adapter Plates on universal I/O panels (P0715058), if required. The superloop adapter plate reduces a QPC414 network loop cutout to the size for a superloop connection.

   The recommended order for installing superloop adapter plates is over I/O panel locations J2, J6, J10, J22, J26, J31.

   - Position the adapter plate over the QPC414 cutout, and install the screw and washer at the bottom of the plate.

   - Position the cable connector on the adapter plate, and install one screw and washer at the top and one screw and washer at the bottom of the connector.

   Figure 101 on shows mounting details for the superloop adapter plate.

4   Cable network loops from the faceplate connector on the network card to the I/O panels on the rear of the Core/Net or Network Module.

   - Label both ends of an NT8D88AD cable with the loop number, then connect one end of the cable to the network card faceplate connector:

      —   J1 for Shelf 1

      —   J2 for Shelf 0

- Route the cable around the card cage to the I/O panel and mount the cable connector in one of the cutouts in the panel.

  The recommended order for connections is J16, J17, J37, J38, then, with superloop adapter plates, J2, J6, J10, J22, J26, J31

  Figure 102 on page 223 shows the network card faceplate connectors, the I/O panel connectors, and the cables required.

5   Cable the backplane connectors (SL0, SL1, SL2, SL3) for the controller card to the I/O panels on the rear of the IPE Module.

- Label both ends of an NT8D92 cable with the loop number, then connect one end of the cable to the backplane connector.

- Mount the connector on the other end of the cable in one of the cutouts in the I/O panels. The recommended order for connections is:

  — SL0 to J2

  — SL1 to J3

  — SL2 to J4

  — SL3 to J5

  Figure 103 on page 224 shows the controller card backplane connectors and the I/O panels for the IPE Module. Complete the network loop connection (see Table 38 on page 218).

- Connect one end of an NT8D98 cable to the I/O panel connector for the network card.

- Connect the other end of the cable to the I/O panel connector for the associated controller card.

6   Seat and secure all connectors.

7   Set the Enb/Dis switch on each network card to Enb.

8   During system software configuration, use the *Software Input/Output: Administration* (553-3001-311) to enter loop assignments.

End of Procedure

Figure 101
Installing a superloop adapter plate

I/O panel

I/O panel cutout label

Superloop
adapter plate

J2

QPC414
I/O panel cutout

NT8D88 superloop to
I/O panel cable
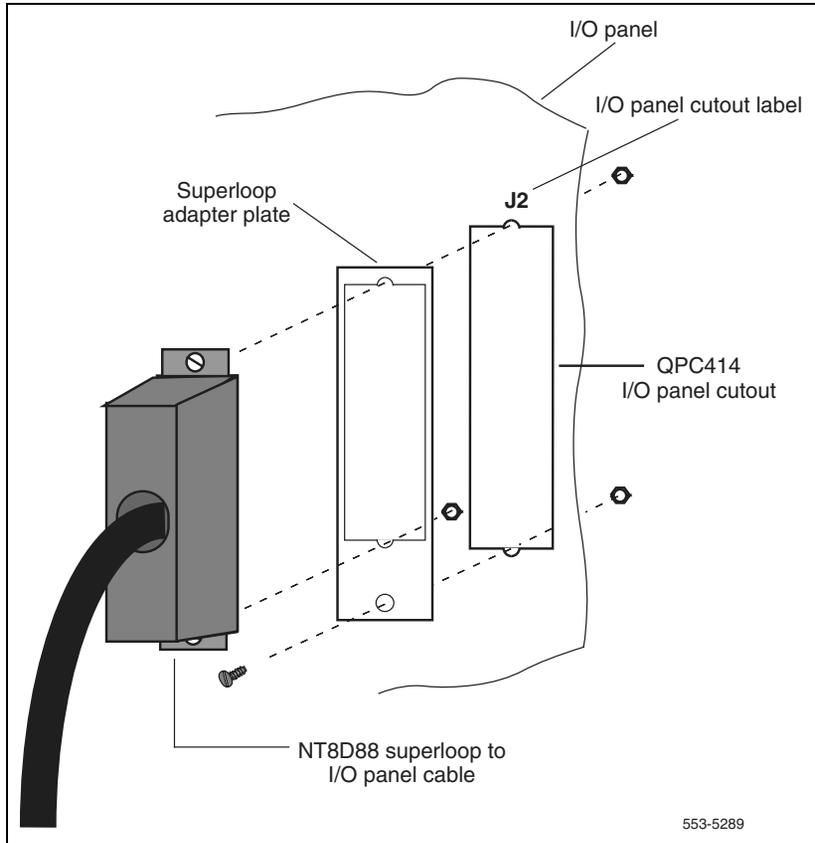
553-5289

Figure 102
NT8D04 Superloop Network Card network loops – network card to I/O panel connections

553-5290
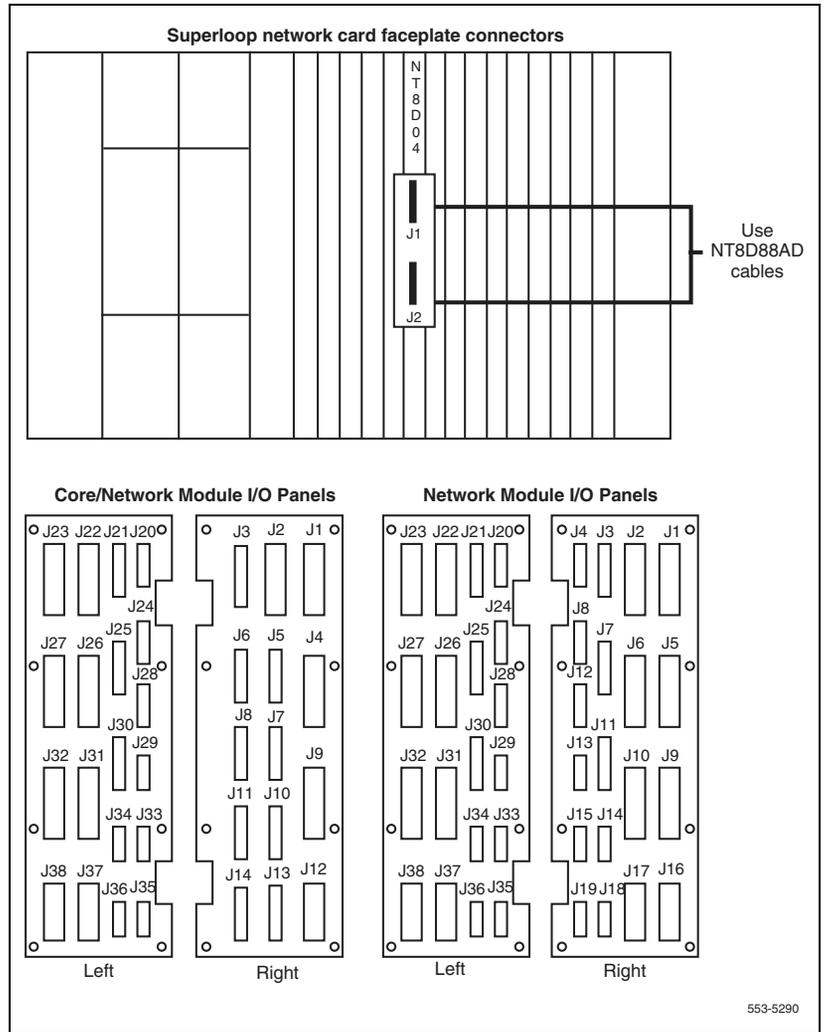
Figure 103
NT8D04 Superloop Network Card network loops – controller card to I/O panel connections

553-3191
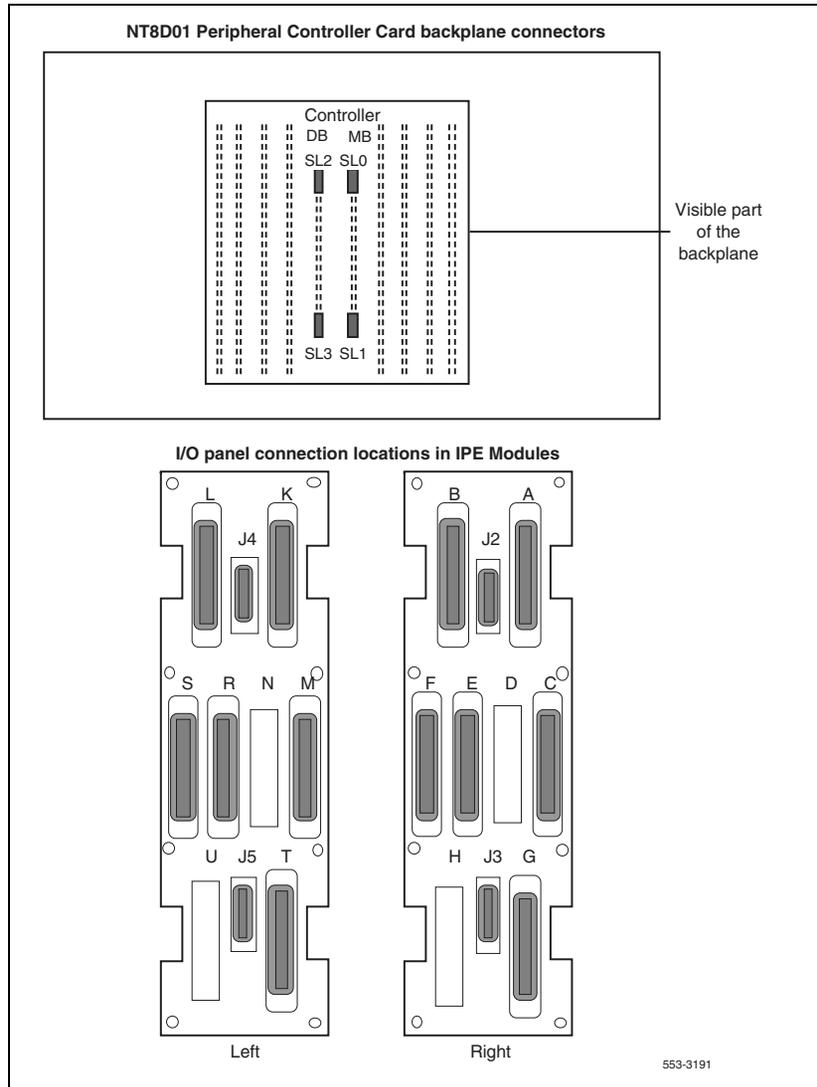
Cabling lines and trunks

Contents

This section contains information on the following topics:

Overview

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 39 on page 226 shows the cable connections from the backplane to the inside of the I/O panel. Figure 104 on page 226 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 39
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 104
NT8D37 backplane cable designations
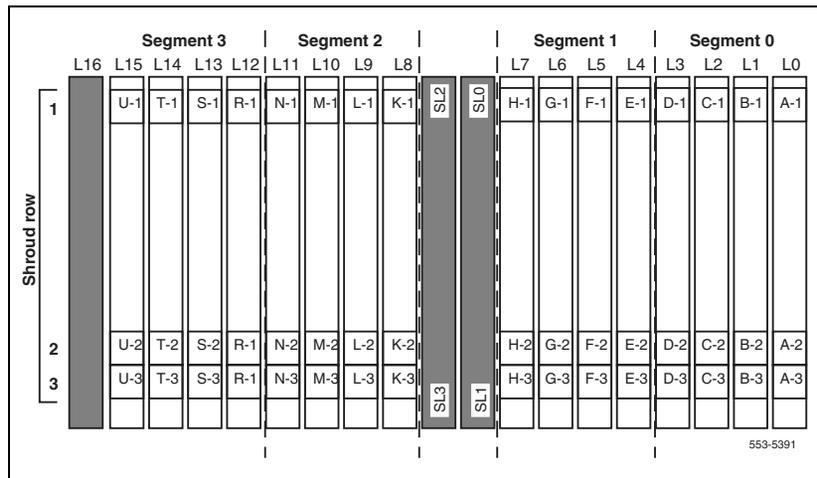
Cabling the NT8D37 IPE Modules

Follow Procedure 45 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.

DANGER OF ELECTRIC SHOCK

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

Procedure 45
Cabling NT8D37 IPE Modules

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 105 on page 228 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.

Note: For information on the MDF layout see "Planning and designating the Main Distribution Frame (MDF)" on page 99.

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

———— **End of Procedure** ————

Figure 105
NT8D37 IPE Module I/O panels

553-5928
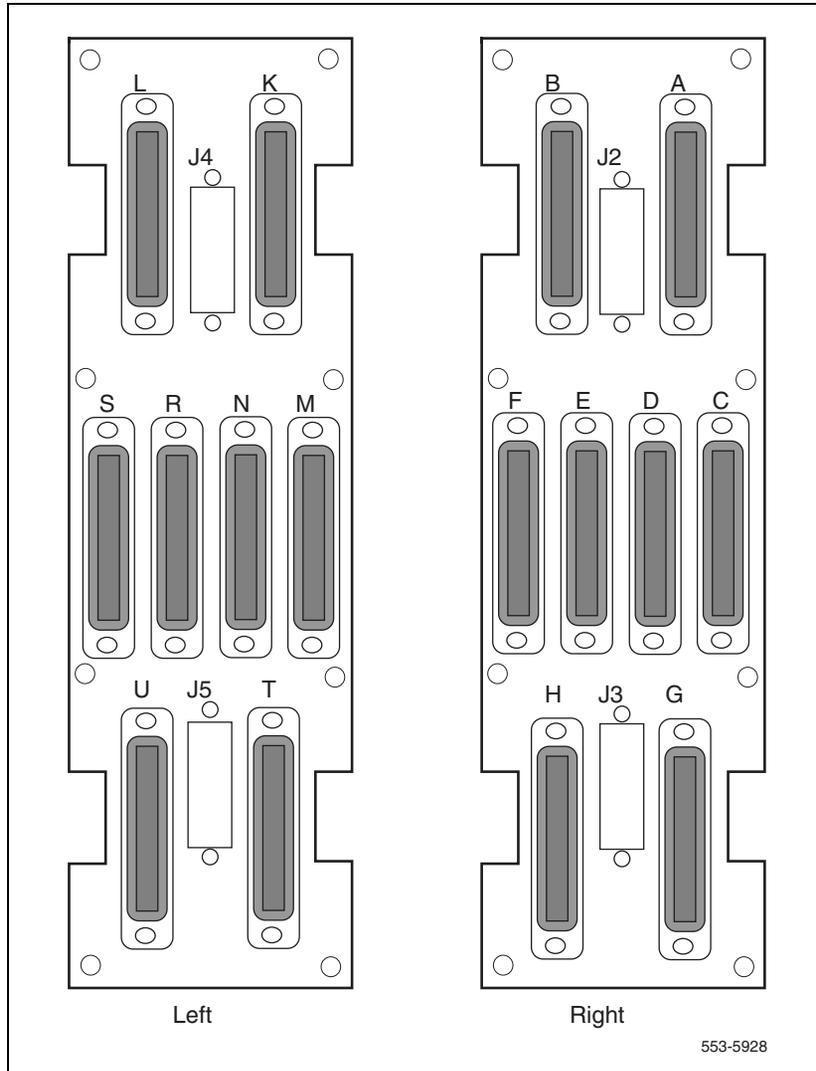
Connecting lines and trunks

Follow Procedure 46 to connect lines and trunks. Ensure that 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.

Procedure 46
Connecting lines and trunks

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 40 on page 230 lists pair-termination tables for line and trunk cards in NT8D37 IPE Modules.

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

———————————— **End of Procedure** ————————————

Table 40
Line and trunk pair-termination tables

NT8D37 IPE Module	
Line cards	Table 41 on page 230
Trunk cards	NT8D14 Universal Trunk Card: Table 42 on page 232
	NT8D15 E&M Trunk Card: Table 43 on page 233 through to Table 45 on page 234
	NT5K17 DDI Trunk Card: Table 47 on page 237 through toTable 49 on page 240
	NT5K18 Flexible Central Office Trunk card: Table 50 on page 242 through to Table 52 on page 246
	NT5K19 Flexible E&M Trunk card: Table 53 on page 248 through to Table 65 on page 261

Table 41
NT8D37 IPE Module: line card pair-terminations (Part 1 of 2)

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

Table 41
NT8D37 IPE Module: line card pair-terminations (Part 2 of 2)

Pair	Pin numbers	Pair color	Unit 24/card
14T/14R	39/14	BK-BR/BK-BR	13
15T/15R	40/15	BK-S/S-BK	14
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

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 42
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

Note 1: 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.

Note 2: Use LD 14 to select trunk termination impedance (600 ohm or 900 ohm). See the *Software Input/Output: Administration* (553-3001-311) for information on LD 14.

Table 43
NT8D37 IPE Module: NT8D15 E&M Trunk Card 2-wire paging mode pair-terminations

Pair	Pin numbers	Pair color	Unit
0T/0R	26/1	W-BL/BL-W	0
A/PG	29/4	W-BR/BR-W	
1T/1R	30/5	W-S/S-W	1
A/PG	33/8	R-G/G-R	
2T/2R	34/9	R-BR/BR-R	2
A/PG	37/12	BK-O/O-BK	
3T/3R	38/13	BK-G/G-BK	3
A/PG	41/16	Y-BL/BL-Y	

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 44
NT8D37 IPE Module: NT8D15 E&M Trunk Card 2-wire type 1 mode pair-terminations (Part 1 of 2)

Pair	Pin numbers	Pair color	Unit
0T/0R	26/1	W-BL/BL-W	0
E/M	28/3	W-G/G-W	
1T/1R	30/5	W-S/S-W	1
E/M	32/7	R-O/O-R	
2T/2R	34/9	R-BR/BR-R	2
E/M	36/11	BK-BL/BL-BK	

Table 44
**NT8D37 IPE Module: NT8D15 E&M Trunk Card 2-wire type 1 mode
pair-terminations (Part 2 of 2)**

Pair	Pin numbers	Pair color	Unit
3T/3R	38/13	BK-G/G-BK	3
E/M	40/15	BK-S/S-BK	

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 45
**NT8D37 IPE Module: NT8D15 E&M Trunk Card 4-wire type 1 and type 2 mode
pair-terminations (Part 1 of 2)**

Lead designations		Pin numbers	Pair color	Unit
Type 1	Type 2			
TA/TB	TA/TB	26/1	W-BL/BL-W	
RA/RB	RA/RB	27/2	W-O/O-W	0
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	
RA/RB	RA/RB	31/6	R-BL/BL-R	1
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	
RA/RB	RA/RB	35/10	R-S/S-R	2
E/M	EA/EB	36/11	BK-BL/BL-BK	
ESC/ESCG	MA/MB	37/12	BK-O/O-BK	

Table 45
NT8D37 IPE Module: NT8D15 E&M Trunk Card 4-wire type 1 and type 2 mode pair-terminations (Part 2 of 2)

Lead designations		Pin numbers	Pair color	Unit
Type 1	**Type 2**			
TA/TB	TA/TB	38/13	BK-G/G-BK	
RA/RB	RA/RB	39/14	BK-BR/BR-BK	3
E/M	EA/EB	40/15	BK-S/S-BK	
ESC/ESCG	MA/MB	41/16	Y-BL/BL-Y	

Note 1: 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.

Note 2: TA/TB is the transmit pair; RA/RB is the receive pair.

Table 46
NT8D37 IPE Module: NT8D15 E&M Trunk Card 4-wire type 1 and type 2 mode pair-terminations (Part 1 of 2)

Lead designations		Pin numbers	Pair color	Unit
Type 1	**Type 2**			
TA/TB	TA/TB	26/1	W-BL/BL-W	
RA/RB	RA/RB	27/2	W-O/O-W	0
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	
RA/RB	RA/RB	31/6	R-BL/BL-R	1
E/M	EA/EB	32/7	R-O/O-R	
ESC/ESCG	MA/MB	33/8	R-G/G-R	

Table 46
NT8D37 IPE Module: NT8D15 E&M Trunk Card 4-wire type 1 and type 2 mode pair-terminations (Part 2 of 2)

Lead designations		Pin numbers	Pair color	Unit
Type 1	**Type 2**			
TA/TB	TA/TB	34/9	R-BR/BR-R	
RA/RB	RA/RB	35/10	R-S/S-R	2
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	
RA/RB	RA/RB	39/14	BK-BR/BR-BK	3
E/M	EA/EB	40/15	BK-S/S-BK	
ESC/ESCG	MA/MB	41/16	Y-BL/BL-Y	

Note 1: 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.

Note 2: TA/TB is the transmit pair; RA/RB is the receive pair.

Table 47
NT5K17 Direct Dial Inward Trunk connections for NT8D37 I/O panel connectors A, E, K, R (Part 1 of 2)

Lead designations			I/O panel connectors				Unit number
DDI Mode	Pins	Pair color	A	E	K	R	
T0 R0	26 1 27 2	W-BL BL-W W-O O-W	Slot 0	Slot 4	Slot 8	Slot 12	Unit 0
T1 R1	28 3 29 4	W-G G-W W-BR BR-W	Slot 0	Slot 4	Slot 8	Slot 12	Unit 1
T2 R2	30 5 31 6	W-S S-W R-BL BL-R	Slot 0	Slot 4	Slot 8	Slot 12	Unit 2
T3 R3	32 7 33 8	R-O O-R R-G G-R	Slot 0	Slot 4	Slot 8	Slot 12	Unit 3
T4 R4	34 9 35 10	R-BR BR-R R-S S-R	Slot 0	Slot 4	Slot 8	Slot 12	Unit 4
T5 R5	36 11 37 12	BK-BL BL-BK BK-S S-BK	Slot 0	Slot 4	Slot 8	Slot 12	Unit 5

Table 47
NT5K17 Direct Dial Inward Trunk connections for NT8D37 I/O panel connectors A, E, K, R (Part 2 of 2)

Lead designations			I/O panel connectors				Unit number
DDI Mode	Pins	Pair color	A	E	K	R	
T6	38	BK-G	Slot 0	Slot 4	Slot 8	Slot 12	Unit 6
R6	13	G-BK					
	39	BK-BR					
	14	BR-BK					
T7	40	BK-S	Slot 0	Slot 4	Slot 8	Slot 12	Unit 7
R7	15	S-BK					
	41	Y-BL					
	16	BL-Y					

Table 48
NT5K17 Direct Dial Inward Trunk connections for NT8D37 I/O panel connectors B, F, L, S (Part 1 of 3)

Lead designations			I/O panel connectors				Unit number
DDI Mode	Pins	Pair color	B	F	L	S	
T0	26	W-BL	Slot 1	Slot 5	Slot 9	Slot 13	Unit 0
R0	1	BL-W					
	27	W-O					
	2	O-W					
T1	28	W-G	Slot 1	Slot 5	Slot 9	Slot 13	Unit 1
R1	3	G-W					
	29	W-BR					
	4	BR-W					
T2	30	W-S	Slot 1	Slot 5	Slot 9	Slot 13	Unit 2
R2	5	S-W					
	31	R-BL					
	6	BL-R					

Table 48
NT5K17 Direct Dial Inward Trunk connections for NT8D37 I/O panel connectors B, F, L, S
(Part 2 of 3)

Lead designations			I/O panel connectors				Unit number
DDI Mode	**Pins**	**Pair color**	**B**	**F**	**L**	**S**	
T3	32	R-O	Slot 1	Slot 5	Slot 9	Slot 13	Unit 3
R3	7	O-R					
	33	R-G					
	8	G-R					
T4	34	R-BR	Slot 1	Slot 5	Slot 9	Slot 13	Unit 4
R4	9	BR-R					
	35	R-S					
	10	S-R					
T5	36	BK-BL	Slot 1	Slot 5	Slot 9	Slot 13	Unit 5
R5	11	BL-BK					
	37	BK-S					
	12	S-BK					
T6	38	BK-G	Slot 1	Slot 5	Slot 9	Slot 13	Unit 6
R6	13	G-BK					
	39	BK-BR					
	14	BR-BK					
T7	40	BK-S	Slot 1	Slot 6	Slot 9	Slot 13	Unit 7
R7	15	S-BK					
	41	Y-BL					
	16	BL-Y					
T0	42	Y-O	Slot 1	Slot 6	Slot 9	Slot 13	Unit 0
R0	17	O-Y					
	43	Y-G					
	18	G-Y					
T1	44	Y-BR	Slot 1	Slot 6	Slot 9	Slot 13	Unit 1
R1	19	BR-Y					
	45	Y-S					
	20	S-Y					

Table 48
**NT5K17 Direct Dial Inward Trunk connections for NT8D37 I/O panel connectors B, F, L, S
(Part 3 of 3)**

Lead designations			I/O panel connectors				Unit number
DDI Mode	Pins	Pair color	B	F	L	S	
T2	46	V-BL	Slot 0	Slot 6	Slot 9	Slot 13	Unit 2
R2	21	BL-V					
	47	V-O					
	22	O-V					
T3	48	V-G	Slot 0	Slot 6	Slot 9	Slot 13	Unit 3
R3	23	G-V					
	49	V-BR					
	24	BR-V					

Table 49
**NT5K17 Direct Dial Inward Trunk connections for NT8D37 I/O panel connectors C, G, M, T
(Part 1 of 3)**

Lead designations			I/O panel connectors				Unit number
DDI Mode	Pins	Pair color	C	G	M	T	
T0	26	W-BL	Slot 2	Slot 6	Slot 10	Slot 14	Unit 4
R0	1	BL-W					
	27	W-O					
	2	O-W					
T1	28	W-G	Slot 2	Slot 6	Slot 10	Slot 14	Unit 5
R1	3	G-W					
	29	W-BR					
	4	BR-W					
T2	30	W-S	Slot 2	Slot 6	Slot 10	Slot 14	Unit 6
R2	5	S-W					
	31	R-BL					
	6	BL-R					

Table 49
NT5K17 Direct Dial Inward Trunk connections for NT8D37 I/O panel connectors C, G, M, T
(Part 2 of 3)

Lead designations			I/O panel connectors				Unit number
DDI Mode	Pins	Pair color	C	G	M	T	
T3	32	R-O	Slot 2	Slot 6	Slot 10	Slot 14	Unit 7
R3	7	O-R					
	33	R-G					
	8	G-R					
T4	34	R-BR	Slot 3	Slot 7	Slot 11	Slot 15	Unit 0
R4	9	BR-R					
	35	R-S					
	10	S-R					
T5	36	BK-BL	Slot 3	Slot 7	Slot 11	Slot 15	Unit 1
R5	11	BL-BK					
	37	BK-S					
	12	S-BK					
T6	38	BK-G	Slot 3	Slot 7	Slot 11	Slot 15	Unit 2
R6	13	G-BK					
	39	BK-BR					
	14	BR-BK					
T7	40	BK-S	Slot 3	Slot 7	Slot 11	Slot 15	Unit 3
R7	15	S-BK					
	41	Y-BL					
	16	BL-Y					
T0	42	Y-O	Slot 3	Slot 7	Slot 11	Slot 15	Unit 4
R0	17	O-Y					
	43	Y-G					
	18	G-Y					
T1	44	Y-BR	Slot 3	Slot 7	Slot 11	Slot 15	Unit 5
R1	19	BR-Y					
	45	Y-S					
	20	S-Y					

Table 49
NT5K17 Direct Dial Inward Trunk connections for NT8D37 I/O panel connectors C, G, M, T
(Part 3 of 3)

Lead designations			I/O panel connectors				Unit number
DDI Mode	Pins	Pair color	C	G	M	T	
T2	46	V-BL	Slot 3	Slot 7	Slot 11	Slot 15	Unit 6
R2	21	BL-V					
	47	V-O					
	22	O-V					
T3	48	V-G	Slot 3	Slot 7	Slot 11	Slot 15	Unit 7
R3	23	G-V					
	49	V-BR					
	24	BR-V					

Table 50
NT5K18 Flexible Central Office Trunk connections for NT8D37 I/O panel
connectors A, E, K, R (Part 1 of 2)

Lead designations			I/O panel connectors				Unit number
COT	Pins	Pair color	A	E	K	R	
T0	26	W-BL	Slot 0	Slot 4	Slot 8	Slot 12	Unit 0
R0	1	BL-W					
	27	W-O					
	2	O-W					
T1	28	W-G	Slot 0	Slot 4	Slot 8	Slot 12	Unit 1
R1	3	G-W					
	29	W-BR					
	4	BR-W					
T2	30	W-S	Slot 0	Slot 4	Slot 8	Slot 12	Unit 2
R2	5	S-W					
	31	R-BL					
	6	BL-R					

Table 50
NT5K18 Flexible Central Office Trunk connections for NT8D37 I/O panel connectors A, E, K, R (Part 2 of 2)

Lead designations			I/O panel connectors				Unit number
COT	Pins	Pair color	A	E	K	R	
T3	32	R-O	Slot 0	Slot 4	Slot 8	Slot 12	Unit 3
R3	7	O-R					
	33	R-G					
	8	G-R					
T4	34	R-BR	Slot 0	Slot 4	Slot 8	Slot 12	Unit 4
R4	9	BR-R					
	35	R-S					
	10	S-R					
T5	36	BK-BL	Slot 0	Slot 4	Slot 8	Slot 12	Unit 5
R5	11	BL-BK					
	37	BK-S					
	12	S-BK					
T6	38	BK-G	Slot 0	Slot 4	Slot 8	Slot 12	Unit 6
R6	13	G-BK					
	39	BK-BR					
	14	BR-BK					
T7	40	BK-S	Slot 0	Slot 4	Slot 8	Slot 12	Unit 7
R7	15	S-BK					
	41	Y-BL					
	16	BL-Y					

Table 51
NT5K18 Flexible Central Office Trunk connections for NT8D37 I/O panel connectors B, F, L, S (Part 1 of 2)

Lead designations			I/O panel connectors				Unit number
COT	Pins	Pair color	B	F	L	S	
T0 R0	26 1 27 2	W-BL BL-W W-O O-W	Slot 1	Slot 5	Slot 9	Slot 13	Unit 0
T1 R1	28 3 29 4	W-G G-W W-BR BR-W	Slot 1	Slot 5	Slot 9	Slot 13	Unit 1
T2 R2	30 5 31 6	W-S S-W R-BL BL-R	Slot 1	Slot 5	Slot 9	Slot 13	Unit 2
T3 R3	32 7 33 8	R-O O-R R-G G-R	Slot 1	Slot 5	Slot 9	Slot 13	Unit 3
T4 R4	34 9 35 10	R-BR BR-R R-S S-R	Slot 1	Slot 5	Slot 9	Slot 13	Unit 4
T5 R5	36 11 37 12	BK-BL BL-BK BK-S S-BK	Slot 1	Slot 5	Slot 9	Slot 13	Unit 5
T6 R6	38 13 39 14	BK-G G-BK BK-BR BR-BK	Slot 1	Slot 5	Slot 9	Slot 13	Unit 6

Table 51
NT5K18 Flexible Central Office Trunk connections for NT8D37 I/O panel connectors B, F, L, S (Part 2 of 2)

Lead designations			I/O panel connectors				Unit number
COT	Pins	Pair color	B	F	L	S	
T7	40	BK-S	Slot 1	Slot 5	Slot 9	Slot 13	Unit 7
R7	15	S-BK					
	41	Y-BL					
	16	BL-Y					
T0	42	Y-O	Slot 2	Slot 6	Slot 10	Slot 14	Unit 0
R0	17	O-Y					
	43	Y-G					
	18	G-Y					
T1	44	Y-BR	Slot 2	Slot 6	Slot 10	Slot 14	Unit 1
R1	19	BR-Y					
	45	Y-S					
	20	S-Y					
T2	46	V-BL	Slot 2	Slot 6	Slot 10	Slot 14	Unit 2
R2	21	BL-V					
	47	V-O					
	22	O-V					
T3	48	V-G	Slot 2	Slot 6	Slot 10	Slot 14	Unit 3
R3	23	G-V					
	49	V-BR					
	24	BR-V					

Table 52
NT5K18 Flexible Central Office Trunk connections for NT8D37 I/O panel connectors C, G, M, T (Part 1 of 2)

Lead designations			I/O panel connectors				Unit number
COT	Pins	Pair color	C	G	M	T	
T0 R0	26 1 27 2	W-BL BL-W W-O O-W	Slot 2	Slot 6	Slot 10	Slot 14	Unit 4
T1 R1	28 3 29 4	W-G G-W W-BR BR-W	Slot 2	Slot 6	Slot 10	Slot 14	Unit 5
T2 R2	30 5 31 6	W-S S-W R-BL BL-R	Slot 2	Slot 6	Slot 10	Slot 14	Unit 6
T3 R3	32 7 33 8	R-O O-R R-G G-R	Slot 2	Slot 6	Slot 10	Slot 14	Unit 7
T4 R4	34 9 35 10	R-BR BR-R R-S S-R	Slot 3	Slot 7	Slot 11	Slot 15	Unit 0
T5 R5	36 11 37 12	BK-BL BL-BK BK-S S-BK	Slot 3	Slot 7	Slot 11	Slot 15	Unit 1
T6 R6	38 13 39 14	BK-G G-BK BK-BR BR-BK	Slot 3	Slot 7	Slot 11	Slot 15	Unit 2

Table 52
NT5K18 Flexible Central Office Trunk connections for NT8D37 I/O panel connectors C, G, M, T (Part 2 of 2)

Lead designations			I/O panel connectors				Unit number
COT	Pins	Pair color	C	G	M	T	
T7	40	BK-S	Slot 3	Slot 7	Slot 11	Slot 15	Unit 3
R7	15	S-BK					
	41	Y-BL					
	16	BL-Y					
T0	42	Y-O	Slot 3	Slot 7	Slot 11	Slot 15	Unit 4
R0	17	O-Y					
	43	Y-G					
	18	G-Y					
T1	44	Y-BR	Slot 3	Slot 7	Slot 11	Slot 15	Unit 5
R1	19	BR-Y					
	45	Y-S					
	20	S-Y					
T2	46	V-BL	Slot 3	Slot 7	Slot 11	Slot 15	Unit 6
R2	21	BL-V					
	47	V-O					
	22	O-V					
T3	48	V-G	Slot 3	Slot 7	Slot 11	Slot 15	Unit 7
R3	23	G-V					
	49	V-BR					
	24	BR-V					

Table 53
NT5K19 Flexible E&M 2-Wire Type 1 connections for NT8D37 I/O panel connectors A, E, K, R

Pair	Pins	Pair color	I/O panel connectors				Unit number
			A	E	K	R	
T0	27	W-O	Slot 0	Slot 4	Slot 8	Slot 12	Unit 0
R0	2	O-W					
E	28	W-G					
M	3	G-W					
T1	31	R-BL	Slot 0	Slot 4	Slot 8	Slot 12	Unit 1
R1	6	BL-R					
E	32	R-O					
M	7	O-R					
T2	35	R-S	Slot 0	Slot 4	Slot 8	Slot 12	Unit 2
R2	10	S-R					
E	36	BK-BL					
M	11	BL-BK					
T3	39	BK-BR	Slot 0	Slot 4	Slot 8	Slot 12	Unit 3
R3	14	BR-BK					
E	40	BK-S					
M	15	S-BK					

Table 54
NT5K19 E&M 2-Wire Type 1 connections for NT8D37 I/O panel connectors B, F, L, S

Pair	Pins	Pair color	I/O panel connectors				Unit number
			A	E	K	R	
T0	27	W-O	Slot 1	Slot 5	Slot 9	Slot 13	Unit 0
R0	2	O-W					
E	28	W-G					
M	3	G-W					
T1	31	R-BL	Slot 1	Slot 5	Slot 9	Slot 13	Unit 1
R1	6	BL-R					
E	32	R-O					
M	7	O-R					
T2	35	R-S	Slot 1	Slot 5	Slot 9	Slot 13	Unit 2
R2	10	S-R					
E	36	BK-BL					
M	11	BL-BK					
T3	39	BK-BR	Slot 1	Slot 5	Slot 9	Slot 13	Unit 3
R3	14	BR-BK					
E	40	BK-S					
M	15	S-BK					
T0	43	Y-G	Slot 2	Slot 6	Slot 10	Slot 14	Unit 0
R0	18	G-Y					
E	44	Y-BR					
M	19	BR-Y					
T1	47	V-O	Slot 2	Slot 6	Slot 10	Slot 14	Unit 1
R1	22	O-V					
E	48	V-G					
M	23	G-V					

Table 55
NT5K19 Flexible E&M 2-Wire Type 1 trunk connections for NT8D37 I/O panel connectors C, G, M, T

Pair	Pins	Pair color	I/O panel connectors				Unit number
			C	G	M	T	
T2	27	W-O	Slot 2	Slot 6	Slot 10	Slot 14	Unit 2
R2	2	O-W					
E	28	W-G					
M	3	G-W					
T3	31	R-BL	Slot 2	Slot 6	Slot 10	Slot 14	Unit 3
R3	6	BL-R					
E	32	R-O					
M	7	O-R					
T0	35	R-S	Slot 3	Slot 7	Slot 11	Slot 15	Unit 0
R0	10	S-R					
E	36	BK-BL					
M	11	BL-BK					
T1	39	BK-BR	Slot 3	Slot 7	Slot 11	Slot 15	Unit 1
R1	14	BR-BK					
E	40	BK-S					
M	15	S-BK					
T2	43	Y-G	Slot 3	Slot 7	Slot 11	Slot 15	Unit 2
R2	18	G-Y					
E	44	Y-BR					
M	19	BR-Y					
T3	47	V-O	Slot 3	Slot 7	Slot 11	Slot 15	Unit 3
R3	22	O-V					
E	48	V-G					
M	23	G-V					

Table 56
NT5K19 Flexible E&M 2-Wire Paging trunk connections for NT8D37 I/O panel connectors A, E, K, R

Pair	Pins	Pair color	I/O panel connectors				Unit number
			A	**E**	**K**	**R**	
T0	27	W-O	Slot 0	Slot 4	Slot 8	Slot 12	Unit 0
R0	2	O-W					
A	29	W-BR					
PG	4	BR-W					
T1	31	R-BL	Slot 0	Slot 4	Slot 8	Slot 12	Unit 1
R1	6	BL-R					
A	33	R-G					
PG	8	G-R					
T2	35	R-S	Slot 0	Slot 4	Slot 8	Slot 12	Unit 2
R2	10	S-R					
A	37	BL-O					
PG	12	O-BL					
T3	39	BK-BR	Slot 0	Slot 4	Slot 8	Slot 12	Unit 3
R3	14	BR-BK					
A	41	Y-BL					
PG	16	BL-Y					

Table 57
NT5K19 Flexible E&M 2-Wire Paging trunk connections for NT8D37 I/O panel connectors B, F, L, S

Pair	Pins	Pair color	I/O panel connectors				Unit number
			B	F	L	S	
T0	27	W-O	Slot 1	Slot 5	Slot 9	Slot 13	Unit 0
R0	2	O-W					
A	29	W-BR					
PG	4	BR-W					
T1	31	R-BL	Slot 1	Slot 5	Slot 9	Slot 13	Unit 1
R1	6	BL-R					
A	33	R-G					
PG	8	G-R					
T2	35	R-S	Slot 1	Slot 5	Slot 9	Slot 13	Unit 2
R2	10	S-R					
A	37	BL-O					
PG	12	O-BL					
T3	39	BK-BR	Slot 1	Slot 5	Slot 9	Slot 13	Unit 3
R3	14	BR-BK					
A	41	Y-BL					
PG	16	BL-Y					
T0	43	Y-G	Slot 2	Slot 6	Slot 10	Slot 14	Unit 0
R0	18	G-Y					
A	45	Y-S					
PG	20	S-Y					
T1	47	V-O	Slot 2	Slot 6	Slot 10	Slot 14	Unit 1
R1	22	O-V					
A	49	V-BR					
PG	24	BR-V					

Table 58
NT5K19 Flexible E&M 2-Wire Paging trunk connections for NT8D37 I/O panel connectors C, G, M, T

Pair	Pins	Pair color	I/O panel connectors				Unit number
			C	G	M	T	
T2	27	W-O	Slot 2	Slot 6	Slot 10	Slot 14	Unit 2
R2	2	O-W					
A	29	W-BR					
PG	4	BR-W					
T3	31	R-BL	Slot 2	Slot 6	Slot 10	Slot 14	Unit 3
R3	6	BL-R					
A	33	R-G					
PG	8	G-R					
T0	35	R-S	Slot 3	Slot 7	Slot 11	Slot 15	Unit 0
R0	10	S-R					
A	37	BL-O					
PG	12	O-BL					
T1	39	BK-BR	Slot 3	Slot 7	Slot 11	Slot 15	Unit 1
R1	14	BR-BK					
A	41	Y-BL					
PG	16	BL-Y					
T2	43	Y-G	Slot 3	Slot 7	Slot 11	Slot 15	Unit 2
R2	18	G-Y					
A	45	Y-S					
PG	20	S-Y					
T3	47	V-O	Slot 3	Slot 7	Slot 11	Slot 15	Unit 3
R3	22	O-V					
A	49	V-BR					
PG	24	BR-V					

Table 59
NT5K19 Flexible E&M 2-Wire Recorded Announcement trunk connections for NT8D37 I/O panel connectors A, E, K, R

Pair	Pins	Pair color	I/O panel connectors				Unit number
			A	E	K	R	
T0	26	W-BL	Slot 0	Slot 4	Slot 8	Slot 12	Unit 0
R0	1	BL-W					
SIG B	29	W-BR					
SIG A	4	BR-W					
T1	30	W-S	Slot 3	Slot 7	Slot 11	Slot 15	Unit 1
R1	5	S-W					
SIG B	33	R-G					
SIG A	8	G-R					
T2	34	R-BR	Slot 3	Slot 7	Slot 11	Slot 15	Unit 2
R2	9	BR-R					
SIG B	37	BL-O					
SIG A	12	O-BL					
T3	38	BK-G	Slot 3	Slot 7	Slot 11	Slot 15	Unit 3
R3	13	G-BK					
SIG B	41	Y-BL					
SIG A	16	BL-Y					

Table 60
NT5K19 Flexible E&M 2-Wire Recorded Announcement trunk connections for NT8D37 I/O panel connectors B, F, L, S

Pair	Pins	Pair color	I/O panel connectors				Unit number
			B	F	L	S	
T0	26	W-BL	Slot 1	Slot 5	Slot 9	Slot 13	Unit 0
R0	1	BL-W					
SIG B	29	W-BR					
SIG A	4	BR-W					
T1	30	W-S	Slot 1	Slot 5	Slot 9	Slot 13	Unit 1
R1	5	S-W					
SIG B	33	R-G					
SIG A	8	G-R					
T2	34	R-BR	Slot 1	Slot 5	Slot 9	Slot 13	Unit 2
R2	9	BR-R					
SIG B	37	BL-O					
SIG A	12	O-BL					
T3	38	BK-G	Slot 1	Slot 5	Slot 9	Slot 13	Unit 3
R3	13	G-BK					
SIG B	41	Y-BL					
SIG A	16	BL-Y					
T0	42	Y-O	Slot 2	Slot 6	Slot 10	Slot 14	Unit 0
R0	17	O-Y					
SIG B	45	Y-S					
SIG A	20	S-Y					
T1	46	V-BL	Slot 2	Slot 6	Slot 10	Slot 14	Unit 1
R1	21	BL-V					
SIG B	49	V-BR					
SIG A	24	BR-V					

Table 61
NT5K19 Flexible E&M 2-Wire Recorded Announcement trunk connections for NT8D37 I/O panel connectors C, G, M, T

Pair	Pins	Pair color	I/O panel connectors				Unit number
			C	G	M	T	
T2	26	W-BL	Slot 2	Slot 6	Slot 10	Slot 14	Unit 2
R2	1	BL-W					
SIG B	29	W-BR					
SIG A	4	BR-W					
T3	30	W-S	Slot 2	Slot 6	Slot 10	Slot 14	Unit 3
R3	5	S-W					
SIG B	33	R-G					
SIG A	8	G-R					
T0	34	R-BR	Slot 3	Slot 7	Slot 11	Slot 15	Unit 0
R0	9	BR-R					
SIG B	37	BL-O					
SIG A	12	O-BL					
T1	38	BK-G	Slot 3	Slot 7	Slot 11	Slot 15	Unit 1
R1	13	G-BK					
SIG B	41	Y-BL					
SIG A	16	BL-Y					
T2	42	Y-O	Slot 3	Slot 7	Slot 11	Slot 15	Unit 2
R2	17	O-Y					
SIG B	45	Y-S					
SIG A	20	S-Y					
T3	46	V-BL	Slot 3	Slot 7	Slot 11	Slot 15	Unit 3
R3	21	BL-V					
SIG B	49	V-BR					
SIG A	24	BR-V					

Table 62
NT5K19 Flexible E&M 4-Wire Type 1 connections for NT8D37 I/O panel connectors A, E, K, R

Lead designations			I/O panel connectors				Unit number
Type 1 mode	Pins	Pair color	A	E	K	R	
TA	26	W-BL	Slot 0	Slot 4	Slot 8	Slot 12	Unit 0
TB	1	BL-W					
RA	27	W-O					
RB	2	O-W					
E	28	W-G					
M	3	G-W					
TA	30	W-S	Slot 0	Slot 4	Slot 8	Slot 12	Unit 1
TB	5	S-W					
RA	31	R-BL					
RB	6	BL-R					
E	32	R-O					
M	7	O-R					
TA	34	R-BR	Slot 0	Slot 4	Slot 8	Slot 12	Unit 2
TB	9	BR-R					
RA	35	R-S					
RB	10	S-R					
E	36	BK-BL					
M	11	BL-BK					
TA	38	BK-G	Slot 0	Slot 4	Slot 8	Slot 12	Unit 3
TB	13	G-BK					
RA	39	BK-BR					
RB	14	BR-BK					
E	40	BK-S					
M	15	S-BK					

Note: The cable pair designated TA, TB is the transmit pair. The pair designated RA, RB is the receive pair.

Table 64
NT5K19 Flexible E&M AC15 trunk connections for NT8D37 I/O panel connectors A, E, K, R

Lead designations			I/O panel connectors				Unit number
Type 1 mode	Pins	Pair color	A	E	K	R	
TA	26	W-BL	Slot 0	Slot 4	Slot 8	Slot 12	Unit 0
TB	1	BL-W					
RA	27	W-O					
RB	2	O-W					
TA	30	W-S	Slot 0	Slot 4	Slot 8	Slot 12	Unit 1
TB	5	S-W					
RA	31	R-BL					
RB	6	BL-R					
TA	34	R-BR	Slot 0	Slot 4	Slot 8	Slot 12	Unit 2
TB	9	BR-R					
RA	35	R-S					
RB	10	S-R					
TA	38	BK-G	Slot 0	Slot 4	Slot 8	Slot 12	Unit 3
TB	13	G-BK					
RA	39	BK-BR					
RB	14	BR-BK					
Note: The cable pair designated TA, TB is the transmit pair. The pair designated RA, RB is the receive pair.							

Table 63
NT5K19 Flexible E&M 4-Wire Type 1 connections for NT8D37 I/O panel connectors B, F, L, S (Part 1 of 2)

Lead designations			I/O panel connectors				Unit number
Type 1 mode	Pins	Pair color	B	F	L	S	
TA	26	W-BL	Slot 1	Slot 5	Slot 9	Slot 13	Unit 0
TB	1	BL-W					
RA	27	W-O					
RB	2	O-W					
E	28	W-G					
M	3	G-W					
TA	30	W-S	Slot 1	Slot 5	Slot 9	Slot 13	Unit 1
TB	5	S-W					
RA	31	R-BL					
RB	6	BL-R					
E	32	R-O					
M	7	O-R					
TA	34	R-BR	Slot 1	Slot 5	Slot 9	Slot 13	Unit 2
TB	9	BR-R					
RA	35	R-S					
RB	10	S-R					
E	36	BK-BL					
M	11	BL-BK					
TA	38	BK-G	Slot 1	Slot 5	Slot 9	Slot 13	Unit 3
TB	13	G-BK					
RA	39	BK-BR					
RB	14	BR-BK					
E	40	BK-S					
M	15	S-BK					

Note: The cable pair designated TA, TB is the transmit pair. The pair designated RA, RB is the receive pair.

Table 63
NT5K19 Flexible E&M 4-Wire Type 1 connections for NT8D37 I/O panel connectors B, F, L, S (Part 2 of 2)

Lead designations			I/O panel connectors				Unit number
Type 1 mode	Pins	Pair color	B	F	L	S	
TA	42	Y-O	Slot 2	Slot 6	Slot 10	Slot 14	Unit 0
TB	17	O-Y					
RA	43	Y-G					
RB	18	G-Y					
E	44	Y-BR					
M	19	BR-Y					
TA	46	V-BL	Slot 2	Slot 6	Slot 10	Slot 14	Unit 1
TB	21	BL-V					
RA	47	V-O					
RB	22	O-V					
E	48	V-G					
M	23	G-V					
Note: The cable pair designated TA, TB is the transmit pair. The pair designated RA, RB is the receive pair.							

Table 65
NT5K19 Flexible E&M AC15 Trunk connections for NT8D37 I/O panel connectors B, F, L, S

Lead designations			I/O panel connectors				Unit number
Type 1 mode	Pins	Pair color	B	F	L	S	
TA	26	W-BL	Slot 1	Slot 5	Slot 9	Slot 13	Unit 0
TB	1	BL-W					
RA	27	W-O					
RB	2	O-W					
TA	30	W-S	Slot 1	Slot 5	Slot 9	Slot 13	Unit 1
TB	5	S-W					
RA	31	R-BL					
RB	6	BL-R					
TA	34	R-BR	Slot 1	Slot 5	Slot 9	Slot 13	Unit 2
TB	9	BR-R					
RA	35	R-S					
RB	10	S-R					
TA	38	BK-G	Slot 1	Slot 5	Slot 9	Slot 13	Unit 3
TB	13	G-BK					
RA	39	BK-BR					
RB	14	BR-BK					
TA	42	Y-O	Slot 2	Slot 6	Slot 10	Slot 14	Unit 0
TB	17	O-Y					
RA	43	Y-G					
RB	18	G-Y					
TA	46	V-BL	Slot 2	Slot 6	Slot 10	Slot 14	Unit 1
TB	21	BL-V					
RA	47	V-O					
RB	22	O-V					

Note: The cable pair designated TA, TB is the transmit pair. The pair designated RA, RB is the receive pair.

Powering up the system and initial loading

Contents

This section contains information on the following topics:

Overview

This section describes how to power up and initialize a Large System and install new software.

Powering up ac systems

Powering up ac systems involves:

1   "Installing the Security Device" on

2   "Preparing to power up" on

3   "Connecting the ac power source" on

4   "Turning ac power ON" on

5   "Resetting the main circuit breakers (ac power)" on

Installing the Security Device

The Security Device (Figure 106 on) 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.

Procedure 47
Installing the Security Device

The Security Device fits into the System Utility card (Figure 106 on).

1   Insert the Security Device into the Security Device holder on the System Utility card with the "Nortel" side facing up. Do not bend the clip more than necessary.

2   Check that the Security Device is securely in place.

--------- **End of Procedure** ---------

Figure 106
Security Device

Preparing to power up

Follow Procedure 48 to prepare to power up a Large System.

	CAUTION
⚠	Verify that the safety grounds are properly connected.

Procedure 48
Preparing to power up

1   Set the ac service panel circuit breakers OFF.

2   Set the main circuit breakers in the rear of each pedestal OFF.

3   Set the power supply or MPDU switches in each module OFF.

4   Set the ringing generators in each IPE or PE module OFF.

5   Set the blower unit switch in the front of each pedestal OFF.

6   Set all faceplate switches to ENB.

——————————— **End of Procedure** ———————————

Connecting the ac power source

To connect a Large System to the ac power source, follow one of the two options below.

Procedure 49
Option 1: Using 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 "Turning ac power ON" on .

——————————— **End of Procedure** ———————————

Procedure 50
Option 2: Hard-wiring 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 Large System column.

2   At the column, connect the wires to the field wiring access block of the PDU according to the following:

- 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 "Turning ac power ON" on .

――――――― **End of Procedure** ―――――――

Turning ac power ON

Follow Procedure 51 and Procedure 52 to prepare to power up a Large System.

<table>
<tr>
<td>⚠️</td>
<td>

CAUTION

System Failure

If a problem occurs when a step is performed, resolve that problem before continuing.

</td>
</tr>
</table>

Procedure 51
Turning ac power on

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 rotates 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.

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 step 1 through step 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 "Resetting the main circuit breakers (ac power)" on .

——————— **End of Procedure** ———————

Resetting the main circuit breakers (ac power)

Follow Procedure 52 to reset the main circuit breakers (ac power).

Procedure 52
Resetting 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.

———————————— **End of Procedure** ————————————

Powering up dc systems

Powering up ac systems involves:

1   "Installing the Security Device" on page 269

2   "Preparing to power up" on page 270

3   "Turning dc power ON" on page 271

Installing the Security Device

The Security Device (Figure 106 on page 265) 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.

Procedure 53
Installing the Security Device

The Security Device fits into the System Utility card (Figure 106 on page 265).

1 Insert the Security Device into the Security Device holder on the System Utility card with the "Nortel" side facing up. Do not bend the clip more than necessary.

2 Check that the Security Device is securely in place.

──────────── **End of Procedure** ────────────

Preparing to power up

> ⚠ **CAUTION**
>
> Verify that the safety grounds are properly connected.

Procedure 54
Preparing to power up

1 Set the ac service panel circuit breakers to each rectifier OFF.

2 Remove the dc power distribution fuses or set the distribution circuit breakers OFF.

3 Set all circuit breakers in the rear of each pedestal OFF.

4 Set the power supply switches in each module OFF.

5 Set the ringing generators in each IPE or PE module OFF.

6 Set the blower unit in each pedestal OFF.

7 Set all faceplate switches to ENB.

8 Proceed to "Turning dc power ON" on page 271.

──────────── **End of Procedure** ────────────

Turning dc power ON

Follow Procedure 55 to turn the dc power on.

Procedure 55
Turning 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**
>
> **System Failure**
>
> If a problem occurs in any of the following steps, resolve that problem before continuing.

> **IMPORTANT!**
>
> 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 rotates slowly. As the system heats up, the cooling fans 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 step 1 through step 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.

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.

──────── **End of Procedure** ────────

Installing software and converting the database

Follow Procedure 56 to install the software and convert the database.

Procedure 56
Installing the software and converting the database

1   Check that a terminal is connected to J25 on Core/Net 1.

2   In Core/Net 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.

3   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.

4   Press the manual RESET button on the CP PII card faceplate.

Before the install 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!

Validate hard drive partition number and size...

There are 3 partitions in disk 0:
The size of partition 0 of disk 0 is XX Mbyte
The size of partition 0 of disk 0 is XX Mbyte
The size of partition 0 of disk 0 is XX Mbyte

Disk partitions and sectors checking is competed!

The system then checks the partitions for any errors. The screen displays the following for each partition:

```
Copyright (c) 1993-1996 RST Software Industries Ltd. All rights
reserved

ver: 2.6 FCS

Disk Check In Progress...

        total disk space (bytes): XX
        bytes in each allocation unit: XX
        total allocation units on disk: XX
        bad allocation units: XX
        available bytes on disk: XX
        available clusters on disk: XX
        maximum available contiguous chain (bytes): XX
        available space fragmentation (%): XX
        clusters allocated: XX

        Done Checking Disk.

            chkdsk for PART_X OK!
            pmDosFsCheck is completed!
```

5   Select yes or (no) when asked if a Signaling Server is connected:

```
 System Date and Time now is:

Day-Month-Year, Hour:Min:Sec

Succession Enterprise Software/Database/BOOTROM
CDROM INSTALL Tool

Does this System have a Signaling Server.....? (Default - No)

    Please enter:
    <CR> -> <n> - No
    <y> - Yes

    Enter Choice>
```

6   The system then enters the Main Menu for keycode authorization.
Remove the CP PII Install Program diskette and insert the Keycode
diskette.

M A I N   M E N U

The Software Installation Tool will install or upgrade
Succession Enterprise System Software, Database and the
CP-BOOTROM. You will be prompted throughout the
installation and given the opportunity to quit at any time.

Please enter:
<CR> -> <u> - To Install menu
<t> - To Tools menu.
<q> - Quit.

Enter Choice> **<CR>**
>Validating Keycode

The provided keycode authorizes the install of X210300
software

(all subissues) for machine type XXXX

(XXX processor on XXXX System)

IMPORTANT!

Remove keycode floppy disk at this time and insert
the database backup disk.

---

7   The screen displays the Install Menu. Confirm that the keycode matches the CD-ROM release:

```
 Please confirm that this keycode matches the CDROM Release

      Please enter:

      <CR> -> <y> - Yes, the keycode matches. Go on to Install
Menu.
      <n> - No, the keycode does not match. Try another keycode
diskette.

      Enter Choice> <CR>

      >Obtain database file names
```

8   Enter **b** to install the Software, Database and CP-BOOTROM:

```
                    I N S T A L L   M E N U

      The Software Installation Tool will install or upgrade
Succession Enterprise System Software, Database and the
CP-BOOTROM. You will be prompted throughout the installation
and given the opportunity to quit at any time.

      Please enter:
      <CR> -> <a> - To install Software, CP-BOOTROM.
      <b> - To install Software, Database, CP-BOOTROM.
      <c> - To install Database only.
      <d> - To install CP-BOOTROM only.
      <t> - To go to the Tools menu.
      <k> - To install Keycode only.

       For Feature Expansion, use OVL143.
      <p> - To install 3900 set Languages.
      <q> - Quit.

      Enter Choice> b
```

9   Verify the CD-ROM version:

Please insert the installation CDROM into the drive on Core X.

   The labeled side of the CDROM should be side up in the CDROM tray.

   Please enter:
   <CR> -> <a> - CDROM is now in drive. Continue with s/w checking.
    <q> - Quit.

   Enter Choice> **<CR>**

The installation CDROM contains version X210300_K.

   Please enter:
   <CR> -> <y> - Yes, this is the correct version. Continue.
    <n> - No, this is not the correct version. Try another CDROM.
   or keycode disk

   Enter Choice> **<CR>**

    >Copying direct.rec from /cd0/0300_KMR.N33/target/p/sl1/ direct.rec to /u/direct.rec
   >Updating /u/direct.rec
   >Processing the Install Control file
   >Installing release 0300K

---

10 Confirm all options before installing the software:

```
                    INSTALLATION STATUS SUMMARY

                  -------------------------------------------

         =============+========+========+=============
     |    Option    |   Choice   | Status |   Comment        |
         ===============+========+========+=========
     | SW: CD to disk |    yes    |        | install for rel 0300K |
         =============+========+========+=============
 =
     |    Option    |   Choice   | Status |   Comment        |
         ===============+========+========+=========
     |   Database   |    yes    |    |    |            |

     |    Option    |   Choice   | Status |   Comment        |
         ===============+========+========+=========
     | CP-BOOTROM |    yes    |    |    |            |


      Please enter: <CR> -> <y> - Yes, start Installation.

          <n> - No, stop Installation. Return to the Main Menu.

 Enter Choice> <CR>

 >Checking System Configuration

 You selected to upgrade the system from release: 2540 to
 release: 0300K.

 This will erase all old system files.
```

Database files will NOT be erased. You may continue installing the software or quit now and leave your system unchanged.

Please enter:

       \<CR> -> \<a> - Continue with Upgrade.
       \<q> - Quit.

Enter Choice> **\<CR>**

       >Starting Software Install
       >Upgrading from release 2540 to release 0300K

11 After a number of files are copied over, 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

\<2>   Western Europe 10 Languages

\<3>   Eastern Europe 10 Languages

\<4>   North America 6 Languages

\<5>   Spare Group A

\<6>   Spare Group B

The following languages are contained in each selection:

i. Global 10 Languages English, French, German, Spanish, Swedish, Italian, Norwegian, Brazilian Portuguese, Finnish, Japanese Katakana.

ii. Western Europe 10 Languages English, French, German, Spanish, Swedish, Italian, Norwegian, Brazilian Portuguese, Finnish, Danish.

iii. Eastern Europe 10 Languages English, French, German, Dutch, Polish, Czech, Hungarian, Russian, Latvian, Turkish.

iv. North America six Languages English, French, German, Spanish, Brazilian Portuguese, Japanese Katakana.

      v. Spare Group A.

      vi. Spare Group B.

12 Continue with upgrade when prompted. Select a database to install:

> Software release 0300K was installed successfully on Core 0.
>
>   All files were copied from CDROM to the hard disk.
>
>   Please press <CR> when ready... **<CR>**
>
>   You will now perform the database installation.
>
>   Note: If you are installing the Database from a floppy disk, please insert the correct disk now.
>
>   Please enter:
>
>   <CR> -> <a> - Install CUSTOMER Database
>   (the customer database diskette must be in the Core 0
> disk drive).
>   <b> - Install DEFAULT Database
>   (the installation CDROM must be in the Core 0
> disk drive).
>   <c> - Transfer the previous system Database.
>   <e> - Check the Database that exists on the hard disk.
>   <q> - Quit.
>
>   Enter Choice> **<CR>**

13 Confirm database transfer:

> You selected to transfer the database from the floppy disk - release: 2540 to the hard disk on Core X. release: 2540.
>
> This will erase the database on the hard disk.
>
> The database diskette has been inserted into the floppy disk drive.
>
> If you quit now, the database will be left unchanged.
>
>> Please enter:
>>
>> <CR> -> <a> - Continue with Database Install.
>> <q> - Quit.
>
> Enter Choice> **<CR>**

The system then informs you of the database details and prompts you to confirm:

> You have chosen to restore database dated: Jul 07 14:10:00 2003
>
>> Please confirm.
>>
>> Please enter:
>>
>> <CR> -> <y> - Yes, load.
>> <n> - No, DO NOT load.
>>
>> Enter Choice> **<CR>**

14 The system restores the database and provides a status summary.

Note: The hard drive on a new system displays an error message that no database is found on hard drive. This message can be ignored.

15 Enter **<CR>** when prompted, returning the system to the Install Menu.

16 Enter **q** to quit:

I N S T A L L   M E N U

The Software Installation Tool will install or upgrade Succession Enterprise System Software, Database and the CP-BOOTROM. You will be prompted throughout the installation and given the opportunity to quit at any time.

Please enter:

<CR> -> <a> - To install Software, CP-BOOTROM.
<b> - To install Software, Database, CP-BOOTROM.
<c> - To install Database only.
<d> - To install CP-BOOTROM only.
<t> - To go to the Tools menu.
<k> - To install Keycode only.

For Feature Expansion, use OVL143.

<p> - To install 3900 set Languages.
<q> - Quit.

Enter Choice> **q**

---

17 The system then prompts you to confirm and reboot:

You selected to Quit the Software Installation Tool.

You may reboot the system or return to the Main Menu.

Before rebooting the system, remove Install diskette from the floppy drive(s).

DO NOT REBOOT USING BUTTON!!

Please enter:

<CR> -> <a> - Reboot the system.
<m> - Return to the Main menu.

Enter Choice> **<CR>**

>Removing temporary files
>Remove /u/disk3321.sys
>Quit Install. Reboot system...

————————— **End of Procedure** —————————

Testing Core/Net 1 and Core/Net 0

Follow Procedure 57 to test Core/Net 1 and Core/Net 0.

Procedure 57
Testing 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 cCNI 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 cCNI c s   Test each cCNI card (core, slot).

STAT SUTL   Get status of System Utility cards.

TEST SUTL   Test the System Utility 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 cCNI c s	Get status of cCNI cards.
TEST cCNI c s	Test cCNI 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, cCNIs, and memory.

STAT CPU	Get the status of both Cores and redundancy.
STAT cCNI c s	Get the status of all configured cCNIs cards.
****	Exit program.

———— **End of Procedure** ————

Performing acceptance tests

Contents

This section contains information on the following topics:

Acceptance tests

CAUTION

Ensure that the current DEP Lists are installed.

Perform the following acceptance tests after the system loading is completed.

1   "Testing the module power supply" on page 288

2   "Testing the blower unit and thermal sensor" on page 290

3   "Testing the sysload" on page 292

See *Software Input/Output: Administration* (553-3001-311) for a detailed explanation of software prompts and the *Software Input/Output: System Messages* (553-3001-411) for the meaning of system messages and display codes generated during acceptance tests.

> *Note:* If you fail to see an expected display code while performing any test, contact your Nortel Networks support representative.

Testing the module power supply

Use this procedure to test module power supplies and ringing generators and their interface to the system monitor. This procedure should be performed for each power supply at system installation, or whenever a module is installed.

> *Note:* Performing these tests on a single CPU system may cause a sysload. Performing these tests on a dual CPU system may cause an initialization. Disregard INI messages during the tests.

Procedure 58
Testing module power supply

1   Verify that the green LED on each power supply is lit and that each red column LED 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.

   • The green LED on the power supply should go out.

   • The red column LED should light.

   • The system terminal should display PWR0002 and BSD090.

   Note: If the power supply is in an IPE Module, XMI messages may be generated.

   • The system terminal should then display BSD000.

3   Set the power supply to ON.

- The green LED on the power supply should light.

- The red column LED should go out.

- The system terminal should display PWR0000.

4   Set the power supply to OFF. Wait until the red column LED lights, then unseat the power supply.

- The red column LED should remain lit.

- The system terminal should display PWR0002 and PWR0003.

5   Make sure the power supply switch is OFF and then push it back into the slot. Set the power supply to ON.

- The green LED on the power supply should light.

- The red column LED should go out.

- The system terminal should display PWR0000.

———————————   **End of Procedure**   ———————————

Testing the blower unit and thermal sensor

Use this procedure to test the NT8D52 Blower Unit and its interface to the system monitor. This test should be performed on the blower unit when a column is initially installed.

Procedure 59
Testing blower unit and thermal sensor

<table>
<tr>
<td>⚠️</td>
<td>

IMPORTANT!

In the steps below, if you fail to see an expected display code, contact your Nortel Networks support representative.

</td>
</tr>
</table>

1 In the front of the pedestal, set the blower unit circuit breaker, or power switch, to OFF.

- The red LED at the top front of the column should light.

Note: Some dc powered blower units such as the NT8D52DD may also display PWR0005.

2 Set the blower unit circuit breaker, or power switch, to ON.

- The column LED should go out.

- The system terminal should display PWR0046.

3 Use a screwdriver to loosen the retaining screws at the front of the blower unit (see Figure 107 on page 291) and pull the unit out until it is disconnected from the pedestal.

Note: Do *not* pull the unit all the way out of the pedestal.

- The column LED should light.

4 Reinstall the blower unit and tighten the retaining screws.

- The column LED should go out.

- The system terminal should display PWR0046.

5   Heat one of the two thermal sensors under the top cap of the column with a hand-held hair dryer or similar heat source.

- The column LED should light.

- Thirty seconds after the thermal sensor detects 70 degrees C (158 degrees F), the main circuit breaker, or the blower unit circuit breaker, at the rear of the pedestal should trip. The system terminal should display PWR0004, PWR0006, and PWR0007.

6   Allow the sensor to cool, then reset the circuit breaker in the pedestal. If a sysload occurs, allow it to complete.

- The column LED should go out.

- The system terminal should display PWR0044, PWR0046, and PWR0047.

7   Repeat step 5 and step 6 for the other thermal sensor.

—————— **End of Procedure** ——————

Figure 107
Blower unit removal

Retaining
screw

Blower unit
circuit breaker

Retaining
screw

553-3040
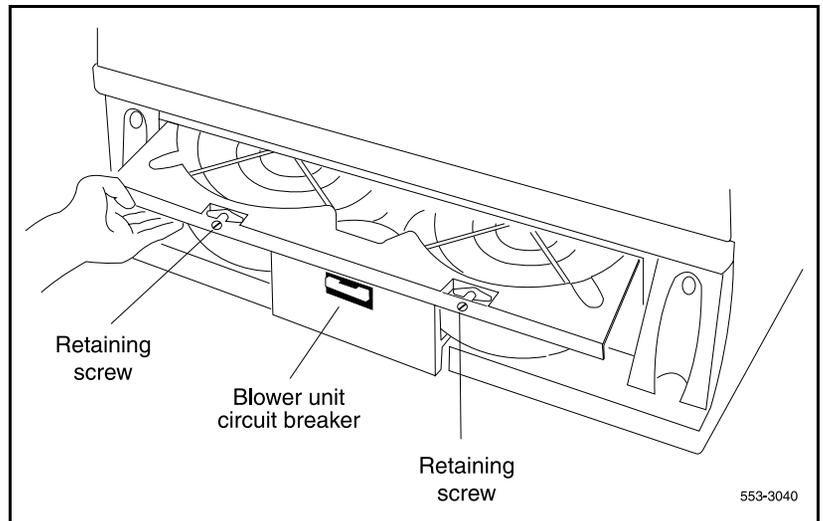
Testing the sysload

Use Procedure 60 to test the sysload (manual reload) function.

Procedure 60
Sysload test

1   Start the sysload:

- Simultaneously press the MAN RST buttons (the bottom buttons) on both Call Processor Cards.

The following functions occur during a sysload:

- The red LED at the top of the CPU column should light.

- The major alarm indication should be displayed on all attendant consoles.

On the LCD displays on the Card(s):

- Following the "Selftest Complete" message, watch the LCD for the message "IOP in Slot 17."

- Watch the LCD for the message "Loading Disk OS."

- When the sysload is complete, the system terminal displays DONE and the system automatically invokes the initialization program.

The following functions occur when the initialization is complete:

- The column LED should go out.

- The major alarm indication should disappear from all attendant consoles.

- The system automatically runs the programs in the midnight routine.

2   Press the return key on the system terminal to monitor the progress of the midnight routines until the OVL111 BKGD response is received.

———————————— **End of Procedure** ————————————

Testing the system terminal and system monitor

Use Procedure 61 to test the system terminals connected to the Large System.

Procedure 61
Testing system terminal and system monitor

1   Log into the system:

> **LOGI** (password)

2   Enter the program and check the status of the system monitor:

> **LD 37**
> **STAT XSM**

3   Test the terminal:

> **TTY x**   "x" is the device number assigned to the system terminal

The system terminal should display

> **ABCDEFGHIJKLM**
> **NOPQRSTUVWXYZ**
> **%*!&()<>=:,.?**
> **READY FOR INPUT**

4   Step through the keys on the keyboard one at a time. All keyboard input should be echoed until END is entered.

5   Exit LD 37:
   ****

──────── **End of Procedure** ────────

Testing the PFTU

Use Procedure 62 to test a PFTU and its interface with the system monitor.

Procedure 62
Testing the PFTU and its interface

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 step 2 and step 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.

——————— **End of Procedure** ———————

Testing the MMDU

Use Procedure 63 to test the MMDUs.

Procedure 63
Testing the MMDUs

1   Log into the system:

  LOGI (password)

2   Enter the program:

  LD 137

3   Make sure the CMDU to be tested is not disabled:

  STAT CMDU   checks the status of both CMDUs

4   If the CMDU to be tested is disabled, enable it:

  ENL CMDU x   x represents the number for the specific CMDU

5   Test the CMDU:

    TEST CMDU

If the system response is not "OK," see the *Software Input/Output: Administration* (553-3001-311) for the meaning of the message received.

6   Exit LD 137:

    ****

7   To test the second CMDU, enter:

    LD 135

Switch CPUs:

    SCPU

Repeat steps 1 through 6.

——————————————   **End of Procedure**   ——————

Installing earthquake bracing

Contents

This section contains information on the following topics:

Seismic-approved applications

Depending on the geographic location, the floor installation method may or may not require seismic bracing. To meet seismic bracing requirements, the installation must meet the Bellcore or the California OSHPD installation specifications. In locations that do not have earthquakes, a non-seismic installation is acceptable.

In certain seismic-approved applications where the pedestal attachment to the floor may be required but Nortel Networks does not offer the appropriate hardware, the installation organization must contact a seismic engineering firm to install the pedestal that meets Bellcore or California OSHPD requirements. This application could include attachment to a raised wood or steel floor.

Universal equipment modules (UEM's) are designed to withstand most earthquakes. However, to provide earthquake security, two kits must be installed for each column—a bracing kit provides vertical support to each column of modules and an anchor kit secures each pedestal to the floor.

Installing seismic bracing

Each Succession 1000M Large System and Meridian 1 Large System has been certified to meet 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). Each Large System has been certified to meet the maximum severity (Zone 4).

- CALIFORNIA OSHPD, as part of the California building code, 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. Each Large System has been certified for such installations under anchorage pre-approval number R-0233.

Installing seismic bracing involves:

1   "Selecting the kit" on

2   "Drilling the floor" on

3   "Installing anchor plates" on

4   "Installing rods" on

5   "Positioning and leveling the system" on

Selecting the kit

To select the applicable bracing and anchorage kits for your particular installation, you must first determine the following site requirements:

- Identify system configuration (number of columns and modules per column).

- Identify specification requirements (BELLCORE or CALIFORNIA OSHPD).

- Determine site mounting floor parameters (this information can usually be found in the engineering building drawings):

– concrete type (hardrock or lightweight aggregate),

– minimum concrete compressive strength (megapascals or psi),

– minimum concrete thickness

First, choose the appropriate module bracing kit using Table 66 on page 299. Select a separate kit for each column of modules. For column expansion (when an additional module is added to a column which already contains seismic bracing) the expansion bracing kit should be used.

Table 66
Seismic Bracing Kits

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

Note: The NT8D64CD kit contains neither bracing rods nor tie bars because these are not needed for single module installations. The NT8D64BD kit does not contain mounting plates as these are not needed for column expansion.

Next, each column must also be secured to the floor. This is accomplished by installing one of two available anchor kits. Select the anchor kit by comparing the site requirements to Table 67 on page 300. This table shows that either anchor kit can be used to meet the CALIFORNIA OSHPD specification, but only Kit B meets the BELLCORE specification. For those installations where neither specification is required, Kit A is recommended due to its shallower concrete requirement.

Both anchor kits can be used in hardrock 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). The floor parameters for your installation can usually be found in the engineering building drawings.

Table 67
Seismic Anchor Kit

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

The kits listed in Table 67 on contain commercially available mounting hardware. You have the option of purchasing the contents directly from the manufacturer (using the listing below) or ordering the kits directly from Nortel Networks.

- Kit A (NT8D64BE) contains four of each of the following items:
    — 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
- Kit B (NT8D64CF) contains four of the following items:
    — Hilti HSL M16/25 (box of 10, manufacturers part# 665934), Hilti Corporation (918) 252-6000

Finally, to aid installation, four kits have been developed. The seismic anchor hole template kit (NT8D64BH) provides a mylar template to aid floor marking. Only one kit is needed for an installation and this kit is reusable.

Drilling the floor

The following tools are required to drill the holes for the anchor bolts.

- 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

	DANGER
⚠️	Wear safety goggles when drilling anchor holes. For all drilling, use the appropriate tools and follow local codes. Make sure to obey all safety and warning precautions provided by the hammer drill and anchor bolt manufacturers.

Procedure 64
Drilling concrete floors

	IMPORTANT!
⚠️	This procedure applies only to installations into concrete floors.

1   Using the equipment room floor plan mark the position of all of the columns.

2   Center-punch each of the hole centers.

3   Using a carbide-tipped drill bit, hammer drill the holes to the size and depth shown in Table 68 on .

Table 68
Anchor hole sizes

Kit	Kit part number	Hole diameter	Hole depth
A	NT8D64BE	1.00 inch	3.18 inch
B	NT8D64CF	24 mm	125 mm

Note: Special care should be taken in drilling the holes. The holes have to be drilled straight and perpendicular to the floor surface in order for the anchors to be installed correctly. The drill fixture kit can aid this process.

4   Should you hit 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 to be installed immediately, cover the anchor holes to prevent debris from falling into them.

——————————— **End of Procedure** ———————————

Installing anchor plates

The following tools are required to install the anchors and the anchor plates:

- Kit A

  — setting tool (Hilti HST 3/4", manufacturer part#329821)

  — 1 1/8 inch open-end wrench

- Kit B

  — 24 mm open-end wrench

Procedure 65
Installing Kit A

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   Locate the two mounting plates for each column 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 108 on .

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

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   Go to "Installing rods" on .

End of Procedure

Figure 108
Mounting plate installation
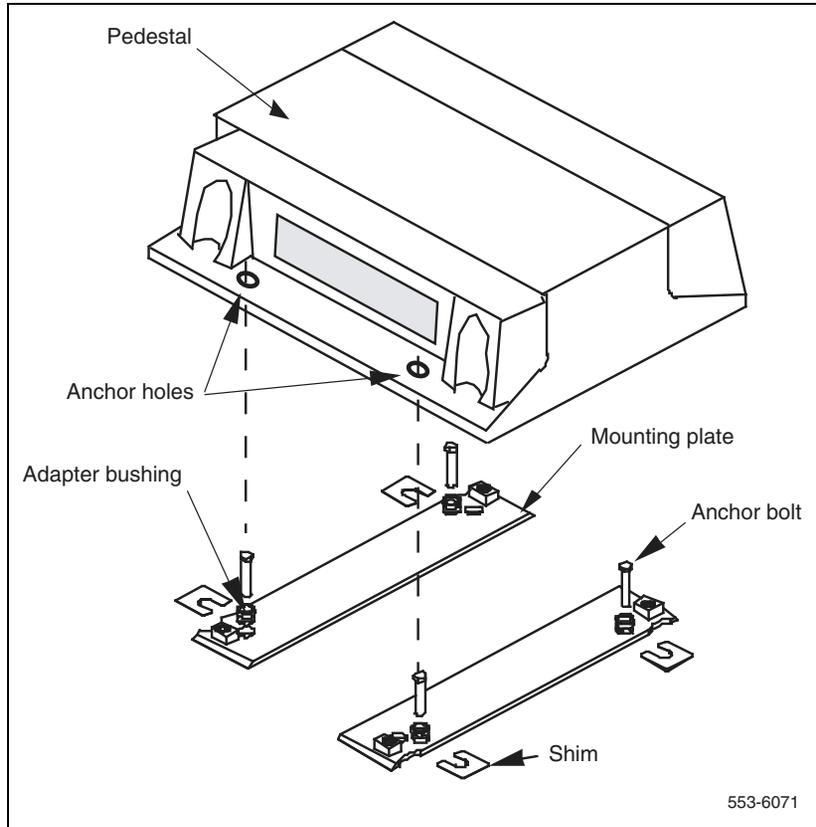
Procedure 66
Installing Kit B

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 will allow 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   Go to "Installing rods" on .

——————— **End of Procedure** ———————

Installing rods

The following tools are required to install the rods:

- 5/16 inch socket wrench

- 1/2 inch open-end wrench (for rods)

- 9/16 inch open-end wrench (for nuts)

   Note: The rods should be installed before you position the columns.

Procedure 67
Installing rods

1   Remove the top cap on each column:

a.   Pull forward on the clips underneath the front edge of each air exhaust grill on the top cap. Lift up and remove the grill as illustrated in Figure 109 on .

Figure 109
Exhaust grill removal
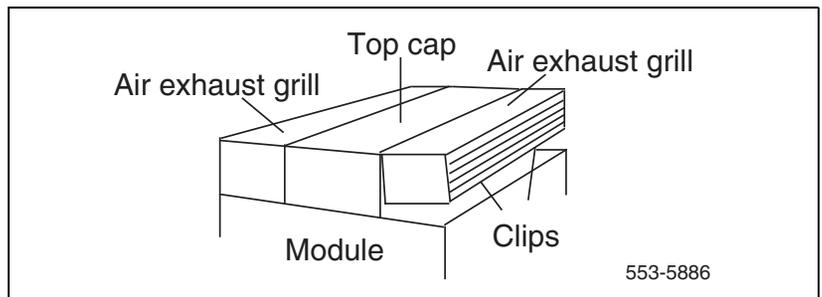
b. Use a 5/16 in. socket wrench to remove the six screws that secure the top cap (see Figure 110 on page 306). Lift the top cap from the column.

Figure 110
Top cap assembly
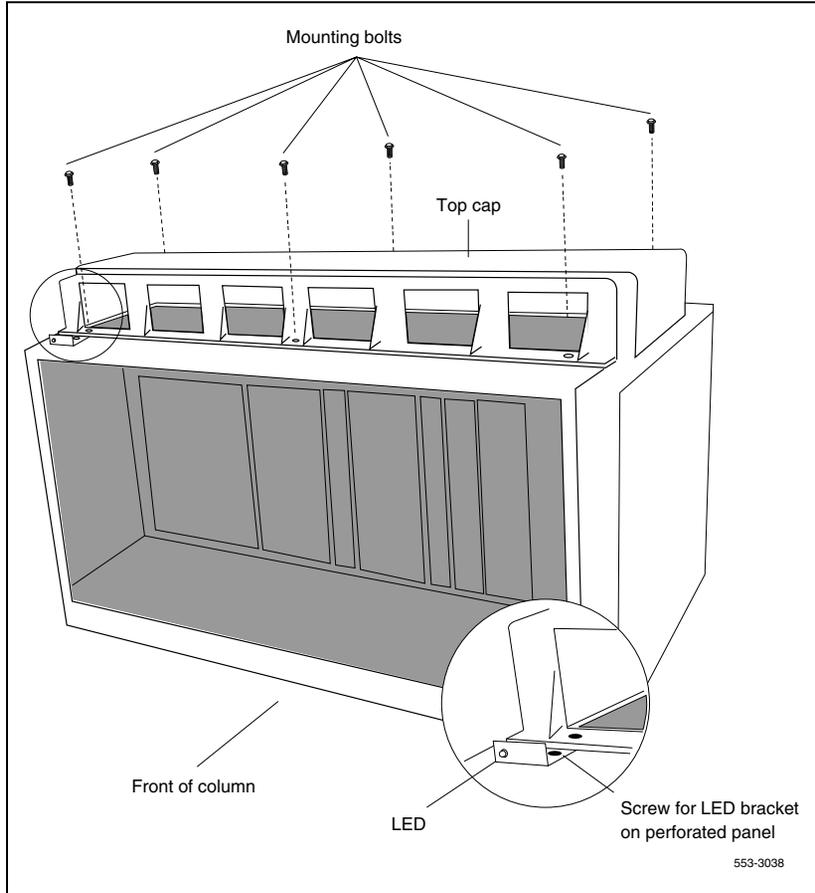
2   Remove the side panels on the exterior of each module by removing the four bolts that secure the panel.

Note: In a two-tier or three-tier column, with adequate ceiling clearance, you may be able to thread the rods down the sides of the column without removing the side panels. Insert each rod into its hole at the top of the column.

3   Install bracing rods:

- Position each rod in one of the vertical slots along the sides of the modules and insert the rods into the threaded holes in the pedestal (see Figure 111 on page 308). Tighten the rods in by hand or snug tight with a 1/2" open-end wrench.

- Place a tie bar over each pair of rods, from side to side across the top of the module, as shown in Figure 111 on page 308.

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

Note: When installing expansion rods as part of the NT8D64BD bracing kit, the rods are screwed into the previously-installed rods by means of a coupling nut. The resulting two-piece rod should be secured in the same manner as the single rod described above.

Figure 111
Installing bracing rods for column support

Tie bars

Earthquake rods

Rods in slots between
modules and
exterior side panels

Side panel

Rods screw
into pedestal

553-3063
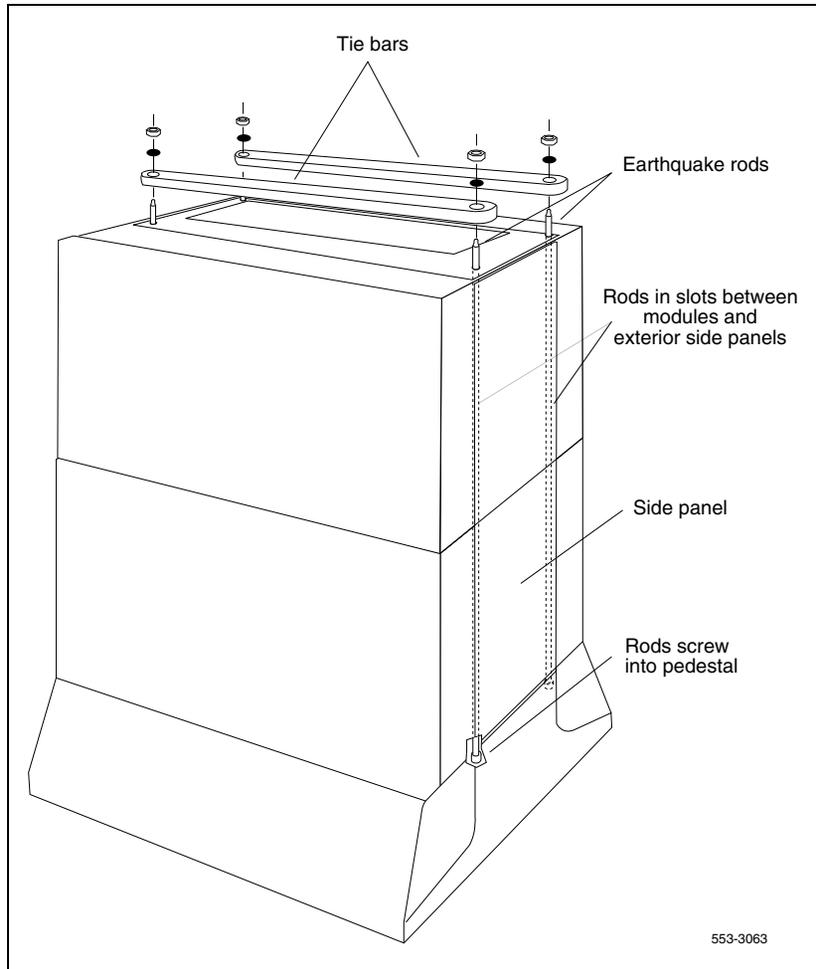
4   Reinstall the top cap and grills:

• Position each top cap and install the bolts that secure it.

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

5   **For a single-column system**, reinstall the side panels on each module.

6   **For a multiple-column system**, install NT8D49AA Spacer Kits between adjacent columns:

a.   Attach gaskets to both sides in the front section of each spacer (see Figure 112 on).

Figure 112
Positioning spacer gaskets

Gasket placement

Rear   Front

553-5641
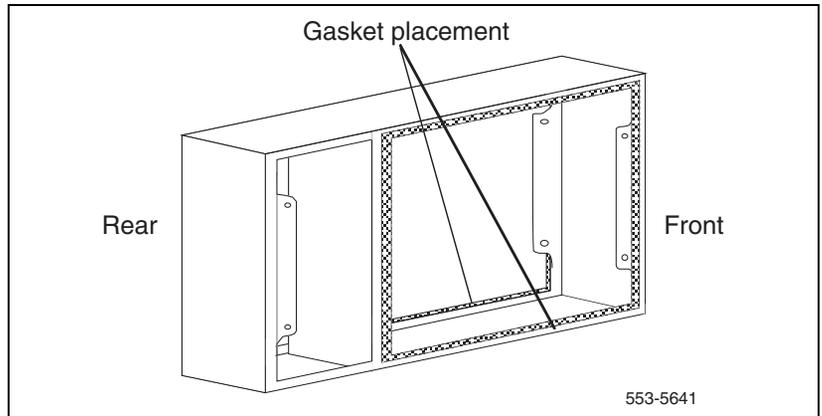
b.   Attach a spacer to one side of each module that will be next to another module, except on the end column (see Figure 112 on and Figure 113 on). Insert the screws through holes in the trim panels.

Figure 113
Adding spacers to columns

(end column)

Spacers   Spacers

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

553-5383
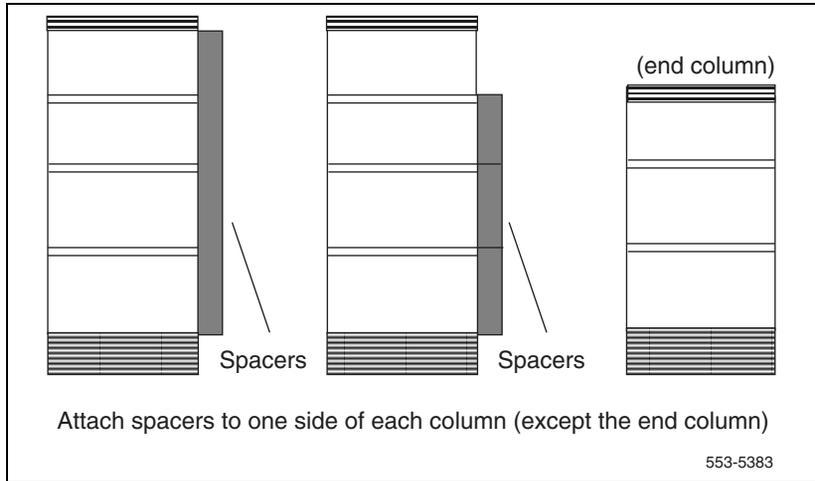
7   Go to "Positioning and leveling the system" on page 311.

———————— **End of Procedure** ————————

Positioning and leveling the system

The following tools are required to position and level the system:

- socket wrench (anchor bolts)

  — 1 1/8 inch for Kit A

  — 24 mm for Kit B

- 5/8" socket wrench (pedestal bolts)

Procedure 68
Leveling the system

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

2 Starting from one end of the line-up, move a column into position.

3 Loosely install the pedestal mounting hardware (1/2" bolts, lock washer, plain washer, and insulating washer), using the plastic insulating washers.

4 Re-level the column, adding or removing shims as needed. Go back and re-level any other columns.

5 Repeat the above steps until all columns have been positioned.

6 Slide shims completely under seismic plates. First tighten the pedestal mounting bolts, torque to 122 Newton-meters (90 ft-lbs). Then, tighten the concrete anchors, torque to 48 Newton-meters (35 ft-lbs).

────────────────── **End of Procedure** ──────────────────

Installing non-seismic bracing

In certain applications where earthquakes do not occur, the pedestal attachment to the floor does not have to meet Bellcore or California OSHPD requirements. This application could include attachment to a raised wood or steel floor using the kits described below.

Installing non-seismic bracing involves:

Selecting the kit

If the installation does not have to meet the Bellcore or OSHPD requirements, the installer can design and install an attachment suitable for the particular installation using:

• NT8D64BF Floor Mounting Kit

• NT8D6401 Insulating Washer Kit

NT8D64BF Floor Mounting Kit

The NT8D64BF Floor Mounting Kit provides the hardware required to secure a Large System column to concrete floors for non-seismic installations, that is, for a non-Bellcore or OSHPD approved installation.

The kit provides four sets of hardware, however, a minimum of two anchors must be used diagonally opposite to secure the column pedestal to the floor. The kit also provides four insulating washers that can be used during kit installation.

NT8D6401 Insulating Washer Kit

The NT8D6401 Insulating Washer Kit is used for attaching the Large System to the floor when the installer is using a third party anchor kit instead of the Nortel Networks NT8D64BF Floor Mounting Kit.

In this case, one NT8D6401 Insulating Washer Kit is required for each pedestal to electrically insulate the mounting bolts from the pedestal casting. Each NT8D6401 Insulating Washer Kit provides four insulating washers.

Installing a non-seismic anchor kit

Procedure 69
Installing the NT8D64BF Floor Mounting Kit

1   Mark the position of each Meridian 1 column using the equipment room floor plan.

2   Mark the location of all four anchor holes for each column using a dark marking pencil.

3   Center-punch the center of each hole in the concrete.

4   Make the hole in concrete by using a rotary hammer drill to the following size and depth:

    • hole diameter 0.625"

    • hole depth 2.00"

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

6   Remove any 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.

9   Insert bolt, metal washer, and shoulder washer into the pedestal hole, as shown in the Figure 114 on . On the far side of the pedestal flange, thread a plastic washer, a metal washer, and the nut onto the bolt. Insert the bolt into the concrete anchor.

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

11 Repeat steps 8 to 11 for remaining bolts.

───────────────── **End of Procedure** ─────────────────

Figure 114
Pedestal mounting flange (rear view)

Pedestal

Bolt

Metal
Washer

Insulating
Washer

Anchor

Shoulder
Washer

Nut

553-7473
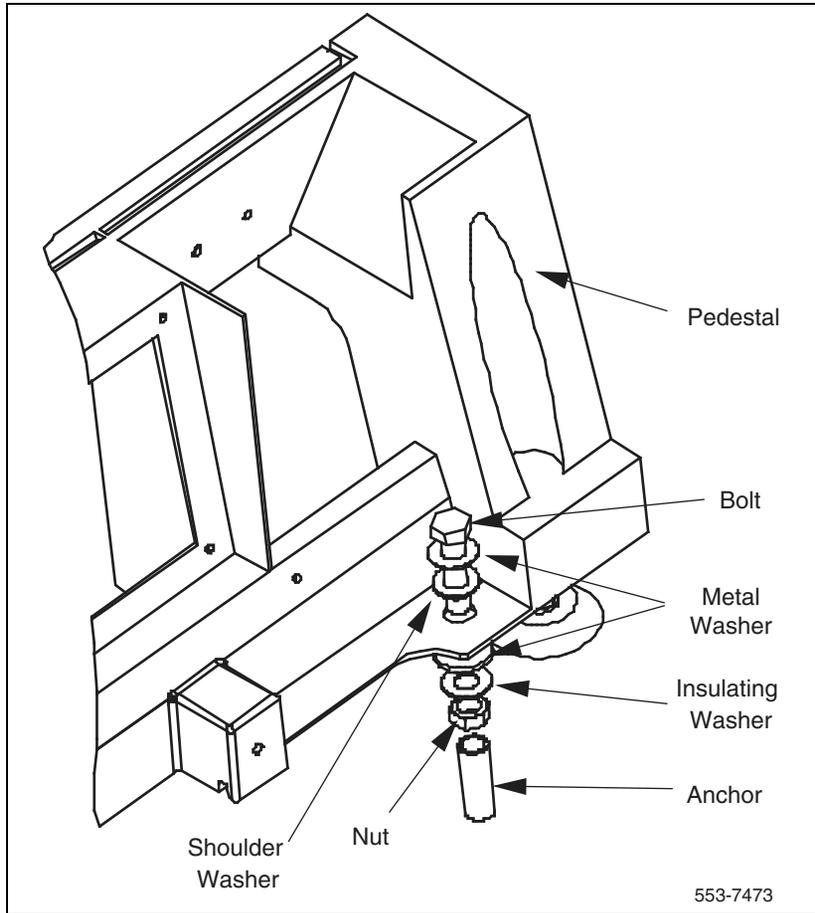
Adding a module to a column

Contents

This section contains information on the following topics:

Overview

The procedures in this chapter apply to adding a module to a column that is fully equipped and powered up. To add a fourth module to a column during initial system installation, see the procedure for placing the fourth module on a column in "Preparing for installation" on .

> **CAUTION**
>
> **Damage to Equipment**
>
> A module containing the system CPU (common equipment cards) should never be installed at the third or the fourth tier of a column. Modules containing common equipment should always be installed in the bottom two tiers of Large System columns. This ensures optimum cooling for the common equipment cards.

A module can be added to a column in one of three positions. A specific procedure is provided for each situation.

- "Adding a module to the base of a column" on page 316

- "Adding a module between two other modules" on page 322

- "Adding a module to the top of a column" on page 326

If the column is equipped with earthquake bracing, the column support rods must be removed and longer rods must be installed after the module is added. To change the rods, see "Installing earthquake bracing" on page 297.

	WARNING
⚠	A fully loaded module weighs approximately 58.9 kg (130 lbs). More than one person is required to move a module.

	DANGER OF ELECTRIC SHOCK
⚡	In a dc-powered system, power to the column can remain on during the following procedures. In an ac-powered system, however, power to the entire column *must* be shut down throughout the procedures.

Adding a module to the base of a column

If conduit or other cabling runs through modules that are being moved, you must tag and disconnect the cables, pull them out of the modules, and reroute them after all of the modules are repositioned. The top cap can remain on the module to which it is attached.

Procedure 70
Adding a module to the base of a column

1   Disconnect and remove the NT8D22 System Monitor for the column in the rear of the pedestal (do *not* turn off the blower unit in the front of the pedestals):

   a.   If the column houses the master system monitor, load LD 37, and software disable the associated SDI port:

   LD 37
   DIS TTY x   disable the device associated with the port

   b.   Disconnect the RJ11 cable to J3, then the cable to J6, then pull the system monitor out of the slot.

2   Set all circuit breakers in the rear of the pedestal to OFF (down).

3   Remove the module above the pedestal:

   a.   Disconnect the power connector to the pedestal (see Figure 115).

   Note: You must press a latch trip on the front and rear of the plug. You may need to use a screwdriver blade against the latch trip on the front of the plug.

   b.   Disconnect the system monitor connector to the pedestal (see Figure 115).

Figure 115
NT7D09CA Pedestal – module power and system monitor connections
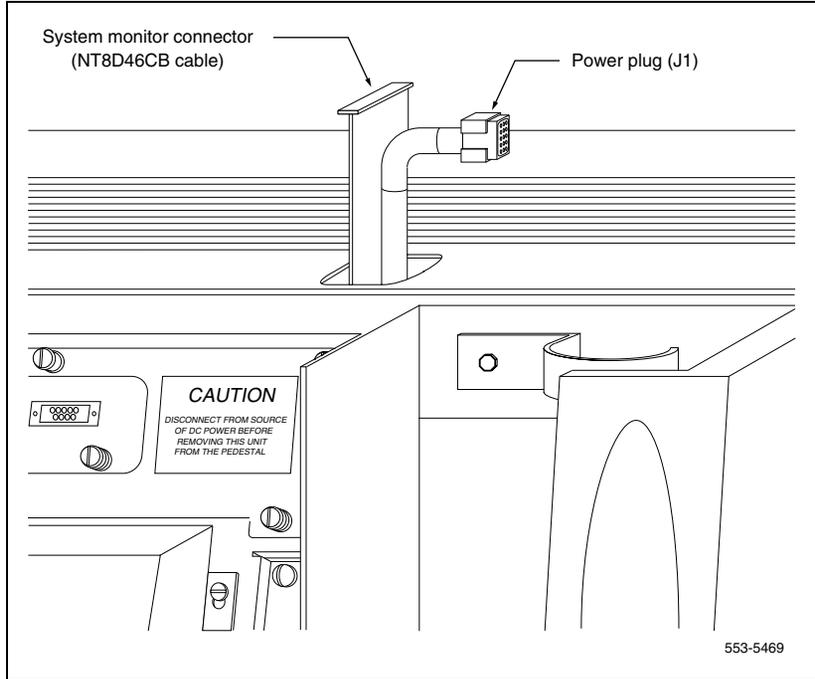
c.   Use a 9/16 in. socket wrench to remove the five mounting bolts that secure the module (see Figure 116) and lift it off the column.

Figure 116
Module mounting bolts

553-3057
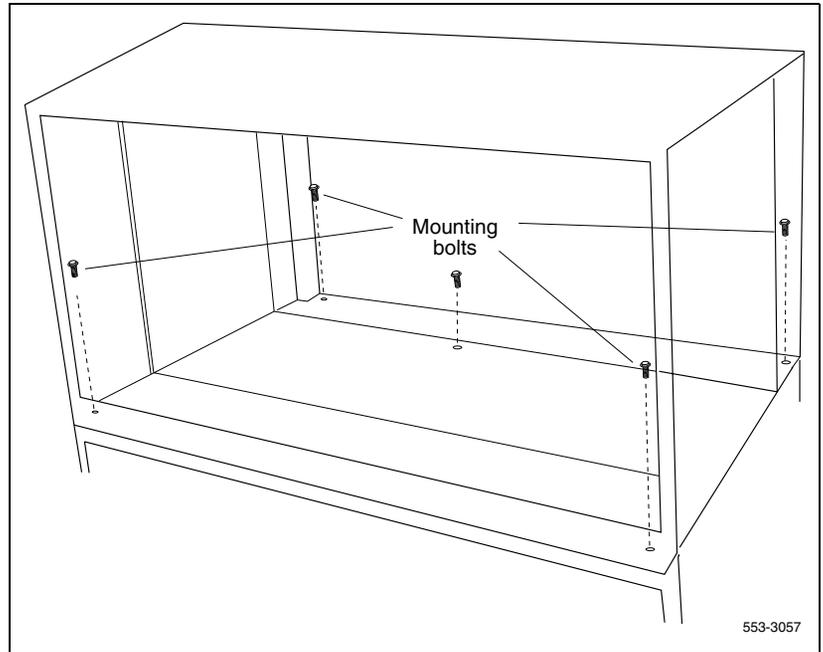
> *Note:* There is an EMI shield (it looks like a brass grill) on the top of each pedestal. Leave this shield on the pedestal. Use a few pieces of tape to hold the shield in position, so the holes for the mounting bolts are aligned with the screw holes on the pedestal. After the module is secured, remove as much of the tape as possible.

4 Position and secure modules:

    a. Locate the positioning guides on the pedestal. Make sure the module being added is facing the same direction as the column.

    b. Place the module being added on the pedestal and adjust it until it is seated securely on the positioning guides.

    c. Secure the mounting bolts for the module.

    d. Place the module that was removed onto the top of the module that was added and secure it with the mounting bolts.

5   Connect the power and system monitor cables in the module:

   a.   Connect the power connectors to the pedestal and to the module above (see Figure 115 on page 318 and Figure 117 on page 321).

   b.   Attach the frame ground wires to the frame ground post at the base of the module.

   c.   Connect the system monitor cable from the pedestal to connector J1 on the module being added.

   d.   Connect the system monitor cable from connector J2 in the module being added to J1 in the module above.

6   Set all circuit breakers in the pedestal to ON.

7   Reinstall the system monitor in the pedestal:

   a.   Reconnect the RJ11 cable to J6, then the cable to J3. Reinstall the system monitor.

   b.   If the column houses the master system monitor, load LD 37, and software re-enable the associated SDI port:

   LD 37

   ENL TTY x   enable the device associated with the port

   ****   exit LD 37

8   Replace all module covers and the pedestal grill.

─────────────── **End of Procedure** ───────────────

Figure 117
Module-to-module power and system monitor connections

I/O safety panel

to J1

Power connectors between modules

System monitor connectors

I/O safety panel

to J2

Rear view

553-5152
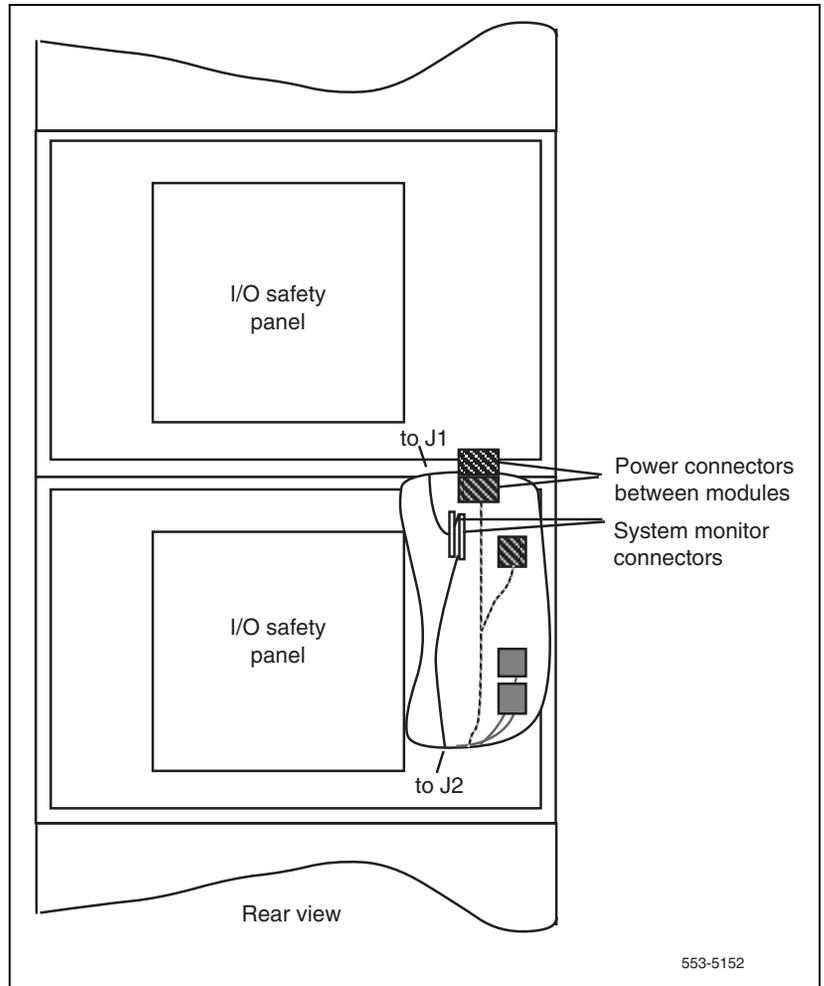
Adding a module between two other modules

If conduit or other cabling runs through modules that are being moved, you must tag and disconnect the cables, pull them out of the modules, and reroute them after all of the modules are repositioned.

The top cap can remain on the module to which it is attached.

Procedure 71
Adding a module between two other modules

1   Disconnect and remove the NT8D22 System Monitor for the column in the rear of the pedestal (do *not* turn off the blower unit in the front of the pedestals):

    a.   If the column houses the master system monitor, load LD 37, and software disable the associated SDI port:

        LD 37
        DIS TTY x   disable the device associated with the port

    b.   Disconnect the RJ11 cable to J3, then the cable to J6, then pull the system monitor out of the slot.

2   Turn off power as necessary:

    •   With ac power, set the main circuit breaker for the column to OFF (down) in the rear of the pedestal.

> **DANGER OF ELECTRIC SHOCK**
>
> Due to hazardous voltage in ac-powered systems, power to the entire column must be shut down. This shuts down all functions in the column.

    •   With dc power, set the switch on the module power supply and the circuit breaker in the rear of the pedestal to OFF (down) for any module that will be moved and for the module being added. (All other modules in the column can safely retain power.)

3   Remove the module that will be above the module being added:

    a.   Disconnect the power connectors between the modules (review Figure 117 on).

    b.   Disconnect the system monitor cable from connector J1 in the module that will be above the module being added.

    c.   Use a 9/16 in. socket wrench to remove the five mounting bolts that secure the module and lift it off the column (see Figure 118 on).

Figure 118
Module mounting bolt

Mounting bolts

553-3057
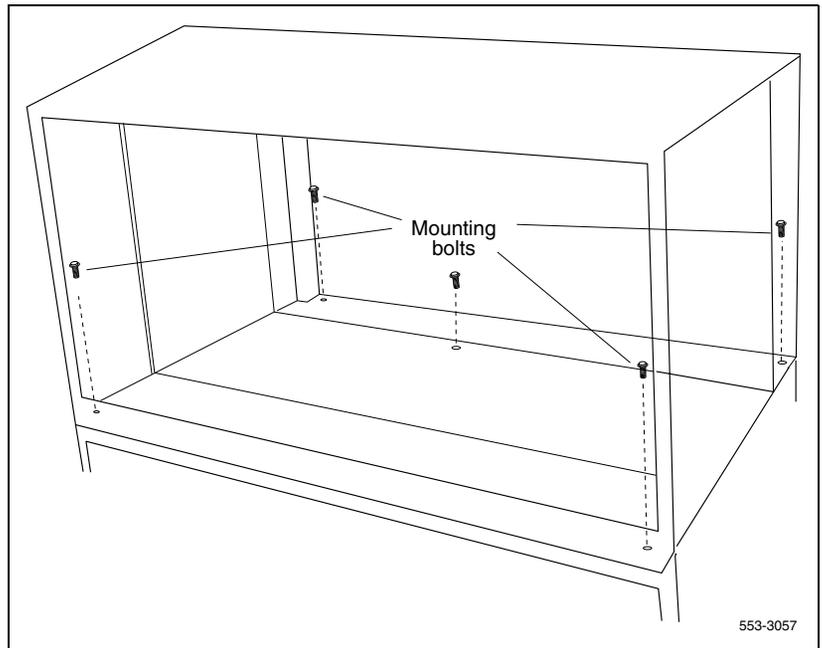
4   Position and secure modules:

   a.   Locate the positioning guides on what is now the top module in the column (see Figure 119 on page 324). Make sure the module being added is facing the same direction as the column.

   b.   Place the module being added on top of the column and adjust it until it is seated securely on the positioning guides.

   c.   Secure the mounting bolts for the module.

   d.   Place the module that was removed on top of the module that was added and secure it with the mounting bolts.

Figure 119
Module positioning guides
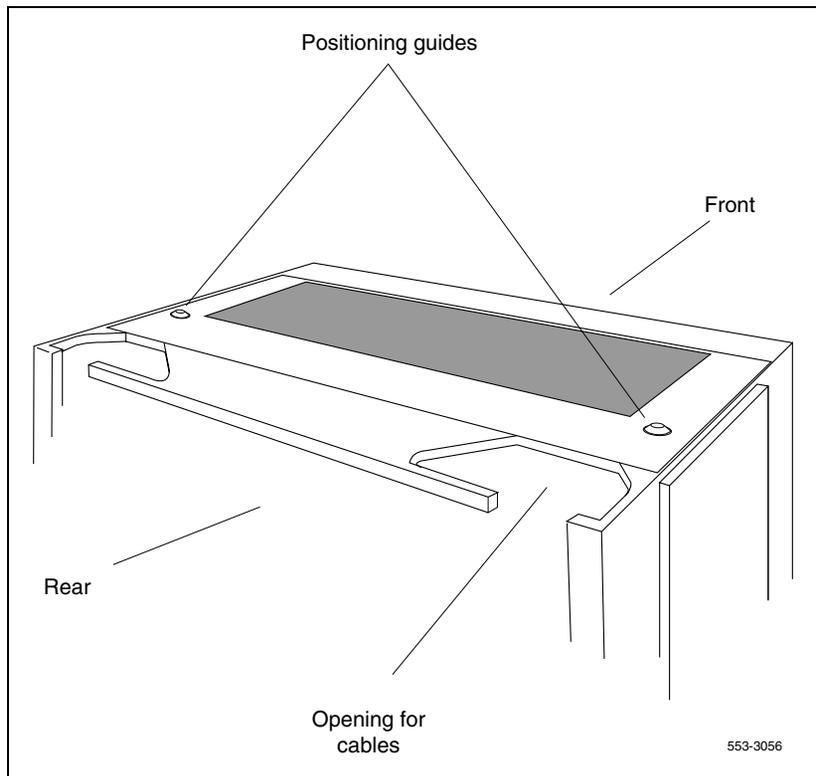
5   Connect the power and system monitor cables between modules:

   a.   Connect the power connectors between the module being added and the modules above and below it.

   b.   Connect the system monitor cable from connector J2 in the module below to J1 in the module being added (review Figure 117 on).

   c.   Connect the system monitor cable from J2 in the module being added to J1 in the module above.

6   Restore power to the module:

   •   With ac power, set the main circuit breaker to ON (up) in the rear of the pedestal.

   •   With dc power, set the circuit breaker in the rear of the pedestal then the module power supply to ON (up) for the module that was added and for any module that was moved.

7   Reinstall the system monitor in the pedestal:

   a.   Reconnect the RJ11 cable to J6, then the cable to J3. Reinstall the system monitor.

   b.   If the column houses the master system monitor, load LD 37, and software re-enable the associated SDI port:

   LD 37

   ENL TTY x   enable the device associated with the port

   ****   exit LD 37

8   Replace all module covers and the pedestal grill.

────────── **End of Procedure** ──────────

Adding a module to the top of a column

In a dc-powered system, power to the column can remain on during this procedure.

If conduit or other cabling runs through the top cap, you must tag and disconnect the cables, pull them out of the way, and reroute them after the new module and the top cap are positioned.

Procedure 72
Adding a module to the top of the column

1   Disconnect and remove the NT8D22 System Monitor for the column in the rear of the pedestal (do *not* turn off the blower unit in the front of the pedestals):

   a.   If the column houses the master system monitor, load LD 37 and software disable the associated SDI port:

   LD 37

   DIS TTY x   disable the device associated with the port

   b.   Disconnect the RJ11 cable to J3, then the cable to J6, then pull the system monitor out of the slot.

2   Turn off power as necessary:

   •   With ac power, set the main circuit breaker for the column to OFF (down) in the rear of the pedestal.

DANGER OF ELECTRIC SHOCK

Due to hazardous voltage in ac-powered systems, power to the entire column must be shut down. This shuts down all functions in the column.

   •   With dc power, set the switch on the module power supply and the circuit breaker in the rear of the pedestal to OFF (down) for the module being added.

3   Disconnect power connections to the top cap:

a.   At the top of the rear of the module, disconnect the orange power connector from the module power harness (see Figure 120 on page 327). Press the four tabs (two on each side) and let the connector fall loose into the module below.

Figure 120
Orange power connector removal tab locations

553-5888
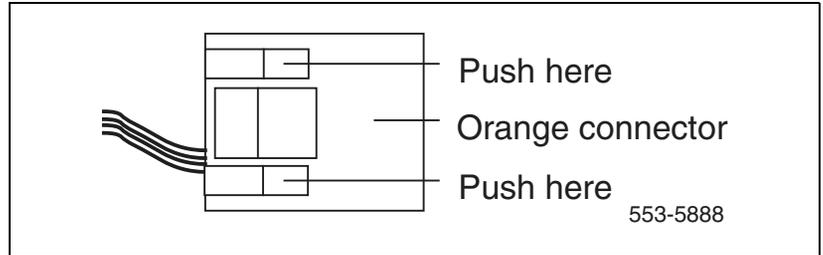
b.   Disconnect the system monitor cable at connector J2 on the backplane.

4   Remove the top cap and perforated panel:

•   For countries other than the UK, pull forward on the clips underneath the front edge of each air exhaust grill on the top cap. Lift up and remove the grill as illustrated in Figure 121 on page 327).

Figure 121
Air exhaust grill removal

553-5886
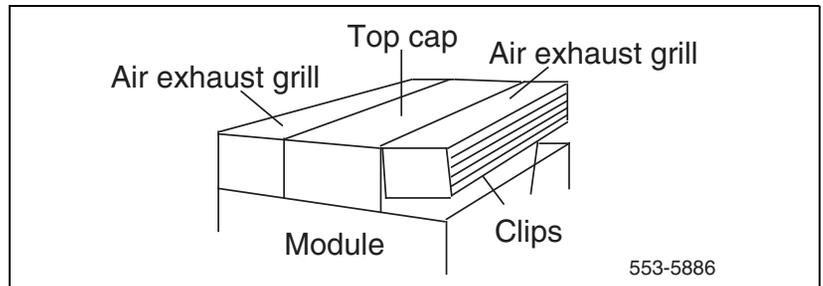
•   In the UK, the front and rear air exhaust grills are secured by Southco fasteners located underneath the front edge of the grill. Use a #1

Phillips head screwdriver and turn the fasteners 1/4-turn to release or secure the grill (see Figure 122 on).

Figure 122
UK air exhaust grill removal
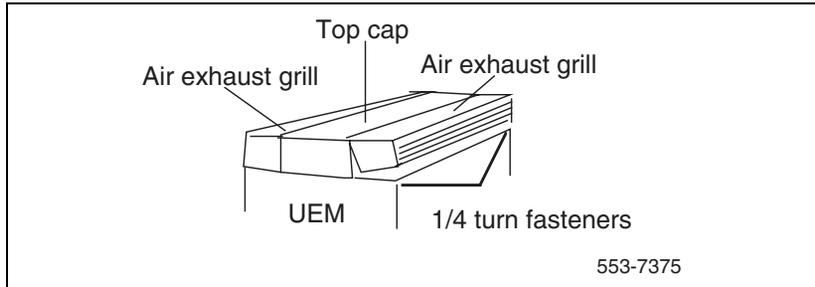
- Use a 5/16 in. socket wrench to remove the six bolts that secure the top cap (see Figure 123 on). Remove the top cap from the column.

- Remove the screw that secures the perforated panel and LED bracket. Slide the panel slightly to the left (looking at it from the rear of the column) and remove it.

Figure 123
Top cap assembly

Mounting bolts

Top cap

Front of column

LED

Screw for LED bracket
on perforated panel

553-3038
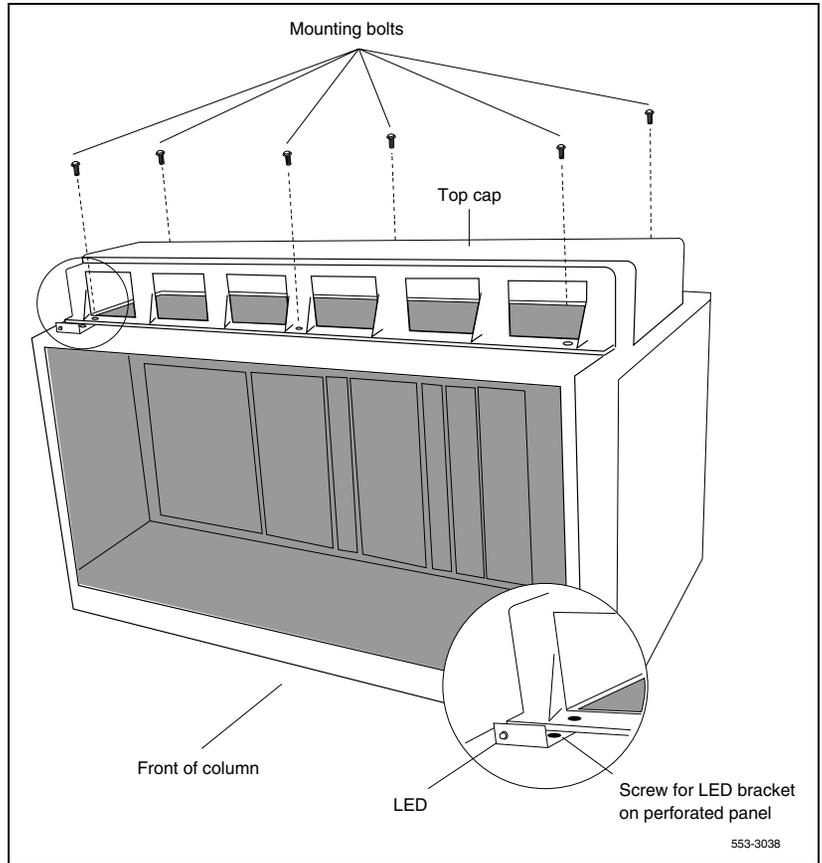
5   Position and secure the module being added:

    a.   Locate the positioning guides on the module in the column (see Figure 124 on). Make sure the module being added is facing the same direction as the column.

Figure 124
Module positioning guides
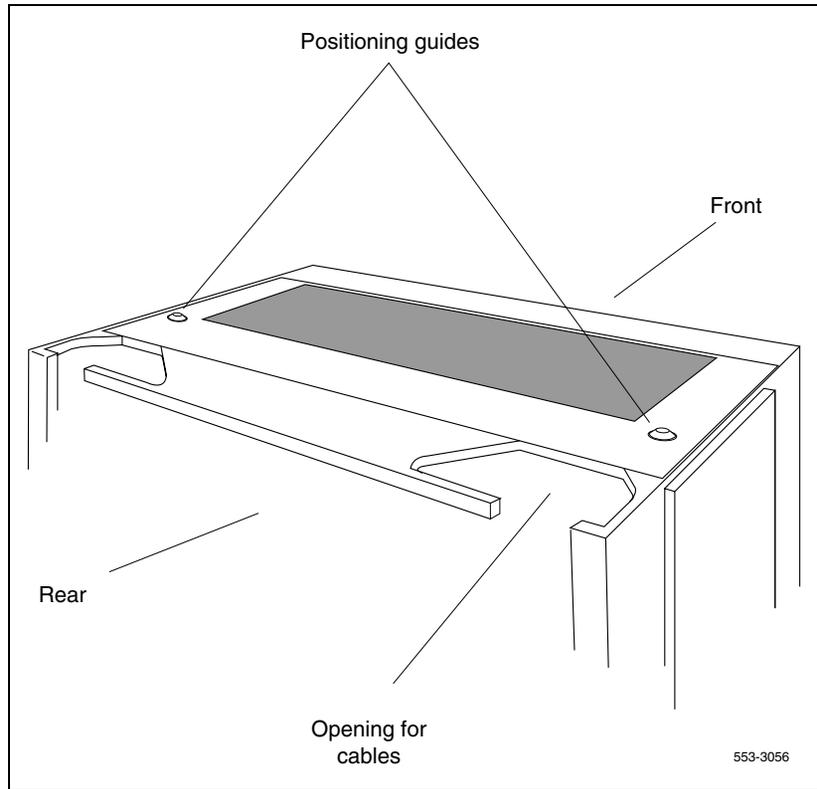
b.   Place the module being added on top of the column and adjust it until it is seated securely on the positioning guides.

c.   Use a 9/16 in. socket wrench to secure the module with five mounting bolts (see Figure 125 on).

Figure 125
Module mounting bolts

Mounting
bolts

553-3057
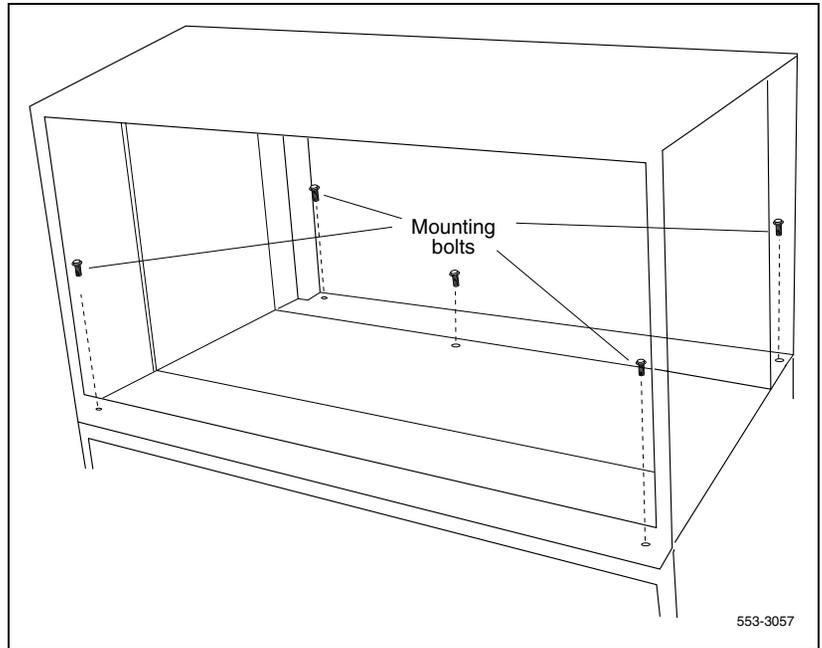
6 Connect the power and system monitor cables between modules:

  a. Connect the power connectors between the module being added and
      the module below it (see Figure 126 on).

  b. Connect the system monitor cable from connector J2 in the lower
      module to J1 in the module being added (see Figure 126 on
).

Figure 126
Module-to-module power and system monitor connections
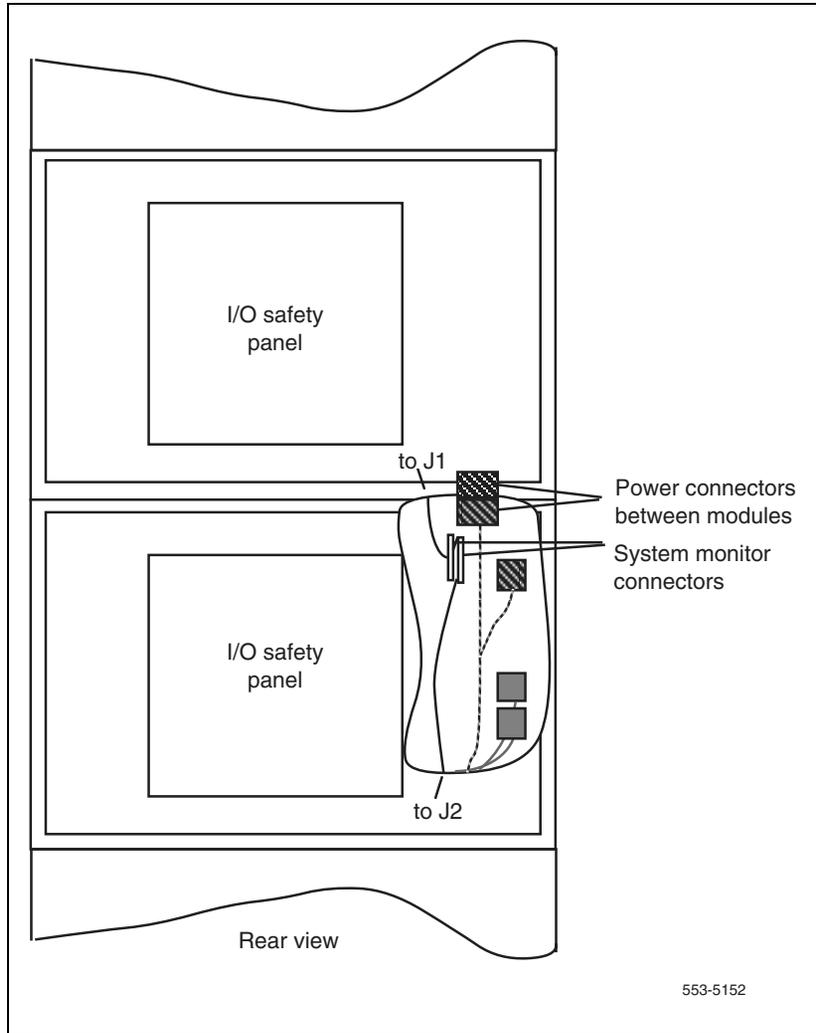
553-5152

7   Install the perforated panel and top cap on the module being added:

    a.   Position the perforated panel and slide it slightly to the right (at the rear). Install the screw that secures the panel and LED bracket.

    b.   Position wiring from the perforated panel so it rests in the cable well located next to the orange power connector at the rear of the module (see Figure 127 on).

Figure 127
Cable well location

Cable well   Orange connector

Top of
module

Bracket

View at rear of module

553-5889
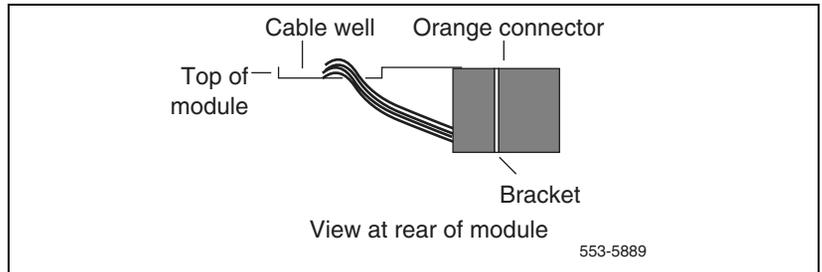
    c.   Position the top cap and install the bolts that secure it.

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

8   Reconnect power to the top cap:

    a.   Connect the system monitor cable to J2 on the backplane. Line up the alignment tab on the connector and snap on the pin headers to position the connector correctly (see Figure 128 on).

Figure 128
Monitor cable J2 backplane alignment tab and key alignment

Alignment tab
on backplane
connector

Key on cable
connector

Side view of connectors

553-5885

9   Connect the orange power connector to the module power harness.
Restore power to the module:

- With ac power, set the main circuit breaker to ON (up) in the rear of
the pedestal.

- With dc power, set the circuit breaker in the rear of the pedestal and
then set the module power supply to ON (up) for the module that was
added.

10   Reinstall the system monitor in the pedestal:

a.   Reconnect the RJ11 cable to J6, then the cable to J3. Reinstall the
system monitor.

b.   If the column houses the master system monitor, load LD 37, and
software re-enable the associated SDI port:

LD 37

ENL TTY x   enable the device associated with the
port

****   exit LD 37

11   Replace all module covers and the pedestal grill.

——————————— **End of Procedure** ———————————

Appendix A: Internal and External Signaling Cables

This appendix contains a list of all known internal and external signaling cables used in the Large System. The cable Product Engineering Code (PEC), CPC code, and length are listed for easy reference.

A0660711 25DB Adapter Cable

PEC	CPC	Length	Description
None	A0660711	2 in.	M25DB-F25DB, Round
Engineering Code: CRP14MADAPT01			

QCAD328 DCHI Interface Cable

PEC	CPC	Length	Description
QCAD329A	A0341116	6 ft	M25DB-M15DB, Round
QCAD328B	A0356843	18 ft	M25DB-M15DB, Round
QCAD328C	A0363996	35 ft	M25DB-M15DB, Round
QCAD328D	A0363997	50 ft	M25DB-M15DB, Round

NT1R03 Shielded 4 Port with Ethernet Cable

PEC	CPC	Length	Description
NT1R03AA	A0400295	31 in.	F50Telco-(5)F15DB, Round

NT1R03 Shielded 4 Port Cable

PEC	CPC	Length	Description
NT1R03BA	A0400297	30 in.	F50Telco-(4)F25DB, Round

NT1R03 Shielded LAM Extension Cable

PEC	CPC	Length	Description
NT1R03CA	A0401483	2 ft	M50Telco-F50Telco, Round

NT1R03 25DB M/M Extension Cable

PEC	CPC	Length	Description
NT1R03DB	A0402335	2 ft	M25DB-M25DB, Round
NT1R03DC	A0402336	4 ft	M25DB-M25DB, Round
NT1R03DF	A0402337	10 ft	M25DB-M25DB, Round
NT1R03DP	A0402338	25 ft	M25DB-M25DB, Round
NT1R03DV	A0402339	45 ft	M25DB-M25DB, Round

NT1R03 25DB M/F Extension Cable

PEC	CPC	Length	Description
NT1R03EB	A0402330	2 ft	M25DB-F25DB, Round
NT1R03EC	A0402331	4 ft	M25DB-F25DB, Round
NT1R03EF	A0402332	10 ft	M25DB-F25DB, Round
NT1R03EP	A0402333	25 ft	M25DB-F25DB, Round
NT1R03EV	A0402334	45 ft	M25DB-F25DB, Round

NT1R03 Max to IPE Modem Cable

PEC	CPC	Length	Description
NT1R03HF	A0402669	10 ft	M25DB-M25DB, Round

NT1R04 Clock Controller to I/O Panel Cable

PEC	CPC	Length	Description
NT1R04AA	A0401042	4 ft	M50Telco-F50Telco, Round

NT1R05 Intercabinet Module Cable

PEC	CPC	Length	Description
NT1R05AA	A0401044	16 ft	F9DB-F9DB, Round

NT4R20 RSM Adapter Cable

PEC	CPC	Length	Description
NT4R20AA	A0358325	25 ft	M50Telco-(3)F25DB, Round

NT5D19AA Maintenance Cable

PEC	CPC	Length	Description
NT5D19AA	A0660348	3 ft	Round

NT5D50AA DBX Ribbon Cable

PEC	CPC	Length	Description
NT5D50AA	A0684808	3 ft	Ribbon, SCSI extension

NT6D4405 CRT Cable

PEC	CPC	Length	Description
NT6D4405	A0363745	33 in.	F25DB-M9DB, Ribbon

NT6D4406 RSM Cable

PEC	CPC	Length	Description
NT6D4406	A0363813	32 in.	M50-F50/M9, Headers, Ribbon

NT6D4407 GSP Cable

PEC	CPC	Length	Description
NT6D4407	A0363746		F36Telco-(4)9DB, Ribbon

NT6D4408 NVP Cable

PEC	CPC	Length	Description
NT6D4408	A0363747	33 in.	(2)F36Telco-(4)2x25Socket, Ribbon

NT6D4410 CSL Cable

PEC	CPC	Length	Description
NT6D4410	A0363749	33 in.	M25DB-F25DB, Ribbon

NT6D4411 DVS Bus Node to Node Cable

PEC	CPC	Length	Description
NT6D4411	A0367987	33 in.	2x30-2x30Socket, Ribbon

NT6D4412 DVS Bus Internal Cable

PEC	CPC	Length	Description
NT6D4412	A0368070	8 in.	F60-F60Socket, Ribbon

NT6D4413 DVS Bus ESBC Terminator

PEC	CPC	Length	Description
NT6D4413	A0364037	9 in.	(2) 2x31HDR-2x31Socket, Ribbon

NT6D4414 DVS Bus Node 1 to 2 Cable

PEC	CPC	Length	Description
NT6D4414	A0364038	60 in.	2x30-2x30Socket, Ribbon

NT6D4415 DVS Bus HABC Terminator

PEC	CPC	Length	Description
NT6D4415	A0364039	76 ft	2x30-2x30Socket, Ribbon

NT6D4416 DVS Bus, Node 2 to 3 Cable

PEC	CPC	Length	Description
NT6D4416	A0364040	6 ft	2x30-2x30Socket, Ribbon

NT6D54 QBL15 Field Wiring Kit (dc)

PEC	CPC	Length	Description
NT6D54AA	A0366358	—	Harness, Loose

NT6P0110 Four-Port Cable

PEC	CPC	Length	Description
NT6D10	A0393843	15 in.	M50Telco-(4)M25DB, Round

NT7D61Ex SDI I/O Cable

PEC	CPC	Length	Description
NT7D61EB	A0409376	2 ft	M25DB-F9DB Round
NT7D61ED	A0409377	6 ft	M25DB-F9DB Round
NT7D61EF	A0409378	10 ft	M25DB-F9DB Round
NT7D61EL	A0409379	25 ft	M25DB-F9DB Round
NT7D61ET	A0409380	30 ft	M25DB-F9DB Round
NT7D61EV	A0409381	45 ft	M25DB-F9DB Round

NT7D89 RS-232 to I/O Panel Cable

PEC	CPC	Length	Description
NT7D89AA	A0387795	2 ft	F60IDT-(2)F25DB, Round
NT7D89BA	A0402055	13 in.	F60IDT-(2)F25DB, Round

NT7D90 Ethernet to I/O Panel Cable

PEC	CPC	Length	Description
NT7D90AA	A0387796	2 ft	60IDT-F15DB, Round
NT7D90BA	A0402054	12 in.	60IDT-F15DB, Round

NT7D94 VME Transceiver Cable

PEC	CPC	Length	Description
NT7D94AA	A0387831		

NT7D95 VME Transition Cable

PEC	CPC	Length	Description
NT7D95AA	A0387839	10 ft	M25DB-F25DB, Ribbon

NT8D46AA System Monitor Stack Cable

PEC	CPC	Length	Description
NT8D46AA	A0356972	32 in.	F40-F40Socket, Ribbon

NT8D46AB System Monitor Jumper Cable

PEC	CPC	Length	Description
NT8D46AB	A0356973	11.25 in.	F50Telco-M40HDR, Ribbon

NT8D46AD System Monitor Quad Serial Data Interface Cable

PEC	CPC	Length	Description
NT8D46AD	A0357803	34/60 in.	F40Socket-F40Socket/25DB, Ribbon

NT8D46AF System Monitor Remote Serial Data Interface Cable

PEC	CPC	Length	Description
NT8D46AF	A0356979	33 ft	F25DB-F25DB, Round

NT8D46AG System Monitor to Extended Serial Data Interface Cable

PEC	CPC	Length	Description
NT8D46AG	A0356976	34 in.	F40-F40/10Socket, Ribbon

NT8D46AJ UPS Alarm Cable (ac)

PEC	CPC	Length	Description
NT8D46AJ	A0356978	45 ft	F9-M25DB, Round

NT8D46AK UPS Alarm Cable (ac)

PEC	CPC	Length	Description
NT8D46AK	A0356980	45 ft	F9-M25DB, Round

NT8D46AL System Monitor Serial Link Cable

PEC	CPC	Length	Description
NT8D46AL	A0359528	7 ft	RJ11-RJ11

NT8D46AN XDF to PFT Cable

PEC	CPC	Length	Description
NT8D46AN	A0356981	7 ft	F50Telco-Loose, Round

NT8D46AP System Monitor Serial Link Cable

PEC	CPC	Length	Description
NT8D46AP	A0356529	25 ft	RJ11-RJ11

NT8D46AQ UPS Alarm Cable (ac)

PEC	CPC	Length	Description
NT8D46AQ	A0362567	45 ft	F9DB-M9DB, Round

NT8D46AS System Monitor Inter-CPU Cable

PEC	CPC	Length	Description
NT8D46AS	A0365088	9 ft	F40Socket-F40/F40Socket, Ribbon

NT8D46AT System Monitor/QBL15 Cable (dc)

PEC	CPC	Length	Description
NT8D46AT	A0366098	32 ft	F9DB-Lugs, Round

NT8D46AU UPS Alarm Cable (ac)

PEC	CPC	Length	Description
NT8D46AU	A0366276	45 ft	F9DB-M5IDT, Round

NT8D46AV System Monitor/QCA13 Cable (dc)

PEC	CPC	Length	Description
NT8D46AV	A0366277	32 ft	F9DB-Lugs, Round

NT8D46AW System Monitor/QBL12 Cable (dc)

PEC	CPC	Length	Description
NT8D46AW	A0366310	32 ft	F9DB-Lugs, Round

NT8D46AX System Monitor CE/PE ST Upgrade Cable

PEC	CPC	Length	Description
NT8D46AX	A0371062	45 ft	F9DB-M25DB, Round

NT8D46AY System Monitor XPE ST Upgrade Cable

PEC	CPC	Length	Description
NT8D46AY	A0371063	45 ft	F9DB-M25DB, Round

NT8D46BA ST Upgrade QCA136 Internal Cable

PEC	CPC	Length	Description
NT8D46BA	A0373191	—	Harness, Loose, Socket

NT8D46BB ST Upgrade QCA136 Internal Cable with Expansion

PEC	CPC	Length	Description
NT8D46BB	A0373192	—	Harness, Loose, Socket

NT8D46BC ST Upgrade QCA137 External Cable

PEC	CPC	Length	Description
NT8D46BC	A0373193	6 ft	M25DB-M25DB, Round

NT8D46BD ST Upgrade QCA136 External Adapter Cable

PEC	CPC	Length	Description
NT8D46BD	A0373194	12 in.	M25DB-F9/F25DB, Round

NT8D46BE ST Upgrade QCA136 External Cable

PEC	CPC	Length	Description
NT8D46BE	A0373195	10 ft	M9DB-F9DB, Round

NT8D46BF ST/RT Upgrade System Monitor External Adapter Cable

PEC	CPC	Length	Description
NT8D46BF	A0373196	12 in.	F9DB-M9/M9DB, Round

NT8D46BG RT Upgrade QCA147 Internal Cable

PEC	CPC	Length	Description
NT8D46BG	A0373197	—	Harness, Loose, Header

NT8D46BH System Monitor to MDF Cable

PEC	CPC	Length	Description
NT8D46BH	A0372848	45 ft	F9DB-Loose

NT8D46BJ Upgrade QCA147 Internal Cable with Expansion

PEC	CPC	Length	Description
NT8D46BJ	A0373199	—	Harness, Loose, Socket

NT8D46BK RT Upgrade QCA137 External Cable with Expansion

PEC	CPC	Length	Description
NT8D46BK	A0373200	12 in.	M25DB-F25/F9DB, Round

NT8D46BL RT Upgrade QCA147 w/Expnsn Ext. Adapter Cable

PEC	CPC	Length	Description
NT8D46BL	A0373701	12 in.	M25DB-F25/F9DB, Round

NT8D46BM ST Upgrade QCA136 w/Expnsn Ext. Adapter Cable

PEC	CPC	Length	Description
NT8D46BM	A0373702	12 in.	M25DB-F25/F9DB, Round

NT8D46CD System Monitor to AEM Cable

PEC	CPC	Length	Description
NT8D46CD	A0401119		F50Telco-F40 Socket, Ribbon

NT8D46CH RT Upgrade QCA147 External Cable

PEC	CPC	Length	Description
NT8D46CH	A0373198	12 ft	M25DB-F9DB, Round

NT8D46DH/EH System Monitor to MDF Cable

PEC	CPC	Length	Description
NT8D46DH	A0388610	150 ft	F9DB-Loose, Round
NT8D46EH	A0379247	100 ft	F9DB-Loose, Round

NT8D46FH System Monitor to SL-100 Cable

PEC	CPC	Length	Description
NT8D46FH	A0390418	Variable	F9DB-Loose, Round

NT8D73 Network I/O to Network I/O Intercabinet Cable

PEC	CPC	Length	Description
NT8D73AD	A0359306	6 ft	M36Telco-M36Telco, Round
NT8D73AF	A0359532	12 ft	M36Telco-M36Telco, Round
NT8D73AL	A0359533	20 ft	M36Telco-M36Telco, Round
NT8D73AS	A0359534	30 ft	M36Telco-M36Telco, Round

NT8D74 Clock Controller to Junctor Cable

PEC	CPC	Length	Description
NT8D74CC	A0406496	4 ft	F50Telco-F50Telco, Round
NT8D74BD	A0406497	6 ft	F50Telco-F50Telco, Round
NT8D74BE	A0406498	8 ft	F50Telco-F50Telco, Round
NT8D74BF	A0406499	10 ft	F50Telco-F50Telco, Round
NT8D74BJ	A0406500	16 ft	F50Telco-F50Telco, Round

NT8D75 Clock Controller to Clock Controller Cable

PEC	CPC	Length	Description
NT8D75BC	A0406501	4 ft	F50Telco-F50Telco, Round
NT8D75BD	A0406502	6 ft	F50Telco-F50Telco, Round

NT8D76 InterGroup Switch to Junctor Cable

PEC	CPC	Length	Description
NT8D76BC	A0406503	4 ft	M50Telco-M50Telco, Round
NT8D76BD	A0406504	5 ft	M50Telco-M50Telco, Round
NT8D76BE	A0406505	6 ft	M50Telco-M50Telco, Round
NT8D76BF	A0406506	8 ft	M50Telco-M50Telco, Round
NT8D76BG	A0406507	10 ft	M50Telco-M50Telco, Round
NT8D76BJ	A0406508	12 ft	M50Telco-M50Telco, Round
NT8D76BL	A0406509	14 ft	M50Telco-M50Telco, Round
NT8D76BP	A0406510	16 ft	M50Telco-M50Telco, Round
NT8D76BR	A0406510	25 ft	M50Telco-M50Telco, Round
NT8D76BS	A0406510	50 ft	M50Telco-M50Telco, Round

NT8D77 Floppy Disk Interface to Floppy Drive Unit Cable

PEC	CPC	Length	Description
NT8D77BA	A0406511	3 ft	F50Telco-M50Telco, Round
NT8D77BB	A0406512	2 ft	F50Telco-M50Telco, Round
NT8D77BC	A0406513	4 ft	F50Telco-M50Telco, Round
NT8D77BD	A0406514	6 ft	F50Telco-M50Telco, Round

NT8D78 CPU Cable

PEC	CPC	Length	Description
NT8D78AA	A0356982	2 in.	2x17Socket-2x17Socket, Ribbon

NT8D79 DTI to Clock Controller Cable

PEC	CPC	Length	Description
NT8D79AB	A0360015	2 ft	M9DB-M9DB, Round
NT8D79AC	A0360016	4 ft	M9DB-M9DB, Round
NT8D79AD	A0360017	6 ft	M9DB-M9DB, Round
NT8D79AE	A0360018	8 ft	M9DB-M9DB, Round
NT8D79AF	A0360019	10 ft	M9DB-M9DB, Round

NT8D80 CPU Interface Cable

PEC	CPC	Length	Description
NT8D80BB	A0406520	2 ft	M50Telco-M50Telco, Round
NT8D80BC	A0406521	4 ft	M50Telco-M50Telco, Round
NT8D80BD	A0406522	6 ft	M50Telco-M50Telco, Round
NT8D80BE	A0406523	8 ft	M50Telco-M50Telco, Round
NT8D80BF	A0406524	10 ft	M50Telco-M50Telco, Round
NT8D80BG	A0406525	12 ft	M50Telco-M50Telco, Round
NT8D80BJ	A0406526	16 ft	M50Telco-M50Telco, Round
NT8D80BL	A0406527	20 ft	M50Telco-M50Telco, Round
NT8D80BP	A0406528	25 ft	M50Telco-M50Telco, Round
NT8D80BZ	A0406529	5 ft	M50Telco-M50Telco, Round

NT8D81 B/P Tip and Ring to I/O Cable

PEC	CPC	Length	Description
NT8D81AA	A0359946	20 in.	M50Telco-(3)2x10Socket, Ribbon

NT8D82 SDI to I/O Cable

PEC	CPC	Length	Description
NT8D82AC	A0359307	4 ft	M25DB-F25DB, Round
NT8D82AD	A0362867	6 ft	M25DB-F25DB, Round

NT8D83 DTI to I/O Cable

PEC	CPC	Length	Description
NT8D83AC	A0358531	4 ft	M15DB-M15DB, Round
NT8D83AD	A0362868	6 ft	M15DB-M15DB, Round

NT8D84 XSDI to I/O Cable

PEC	CPC	Length	Description
NT8D84AA	A0357203	18 in.	2x5Socket-M9DB, Ribbon

NT8D85 Network to PE Cable

PEC	CPC	Length	Description
NT8D85BB	A0406533	2 ft	M36Telco-M36Telco, Round
NT8D85BC	A0406534	4 ft	M36Telco-M36Telco, Round
NT8D85BD	A0406535	6 ft	M36Telco-M36Telco, Round
NT8D85BE	A0406536	8 ft	M36Telco-M36Telco, Round
NT8D85BF	A0406537	10 ft	M36Telco-M36Telco, Round
NT8D85BJ	A0406538	16 ft	M36Telco-M36Telco, Round
NT8D85BL	A0406539	20 ft	M36Telco-M36Telco, Round
NT8D85BP	A0406540	25 ft	M36Telco-M36Telco, Round
NT8D85BV	A0406541	45 ft	M36Telco-M36Telco, Round
NT8D85BZ	A0406542	5 ft	M36Telco-M36Telco, Round

NT8D86 Network to I/O Cable

PEC	CPC	Length	Description
NT8D86AC	A0359311	5 ft	M36Telco-F36Telco, Round
NT8D86AD	A0362869	6 ft	M36Telco-F36Telco, Round

NT8D88 Superloop Network Card to I/O Cable

PEC	CPC	Length	Description
NT8D88AC	A0359308	5 ft	M24Telco-M24Telco, Round
NT8D88AD	A0362871	6 ft	M24Telco-M24Telco, Round

NT8D90 SDI Multiple Port Extension Cable

PEC	CPC	Length	Description
NT8D90AF	A0358948	10 ft	M25DB-F25DB, Round

NT8D91 Superloop Network to Peripheral Controller Cable

PEC	CPC	Length	Description
NT8D91AC	A0358526	4 ft	M24Telco-F24Socket, Round
NT8D91AD	A0358527	6 ft	M24Telco-F24Socket, Round
NT8D91AE	A0358528	8 ft	M24Telco-F24Socket, Round
NT8D91AF	A0358529	10 ft	M24Telco-F24Socket, Round
NT8D91AG	A0358530	12 ft	M24Telco-F24Socket, Round
NT8D91AJ	A0358918	16 ft	M24Telco-F24Socket, Round
NT8D91AP	A0358924	25 ft	M24Telco-F24Socket, Round
NT8D91AT	A0365604	35 ft	M24Telco-F24Socket, Round
NT8D91AV	A0358923	45 ft	M24Telco-F24Socket, Round

NT8D92 I/O to Peripheral Controller Cable

PEC	CPC	Length	Description
NT8D92AB	A0359309	20 in.	M24Telco-F24Socket, Round

NT8D93 XSDI I/O to DTE or DCE Cable

PEC	CPC	Length	Description
NT8D93AJ	A0357270	16 ft	M25DB-M9DB, Round
NT8D93AW	A0357271	48 ft	M25DB-M9DB, Round

NT8D95 SDI I/O Panel to DTE or DCE Cable

PEC	CPC	Length	Description
NT8D95AJ	A0358909	16 ft	M25DB-M9DB, Round
NT8D95AT	A0358910	34 ft	M25DB-M9DB, Round
NT8D95AW	A0358911	48 ft	M25DB-M9DB, Round

NT8D96 SDI Multiple Port Cable

PEC	CPC	Length	Description
NT8D96AB	A0358952	2 ft	M25DB-(3)F25DB, Round

NT8D98 Superloop Network I/O to Superloop Network I/O Intercabinet Network Cable

PEC	CPC	Length	Description
NT8D98AD	A0363633	6 ft	M24Telco-M24Telco, Round
NT8D98AF	A0363751	12 ft	M24Telco-M24Telco, Round
NT8D98AL	A0363752	20 ft	M24Telco-M24Telco, Round
NT8D98AS	A0363753	30 ft	M24Telco-M24Telco, Round
NT8D98AT	A0365600	38 ft	M24Telco-M24Telco, Round

NT8D99 CPU to Network Cable

PEC	CPC	Length	Description
NT8D99BB	A0616247	26 in	M36Telco-M36Telco, Round
NT8D99AC	A0357259	4 ft	M36Telco-M36Telco, Round
NT8D99BD	A616249	66 in	M36Telco-M36Telco, Round

NT9D89 CNI-3 to 3PE Cable

PEC	Length	Description
NT9D89CA	8 ft	Used when faceplate port "C" is configured
NT9D89DA	10 ft	Used when faceplate port "C" is configured
NT9D89EA	12 ft	Used when faceplate port "C" is configured
NT9D89FA	25 ft	Used when faceplate port "C" is configured
NT9D89GA	50 ft	Used when faceplate port "C" is configured

NT9J93 DTI Echo Canceler to I/O Cable

PEC	CPC	Length	Description
NT9J93AD	A0363202	6 ft	M15DB-F15DB, Round

NT9J94 RPE to I/O Cable

PEC	CPC	Length	Description
NT9J94AB	A0363204	2 ft	F50Telco-F50Telco, Round

NT9J96 Network to I/O Intracabinet Network Cable

PEC	CPC	Length	Description
NT9J96AC	A0359316	40 in.	M36Telco-F36Telco, Round
NT9J96AD	A0359540	70 in.	M36Telco-F36Telco, Round
NT9J96AE	A0359541	85 in.	M36Telco-F36Telco, Round
NT9J96AG	A0359542	12 ft	M36Telco-F36Telco, Round
NT9J96AH	A0359543	14 ft	M36Telco-F36Telco, Round
NT9J96AJ	A0359544	16 ft	M36Telco-F36Telco, Round

NT9J97 Superloop Network to I/O Intracabinet Network Cable

PEC	CPC	Length	Description
NT9J97AC	A0359317	40 in.	M24Telco-F24Telco, Round
NT9J97AD	A0359545	70 in.	M24Telco-F24Telco, Round
NT9J97AE	A0359546	85 in.	M24Telco-F24Telco, Round
NT9J97AG	A0359547	12 ft	M24Telco-F24Telco, Round
NT9J97AH	A0359548	14 ft	M24Telco-F24Telco, Round
NT9J97AJ	A0359549	16 ft	M24Telco-F24Telco, Round

NT9J98 Network to ST I/O Intracabinet Network Cable

PEC	CPC	Length	Description
NT9J98AC	A0359531	40 in.	M36Telco-F36Telco, Round
NT9J98AD	A0359550	70 in.	M36Telco-F36Telco, Round
NT9J98AE	A0359551	85 in.	M36Telco-F36Telco, Round

NT9J99 Superloop Network to ST I/O Intracabinet Network Cable

PEC	CPC	Length	Description
NT9J99AC	A0359315	40 in.	M24Telco-F24Telco, Round
NT9J99AD	A0359552	70 in.	M24Telco-F24Telco, Round
NT9J99AE	A0359553	85 in.	M24Telco-F24Telco, Round

NTAK0410 Battery Cable

PEC	CPC	Length	Description
NTAK0410	A0373953	6 ft	1x5Socket-1x2Socket, Round

NTBK04 1.5MB DTI/PRI T1 Cable

PEC	CPC	Length	Description
NTBK04AA	A0394216	20 ft	F50Telco-F15DB, Round

NTBK04 1.5MB Carrier/Clock Cable

PEC	CPC	Length	Description
NTBK04AB	A0394641	20 ft	F50Telco-M15DB, Round

NTBK04 1.5MB DTI/PRI Carrier Cable

PEC	CPC	Length	Description
NTBK04BA	A0394953	6 ft	M25DB-(2)M15DB, Round

NTBK04 1.5MB DTI/PRI Carrier Cable

PEC	CPC	Length	Description
NTBK04CA	A0394217	20 ft	F50Telco-M15DB, Round

NTBK05 SDT12 120-OHM E1 Cable

PEC	CPC	Length	Description
NTBK05AA	A0394217	20 ft	F50Telco-M9DB, Round

NTBK05 2MB DTI/PRI Coax Carrier Cable

PEC	CPC	Length	Description
NTBK05CA	A0397000	20 ft	F50Telco-(2)BNC, Round

NTND11 CMB to CMB Cable

PEC	CPC	Length	Description
NTND11AA	A0389598	6 ft	4x15HDR-4x15HDR, Round

NTND13 SCSI Cable

PEC	CPC	Length	Description
NTND13AA	A0389600	1 ft	4x15Socket-4x15Socket, Round
NTND13AB	A0396616	3.5 ft	4x15Socket-4x15Socket, Round
NTND13AC	A0396617	6 ft	4x15Socket-4x15Socket, Round

NTND14 CNI to 3PE Cable

PEC	CPC	Length	Description
NTND14AA	A0389601	5 ft	4x15Socket-M50Telco, Round
NTND14AB	A0389602	10 ft	4x15Socket-M50Telco, Round
NTND14AC	A0389603	12 ft	4x15Socket-M50Telco, Round
NTND14AD	A0389604	16 ft	4x15Socket-M50Telco, Round
NTND14AE	A0389605	25 ft	4x15Socket-M50Telco, Round
NTND14AF	A0389606	30 ft	4x15Socket-M50Telco, Round
NTND14AG	A0389755	35 ft	4x15Socket-M50Telco, Round
NTND14AX	A0396422	50 ft	4x15Socket-M50Telco, Round
NTND14AW	A0396936	2 ft	4x15Socket-M50Telco, Round

NTND26 MDSL to DCHI Cable

PEC	CPC	Length	Description
NTND26AA	A0393414	6 ft	SCSII-15DB, Round
NTND26AB	A0393415	18 ft	SCSII-15DB, Round
NTND26AC	A0393416	35 ft	SCSII-15DB, Round
NTND26AD	A0393417	50 ft	SCSII-15DB, Round

NTND27 MSDL to I/O Panel Cable

PEC	CPC	Length	Description
NTND27AA	A0393418	4 ft	SCSII-25DB, Round

NTND27 MSDL SDI/AM2 Cable

PEC	CPC	Length	Description
NTND27AB	A0393419	6 ft	SCSII-25DB, Round

NTND28 Network Expansion Intercabinet Cable

PEC	CPC	Length	Description
NTND28BA	A0399441	13 ft	F50-F50Telco, Round
NTND28BB	A0399490	16 ft	F50-F50Telco, Round
NTND28BA	A0399491	22 ft	F50-F50Telco, Round

NTND29 Network Expansion CPU Interface Cable

PEC	CPC	Length	Description
NTND29AA	A0393903	6 ft	M50Telco-M50Telco, Round

NTND30 Network Expansion Junctor to I/O Housing Cable

PEC	CPC	Length	Description
NTND30AA	A0393904	6 ft	M50Telco-M50Telco, Round

NTND37 Dual SDI Cable

PEC	CPC	Length	Description
NTND37AA	A0394677	8 ft	M25DB-(2)F25DB, Round

NTND71 BRA Clock Reference to Clock Controller Cable

PEC	CPC	Length	Description
NTND71AA	A0398302	6.5 ft	M9DB-M9DB, Round
NTND71AB	A0398303	12 ft	M9DB-M9DB, Round
NTND71AC	A0398304	25 ft	M9DB-M9DB, Round
NTND71AD	A0398305	42 ft	M9DB-M9DB, Round

NTND72 Clock Reference to Clock Controller Cable

PEC	CPC	Length	Description
NTND72	A0398306	6.5 ft	F9DB-(2)M9DB, Round

NTND82 Printer to LIU Cable

PEC	CPC	Length	Description
NTND82AA	A0398761	10 ft	M25DB-M25DB, Round
NTND82AB	A0398762	25 ft	M25DB-M25DB, Round

NTND91 CSL Cable

PEC	CPC	Length	Description
NTND91AA	A0399143	10 ft	M25DB-M25DB, Round
NTND91AB	A0399144	25 ft	M25DB-M25DB, Round

NTND91 Extension-25DB Cable

PEC	CPC	Length	Description
NTND91BA	A0401606	10 ft	M25DB-F25DB, Round
NTND91BB	A0401607	25 ft	M25DB-F25DB, Round

NTND94 CNI to I/O Panel Cable

PEC	CPC	Length	Description
NTND94AA	A0399239	6 ft	4x15Socket-M50Telco, Round

NTND94 Cable

PEC	CPC	Length	Description
NTND94BA	A0402023	17.5 in.	4x15Socket-M50Telco, Round
NTND94CA	A0402056	13 in.	4x15Socket-M50Telco, Round

NTND95 EMI Box to 3PE Cable

PEC	CPC	Length	Description
NTND95AA	A0399240	8 ft	M50Telco-M50Telco, Round

NTRC46 Clock to FIJI Cable

PEC	CPC	Length
NTRC46AA	A0757801	4 ft - 13.5 ft (see note)
NTRC46BA	A0757802	5.5 ft - 8 ft (see note)
NTRC46CA	A0757803	22 ft - 22 ft (see note)

Note: The "length" indicates the lengths of the two "Y" terminations.

NTRC47 FIJI to FIJI Sync Cable

PEC	CPC	Length
NTRC47AA	A0757471	5 ft

NTRC48 Fiber Ring Cable

PEC	CPC	Length	Description
NTRC48AA	A0757804	6 ft	fiber optic cable
NTRC48BA	A0757806	10 ft	fiber optic cable
NTRC48CA	A0757807	12 ft	fiber optic cable
NTRC48DA	A0757808	14 ft	fiber optic cable
NTRC48EA	A0757809	19 ft	fiber optic cable
NTRC48FA	A0757810	26 ft	fiber optic cable
NTRC48GA	A0757811	32 ft	fiber optic cable
NTRC48HA		50 ft	fiber optic cable

NTRC49 Clock to Clock Cable

PEC	Length
NTRC49AA	6 ft
NTRC49BA	20 ft

List of terms

ac

Alternating current

ac equipment ground (ACEG)

An insulated conductor, used to protect personnel from injury, that does not normally carry current. The ACEG is permanently bonded to the service panel ground and to metal parts of electrical equipment that do not normally carry current.

AWG

American wire gauge

Backplane

A printed circuit board that extends across the width of the card cage and connects to the circuit card connectors

Battery backup

System power furnished by stand-by batteries that are charged by a charger. If commercial power fails, the batteries will maintain service for a limited period of time, determined by the size of the batteries and the traffic on the system. (Also called battery reserves.)

Battery return (BR, BATRTN, or RTN)

A conductor that carries –48 V dc return current. Although battery return conductors are not grounding conductors, they must be referenced to ground by a single connection.

BTU

Bus Terminating Unit

Bus

A copper bar, plate, or conductor

Card cage

A frame for holding circuit cards in a module; also called a card chassis

CE/PE

Common Equipment/Peripheral Equipment

CEC

Canadian Electrical Code

Central Office (CO)

The site where a telephone company terminates customer lines and houses the switching equipment that interconnects those lines

Central Processing Unit (CPU)

The main portion of a computer that contains the primary storage, arithmetic and logic units, and the control unit (can also mean a mainframe computer)

Circuit cards

Circuit cards carry the electronics for particular functions (such as memory and switching functions). Most cards are housed in the card cage in a module and connect to the backplane. Some cards must be installed in dedicated slots in a card cage. (Also called circuit packs or boards.)

CMA

Changeover and Memory Arbitrator

CMDU

Core Multi-Drive Unit

cCNI

Compact Core to Network Interface

Common Equipment (CE)

A hardware subsystem that houses one or more CPUs, memory cards, disk drive units, and service cards

CSA

Canadian Standards Association

dc

Direct current

DCE

Data Communications Equipment

DTE

Data Terminal Equipment

DTR

Digitone Receiver

EEPE

Enhanced Existing Peripheral Equipment

FDI

Floppy Disk Interface

FDU

Floppy Disk Unit

FG (or FGND)

Frame Ground (safety ground)

Ground

A metallic connection, whether intentional or accidental, between an electric circuit or equipment and the earth, or some conducting body that serves in place of the earth. Typically, a connection to earth obtained by a grounding electrode.

Hz

Hertz (cycles per second)

IG

Isolated Ground

Input/Output (I/O)

Exchange between a machine and end user equipment

IOP

Input/Output Processor

IPB

Inter-Processor Bus

IPE

Intelligent Peripheral Equipment

LED

Ligh-Emitting Diode

Line

A communications channel or circuit; an electrical path

Logic Return (LR or LRTN)

Sometimes referred to as logic ground, logic return is the voltage reference and current return path that is eventually connected to the single point ground for analog and digital circuits.

Logic Return Equalizer (LRE)

The point at which all logic return wires are consolidated before connecting to the single point ground. Physically, the LRE function can be provided by a separate grounding bus bar, by the common battery return bus in a dc power distribution panel, or by the ac equipment ground in an isolated ground service panel.

Loop

A bidirectional path between network equipment and peripheral equipment

MDF

Main Distribution Frame (cross-connect terminal)

MDU

Multi-Disk Unit

MFA150

150-amp modular front access dc power system, rack style

Module power supplies

Individual power units that generate the different dc voltages required by the cards installed in each module

MPDU

Module Power Distribution Unit

MPP600

600-amp modular dc power plant, cabinet style

MSI

Mass Storage Interface

NEC

National Electrical Code (U.S.A.)

Network equipment

A hardware subsystem that provides digital multiplexed switching for voice, data, and signaling paths

NT6D82

900-amp dc power system, rack style

Pedestal

The bottom element in a column. Each pedestal houses a blower or fan unit, an air filter, the PDU (which contains the column circuit breakers), and the system monitor. (The pedestal in system Option 21A houses only the PDU.)

Peripheral Equipment (PE)

A hardware subsystem that provides analog and digital line and trunk interfaces and houses a combination of line, trunk, and Digitone receiver circuit cards

PFTU

Power Failure Transfer Unit

Power Distribution Unit (PDU)

Input power is brought into the pedestal to the PDU. The PDU distributes input power to the column.

QBL12

75-amp external dc power distribution unit

QBL15

150-amp external dc power distribution unit

QCA13

50–200-amp rectifier/distribution unit cabinet

RPE

Remote Peripheral Equipment

SDI

Serial Data Interface

Single Point Ground (SPG)

A single connection used to reference electronic equipment to ground; no dc current flows through the connection unless a fault condition exists.

System monitor

A microprocessor-based circuit card that controls and monitors the status of cooling equipment and power-related hardware and functions

System SPG

The point where frame ground, logic return, ac equipment ground, and battery return are connected to ground

TDS

Tone and Digit Switch

TN

Terminal Number

Top cap

> The top cap is mounted on the top module of each column. It provides airflow exits, EMI/RFI shielding, I/O cable entry and exit, and overhead cable rack mounting. The top cap covers thermal sensor assemblies for the column.

Trunk

> A single circuit between two points, both of which are switching centers or individual distribution points

Universal Equipment Module (UEM)

> A modular, self-contained hardware cabinet that houses a card cage, power supply, backplane, circuit cards, and other basic equipment. When equipped, the UEM becomes a specific type of module, such as a CPU Module or Network Module.

UPS

> Uninterruptible Power Supply

V ac

> Voltage alternating current

V dc

> Voltage direct current

Index

Numerics

O

Meridian 1, Succession 1000M

Large System

Installation and Configuration

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